



Universiteit
Leiden
The Netherlands

Medicinal, Aromatic and Cosmetic (MAC) plants for community health and bio-cultural diversity conservation in Bali, Indonesia

Leurs, L.N.

Citation

Leurs, L. N. (2010, January 13). *Medicinal, Aromatic and Cosmetic (MAC) plants for community health and bio-cultural diversity conservation in Bali, Indonesia*. Retrieved from <https://hdl.handle.net/1887/14562>

Version: Corrected Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/14562>

Note: To cite this publication please use the final published version (if applicable).

Medicinal, Aromatic and Cosmetic (MAC) Plants for
Community Health and Bio-Cultural Diversity Conservation
in Bali, Indonesia

Medicinal, Aromatic and Cosmetic (MAC) Plants for Community Health and Bio-Cultural Diversity Conservation in Bali, Indonesia

PROEFSCHRIFT

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van de Rector Magnificus prof. mr. P.F. van der Heijden,
volgens besluit van het College voor Promoties
te verdedigen op woensdag 13 januari 2010
klokke 16.15 uur

door

Liesbeth Nathalie Leurs

geboren te Diest, België
in 1977

Promotiecommissie:

Promotor: Prof. Dr. L.J. Slikkerveer

Overige leden: Prof. Dr. L. K. Suryani (Udayana University, Bali, Indonesia)
Prof. Dr. C. Lionis (University of Crete, Greece)
Prof. Dr. E.F. Smets
Prof. Dr. P. Baas
Dr. Koh Hwee Ling (National University of Singapore, Singapore)
Dr. M.M.J. van Balgooy
Dr. B.A. Reith

This study has been made possible thanks to the gracious support of the Sekar Manggis Foundation in Bali, Indonesia.

Medicinal, Aromatic and Cosmetic (MAC) Plants for Community Health and Bio-Cultural Diversity Conservation in Bali, Indonesia

Liesbeth Nathalie Leurs

Leiden Ethnosystems and Development Program (LEAD) Studies No.5
Leiden University

Building a world where we meet our own needs without denying future generations a healthy society is not impossible, as some would assert. The question is where societies choose to put their creative efforts.

Christopher Flavin
(State of the World 2003)

ISBN 978-90-8570-497-3

Printed: Wöhrmann Print Sevice, Zutphen

Cover Photograph: Impression of the TOGA of *Puskesmas* Abiansemal II with the ‘plants’ request’ expressed on the sign: *Rawatlah aku, seperti kamu merawat dirimu sendiri* (Take care of me as you would take care of yourself).

Photograph: L.N. Leurs (2006)

Copyright ©: L.N. Leurs, December 2009

All rights reserved. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or any storage or retrieval system, without permission from the copyright owner, except for the quotation of brief passages.

This dissertation is dedicated to my friend and partner,
Ralph Braeken, who supported me and
stood by my side, especially during this journey.

Preface

People and their boundless creativity for dealing with the challenges which life brings us have always fascinated me. Above all, I have been intrigued by the various approaches towards health and healing practices and how people deal with the seemingly endless possibilities surrounding them. I grew up in a situation where all health and healing practices which do not belong to the realm of the bio-medical sciences were commonly considered at the very least mere alternatives, but often as non-scientific or even superstitious practices. However, during my prolonged visits to Indonesia, it was an eye-opening experience to see that there health and healing practices belong to a multitude of medical systems; not confined to the bio-medical system, but part of an integrated health care. This medically plurastic society creates an even more complex situation for the community members' health-seeking behaviour. I truly believe that in the chaos of the multitude of possibilities for health and healing there lies a suitable solution for each and everyone of us. How to find this solution, either for oneself or for a loved one, is a true challenge. How to obtain this solution is an even greater task. First of all, one has at least to have the knowledge that there is a mere possibility of the existence of a solution. If a person has no idea about, cannot dream of, or imagine that a solution for his or her problem exists, it will certainly never be realised. Providing people with tools to help them find and use the appropriate health and healing practices requires the empowerment of this people, so they can manage their own life.

In order to empower people and give them the opportunity to take responsibility for themselves and for their actions, begins with respecting them, their world, their surroundings, their knowledge, their beliefs and their practices. Despite the undeniably major health improvements which have been made by the bio-medical sciences, it is therefore essential to recognise the importance of the other, specifically of the traditional, health care systems. The LEAD programme of the University of Leiden, composed of an inspiring group of academicians, is exploring new approaches to the study of human behaviour in its practical setting of the Knowledge-Belief-Practices complex. This study in Bali, as part of the LEAD Programme with respect to other people's realities and conceptualisations, focuses on the documentation, description and analysis of an underestimated and understudied aspect of the, mainly traditional, knowledge, beliefs and practices of the Balinese community members in health and healing: the local use of medicinal, aromatic and cosmetic (MAC) plants.

Currently, we are beginning to become more aware of the alarming decline in the biodiversity of Planet Earth and the serious consequences this might have on human health and well-being. As Klaus Töpfer, Executive Director of UNEP (1999: xi) states: '*Respect for biological diversity implies respect for human diversity. Indeed, both elements are fundamental to stability and durable peace on earth*'. A study on the role of MAC plants for community health therefore has to take into account its relation to biodiversity. If we humans want to be able to survive, besides the luxuries which nature can give us, we will have to respect the essential necessities and advantages which we need for our own survival. We have to begin to realise that we humans are part of biological diversity ourselves.

As small kids, who loved to run and play around in the fields or forests nearby, my sisters and I soon learnt the handy trick of how to use greater plantain (*Plantago major subsp. Major*) for whenever we 'burned' ourselves on the prickly leaves of stinging nettle (*Urtica dioica L.*). We lost no time, however, to learn that that the same nasty stinging nettle also had health-improving qualities, but we never really did learn to appreciate the nettle soup served for dinner. As common and as normal as it seemed to us, I soon realised that quite a big group of playmates had never heard of this small phenomenon. They did not know about it and

neither did their parents. This situation has only worsened over the years and fewer people still have any idea of the potential of the natural pharmacy in their own environment. While finalising this dissertation, someone, as so many unaware of the current possible applications of plants for human health, actually praised me for doing ‘such good work’ drawing attention to the role of plants in health and healing in Bali, since ‘*we no longer have such plants here*’. Undoubtedly, the use of MAC plants enriches community health by strengthening its armoury and, since these practices substantiate the ‘inextricable link’ between biodiversity and cultural diversity, they support the preservation of the knowledge and beliefs on which the utilisation of MAC plants is based. However, if we truly do not want to lose this indispensable knowledge, more research will have to be carried out. Not only general research directed at the documentation and conservation of the knowledge, beliefs and practices of MAC plants, but specific research directed at the people who maintain such knowledge, belief and practices, how, why and whether they are still transferring this cultural heritage to the next generation.

It is my hope that through this kind of research as laid down in the present dissertation, people will be inspired to continue their efforts to pave the way for the (re-)appreciation and integration of the different kinds of plant-based health and healing knowledge, beliefs and practices not only for curative but also for promotive and preventive health care in the future in a sustainable way.

Acknowledgements

This study has been a wonderful journey in so many ways. I would like to take this opportunity to thank the many individuals and institutions who have helped me on my way and have contributed so generously to the completion of this research.

I would like to express my sincere gratitude for the financial support which I received from the Sekar Manggis Foundation in Bali. They granted me a very unique fellowship which helped me to realise this study. I am particularly very grateful for the inspirational support of H.R.H. Dr. Anak Agung Gede Agung in Bali. Similarly, I thank the Richard Leakey Foundation, for the provision of administrative and managerial supervision and support, thereby enabling me to work out the practical and logistic endeavours of this study.

In addition, I would like to thank the *Lembaga Ilmu Pengetahuan Indonesia* (LIPI) for its attention and interest in my study, granting me a research permit (No.02387/SU/KS/2006) to collect extensive data in Bali during my fieldwork in 2006. I thank Prof. Dr P. Idjradinata of Universitas Padjadjaran in Bandung, who supported this study within the framework of the ongoing Bilateral Cooperation Programme with Leiden University in Research and Training. Specifically, my gratitude goes to Mrs.Prof.Dr. L. K. Suryani of Udayana University in Bali, who I highly respect both as an individual and as a scientist with a remarkable expertise in community health care, based on her pioneering research and work among the *balians* and the community members in Bali. I thank her for her advice on both academic and social events during my stays in Bali and for her co-supervision of the members of my field team, who assisted in conducting the hundreds of interviews with tireless and meticulous efforts: I Dewa Gede Angga Setiawan, I Komang Gede, I Komang Kusumaadi, I Made Ari Basudewa, I Nyoman Wiweka, I Wayan Astawan, I Wayan Windu and Komang Bagus Somali.

Similarly, I am indebted to the many officials of the Central Government in Jakarta, the Provincial Authorities of Bali and the Regency Authorities of Badung, Buleleng, Karangasem and Tabanan for supporting this study and granting me the required permits. I also would like to take the opportunity here to specifically thank all the officials, heads and inhabitants of the four villages: Angantaka, Bengkel, Pelapuan and Tumbu for their active participation and contribution to this study. My gratitude goes to all those who made the effort to guide and educate me in the community health and bio-cultural diversity conservation of MAC plants in Bali and to those who provided me with a 'home away from home' during my long stays in Indonesia. I thank them and their families: Agung Putradhyana, Astri Dhamayanti, Atiek, Ayuk, Bapak Hatomi, Bapak Sadre, Bapak Wayan Mangku, the late Caroline Tirtasudira, Cokorda Anom Indrajaya, Cokorda Istri Dewi St, Cokorda Rai Adi Pramatha, Cokorda Raka Satria Wibawa, Denik, Dr. Cokorda Bagus Jaya Lesmana, Dr. Ida Bagus Djanardana, Dr. I Dewa Gede Basudewa, Emi Rahmawati, Eka, Gede Siwa, Gede Sugiarto, Gusman, Gusti Ayu Suci Oka Tesnawati, Ibu Ecin, Ibu Epa, Ibu Inin, Ibu Sarihati, I Dewa Made Sukabawa, I Gede Satya Raditya, I Ketut Sastra, I Made Astawasta, I Made Yogamurti, I Nyoman Alus, Ir Cokorda Alit Indra Wardhana, Ir Cokorda Putra Surya Adnyana, Ir I. A. Rusmarini, Jero Mangku Griyasaba, Kadek Trisnawati, the late Ketut Alit Bawa, Made Jeani Purnama, Made Sangka, Mangku Gede Wayan Sarde, Merta Dana, Nengah Rinta, Ni Made Lisa Larasati, Ni Wayan Adih Rusmini, Parawata Kusuma, Pemangku Ratas, Prof. Dr. A. Himendra Wargahadibrata, R.R. Arie Sulistyowati, Sari, S. Kusman Futus, Siti Rusdenia Rusad, and Wayan.

I thank the Staff of the Faculty of Science and the Leiden University Branch of the National Herbarium of The Netherlands who provided me with guidance and support. Equally, I wish to thank the Staff of the Faculty of Social Sciences. Because of the *mores* of

Leiden University, they all will have to remain unnamed here, but will always be remembered. I thank Mrs. Rosemary Robson B.A. (Hons), for meticulously correcting and editing this dissertation. My special thanks go to the Members of the Leiden Ethnosystems and Development Program (LEAD) who provided me with a most welcome platform for the exchange of ideas and invaluable advice and assistance: Mrs. Drs. M. Slikkerveer MA, Mrs. Drs. D. Bosch MA, Dra. W. Erwina MA, Mr. M. Chirangi MA, Dr. Y. Gheneti, Dra. S.C.D. Amar MA, Mrs. Dr. A.K. Ibui, Dra. N. Ambaretnani MSc, Ms. J. Aiglsperger MA and Ms. L.M. Blank MA.

Furthermore, I take this opportunity to thank various people in The Netherlands and Belgium who I am fortunate enough to have in my close circle of family and friends. I have received continuous support from them, and they all have indeed shown immense patience over the past years. I thank my colleagues at ActiVite for their continuous interest and the freedom they have given me to pursue this study by granting me the required time away from The Netherlands and providing me every time with a welcome return.

Most of all, I am grateful to the numerous people in Bali, Java, Lombok and Sumatra who have received me so graciously into their lives and shared with me their dreams, knowledge, beliefs, practices and wisdom. I hope that each and every one of them, who I may have failed to name here, will accept my gratitude and I can only wish that the generosity they have granted me will somehow be returned to them. I wish them all well, and hope that I can continue to contribute to putting their wisdom to good use and help them to make their dreams come true.

Om, santi, santi, santi, om
Terima Kasih
Sampai Jumpa

Contents

Preface	ix
Acknowledgements	xi
List of Figures	xvi
List of Illustrations	xvii
List of Maps	xviii
List of Tables	xix
Chapter 1 Introduction	1
1.1 Bali: Paradise on Earth	1
1.1.1 Respectful Greetings from Bali; an Island of Temples	1
1.1.2 Ideal Life in Bali: <i>Perilaku Hidup Bersih & Sehat</i>	3
1.1.3 Health for All: Creating Paradise on Earth	4
1.2 Nature and Health Intertwined	6
1.2.1 Plants for Human Health	6
1.2.2 Health and Healing in Bali	8
1.2.3 Community Health in the Pluralistic Medical Configuration	11
1.3 Bio-Cultural Diversity: Contributing to Health in Bali	12
1.3.1 Biodiversity and Human Health	12
1.3.2 Cultural Diversity in a Globalizing World	15
1.3.3 Bio-Cultural Diversity Conservation of MAC plants	17
1.4 General Aim and Specific Objectives	19
1.5 Structure of the Study	21
Chapter 2 Theoretical Orientation	25
2.1 MAC Plant Utilisation	25
2.1.1 The Field of Ethno-botany	25
2.1.2 Ethno-Botanical Knowledge Systems (EKS)	28
2.1.3 MAC Plants for Health and Healing	30
2.2 Medical Pluralism	32
2.2.1 Medical Systems	32
2.2.2 Community Health	35
2.2.3 Health Care Utilisation	38
2.3 Bio-Cultural Diversity Conservation	42
2.3.1 Biodiversity Conservation	42
2.3.2 Cultural Diversity Conservation	45
2.3.3 The 'Inextricable Link' between Nature and Culture	47
Chapter 3 Methodology	53
3.1 Research Methodology	53
3.1.1 The Ethnosystems Approach	53
3.1.2 The Multivariate Model for Use and Conservation of MAC Plants	56
3.1.3 Operationalisation of the Conceptual Model	59

3.2 Data Collection	69
3.2.1 Participant Observation and Interviewing Techniques	69
3.2.2 Free Listing and Pile Sorting	70
3.2.3 Ethno-Botanical Survey	71
3.2.4 Household Survey	72
3.3 Statistical Analyses	76
3.3.1 Bivariate Analysis	76
3.3.2 Multivariate Analysis: OVERALS	77
3.3.3 Multiple Regression Analysis	78
Chapter 4 Research Setting: The Island of Bali	81
4.1 Bali: ‘Island of the Gods’ in Indonesia	81
4.1.1 Geography of the Archipelago	81
4.1.2 Biodiversity	84
4.2 The Cultural Area of Bali	85
4.2.1 History	85
4.2.2 Cultural Diversity	90
4.2.3 Social Organisation	91
4.2.4 <i>Hindu Dharma</i> : A Practised Religion	94
4.2.5 Balinese Hindu Philosophy of Life	99
4.3 Life in Four Balinese Villages	103
4.3.1 Spatial Organisation of the Sample Villages	103
4.3.2 Socio-Demographic Profile	109
4.3.3 Socio-Economic Profile	115
Chapter 5 Health and Healing in Bali	123
5.1 Role of MAC Plants in Health	123
5.1.1 Herbal Medicine in Bali	123
5.1.2 <i>Emic</i> Classification of MAC Plants	129
5.1.3 Reported Use of MAC Plants by the Community Members	133
5.2 The Plural Medical System in Bali	135
5.2.1 Traditional Medicine	135
5.2.2 Modern Medicine	139
5.2.3 Curative, Preventive and Promotive Health Care	145
5.3 Health, Illness and Disease in Bali	151
5.3.1 Cultural Concepts and Global Indicators	151
5.3.2 Decision Making and Illness Behaviour	153
5.3.3 <i>Emic</i> Disease Classification	156
Chapter 6 Bio-Cultural Diversity Conservation in Bali	161
6.1 Biodiversity Conservation	161
6.1.1 Biodiversity Conservation and Sustainable Development	161
6.1.2 Biodiversity Conservation of MAC Plants	166
6.2 Cultural Diversity Conservation	169
6.2.1 Cultural Diversity Conservation in Bali	169
6.2.2 Cultural Conservation of MAC Plants	173
6.3 Bio-Cultural Diversity Conservation	177
6.3.1 <i>Tri Hita Karana</i> : The Balinese Cosmology	177
6.3.2 Threat <i>versus</i> Enrichment: Tourism in Bali	181
6.3.3 Enrichment <i>versus</i> Threat: MAC Plant Utilisation	185

Chapter 7	Analyses of MAC Plant Utilisation and Conservation	193
7.1	Preparation of the Dataset	193
7.1.1	Recoding by Qualitative Method	193
7.1.2	Recoding by Calculation Method	197
7.2	Quantitative Analyses	202
7.2.1	Bivariate Analyses	202
7.2.2	Multivariate Analysis of the Variables by OVERALS	218
7.2.3	Multiple Regression Analysis of the Blocks of Factors	224
Chapter 8	Conclusions and Implications	231
8.1	Conclusions	231
8.2	Implications	241
8.2.1	Theoretical and Methodological Implications	241
8.2.2	Practical Implications	242
Appendix I:	Declaration of Alma Ata (1978)	245
Appendix II:	Declaration of Belém (1988)	248
Appendix III:	The Chiang Mai Declaration (1988)	249
Appendix IV:	Leipzig Declaration (1996)	250
Appendix V:	Health in the Millennium Development Goals (2006)	253
Appendix VI:	List of Reported MAC plants	255
Appendix VII:	Division of the Stratified Sample	259
Appendix VIII:	Dendrogram of the MAC Plants	260
Appendix IX:	Dendrogram of the Diseases	263
	Glossary	265
	Abbreviations	273
	Summary	275
	Samenvatting	291
	Ringkasan	309
	Bibliography	327
	Curriculum Vitae	343

List of Figures

Figure 2.1	The Institute of Medicine's model of the multiple determinants of health Source: Liburd & Snizek (2007: 2)	41
Figure 2.2	Biodiversity, ecosystem functioning, ecosystem services, and drivers of change Source: Secretariat of the Convention on Biological Diversity (2006: 14)	51
Figure 3.1	Model of relationships between the individual and social systems Source: Kohn & White (1976b: 11)	56
Figure 3.2	The conceptual model indicating the blocks of factors for the utilisation and bio-cultural diversity behaviour of MAC plants Source: Adaptation of Slikkerveer' model (1990).	58
Figure 3.3	The links in the measurement process. Source: Kohn & White (1976b: 25)	59
Figure 4.1	Frequency of the household members' age divide by sex (N=1724) Source: Household survey 2006	111
Figure 5.1	Organization Structure of the Government Health System Source: WHO (2007b: 9)	142
Figure 5.2	The bio-psycho-spirit- sosiobudaya concept for health maintenance and restoring Source: Suryani (2006: personal communication)	150
Figure 7.1	OVERALS analysis of MAC plant utilisation and bio-cultural diversity conservation Source: Household survey 2006	222
Figure 7.2	The conceptual model indicating the calculated multiple correlation co-efficients between the blocks of factors for the utilisation and bio-cultural diversity behaviour of MAC plants. Source: Household survey 2006	228

List of Illustrations

Illustration 1.1	The programme ' <i>Perilaku Hidup Bersih & Sehat</i> ' visualised Photographed by L.N. Leurs (Fieldwork 2006)	3
Illustration 4.1	<i>Pujumandala</i> , five houses of pray united on one location in Nusa Dua Photographed by L.N. Leurs (Fieldwork 2006)	95
Illustration 4.2	Illustration of the daily <i>banten</i> (left), the stacked offerings (middle) and an offering for the <i>butakala</i> (right). Photographed by L.N. Leurs (Fieldwork 2006)	98
Illustration 4.3	Example of the Balinese calendar Photographed by L.N. Leurs (Fieldwork 2006)	102
Illustration 5.1	A <i>loloh</i> based on <i>sambung nyawa</i> (<i>Gynura pseudochina</i> (L.) DC) on the left and prepared and applied <i>boreh</i> , <i>beras kencur</i> , on the right Photographed by L.N. Leurs (Fieldwork 2006)	124
Illustration 5.2	Home-made, dried herbal medicine (left) and a selection of books on herbal remedies (right) Photographed by L.N. Leurs (Fieldwork 2006)	127
Illustration 5.3	Information board on use of plants of <i>puskesmas</i> Abiansemal II with an impression of the TOGA of <i>puskesmas</i> Abiansemal II on the background Photographed by L.N. Leurs (Fieldwork 2006)	128
Illustration 5.4	A <i>balian usada</i> in front of his <i>lontar</i> Photographed by L.N. Leurs (Fieldwork 2006)	139
Illustration 5.5	The <i>puskesmas keliling</i> of <i>puskesmas</i> Abiansemal II Photographed by L.N. Leurs (Fieldwork 2006)	144
Illustration 5.6	Health education offered to the community members of Angantaka of during the <i>posyandu</i> organised by the <i>puskesmas</i> Photographed by L.N. Leurs (Fieldwork 2006)	147
Illustration 6.1	Proclamation of regulations on the designation of the land Photographed by L.N. Leurs (Fieldwork 2006)	165
Illustration 6.2	Impression of home gardens containing MAC plants Photographed by L.N. Leurs (Fieldwork 2006)	167
Illustration 6.3	The newly renovated <i>Taman Ujung</i> in Tumbu Photographed by L.N. Leurs (Fieldwork 2007)	171
Illustration 6.4	Young Balinese people actively involved in attending traditional drama and dances both as spectators and performers Photographed by L.N. Leurs (Fieldwork 2006)	172
Illustration 6.5	Impression of the <i>lontar</i> preserved in <i>Gedong Kirtya</i> , Singaraja Photographed by L.N. Leurs (Fieldwork 2006)	174
Illustration 6.6	Example of a box serving the five elements for the betel nut chewing Photographed by L.N. Leurs (Fieldwork 2006)	176
Illustration 6.7	Balinese government-sponsored advertisement: 'Keep Bali Beautiful' Photographed by L.N. Leurs (Fieldwork 2006)	179
Illustration 6.8	Relief of the <i>Meduwe Karang</i> temple showing a tourist on his bicycle Photographed by L.N. Leurs (Fieldwork 2006)	184
Illustration 6.9	Information and warning board about medicinal plants at the botanical gardens Photographed by L.N. Leurs (Fieldwork 2006)	187

List of Maps

Map 4.1	Map of the Republic of Indonesia with indication of the Wallace Line Source: Adaptation of CIA (2009)	82
Map 4.2	Map of Bali with indication of the location of the four sample villages Source: Adaptation of Agung (2005: 156)	83
Map 4.3	Schematic layout of the village of Angantaka Source: Fieldwork 2006	105
Map 4.4	Schematic layout of the village of Bengkel Source: Fieldwork 2006	106
Map 4.5	Schematic layout of the village of Pelapuan Source: Fieldwork 2006	107
Map 4.6	Schematic layout of the village of Tumbu Source: Fieldwork 2006	108

List of Tables

Table 2.1	Overview of the shifted focus of the Primary Health Care (PHC) movement Source: WHO (2008b: xv)	37
Table 3.1	Socio-demographic factors: Concepts, variables, indicators and categories	61
Table 3.2	Psycho-social factors: Concepts, variables, indicators and categories	63
Table 3.3	Enabling factors: Concepts, factors, indicators and categories	65
Table 3.4	Perceived morbidity factors: Concepts, factors, indicators and categories	66
Table 3.5	Institutional factors: Concepts, factors, indicators and categories	67
Table 3.6	Intervening factors: Concepts, factors, indicators and categories	68
Table 3.7	Dependent factors: Concepts, factors, indicators and categories	68
Table 3.8	Overview of the household size and related number of individuals in the sample Source: Household survey 2006	74
Table 4.1	Distribution of caste membership of the household head according to the sample villages (N=400) Source: Household survey 2006	109
Table 4.2	Distribution of the gender of the household members according to the sample villages (N=1724) Source: Household survey 2006	110
Table 4.3	Distribution of the age of the household members according to the sample villages (N=1724) Source: Household survey 2006	110
Table 4.4	Distribution of the level of education of the household members according to age (N=1724) Source: Household survey 2006	113
Table 4.5	Distribution of the level of education of the household members according to sex (N=1724) Source: Household survey 2006	114
Table 4.6	Distribution of the monthly income of the households according to the sample villages (N=400) Source: Household survey 2006	116
Table 4.7	Distribution of the SES of the households according to the sample villages (N=400) Source: Household survey 2006	117
Table 4.8	Distribution of the profession of the household members according to the sample villages (N=1724) Source: Household survey 2006	118
Table 4.9	Distribution of the main occupation of the household members according to age group (N=1724) Source: Household survey 2006	119
Table 5.1	Composition of the clusters of the MAC plants reported by respondents of the sample villages Source: Fieldwork 2006	131
Table 5.2	Top ten reported MAC plants by type of use by the household members (N=1724) Source: Household survey 2006	134
Table 5.3	Composition of the clusters of the diseases reported by respondents in the sample villages Source: Household survey 2006	158
Table 5.4	Distribution of utilisation of MAC plants according to reported disease cluster (N=1724) Source: Household survey 2006	159
Table 6.1	Distribution of the perceived impact of the government on the biodiversity conservation of MAC plants according to the sample villages (N = 400) Source: Household survey 2006	163
Table 6.2	Distribution of the perceived amount of MAC plants according to finding-place (N=400) Source: Household survey 2006	168
Table 6.3	Perceived impact of tourism on the utilisation, cultural diversity and biodiversity of MAC plants (N=400) Source: Household survey 2006	182
Table 7.1	Overview of the variables which needed no recoding	194

Table 7.2	Overview of the variables measured by a single question recoded by qualitative methods	195
Table 7.3	Overview of the variables recoded by calculation methods	197
Table 7.4	Distribution of the socio-demographic variables over the dependent variables (N=400) Source: Household survey 2006	205
Table 7.5	Distribution of the psycho-social variables over the dependent variables (N=400) Source: Household survey 2006	208
Table 7.6	Distribution of the enabling variables over the dependent variables (N=400) Source: Household survey 2006	212
Table 7.7	Distribution of the perceived morbidity variable over the dependent variables (N=400) Source: Household survey 2006	213
Table 7.8	Distribution of the institutional variables over the dependent variables (N=400) Source: Household survey 2006	214
Table 7.9	Distribution of the intervening variables over the dependent variables (N=400) Source: Household survey 2006	215
Table 7.10	Values of the component loadings of the 33 variables (N=400) Source: Household survey 2006	220
Table 7.11	Strongest variables within the two sets OVERALS analyses on the two dimensions Source: Household survey 2006	225
Table 7.12	Calculated multiple correlation co-efficients of the OVERALS analysis between the seven blocks of factors of the conceptual model Source: Household survey 2006	226

1 Introduction

Medicinal, aromatic and cosmetic (MAC) plants play an important role in human health. Since prehistoric times, human beings worldwide have made efforts to influence, maintain and restore their health (*cf.* Slikkerveer 2006a; Ibui 2007). Plants have played a prominent role in these efforts, as part of the human diet as well as in specific health and healing practices. Human-plant relations have been developed and substantiated into the knowledge, beliefs and practices of societies and subsequently conserved in both oral and written traditions and medical systems worldwide. The World Health Organisation (WHO) estimates that 80% of the population in developing countries, approximately 3.5 billion people, rely on traditional, mostly plant-based, medicines for their Primary Health Care needs (*cf.* Balick & Cox 1997; Van Seters 1997).¹ In developed countries, in which people tend to rely on the bio-medical or modern medical system as their source of medicine, a drastic decline in interest in plant-based medicine occurred in the nineteenth century as the consequence of two factors: the introduction of Cartesian scientific materialism and the cumulative advances in medical techniques and technologies (*cf.* Slikkerveer 2006a). Recently, herbal medicines have been rediscovered in developed countries. This re-emergence has been prompted by green consumerism, the resurgence of interest in the use of ‘naturals’ and some disappointments in the bio-medical medicine, specifically in the search for cures for chronic and degenerative diseases (*cf.* De Silva 1997; Slikkerveer 2006a).

The renewed interest in herbal medicine and the search for new bio-active components for pharmaceutical drug development have inspired research topics focusing on the identification, description and scientific experimental validation of the medicinal, aromatic and cosmetic (MAC) plants used in traditional medical systems. Currently, the global community has begun to be more acutely aware of the alarming decline in the biodiversity of the Earth and the serious consequences this might have on human health and well-being (*cf.* Chivian 1997). The alarmed recognition of these consequences and the mounting awareness of the ‘inextricable link’ between biodiversity and cultural diversity have spelled out the need for more attention to be paid on the underlying human-plant relations and their interactions as these are envisaged by the discipline of ethno-botany.

Acknowledging the complexity of pluralistic medical configuration practised by the nations of the world, medical anthropological research has focused principally on the description of the way people choose between the treatments offered by either bio-medical specialists or traditional healers. Consequently researchers have commonly overlooked the most common form of therapy, self-care and self-medication so widely found in the application of fresh MAC plants, especially in developing countries. This study, carried out in the interdisciplinary field of medical anthropology and ethno-botany, documents, describes and analyses knowledge of, belief in and practices with medicinal, aromatic and cosmetic (MAC) plants among Balinese community members, viewed in the context of community health and the bio-cultural diversity conservation of MAC plants.

1.1 Bali: Paradise on Earth

1.1.1 Respectful Greetings from Bali; an Island of Temples

Bali, the research field of this study, is one of the thousands of islands which form to the Republic of Indonesia. Bali, known around the world as an attractive tourist location, is promoted by such alluring slogans as ‘Bali: Island of the Gods’ and ‘Bali: Paradise on Earth’.

These slogans accentuate the natural beauty of the island, its exoticism, and its vibrant culture. For more than a century, tourists of all kinds have visited Bali. Renowned for its natural beauty and cultural complexity, Bali has always attracted others. Bali has lured immigrants and visitors with the promise exuded by its excellent religious, artistic, agricultural and economic prospects. As well as tourists, Bali has attracted scholars interested in studying life in Bali past and present. Consequently, Bali is and has been a well-studied place. Studies of Bali cover a wide spectrum; there are numerous historical, sociological, anthropological, biological, ecological and demographic studies, and the subjects studied range from the daily reality of medicine and law, to those more intricate subjects related to philosophy and mysticism. Frequently, studies and research in Bali are carried out in close co-operation with the inhabitants of the island, which has indeed been the case for this study. Above all, Bali, the island and the variety of life forms to which it is home, are studied, described and monitored by the Balinese themselves.

The name of the island of Bali is said to be derived from an Old Javanese word '*wali*' which means 'tribute', 'obligation' or 'gift' (cf. McCauley 1984). In the literature, the Balinese are portrayed as the embodiment of grace and composure, a 'gifted' people. The incidence of great artistic skill and accomplishment, in the performance, graphic and other forms of arts among the Balinese is amazingly high, much higher, in all probability, than among any other people (cf. Hanna 1976). Most likely the inspiration for this phenomenon has been the fourteenth-century, Balinese *kraton* culture, adopted from Java, which has been further developed and refined by the social obligation which requires creative participation in a communal system (cf. Hanna 1976). This communal system is inextricably intertwined with the Bali faith, the *Hindu Dharma*. The *Hindu Dharma* is openly visible in the regular rituals and performances and in the ubiquitous examples of religious architecture: the walled-in, open-air areas containing several pavilions and shrines, the temples of Bali.

There are more than 10,000 temples in Bali. These religious edifices have a variety of purposes, serving the family, the state, the rice-fields, and the sea, to name but a few of their functions. The temples vary greatly in size. Village temples are large enough to accommodate most members of the community attending a single ceremony; others are barely large enough to fit a single family (cf. Jensen & Suryani 1992). The enormous number and variety of temples is a tangible reminder that Bali is an island of great diversity and an island of interconnectivity. There can be no better illustration of this diversity and interconnectivity of the Balinese than the *Sad Kahyangan*, the list of the six most sacred temples of Bali. Every Balinese Hindu recognizes the *Sad Kahyangan* and considers temple *Pura Besakih*, situated on the slopes of Mount Agung, as the one mother temple but which other five temples are included varies by region, illustrating that the Balinese are connected by the same principle, yet celebrate the diversity in its application.

The beliefs of the Balinese are a living force which pervade the island and reverberate outside it. The Balinese Hindu extend an invitation to the gods, entreating them to enter to world of men. This is expressed in a whole complex of actions: the ringing of the bell, the water, the lighting of a stick of incense, the delicious food, the sparkling entertainment, the spending hours making an offering of woven palm leaves and resplendent flowers, the time to think every day of the 'other world', the presenting of something to the gods and the freely giving a smile or a wave to everyone passing by. As information provided by the Indonesian Embassy says: '*The Balinese feel themselves to be a blessed people, a feeling continually reinforced by the wealth of their everyday life and strengthened by the splendour of their religion; it is almost as if the Balinese are living as artists continually worshipping their muse*'. Bali, the Island of the Gods, is an island of enlightenment and it inspires humans, both

Balinese and those simply visiting. It is a popular location for national and international congresses on political, health and biodiversity topics; numerous scholars and artists are drawn to the island finding endless fascination in the study of its performance and graphic arts.

1.1.2 Ideal Life in Bali: *Perilaku Hidup Bersih & Sehat*

The ideal picture of how enlightened and beautiful life in Bali can be is used as the visualisation of the slogan issued by the Balinese Ministry of Health programme on community health bearing the Indonesian-language admonition: '*Perilaku hidup bersih & sehat*'; 'Live clean and healthy'.² The poster, depicted in Illustration 1.1, sets out the guidelines by which this ideal happy and healthy life can be achieved set against a background featuring a temple and a mountain, major icons to typify Bali. The Ministry of Health invites the public to invest in five pillars to obtain the goal of this ideal life: mother and child care, balanced nutrition, a healthy environment, healthy lifestyle and active community participation. The fourth guideline of the fifth pillar, active community participation, is the realisation of self-reliance in health care. This has been achieved for example by setting up of a TOGA, a *Tanaman Obat keluarGA* (medical family garden). The TOGA has two purposes: it dispenses medical supplies to its family members and is also intended to watch over for the preservation of medicinal plants and to pass on the traditional knowledge to the younger generations (*cf.* Slikkerveer & Slikkerveer 1995).



Illustration 1.1 The programme '*Perilaku Hidup Bersih & Sehat*' visualised
Photographed by L.N. Leurs (Fieldwork 2006)

The Balinese people and their government are actively engaged in achieving 'developed country' status. Their aim is to achieve political, economic and social stability and with this attain a high level of community health. If Indonesia is to achieve the desired status, progress

has to be made in many areas in order to be able to sustain its impressive economic growth and stability. Examples of two of the problems still to be faced by the nation are the fact that too many people are still living below the poverty line and the productivity of labour and the quality of human resources are relatively low compared with other ASEAN countries. Oil and timber, which have so far constituted the top two export commodities are declining and terrestrial (upland) resources becoming scarce or are proving difficult to develop (cf. Solahuddin & Dahuri 1998). In relation to the goal of achieving the desired status, in 1969 the Indonesian government began working with Five Year Development Plans (REPELITA). At that time, the per capita income was US \$70, twenty years later per capita income had risen to US \$920 (cf. Solahuddin & Dahuri 1998). In the following twenty years per capita income has risen again, so that in July 2008 Indonesia was classified by the World Bank as a lower middle-income country signifying an income between US \$936 to US \$3,705 (cf. World Bank, 2008). However, to realise economic growth regardless of the goals formulated in the REPELITA, Indonesia and Bali alike are most likely poised to overload the life-support systems on which their economies depend. Even if the shift is made to sustainable development, estimates indicate that, for at least another decade, Indonesia will have to depend heavily on its natural resources. By then, if not already right now, severe or irreversible damage will have been caused to the environment (cf. Solahuddin & Dahuri 1998; Töpfer 1999).

International society expressed its intention of bringing all citizens of the world to a level of health which would permit each person to lead a socially and economically productive life by the year 2000, articulated in the slogan: 'Health for All by the Year 2000'. The approach was endorsed by the International Conference on Primary Health Care, held in Alma-Ata in 1978 (cf. Bannerman *et al.* 1983).³ Primary Health Care is defined by WHO as: '*essential health care made accessible at a cost a country and community can afford, with methods that are practical, scientifically sound and socially acceptable*' (WHO 1998: 3). Today, the year 2000 is almost a decade ago and as a consequence of the failure to complete 'Health for All by the Year 2000', new health-related goals have been set in the Millennium Development Goals (MDG). The Millennium Development Goals (MDG) provide the framework for development and time-bound targets by which progress can be measured. Awareness of the current situation makes it seem highly unlikely MDG for poor and developing countries will be met (cf. WHO 2006a). MDG present a vision for the future: '*a world with less poverty, hunger and disease, greater survival prospects for mothers and their infants, better educated children, equal opportunities for women, and a healthier environment; a world in which developed and developing countries worked in partnership for the betterment of all*' (United Nations 2007: 3). WHO (2007b) follows the progress of the achievement of health related MDG.⁴ Every year up to the target year 2015, a report is being published announcing the achievement of the goals. Currently these reports show that progress has been made but that there is still a long way to go to realise promises to the current and the future generations.

1.1.3 Health for All: Creating Paradise on Earth

Indonesia, as almost every country in the world, is party to at least one international treaty which recognises health-related human rights (cf. WHO 2006a). The World Health Organization (WHO) Constitution states that '*the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition*' (WHO 2006b: 1). The Indonesian government, in its efforts to accomplish this intention, is continuing to incorporate the Millennium Development Goals in its health policies. In the second twenty-five-year

development plan (1994-2019), its emphasis has been placed on the development of human resources, giving priority to the improvements in health and education, stating that this is as important to its national development and self-reliance as economic development. In order to relieve the need for large governmental investments in costly health facilities, it has recognised the role of the private sector (*cf.* WHO 2007a). In Bali, this private sector consists of representatives of the bio-medical or modern medical system and the different local and regional traditional medical systems. Law on Health No.23, enacted in 1992, which provides a legal basis for the health sector activities, stipulates the goals of the health programmes are to increase the awareness, willingness and ability of everyone to live a healthy life (*cf.* WHO 2007b).

As there is a worldwide recognition that development and health care are interrelated, WHO states that: *'any significant progress towards the health-related Millennium Development Goals requires action in many sectors and at all levels – individual, community, national, regional and global'* (WHO 2006a: ii). WHO has reached the conclusion that a global framework for a health promotion strategy is needed for all stakeholders, not just its own organisation. Its global health agenda highlights seven priority areas (*cf.* WHO 2006a):

1. investing in health to reduce poverty;
2. building individual and global health security;
3. promoting universal coverage, gender equality, and health-related human rights;
4. tackling the determinants of health;
5. strengthening health systems and equitable access;
6. harnessing knowledge, science and technology; and
7. strengthening governance, leadership and accountability.

As said in passing above, the Indonesian government is investing in the health of its population. It partly finances health care and it encourages the management of care. National health care programmes concentrate on mother and child health, the creation of a healthy environment (including access to clean water, adequate sanitation, housing quality and waste control), disease management (shifting from infectious to chronic diseases management) and public health problems include combating malaria, tuberculosis, dengue/haemorrhagic fever, the spread in HIV/AIDS, iodine-deficiency, an increasing number of traffic fatalities and an increasing number of smokers (*cf.* Kosen & Gunawan 1996). Obviously not all plans run as smoothly as might be wished for, but efforts are unquestionably being made and it is not just the policy makers and people working in the field of health and healing who are actively involved in this goal to improve community health, the community itself contributes too. All media, both spoken and written media, constantly pay attention to health care issues and report on political debates, sociological problems and new advances in medicine. For instance, at the beginning of 2006, headlines on health issues were full of the bird flu; the policies, practical solutions and problems to deal with this epidemic were constantly debated.

Political debates on the topic are not limited to the issue of health care development, planning and resource management, they are constantly contributing towards the development of a vision of community health as a whole, including cure, care, health promotion, preventive health care and wellness of the Indonesian people. As reported by Kosen and Gunawan (1996), policies which are issued to guide the development of health care urge for improvements in quality of life, the observance of humanitarian principles, use of scientifically approved traditional medicine and the provision of public health through a three-

tiered system. Indonesia is following WHO by favouring the application of, preferably scientifically approved, traditional medicine and the use of plants, although not purely restricted to the realms of traditional health care, which is part of the WHO strategy to improve the Primary Health Care in countries, by reducing poverty and generating 'Health for All' or in case of Bali, the realisation of a true 'paradise on earth'.

1.2 Nature and Health Intertwined

1.2.1 Plants for Human Health

Plants have been used for health and healing purposes since the dawn of time, estimations date the use of plants as medicine back to prehistoric times (*cf.* Slikkerveer 2006a; Ibui 2007). Veilleux & King (2008) report that the earliest recorded uses are found in the Code of Hammurabi in Babylon circa 1170 BC and in ancient Egypt circa 1550 BC. Today the use of plants for health and healing purposes is no longer restricted to the application of the raw plant materials, an impressive number of pharmaceutical drugs have been isolated from natural sources and there are numerous industrially produced herbal products. Lewis & Elvin-Lewis (2003) have documented that about 25% of the prescription drugs dispensed from community pharmacies in the United States from 1959 to 1980 contained plant extracts or active principle derived from higher plants and that 119 chemical substances derived from 90 plant species are important drugs currently in use.

As they have done throughout human history, plants continue to be a major source of medicines. The properties of some medicinal plants, for example the opium poppy (*Papaver somniferum L.*), have been recognized and widely used for many centuries; others, for example the Pacific yew (*Taxus brevifolia Nutt.*), the original source of the cancer drug, Taxol, are relatively new arrivals in mainstream medicine. Besides providing the basis for between 30% and 40% of present-day conventional drugs, the medicinal and curative properties of various plants also form the basis of herbal supplements, botanicals, nutraceuticals and teas.

Worldwide an estimated 35,000 plant species are being used for medicine, often in uncontrolled trade systems and clinically uncontrolled uses (*cf.* Ibui 2007). The efficacy of only a small group of medicinal, aromatic or cosmetic (MAC) plants, and even fewer of the commonly known compounds, has been proved or disproved in clinical trials. This surprisingly small number is a consequence of the extreme difficulty experienced in identifying and reproducing the processes of the bioactive components of plants. This is the result of the highly complex molecular structures of the large numbers of chemical substances which plants have developed in the course of their evolution to defend themselves against insect pests and fungal and other pathogenic diseases (*cf.* Van Seters 1997).

The lack of clinical trials which have tested the efficacy and safety of these plants does not seem to have had any affect on the actual use of plants for health and healing practices. WHO (1993) estimates that up to 80% of the population of the non-industrial world still relies on traditional forms of medicines, and an estimated 3.5 billion people in the developing world resort to plants as components of their Primary Health Care (*cf.* Balick & Cox 1997). For the last two decades more people, even those living in industrialized countries, have been returning to or adopting ancient remedies and incorporating traditional forms of treatment in their health services programmes (*cf.* Posey 1999b; WHO 2000). To some extent, this reorientation is attributable to increases in the price of modern medicine and, the coincidental growing disillusionment of clients and patients who have been confronted with the unpleasant side-effects or diminishing effects of several pharmaceutical drugs (*cf.* Bodeker *et al.* 1997;

Slikkerveer 2006b). The Chiang Mai Declaration recognises the importance attached to the use of medicinal plants in Primary Health Care, in both self-medication and in national health services (cf. Van Seters 1997).⁵

Over the centuries, medicinal plants have been studied and analysed in Indonesia. The earliest proof of the use of medicinal plants there is found on reliefs on artefacts found near Borobodur, a stupa in Central Java which dates from ca AD 800. These depict plants and scenes of grinding the ingredients for female health and beauty care (cf. Beers 2001). Written records of herbal medicine, such as the texts on the *lontar usada* in Bali, the *lontarak Pabbura* of South Sulawesi and the *rontal* of Java, can be dated back to the tenth century.⁶ The first written records related to the scientific study on medicinal plant use in Indonesia date from the fifteenth and sixteenth centuries. They were noted by Bontekoe (1689) and Rumphius (1741). The latter made a meticulous study of the flora and fauna of the island of Ambon, in the Indonesian island group the Moluccas. His work is published in both Latin (*Herbarium Amboinense*) and Dutch (*Het Ambonisch kruid-boek*). His example was followed by others with an interest in medicine, among them: Fleming (1820), Praeger (1863), Van Gent (1880), Kloppenburgh-Versteegh (1907), Weck (1937) and Van Wijk-Fransz (1939).

About 15,000 plant species are used in Indonesia at present for medicinal purposes (cf. Erdelen *et al.* 1998). These species play a significant part in maintaining, improving and restoring the quality of life. A large number of the plants currently used for health improvement are known primarily as either vegetables or spices and are part of the Balinese daily diet. Nevertheless, several of the plants are also used for medicinal, aromatic or cosmetic purposes, whether self-prepared or locally or industrially produced herbal mixtures such as *jamu*, contain toxins. When used correctly, the toxic plants become valuable healers. Some examples are: tamarind (*Tamarindus indica* L.), the sap of cashew nut tree (*Anacardium occidentale* L.), *kecubung* (horn of plenty; *Datura inoxia* P. Mill.), the flowers of the Madagascar periwinkle (*Catharanthus roseus* (L.) G. Don), and the pineapple (*Ananas comosus* (L.) Merr.) (cf. Beers 2001). Although these 'dangerous plants' are efficacious healers if used correctly, if tampered with, toxic chemical reactions are liable to occur. Unfortunately there are charlatans in every country, therefore the *Indonesian Jamu Association* constantly warns the public to be beware of using illegally manufactured products (cf. Beers 2001).⁷

It is estimated that about 10% of the total flora of Indonesia has some medicinal value (cf. Schumacher 1996) and, according to Erdelen *et al.* (1998), the number of species might actually be much higher. Recently there has been a noticeable shift and Bodeker (1997) has warned that in many traditional societies, where women are the primary herb gatherers and herbalists, societal changes in work and family patterns have had an impact on the nature of the traditional health sector and its services in providing everyday health care. It goes without saying these changes have an impact on the current plant use. Moreover a plant in one place is not the same in another. Erdelen *et al.* (1998) specify that particular use of a plant species for medicinal use is not inherent in the plant species. Although, several species of medicinal plants described in the *Taru premana lontar*, the ancient indigenous pharmacopoeia of Bali, can be traced back in the *materia medica* of other Indonesian areas (cf. Slikkerveer & Slikkerveer 1995), their use often differs between ethnic groups within Indonesia: a plant species used for a certain disease in Bali might not be used for the same disease in other Indonesian areas and vice-versa.

For a very long time, drug discovery, ethno-botany, traditional and indigenous medicines have been the basis for research into medicinal plants. Even so there are still a large number of problems to be addressed. Since the application of medicinal plants, regardless of how

carefully prepared, affects the life process because they remain chemical substances, doctors, pharmacists and government health officials, in Indonesia as elsewhere in the world, insist on clinical trials to verify the efficacy and safety of plants, plant products and other forms of herbal medicine. An even larger problem is that of supply. As new uses for medicinal plants are discovered and popularized, sustainability becomes a growing issue; concern about growth stresses the critical need for conservation of both species and habitat. When a particular herbal medicine becomes popular, it can be over-exploited and the very resource will be threatened with extinction.

Whereas once herbal enterprises were few, now competition often forces the focus to fall on the need for greater production and wider diversity of herbal products. Naturally, this utilizes more plant resources. The increased use compounded by habitat destruction is causing a growing shortage of plant resources, including some of the most treasured medicinal species. Moreover, when species are not cultivated on a large scale but taken from the wild, detailed knowledge of their geographic distribution, habitat requirements, and abundance, is still going to be a *sine qua non* for their successful conservation in the long run. Some species are already endangered and might become extinct if effective conservation measures are not identified and implemented. To counter this threat, Erdelen *et al.* (1998) suggest a new integrated and trans-disciplinary approach aimed at integrating research in the biodiversity of indigenous plant species of Indonesia used for medicinal purposes, studies of bio-geography and identification of issues for their successful conservation on the principle of sustainability.

The purpose of this study is to focus on the utilisation of fresh MAC plants in home remedies for health and healing in Bali. Usually these plants are collected in the wild or cultivated in private gardens. A new trend is buying the fresh plants in markets or even supermarkets which, for instance, offer fresh leaves of *aloe vera* (*Aloe vera* (L.) Burm. f.). This study does not make a distinction between the utilisation of plants on the basis of personal decisions prompted by a self-diagnosis, or those taken on the advice of another individual or health practitioner.⁸ The term MAC plants, short for medicinal, aromatic and cosmetic plants, is used in this work to refer to each plant reported by the respondents, the Balinese community members, as being applicable to some kind of health and healing purpose. The reported knowledge might be based on information gathered or on people's own past experience with the administration of the plants either to themselves or other community members. Nevertheless, there is a chance that the plant reported to be used for health and healing is in fact not a medical plant but a purely aromatic, cosmetic or regular food plant. There is an even slimmer chance that the plant is none of the above and has only, if at all, a placebo effect. It should be clearly understood that it is not within the scope of this study to determine whether the plants used do indeed have the alleged bio-active components or to prove their efficacy.⁹ The work concentrates on the community members' knowledge, beliefs and practices pertaining to MAC plants in relation to community health and bio-cultural diversity conservation of MAC plants.

1.2.2 Health and Healing in Bali

Nowadays, health is a concept which spills over the bio-medically defined and achieved goal. An individual's experience of health following Nichter (2001: 81) is: '*visceral as well as psychosocial, environmentally conditioned as well as cultural mediated, subject to the idiosyncrasies of one's individual habits as well as to the dictates of routine practices, and judged in relation to one's ability to enjoy life's pleasures and experience happiness – however defined- as well as in relation to social roles and work demands. Health is experienced as an absence of worries, socially devalued states, and uncomfortable symptoms,*

but also as a positive source of vitality, be this expressed in terms of beauty or spirituality, inner strength or ritual purity, resistance, or immunity'. WHO defines health in the more compact phrase *'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'* (WHO 2006b: 1). This definition is complemented by the Declaration of Alma Ata (1978) which endorsed the claim that health is a fundamental human right and that the attainment of the highest possible level of health is the most important global social goal. Its realisation is not restricted to the health sector, it requires the action of many social and economic sectors.¹⁰

Knowledge, beliefs and practices on health in ancient cultures and the continuous interaction between cultures have combined to lead to a wide variety of medical systems. A medical system and, from its definition medicine itself, is a socio-cultural phenomenon. Contemporary bio-medicine, the medical systems commonly referred to as the modern medical system, cannot be taken as a absolute baseline for medical reality and knowledge (*cf.* Bernstein 1997).¹¹ Medical systems have evolved over the ages as a distinct body of knowledge of health and healing, relying upon the balanced interaction of the community with, in the Balinese case, the rich domains of the natural environment (*cf.* Slikkerveer & Slikkerveer 1995).

Several of the medical systems, for instance, the modern medical or bio-medical system, traditional medicine, or the ethno-medical systems of the 'Great Traditions' transcend geographical or cultural boundaries. As a consequence of this mixing and matching, today almost every country has a medical system which can be described as pluralistic, harnessing both conflicting and synergizing health and healing knowledge, beliefs and practices. The three major 'Great Traditions' or regional medical systems, as Foster (1983), Leslie (1976), Kleinman (1978) among others have documented, are the Hippocratic-Galenic or ancient Greek system, the Ayurvedic system of India and the Chinese medical systems.¹² Over time, transmigration and other forms of human interaction have lead to a situation in which newly introduced medical systems come into contact with local indigenous medical systems. The upshot is the present situation in which several medical systems co-exist, which has been labelled medical pluralism.

In the Balinese situation, the present medically pluralistic system is basically a configuration of two main medical systems: the local Balinese traditional system and the bio-medical system. Unquestionably, over the course of history, interaction has taken place and the Balinese traditional system, has been strongly influenced by regional medical systems. Slikkerveer & Slikkerveer (1995: 17) indicate that all three 'Great Traditions' share certain common characteristics such as: *'a 'naturalistic' cosmological view of the universe encompassing an equilibrium model to explain health and disease and to indicate proper cure, a conception of elements with ascribed values, the significance of bodily fluids or humours and the belief in a metaphorical 'breath of life''*. These common characteristics, are found in the local traditional medical systems of the Balinese and other groups in Indonesia (*cf.* Slikkerveer & Slikkerveer 1995).

Above all the Aryurvedic conceptualisation of the physical and physiological processes in the human body is traceable in the Balinese conceptualisation; a survival of the principles in the Aryurvedic system and the Hindu religion which was once widely disseminated in South-East Asia. On the basis of his study of the Balinese medical manuscripts on palm-leaves (*lontar*), Weck (1937) clearly documented the strong effect of learned medical tradition of the Hindus and contrasted these philosophical-mystical perceptions of the learned medical traditions with the magical beliefs and practices of folk medicine. The Hippocratic-Galenic system permeated the Arab world, where indeed it was preserved, and became linked with the

Islamic faith and. As a consequence of the close historical relationship between Bali and Islamic Java, the principles of the Graeco-Arab medicine have also influenced the traditional Balinese medical system.

Studies in Indonesia and Bali with a medical-anthropological orientation have revealed that the indigenous medical knowledge systems are embedded in an all-embracing equilibrium model of the universe connecting the physical world with the spiritual world, the microcosmos to the macrocosmos, nature to culture; this has been documented by such scholars as Leslie (1976), Geertz (1977), Kleinman (1980), Connor (1982), the works collected in Bannerman, Ch'en & Burton (1983), McCauley (1984), Jordaan (1985) Leslie & Young (1992), Suryani & Jensen (1993), Slikkerveer & Slikkerveer (1995), Hobart, Ramseyer & Leemann (1996), Hobart (2002) and Slikkerveer (2005). Looking more specifically at the Balinese conceptualisation of health and healing, it is obvious that the connection between the physical and spiritual world plays a prominent role. To the Balinese, the world is alive with gods and spirits. It is these supernatural phenomena, including manifestations of the ancestors, gods, (evil) spirits, witchcraft and (black) magic, which dominate the core of man's activities in daily life, including ceremonies, rituals, dances, plays, supernatural possession, physical and mental illnesses, and healing (*cf.* Suryani & Jensen 1993). Today there is still a strong belief among Balinese in black magic and witchcraft and these beliefs have been incorporated into the Balinese traditional medical system (*cf.* Hobart *et al.* 1996).

In the present-day plural medical system in Bali, several systems can be truly said to co-exist alongside each other; each has its own *materia medica*, medical paraphernalia, health and healing practices and techniques, disease classifications, disease aetiology and conceptualisation of the human body. From the perspective of a community member living within a plural medical system, he or she is presented with a range of attitudes towards the different systems available which he or she can adopt.¹³ The majority of people living in developed countries prefer to confine themselves to a single medical system, the bio-medical medical system, as the baseline for their medical reality and knowledge. This collective preference is expressed in the common name used for all health and healing-related knowledge, beliefs and practices which cannot be said to belong to the bio-medical tradition as complementary and alternative medicine (CAM); signifying that they are not part of the mainstream bio-medical system. Among Balinese community members, those individuals who choose to confine themselves fully to a single medical system are in the minority. The majority of the people do not choose between the systems but generate, maintain or secure health by relying on different medical systems chronologically or simultaneously. The two main medical systems in Bali are bio-medical medicine, referred to as modern medicine, and the Balinese traditional system, commonly referred to by the terms *obat Bali asli* or *obat asli* or *pengobatan tradisional*; traditional medicine in this study. Furthermore, in Bali there are various practitioners active who may belong to any of the other types of local or regional traditional medical systems from either the little or great traditions. Aryuvedic and Chinese medicine are well represented and practitioners practising acupuncture, reiki or shiatsu are to be found all over Bali.

Community members have an equal option to confine themselves to either one of the medical systems available when they are confronted with a period of disease and they might use the systems chronologically or simultaneously. Sometimes the medical systems complement each others, but more often they conflict with each other because of inconsistencies in their ideologies, theories and conceptualisations. The community members' conceptualisation of health and healing is not restricted to a single system; they have created their own lay disease theories and categorisations which ineluctably affect their health and

healing practices and their illness behaviour.¹⁴ The underlying conceptualisation binding everything together is the Balinese concept of dynamically balanced integrated wholes which is used to describe the universe, the world of men, the human body and certain offerings. The disturbance of any integrated whole is usually thought to be caused by disharmony which might prelude illness (*cf.* McCauley 1984). Such a disruption to the balance between the wholes, which is widely accepted in traditional medicine, does not necessarily conflict with the perceptions of health and healing held by the modern medical system. Suryani & Jensen (1993) urge physicians and psychiatrists in Bali who practise Western techniques to expand their ideas to include the knowledge and beliefs of the traditional medical system, the supernatural and the work of the *balian* so that they might improve their efficacy.

1.2.3 Community Health in the Pluralistic Medical Configuration

The term community health as used in this study refers to the health of a community, in which health is broadly encapsulated in the WHO definition as a state of complete physical, mental and social well-being and not simply the absence of disease or infirmity (*cf.* WHO 2006b). Community health is shaped by the interrelationship between both the medical and social systems. The state of health of a community is co-determined by political, economic and socio-cultural factors which directly control the availability, accessibility, affordability and quality of, for example, facilities, personnel, programmes, interventions or materials; whether these are for Primary Health Care or other types of health care and contributions to community health provided by either government, privatised institutions or community members.¹⁵ Essential to the concept of community health is that it does not focus solely on curative health care; it specifically includes the health preventive and health promotive activities. The Indonesian government is active in encouraging preventive health care specifically through the department: *Seksi Promosi Kesehatan* of the Ministry of Health. Several more institutions are continuously involved in health promotion and preventive activities as will be elaborated on in Section 5.2.3. Unfortunately the current economically unfavourable conditions have made it non-profitable for insurance companies to invest in health preventive and promotion programmes on the individual level. The media is a popular instrument of the State to advocate its programmes on health prevention and promotion. If there are serious threats caused by the spreading of disease and sickness or when a possible epidemic might break out, all the media are mobilized to prevent further damage. This was the case for the outbreak of polio in 2005, dengue fever in 2005, the bird flu in 2006 and is also brought into action to raise awareness of the constant threat of typhoid, malaria and TBC.

Medical pluralism is a daily reality in Bali. The Balinese see no reason why traditional medicine should not work in conjunction with high tech. modern medicine; from their perspective the technique of the one system is no better than the other. Their only concession is that one applied technique might be more appropriate than another to a specific person with a specific complaint at a specific time in a specific environment. One of the Balinese community members expressed it as follows: *‘There is no great difference between the balian and the doctors. There are those who are skilled and those who aren’t. It depends on the individual and it definitely depends on the disease one is suffering from, to see how good they are. And, in the end, nothing is 100 per cent, no individual and no treatment can cure everyone or everything.’* The pluralistic medical configuration of Bali is demonstrated by remarkable synergies such as the marriage of a modern, trained midwife with a renowned *balian*, both of whom have their practices at their marital house. Community health in Bali as a whole is continuously shaped by a dynamic complex of medical systems which, as a result of their interactions, consequential developments and continuous adaptations, affect health

and healing practices on a day-to-day basis. Balinese community members do make a difference between modern and traditional medicine. It is commonly said that: modern medicine treats and traditional medicine heals.

In this adage, Balinese community members are expressing that the first action made by traditional medicine is to look for the source of the disruption of the disharmony generating ill-health, whereas modern medicine usually focuses on the reparation of the ‘disruption’, healing the symptoms. The previous statement is a brutal generalisation, which unjustly deprives the bio-medical system of its numerous successful achievements and breakthroughs in medical science and health care. Actually, the objections raised to bio-medical health and healing practices does not attack the technical approach but is aimed at the materialism and the objectification of humans. A view shared by members of societies which have a long tradition of bio-medicine, as Bannerman (1983: 11) notes since the 1980s: ‘*a serious reawakening of interest in the emotional, spiritual and irrational aspects of health is expressing itself by the rediscovery of local traditional systems of health care and the importation of traditional practices from abroad*’.

Traditional healers are renowned for their knowledge and use of local flora and fauna in their remedies. Their contribution to community health is both recognised and strongly promoted by WHO (cf. Bannerman *et al.* 1983; WHO 1993). The use of fresh plants in Bali today is not solely related to the traditional medical system; instead it transcends the boundaries of the different medical systems, as will emerge in the following Chapters. Nevertheless, the utilisation of fresh plants for health and healing purposes, despite its promotion by WHO, seems to be losing ground in Bali and serious concerns are being raised about the loss of the knowledge and beliefs related to plants, several of which are even threatened with extinction.

The major force threatening the application of MAC plants is not access to new scientific insights but the transformation of Balinese society into a consumer society. This tendency is felt throughout the whole plural medical system, in which health and healing practices, regardless of their origins, are being commercialised for better and worse. In a consumer society, people search for practical, consumer friendly solutions, therefore they opt for the shorter and faster results which might not produce a 100 per cent satisfactory healing session, but will offer relief within a brief time span. The modern Balinese look for quick fixes, which are usually beyond the agency of the slower acting application of MAC plants. They find these at the *obat warungs*, prescription-free drugs, focused on relieving symptoms; easy, ready to use and affordable. Patients nowadays look for curing techniques which take only a single session, and the time-consuming healing techniques such as the dietary rules commonly advised by *balian* a few decades ago, following the principles of the *usada* of the division of plants into the categories *nyem* (cold) or *tis* (fresh), *dumelada* (neutral, tempered), *angat* (warm) or *panas* (hot), have become uninteresting.¹⁶

1.3 Bio-Cultural Diversity: Contributing to Health in Bali

1.3.1 Biodiversity and Human Health

As Schambra (1997: xv) states: ‘*The staggering rate of irreversible biodiversity loss we are currently experiencing around the globe holds serious consequences for medicine and public health. Plants, animals, and microbes have provided a major source of therapeutic agents for human disease, including chemical leads towards treatment for cancer, glaucoma, malaria, Parkinson’s disease, inflammatory disorders, high blood pressure, and a range of bacterial, fungal and viral infections. Yet, only a tiny fraction of the world’s biological wealth has been*

studied for potential therapeutic benefit'. Indicating the pressing burden which biodiversity loss ushers in because of the loss medicinal value current biodiversity entails, Schambra (1997) touches just upon one of the relationships between biodiversity and human life.

There are many benefits and functions of biological diversity and they can be grouped into a number of categories: ethical and moral values, recreational and aesthetic values, use as a resource for food, medicine, materials, research inspiration and education (utilitarian) and maintenance of the environment (ecosystems and climates) (*cf.* Spellerberg 1998). It can be safely stated that human health, especially quality of life, is intricately interconnected with the biodiversity of the planet on which we live. More immediately, the impoverishment of biological resources in many countries might be regarded as an antecedent to a decline in community or cultural diversity. Indications of this are provided in diet, medicine, language and social structure (*cf.* Pearce & Moran 1994). Technical descriptions of biodiversity often give the impression that science and economics are adequate tools to characterise the qualities of the intricate web of life, but as Posey (1999b: xvii) points out: *'In a world increasingly dominated by mega-modelling, global trading and consumer trends, it is easy to forget that values of plants, animals, landscapes and ecosystems cannot be adequately measured in statistical or monetary terms – and certainly cannot be described using the languages of only a few academic disciplines and markets, no matter how politically favoured and powerful they might be'*. So far, estimates of precise rates of the loss of biological diversity have been hampered by the absence of any baseline measurement (*cf.* Pearce & Moran 1994).

Large amounts of research time are and have been devoted to establishing such a baseline. Even more time is devoted to finding the cause of the decline in biodiversity and establishing the effects of its impact. Commonly accepted contributors to the biodiversity loss are the global climate change, stratospheric ozone depletion, toxic substances in the environment and habitat construction (*cf.* Chivian 1997). Surely, regardless of whether the 'how much', 'by whom' or 'by what', questions can be answered indisputably, is it not as R. Leakey (2008) during his public lecture in Leiden on *Broad implications on Climate Change in East Africa in Terms of Human and Animal Futures* asked, time to start acting and prepare for the consequences of climate change and biodiversity loss, rather than disputing it. Conservation and utilisation are not mutually exclusive concepts. If people are not inclined to deal with the profound ethical and aesthetical implications of the loss of biodiversity, surely they must be sensitive to the serious economic and social costs, such as the negative impact on human health, this brings in its train (*cf.* Töpfer 1999). Since 1987, global communities have been promoting any action which it is thought might achieve the sustainability of the world. International consensus for moving towards the conservation of biodiversity and its sustainable management was reached in 1992 through the endorsement of Agenda 21 in the Convention on Biological Diversity, followed later by the Convention on Climate Change, the Rio Declaration, and the Kyoto Protocol. The ideal striven for is the intention, defined in the 1992 Convention on Biological Diversity, that sustainable development will lead to *'the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits'* (Spellerberg 1998: 1).

Although it is surely time to take action, we have to know where to start, where we stand, which species, genes or ecosystems are at present in severe danger of irreversible damage. The International Union for the Conservation of Nature and Natural Resources (IUCN) is the main authority on the conservation status of species. In 1963, IUCN created a Red List of Threatened Species, known as the IUCN Red List or Red Data List. The IUCN Red List is the most comprehensive inventory of the global conservation status of plant and animal species. Nevertheless, the present status of the plants commonly used for maintaining and restoring

health is blurred, because they might not yet have been researched and their status in the IUCN list is still undecided. Many lists have been compiled by different types of research listing the rare medicinal plants of Indonesia, but these lists vary considerably in species composition. This is very probably the upshot of a lack of clarity on what criteria the rarity was assessed (*cf.* Erdelen *et al.* 1998). One promising initiative is PROSEA (Plant Resources of South–East Asia), an international co-operative programme of which the principal goal is to document information on plant resources in South–East Asia and make them widely available for use by educational, extension, research and industrial sectors, supporting and promoting the sustainable use of resources.¹⁷

Whereas global warming and stratospheric ozone depletion seems to be a remote from everyday reality cause of biodiversity loss to them, Balinese community members are well aware of the toxic substances in their environment and habitat construction. Furthermore, on account of changes in land utilisations, mostly economically driven, shortage of agriculture land is becoming a real problem in Bali, and it seems that the land still used for agriculture is constantly being more damaged because of the use of heavy machinery and pesticides. Several medicinal plants used to grow on the edges of the man-made, steeply terraced rice-fields (*sawah*), but this is now a thing of the past as a consequence of the extensive use of pesticides. Currently, there is a renewed interest in organic agriculture. Despite the downsides such as less bountiful rice harvest a year, people do value and some even prefer organic agriculture not only because it is a sustainable way of pursuing agriculture but also because it is considered to improve the quality of the products. There is a general consensus worldwide that agriculture requires a better solution if it is to produce the enormous amounts of food required for the human population. This means abandoning gathering food from natural, non-controlled sources. The key endorsement of the reciprocal relationship between biodiversity and agriculture by governments was the FAO Global Plan of Action (GPA) for the Conservation and Sustainable Use of Plant Generic Resources for Food and Agriculture, in Leipzig (1996) (*cf.* Heywood 1999).¹⁸

Food depletion or further intoxication of human food has undeniably negative effects on human health. However, there is a hidden danger: various effects of these menaces might only become visible in the long term. If the loss of biodiversity is not halted, we are facing the following human health consequences (*cf.* Chivian 1997):

- loss of potential medicine; which may contain valuable medicinal components for treating human diseases which are at present untreatable and which cause enormous human suffering;
- loss of medical models; with a loss of species, we are also losing valuable medical models which may help us understand human physiology and disease better;
- infectious diseases; alterations in biodiversity disrupt the equilibrium of ecosystems resulting in the emergence or re-emergence of infectious diseases in man.

In conclusion, as a summing up of the consequences which biodiversity loss holds for human health, the following quote from the National Institutes of Health Report to the US Senate on December 20, 1994, Medical Products from the Natural World and the Protection of Biological Diversity is very apt (Quoted from Bailey & Grupenhoff 1997: 353-354): *‘Perhaps the best way to illustrate the importance of biodiversity is by analogy to the diversity of human knowledge stored in books. When the library in Alexandria was consumed by fire in 391 AD, when Constantinople was sacked in 1453, or when Maya codices were burned in the 16th century auto-da-fe, thousands of works of literature were destroyed. Hundreds of works*

of genius are now known to us only by their titles, or from quoted fragments. Thousands more will never be known; several millennia of collective human memory have been irretrievably lost. Like books, living species represent a kind of memory, the cumulative record of several million millennia of evolution. Every species has encountered and survived countless biological problems in its evolutionary history; molecules, cells and tissues record their solutions. Because we are biological being ourselves, nature offers a vast library of solutions to many of our current health, environmental and economical problems. Unfortunately, that precious and irretrievable information is now being destroyed at an unprecedented rate.'

1.3.2 Cultural Diversity in a Globalizing World

There is an extensive discussion about what the term culture means; often it is misused as a synonym for society. Tomlinson (1999) defines culture as a concept and an entity in relation to globalisation and states that globalisation disturbs the way we conceptualise 'culture'. He argues that, for a long time, culture has had to contend with the problem that it has been tied to the idea of a fixed locality and therefore *'culture should (at least) be seen as existentially meaningful symbolization and experience'* (Tomlinson 1999: 83). The study of material culture, consumption patterns and the way people deal with the mass consumption society is growing in importance as a tool by which to map cultural differences and changes (cf. Van Leeuwen 1997). Nevertheless, culture is more than what meets the eye, it transcends folklore and material culture, it is *'the embodiment of values, institutions and patterns of behaviour. It is a composite whole representing a people's historical experience, aspirations and world view'* (Posey 1999a: xi). In Geertz' terms we should think of cultural processes as the construction of meaning as *'a context in which [events] can be intelligibly ... described'* (Geertz 1973: 14).

The term culture used in this research refers to the socio-cultural system, a totality of socially transmitted behaviour patterns, arts, beliefs, institutions and all other products of human work and thought; a system of symbols and meaning, operating as a determinative structure for human behaviour. Balinese culture refers to the collective of patterns, traits and products as expressed by the Balinese people. All human societies and cultures, even the most 'traditional', are enmeshed in change (cf. Altwaijri 1997; Posey 1999a; Tomlinson 1999; Agung 2005; Slikkerveer 2005; Hauck 2006). Therefore, culture as used in this research should not be perceived as a static autonomous structure of meaning, but as a dynamic process.

Cultural diversity can be understood as: *'the variety of human expression and organization, including that of interactions among cultural groups and between these groups and the environment'* (Harmon 1998: 353). Languages are the carriers of many cultural differences, and their variety constitutes the building blocks of cultural diversity. Consequently, languages are arguably the fundamental raw materials of human thought and creativity (cf. Maffi 2004). Cultural diversity is very apparent in the more obvious cultural differences which exist between peoples, such as language, dress and traditions, but it is also present in the significant variations in the way societies are organised, in their shared conception of morality and in the ways they interact with their environment. Today, the right to cultural diversity has become one of the rules of international law, corroborated by the Charter of the United Nations Organization, as well as the treaties and conventions governing cultural co-operation relations in the international community (cf. Altwaijri 1997). The first article of the declaration on the Principles of International Cultural Co-operation (Issued by the General Conference of UNESCO, at its 14th Session, 4 November 1996), states that:

1. each culture has a dignity and a value which must be respected and preserved;
2. each people shall have the right and the duty to develop its own culture; and
3. all cultures, with their rich diversity, differences and mutual influence, constitute part of the heritage owned in common by all mankind.

Nowadays, a growing amount of attention is being paid on the negative impact of globalisation, tourism and modernity on present-day cultural diversity, especially in the smaller indigenous communities. Balinese society and culture have been exposed to international influences to an almost overwhelming degree over the past few decades. The growth of mass tourism in particular has had a major impact on the island, the expansion of economy, not least the authority of metropolis and capital of Indonesia, Jakarta. Tomlinson (1999) states that it is very unlikely that globalisation will actually trigger the feared homogenisation. Proof of his statement is to be found in the obviously diverse world we encounter today. Globalisation, which has many more sources than simply technologically advanced communication systems, is not a one-way process. Therefore it should at the least adduce the possibility that, if global structures can affect the local, the local can also intervene in the global. Globalisation and localisation occur simultaneously, in tandem with exogenous modernising processes, local processes are strengthening and the Balinese are appearing increasingly reluctant to relinquish the identity on which they constantly are working themselves (*cf.* Pitana 1999).

Balinese have always had the gift of being able to identify and externalise their culture for others. With the advent of full colonial control in Bali in the nineteenth century, the pressure increased on the Balinese to produce ready summaries of what Bali was all about and, nowadays, Balinese seek to identify what is essentially Balinese for such outsiders as tourists, academics and development planners (*cf.* Vickers 1996a). The advent of tourism can be either a challenge or a threat, and it is simultaneously an opportunity for Balinese to forego or find their identity, religion, art and many traditions, or what Hobsbawm (1983) called the '(re)invention of tradition' (*cf.* Pitana 2000). As Picard (1996) has argued, 'touristic culture' has been thoroughly internalised by the Balinese, paradoxically contributing to a reification of that which is defined as authentically Balinese and it also becomes 'an integral part of a process of cultural invention' (*cf.* Connor & Rubenstein 1999). The Balinese themselves engage in an active, constant debate on the issue of what is known as *balisasi* or *kebalian* (being Balinese) (*cf.* Salan & Maretzki 1983). Awareness of the indivisible unity of religion (*agama*), tradition (*adat*) and culture (*budaya*) is considered essential by the Balinese if their identity is to remain intact (*cf.* Hobart *et al.* 1996; Picard 1999).¹⁹ The focal point in these debates is their desire to keep the control of their own culture, which they are aware is a continuously changing structure, in their own hands, instead of ceding this control to outsiders, regardless of their origin. Both changes and evidence of stability are discernible at present in Bali; Balinese culture is a living dynamic system (*cf.* Suryani 1988).

Suryani & Jensen (1993) argue against tourism and such other external forces as globalisation, alleging these destroy the Balinese culture. These authors state that, against all predictions, the Balinese have kept their socio-cultural structure and that the island of Bali has retained much of its natural scenic beauty in spite of the pressure exerted by a major tourist industry and the rapid infusion of modern technology. Furthermore, even more strikingly, the Balinese have maintained their fundamental centuries-old customs. The Balinese absorb material culture without a break in tradition. They have the ability to assimilate new, foreign ideas into their traditional forms, and inject new life into their culture (*cf.* Covarrubias & Covarrubias 1937; Ramseyer 1986; Jensen & Suryani 1992).

Interestingly, the basic values, shaped by religious and communal social interactions, of which a basic characteristic is the maintenance of equilibrium of forces, have remained remarkably intact (*cf.* Ramseyer 1986; Jensen & Suryani 1992). Adaptation to the disturbances in the cultural equilibrium will continue to occur, however conformism has never been part of the Balinese culture. This is encapsulated in the important ‘cultural difference’ concept of *desa-kala-patra* which takes into account the differences from village to village (*desa*), from time to time (*kala*) and from cultural pattern to cultural pattern (*patra*) (*cf.* Jensen & Suryani 1992; Pitana 2000; Ramseyer 2001; Agung 2005). The Balinese celebrate their differences but their core basic elements are the same as those which make them all Balinese. Cultural conservation in Balinese culture is the constant re-evaluation of the Balinese identity, rather than the preservation of the *status quo*.

Culture matters to globalisation in the obvious sense that it is an intrinsic aspect of the whole process of complex connectivity (*cf.* Tomlinson 1999). In the words of Giddens (1990: 36) ‘*Cultural connectivity introduces the idea of the reflexivity of global-modern life. ... The idea builds upon the inherent reflexivity of human beings: the capacity we all have to be constantly aware of ourselves as acting in the processes of acting, to ‘routinely ‘keep in touch’ with the grounds of what [we] do as an integral element of doing it’.* Over the past few decades, the complementary importance of cultural diversity, which is reflected in the Traditional Ecological Knowledge systems (TEK) on natural resource management including the use and conservation of plants and animals, has been widely documented for various sectors of the society by such disparate fields as anthropology, agriculture, fisheries, forestry, ecology, biology, botany and medicine (*cf.* Slikkerveer 1999).²⁰ Retaining their Balinese cultural identity and their Traditional Ecological Knowledge systems (TEK) contributes to the conservation of the bio-cultural diversity of the world and specifically of Bali.

1.3.3 Bio-Cultural Diversity Conservation of MAC plants

Unavoidably, in a medical anthropological study with an ethno-botanical focus, a decision has to be made about the place of humans in the world today. The intellectual debate on the relationship between ‘nature’ and ‘culture’ is one of the longest and most controversial in history. In essence it is a presentation of two extreme perspectives; at the one end are those whose views which separate humans from, and often dominant over, other life forms and at the other end are those whose views placing humans squarely within an interdependent web of life, as an intrinsic component of nature (*cf.* Maffi 2004). Diversity, both biological and cultural, is intrinsic to life itself and to the cultures and societies which have co-evolved with the natural and metaphysical world which surrounds them. Humans in this study, following Posey’s approach (1999a), are seen as an integral part of biodiversity, not merely as observers but as users of the biological diversity and participators of cultural diversity. A strong, undeniable relationship exists between the biological and cultural diversity which is constantly changed keeping pace with the interrelationships among and between them, continuously re-evaluating the parameters of human existence. The link between cultural and biological diversity is reinforced by the findings of Durning (1992), which indicate that six of the nine countries which together account for 60% of human languages, a major indicator of cultural diversity, are also mega-diversity centres in the biological sense with exceptional numbers of unique plant and animal species and Indonesia is one of those six countries.

The term bio-cultural diversity, expressing the relationship between biological and cultural diversity was first affirmed in the Declaration of Belém (1988).²¹ Then, in 1996, the term bio-cultural diversity conservation was elaborated more specifically by Slikkerveer

(1996) in the context of agricultural knowledge systems in Kenya, East Africa. Today, it is widely accepted that the great and rapid extinction of the biodiversity of plant and animal species poses a threat to the eventual survival of humankind. However, even more alarming is the loss of cultural diversity in terms of vanishing traditional knowledge which, in some cases, seems to surpass the loss of the plant species themselves (*cf.* Pearce & Moran 1994; Van Seters 1997; Slikkerveer 2000b). In recent years, greater public awareness of and concern about the environmental issues which are affecting their livelihood and subsequently lowering their quality of life have emerged among ASEAN people. This mind-shift has prompted calls and demands for conservation measures and regulations to combat pollution by the governments in ASEAN countries, either individually at national levels or collectively at the regional levels. Currently, the environment and biodiversity conservation are recognised by many of the ASEAN leaders as issues of central rather than of peripheral importance (*cf.* Ismail 1998).

Most traditions recognise the link between health, diet, properties of different foods and medicinal plants, and horticultural and natural resource management practices, all within a highly articulated cosmological and social context (*cf.* Posey 1999b). Local knowledge encompasses information about locations, movements and other factors explaining spatial patterns and timing in the ecosystem, including sequences of events, cycles and trends. Direct links with the land are fundamental and obligations to maintain these connections form the core of individual and group identity (*cf.* Posey 1999b). Balinese community members see a solution to the problem of the diminution of local knowledge by focusing their community resource management programmes on the reinforcement of local social, cultural and economic institutions, thereby raising the level of the understanding and knowledge about the construction of artefacts and the conservation of local knowledge.

The cosmovision of a society encapsulates the spiritual and religious values and knowledge and belief systems of its population. The articulated cosmological Balinese context and the message it contains is cocooned in and kept alive by the stories, myths and sagas, taught by word of mouth, images and performances to the Balinese children. Above all it is the great epics, the *Ramayana*, *Mahabharata* en *Calon Arang*, which unequivocally depict the norms and values and virtues to be striven for by the individual and the pitfalls of human life. Agung (2005: ix) observes that the Balinese resilience is based on: *'a complex web of inherent predisposing, enabling and environmental factors manifest in the tangible (sekala) and the intangible (niskala), among others the concepts of triloka and the tri hita karana, respectively the Balinese cosmovision and philosophy of life, as well as a host of other concepts such as the desa kala patra and institutions such as the desa and banjar which practices the elements keeping the Balinese culture alive'*.

The Balinese cosmovision is based on the division of the universe into three related dimensions (*tri loka*), encompassing the underworld (*buhr*), the world of humans (*bwah*), and the world of the gods, spirits and ancestors (*swah*). *Tri angga* is a concept related to *tri loka* and it subdivides everything else in the Balinese cosmos into three components: *nista* (things located down or low); *madia* (middle or neutral) and *utama* (high and lofty) (*cf.* McCauley 1984; Suryani & Jensen 1993; Pitana 2000; Agung 2005). For centuries, *tri hita karana* has been guiding local people's behaviour in all aspects of life, including the maintenance or restoration of a harmonious relationship with their environment. For the Balinese, the implementation of this principle in their intervention strategies in the environment embodies their conception of the conservation of the diversity of life, and is palpably expressed in their use, management and conservation of the diverse sources (*cf.* Agung 2005). The *tri hita karana* concept shapes the attitude of the Balinese and teaches them that men will achieve

happiness if they are able to create an harmonious relationship with the three aspects of the concept, namely with God (*Sang Hyang Widhi Wasa*), the macrocosmos or the total physical environment of man both nature and social (*buana agung*) and the microcosmos or the person him- or herself with his or her bodily needs, thoughts and feelings (*buana alit*) (cf. Suryani & Jensen 1993; Pitana 2000; Sacchette 2002; Agung 2005).

The *desa kala patra* concept is defined by Pitana (2000: 42) as a: ‘*human ecology concept, in which man and society always try to adjust to environment which has an influence to their life*’. *Tri hita karana* is, the *corpus* of the Balinese Knowledge-Belief-Practice complex, also known as the *corpus-cosmos-praxis* complex. *Tri hita karana* and its supporting concepts help community members to practise these teachings. A good example is *aturan awig* in which the preservation of the rich cultural of Bali is laid down and the ceremonial *tumpek*, the birthdays of nature, by which the Balinese Hindu is reminded of God’s gifts to men through nature. The source of *Desa kala patra*, another one of the supporting concepts, is the holy book *Wrehaspati Tatwa* which is one of the most important expressions of philosophy on harmony and balance because it is in essence a philosophy of adaptation. It advises mankind to be prepared to face the changes time brings, since all acts and behaviour should fit the place (*desa*), time (*kala*) and condition (*patra*) (cf. Agung 2005).

Despite the richness of its ‘gifts’, on account of the strains on its natural sources caused by both a growing population and the negative effects of practices commonly motivated by economic aspirations, specifically by the tourist industry, loss of biodiversity and the invasion of its cultural life, Bali is under siege. The Balinese themselves are starting to realise that their surroundings and their reality are both changing. There is a growing appreciation of individualism and there is a breakdown in the community cohesion. Today Balinese community members are looking for a way to safeguard the bio-cultural diversity conservation of MAC plants and simultaneous to protect Bali as a whole and recover the *gaya* (powerful, energetic) way of living in Bali by using its resources in a sustainable way. Nevertheless, present-day reality is far from this perfect picture; economic and political obstacles loom large in obstructing this ideal life and making a sustainable living a goal everyone can aspire to. Taking right into their own hands, key Balinese figures are actively involved in a kaleidoscope of initiatives and programmes devised to conserve bio-cultural diversity in Bali for future generations. There are simply too many initiatives to name them all: initiatives started by dreamers, idealists, academics, policy makers, politicians, health workers, teachers, traditional healers, *adat* leaders, priests, fathers and mothers. Most promising are those initiatives which concentrate on children. Schools and private initiatives, commonly steeped in the Balinese Hindu philosophy on life, have begun to reinforce the bond between children and the nature surrounding them by taking them out of their urbanised environment into the forests, the mountains, the shores or the *sawahs*, just to have fun. The whole intention of these programmes and initiatives is to implant in the children of today fond memories and a deep appreciation of nature. By inculcating the instructions and beliefs about the Balinese ideal way of living in a relaxed atmosphere, they hope they are laying foundation stones, since after all the children of today are the economists, politicians, academics, leaders, mothers and fathers of tomorrow.

1.4 General Aim and Specific Objectives

The general aim of this study is to document, describe and analyse the Balinese community members’ knowledge of, beliefs in and practices pertaining to medicinal, aromatic and cosmetic (MAC) plants in the context of community health and the bio-cultural diversity conservation of MAC plants. To this end, both qualitative and quantitative research

techniques have been used to analyse the various categories of factors in relation to community members' reported use of fresh MAC plants as home remedies within the wider scope of community health in the pluralistic medical configuration of Bali and whether the community members' behaviour exhibits a sustainable character towards both the conservation of the MAC plants diversity in terms of genes, species and ecosystems preservations and to the conservation of the local knowledge, beliefs and practical applications of the MAC plants.

The various categories of factors analysed in relation to the community members' utilisation and bio-cultural diversity conservation of MAC plants are approached from the local Balinese (*emic*) point of view.²² Particular attention is paid to the 'invisible' factors: belief systems and local philosophies pertaining to nature and the environment, which are likely to play a determinant role in guiding the Balinese community members' MAC plant utilisation and the bio-cultural diversity conservation of MAC plants. To realise this general aim, taking into consideration that there are three main aspects on which this study of the Balinese community members' knowledge of, belief in and practices pertaining to MAC plants is focused, namely: community health, the conservation of MAC plant resources and the preservation of the local culture on MAC plants, seven specific objectives have to be achieved:

- *firstly*: to provide a description of the Balinese research setting as a unique part of the developing nation Indonesia with its own distinctive geography, population and culture;
- *secondly*: to describe and analyse the *emic* perspective on the knowledge, belief and utilisation of fresh MAC plants;
- *thirdly*: to present the construction of the Balinese *emic* MAC plant classification;
- *fourthly*: to describe the complex aspects of the pluralistic medical configuration in Bali affecting community health and the Balinese knowledge, beliefs and practices pertaining to promotive, preventive and curative health and healing practices, in terms of traditional and modern medicine;
- *fifthly*: to describe and analyse Balinese knowledge of, belief in and practices pertaining to fresh MAC plants in relation to the sustainable use of these plants, substantiating the biodiversity conservation of the island;
- *sixthly*: to describe and analyse Balinese knowledge of, beliefs in and practices pertaining to MAC plants in relation to the preservation of the cultural diversity of the island;
- *finally*: to analyse the interrelationships between the various categories of factors, identifying the interaction among the factors on the Balinese community members' utilisation and bio-cultural diversity conservation of MAC plants.

It is hoped that the theoretical, methodological and practical implications of the study will be able to be formulated as important results which will encourage further theoretical developments in the interdisciplinary fields of Medical Anthropology and Ethno-botany related to bio-cultural diversity and sustainable development. This study uses the Ethno-botanical Knowledge Systems (EKS) analysis of the perception and uses of the medicinal plant resources as a general approach in the context of action-related decisions made by local Balinese people in real-life situations. The related Ethnosystems Approach, developed in Leiden, will hopefully generate new information about the impact of the classification systems and the dynamics of interrelationships in the ethno-botanical/medical-anthropological processes operating in the socio-medical environment of Balinese communities.

In the past, incorporation of indigenous knowledge for practical problem-solving was easily absorbed into 'science' where it was designated in a rather off-handed fashion as 'common knowledge'. Generally speaking, this practice was opposed by supporters of the conventional views of Western 'scientific' or 'value-free' knowledge. This study will be one stone in constructing a bridge to close the artificial gap between 'scientific' knowledge and 'traditional' knowledge, supporting Barsh's (1999) perception of Traditional Ecological Knowledge (TEK) as a specific part of the overall Indigenous Knowledge Systems (IKS) systems, in which he states that they certainly to some extent scientific because these systems are empirical, experimental and systematic and therefore compatible with global science. It is hoped that the results will underscore the importance of what tend to be dismissed as the 'invisible' factors in belief systems and local philosophies on nature and environment and put the Balinese cosmovision in relation to the utilisation and bio-cultural diversity conservation of MAC plants.

On the basis of the empirical data collected by qualitative and quantitative research techniques and carried out in four sample villages in what is known as the 'cradle of Hindu-Balinese culture', the central-south-eastern part of Bali, the utilisation of MAC plants is placed in its realistic medical pluralism context, showing that the practices pertaining to fresh MAC plant utilisation for health and healing practices essentially transcend the boundaries of the knowledge and belief systems encompassed by a single medical system. Thereby the lay knowledge-practices-belief paradigm, which combines theories and approaches from the main medical systems into an integrated whole, will be documented, legitimising the various application of MAC plants in the medical pluralistic situation. Furthermore, using this extensive empirical data set, this study documents and analyses the bio-cultural diversity conservation of MAC plants in relation to the principles and processes of sustainable community development.

The methodological implications of the study are very important. The application of the Ethnosystems Approach and the defined multivariate conceptual model in this study considerably substantiate the concept of 'Evidence-Based Bio-Cultural Conservation' which promotes the selection, analysis, understanding, evaluation and integration of meaningful and applicable evidence of bio-cultural management and conservation in community development activities. Drawing from the work on conservation of medicinal plants by Akerele, Heywood & Synge (1991) and Bodeker *et al.* (1997), the theoretical orientation is largely provided by Martin (1994; 1995) who focuses in his perspective on ethno-botany, health care and biodiversity conservation on the complex issues related to the convergence of ethno-botany and conservation in the global people and plants initiative of WWF, UNESCO and Kew. The practical implications of the study include an insight into the community members' knowledge of, belief in and practices pertaining to MAC plant utilisation, taking the current medical pluralistic situation and the identification of factors which heavily affect the utilisation and bio-cultural diversity conservation of MAC plants into account. These insights on MAC plant utilisation and bio-cultural diversity conservation can be applied to more extensive policy development in order to contribute to community health improvement and the bio-cultural diversity conservation of Bali.

1.5 Structure of the Study

Chapter 1 introduces the overall developments of the individual aspects of this study: Bali, the research island often lauded as a 'paradise on earth', the application of plants to human health, the complex health and healing reality in Bali in which the utilisation of MAC plants is encapsulated, the consequences of biodiversity loss for human health, the concept of

cultural diversity in a globalising world and, finally, the need for bio-cultural diversity conservation to safeguard the community members knowledge of, beliefs in and practices pertaining to MAC plants.

Chapter 2 is an overview of the theories and concepts used in this study. First, since the utilisation and bio-cultural diversity conservation of MAC plants is approached within the framework of ethno-botany, the discipline and specifically the concept of ethno-botanical knowledge systems are discussed. In Section 2.2, the concept of medical pluralism is introduced focusing on the conceptualisation and classification of medical systems, community health and health care utilisation. Section 2.3 describes the biological and cultural diversity conservation of MAC plants and concludes with the foundation of bio-cultural diversity: the ‘inextricable link’ between nature and culture.

Chapter 3 presents the applied research methodology and the specific qualitative and quantitative research methods and techniques used in this study. Section 3.1 introduces the Ethnosystems Approach, the leading methodological approach in this study, featuring three basic elements: the historical perspective (HP), the Leiden concept of ‘field of ethnological study’ (FES) and the participant’s view (PV). This is followed by the multivariate model and its operationalisation into measurable variables. Section 3.2 discusses the various qualitative and quantitative methods and techniques used to collect the data to substantiate the knowledge of, beliefs in and practices of the Balinese community members pertaining to fresh MAC plants in relation to community health and bio-cultural diversity conservation. Section 3.3 concludes with the introduction of the statistical analyses of the variables identified within the block of factors in relation to the utilisation and bio-cultural diversity conservation of MAC plants applied in this relational research.²³

Chapter 4 describes the research setting of this study. Section 4.1 highlights the geography and biodiversity of the research setting in the broader context of the Indonesian Republic. Section 4.2 is devoted to the Balinese, beginning by highlighting the historical developments leading up to current cultural diversity in Bali. This is followed by a sketch of the current cultural diversity of Bali. Section 4.2 features the keystones of *the* Balinese, the research population of this study who live in central-south-eastern Bali, the social organisation, the *Hindu Dharma*, the main religion of the island and the Balinese philosophy of life. Section 4.3 concludes with an introduction to the four sample villages and their socio-demographic and socio-economic profiles.

Chapter 5 discusses the broad spectrum of health and healing practices in Bali. Section 5.1 concentrates on the utilisation of MAC plants; the *emic* classification of the MAC plants reported and cites the reported utilisation of MAC plants in relation to the type of user and intended application. Section 5.2 sketches the wider context of community health in Bali, the medical pluralism, in relation to which MAC plant utilisation has to be understood. The focus is on the role of fresh MAC plants in the traditional and modern medical systems and in promotive, preventive and curative health and healing practices. Section 5.3 concludes with the conceptualisation of health, illness and disease and the *emic* classification of diseases.

Chapter 6 addresses the bio-cultural diversity conservation of MAC plants by the community members. Sections 6.1 and 6.2 discuss biodiversity conservation and cultural diversity conservation, focusing on the actions of the Balinese themselves. Section 6.3 puts the bio-cultural diversity conservation and the sustainable use of natural and social resources in the island in relation to the ancient Balinese-Hindu principle *tri hita karana* and evaluates both the threats and opportunities posed by tourism, which is often blamed as the source of natural and social deterioration in Bali and the utilisation of MAC plants, which is perceived as a valuable contributor to community health in Bali.

Chapter 7 presents the quantitative analyses of the knowledge-practice-belief complex influencing MAC plant utilisation and bio-cultural diversity conservation of the members of the Balinese community. Section 7.1 documents the steps taken to translate the measurable phenomena into the intended variables. The final three Sections present the statistical analyses; the bivariate, multivariate and multiple regression analyses of the variables and the blocks of factors of the conceptual model used to study the interrelations of the various blocks of factors of MAC plant utilisation and bio-cultural diversity conservation.

Finally, Chapter 8 presents the conclusions and the theoretical, methodological and practical implications of this study, documenting, describing and analysing the Balinese community members' knowledge of, belief in and practices pertaining to medicinal, aromatic and cosmetic (MAC) plants in relation to community health and bio-cultural diversity conservation of MAC plants.

Notes

- ¹ The term traditional is used in this study following Posey (1999b) who bases the definition of traditional on the perception of the Four Directions Council (1996) of Canada: '*What is 'traditional' about traditional knowledge is not its antiquity, but the way it is acquired and used. In other words, the social process of learning and sharing knowledge, which is unique to each indigenous culture, lies at the very heart of its 'traditionality'. Much of this knowledge is actually quite new, but it has a social meaning, and legal character, entirely unlike other knowledge. Traditional livelihood systems, therefore, are constantly adapting to changing social, economic and environmental conditions*' (Posey, 1999b:3).
- ² In the last few decades omens have appeared, interpreted by the Balinese as possible portents of the *kali yuga*: the 'age of chaos', preceding radical change in the Hindu cyclical concept of time (*cf.* Connor & Rubenstein 1999). These omens include such ecological disasters as the fires in Kalimantan and Sumatra in 1997, the devastation wrought by the tsunami on the shores of North Sumatra in 2004 and the shores of Java in 2006, the numerous severe and less severe earthquakes and volcanic eruptions in Sumatra, Java and Bali up to 2007, the changing weather pattern, making it hard to predict the beginning and end of the rainy season. There are also such man-made economic disasters as the collapse of the Indonesian economy at the end of the 1990s and the global crisis in 2008, and the growing political and social instability bringing disruption in cultural and social constraints and destruction, expressed in the bombings in 2002 and 2005. Despite these disasters, the Balinese simply seem to be able to bounce back and are more than ever motivated to continue to strive for that ideal picture of a happy and healthy life for all.
- ³ See Appendix I for the full text of the Alma Ata Declaration (1978).
- ⁴ See Appendix V for an overview of health-related Millennium Development Goals (2006).
- ⁵ See Appendix III for the full text of the Chiang Mai Declaration (1988).
- ⁶ *Lontar*, the classical palm-leaf manuscripts, are valued for their content and are deemed to be objects in themselves, receptacles of mystic power, *kesaktian*. This energy can be conferred upon others by suitable incantations, offerings and holy water which has been in contact with the manuscripts (*cf.* Hobart *et al.* 1996). Several of the original family-owned *lontar* are currently kept in the Netherlands at the KITLV, Leiden. Copies of the original *lontar*, often family-owned, are kept in the *Gedong Kirtya* in Singaraja.
- ⁷ '*The Jamu companies: Martha Tillar, P.T. Nyonya Meneer Semarang (Jamu Jawa Asli), Mustika Ratu, Jamu Darmi, Jamu Indonesia Simona, Deltomed Laboratories, Jamu Borobudur, Jamu Jago, Jamu Air Mancur, Jamu Ibu, Jamu Sido Muncul, Jamu Sari Ayu, Indofarma, Berial Sumber Medica, are some of the names of the by the Indonesian Jamu Association recognizes 500 brands*' (Beers, 2001: 49).
- ⁸ The term practitioner is used in this study to refer to any type of health care provider within the framework of any of the medical systems. The term practitioner is also used in this study for all bio-medically trained health providers as well as those working and/or trained in the local or regional medical systems.
- ⁹ Bio-active compounds or active ingredients in relation to herbal medicine refer to: '*ingredients of herbal medicines with therapeutic activity. In herbal medicines where the active ingredients have been identified, the preparation of these medicines should be standardized to contain a defined amount of the active ingredients, if adequate analytical methods are available. In cases where it is not possible to identify the active ingredients, the whole herbal medicine may be considered as one active ingredient*' (WHO 2000: 4).
- ¹⁰ See Appendix I for the full text of the Alma Ata Declaration (1978).

- ¹¹ The terms ‘modern medicine’, ‘modern health care’ and ‘modern system’ are used in this research to refer to the contemporary biomedical system and its professionals and institutions.
- ¹² See among others sources for a description of the Hippocratic-Galenic or ancient Greek medical system Said (1983), for the Ayurvedic medical system Kurup (1983) and for the Chinese medical system Pei (1983).
- ¹³ Following the remark of Foster and Anderson (1978: vii), in this gender-conscious era the use of personal pronouns often presents difficulties. It is hoped that reader will realise that when ‘he’ is used in a generic sense, ‘she/he’ may be read at one’s discretion.
- ¹⁴ At many points during ‘the course of the illness,’ medical and social decisions must be made, roles re-adjusted, and attitudes changed to conform to the reality of the situation. Illness behaviour, the most general of these terms, has been defined as the way in which symptoms are perceived, evaluated, and acted upon by a person who recognises some pain, discomfort, or other sign of malfunction. Illness behaviour may occur in the absence of sick roles and patient roles (*cf.* Foster & Anderson 1978).
- ¹⁵ Primary Health Care as defined in the Declaration of Alma Ata (1978) is based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost which the community and the country can afford to maintain at every stage of their development in the spirit of self-determination.
- ¹⁶ The three or five division of plants into *nyem* (cold) or *tis* (fresh), *dumelada* (neutral, tempered), *angat* (warm) or *panas* (hot) is related to the theoretical division of diseases following the *usada* into *panas* (hot), *nyem* (cold) and *sebaa* (neutral or middle, hot-cold) and are meant to counteract them.
- ¹⁷ PROSEA operates as an autonomous, non-profit international foundation registered in Indonesia. PROSEA is based in Bogor, Indonesia, and is jointly managed and implemented by a network of institutions in five South-East Asian countries (Indonesia, Malaysia, the Philippines, Thailand, and Vietnam).
- ¹⁸ The GPA (Food and Agriculture Organization of the United Nations. 1996) was prepared with the active participation of 155 countries, and the public and private sectors. It contains the priority actions they identified, at local, national, regional and international levels and it provides an integrated framework for systematic, rational, balanced and equitable co-operation. There was no agreement on financing for the Plan (generally estimated at \$130-300 million per annum) and the Leipzig Plan has not yet been formally operationalised at the international level. Responsibility for the implementation of Leipzig rests with governments through the FAO Commission. See Appendix IV for the full text of the Leipzig Declaration (1996).
- ¹⁹ ‘*Adat*’ is a word of Arabic origin borrowed by Islamized populations in the Archipelago to refer to indigenous ‘customary law’ as opposed to imported ‘(religious) law’ (*syariah, hukum*). Introduced to Bali by the Dutch, the word ‘*adat*’ replaced a varied terminology for variable local customs: ‘*kerta, palakerta, dresta, catur dresta, sima, tat krama, tat loka cara*– which had ‘a field of meanings covering ritual obligations, social institution, legal regulation, and ancestral evocation’ (Warren 1993: 4).
- ²⁰ Indigenous Knowledge Systems (IKS) refers to the indigenous or traditional knowledge, innovations and practices complex. Since there is no standardization of the term, literature on the concept uses a variety of acronyms such as Local Knowledge (LK), Indigenous Knowledge (IK), Indigenous Knowledge Systems (IKS), Traditional Knowledge (TK) and the like. In this dissertation the term Indigenous Knowledge Systems (IKS) and Traditional Ecological Knowledge (TEK) will be used.
- ²¹ See Appendix II for the full text of the Belém Declaration (1988).
- ²² The *emic* view, as opposed to the *etic* view, looks at cultures from within, allowing the researcher to conceptualise the community studied on the basis of local constructs and concepts. Consequently *emic* classifications are those drawn from the way local people perceive things with their own eyes and expressed in their own language whereas *etic* classifications are borrowed from the way the researcher perceives and classifies the world (*cf.* Martin 1995).
- ²³ Rosnow and Rosenthal (2002: 15) define research as relational when two or more variables or conditions are measured and related to one another.

2 Theoretical Orientation

The purpose of this Chapter is to present an overview of the theories and concepts used in this thesis. The point of departure is the Knowledge-Belief-Practice paradigm used as a basic approach to studying human behaviour. This leads to the analysis of the utilisation and bio-cultural diversity conservation of MAC plants. The first step is the introduction to the development of the research field of ethno-botany. This is followed by an elaboration of the ethno-botanical knowledge system (EKS) which explicates the local knowledge of, belief in and practices pertaining to plants. EKS is a specification of a Traditional Ecological Knowledge system which contains the potential to improve agriculture, to promote natural resources management, to encourage bio-cultural diversity conservation and, finally, health care. The ethno-botanical knowledge systems approach, on which this study rests, places the *emic* point of view central. The final part of Section 2.1 is devoted to MAC plant utilisation in the context of ethno-botanical knowledge systems and medical pluralism.

The next step on the ladder is the introduction to the theories and concepts related to medical pluralism. Although often dichotomised, the medical pluralistic system is richer than the two commonly identified main medical systems: the modern medical system and the traditional medical system. Community health in Bali is affected by a dynamic complex of medical systems and their interactions, developments and adaptations. Each medical system is based on its specific disease theory system, including knowledge and beliefs about the nature of health, the aetiology of illness and disease and the remedies available. Consequently, it presents the reasoning on which can be developed both curative health care and its other two pillars, promotive and preventive health care¹. Interactions between the different medical systems are a daily reality, which inexorably influences policy makers, the practice of medicine and community health. This chapter will adduce proof that medical systems cannot be understood solely in terms of their component parts. Everywhere at all times, medical systems are cultural and social constructs which pervade the inclination of the individual and the society in efforts to mobilize resources to restore, maintain or improve an individual's health.

The final step is to examine the theories and concepts of bio-cultural diversity conservation in relation to MAC plants. Recently, global awareness of the importance of the conservation of biodiversity, which has elicited strong support from many international organisations, development agencies and research institutes, has drawn attention to the negative consequences of the dramatic loss of species, genes and ecosystems for the future of humankind, and it has pertinently led to a growing concern about the related, similarly disappearing, cultural diversity in terms of traditional and indigenous knowledge and practices related to natural resources management and conservation. As stated at the end of Section 2.3, it is in this 'inextricable link', which requires respect for both biological and cultural diversity, in which the key for sustainable use of the natural resources of the world lies.

2.1 MAC Plant Utilisation

2.1.1 The Field of Ethno-botany

The term ethno-botany was first introduced in 1896 by the American botanist John W. Harsberger. It then encompassed the academic study of 'plants used by primitive and aboriginal people'. Nowadays the term ethno-botany refers to the study of the interactions

between people and plants (*cf.* Martin 1995). The rather static study of local ideas, taxonomies and classifications used by local communities espoused by cognitive anthropology was developed in the late 1970's by such ethno-scientists as Goodenough (1956) and Conklin (1957) to encompass a more dynamic behaviour-oriented ethno-science in which an attempt is made to operationalise and implement local people's ideas and practices in the process of socio-economic development (*cf.* Slikkerveer 2002). The growing academic interest in the *emic* point of view emerged from studies focusing on taxonomies and botanical classifications (*cf.* Ibui 2007). This growing interest expanded in tandem with the realisation that there is a conceptual difference between Western views and the views of other societies towards the relationship between nature and humans. Western views, which inevitably permeate research by Western-trained scientists, designate the relationship between nature and humans as a dualism, based on the 'either/or' principle, whereas the perception of the relationship by other societies can be said to be 'dialectical' or 'holistic', based on the principle 'both/and' where human being and nature are 'creatively intertwined' (*cf.* Gray 1999).

Ethno-botany illuminates the *emic* point of view on the local flora and focuses on the relationship between plants and people in their particular community or culture (*cf.* Erdelen *et al.* 1998). Hence ethno-botany is the study of: '*how people of a particular culture and region make use of indigenous plants*' (Veilleux & King 2008: 1). From its modest beginning ethno-botany, the direct observation of the ways in which people used plants by compiling lists, has grown considerably in size and importance (*cf.* Martin 1995; Ibui 2007). The roots of the field of ethno-botany can be traced back to the long-standing interest in how human societies around the world make use of plants in their local environments, a practical or biological orientation, and, since the 1950s, an interest in how humans perceive, classify and name the natural world, a more cognitive or anthropological orientation (*cf.* Carlson & Maffi 2004).

Cotton (1996) shows that over the years since its inception more than a century ago, the term ethno-botany has become more difficult to define. At the present day, it has evolved into a multidisciplinary research area, in which the foremost issues are: the interaction between plants and people, the management of plant diversity by indigenous communities and the traditional use of medicinal plants. Martin (1995) describes ethno-botany as a multidisciplinary research area, to which six fields of discipline contribute, all having their own traditions about theory, methodology and research techniques:

1. botany;
2. ethno-pharmacology;
3. anthropology;
4. ecology;
5. economics;
6. linguistics.

Martin (1995: 10) points out that it is virtually impossible to compile a truly complete ethno-botanical data set. His reason is not just the restrictions imposed by practical time and monetary considerations; it is also affected by ethical principles. In short, a complete ethno-botanical data set would imply a full record of all views of all community members of all plants in their environment. The intrusion this would impose on community life would simply be unethical. Therefore ethno-botanical studies confine their research questions to one or a few of the six sub-fields, bearing in mind references to the other sub-fields. The sub-field of ethno-pharmacology, whose main objective is the scientific validation of traditional herbal medicine for modern drug development, has made an especially great contribution to health

care as demonstrated in the studies of Prance *et al.* (1994), Balick & Cox (1997), Slikkerveer (2000b; 2005) and Bogers *et al.* (2006). Ibui (2007) indicates that ethno-botanical publications discussing the more comprehensive study, analysis and interpretation of human-plant relations are still relatively rare. Besides her own work (2007), there are the works of Leakey and Slikkerveer (1991a), Martin (1995), Anderson (1996) and Slikkerveer (2006b). This particular study will focus on the management of plant diversity by indigenous communities and the traditional use of medicinal plants. By means of a primarily anthropological research methodology, described in Chapter 3, it will address the first two of the four major interrelated endeavours in ethno-botany defined by Martin (1995: 3):

1. basic documentation of traditional botanical knowledge;
2. the quantitative evaluation of the use and management of botanical resources;
3. the experimental assessment of the benefits derived from plant, both for subsistence and for commercial ends;
4. applied projects which seek to maximise the value which local people attain from their ecological knowledge and resources.

There is a strong relationship between ethno-botany and the fields of economic botany and ethno-ecology. Hill (1937) defines economic botany as '*the study of the array of plant usage by people*' focused on plant descriptions which contribute to a database of plant usages in different cultures around the globe of plants and plant products which may be profitable. As Ibui (2007: 28) notes: '*studies in economic botany generally focus on both traditional and modern uses of plants, and often concentrate either on the use of a single plant or group of plant throughout a series of cultures, or an array of plant uses from different cultures*'. Although economic botany embraces the local uses of plants, its basic field of study is these local uses from an *etic* point of view. Slikkerveer (2000b) notes that, by the end of the nineteenth century, the separation between the natural scientists' specialisation of economic botany and the social scientists, ethno-botany the new field of 'ethno-science' developed to study the totality of the place of plants in non-Western cultures from the local peoples' point of view.

Ethno-ecology is defined by Hardesty (1977) as '*the study of systems of knowledge developed by a given culture to classify the objects, activities and events of its universe*'. Slikkerveer (1999: 170) states that: '*Ethnoecology focuses primarily on the ideas, perceptions and classifications of the environmental relationships of members of a particular community or culture*'; ethno-botany therefore is subsumed in the broader scope of ethno-ecological studies. In the 1990s, a more encompassing ethno-ecological perspective of the human-environment relationship emerged. It was a model which integrated biological, cultural and linguistic studies in an attempt to understand in indigenous and traditional communities their knowledge of and beliefs in their biological environments and their practices of use and management of the natural resources found in their ecosystems (*cf.* Toledo 1992; Carlson & Maffi 2004).

Another major development in the 1990s was the realisation that, although indubitable local ecological knowledge, beliefs and practices contribute to economic, medicinal and other plant utilisation, they also makes a very positive contribution to biodiversity conservation and sustainable use of natural resources. The foundation for this is the growing recognition that: '*one emergent property of ecosystems having experienced significant human presence and human resource use over time is that they are biocultural systems- systems that have been jointly shaped by biological and cultural dynamic- and that much biodiversity found in place*

... is actually anthropogenic' (Carlson & Maffi 2004: 1). Ethno-ecology has blossomed in recent years according to Prance (1995: xvi) because: '*the realisation that the vast body of knowledge contained in both indigenous and folk cultures is being rapidly lost as natural ecosystems and cultures are being destroyed by the encroachment of development*'. In the wider scope of ethno-ecology, ethno-botanical research is in a position to identify conservation issues as it is a collaboration between people in local communities and scientists. Therefore it makes it possible to begin to explore solutions to conservation and development issues. Even as information on plant use is being collected, the ethno-botanical survey can help local people define their needs for plant resources (cf. Martin 1995).

2.1.2 Ethno-Botanical Knowledge Systems (EKS)

Ethno-botanical knowledge systems (EKS) are a specification of Traditional Ecological Knowledge systems (TEK). The concept of a system of knowledge refers to knowledge as an enclosed and dynamic whole composed of concepts, perceptions, practices, skills, technologies and experiences. In a certain culture or region this configuration has been developed and honed over a number of generations. In mutual relation to each other, the elements in this configuration have a meaning surpassing the sum of the separate parts, a phenomenon referred to as 'synergy' (cf. Slikkerveer 2000a). TEK encompasses a body of knowledge, practice, and beliefs about the dynamic relationship of living beings with one another and with their environment. Since its introduction in the late 1970s, 'ethno-botany' and 'indigenous peoples' and their 'traditional ecological systems' (TEK) have evolved into central concepts leading to a process of participatory and sustainable development because of its focus on the newly applied, behaviour-oriented ethno-science and the awareness of the increasing failure of Western development programmes in the Third World (cf. Brokensha *et al.* 1980; Freeman & Carbyn 1988; Fairhead 1992; Johnson 1992; Berkes 1993; Doubleday 1993; Williams & Baines 1993; cf. Warren *et al.* 1995; Ismail & Murtedza 1998; Posey 1999a).

Traditional Ecological Knowledge systems (TEK) are defined by Berkes (1993: 3) as: '... a cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment'. A TEK primarily encompasses local knowledge of the whole ecological system and human's interactions with that environment. The concept also includes the local knowledge of such separate components as humans, plants and animals as well as such whole systems as the soils, natural forces and landforms and the interrelatedness of all components (cf. Turner *et al.* 2000). Moreover, it encompasses local people's knowledge, beliefs and practices handed down over many generations as part of a culture (cf. Warren *et al.* 1995; Berkes 1999; Slikkerveer 1999). A TEK is the basis for local decision making in areas of contemporary life, including natural resource management, nutrition, food preparation, health, education and community and social organization (cf. Warren *et al.* 1995).

As Slikkerveer (2000b) shows, a TEK has the potential for the improvement of health care, agriculture, natural resources management and bio-cultural conservation. Several recent studies have certainly provided additional evidence of the practical values of TEK, but they have also drawn attention to the significant role of the underlying, albeit often 'invisible', belief systems and local philosophies pertaining to nature and environment. As Posey (1999b) delineates, a TEK is '*holistic, inherently dynamic, and constantly evolving through experimentation and innovation, fresh insight and external stimuli*'. Although it is empirical, experimental and systematic, a TEK has not been widely recognised as being complementary, equivalent and applicable to scientific knowledge. Some of those who do acknowledge this

are Colorado (1988), Schultes (1988), Posey (1990), Hunn (1993), Corsiglia & Snively (1995), Barsh (1999) and Slikkerveer (1999). According to Maffi & Oviedo (2000). A TEK has been found to be more accurate and complete than Western scientific knowledge about local environments. Maffi (2004) states that a TEK has an undeniable value in environmental conservation and sustainable use as well as for the analysis and monitoring of long-term ecological changes. Since the 1970s, the value of TEK has been extensively documented in studies of traditional societies worldwide, see, for instance, the studies of Berlin *et al.* (1974), Hunn (1976), Hays (1981), Williams & Hunn (1981), Bulmer (1982), Hames & Vickers (1983), Posey (1985), Ellen (1986), Van den Breemer (1989), Posey & Dutfield (1997), Vergara (1998), Adimihardja (1999), Alcorn (1999), Berkes (1999) and Gray (1999).

The first and foremost advantage of a TEK is that it is highly localized. Therefore, as Barsh (1999: 73) argues: *'indigenous people can make better predictions about the consequence of physical changes or stresses in a particular ecosystem'*. Secondly a TEK has imported social and legal dimensions into knowledge systems since: *'the structure of an ecosystem is regarded as a negotiated order in which all species are bound together by kinship and solidarity'* (Barsh 1999: 73). In reference to a knowledge system, the word knowledge should not be seen simply as a cerebral activity. Gray (1999: 62) points out that: *'it is also bound up in practical activity and technological systems reflecting both collective and personal experience and long-term observation. Knowledge is manifest in techniques as well as in perceiving, utilizing and managing resources'*. With the growing realisation of the value and usefulness of a TEK, Slikkerveer (1999: 169) points out that the debate has shifted from the what to the how question; *'how can such knowledge systems be used to ensure equitable benefit sharing of the resources with the contributing communities ... How can humanity benefit without further undermining the health and well being of traditional and indigenous peoples?'*

Ethno-botanical knowledge systems (EKS) are a specification of TEK. They focus on the botanical knowledge of local communities framed in their own, *emic* classifications corresponding to cultural principles. Pike (1967) coined the terms *etic* and *emic* for attributes which are respectively extrinsic (objective) and intrinsic (subjective) to a society. An *etic* classification or *etic* perspective should be understood as objective in the sense that it comes from outside the context in which it is used, while an *emic* classification or *emic* perspective is context dependent. The *emic* classification, rather than the *etic* classifications, is paramount in ethno-botanical research. The latter is usually the classification applied by botanists which have been based on the binominal nomenclature introduced by Linnaeus.

The study of the *emic* classification of plants is one of the main parts of these studies linked to the use of linguistics in the field of ethno-botany. Linguistic studies have reached the conclusion that no *emic* classification is comprehensive in the taxa at its lower ranks, folk genera and folk species, for a local habitat. The reason adduced is that it is generally true that usually only a sub-set of organisms in any given region has an extended conceptual recognition in the *emic* classification. However, Berlin (1992) argues that *emic* classification can indeed be considered to be comprehensive since plants without any linguistic recognition will be stated to be related or similar to some set in the *emic* taxa. The sub-set of organisms with an extended conceptual recognition in the *emic* classification is usually determined by human-plant interactions. Generally speaking, a community's use of wild and domesticated plants is revealed in the *emic* classification. There is no intention in this study to document the *emic* classification of all wild or domesticated plants; a conscious choice has been made to single out the MAC plants used for health and healing purposes. Section 5.1.2 presents the *emic* classification by the Balinese community members of the MAC plants reported.

The use of ethno-botanical knowledge systems (EKS) has proved to be a promising instrument to use to support the successful method of ethno-directed sampling of indigenous plant collections, in bio-prospecting for useful plants for medicine, food, fibres and new, plant-based products (*cf.* Balick 1994; Cox 1994; Van Seters 1997; Slikkerveer 2006a). In ethno-botany, various approaches have been developed and tested as a means to document and analyse people's ethno-botanical knowledge systems. The model for this is provided by the four major ethno-botanical endeavours defined by Martin (1995). The ethno-botanical knowledge systems approach, which is part of the Ethnosystems Approach developed by the LEAD Programme of Leiden University in the Netherlands, introduces a more dynamic and comparative dimension to the field of ethno-botany, combining a *horizontal* and *vertical* comparison between the individual and systems of plant use, management and conservation in different cultures (*cf.* Ibui 2007). The Ethnosystems Approach focuses on the knowledge and use of plant resources in and among different cultures and communities in a particular field of anthropological study (FAS) (*cf.* Slikkerveer 2000b; 2006a). This approach, the guideline used in this research and presented in more detail in Section 3.1.1, and the conceptual model, presented in Section 3.1.2, formed the framework for the data collection and the basis for the quantitative analyses of the Balinese community members' utilisation and bio-cultural diversity conservation of MAC plants as presented in Chapter 7.

2.1.3 MAC Plants for Health and Healing

The term MAC plants, the abbreviation of medicinal, aromatic and cosmetic plants, is one of the thirteen major classifications of useful plants identified by MEDUSA. This classification is based on the use categories compiled by Cook (1995). The thirteen use categories identified by MEDUSA are: food, food additives, animal food, bee plants, invertebrate foods, materials, fuels, social uses, vertebrate poisons, non-vertebrate poisons, environmental uses, gene sources and medicines, aromatic (or perfumery) and cosmetics uses (*cf.* Heywood & Skoula 1999). The term MAC plant is used in this study to refer to the fresh plants which the respondents have reported to be suitable for health and healing purposes. Whether a plant is considered suitable is related to the EKS of the community members and their view can be based either on information gathered or on the respondent's own experience of applying the plant to themselves or other community members. As this study concentrates on the particular aspect of the EKS of the Balinese community members, it is not within its scope to describe the whole range of MAC plant applications, such as *jamu* and the other types of herbal medicine in Bali, although a short description will be given in Section 5.1.1.

The goal of the thesis is to describe the ethno-botanical knowledge related to the fresh MAC plants used as home remedies by community members for health and healing purposes. Hence the range of this study is to document the knowledge, beliefs and practices of MAC plants transferred by the Balinese EKS, regardless of where the origin of the current knowledge, beliefs and practices of MAC plants lies: whether this be in local knowledge systems, pseudo-scientific or scientific resources. Given the various cosmovisions and conceptual frameworks in the plural medical system in Bali, there is a wide variety of activities which can be classified as health and healing activities in their respective contexts. The presence of medical pluralism and the different perceptions of health and the conceptual frameworks involved places the understanding of medicinal plants in a broader sense than the strict bio-medical interpretation of medicinal plants related to the medical systems. In several of these systems, a person's daily diet, including the plants they eat, is designated a health practice, since these provide the body with the materials necessary for it to function and, concomitantly, by strengthening physical functions it contributes to avoiding sickness (*cf.* Ibui

2007). Informants were asked about their knowledge, beliefs and practices pertaining to MAC plants in relation to their health and healing activities. At the same time they were also questioned specifically about the use of plants for aromatic and cosmetic uses.

Slikkerveer (2006a: 2) states that: '*traditional medicine in terms of a culture-bound body of indigenous medical knowledge, belief and practise has provided the primarily plant-based foundation for many ethnomedical systems which already existed long before the development of 'scientific' or cosmopolitan medicine*'. The Balinese traditional medical system is no exception to this and it has unquestionably existed since long before the modern medical system was introduced into Bali. The drug treatment of the Balinese traditional medical system was and still is related to the application of herbal medicine. WHO (1993) estimates that up to 80% of the population of the non-industrial world still relies on traditional forms of medicines and an estimated 3.5 billion people in the developing world rely on plants as components of their Primary Health Care (*cf.* Balick & Cox 1997). Although traditional forms of medicine are famous for the herbal remedies, the use of plants for health and healing purposes is not restricted to the realm of the traditional local or regional medical systems; plants are also used in the modern medical system. WHO estimates that more than 21,000 plant species are being used in medicine on a global scale. Of these 2,000-3,000 species are applied in health and healing practices in South-East Asia (*cf.* Slikkerveer 2002).

In 2002, WHO launched its first ever comprehensive traditional medicine strategy. Besides the documentation of traditional medicine and remedies and the development of national policies regarding them, the purpose of this was also to create stronger evidence-based safety, efficacy and quality standards for all traditional and complementary and alternative medicine (CAM) products and practices, specifically the use of plants. Numerous plants products are used for health and healing. 25% of modern medicine is made from plants first used traditionally. Nonetheless, still only a fraction of the medical plants used in traditional and modern medicine are botanically documented (*cf.* De Padua *et al.* 1999). It is not within the scope of this study to document all possible applications of MAC plants, ranging from the application of fresh wild plants to the synthesised bio-active components in modern drugs and from single use fresh plants, up to complex (industrialised produced) mixtures. This study focuses on the Balinese community members reported use of fresh MAC plants which they collected, harvested or bought themselves and which are administered for the purpose of preventive, promotive or curative health care.

As the focus of this study obviously lies on the plants used for health and healing practices, it must be stated that these practices are influenced on a daily basis by the knowledge and beliefs of the Balinese community members. In order to avoid any misconceptions, the term MAC plant used throughout this study should be considered a collective reference to the medicinal, aromatic and cosmetic plants which are reported to be used for any type of health and healing practices: curative, promotive or preventive. The MAC plants reported in this study could also include plants which do indeed possess the bio-active components to make them effective for their reported purpose. These plants could just as well have no effective bio-active components at all or they might be any type of plant, even a poisonous plant, without any qualities beneficial to health at all. In this study, the Knowledge-Belief-Practice complex has been taken as the basic approach to the study of human behaviour, in this case the utilisation and bio-cultural diversity conservation of MAC plants. This Knowledge-Belief-Practice complex, incorporated in the Balinese TEK and EKS, is the key which links nature and culture and encompasses the idea that how people know the world governs their behaviours, understandings and values and shapes their interactions with nature (*cf.* Slikkerveer 1999; Toledo 2000; Berkes 2001; Carlson & Maffi 2004).

2.2 Medical Pluralism

2.2.1 Medical Systems

Health care in Bali, and in the rest of Indonesia is characterised by a plural medical system. The term ‘plural medical system’ is used by medical anthropologists to refer to societies which have many distinct healing roles and in which a patient can resort to perceptions and practices of different co-existing medical systems (*cf.* Leslie 1976; Slikkerveer 1990; Connor & Samuel 2001). The focal point of this study is the Balinese community member. To the community members, regardless of the role they have, for instance patient, carer or the practitioner, medical pluralism is a daily reality. Concentrating on the individual community member’s perspective, health and healing practices, specifically the utilisation of MAC plants, means that these have to be analysed in the context of the pluralistic medical configuration, even though some specific practices are retraceable to a specific medical system.

This study follows Dunn’s (1976: 135) definition of a medical system: ‘the pattern of social institutions and cultural traditions that evolves from deliberate behaviour to enhance health, whether or not the outcome of particular items of behaviour is ill health’. As Slikkerveer (1990) states, Dunn’s definition stresses the medico-ecological interaction between behaviour and socio-cultural structure and places a medical system in its historico-geographical context. Furthermore, Dunn’s definition, which bases a medical system on the patterns of social institutions and cultural traditions, captures the dynamics of a medical system. The medical system itself has to be seen as part of the total cultural pattern in order to be fully comprehended (*cf.* Foster & Anderson 1978; Kleinman 1980). Kleinman (1980) pointed out that medical systems do meet Geertz’ (1973: 3-30) definition of a cultural system because they are both a map ‘for’ and ‘of’ a special area of human behaviour. Kleinman (1980) in fact used the term health care system and not medical system when he linked it to Geertz’ (1973) definition. In his use of the term health care system, Kleinman (1980) refers to all health-related and systematically interconnected components in a society: the illness, the responses to it, individuals experiencing it and treating it and the social institutions relating to it, all systematically interconnected. As Slikkerveer (1990) notes, Dunn’s (1976) definition of a medical system can be used interchangeably for the term ‘system of health care delivery’. Therefore the terms medical system and health care system can and are use interchangeably. Dunn (1976) differentiates between three types of medical systems:

1. local medical systems, which are the folk or indigenous medical system of small-scale societies; the peasant communities, horticultural and pastoral societies or small-scale foraging societies;
2. regional medical systems, which are those medical systems distributed over a relatively large area, for example the traditional Chinese Medicine and the Aryuvedic Medicine;
3. the cosmopolitan medical system refers to the contemporary bio-medical system or modern medical system, which is a global medical system.

In most plural medical system situations, there is one system which enjoys a pre-eminent status over the others (*cf.* Baer *et al.* 2003). In Indonesia, specifically in Bali, this pre-eminent status is held by the cosmopolitan medical system. A wide variety of labels is used to identify the cosmopolitan or modern medical system.² These include: regular medicine, allopathic medicine, scientific medicine, cosmopolitan medicine, bio-medicine and modern medicine. It has become common practice for a medical anthropologist to refer to this form of medicine as bio-medicine (*cf.* Baer *et al.* 2003), following Leslie’s (1976) suggestion in his introduction to

the book *Asian Medical Systems*. The term ‘modern medicine’ (*pengobatan modern*) is the term commonly known by the Balinese community members and it captures the concept of the cosmopolitan medical system. This is especially relevant as the translations of bio-medicine or cosmopolitan medicine into Indonesian would not result in a usable term covering the same concept. So, despite the fact that medical anthropology commonly uses the term bio-medicine and that the term ‘modern’ medical system is perceived as a judgemental term because of its intrinsic meaning of modern, the term modern medicine is used throughout this study when referring to the cosmopolitan medical system. Nevertheless, for the considerations given above, the term ‘modern medicine’ (*pengobatan modern*) has been used in all communications with the respondents.

To the same degree that the term ‘modern medicine’ is unsatisfactory, the term ‘traditional medicine’ also falls far short. First and foremost, this is because traditional medicine is used too easily. It levels both the local and regional medical systems and it does not distinguish between all-embracing and complex systems versus small practices (*cf.* Bannerman *et al.* 1983). Nonetheless, the numerous different local and regional medical systems are referred to by the single term ‘traditional medicine’ in developing countries. In developed countries, such systems are collectively referred to by the terms complementary and alternative medicine (CAM).³ This study only uses ‘traditional medicine’ in its theoretical orientation, namely as a collective term for the local and regional medical systems. To the respondents of this study, the Balinese community members, the term traditional medicine refers to one single local medical system. The respondents use the term traditional medicine (*pengobatan tradisional*) interchangeably with the term Balinese medicine (*pengobatan Bali*) and its synonyms such as *obat Bali asli*. Considering its spread among the population of Bali, this one specific local medical system, discussed in more detail in Section 5.2.1, can be considered the largest local medical system in Bali today.

A common feature of traditional medical systems is that they: ‘*span a diverse range of policy areas that extend beyond the immediate domain of health as conceived by the bio-medicine tradition*’ (Bodeker 1997: 1). Traditional medical systems, local and regional medical systems alike, integrate the principles of synergy and holism in their methodology. Traditional medicine seems to be more affective in the fields in which modern medicine is less strong; specifically in the field of degenerative conditions and in conditions where behavioural, emotional and spiritual factors play a major role (*cf.* Bannerman *et al.* 1983). Modern medical methodology seeks to break up the complicated phenomena and processes into smaller components, measurable by scientific parameters. These have to be dealt with separately and in isolation, a process which commenced at the beginning of the nineteenth century with the application of the Cartesian scientific materialism to all human activities including health and healing. The technological developments in bio-medicine preceded the advances in the human side as pointed out by Canary (1983: 91-92): ‘*it is only within the last 100 years that specific qualifications have been required for the practice of medicine, nursing, midwifery, and other health professions, ... deep, extended and sophisticated training in educational centres has led to more research activity, the acquisition of more knowledge, and the development of techniques; as a corollary, the increased capacity of technology has led to a burgeoning in the industrial field of medical engineering*’. The co-existence of modern and traditional medical systems in plural medical systems can be attributed to this difference in strengths of the individual systems. This is specifically the case for the health and healing situation in Bali which will be discussed in far greater detail in Chapter 5. Each medical system has its own theory of disease system. It stands to reason that this will encompass the knowledge and the beliefs about the nature of health, the causes of illness and

disease and the possible remedies. This research follows the description of a theory of disease system given by Foster and Anderson (1978: 37): ‘A disease theory system embraces beliefs about the nature of health, the causes of illness, and the remedies as other curing techniques used by doctors. ...Disease theory systems deal with causality, the explanations such as breach of taboo, theft of the soul, an upset in the hot-cold balance within the body, or the failure of a human organism’s immunological defences against pathogenic agents such as germs and viruses. A disease theory system is thus an ideational, conceptual system, an intellectual construct, a part of the cognitive orientation of the members of the group. It deals with classification, explanation, and cause and effect. All disease causality systems are, in large part, rational and logical, in that curing techniques are functions of, or stem from, a distinctive conceptual organization of ideas about causes.’ In the light of their explanatory character, disease theory systems have the potential to play a powerful role in sanctioning and supporting social and moral cultural norms. They do this by providing the rationale for conservation practices and to control aggression (*cf.* Foster & Anderson 1978). Each medical system supported by its disease theory system contains the reasoning to develop, a promotive and preventive health care, in addition to curative health care. Therefore, current local promotive, preventive and curative health care principles are rational since they are functions of what causes sickness. However, this does not necessarily mean that these principles and actions are always as effective (*cf.* Bannerman *et al.* 1983).

In the medical plural system, community members are confronted with different disease theory systems. This confrontation inclines them to generate their own knowledge and beliefs on the basis of the present medical systems in the area in which they live. The bio-medical system classifies disease in terms of a single taxonomy with universal categories. Consequently, each known disease retains its identity wherever it might appear and independent of the social context (*cf.* Lieban 1977). Roughly, all traditional medical systems classify diseases by more holistic approaches including, besides measurable components, the onset, perceived aetiology, course of an illness, plus the psyche and personal aspects of the person whose illness is being classified. The strict approach to disease classification adopted in bio-medicine would simply rule out any integration with any form of classification other than the one fitting the single taxonomy. Nevertheless, this is exactly what the current *emic* disease classification in Bali does, mixing concepts related to the different types of disease theory systems. This produces what seems to be an integrated disease theory system providing the rationale for the classification. This generates a ‘new’ seemingly integrated disease theory system which obtrudes into the *emic* disease classification. This ‘new’ disease theory system appears to be integrated but this is no more than an illusion as it places different perspectives derived from the different systems next to or on top of each other, rather than generating a new whole, truly integrated system, free of internal conflicts or double reasoning. The current *emic* disease classification in Bali, integrating concepts and perceptions of the theory of disease in the bio-medical system, and the Balinese traditional medical system are discussed in Section 5.3.3.

The real characteristics of medical pluralism are reflected in the situation in which various systems come into contact which influences how they inter-relate with each other (*cf.* Leakey & Slikkerveer 1991a; Hardon *et al.* 1995). Besides the exchange of knowledge, beliefs and practices between the different systems through physical encounters with practitioners as well as written or oral forms of exchanges, there are individual practitioners who combine the ‘best of both worlds’ in their practices. Some practitioners, who have made a successful combination of the knowledge, beliefs and or practices from different medical systems, even succeed in upholding distinctive roles in the different medical systems; other practitioners

simply combine or mix the conceptual constructs belonging to different medical systems. Examples of both situations are found worldwide. One good illustration of the first situation, in Bali is when, after practice hours, often in a different setting, a bio-medically trained doctor, nurse, psychiatrist or specialist takes on the role of a traditional healer such as the *balian*. An illustration of the second situation is a Dutch case in which bio-medically trained family doctors combine their bio-medical practices with homeopathy. In the Netherlands, this has fuelled a heated political and medical debate between those opposing this combination and those supporting it. The plural medical system, consisting of different medical systems, cannot be understood solely in terms of its own components. A medical system is a conceptual construct which involves the interaction of a number of people, of whom their intrinsic goal is to mobilise the resources of the patients, the family and the society to which they belong to bear the problem of the patient (*cf.* Foster & Anderson 1978). Each medical system, seen as the total set of social institutions and cultural traditions, reflects the logical and philosophical characteristics which are connected to health and disease perceptions in the worldview of the ‘mother’ society to which the medical systems belongs. Theoretically, most medical systems can be traced back to a certain ‘mother’ society from which it once originated. Practically, in daily life, it is impossible to draw clear lines since, as any other social systems, medical systems are not static, but adaptive and dynamic (*cf.* Foster & Anderson 1978; Slikkerveer 1990; Posey 1999a).

2.2.2 Community Health

Sofoluwe (1985) defines community health as: *‘that branch of health service which aims at achieving the highest level of physical, mental, social, moral and spiritual health for all citizens on community basis. It seeks to do this by first identifying the roots and causes of all prevalent diseases and health problems, and then dealing with them through a judicious utilisation of governmental, private, and especially, community resources’* (Quoted from Buschkens 1990: 12). Community health is shaped by the interrelationship between medical and social systems. The state of health of a community is co-determined by political, economic and socio-cultural factors which directly control the availability, accessibility, affordability and quality of the components of community health, for example facilities, personnel, programmes, interventions or materials. Community health is based on the Primary Health Care model, a social model based on the ‘Health for All’ concept, in which health conforms to the WHO definition broadly defined as a state of complete physical, mental and social well-being and not simply the absence of disease or infirmity (*cf.* WHO 2006b).

The Primary Health Care model proposed at Alma Ata (1978) states the need for a comprehensive health strategy which provides health services and concomitantly addresses the underlying social, economic and political causes of poor health.⁴ Canary (1983: 102) notes that: *‘Modern public health and preventive medicine arose as parallel disciplines to clinical medicine during the 19th century. They developed through the application of science and politics to the control of mass sickness and to the widespread social and environmental problems considered to be affecting the health of the public’*. The focus of health care was predominantly curative in the pre-WO II period reflecting the fact that in the nineteenth and early twentieth century the leading cause of death was infectious disease. Improvements in public health ushered in better nutrition, sanitation, and smaller families, therefore by the latter part of the twentieth century chronic disease had taken the lead as the major cause of mortality (*cf.* Liburd & Snizek 2007).

The Alma Ata Declaration (1978) led to the adoption of the ‘Global Strategy for Health for All by the Year 2000’ in 1981, defined by WHO (1998: 2) as: *‘the attainment by all the*

people of the world of a level of health that will permit them to lead a socially and economically productive life'. The 'Global Strategy for Health for All' represents the formal beginnings of the social model of health with Primary Health Care (PHC) as its mean. PHC is defined in the Declaration of Alma Ata (1978) as: *'essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination. It forms an integral part both of the country's health system, of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact of individuals, the family and community with the national health system bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process'*.

The social model of health is a framework for improvements in health and well-being which is to be achieved by addressing the social and environmental determinants of health, bearing in mind biological and medical factors. In contrast to medical care, which focuses on the individual patient and is concerned with preventing, treating and curing disease, community health is focused on a defined population and brings the available health care systems into relation with other social institutions of society and presents the evolution of health outcomes in population terms (*cf.* Kissick 1978). The basic concern of medical care and community health is the same: the health of people. However, the approaches are different, as are the sciences behind it. The auxiliary sciences which support medicine are biochemistry, microbiology, anatomy, pharmacology, physiology and pathology. Community health is related to such sciences as epidemiology, bio-statistics, operations research, system analysis, management sciences, sociology, political science, anthropology and economics. Community health reacts to all the political, economic, social and cultural changes in a particular society, and consequently its character in every society is different.

The Alma-Ata Declaration presented Primary Health Care (PHC) in a dual light. It unquestionably includes the fundamental level of care in a health system reconfigured to emphasise the basic health needs of the majority; yet PHC was also *'presented as a philosophy of health work as part of the 'overall social and economic development of the community'* (WHO 2005: 11). Thirty years after the introduction of PHC, it is clear that the rising expectations and broad support for the ideal of achieving the vision set forth at Alma-Ata values have not always been easily translated into the effective transformation of health systems. The core of this problem lies in the oversimplified message of the PHC movement. At times, national and global health authorities have seen PHC not as a set of reforms, as was intended, but as one health care delivery programme among many, providing poor care for poor people (*cf.* WHO 2008b). Table 2.1 gives an overview of the shift in focus of PHC from the early attempts to implement it and the current concerns of PHC reforms, which are aimed at realising a higher level of community health in the present-day reality of medical pluralism operating in a globalising context. The 'Health for All' concept is still the main vision of WHO and has been expanded to ensure that the WHO policies will continue to develop beyond the year 2000. In 1998, WHO adopted 'Health for All in the Twenty-first Century'. At present it is clear that if PHC is actually to contribute to the attainment of these goals, it will be necessary to reform it on the basis of the following four sets of PHC reform (WHO 2008b: xvi):

1. reforms which ensure that health systems contribute to health equity, social justice and the end of exclusion, primarily by moving towards universal access and social health protection universal coverage reforms;
2. reforms which reorganise health services as primary care, that is around people's needs and expectations, so as to make them more socially relevant and more responsive to the changing world while producing better outcomes – service delivery reforms;
3. reforms which ensure healthier communities, by integrating public health actions with primary care and by pursuing healthy public policies across sectors – public policy reforms;
4. reforms which replace a disproportionate reliance on command and control and laissez-faire disengagement of the State by implementing the inclusive, participatory, negotiation-based leadership required by the complexity of contemporary health systems – leadership reforms.

Table 2.1 Overview of the shifted focus of the Primary Health Care (PHC) movement

Early attempts at implementing PHC	Current concerns of PHC reforms
Extended access to a basic package of health interventions and essential drugs for the rural poor	Transformation and regulation of existing health systems, aiming for universal access and social health protection
Concentration on mother and child health	Dealing with the health of everyone in the community
Focus on a small number of selected diseases, primarily infectious and acute	A comprehensive response to people's expectations and needs, spanning the range of risks and illnesses
Improvement of hygiene, water, sanitation and health education at village level	Promotion of healthier lifestyles and mitigation of the health effects of social and environmental hazards
Simple technology for volunteer, non-professional community health workers	Teams of health workers facilitating access to and appropriate use of technology and medicines
Participation as the mobilization of local resources and health-centre management through local health committees	Institutionalized participation of civil society in policy dialogue and accountability mechanisms
Government-funded and delivered services with a centralized top-down management	Pluralistic health systems operating in a globalized context
Management of growing scarcity and downsizing	Guiding the growth of resources for health towards universal coverage
Bilateral aid and technical assistance	Global solidarity and joint learning
Primary care as the antithesis of the hospital	Primary care as coordinator of a comprehensive response at all levels
PHC is cheap and requires only a modest investment	PHC is not cheap: it requires considerable investment, but it provides better value for money than its alternatives

Source: WHO (2008b: xv)

Although PHC has acknowledged the role of traditional medicine, there is no perfect synergy between the present medical systems in the day-to-day reality of a plural medical system and, as indicated, PHC is in need of reform if it is to realise the level of community health for all which is its goal. Eisenberg & Kleinman (1981a: 8) stated that rather than predomination of one worldview in the plural medical system, there are: '*sets of competing ideologies which have resulted from commerce between cultures and different degrees of access to specialised knowledge*'. This is reflected in the Balinese *emic* disease classification and in the promotive, preventive and curative health and healing knowledge, beliefs and practices. In both developed and developing countries, the interactions between medical systems are a daily reality impinging on the practice of medicine and the cogitations of policy makers in their attempts to generate safer, high-quality, more effective, economically sustainable health care. In spite of these attempts, health fraud and charlatans who pretend professionally or publicly to possess a skill, knowledge or qualifications required by health and healing practices which she or he does not possess, are common in the plural medical system and can be found in all three sectors. There is an extensive body of legislation which has been passed by governmental agencies and medical commissions to curb health fraud and charlatans. Unfortunately, because of the complexity of the medical systems and health care sectors in a plural medical system, compounded by the practical shortcomings in the implementation, maintenance and execution of the control systems, these and legislation to counter them still be marred by many loopholes and none has been proven to be foolproof. To this day, Balinese community members, and the same maybe said of individuals in every other country, regularly fall victim to malpractice, health fraud and charlatans.

Given the legally grey area in which it is sited, the focal point of this study, the practice of utilisation of MAC plants for health and healing, is particularly vulnerable to malpractice either by intention, because of lack of knowledge or the provision of misinformation of the patients or of their advisors. This latter point is a reminder that the motive for the self-medication with MAC plants might be based on either the individual's own assessment or the advice of another person or practitioner. Patients and practitioners alike can choose to abide by a single medical system or to combine different medical systems, as different medical systems co-exist and evolve in the medical pluralistic system. The interaction of the medical systems constantly influences community health, at the practical and at the theoretical level. The actual use of MAC plants can produce paradoxical behaviour. A person might justify the specific use of the MAC plants using the disease theory of another medical system, which they would not normally claim as their own. The concepts and theories behind the health-seeking behaviour and the rationale of health care utilisation, a complex interaction of various factors which might explain this type of paradoxical behaviour are discussed in the sections below.

2.2.3 Health Care Utilisation

Theoretically a plural medical system can be divided into three different types of medical systems: local, regional and cosmopolitan. From the perspective of the community members seeking guidance to affect, maintain or restore their health, such theoretical construction is pretty meaningless. They are in a situation in which they can subscribe to a wide range of type of therapies, practices and explanations, knowledge and beliefs constructs. Consequently they are landed in a highly complicated situation in their quest for a choice of their health-seeking behaviour (*cf.* Hardon *et al.* 1995). Health-seeking behaviour is revealed in the study of health care utilisation, which focuses on the processes underlying this behaviour and is important to the improvements in health care delivery systems (*cf.* Yoder 1982b).

Illness behaviour, which can occur in the absence of sick roles and patient roles, is defined as: 'the way in which symptoms are perceived, evaluated, and acted upon by a person who recognizes some pain, discomfort, or other sign of malfunction' (Foster & Anderson 1978: 146). Usually, the sequence of medical events which represents major transition points involves new decisions about the future course of medical care and the illness behaviour is an integral part of this. It is divided into five stages documented in the classical study of Suchman (1965):

1. the symptom experience stage ('the decision that something is wrong');
2. the assumption of the sick role state ('the decision that one is sick and needs professional care');
3. the medical care contact stage ('the decision to seek professional medical care');
4. the dependent-patient role stage ('the decision to transfer control to the professional and to accept and follow prescribed treatment'); and
5. the recovery or rehabilitation state ('the decision to relinquish the patient role').

Although the individual is the object of each of the five stages, none of the stages is ever a single-person phenomenon, but a social phenomenon (*cf.* Eisenberg & Kleinman 1981b). In Stage 1, assumption of the sick role state, the individual must make, almost always with advice of others, a self-diagnosis of being ill. This is a judgement made against implicit standards of reference, individual or social, of what it means to be well (*cf.* Eisenberg & Kleinman 1981a). Twaddle (1981: 15) notes that a symptom is more likely to be regarded as significant in the following eight cases namely when: '1) it interferes with normal activities or characteristics, 2) the symptoms are clear –they are obvious to others and are already defined as meaning sickness in the group-, 3) they exceed the tolerance threshold of the individual and/or (s)he expresses the symptoms to others –features that vary with ethnic identity, social class and the particular interactions in question, 4) the symptom is unfamiliar and regarded as threatening to the individual or to others, 5) it is seen as being caused by an underlying serious problem, 6) it is thought to lead to serious incapacities or death, or it is expected to last for a long time, 7) there are other crises in the life of the individual and attention to the symptoms can alleviate some stress; and 8) other people think they are serious'.

Stage 2 is engaged only when experience of and manifestation in a person's behaviour or bodily functions are acknowledged as an illness or disease. The way in which symptoms and particular bio-chemical conditions are experienced by an individual and clinically manifested is strongly determined by psychological, social and cultural factors (*cf.* Good & Delvecchio 1981; Pfifferling 1981). Buschkins & Slikkerveer (1982) divide 'patients' into two groups: the internal-action patients, who seek only internal medical aid and resort to home remedies, and the external-action patients, who seek medical aid from some type of practitioner. Buschkins & Slikkerveer (1982) use the term 'non-action patients' for persons who, discover they are ill on the basis of self-diagnosis or even a professional diagnosis and do nothing to ensure recovery.

Stage 3, the medical care contact stage, and Stage 4, the dependent-patient role stage, concentrate on the external-action patients. Since the focus of this study is the self-administration of MAC plants, although not specifically excluding the external-action patients, it does concentrate on internal action patients. In theory, because they have resorted to self-treatment, these internal action patients have no contact with a professional; nevertheless, this does not rule out contact with the plural medical system. In the first instance this is in reference to the system they chose to espouse. In the second instance, since they

might unquestionably be considered patients by their social environment. Regardless of the preference for no medical contact, self-medication or a specific health care provider in the medical pluralistic situation, their illness behaviour is unmistakably connected to the understanding of how the Balinese classify illness, since illness beliefs, behaviour and health-care activities are interrelated (*cf.* Hobart *et al.* 1996).

This study does not single out the utilisation of MAC plants for the curative purposes for which the five stages of illness behaviour designated by Suchman (1965) has been developed. It also includes their use in maintaining health and physical and emotional strength; namely, their health promotive practices and the utilisation for the avoidance of disease, sickness and ill-health: preventive health practices. Action undertaken to prevent illness or to diagnose it at the pre-symptomatic stage are referred to collectively as health behaviour (*cf.* Slikkerveer 1990). As pointed out by WHO (2002), many diseases can be prevented, but health care systems do not make optimum use of their available resources. In the twentieth century, large sections of the world have an increasingly expectation of living longer, and in this process positive health can be assumed and anticipated (*cf.* Albrecht *et al.* 2000). This expectation has created a positive environment for study and research which has produced numerous models and approaches, specifically for preventive health care and health promotion; in short a viable approach and tool for comprehensive and equitable health development.

Most of the models developed for preventive and promotive health care concentrate on intervention and strategies, not on the individual perspective. The current leader in the field is the model of Mrazek and Haggerty (1994) which divides the full spectrum of health preventive interventions or strategies into universal, selective, indicative and care-related preventions. Models focusing on the individual's perspective have been extrapolated on such socio-cognitive models of health behaviour as the health belief model (*cf.* Glanz *et al.* 2002) and the theories of reasoned actions and planned behaviour (*cf.* Ajzen & Fishbein 2005). Although these models support the selection of several of the phenomena underlying the variables identified in the blocks of factors in the conceptual model of this study, they focus either on the individual or on the intervention but exclude the system to which they belong, the highly complex medical pluralistic system. Therefore, in order to connect the preventive and promotive health care utilisation with the curative health care utilisation of the application of MAC plants, an analogous model of the Suchman's (1965) five stages of illness behaviour will be constructed in Section 5.3.2 for the preventive and promotive health behaviour and internal patients or self-treatment.

The use of health care services provided by the various practitioners in a medically pluralistic situation is a highly complicated event, '*determined by the interaction of biological, psychological, and social forces that affect not only the volume but also the type and quality of service consumed*' (Anderson *et al.* 1976: 21). Foster (1983: 24) warns that conceptual constructs of medical systems might be upheld in theory but that in practice: '*people chose therapists, not medical systems*'. He (1983) warns that the stereotypes contrasting traditional and modern medicine as a basis for health planning should not be accepted uncritically and sounds a warning note when he remarks that recent research shows that the health care decision-making process is affected by a great many factors: economic and social costs, prestige factors, distance, convenience, time, traditional beliefs, the personality or fame of specific curers and the like. In a nutshell, in the final analysis people choose therapists, not medical systems. It is important to realise, in essence the analysis of the relationships and interactions between the different factors of the health and healing behaviour derived from epidemiological, behavioural and sociological models can be regarded as a form of consumer behaviour. Anderson *et al.* (1976: 21) specified this health and healing consumer

behaviour as ‘a form of consumer behaviour, modified as to both its frequency and its content by social controls which operate either overtly in the health services system, or covertly and dependent upon the allocation and rationing of scarce resources in the face of competition; the nature and extent of such controls will vary with the underlying philosophy of the social systems’.

In its model, the Institute of Medicine has visualised a practical representation of the complex reality of this health and healing consumer behaviour in community health (Liburd & Snizek 2007). Figure 2.1 presents the model of the Institute of Medicine consisting out of an inner circle and four outer circles. The innermost circle is formed by innate individual traits such as age, sex, race and biological factors and the biology of disease. The first circle outside the centre circle represents individual behaviour; the next circle represents social, family, and community networks; the circle beyond this represents living and working conditions; and the outermost circle represents broad social, economic, cultural, health, and environmental conditions and policies at the global, national, State, and local levels.

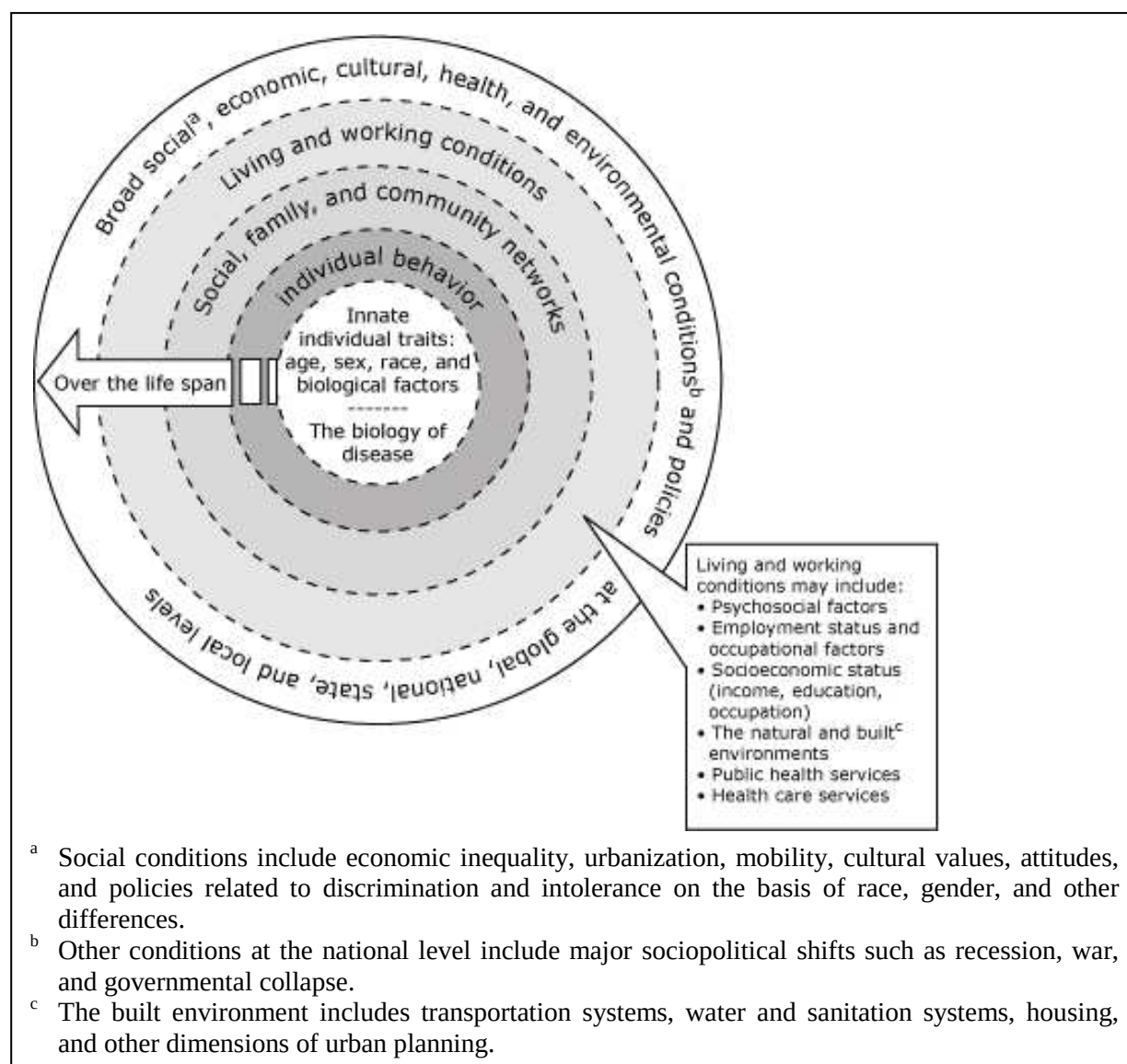


Figure 2.1 The Institute of Medicine's model of the multiple determinants of health
Source: Liburd & Snizek (2007: 2)

Slikkerveer (1990) designed a theoretical model to describe health care utilisation in the plural medical system, which is the basis of the multivariate model of this study. His model (1990: 70-71) was inspired by the multi-dimensional models of Suchman (1965), Andersen (1968), Greenlick *et al.* (1973) and Kohn & White (1976b) and by previous research carried out in East Africa by Buschkens & Slikkerveer (1982). The foundation of these multivariate models was the main early models explaining the differences in health care: the socio-psychological model, the access model and the socio-cultural model (*cf.* Slikkerveer 1990). Socio-psychological models, based on individual decision making, emphasise such concepts as fear of treatment, attitudes to health care and knowledge about an illness. The access model stresses the geographical and financial accessibility of medical institutions and finally the socio-cultural model stresses the important influence of social and cultural factors, including the culture of the health care as an institution (*cf.* Slikkerveer 1990). The construction of the multivariate model used in this study and its operationalisation is discussed in Sections 3.1.2 and 3.1.3.

2.3 Bio-Cultural Diversity Conservation

2.3.1 Biodiversity Conservation

The term biodiversity is the common abbreviation of biological diversity which has a number of modified definitions. Pearce & Moran (1994: 1) describe biodiversity as *‘an umbrella term used to describe the number, variety and variability of living organisms in a given assemblage. Biodiversity therefore embraces the whole of ‘Life on Earth’. Decline in biodiversity includes all those changes that have to do with reducing or simplifying biological heterogeneity, from individuals to regions’*. Biodiversity is commonly defined as corresponding to three fundamental and hierarchically related levels of biological organisation: genetic, species and ecosystem diversity (*cf.* Pearce & Moran 1994; Schulte 2002). In 1992 the Convention on Biological Diversity defined biological diversity as following: *‘the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, this includes diversity within species, between species and of ecosystems’* (Spellerberg 1998: 2).

This study of MAC plants, viewed as individual organisms, is obviously related to both the genetic and species diversity level of biodiversity. As the Chiang Mai Declaration (1988) states the consequences of the loss of plant biodiversity around the world are alarming and many of the plants which provide traditional and modern drugs are threatened.⁵ Unquestionably, this study is also inextricably connected to the ecosystem diversity level of biodiversity, since the utilisation of MAC plants has a direct impact on the community members’ ecosystem, whether this is impact positive or negative. Ecosystem diversity according to Pearce & Moran (1994: 5) relates to: *‘the variety of habitats, biotic communities and ecological processes in the biosphere as well as the diversity within ecosystems. Diversity can be described at a number of different levels and scales:*

1. *functional diversity is the relative abundance of functionally different kinds of organisms;*
2. *communities diversity is the number sizes and spatial distribution of communities, and it is sometimes referred to as patchiness; and*
3. *landscape diversity is the diversity of scales of patchiness.’*

The biodiversity extinction crisis which is threatening the world began to attract widespread scientific and public attention in the 1980s (*cf.* Wilson 1988). Although heatedly debated, the majority agreed upon the perception that by and large the current crisis was a human-made phenomenon, caused by the negative impact of human activities on the environment ranging from changes in land use to overharvesting, waste disposal, alien species invasions, extreme natural events and the number one headline today, climate change (*cf.* Maffi 2004).⁶ The perception of human involvement in the decline of biodiversity led to the ineluctable conclusion that humans have to be part of the solution: biodiversity conservation. This term refers to the multidisciplinary practices intended to protect and manage all aspects of biodiversity: efforts to avoid a decline in biodiversity. The complex continuum of possible approaches to conservation forms the 'bio-centric' vision, promoting a human-hands off approach, at the one extreme, and the 'anthropocentric' vision, promoting the linking of environmental protection to sustainable development by stressing the integration of human needs in conservation, at the other (*cf.* Maffi 2004).

When conservation is used in this study, it relates to the second approach: sustainable development stressing the integration of human needs. Consequently conservation should not be literally understood as the maintenance of a status quo, but thought of in a more dynamic sense. The use of natural resources, whether these resources are used for medicine, food, shelter or clothing, is a necessity for human survival. As natural resources have to be used, even when this is conscientiously done, because of the basic principles elucidated by Darwin, changes in biodiversity constitution will always take place: nature itself is a dynamic process. Pearce & Moran (1994: 6) define six general rules of dynamic processes in the ecosystem which link environmental changes, biodiversity and inherent ecosystem processes:

1. *the mix of species making up communities and ecosystems changes continually;*
2. *species diversity increases as environmental heterogeneity of the patchiness of a habitat does, but increasing patchiness does not necessarily result in increased species richness;*
3. *habitat patchiness influences not only the composition of species in an ecosystem, but also the interactions among species;*
4. *periodic disturbances play an important role in creating the patchy environments that foster high species richness. They help to keep an array of habitat patches in various successional states;*
5. *both size and isolation of habitat patches can influence species richness, as can the extent of the transition zones between habitats. These transitional zones, or 'ecotones', support species which would not occur in continuous habitats. In temperate zones, ecotones are often more species rich than continuous habitats, although the reverse may be true in tropical forests; and*
6. *certain species have disproportionate influences on the characteristics of an ecosystem. These include keystone species, whose loss would transform or undermine the ecological processes or fundamentally change the species composition of the community.*

Currently scholars are debating which measurement best characterizes the pattern of difference in biodiversity and how biodiversity should be measured or estimated as a whole (*cf.* Pearce & Moran 1994; Schulte 2002). Although these debates are very heated, the loss of biodiversity is unquestionably perceived to have negative implications for human welfare, health and indeed human survival (*cf.* Van Seters 1997; Spellerberg 1998). The ways with which natural resources have been dealt with in the past decades, including the handling of MAC plants, have certainly been exploitative and this has impacted adversely on our own

environment (*cf.* Ismail 1998). These exploitative methods of dealing with natural resources added to biodiversity loss and undeniably the main motivation for using these exploitative methods has been economically inspired. By placing a monetary value on species and ecosystems, the loss of biodiversity has been transposed to the economic sphere (*cf.* Posey 1999b). If a monetary value were to be placed on the loss of biodiversity, this might add to the sense of urgency of the necessity to act now against further loss, but it does not even begin to comprehend the true value of biodiversity in relation to the quality of human and for that matter all life on the planet, or as Foster & Anderson (1978: 27) state: ‘... *the die was cast millennia ago; the problem is not whether we will upset nature but, how to change it so that innovations will be beneficial and not deleterious.*’

Biodiversity loss can be caused by proximate causes: logging, agricultural clearance of forested land, pollution, or fundamental causes related to economic, institutional and social factors lurking behind the proximate causes (*cf.* Pearce & Moran 1994: 18). In recent years greater public awareness of and concern about the need to tackle biodiversity loss and its causes has grown. Many international organisations and foundation are working on series of influential publications, conventions and strategies. Several organisations and institutes active at a global level have begun to combat biodiversity loss and simultaneously work on the promotion of a sustainable way of living. Leading up to ‘new’ global institutes with a primary concern for the environment and biodiversity in the 1980s, examples are: the World Wide Fund for Nature (WWF), the World Commission on Environment and Development (WCED), the United Nations Food and Agriculture Organisation (FAO), the World Conservation Monitoring Centre (WCMC), the World Resources Institute, the International Union for the Conservation of Nature (IUCN), the United Nations Development Programme (UNDP), and the United Nations Environment Programme (UNEP) (*cf.* McNeely et al. 1990; Heywood et al. 1995; Spellerberg 1998; Agung 2005; Ibui 2007).

As documented by McNeely *et al.* (1990), IUCN/UNEP/WWF (1991), Groombridge (1992), Heywood *et al.* (1995), Grifo & Rosenthal (1997), Bodeker (1997) and the Secretariat of the Convention on Biological Diversity (SCBD 2006), biodiversity loss is a growing threat to the health and well-being of the peoples of the world. The 2010 biodiversity target is described as ambitious by the Secretariat of the Convention on Biological Diversity itself. It attempts to achieve: ‘*a reduction of the current rate of biodiversity loss at the global, regional and national level, as a contribution to poverty alleviation and for the greater benefit of all life on Earth*’ (SCBD 2006: iv). Chivian (1997) has documented that environmental degradation and species extinction results in loss of medicine, medical models and ecological protection from infectious disease. Epstein *et al.* (1997) and Dobson *et al.* (1997) both document the link between loss of biodiversity and infectious diseases.

A key to biodiversity conservation, and specifically to the biodiversity of MAC plants, lies, Erdelen (1998) argues, in better management of both the diversity and the dynamics of the traditional medical system in relation to the biogeography.⁷ Proponents of this approach state that several of the threats to biodiversity are located at local and regional levels, including invasion and destruction of ecological systems. An illustration of this is the over-harvesting of a medicinal plant species to supply the growing herbal market, taking advantage of their great commercial benefits. Management of an environment is located at different levels: at the national or regional level it is found in legislation; at an individual level it lies with the community members. Whether or not there is legislation at the national and regional level, if community members have no knowledge or awareness of it, this is tantamount to an absence of legislation. Part of the objective of the household survey was to measure the level of awareness of the respondents about the impact of the government on the biodiversity of

plants. Community members were simultaneously asked about their knowledge and their practices related to the biological conservation of plants. The results of this inquiry are presented and analysed in Chapters 6 and 7.

2.3.2 Cultural Diversity Conservation

There is more to cultural diversity than meets the eye. This is because culture is more than a mixture of folklore or the arts; culture is *'the embodiment of values, institutions and patterns of behaviour. It is a composite whole representing a people's historical experience, aspirations and world view'* (Posey 1999a: xi). All human societies and cultures, even the most 'traditional' ones, are affected by change (*cf.* Altwaijri 1997; Posey 1999a; Tomlinson 1999; Agung 2005; Slikkerveer 2005; Hauck 2006). Cultural diversity, the variety or plurality of human social structures, belief systems and strategies for adapting to situations in different parts of the world, is most apparent in the obvious cultural differences which exist between peoples: language, dress and traditions. However, there are also significant variations in the way societies organise themselves, in their shared conception of morality and in the ways they interact with their environment. It is debatable whether these differences are merely incidental artefacts arising from patterns of human migration or whether they represent an evolutionary trait which is the key to our success as a species. Despite wide-ranging differences, it has become apparent that, although the constant change is inherent in human societies and cultures, cultural diversity as a whole is declining.

Languages, the codifications, intellectual heritages and frameworks for the unique understanding of life of each society, are considered a major indicators of cultural diversity (*cf.* Martin & Idrus 1998; Posey 1999b; Maffi 2004). Maffi (1999: 24) argues that *'while no individual aspect of human life can be taken as a diagnostic indicator of cultural distinctiveness, language is the carrier of many cultural differences; furthermore, using language as a proxy affords us the best chance of making a comprehensible division of the world's people into constituent cultural groups'*. Martin & Idrus (1998) highlight the correlation between biological, linguistic and cultural diversity in South-East Asia and the Pacific by taking examples from the Solomon islands, where probably over eighty languages are spoken and hundreds of islands harbour a enormous variety of plant and animal species. From there they pass on to Papua New Guinea and Borneo, part of the Indonesian Republic, which have even higher levels of biological, cultural and linguistic diversity.

Linguists estimate that between 5000 and 7000 languages are spoken today on the five continents (*cf.* Krauss 1992; Harmon 1995; Grimes *et al.* 1996; Maffi 1999). An estimated half of these languages will disappear within a century and with them the codifications, intellectual heritages, and frameworks for the unique understanding of life of each society (*cf.* UNESCO 1993). An even higher number are losing the 'ecological' context which keeps them vibrant languages (*cf.* Mühlhäusler 1996; Töpfer 1999). Martin & Idrus (1998) indicate a possibly even higher distinction rate in languages of 90%, based on estimations of linguists that only 600 of the 6000 languages currently spoken will exist by the year 2050.

According to Altwaijir (1997: 12), the protection of the right to cultural diversity requires: *'the development of international cooperation in the fields of education, science and culture in the framework of the existing treaties, covenants and agreements that govern the work of international and regional organizations and institutions. However, it must be stressed that the exercise of the right to cultural diversity throughout the world cannot blossom fully unless dialogue among religions, cultures and civilization be enhanced and further developed till it entrenches the values of concord, cooperation and coexistence among the followers of the different civilizations, and consolidates international cooperation in the*

framework of the existing international and regional organizations, which constitute, in their own right, an international system that rallies peoples, nations, States and governments alike, regardless of their religion, culture and civilization.'

Recently, the complementary importance of cultural diversity, reflected in the Traditional Ecological Knowledge systems (TEK) relating to natural-resource management including the use and conservation of plants and animals, has been widely documented in various sectors of knowledge, including anthropology, agriculture, fisheries, forestry, ecology, biology, botany and medicine (*cf.* Slikkerveer 1999). Numerous studies have substantiated this complementary importance of cultural diversity, including the works of Posey (1985), Chambers, Pacey & Trupp (1989), Leakey & Slikkerveer (1991b), Arnold (1992), Fairhead (1992), Mathias-Mundy (1992), Mazur & Titilola (1992), Richards (1992), Sarin (1995), Warren, Slikkerveer & Brokensha (1995), Posey & Dutfield (1996) and Schulte (2002).

Traditional knowledge, specifically traditional medicine, has been used for thousands of years and its practitioners have made a great contribution to human health, but it was not until the Alma-Ata Declaration (1978) that countries and governments were called upon to include traditional medicine in their primary health systems for the first time, and to recognize the associated practitioners of traditional medicine as a part of health care, particularly for Primary Health Care at the community level. This was tantamount to recognising this medical trait in their culture officially.⁸ After this break-through in the acceptance of the role of traditional medicine in Primary Health Care development at the WHO International Conference in Alma Ata (1978), a renewed interest in and implementation of TEK, specifically in ethno-botanical knowledge systems, followed in applied-oriented areas, acknowledging its potential in more participatory and sustainable health systems (*cf.* Slikkerveer 1999).

Globalisation, primarily known as the force behind the integration on a global scale of all aspects of the economy, including raw materials, labour, transport, finance, distribution and marketing, poses the primary threat to cultural diversity (*cf.* Agung 2005). Other well-known negative effects ascribed to globalisation, perceived as economic power, are biological and include climate change, loss of biological diversity, depletion of the ozone layer, pollution, exhaustion of water resources and the conflicts over shared resources (*cf.* Töpfer 1999). Globalisation is regarded as an enormous threat since there are two main scenarios commonly recognized in it. The first is what followers decry as the 'Global Capitalist Monoculture' and the second is feared as the 'Westernization of the World' (*cf.* Tomlinson 1999). Neither of these scenarios leaves much room for cultural diversity and both concentrate on the economic aspect of globalisation. Although it is highly unlikely that globalisation will succeed in making a unified global culture, unquestionably the whole process must influence existing cultures (*cf.* Tomlinson 1999). The influences motivated by globalisation-related processes elicit changes in existing cultures and these changes might lead to the extinction of 'old' cultures, but also to the creation of 'new' cultures.

Tomlinson's (1999) warning should be taken to heart and there should be no mistaking the connectivity of globalisation for unicity, proximity or intimacy. Tomlinson (1999: 2) defines globalisation as *'the rapidly developing and ever-densening network of interconnections and interdependences characterizing modern social life'*. Giddens (1990: 64) defines globalisation in social theory as *'the intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa'*. Although globalisation is often represented as a causal process, Connor (2001: 14) argues that: *'it is more productive to think of it as a descriptive term for many interrelated phenomena that require theoretical analysis'*. For

instance, when it concentrates on the technology and developments in communications systems globalisation dissolves geographical distances and political boundaries and makes it possible to enhance access to goods and services which can bring progress and new opportunities to the people of the Earth (cf. Töpfer 1999). The main threat of globalisation, which looms largest in the minds of many, is its slumbering potential to evolve into a dictatorial regime relying solely on the capitalistic-dictated market-oriented consumer society which would therefore marginalise any cultural perspective other than the economic.

Tomlinson (1999) states that it is very unlikely that globalisation is the harbinger of homogenisation. The obviously diverse world which can be encountered today is ready proof of this. Globalisation, which has more sources than the technologically advanced communication systems, is not a one-way process. Therefore it should at the least adduce the possibility that, if global structures can affect the local, conversely the local can also intervene in the global. Culture and cultural diversity do matter to globalisation, in the obvious sense that culture is an intrinsic aspect of the whole process of complex connectivity and in the sense that it marks out the symbolic terrain of meaning construction as the arena for global political intervention (cf. Tomlinson 1999). Global political intervention is made possible if communities all over the world realise that their everyday actions are interconnected with the distant unknown other and to the fate of the planet. This realisation has led to the present-day global interventions in such matters as health and environmental care.

Moreover, by creating a global forum globalisation might be the very key to the protection of cultural diversity and the advocate of the right to cultural diversity. A similar process has taken place in awakening global awareness of the urgency of present-day environmental problems. Altwaijri (1997) states that globalisation can be neither the antithesis of identity, nor its substitute, and that it will develop into the promoter of the diversity of culture and the flourishing of identities. He (1997: 15-16) argues that the general sense of the term identity will not change either when adopting a linguistic or a modern philosophical acceptance of the term as it always will: *‘connote the fact of being distinct from others or of being the same in all respects, that is to say to have specific characteristics, values and constituents that distinguish the individual and society from others. In short, the cultural and civilizational identity of a given nation represents the immutable and essential body of general characteristics and traits peculiar to the civilization of a nation, which confer upon the national personality a patina that distinguishes it from the other national personalities’*.

Tomlinson (1999: 105) believes that in the process of the globalisation of our current stage of modernity: *‘not merely different, more complex identity position, but also different modes of cultural identification are arising’*, therefore stimulating and building a gateway to greater differentiation rather than unification. Pitana (1999) has demonstrated that in Bali at present, globalisation and localisation are occurring simultaneously. Even as the exogenous modernising processes are strengthening, the local processes are being reinforced. The current knowledge, beliefs and practices pertaining to MAC plants among the Balinese community members will be described and analysed in more detail in relation to the utilisation of MAC plants and the bio-cultural diversity conservation of MAC plants in Chapters 5, 6 and 7.

2.3.3 The ‘Inextricable Link’ between Nature and Culture

There is an ‘inextricable link’ between nature, society, language and culture (cf. Martin & Idrus 1998; Posey 1999a; Slikkerveer 2000b). The term bio-cultural diversity, expressing the relationship between biological and cultural diversity, was first affirmed in the Declaration of Belém (1988).⁹ The ‘Global Biodiversity Strategy’ refers to the relationship between biological and cultural diversity in its principles as following: *‘humanity’s collective*

knowledge of biodiversity and its use and management rests in cultural diversity; conversely, conserving biodiversity often helps strengthen cultural integrity and values' (quoted from Slikkerveer 2000b: 13).¹⁰ The interaction between humans and plants reveals a particularly mutual pattern which has its roots in prehistory (*cf.* Slikkerveer 2000b; Ibui 2007). Throughout recent history an ongoing effort has been made to document plants and their uses all over the world by different academically disciplines, especially by scientists in the field of 'ethno-botany', as discussed in Section 2.1.1.

Since the 1990s, developments into the insights of the sustainable human-environment relationships, integral to the TEK of local peoples, versus the unsustainable human-environment relationships related to the migration or the rise of complex civilizations, has led to the growth of an integrated bio-cultural perspective at the intersection of the environmental and the social sciences (*cf.* Oldfield & Alcorn 1991; Shiva *et al.* 1991; Toledo 1994; Stevens 1997; Martin & Idrus 1998; Posey 1999a; Maffi 2004). Today, the enormous, rapid extinction of biodiversity of plant and animal species is recognised as a threat to the eventual survival of humankind. Even more alarming is the loss of cultural diversity in terms of rapidly disappearing traditional knowledge. Specifically in relation to this study, in some cases knowledge of MAC plants seems to surpass the loss of the plant species themselves (*cf.* Pearce & Moran 1994; Van Seters 1997; Slikkerveer 2000b). Traditional healers are often skilled botanists and their talent for locating the requisite plant is doomed to be lost even faster, since their knowledge is often not documented and the younger generation is uninterested as it has different ambitions (*cf.* Van Seters 1997). The reassessment of the 'inextricable link' between nature and culture has awoken renewed attention in the context of conservation, as a consequence of the obvious correlations and interactions between humans and their ecosystems. This has evolved into the what is known as the bio-cultural diversity model of conservation which seeks to integrate both the preservation of human life-styles and natural life forms (*cf.* Agung 2005).

Various studies based on long-term anthropological and ethno-science research in small-scale communities in developing countries has shown that such communities have well-adapted indigenous systems of knowledge and practices, which have enabled them to live and survive in their particular environments sustainably for many centuries (*cf.* Slikkerveer 1999). There is a danger that such findings might lead to an over-emphasis on a presumed conservation ethic of indigenous peoples, creating the myth of the '*ecologically noble savage*' (*cf.* Redford 1991). Ellen (1986) rightly indicates, traditional communities, often regarded as conservation-oriented, are so because they are indeed small, and therefore their environmental impact is minimal. However, Posey (1999b: 4) argues that traditional livelihood systems are dynamic, constantly adapting to changes in social, economic and environmental conditions, but no matter what these changes are, they still embraces the principles of sustainability and generally emphasise the following values:

1. *co-operation;*
2. *family bonding and cross-generational communication, including links with ancestors;*
3. *concern for the well-being of future generations;*
4. *local-scale self-sufficiency, and reliance on locally available natural resources;*
5. *rights to lands, territories and resources which tend to be collective and inalienable rather than individual and alienable; and*
6. *restraint in resource exploitation and respect for nature, especially for sacred sites.*

Balinese society incorporates these six values to a reasonable extent. Therefore they can be identified as a traditional livelihood system as envisaged by Posey (1999b). Size-wise, Balinese society does not fit the criteria and it is very questionable whether its environmental impact is small, especially in view of the (in)famous tourist industry which penetrates every part of the island. Originally Balinese society may have been a traditional livelihood system. Over time, as noted by Schulte (2002) local or traditional people tend to become so alienated that they abandon their traditional resource-friendly and conservation-oriented methods of land use.

In Bali, the Dutch colonisation of the island placed all the natural resources under national authority depriving the local people of forest access. After Indonesia gained political independence, for reasons of convenience natural resources continued to be controlled by centralized management systems and those central authorities redirected forest management towards the commercial production of timber, excluding other important but non-industrial functions of the forest (*cf.* Schulte 2002). Like many other present-day traditional societies, to a large extent part Balinese society slots into the global economy and it would be unfair as Redford (1991) and Kalland (1994) argue to expect the Balinese, or any other indigenous people, to use solely traditional, low-impact, subsistence technologies and strategies.

It would be easy to be tempted into a discussion about whether or not indigenous peoples are 'natural conservationists' and whether or not a community, in this study the Balinese community, could be identified as indigenous people. Although today the use of the term indigenous is common, Posey (1999b) notes that it is not easy to define the term 'indigenous' in many parts of the world. Problems with the term indigenous have emerged in discussions linked to basic human rights, as well as to land, territorial and collective rights, because of the fundamental principle of self-identification as indigenous or tribal incorporation in the definition of indigenous as established by the International Labour Organization Convention 169 (ILO 169).¹¹ Gray (1999: 61) states that: *'As a general orientation to the concept of indigenous, one could say that indigenous peoples are distinct peoples, with their own languages, cultures and territories, who have lived in a country since times prior to the formation of the current nation state. They have become disadvantaged and vulnerable as a result of colonial invasion of their territories either by international colonization or by groups in the countries in which they live. More than 300 million people in the world are indigenous.'* The UN Working Group on Indigenous Populations advised that the term indigenous people should not be defined too precisely (*cf.* Daes 1993).¹² As Posey (1999b: 7) rightly argues both *'the unequivocal influence of indigenous and local communities in the formation and maintenance of modern ecosystems'* and *'the formidable number of case studies'* illustrate *'how Traditional Ecological Knowledge and practices serve to effectively manage and conserve mountain, forest, agricultural, dry-land, highland, aquatic and other ecosystems'* (Quoted from Agung 2005: 45).

Balinese Traditional Ecological Knowledge (TEK) is enshrined in history, present-day practices and, with the right conservation techniques it will be there for future generations. Upholding the cultural diversity of the island communities and their TEK and inherently creating a sustainable way of respecting the bio-cultural diversity of the island should be encouraged in order to give the following generations a viable future. Maffi & Oviedo (2000) state that: *'... success in conserving biological diversity may well be interrelated to the maintenance of cultural diversity, and that conversely, the loss of cultural diversity is part and parcel of the same socio-economic and political processes leading to biodiversity loss'*. Posey (1999b: 8) applauds that the intrinsic link between culture and nature is now also recognised by UNESCO in the form of cultural landscapes: *'Cultural landscapes, and their links to*

conservation of biological diversity, are now recognized under the 1972 UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage ('The World Heritage Convention'). A new category of World Heritage Site, the 'Cultural Landscape', recognizes 'the complex interrelationship between man and nature in the construction, formation and evolution of landscape'.

Lewis & Elvin-Lewis (2003) have documented the link between nature and culture specifically for the use of medicinal plants. When they generalised their findings, they concluded that loss of language and knowledge as a consequence of acculturation and plant and habitat destruction is a major concern in the case of the survival of the often elaborate, lengthy traditional healing programmes, which cogently also encompass spiritual and sometimes mythical roles, in addition to the use of herbal therapies. Lewis & Elvin-Lewis (2003) specify that the small traditions especially are more vulnerable to outside influences. The great traditions such as traditional Chinese medicine, Ayurvedic medicine and Graeco-Arab medicine are functioning well since they are buffered by having major geographic areas, many users and trained practitioners. Bodeker (1997) links the long-term viability of traditional health systems with the prospects of the future supply of medicinal plants and with places at which practitioners can supervise the preservation of traditional ecological and medical knowledge at the core of future prospects for ancient but challenged traditions.

Toledo (2000) synthesises his perception of ethno-ecological research by defining ethno-ecology as: '*a discipline that explores three interrelated levels of human-environment relationships: the corpus (knowledge), the cosmos (beliefs) and the praxis (practices) displayed by human societies in their interaction with their local ecosystems*' (Quoted from Carlson & Maffi 2004: 1). The Knowledge-Belief-Practice complex makes it possible to assess the rather complicated bio-cultural diversity conservation behaviour exhibited by respondents as one integrated complex of human-environment relationships and interactions (cf. Slikkerveer 1999). *Tri hita karana* forms the *corpus* in the Knowledge-Belief-Practice complex in Bali. It is defined by Agung (2005: 271) as: '*a religious based guiding principle of human behaviour to maintain and restore the 'Sacred Balance' between and within the human world (pawongan), the natural world (palemahan) and the spiritual world (parahyangan).*' It is an ancient Hindu-Balinese principle, which should be translated as the 'three-happiness-sources'. This has virtually become the all-embracing Balinese philosophy of life safeguarding the harmony and 'Sacred Balance' among the three cosmic dimensions of humans virtually on a daily basis: God (referring to all representations of *Sang Hyang Widhi Wasa*, including gods, spirits and ancestors), the *buana agung* (macrocosmos; the entire physical universe), the *buana alit* (microcosmos; the individual or the soul) (cf. McCauley 1984; Suryani & Jensen 1993; Pitana 2000; Agung 2005). Balinese believe that keeping the balance by honouring the *tri hita karana* concept is extremely important to the local use, management and conservation of nature (cf. Agung 2005) and to health, well-being and happiness, since imbalance between them invites illness (cf. McCauley 1984; Suryani & Jensen 1992; Pitana 2000; Sacchette 2002). As the guiding principle keeping the balance, *Tri hita karana*, expresses the spiritual and religious values in the Balinese knowledge system which provides the fundamental understanding of the human, natural and spiritual world of Bali. It is included in the operationalisation of the multivariate model presented in the next chapter.

The 'inextricable link' between biological and cultural diversity and the Knowledge-Belief-Practice complex is integrated in the views of the Convention of Biological Diversity on drivers of change influencing biodiversity and ecosystems stating that: '*biodiversity is affected by drivers of change and also is a factor modifying ecosystem functions. It*

contributes directly and indirectly to the provision of ecosystem goods and services. These are divided into four main categories by the Millennium Ecosystem Assessment: goods (provisioning services) are the products obtained from ecosystems; and cultural services represent non-material benefits delivered by ecosystems. Both of these are directly related to human well-being. Regulating services are the benefits obtained from regulating ecosystem processes. Supporting services are those necessary for the production of all other ecosystem services' (SCBD 2006: 14).

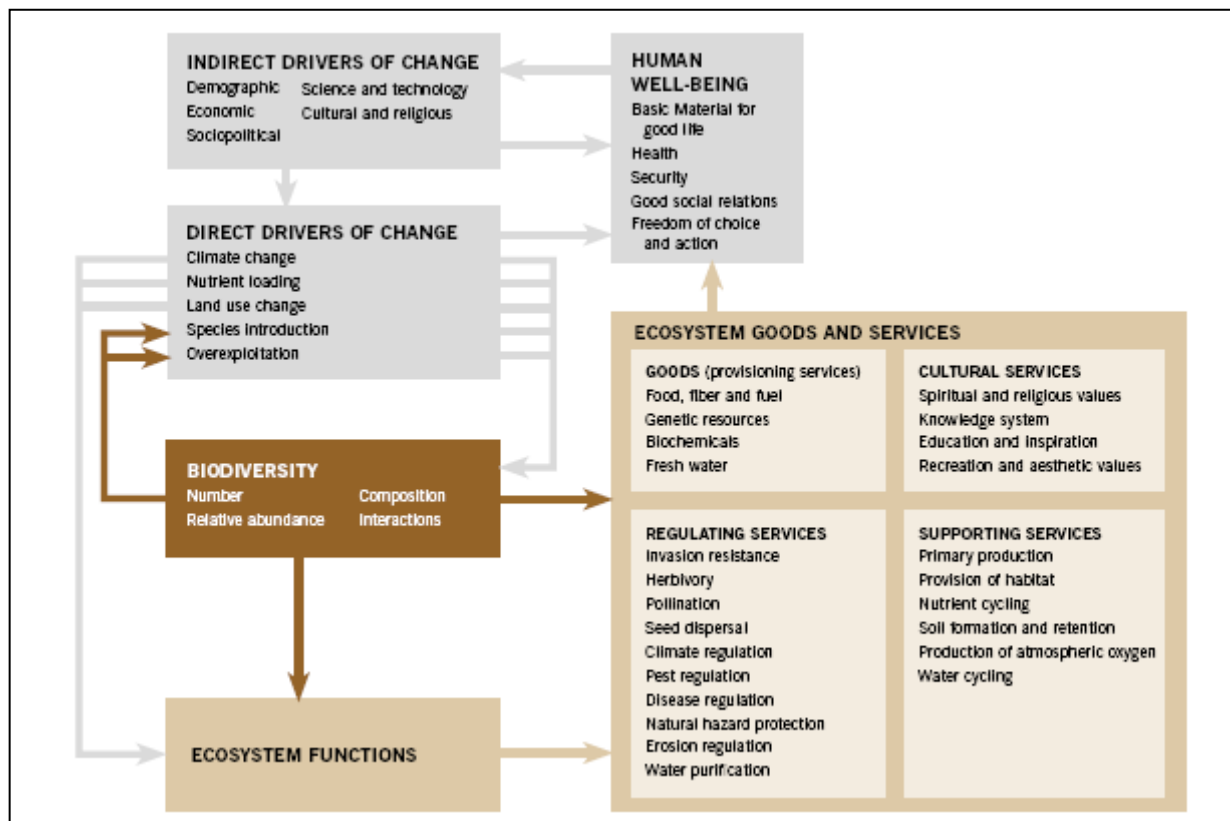


Figure 2.2 Biodiversity, ecosystem functioning, ecosystem services, and drivers of change
Source: Secretariat of the Convention on Biological Diversity (2006: 14)

This study supports the essential function of the Knowledge-Belief-Practice complex as a basic approach to the study of human behaviour and incorporates this complex and the inter-relationship of biodiversity, ecosystems and drivers of change in the research approach and multivariate conceptual model presented in Section 3.1. Figure 2.2 shows the inter-relationship between the cultural services of ecosystems defined by the Secretariat of the Convention on Biological Diversity (SCBD) and human well-being and biodiversity. One major aspect of the spiritual and religious values and knowledge systems in relation to the research population of this study is revealed in the cosmovision of a society. Balinese cosmovision is based on the division of the universe in three related dimensions (*tri loka*) encompassing the underworld *buhr*, the world of humans *bwah*, and the world of the gods, spirits and ancestors, *swah*. *Tri angga* is a concept related to *tri loka* and it ensures that everything else in the Balinese cosmos is also subdivided into three components (*nista*, *madya* and *utama*) (cf. McCauley 1984; Suryani & Jensen 1993; Pitana 2000; Agung 2005). It is in recognition of and respect for the 'inextricable link' between biological and cultural diversity,

that the key to sustainable use of the world natural resources lies (*cf.* Altwaijri 1997; Posey 1999a). Indubitably it will prove indispensable to the survival of diversity to learn and respect the ways of present-day indigenous and traditional peoples and integrate them into environmental and developmental considerations (*cf.* Posey 1999a). In conclusion, it cannot be into clearer words that those of Plotkin (1988) did: *‘Conservationists often talk about the problem of disappearing species, but the knowledge of how to use these species is disappearing much faster than the species themselves’*, which leaves us with an intrinsic command to ensure the preservation of both MAC plants and the knowledge, practices and beliefs of the Balinese community about MAC plants.

Notes

- ¹ There is a semantic difference between ‘disease’ and ‘illness’. ‘Disease’ is objective and ‘illness’ refers to the more subjective or psychological dimension of non-health. Eisenberg & Kleinman (1981a: 13) state this distinction as follows: *‘Physicians diagnose and treat diseases: that is abnormalities in the structure and function of body organs and systems. Patients suffer illnesses; that is experiences of disvalued changes in states of being and social function’*.
- ² Despite the intrinsic meaning of the term modern, it should be borne in mind that modern medicine developed from the regional medical system popular in Western countries. Since the sixteenth century, the Greek humoral regional medical system commenced its evolution into the current bio-medicine based on a progressive accumulation of knowledge of anatomy and physiology. The process accelerated in the nineteenth century with the discovery of germ theory, antiseptis, and anaesthesia. In our time, the discovery of antibiotics and such technological developments as diagnostic imaging technologies and microsurgery have changed the scene again. The list of technological accomplishments is continuing to grow (*cf.* Leslie & Young 1992).
- ³ Complementary and alternative medicine (CAM) can be grouped into five major, somewhat overlapping groups: 1) Alternative medical systems (for example the traditional Chinese medicine, Aryuvedic medicine, homeopathic medicine and naturopathic medicine); 2) biologically based therapies; 3) manipulative methods; 4) mind-body interventions; and 5) energy therapies (*cf.* Lewis & Elvin-Lewis 2003).
- ⁴ See Appendix I for the full text of the Alma Ata declaration (1978).
- ⁵ See Appendix III for the full text of the Chiang Mai Declaration (1988).
- ⁶ The current major extinction event is labelled the sixth in the history of the Earth and the greatest since the dinosaurs disappeared 65 million years ago (*cf.* SCBD, 2006).
- ⁷ Bio-geography is the science of the geographic distribution of organisms. The central question in bio-geography is: *‘How are were extant and fossil organisms distributed in space and time and what are the underlying causes for these patterns’* (Erdelen *et al.* 1998: 6).
- ⁸ See Appendix I for the full text of the Alma Ata declaration (1978).
- ⁹ See Appendix II for the full text of the Belém declaration (1988).
- ¹⁰ The Convention on Biological Diversity (CBD) is one of the major international forces recognising the role of indigenous and local communities in *in situ* conservation. Article 8(j) of the Convention on Biological Diversity (CBD) spells out the specific obligation of each contracting party subject to its national legislation: *‘(to) respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional life-styles relevant for the conservation and sustainable use of biological diversity and promote the wider application with the approval an involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices’* (Posey, 1999b: 9).
- ¹¹ The ILO 169 is the only legally binding international instrument specifically intended to protect indigenous and tribal peoples but has only ten State Parties (*cf.* Posey 1999b).
- ¹² Because of the lack of a clear definition of the term indigenous peoples, so far UN conventions have been unable to reach a final decision, leaving open the possibility that any minority group could assert its rights, and the extension of the right of self-determination could have serious implications for the territorial integrity of States.

3 Methodology

This Chapter presents the research methodology and the specific methods and techniques applied in this study. A variety of qualitative and quantitative research methods and techniques were applied to document and analyse the Balinese community members' knowledge of, beliefs in and practices pertaining to MAC plants in relation to three main aspects: community health, the conservation of plant resources and the preservation of the local culture.

It commences with a description of the leading methodological approach of this study, the Ethnosystems Approach which has three basic elements: the historical perspective (HP), the Leiden concept of 'field of ethnological study' (FES) and the participant's view (PV). The Ethnosystems Approach assesses local and regional systems of knowledge and practices in the dynamic context of development and change. On the basis of empirically measurable criteria, the Ethnosystems Approach makes it possible to document and study local systems in a more realistic context. Section 3.1.2 introduces the conceptual model. This multivariate model, integrating the principles of the Ethnosystems Approach and the Knowledge-Belief-Practice complex, is the basis for the quantitative analysis of the utilisation and bio-cultural diversity conservation behaviour of MAC plants in Bali. Section 3.1.3 presents the operationalisation of the conceptual model with an overview of the intended variables and their categories, the basis of the statistical analyses.

Section 3.2 discusses the main methods and techniques of data collection and analysis, with the exception of the ongoing process of literature survey, in four separate blocks. The first block introduces participant observation and the interviewing techniques used throughout the fieldwork to collect mainly qualitative data. In the second block, free-listing and pile-sorting are described; the quantitative techniques by which the *emic* disease and the *emic* MAC plant classifications are documented. The third block sets out the line of reasoning leading to the specific type of ethno-botanical survey applied in this study combining ethno-botany and social anthropology. The feature of the fourth block is the way the household survey, the main tool for the collection of the extensive data to document the variables defined on the basis of the conceptual model, was conducted.

Section 3.3 discusses the statistical analyses of the collected data to support the qualitative findings of this study by quantitative techniques. In line with the selection of the multivariate conceptual model which can handle the complexity of the local Knowledge-Belief-Practice complex, statistical analyses have been applied ranging from the bivariate to multivariate analyses and multiple regression analysis to capture the mutual interaction of the various categories of factors of the utilisation and bio-cultural diversity conservation of MAC plants.

3.1 Research Methodology

3.1.1 The Ethnosystems Approach

The Ethnosystems Approach, the chief approach in this study, has its roots in the classical school of sociological and socio-linguistic thought, 'ethno-methodology', introduced in the 1960s by Garfinkel (1964) and Cicourel (1967). The focus of ethno-methodology is the practical, everyday, common-sense reasoning of community members connected to their lay methods (*cf.* Agung 2005). Although useful to the development of interaction research, because of its presentation of an over-ordered version of everyday life without an explanation of social structures and constraints, ethno-methodology lost ground (*cf.* Slikkerveer 1999). In

the 1970s, ethno-methodology was reinitialised and developed into the 'Ethnosystems Approach' by the Medical Anthropology and Sociology department at Leiden University. In the process, its primary constraints were overcome (cf. Ibui 2007).

The Ethnosystems Approach has been largely operationalised in policy-based research in projects in Africa and Asia, studying complex systems of indigenous knowledge and practices thereby increasing the understanding and improving clarification of the interaction process between indigenous and global knowledge (cf. Van den Breemer 1989; Leakey & Slikkerveer 1991b; Van den Breemer *et al.* 1991; Adams & Slikkerveer 1996; Slikkerveer & Lionis 1996; Adimihardja 1999). The LEAD Programme of Leiden University redefined the Ethnosystems Approach for use in a wide variety of sectors of societies and communities worldwide. Slikkerveer & Decherling (1995) demonstrated that the Ethnosystems Approach accommodates the analysis of processes of interaction between humans and their environment and that it takes account of the significant patterns of use, management and conservation of bio-cultural diversity. In their recent studies Agung (2005) and Ibui (2007) demonstrated that the Ethnosystems Approach is a useful tool to analyse the conservational behaviour of the Balinese towards their bio-cultural diversity and the analysis of the indigenous knowledge of, belief in and practices with wild plants among the Meru of Kenya. This study combines these findings and studies of the Ethnosystems Approach for the utilisation and bio-cultural diversity conservation of MAC plants.

The Ethnosystems Approach seeks to contribute to the establishment of a common ground for the comparison and synthesising of analytical principles by providing an interdisciplinary non-normative framework of *emic*, regional comparative and (pre)historical analysis (cf. Slikkerveer & Decherling 1995). Moreover, as stated by Agung (2005: 93): *'the approach provides a nuance to the factor, often ignored in the debate, of the emic perception not only of what is perceived of what scientist refer to as biocultural diversity, but even more so what in their local experience entails into conservation of biocultural diversity at community level'*. In a broader context, the Ethnosystems Approach can be used to analyse such dynamic concepts as beliefs, perceptions, practices and decision-making processes and interrelate these with the socio-economic development in various sectors of the communities involved (cf. Ibui 2007). It encompasses three basic concepts: the Historical Perspective (HP), the Leiden concept of 'Field of Ethnological Study' (FES) and the Participant's View (PV). Each of the three basic concepts in the Ethnosystems Approach and their connected research methods and techniques will be discussed in the following pages.

The historical perspective (HP) facilitates the analysis of the historical dimension of development processes. In this study the focus of the historical perspective lies on those historical developments in medicine, resource management and cultural-diversity conservation which influence the current use and bio-cultural diversity conservation behaviour of MAC plants in Bali. In contrast to the Ethnosystems Approach, other contemporary-oriented approaches fail to unravel the dynamic of the origins and development of processes which have led to present-day complexes, particularly in trans-cultural research settings (cf. Slikkerveer 1999). The HP concept certainly facilitates the assessment of cognitive and behavioural components of the community studied. As will be documented in more detail in Chapter 4, Bali has a rich history marked by waves of immigrations of people, and of ideas and policies influencing the development processes in medicine, resource management and national and local identities shaping its cultural diversity. As said before, this study follows Dunn's (1976: 135) definition of a medical system: *'the pattern of social institutions and cultural traditions that evolves from deliberate behaviour to enhance health, whether or not the outcome of particular items of behaviour is ill health'*. This definition with

its focus on the words ‘social institutions’, ‘cultural traditions’ and ‘evolves’ places a medical system in its historico-geographical context (*cf.* Slikkerveer 1990). The chosen definition of a medical system, a key concept in this study, therefore links up with the HP concept of the Ethnosystems Approach. Specifically, the research techniques of literature survey and interviewing have been applied to substantiate the historical perspective.

The Leiden concept of ‘Field of Ethnological Study’ (FES) is the second basic concept of the Ethnosystems Approach. Indonesia contains a wide variety of sub-cultures and can be regarded as a FES. FES is related to the concept of ‘culture area’ introduced later and refers to a geographical region in which cultural features can be compared between different ethnic groups in that same region (*cf.* Slikkerveer 1999). The determination of Indonesia as a FES evolved from the extensive ethnological fieldwork by Van Wouden (1935), who observed that there was a pan-Indonesian culture characterised by such similar, comparative cultural traits as language, kinship, arts buttressed by similar perceptions and practices in agriculture, forestry and medicine. This determination of Indonesia as a FES has been substantiated by various structural anthropologists belonging to the ‘Leiden Tradition’, for instance De Josselin de Jong (1984) and Schefold (1988).

As a regional comparative research tool, FES has proved to be more realistic and less normative than other approaches. It was a leading concept during the orientation and documentation phases of the literature study. The fieldwork area for this study was restricted to the Indonesian island of Bali. During the fieldworks periods, executed in 2005 to 2007, the research technique participant observation was used continuously. The researcher had already had experience of this during previous fieldwork in Sumatra (1999) and Java (2002). This made it possible for the researcher to recognise those aspects of the Balinese society which are part of that pan-Indonesian culture determined by the structural anthropologists. When appropriate, the specific features of Bali will be related to Indonesia, the Field of Ethnological Study, in the discussions and descriptions of the results of this study in Chapters 4 to 7.

Participant’s View (PV) is related to the anthropological concept of the *emic* view, a technique which pays special attention to the *in situ* aspects of indigenous knowledge. The local population’s point of view on its own way of life, including its system of management, use and conservation of natural resource has become a major guiding principle in policy planning and implementation at the local level (*cf.* Ibui 2007). The *emic* view, as opposed to the *etic* view, looks at cultures from inside, allowing the researcher to conceptualise the community studied on the basis of local constructs and concepts. Consequently, *emic* classifications are those drawn from the way local people perceive things through their own eyes and express them in their own language; whereas *etic* classifications are taken from the way the researcher perceives and classifies the world (*cf.* Martin 1995). PV is a broad concept which includes: ‘*the assessment of symbolic representations, world-views (cosmologies or cosmovisions), culture-bound philosophies of nature and the environment, perceptions, attitudes, opinions, etc. as part of the underlying structure of values, norms and belief systems, which characterize specific cultures*’ (Slikkerveer 1999: 173).

The conceptual model and its operationalisation provided the guidelines to maintain the focus of this broad participant view concept on the three main objectives of this study of MAC plants: community health, the conservation of MAC plant resources and the preservation of local culture in relation to MAC plants. A wide range of research techniques were used to study the *emic* view and the participant’s view (PV): participant observation, (semi)-structured interviewing techniques, open interview techniques, the free listing and pile-sorting techniques, the ethno-botanical survey and not least the household survey.

3.1.2 The Multivariate Model for Use and Conservation of MAC Plants

The study focuses on Balinese knowledge of, beliefs in and practices with MAC plants in relation to their utilisation and bio-cultural conservation. Slikkerveer (1990) states that the specific features of health care, such as the pluralistic medical configuration and multiple utilisation, require a multi-dimensional model to describe, analyse and explain the complex processes of illness behaviour and health care utilisation, focused in this study on the preference of community members for using MAC plants for health and healing purposes. In his study on transcultural health care utilisation, Slikkerveer (1990) introduced a conceptual model which distinguished a set of categories at the individual level: the predisposing factors, enabling factors and perceived morbidity factors, and a set of factors at the system level, factors of the plural medical system and factors of health care utilisation.

Slikkerveer's (1990) multivariate model provides a means to determine the relationship between the six blocks of factors forming the possible determinants of variation in health-service utilisation as determined by McKinlay (1972) namely: socio-demographic, socio-psychological, socio-cultural, economic, geographic, and organisational factors. Slikkerveer's model (1990: 70-71) was inspired by the early multivariate models of Suchman (1965), Andersen (1968), Greenlick *et al.* (1973) and Kohn & White (1976b) and by previous research carried out in East Africa by Buschkens & Slikkerveer (1982).

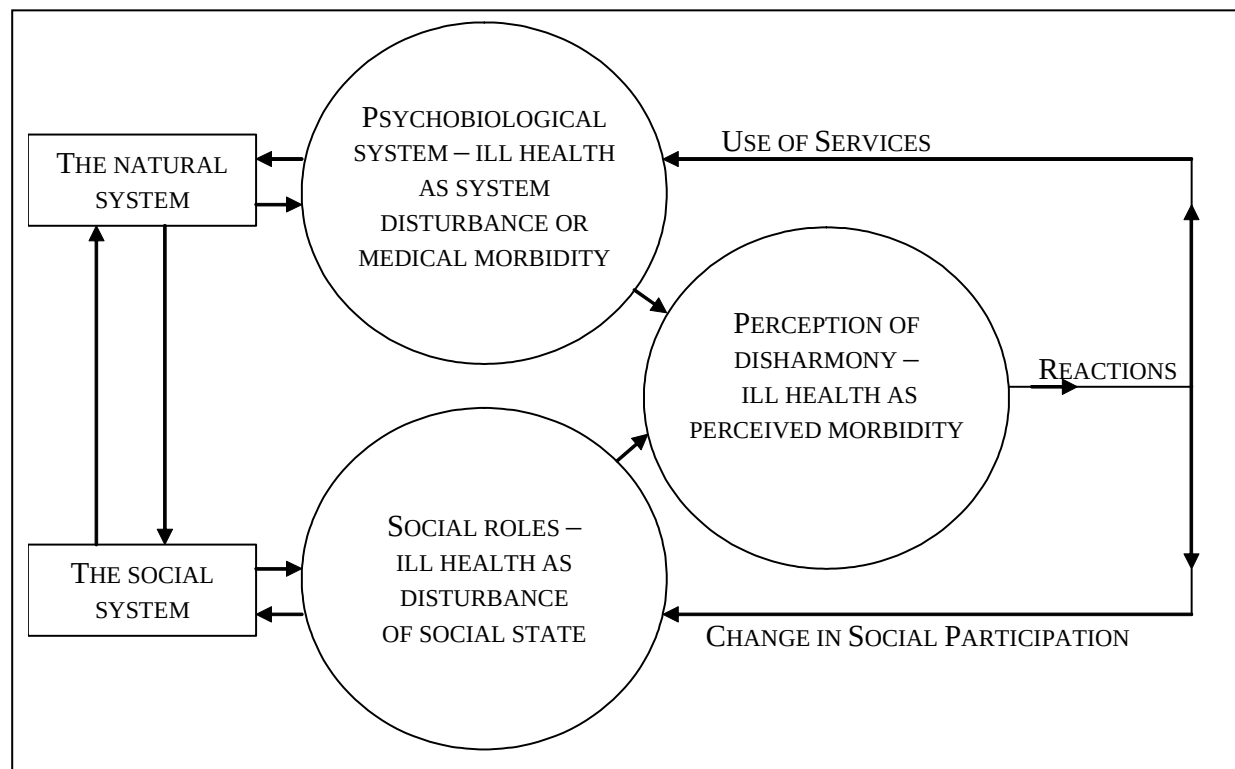


Figure 3.1 Model of relationships between the individual and social systems

Source: Kohn & White (1976b: 11)

Suchman (1965) laid the basis in his early work on the depth of belief in modern medicine among ethnic groups in New York City. This was the foundation of his five stages of illness behaviour which, although linear, describes illness as a dynamic process of successive choices of alternative forms of behaviour. Kohn & White's model (1976b), presented in Figure 3.1,

widened this dynamic process by harnessing the continuous adaptations in the individual actions undertaken in order to remedy the situation. Kohn & White's model (1976b) respects the adaptive and regulatory aspects of the processes of health, illness and care in both the personal and social system. It shows how a disturbance in the individual's psycho-biological system corresponds to behaviour directed either towards the psycho-biological system through the seeking of treatment or towards altering the system of social connections or towards some combination of these (*cf.* Kohn & White 1976b).

Kohn & White's model (1976b) singles out the perceived morbidity, just one aspect in one of the six blocks of factors defined by McKinlay (1972), the socio-cultural factors. Kohn & White's model (1976b) placed a stronger emphasis on the perceived morbidity than any other models had done before. In conjunction with the World Health Organisation, Kohn & White (1976b) developed the 'WHO model' using four blocks of variables predisposing factors, enabling factors, perceived morbidity and health service system factors, which Slikkerveer (1990) incorporated into his model.

In the application of his conceptual model, Slikkerveer (1990) showed that factors at the individual level could be 'elevated' to the systems level to allow the comparative analysis between factors related to both individuals and systems. Following later developments, the conceptual model evolved into a quantitative analytical model focused on the operationalisation of the participants' own, *emic*, perspectives (*cf.* Slikkerveer & Dechering 1995; Slikkerveer 2002; Slikkerveer & Quah 2003). Slikkerveer's conceptual model allows patterns of behaviour in the Knowledge-Belief-Practice complex to be studied (*cf.* Slikkerveer 1999). This multi-dimensional conceptual model provides the basis for a systematically sampled and statistically adapted quantitative analysis of independent and intervening factors, interacting on the dependent factors. The sampling of the statistical analysis methods and techniques will be discussed in Section 3.2.

Agung (2005) adapted Slikkerveer's model for his study of the Balinese conservation behaviour of bio-cultural resources in the context of the ongoing development process of globalization and global tourism and added such so-called 'invisible' factors as indigenous cosmologies, belief systems and attitudes. Added to the conceptual model, these 'invisible' factors can be analysed in relation to local patterns of human behaviour in the context of development and change. The addition of these 'invisible' factors produces a multivariate model which widens the perspective on culture and also enables an assessment of the cognitive and behavioural components of particular groups or communities as 'systems' in a fairly holistic mode to be made (*cf.* Agung 2005). In her study of wild plant use behaviour in Meru, Kenya, Ibui (2007) used the same conceptual model as Agung (2005) and defined the variables of the various blocks of factors to suit her research, demonstrating the adaptability of the model for analysis of patterns of the use of wild plants, including medicinal plants. The model makes it possible to assess the fairly complicated bio-cultural diversity conservation behaviour of respondents as one integrated complex of human-environment relationships and interactions connecting the individual with the system level.

The conceptual models used by Agung (2005) and Ibui (2007) are the basis for the conceptual model of this study (see Figure 3.2). This retains the three big block structure of the independent, the intervening and the dependent factors as defined in Slikkerveer's original model (1990). The factors for this study of the utilisation and bio-cultural diversity conservation behaviour of MAC plants are specified in the three big blocks. The three dependent factors in this study are: the utilisation of MAC plants, the biodiversity conservation of MAC plants and the cultural diversity conservation of MAC plants.

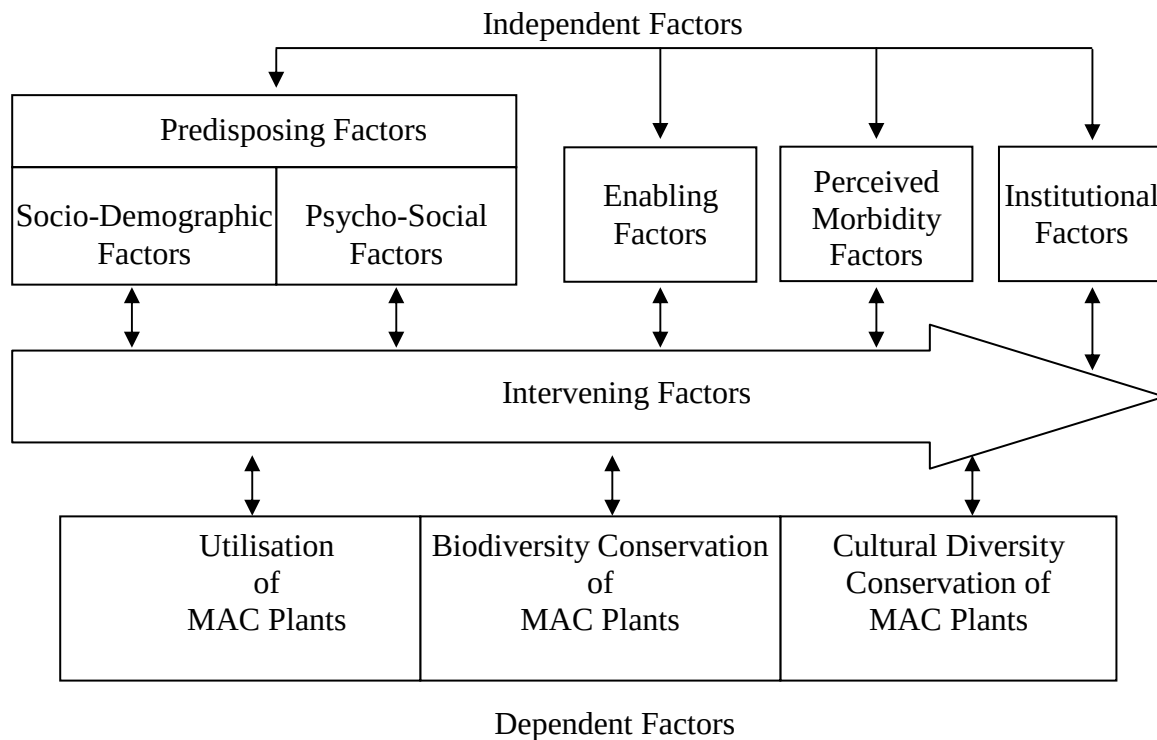


Figure 3.2 The conceptual model indicating the blocks of factors for the utilisation and bio-cultural diversity behaviour of MAC plants
Source: Adaptation of Slikkerveer' model (1990).

The independent factors consist of four blocks, namely: the predisposing, the enabling, the perceived morbidity and the institutional factors. These four blocks incorporate the sets of factors forming the possible determinants of variation in health-service utilisation following the 'WHO model' of Kohn & White (1976b). The predisposing factors incorporate the socio-demographic and psycho-social factors. The enabling factors incorporate the economic factors and geographic factors. Finally, the organisational factors are incorporated into the institutional factors. Following the example of Slikkerveer (1990), derived from that of Kohn & White's model (1976b), the perceived morbidity factors are set apart in a separate block of factors. The 'invisible' factors added by Agung (2005) are incorporated into the psycho-social factors as part of the predisposing factors and, to a smaller extent, they are incorporated into the institutional and intervening factors. It should be clearly understood that the term 'independent' factors refers to the group of factors which are documented as such in the context of this study and are hypothesised to influence the dependent factors of this study. At the point of measurement, these factors can be considered 'independent' since the measurements represent the 'current' situation for each of them at the point of measurement; the study does not pretend to predict changes in these indicators after the measurement. The same reasoning applies to the intervening factors which are graphically represented in the model by the large arrow. The intervening factors consist of those factors which might have altered the 'standard' pattern of behaviour to be found in the dependent factors interrelation with the independent factors. Section 3.1.3 discusses the operationalisation of the model and presents the variables used to measure the factors by means of a household survey.

3.1.3 Operationalisation of the Conceptual Model

Kohn & White (1976b: 25) point out that: ‘*all empirical research involves at least some abstraction from the diversity and fluidity of the ‘real’ world*’. The conceptual model presented in Figure 3.2 is the abstraction of this study capturing the complex processes of health care utilisation focused on in this study of knowledge of, beliefs in and practices of the Balinese community members in relation to the utilisation of MAC plants for divergent health purposes and the interrelationship of the utilisation of MAC plants with the community members’ bio-cultural diversity conservation behaviour related to them. The multi-dimensional model conceptualises the interrelationships between the independent, intervening and dependent variables. The concepts in the model are the blocks of factors: the predisposing factors, divided into the socio-demographic and psycho-social factors, the enabling factors, the perceived morbidity factors, the institutional factors, the intervening factors and the dependent factors, divided into cultural diversity behaviour towards MAC plants, biodiversity behaviour towards MAC plants and medical utilisation of MAC plants. The blocks of factors have to be identified and operationalised to be measured; they have to be put into relationship with the diversity and fluidity of the ‘real’ world.

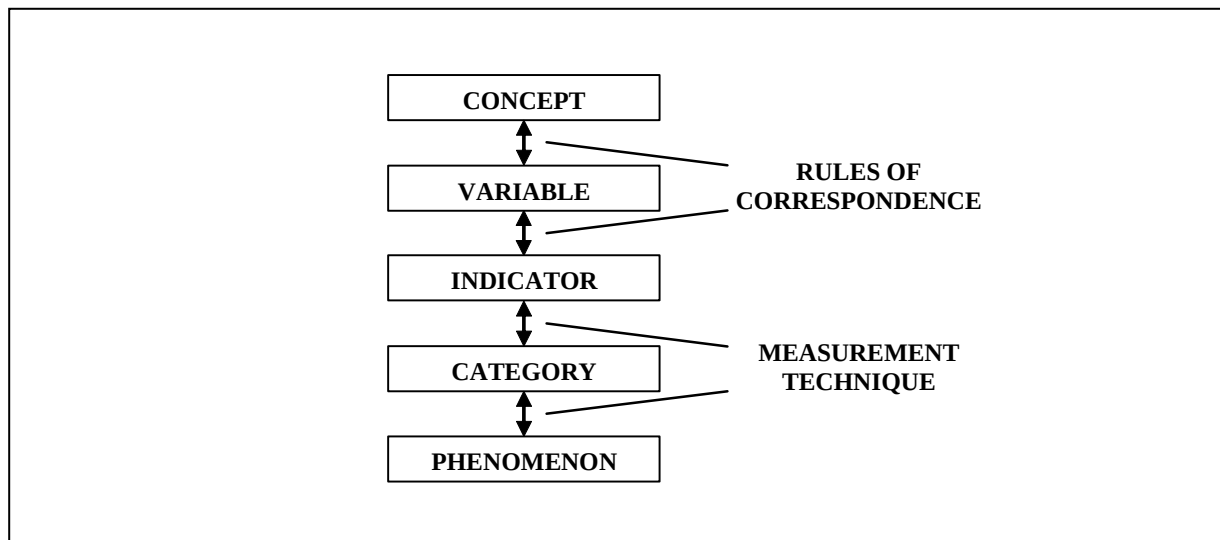


Figure 3.3 The links in the measurement process.

Source: Kohn & White (1976b: 25)

The operationalisation of the conceptual model from the concepts (blocks of factors) into a workable questionnaire (measurement of phenomena) was guided by the links in the measurement process as defined by Kohn & White (1976b) illustrated in Figure 3.3. The identification of the variables which make up the blocks of factors (concepts) is essentially based on the literature study of health care utilisation studies presented in Chapter 2. The variables identified were formulated at an abstract level which needs to be concretised by formulating indicators which can be related to empirical-measurable phenomena or criteria. The initial identification of the indicators by literature research has been complemented by the results of the preliminary fieldwork executed in the year (2005), thereby identifying the general indicators related to health care utilisation applicable to the proposed study in Bali. After the establishment of the indicators and the categories for the variables, the final step in the measurement process was taken: identifying the specific phenomena, the empirically

measurable criteria. The questions in the household survey are formulated at the phenomenon level. The answers, the measurements of the phenomena, were linked back in the analysis process to the chosen level of analysis which corresponded to the level of variables in the links of measurement process by Kohn & White (1976b).

Figure 3.3 identifies the critical points in the links of the measurement process of Kohn & White (1976b): the rules of correspondence and the measurement techniques. These critical points indicate the sources of error which can be made in the transposition of the conceptual model into a workable questionnaire. The first source of error might occur when the rules of correspondence are not followed from concept to variable and to indicators of the indented variable. The second source of error, which is more critical, since it seems so deceptively easy to avoid, is when there is a failure to use the appropriate measuring technique to link the indicators with the real events, data, action: the phenomena. The identification of the variables in the block of factors and the identification of the indicators, categories and phenomena for this study was substantiated by literature research and preliminary fieldwork to reduce the chances of making the first or second type of error. The composition of the blocks of factors from variable to measurable phenomena is an adaptation of the composition of the blocks of factors used by Slikkerveer (1990: 72-78), Agung (2005: 112-118) and Ibui (2007: 70-79) in their studies of respectively the utilisation of the plural medical system, the bio-cultural diversity conservation and the utilisation of wild plants.

The reduction of chances in the second source of error is related to the construction and testing of the household survey, the main documentation tool of the utilisation and bio-cultural diversity conservation behaviour of MAC plants thereby respecting the *emic* point of view of the Balinese community members. The household survey was conducted to collect cross-sectional data based on a pre-formulated questionnaire, containing a mixture of closed and open questions to measure the phenomena underlying the indicators. In addition to the questions recording the phenomena required to identify the indicators, some questions were included either as a control variable or to collect more extensive qualitative information.

The ideal situation is to measure each indicator by a single phenomenon, in a single question. In several cases this was simply not possible. If this were the case, more questions were added to measure that indicator properly. The main requirement of the questions used in the household survey was that they documented the informants' ready knowledge, beliefs and practices. Open-ended questions left the respondents free to answer in their own words instead of resorting to pre-formulated categories. This choice made it possible for the informant to express his/her knowledge, beliefs and practices in their own words. The size and complexity of the total questionnaire had to be monitored; therefore in several cases it was decided not to not use open-ended questions, but closed questions with ranked answer categories.

In the section below, overview tables present the operationalisation of the block of factors (concepts) into variables up to the level of the categories based on the indicators. The categories presented in the tables are the categories of the variables as they were to be used in the statistical analyses. All variables were measured on the basis of the underlying phenomena of the indicators. The relationship between the categories presented in the overview tables and the original answers categories or open answers, related to these phenomenon measured, will be explained in Chapters 4 to 7, in the discussion of the data analyses. The questions added to the household survey which had either a relation to control role or qualitative variables are not presented in the overview tables. The control and qualitative variables are discussed separately in the paragraphs discussing the block of factors.

The predisposing factors: socio-demographic factors

The conceptual model exhibits two types of predisposing factors: socio-demographic and psycho-social factors. The socio-demographic factors are presented in Table 3.1.

Table 3.1 Socio-demographic factors: Concepts, variables, indicators and categories

Concept	Variable	Indicator	Category
Socio-demographic factors	Village	Name of the village	Angantaka; Bengkel; Pelapuan; Tumbu
	Sex	Physical characteristic	Male; Female
	Age	Number of years alive	0-4; 5-9; 10-14; 15-19; 20-24; 25-29; 30-34; 35-39; 40-44 45-49; 50-54; 55-59; 60-64; 65-69; 70-74; 75-79; 80-84; 85-89; 90-94; 95-99
	Formal education	Level of finished formal education	No formal education; Primary school; Junior high school; Senior high school; College; University
	Place of birth	Place of birth	Same village; Same regency; Elsewhere in Bali; Outside Bali
	Ethnic affiliation	Ethnic affiliation	Balinese; Non-Balinese Indonesian; Non-Indonesian
	Caste	Caste membership	No caste; <i>Brahmana</i> ; <i>Satria</i> ; <i>Wesya</i> ; <i>Sudra</i>
	Religion	Type of religion	Hindu Bali; Muslim; Buddhist
	Marital status	Present marital status	Single; Married monogamy; Married polygyny; Divorced; Widowed
	Profession	Main occupation	Not economically active; Not in labour force; Unemployed; Agriculture, forestry, hunting and fishery; Manufacturing industry; Building/ construction; Wholesale & retail trade, Restaurants and hotels; Transportation, storage and communication; Financing, insurance, real estate & business services; Community, social and personal services; Other
	HH-composition	Number of household members	1 or 2 HH members; 3 HH members; 4 HH members; 5 HH members; 6 or more HH members

The ‘hard’ background variables commonly recognised to affect health care utilisation are: ‘Village’, ‘Sex’, ‘Age’, ‘Formal education’, ‘Place of birth’, ‘Ethnic affiliation’, ‘Caste’, ‘Religion’, ‘Present marital status’, ‘Profession’ and the current household size, ‘HHcomposition’ (cf. Kohn & White 1976a; Slikkerveer 1990; Agung 2005; Ibui 2007). In general, ‘hard’ background variables reflect the socio-cultural background of the respondents. For qualitative reasons, the socio-demographic indicators of every household member were recorded to a maximum of ten members in a single household. The measurement of phenomena related the indicators of these ‘hard’ factors did not require specific techniques; all could be measured by single question.

In addition to the questions measuring the socio-demographic indicators identified, one control variable and two qualitative variables were added to the questionnaire. The control variable ‘banjar’, the *banjar* or *dusun dinas* (organisational unit or neighbourhood) was recorded to enable the researcher to crosscheck the household interviews conducted with the intended stratified sample as presented in Section 3.2.4.¹ The qualitative variable ‘relationship of the household member to the household head’ gives an insight into what the composition of an average household in the sample was. It was used as a control mechanism to detect mistakes by crosschecking the reported relationship with the household member’s sex and age.

The second qualitative variable recorded was the ‘frequency of sports participation’ of each household member. Generating a healthy lifestyle is one of the national health goals of Indonesia, a preventive health campaign disseminated by the mass media. The campaign includes convincing people to stop smoking, to eat healthily (rich in nutrition, low in ‘wrong’ sugars and fats) and exercise. The frequency of sports participation of each household member indicates the level of engagement in sport activities, giving an indication of the respondents’ willingness to undertake actions in the realm of preventive and promotive health care. Table 3.1 presents the indicators and categories of the variables belonging to the socio-demographic factors.

The predisposing factors: psycho-social factors

The second block in the predisposing factors is that of the psycho-social factors, which refer to the knowledge, ideas, opinions, beliefs and attitudes of the members of the community. The variables in this block of factors presented in Table 3.2 are: ‘Knowledge of MAC plant use’, ‘Knowledge of the modern medical system’, ‘Knowledge of the traditional medical system’, ‘Knowledge of biodiversity conservation of MAC plants’, ‘Knowledge of cultural diversity of MAC plants’, ‘Knowledge of *tri hita karana*’, ‘Belief in MAC plant use’, ‘Belief in the modern medical system’, ‘Belief in the traditional medical system’, ‘Belief in biodiversity conservation of MAC plants’, ‘Belief in cultural diversity of MAC plants’ and ‘Belief in *tri hita karana*’.

As apparent from the lists of the variables, this block includes the knowledge and believe variables which are directly linked with the three dependent variables: utilisation of MAC plants and biodiversity and cultural diversity conservation of MAC plants. Besides these six variables, the variables knowledge and belief on modern health care, traditional health care and *tri hita karana* are added. These additional variables have to be taken into consideration in the analysis of MAC plant utilisation and bio-cultural diversity conservation since they affect the dependent factors; knowledge of and belief in modern and traditional health care because of their relationship with medical pluralism in Bali and knowledge of and belief in *tri hita karana* because of their relationship to the Knowledge-Belief-Practice complex of Bali. It was assumed that, because of their strong relationship with traditional medical systems,

utilisation of MAC plants would be lower if a respondent had a high level of knowledge and strong belief in modern health care. A hypothesis was constructed in relation to the Knowledge-Belief-Practice complex, namely: respondents with a high knowledge and belief in *tri hita karana* would correlate with a high score on biodiversity conservation and cultural-diversity conservation behaviour of MAC plants. The results of these analyses are discussed in Chapter 7.

None of the indicators of the psycho-social variables could be measured on the basis of a single question. Each variable was operationalised in a set of phenomena which were measured individually by single questions. In the case of the knowledge questions respondents were asked to demonstrate their knowledge by giving up to five examples of each phenomenon. For instance, they were asked to name up to five examples of plants which could be used curatively. The belief questions were also operationalised in sets of phenomena but in this case the respondents were asked to indicate their perceived effectiveness or importance of a phenomenon on a ranked scale from 1 ‘very little’ to 5 ‘very much’. The belief in MAC plant use and modern and traditional medicine was measured by perceived efficacy and the bio-cultural diversity and *tri hita karana* were measured by perceived importance.

The questions about the interrelated phenomena of the knowledge and belief variables documented the knowledge of respondents by examples and the perceived efficacy of different aspects on the six topics of the knowledge and belief variables: MAC plant utilisation, modern medical system, traditional medical system, biodiversity of MAC plants, cultural diversity of MAC plants and knowledge of the *tri hita karana*. The questions related to the knowledge variables generated an extensive dataset of qualitative information which will be presented in Chapters 4, 5 and 6. No separate qualitative or control variables were added to the psycho-social factors block. Section 7.1 contains an elaboration of the techniques used to assess the categories of the variables based on the real answers related to the knowledge and belief variables.

Table 3.2 Psycho-social factors: Concepts, variables, indicators and categories

Concept	Variable	Indicator	Category
Psycho-social factors	Knowledge of MAC plants use	Level of knowledge of MAC plants use	Very little knowledge; Little knowledge; Average knowledge; Considerable knowledge; Very considerable knowledge
	Knowledge of Modern Medical System	Level of knowledge of Modern Medical System	Very little knowledge; Little knowledge; Average knowledge; Considerable knowledge; Very considerable knowledge
	Knowledge of Traditional Medical System	Level of knowledge about traditional Medical system	Very little knowledge; Little knowledge; Average knowledge; Considerable knowledge; Very considerable knowledge
	Knowledge of Biodiversity conservation of MAC plants	Level of knowledge about biodiversity conservation of MAC Plants	Very little knowledge; Little knowledge; Average knowledge; Considerable knowledge; Very considerable knowledge

Table 3.2 (continued) Psycho-social factors: Concepts, variables, indicators and categories

Concept	Variable	Indicator	Category
Psycho-social factors	Knowledge of Cultural diversity conservation of MAC plants	Level of knowledge about cultural diversity conservation of MAC plants	Very little knowledge; Little knowledge; Average knowledge; Considerable knowledge; Very considerable knowledge
	Knowledge of <i>Tri hita karana</i>	Level of knowledge of <i>tri hita karana</i>	Very little knowledge; Little knowledge; Average knowledge; Considerable knowledge; Very considerable knowledge
	Belief in MAC plants use	Level of belief in efficacy of MAC plants use	Hardly any effect; Some effect; Average effect; Considerable effect; Very considerable effect
	Belief in Modern Medical System	Level of belief in efficacy of Modern Medical System	Hardly any effect; Some effect; Average effect; Considerable effect; Very considerable effect
	Belief in Traditional Medical System	Level of belief in efficacy of Traditional Medical System	Hardly any effect; Some effect; Average effect; Considerable effect; Very considerable effect
	Belief in Biodiversity conservation of MAC plants	Level of belief of importance of Biodiversity conservation for MAC plants	Very little importance; Little importance; Average importance; Considerable importance; Very considerable importance
	Belief in Cultural diversity conservation of MAC plants	Level of belief of importance of Cultural diversity conservation for MAC plants	Very little importance; Little importance; Average importance; Considerable importance; Very considerable importance
	Belief in <i>Tri hita karana</i>	Level of belief of importance of <i>Tri hita karana</i> for MAC plants	Very little importance; Little importance; Average importance; Considerable importance; Very considerable importance

The enabling factors

The variables in the block of enabling factors were: family income, socio-economic status (SES), geographical distance to health care practitioners of modern medicine and traditional medicine, and the geographical distance to MAC plants (see Table 3.3 for the variable names). Enabling factors are hard for respondents to alter but geographical and financial accessibility, especially the ability to pay the cost of health care, are important determinants in utilisation (*cf.* Greenlick *et al.* 1973; Kohn & White 1976a; Slikkerveer 1990). The variables

family income and geographical distance could be measured by a single question. The geographical distance was expressed in distance in time rather than spatial distance and, for qualitative reasons, respondents specified what or who the closest place was. This qualitative information will be presented in Chapters 4, 5 and 6.

The socio-economic status (SES) was recorded in a similar way to the psycho-social factors. A set of interrelated phenomena were measured to assess the intended categories; very poor, poor, average, rich and very rich. The interrelated phenomena measured were: land and animal ownership, type of house, real-estate ownership and value of the property of motorized and electronic items. The control factor used for the enabling factors was the self-assessment of the SES by the respondents in the same categories as intended for the SES variable, very poor, poor, average, rich or very rich. The results and relationship between the control variable and SES is discussed in Chapter 4.

Table 3.3 Enabling factors: Concepts, factors, indicators and categories

Concept	Variable	Indicator	Category
Enabling Factors	Family income	Total average amount of the monthly income of the household	<100.000; 100.000-500.000; 501.000-1.000.000; 1.001.000-2.000.000; 2.001.000-3.000.000; 3.001.000-4.000.000; >4.000.000; No income reported
	Social Economic Status (SES)	SES based on land and animal ownership, type of house, ownership real estate and motorized vehicles and electronics	Very poor; Poor; Average; Rich; Very rich
	Geographic distance to modern medicine	Time to the nearest modern medicine facility / representative	> 1 hour; 45-60 minutes; 30-45 minutes; 15-30 minutes; < 15 minutes
	Geographic distance to traditional medicine	Time to the nearest traditional medicine facility / representative	> 1 hour; 45-60 minutes; 30-45 minutes; 15-30 minutes; < 15 minutes
	Geographic distance to MAC plants	Time to the nearest place where MAC plants can be obtained	> 1 hour; 45-60 minutes; 30-45 minutes; 15-30 minutes; < 15 minutes

Perceived morbidity factors

The majority of studies on the utilisation of health care services have shown that perceived morbidity is a major determinant in seeking help (*cf.* Koos 1954; Suchman 1965; Warren 1974; Kohn & White 1976b; Janzen & Arkininstall 1978; Kleinman 1980; Yoder 1982a; Kleinman 1986; Slikkerveer 1990). Slikkerveer (1990: 74) defined perceived morbidity as *‘the observation and interpretation of symptoms of illness which initiate the decision making of seeking and obtaining medical help. This subjective picture may conform to the objective picture according to medical standards but need not necessarily do so’*. In this study, perceived morbidity was operationalised by the respondent report of a ‘dis-ease’ episode which had occurred in the past twelve months. For qualitative reasons these records were listed for each household member from whom the socio-demographic information was collected. For qualitative reasons, a question was added listing the pregnancies of the household members in the last twelve months and the use of MAC plants during this period of time, the results are discussed in Chapter 5.

The information on the reported ‘dis-eases’ was recorded by means of two questions: the first question noted whether the household member had been ill during the last twelve months and if so, the second question recorded the specification of the reported ‘dis-ease’. The respondents reported the disease, illness or disorder using the local nomenclature and not necessarily by the name pertaining to the disease classification used by bio-medically trained practitioners. The reported diseases were applied in the pile-sort technique resulting in the *emic* classification of the reported diseases, presented in Chapter 5. The *emic* classification provided the basis for the categories of the variable reported disease.

Table 3.4 Perceived morbidity factors: Concepts, factors, indicators and categories

Concept	Variable	Indicator	Category
Perceived morbidity	Reported disease	<i>Emic</i> classification of the reported disease	Fever; Coughing; Head/throat; Intestines/Stomach; Movement restrictions; Skin; External; Organs; Brain; Internal (system); Other; Not specified; No disease reported

The institutional factors

The institutional factors were the local and national administrative structures and representatives of local institutions, for instance the current political administration, the financial and the geographical accessibility of national and local facilities and institutions. The specific variables presented in Table 3.5 are the following: ‘Awareness of local institutions related to MAC plant use’, ‘Awareness of institutions linked to biodiversity of MAC plants’ and ‘Awareness of institutions on cultural diversity of MAC plants’.

The questions related to the indicators of the institutional factors were recorded in the same way as the knowledge questions in the psycho-social factors block. The interviewers reported that this set of questions needed the most clarification and often, even after clarification, most respondents indicated that they did not know any example of such institutions. This indicates that respondents are not directly aware of the institutions performing at the systems level or their impact on MAC plant utilisation and the biodiversity and cultural-diversity conservation behaviour of MAC plants. During the preliminary

fieldwork in 2005, the community members' awareness of modern and traditional health care or of *tri hita karana* which is also embedded in the traditional government institution and its rules and regulations system emerged; the *adat* did not discriminate and therefore no separate questions were included to test awareness of the related institutions or organisations.

Undeniably, there were considerable differences in the personal experiences of respondents with traditional or modern health care institutions. The researcher decided not to include questions related to these aspects of the institutions connected to traditional and modern health care, since their inclusion would shift the focus of the study from the utilisation of MAC plants and bio-cultural diversity conservation to the topic of transcultural health care utilisation. Table 3.5 presents the institutional variables which were included in the questionnaire.

Table 3.5 Institutional factors: Concepts, factors, indicators and categories

Concept	Variable	Indicator	Category
Institutional factors	Awareness of local institutions linked to MAC plant use	Level of awareness of influence of local institutions on MAC plant use	No awareness; Little awareness; Average awareness; High awareness
	Awareness of local institutions linked to biodiversity of MAC plants	Level of awareness of influence of local institutions on biodiversity of MAC plants	No awareness; Little awareness; Average awareness; High awareness
	Awareness of local institutions linked to cultural diversity of MAC plants	Level of awareness of influence of local institutions on cultural diversity of MAC plants	No awareness; Little awareness; Average awareness; High awareness

The intervening factors

The block of intervening factors consisted of the variables which might have altered the 'standard' pattern of behaviour documented by the dependent factors in relation to the interrelated independent factors. The intervening factors were operationalised in a set of questions asking the respondents their perceived impact of the government, tourism and the increased use of resources on the three topics of the dependent variables: MAC plant utilisation, the biodiversity conservation of MAC plants and the cultural diversity conservation of MAC plants. Respondents were asked to indicate their perception of this impact of the government, tourism and increased use of resources; the three intervening variables presented in Table 3.6. For reasons of compatibility, there was a control for each answer, whether the given answer ranking from 1 'very little impact' to 5 'very high impact' was considered positive or negative by the respondents, to avoid miscalculations when recoding the original answers. This process will be explained in Section 7.1. The questions included in the household survey consequently did not measure the objective impact of the three actors, government, tourism and increased use of resources but the perceived impact of the individual respondents.

Table 3.6 Intervening factors: Concepts, factors, indicators and categories

Concept	Variable	Indicator	Category
Intervening factors	Government	Perceived impact of government on MAC plant use and bio-cultural diversity	Very low impact; Low impact; Average impact; High impact; Very high impact
	Tourism	Perceived impact of tourism on MAC plant use and bio-cultural diversity	Very low impact; Low impact; Average impact; High impact; Very high impact
	Increased use of resources	Perceived impact of increased use of resources on MAC plant use and bio-cultural diversity	Very low impact; Low impact; Average impact; High impact; Very high impact

The dependent factors

The conceptual model represented the relationships in the context of the ‘inextricable link’ between nature, society, language and culture and by *emic* classifications determined behaviour. The dependent factors documented the behaviour as reported by the respondents, covering the twelve months prior to the household survey. The dependent variables ‘Utilisation of MAC plants’, ‘Biodiversity Conservation of MAC plants’ and ‘Cultural diversity Conservation of MAC plants’ are presented in Table 3.7. The dependent variables were operationalised in a similar way to the psycho-social factors, measuring different aspects of behaviour. The reverse measurement process from original answers to indented category for the variables led to an indication of the average frequency of MAC plant utilisation and an assessment of the biodiversity and cultural diversity conservation behaviour in the total sample. Several qualitative questions were added to substantiate the reported behaviour by recording the MAC plants used. The frequency of MAC plant utilisation for curative, preventive and promotive reasons was listed for every household member of whom the socio-demographic aspects were recorded. The findings are presented in Chapter 5. Biodiversity and cultural conservation behaviour were substantiated by the reported actions. Chapter 6 presents the qualitative information generated by these reports.

Table 3.7 Dependent factors: Concepts, factors, indicators and categories

Concept	Variable	Indicator	Category
Dependent Factors	Utilisation of MAC plants	Average use frequency of MAC plants during the last 12 months	Very low use; Low use; Average use; High use; Very high use;
	Biodiversity Conservation (BDC) of MAC plants	Conservational behaviour towards biodiversity during last 12 months	Very low BDC behaviour; Low BDC behaviour; Average BDC behaviour; High BDC behaviour; Very high BDC behaviour;
	Cultural Diversity Conservation (CDC) of MAC plants	Conservational behaviour towards culture during last 12 months	Very low CDC behaviour; Low CDC behaviour; Average CDC behaviour; High CDC behaviour; Very high CDC behaviour;

3.2 Data Collection

3.2.1 Participant Observation and Interviewing Techniques

The data collection of either a qualitative or a quantitative nature is focused on the knowledge-belief- practice complex in relation to the three main aspects of this study in the context of medical pluralism and the ‘inextricable link’ between nature and culture. Participant observation and interviewing techniques have been used throughout the fieldwork and were specifically used to collect qualitative data. Engaging in participant observation literally means that the researcher makes observations while participating in everyday activities. Living at the research site, preferably with a guest family, gives a researcher access to everyday behaviour which is generally not discussed in interviews, because the respondents often consider it non-information. Although indicating themselves that the terms are used interchangeably, Rosnow & Rosenthal (2002) make a distinction between participant observation and ethnographic research in which the qualitative data resulting from the latter approach is, in their opinion, more exhaustive than the selective records which generally typify participant-observer research.

The participant observation technique used by the researcher integrated several techniques which Rosnow & Rosenthal (2002) assign to the techniques of an ethnographer, for example, analysing the conversations noted *verbatim*. In practice this was supported by digital recordings of the conversations, the use of extensive field notes and notes based on memory, the application of many pages of detailed observations to which the researchers interpretation of the meaning of particular passages was added after the data has been worked out. Nevertheless, the researcher applied the participant observation technique because the research data collections had to concentrate on the scope of this study. During the periods of fieldwork in 2005, 2006 and 2007, the participant observation and interviewing techniques were concentrated on the following topics:

- the knowledge of, beliefs in and practices of the community concerning MAC plants;
- the *emic* classification of illness, diseases and disorders;
- local people’s knowledge of MAC plants;
- the *emic* classifications of plants;
- the factors which interact with the resource perception and utilisation of MAC plants;
- the Balinese pluralistic medical configuration;
- the local socio-political strategies on bio-cultural diversity conservation specifically policies and strategies in relation to MAC plants and MAC plant utilisation.

The three main different interview techniques used in this study were: the structured, the semi-structured and the unstructured interview. The questionnaire used in the household survey, which is discussed separately in Section 3.2.4, is a structured interview. Semi-structured interviews are those for which the researcher works with interview schemes which structure the main questions and lists the topics information sought. Semi-structured interviews and their schedules were used for pre-scheduled and unannounced visits to officials in the various regional and local government institutions in Bali, specifically those connected with the four sample villages. The advantage of semi-structured interviews is that they leave room to the respondents to give additional information, since the questions in a semi-structured interview are based on open-ended questions.

The main interview technique applied throughout all the fieldwork was the unstructured interview or free interview. The objective unstructured interview, often a series of interviews, was to gain a deeper insight into the way of life and personal motives and experiences of groups or individuals (*cf.* Dechering 1995). The unstructured interview creates the illusion of a normal conversation but the interviewer sets the context and topics for the conversation. At the beginning of the conversation, the interviewer will explain the aim of the conversation to the respondent. The respondent is free to react however she or he wants and can give direction to the interview.

The results of the (series of) unstructured interviews, specifically of the first fieldwork (2005), allowed the documentation and description of the links in the measurements of the various categories of factors from the concept level into measurable phenomena. In each of the four sample villages, key informants were selected for these in-depth unstructured interviews throughout the months of fieldwork in 2005, 2006 and 2007. These key informants are the local specialists and the representatives of the local authorities, and included many local (*adat*) leaders, representatives of the bio-medical health care system, traditional healers, local plant experts and members of local NGOs and other bodies active on either biodiversity, sustainable development or Balinese cultural heritage and conservation.

3.2.2 Free Listing and Pile Sorting

The *emic* view on the categorisation of illnesses and diseases contrasted with MAC plants is essential to this ethno-science study. The free-listing and pile-sorting techniques are applied to describe the *emic* classifications quantitatively.

Pile sorting is a technique which gives information on how the structure of the data appears to a group of people but it cannot be used to compare the data from individuals (*cf.* Russell Bernard 2002). Since the objective of this method is to structure the local classifications, the fact that the data cannot be compared between individuals was not a restriction. The preparation of the pile sort, creating the set of cards to be used in the pile-sort technique was done by using the free-listing technique. Russell Bernard (2002: 282) states that free listing is '*a deceptively simple but powerful technique*' in which a respondent is asked to list all the X they know about, or what kind of X there are.

Free listing was incorporated into the questionnaire used for the household survey as part of the collection of the extensive qualitative information on the use of MAC plants by and for the community members. The respondents were asked to list MAC plants and diseases, illnesses or disorders in relation to different questions. In the questions related to the knowledge variables, the respondents were asked to list a maximum of five examples of different phenomena which included plant names and disease names. Combined, the answers to the different questions generated an extensive list of commonly known names of MAC plants and a list of names or diseases and illnesses, mostly those for which MAC plants were reported to be used in either a preventive, promotive or curative way.

The data collected by means of the free-listing technique in the household survey was complemented by information from the semi-structured and unstructured interviews with community members and local specialists. On the basis of this collective data, the sets for the two pile sorts were made. Each item on the list was printed on a card and the two packs of cards were the tools used to conduct the two pile sorts, 137 cards for the *emic* MAC plant classification and 81 for the *emic* disease classification. The 137 cards in the MAC plant classification were those named by the first 200 respondents in the household survey. The MAC plant cards used in the pile sort represent 81.55% of all the MAC plants (168) named in the household survey.

The pile sorting was done using the free-pile method. The free-pile method, also called unconstrained pile sort method, means that the respondents are told that they can make as many piles as they like with the cards provided by the researcher as long as they do not pile them all together or separate all of them (*cf.* Russell Bernard 2002). If the item on the card was unknown to the respondent, it was removed from the pile sort, putting it to the ‘cannot be sorted by the respondent’ pile, for example, ‘missing’. If a respondent consciously made a separate pile, with a single card, it meant that the respondent thought that particular card could not be matched with the other cards already grouped in piles, and therefore truly counted as a separate pile. When the respondents finished the pile sorting, they were asked to describe each pile of cards preferably using a single noun. The descriptions for each pile given by each respondent were noted down. Respondents could take as long as they wanted to sort out the cards. They were informed that the exercise was not a test on knowledge and that no right or wrong answers could be given. On average it took the respondents 30 to 45 minutes to complete a pile sort.

The results of a pile sort can be analysed by the technique of standardization, however in the case of these pile sort analyses, the number of category names even after standardization was too high. Given the high number of categories and the high number of cards involved, the pile-sort analyses were substantiated statistically by means of a cluster analysis. For the cluster analysis of the pile sort, a placement matrix was built on the basis of the transcriptions of the executed pile sorts. This matrix had equal numbers of columns in rows, namely the number of cards involved in the pile sort. The cells of the placement matrix were filled with the *p* value. *P* stands for the number of times the card on the x-axis and the one on the y-axis has been placed by the respondents in the same pile. Consequently the diagonal of this matrix was filled with the same number, namely the number of respondents who executed the pile sort. The number of cards in a pile and their identification by the respondent are irrelevant to the calculation the *p* value. The cluster analysis of the placement matrix was executed with the SPSS package using the function hierarchical cluster analysis applying Ward’s Clustering Method and the squared Euclidean distance as a measure.² The results are discussed in Sections 5.1.2 and 5.3.3, discussing the *emic* classifications of MAC plants and the *emic* disease classification.

3.2.3 Ethno-Botanical Survey

An extensive qualitative dataset was collected by means of the questionnaire used for the household survey. The respondents were requested to list names of MAC plants they knew and list MAC plants which were used by each one of the household members during the last twelve months for the reported disease and/or any another curative, promotive and preventive reasons. The ethno-botanical research, social-anthropological focus and Ethnosystems Approach put the *emic* point of view central. Therefore respondents had the freedom to name the plants by their common name. Consequently, the list of plants collected was a list of plants with their common names in Indonesian and in some cases Balinese. This study makes a link between the lay knowledge and the existing scientific knowledge. The respondents in the household survey were chosen at random from the four sample villages and there was no specific sampling of such local plant experts as the *balian* or herbalist. The respondents can be considered laymen with regard to MAC plant use and knowledge.

Extensive botanical research has been done in Indonesia over the years. This has produced various publications which link the botanical names of plants with common Indonesian names and in some cases even with the Balinese names. Given this existing knowledge, it was possible to focus the ethno-botanical survey on the recognition instead of

determination of the plants. Hence, the focus of the ethno-botanical survey shifted from the *ethic* point of view, focusing on the determination of plants following the standard botanical techniques to the *emic* point of view, the chosen approach for this ethno-botanical survey. Following this technique, explained in more detail in the next section, it was possible to relate the lay knowledge of (common) plants names to the frequent combination of the common and scientific plant names used in (semi-)scientific publications which often give information and instructions on the application of MAC plants.

The ethno-botanical survey executed with the intention of connecting the reported lay names with the scientific names began by selecting a local plant expert with a strong affinity with plant utilisation for medicinal purposes in each village. In addition to the four local plant experts resident in one of the four sample villages, two other Balinese plant experts active as herbalists were added to the list of local plant experts. Each of these local plant experts was asked to show the researcher the MAC plants listed by their fellow community members in the household survey. A photographic reference was made of each plant pointed out on the basis of its reported name. The photographic reference consisted of photographs of the full plant, the leaf setting, a close-up of the leaf, the bark, the roots and when available fruits and flowers.

The same list of the common names of MAC plants were crosschecked with literature sources for their scientific names. The two main sources used for this were: *Indek Tumbuh-Tumbuhan obat di Indonesia* (the Medicinal Herb Index of Indonesia) (Kasahara & Mangunkawatja 1986) and *Obat Asli Indonesia* (Sastroamidjojo 2001), an additional crosscheck was made on the notation of the scientific name with the Integrated Taxonomic Information System (ITIS) and the Netherlands Biodiversity Information Facility (NLBIF).³ On the basis of this literature research, the MAC plant list was complemented by the possible family, genus and Latin plant names of the reported MAC plants species related to their notations in the literature. In the final step, this list was complemented by the vernacular (common) names of the plants and their scientific names based on literature research was crosschecked with the photographic material.⁴ The results and findings of this particular ethno-botanical survey technique will be presented in Chapter 5.

3.2.4 Household Survey

The household survey was the tool selected to collect an extensive dataset to substantiate the various categories of factors of the conceptual model and to collect the numerous qualitative data to document, describe and analyse the knowledge, practices and belief of the community members in relation to the utilisation and the bio-cultural diversity conservation of MAC plants. The household survey was conducted in each of the four sample villages.

The focus of the study lies on the knowledge, practices and beliefs related to the utilisation of MAC plants in home remedies. Mostly these MAC plants are freshly plucked, and either self-cultivated or collected from the direct environment of the community members. Therefore, it was a pre-determined condition that each sample village should be located in a different area, representative of a different type of environment in Bali. Agung (2005) indicates that the considerable geographical variety in Bali is composed of the mountains of the interior, the lowlands and the limestone plains along the coast and that physically Bali is divided into three main parts: a series of volcanic mountains to the north, the fertile agricultural lands of the south and the arid areas of the west.

The geographical variety of the limestone plains and the physically arid parts of the west cover only a small percentage of the living are of the study population', the 'cradle of Hindu-Balinese culture'; the north-south axis of the island and the land farther to the east. In order to

cover the environments in which the majority of the study population settlements are located with the sample villages, a village was selected at random in each one of the following pre-determined areas: the mountains in the north, the mountain slopes in the east, the coastal lowlands in the south and the lowlands in the central area of the island.

A second predetermined condition required of the sample villages was that they had to have a similar sized population in order to reduce the variations in accessibility to bio-medical health care facilities. The spread of the modern medicine facilities, both in number and type, originally planned by central government and currently managed by regional authorities, is related to population spread and size. Therefore the villages selected as sample villages had to have similar populations, approximate to the average size of a Balinese village. On the basis of the village statistics available at the *Badan Pusat Statistik* (BPS) office, which gave an overview of the number of household heads in each village (*desa dinas*) in the four pre-selected areas, four similar sized villages were selected.⁵ These four sample villages, which are described in detail in Chapter 4, are in alphabetical order:

- Angantaka located in the central lowlands, part of district Abiansema in Badung regency;
- Bengkel, located in the coastal lowlands, part of district Kediri in Tabanan regency;
- Pelapuan, located in the mountains, part of district Busungbiu in Buleleng regency;
- Tumbu, located on the mountain slopes, part of district Karangasem in Karangasem regency.

The local authorities in each village provided an overview of the names of the household heads registered in each village in the year 2006. Following Sudman (1983), the size of the sample in a survey research should have been 200-500 persons or households considering a regional specified area if no sub-groups are made; if sub-groups are made it would be more appropriate to sample 500- 1000 persons or households (*cf.* De Heus *et al.* 1995). Although the villages could be considered sub-groups, they were not approached as such but as examples of human settlement in four different geographical areas of one regionally specific area: the living area of the study population the central-south-eastern part of Bali. Therefore, on the basis of the lists provided by the local authorities, a stratified random sample of 100 household heads was made in each village.

The stratification was related to the size of the *banjar/dusun dinas* in each village, in order to guarantee a sufficient spread of the household heads in the sample throughout the villages. To select the names of the respondents based on the lists of household, heads randomized numbers were provided by the Research Randomizer (*cf.* Urbaniak & Plous 1997) which uses the 'Math.random' method in the JavaScript programming language to generate its random numbers. The numbers are generated by use of a complex algorithm, seeded by the computer clock, which only gives the appearance of randomness, but was sufficient for the sampling of the respondents for the household survey executed. Random assignment was the chosen approach since it gives each household an equal chance of being selected, without the researcher subconsciously letting her own opinions affect the sampling, although it does not guarantee equality in the characteristics of the units, in this case the households (*cf.* Rosnow & Rosenthal 2002).⁶

The stratified random sampling gave a total sample of 400 households, 100 household in each sample villages. Qualitative information on individual household members to a maximum of ten in a single household were collected in the 400 households totalling 1724 household members in the sample. Table 3.8 gives an overview of the household size of the households in the sample and the corresponding total of household members in the sample.

Table 3.8 Overview of the household size and related number of individuals in the sample

Household size	N	%	Number of household members in the sample	
One-person households	3	0.75	3	household members
Two-person households	26	6.50	52	household members
Three-person households	89	22.25	267	household members
Four-person households	125	31.25	500	household members
Five-person households	81	20.25	405	household members
Six-person households	54	13.50	324	household members
Seven-person households	12	3.00	84	household members
Eight-person households	5	1.25	40	household members
Nine-person household	1	0.25	9	household members
Ten-person or larger households	4	1.00	40	household members
Total households	400	100.0	1724	household members

Source: Household survey 2006

The questionnaire was constructed on the basis of the phenomena related to the blocks of factors in the conceptual model to which several questions were added to acquire more qualitative information, as explained in Section 3.1. The questionnaire used in the household survey was a combination of open and closed questions and was conducted in the Indonesian language. The respondents were interviewed orally in a face-to-face situation. There are several advantages in a face-to-face interview, Rosnow and Rosenthal (2002) identified the three most important:

1. giving the opportunity to establish rapport, stimulating trust and co-operation;
2. creating the opportunity to help participants with the interpretation of questions;
3. allowing flexibility in determining the wording and sequence of questions, giving the interviewer creator control over the situation.

The two first advantages especially were seized in performing the household survey and, although the interviewers had some flexibility in the words they used, they were instructed to keep to the pre-phrased questions and no liberties were allowed in the sequence of questions. The interviewers noted down the answer on the questionnaire forms either by ticking the box of the pre-printed answers or by writing down the full answers in case of the open questions. The respondents themselves had no access to the questionnaire forms. All eight interviewers were bilingual in Indonesian and Balinese and were trained collectively. The training encompassed both theoretical and methodological information about the goal and set-up of the household survey. Besides the training on general interviewing techniques, specific attention was paid to the questionnaire used in this household survey. Significant time was spent on the discussion of the meaning of each question, its intention, possible answers and specific ways and examples with which, if necessary, the interviewer could explain the question to a respondent. From their intensive period of interviewing respondents for their research on trance and possession in Bali, Suryani & Jensen (1993) learned that Balinese tend to answer questions in a short, one-sentence answers and that 'I don't remember' and 'I have forgotten' are often used when the respondent finds it hard to put her or his experience into words. Therefore, special attention was paid to the interviewer's interrogation techniques, to avoid accepting answers such as 'I don't know', 'I don't remember' and suchlike too easily as an acceptable answer.

A household head (*kepala keluarga*) is an administrative term in Indonesia. It refers to the administrative head of a nuclear family, not to the head of a physical household represented by a house or a compound.⁷ Therefore it is possible that several household heads might live in the same compound. As a patrilineal society, Bali assigns the term *kepala keluarga* primarily to a male. Only if the male is not present in a household is a woman assigned the title *kepala keluarga*. A male is considered not to be present in the event of decease, divorce or mental or physical illness which prevents him representing the household.

In most societies, knowledge is also divided by gender; women are most often the bearers of botanical and medicinal knowledge (*cf.* Barsh 1999). Since women traditionally, in Bali too, assume the caretaker role for the collection of the information on all uses of MAC plant by and for all the household members, it was essential that the women were present during the household survey interviews. These were held in the respondents' homes, making it practically and ethically questionable to restrict other household member's access to the place where the interview was held. Because of this and the preference for having the women present during the interview, the household survey was conducted as a questionnaire of which the majority of the answers were given by the household head but complemented by other household members, either at the request of the household head or voluntarily.

The interviewers were instructed to interview the household head whose name they received. Because the name-giving process in Bali produces many similar names for individuals, the interviewers received as much information about the listed household heads as was available, including the full names of all the other household members, their sex and their birthdates.⁸ In close co-operation with the local authorities all pre-selected household head were identified. Given that some registrations were not always fully up-to-date, for instance because of recent death or migrated villagers who were still on the list and the Balinese custom of remaining registered in a village although they do not live or had lived in the village recently, in total thirty pre-selected household head as respondents were replaced by the household head next on the lists provided. Probably because of the close co-operation with the local authorities, both government and *adat*, none of the household heads selected as a respondent refused co-operation in the household survey.

Although the interviewers worked independently in the villages, the researcher visited them at least once a week to check on their progress and to make sure that differences in interpretations or notations on the questionnaires were kept to a minimum. Besides these weekly face-to-face contacts, communication between the researcher and the interviewers was maintained by telephone. All 400 interviews in the household survey were collected over a period of one month, commencing 4 June 2006 to 4 July 2006.

The information gathered by means of the household survey forms the basis for the analyses of the *emic* classifications of the MAC plants (presented in Section 5.1.2), the *emic* classification of illnesses and diseases (presented in Section 5.3.3), the analyses *emic* classifications of the MAC plants (presented in Section 5.1.2), the documentation of the utilisation and bio-cultural diversity conservation of MAC plants presented discussed in Chapters 5 and 6, and the qualitatively generated information is presented in the appropriate places in Chapters 4 to 6, where the collected data is referred to available national (Indonesia) and regional (Bali) data of the year 2006.

3.3 Statistical Analyses

3.3.1 Bivariate Analysis

On the basis of the results of the household survey, two datasets were formed. These were the basis for the statistical analysis presented in this study. The first dataset was that based on the number of households involved in the household survey and in which n equals 400. The household database was the basis for the analysis of the Balinese community members' knowledge of, beliefs in and practices with MAC plants related to the utilisation of MAC plants, the biodiversity conservation and the cultural diversity conservation of MAC plants, presented in Chapter 7. The second dataset contains 1724 cases, namely all the household members for which the socio-demographic, the perceived morbidity and utilisation of MAC plants was collected. This dataset was used purely for descriptive univariate and bivariate statistics which are presented where appropriate to substantiate the qualitative findings in relation to the different topics presented in Chapters 4 to 6. Descriptive and inferential statistical techniques, univariate, bivariate or multivariate were used on these two datasets derived from the household survey. The following sections describe the bivariate and multivariate statistical techniques selected to analyse Balinese knowledge, beliefs and practices and MAC plant utilisation and bio-cultural diversity conservation.

The bivariate analysis was used to examine whether one variable relates to another and more specifically what was the shape, direction and strength of the relationship is (*cf.* Weinberg & Abramowitz 2002). The focus of a bivariate analysis was the association between two variables, and although it does imply co-variation, it should not be mistaken for causation (*cf.* Rosnow & Rosenthal 2002; Field 2005). Given the type of data collected by means of the household survey, mainly non-dichotomous categorical data, only a few bivariate statistical analyses were appropriate as inferential techniques: the cross-tabulations and the Spearman Rank Correlation Coefficient (Spearman's Rho , r). The cross-tabulation technique was used in this study to establish whether the difference observed in the cross-tabulation of the sample represented a real difference in the population as a whole. The Pearson's Chi-square (X^2) test of independence permits such a judgement; it allows determination of whether or not there is a statistically significant association between two variables (*cf.* Miller *et al.* 2002).

The confidence level for this study is set at 95%. Since the use of the Pearson's Chi-square of the confidence level of 95% could result in the mere dichotomy of 'significant' versus 'not significant', a differentiated assessment was used: 'strongly significant' if the value is between 0.05 and 0.01, 'very strongly significant' if the value is between 0.01 and 0.001 and 'most strongly significant' if the value is < 0.001 (*cf.* Agung 2005). In Section 7.2 the cross-tabulations between each of the three dependent variables towards each variable of the different blocks of factors in the household dataset ($N=400$) are presented.

In order to calculate Pearson's Chi-square test, the expected counts were calculated (*cf.* Miller *et al.* 2002; Field 2005), but not presented in the overviews. Pearson's Chi-square can be suitably used for categorical data, which are per definition not continuous. Although Pearson's Chi-square does not rely on such assumptions as having continuous normally distributed data as most statistical tests: two important assumptions must always be fulfilled: firstly each respondent can score only in one cell of the cross-tabulation and secondly no expected frequencies should be below 1 and no more than 20% of expected frequencies should be below 5 (*cf.* Field 2005).

While the Pearson's Chi-square results confirmed the existence of a significant association between two variables, Cramer's V indicated the strength of the association if at least one variable is nominal in the cross-tabulation. Absolute values of Cramer's V range between 0 and 1, with 0 representing no association and 1 a perfect association. When both variables are ordinal, gamma (γ) is the most popular measure of association. Gamma can rank from -1, representing a perfect negative association, to +1 indicating a perfect positive association. Gamma scores around 0 indicate weak associations between two ordinal variables, as the Cramer's V values around 0 do for the cross tabulation with a nominal variable. For each cross-tabulation presented in Section 7.2, besides the Pearson's Chi-square value, the value of the appropriate measurement of strength considering the measurement level of the variables are given.

The Spearman Rank Correlation Coefficient (Spearman's Rho) is a special formula of the Pearson Correlation Co-efficient, a way to measure the direction and strength of the linear relationship. The requirement for using the Spearman Rank Correlation Co-efficient is that both variables involved have to be at the minimum of the ordinal measurement level. All dependent variables have the ordinal measurement level and therefore the Spearman's Rho will only be given for the relationship between the dependent variables and the independent variables which are ordinal. Spearman's Rho indicates whether the variables are or are not related to one another and if they are related whether the relationship is positive or negative (*cf.* Field 2005). A positive relation indicates that, if a respondent scores higher on the dependent variables, he/she also scores higher on the independent variable and vice-versa. A negative relationship indicates that a higher score on the dependent variables relates to a lower score on the independent variable and vice-versa. Spearman's Rho can be interpreted in the same way as the Pearson Correlation Co-efficient (*cf.* Weinberg & Abramowitz 2002; Field 2005). Pearson Correlation values approximately equal to 0.50 are considered strong, approximately equal to 0.30 considered moderate and approximately equal to 0.10 are considered weak (*cf.* Cohen 1988; Weinberg & Abramowitz 2002; Field 2005).

3.3.2 Multivariate Analysis: OVERALS

The conceptual model presented in Section 3.1.2, based on previous findings in medico-social sciences, indicates that various categories of factors are explanatory for the utilisation and bio-cultural diversity conservation of MAC plants, but one-to-one relationships are hard to establish (*cf.* Slikkerveer 1990; Agung 2005; Ibui 2007). Although individually the variables might have an explanatory relationship to the dependent variables, bivariate analyses does not take into consideration the mutual interaction between the variables. This study uses multivariate analysis to analyse the Balinese community members' knowledge, beliefs and practices related to MAC plants, their utilisation and bio-cultural diversity conservation behaviour, harnessing the interrelationship of the variables. When analysing Balinese behaviour, McCauley (1984) suggested that neither economics, social structure nor even beliefs should be privileged. The themes considered crucial to any given problem depend on the social context and past experiences of the Balinese involved, hence exceed the individual.

The multivariate analysis of the household dataset makes it possible to analyse the Balinese community members' behaviour in the patterns of the interrelationship of the large set of independent, intervening and dependent variables. When there are multiple independent and dependent variables in a design, in this study -three dependent variables, the design is said to be multivariate (*cf.* Tabachnick & Fidell 1989). Multivariate measures of association are by nature more complex than their univariate counterparts, because they must take into account the relationships of the predictor variables with the responses of the dependent variables and

the relationships between the multiple dependent variables. By using multivariate analysis techniques it is possible to determine which variables have the strongest impact on the interrelationship of the variables.

Classical multivariate analysis assumes that each variable has *a priori* quantification and can be treated as numerical data (*cf.* Van de Geer 1993). In this study, although some variables could be considered to be (quasi-)interval data, treating all data numerically would have been an oversimplification of the complexity of this dataset. Therefore the non-linear multivariate analysis, which does not have the same *a priori* assumption of the classical multivariate analysis, is the appropriate analysis to use. In his study, Agung (2005) documented the link between the conceptual model and the OVERALS multivariate statistical analysis. Following the example of Agung (2005) and Ibui (2007), the OVERALS analysis was used in this study. The OVERALS analysis is a non-linear generalized canonical analysis (*cf.* Van de Geer 1993), which allows the inclusion of variables with different measurement levels, including those with nominal and ordinal levels, in the analysis and allows different sets of variables to be worked with. In this study, the set of the independent and intervening variables form the first set and the second set are the dependent variables. In Section 7.2.2 the multivariate analysis of the household dataset (N=400) will be presented analysing the reported behaviour of the Balinese community toward MAC plant utilisation and bio-cultural diversity behaviour based on the variables.

3.3.3 Multiple Regression Analysis

The general purpose of Multiple Regression Analysis is to learn more about the relationship between several independent or predictor variables and a dependent or criterion variable. Following the example of Agung (2005) and Ibui (2007), a Multiple Regression Analysis was used based on the individual OVERALS analyses between each block of factors with all other block of factors in the model. Specific Multiple Regression Analysis was used here to calculate the relative importance of the block of factors and the block of dependent variables. The most commonly used multivariate measures of association can be expressed as functions of the 'eigenvalues' of the product matrix. In this analysis, the multiple correlation coefficients (ρ_d) of the individual OVERALS analyses will be used to measure the association. The multiple correlation coefficient (ρ_d) is related to the 'eigenvalues' (E_d). The formula used to calculate the multiple correlation coefficient (ρ_d) is $\rho_d = \sqrt{E_d / \sum E_d}$ (*cf.* Van der Burg 1983).

The approach to the Multiple Regression Analysis respects the pre-defined block of factors presented in the multivariate model in Figure 3.2. This model, as indicated by Agung (2005), widens the perspective on culture and also permits the assessment of the cognitive and behavioural components of particular groups or communities as 'systems' in a fairly holistic mode, hence generating a value relation towards policy making. The Multiple Regression Analysis of the block of factors gives an indication of on which aspects further policies should be developed and on which point policies should be concentrated to heighten the probability of positively affecting the intended change in behaviour in the community. In Sections 7.2.2 and 7.2.3 the multivariate and multiple regression analyses of the household dataset (N=400) will be presented analysing the reported behaviour of the Balinese community toward MAC plant utilisation and bio-cultural diversity behaviour discriminating between the block of factors.

Notes

- ¹ Balinese villages (*desa*) are composed of organisational units or neighbourhoods called *banjar*, in some areas *dusun*. These governing and social groups form the basis of much of the communal life of Balinese society (*cf.* Suryani & Jensen 1993).
- ² The SPSS © package used for the data analysis is the SPSS 15.0 statistical and data management software.
- ³ Access to the ITIS database is available by the website: http://www.catalogueoflife.org/info_about_col.php. Access to the NLBIF databases is available by the website: <http://www.nlbif.nl/>. The NLBIF is the Dutch national node of the Global Biodiversity Information Facility (GBIF).
- ⁴ See Appendix VI for a complete overview of MAC plants mentioned, the names and type of reported use.
- ⁵ The 2005 statistics became available at the BPS office in Denpasar directly after their publication in August 2006; therefore the researcher had to use the data available at the time of the fieldwork period, the 2004 data.
- ⁶ See Appendix VII for the division of the stratified sample in the four sample villages.
- ⁷ Various Balinese houses are compounds consisting of five to seven separate buildings. Commonly the separate buildings are used as follows: one for grandparents, one to three for ceremonies and one the kitchen, which is a separate building and is solely used for preparing food, not its consumption (*cf.* Jensen & Suryani 1992). Formerly it was very common for several nuclear families to live together in one compound, each occupying a separate building as their 'house' or 'sleeping room' and sharing the ritual buildings and kitchen. Nowadays in Bali, more nuclear families live separately, either in a house (as in Western societies) or sometimes a whole compound.
- ⁸ As Geertz (1966: 13) noted, there are six sorts of labels which one person can apply to another in order to identify him or herself as an unique individual: 1) personal names; 2) birth-order names, commonly Gede, Putu or Wayan for the first child, Made or Kadek for the second, Nyoman or Komang for the third and Ketut for the fourth, beginning the cycle over again with Wayan for the fifth, Nyoman for the sixth child and so forth; 3) kinship terms; 4) teknonyms, such as 'father-of' and 'mother-of', whether the name of the firstborn until the birth of the first grandchild at which time they will be addressed to as 'grandfather-of' and 'grandmother-of' plus the name of the grandchild; 5) status titles, usually 'called 'caste names'' such as Anak Agung, Tjokorda or Gusti, Dewa and Ayu for the Satria caste; 6) public titles, often quasi-occupational titles used by representatives of either the *desa adat* or *desa dinas*, priests and healers. The birth-order names are used very commonly, resulting in a considerable number of people bearing the same name. To identify a person, a combination of the above six sorts of labels is very common, but not always part of the official name. A seventh sort of label is that related to the gender Ni Luh, Ayu and I are used for women. Sometime the name is a reference to one gender and to the caste as is Ide, which can only be used by women of the first caste. Names do change in settings or roles taken by the individual. Note something of an intrinsic contradiction, since in the West more commonly it is one name one person but we also have different contexts and types of name use.

4 Research Setting: The Island of Bali

This chapter is a description of the research setting of this study, the island of Bali. It concentrates on the geographic, historical and socio-demographic aspects of human life related to the three main aspects of this study: community health, the biodiversity conservation of MAC plants and the preservation of the local culture related to them. As the field of ethnological study to which the island of Bali belongs, the Republic of Indonesia is the broader context.

Section 4.1 is a short introduction to the geography of Bali and biodiversity in the broader scope of the Republic of Indonesia. Indonesia, situated along the equator, is renowned as one of the world centres of mega biodiversity. Bali is one of its islands blessed with this high biodiversity, but is currently menaced as the population grows and negative effects of such economic aspirations as the tourism industry accrue.

Section 4.2 is devoted to the Balinese themselves. Section 4.2.1 begins with an introduction to the large-scale general developments from prehistory, followed by a brief discussion of major historico-political developments leading to the current cultural diversity in Bali. Section 4.2.2 sketches this cultural diversity, noting the different ethnic groups living there. Section 4.2.3 describes the keystones of the highly complex Balinese social organisation: the interest and working-group system (*seka*), the clan system (*dadia*), the stratification system (*kasta*), and the community system (*banjar*). Section 4.2.4 introduces the main religion of Bali, *Hindu Dharma*, examining the ceremonies, rituals and offerings and the Balinese calendar which the Balinese use as a time guide in observing and following the practical implication of their religion. Finally, Section 4.2.5 is devoted to the Balinese philosophy of life and the concept *tri hita karana* which are major factors in shaping Balinese social life and the community members' utilisation and bio-cultural diversity conservation behaviour of MAC plants.

In a short geographical orientation, Section 4.3 introduces the four sample villages: Angantaka, Bengkel, Pelapuan and Tumbu. This is complemented by a description of the socio-demographic and socio-economic profiles of Bali, concentrating on the specific profiles of the four sample villages and the data generated by the household survey. These four sample villages are the focus of this study on community members' utilisation and bio-cultural diversity conservation behaviour of MAC plants in Bali.

4.1 Bali: 'Island of the Gods' in Indonesia

4.1.1 Geography of the Archipelago

Indonesia is a Greek-derived name referring to the islands (*nesos*) south of India (*Indos*). The territory of the Republic of Indonesia consists of 17,508 islands and islets of which about 6,000 are inhabited. Indonesia stretches from 6°08' north to 11°15' south latitude and from 94°45' to 141°05' east longitude; the estimated total area ranges slightly over 5 million km², of which 2 million km² is land and the other 3 million km² sea (*cf.* Indonesian Embassy 2007). The Indonesian islands are geographically grouped with reference to the shelves on which they are located on, see Map 4.1. Sumatra, Java, Kalimantan and Sulawesi form the Greater Sunda Islands, the Lesser Sunda Islands range from Bali to Timor. West Papua is the Indonesian part of New Guinea and the other islands are grouped as the Moluccas (*cf.* Agung 2005).



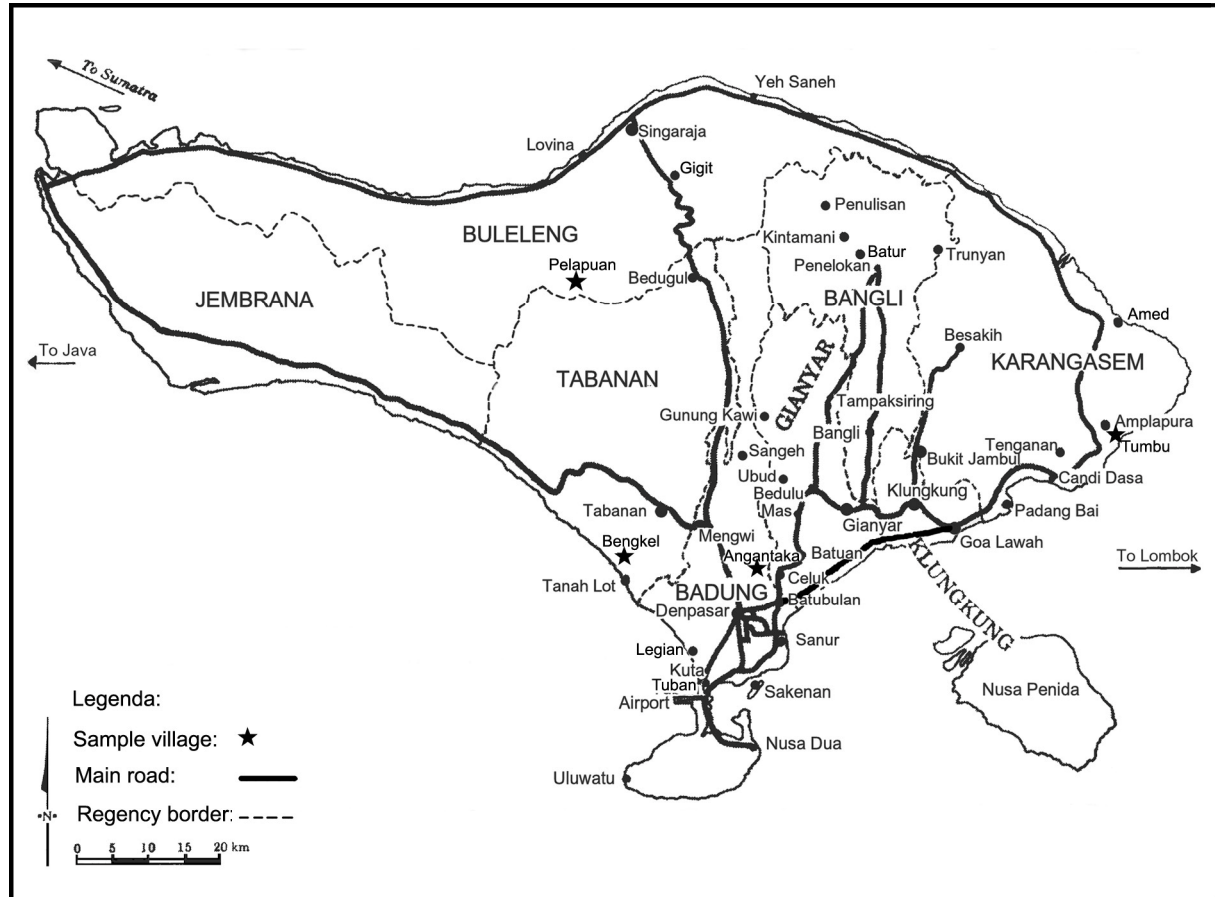
Map 4.1 Map of the Republic of Indonesia with indication of the Wallace Line
Source: Adaptation of CIA (2009)

In area, Bali is the smallest of the thirty provinces of the Republic of Indonesia (*cf.* Hobart *et al.* 1996). Besides the main island Bali, it encompasses the islands: Nusa Penida, Nusa Ceningan, Nusa Lembongan, Serangan and Menjangan and it covers 5,633 km², 0.23% of all the Indonesian islands (*cf.* PPB 2007). The main island, the research area of this study, is twice as long as it is wide, and is the westernmost of the Lesser Sunda Islands, at 8° latitude and 18° north of the western end of Australia, separated from Java by the shallow 2.5 km-wide Bali Strait.

The climate is characterized by an equatorial double rainy season (*cf.* Indonesian Embassy 2007). On average Bali has a relative humidity between 70% and 90%. Especially in the rainy season it seems much hotter because of the higher humidity and it generally rains more in the mountain areas than in plains and along the coasts (*cf.* Jensen & Suryani 1992). Average temperatures, influenced by the seasons and time of day, can be classified by areas: the coastal plains have an average of 28°C; the inland and mountainous areas 26°C and higher mountain areas 23°C, varying according to altitude (*cf.* Indonesian Embassy 2007). The monsoon-type climate used to bring a dry season from June to September and a rainy season from December to March. In recent years these weather patterns have been disrupted. Balinese, as do other Indonesians, complain that the rains have become unpredictable in the last few years. Rains are 'late' by several weeks and the start of the rainy season varies each year. As unpredictable as the rainy season, it is also not possible to pinpoint the start of the dry season. Now there is a much longer period of mixed weather than before and monsoon-like rains might fall in previously dry months. These changes have not passed unnoticed and more voices are raised pointing out a possible relationship between these changes and global and local disregard for nature leading to pollution, biodiversity loss and drastic changes in ecological systems.

Like many other islands of Indonesia, volcanoes, in total twenty-four, are dispersed over Bali (*cf.* Panji Tisna 2001b). The geographical and religious centre of the population studied is the highest volcano, Mount Agung (3142 metres). Mount Agung is located in the Karangasem Regency. Above it, in the conceptual world of the Balinese, lives God (*cf.*

Hobart et al. 1996). Mount Agung is a reference point for the Balinese who express directions by *kaja* (towards the mountain) and *kelod* (towards the sea). On its southern slopes is the largest and most important temple of Bali, the mother temple, Pura Besakih. The second most important temple is located at mount Batur (1917 metres), Pura Ulun Danu, referred to as the temple of Batur.



Map 4.2 Map of Bali with indication of the location of the four sample villages
Source: Adaptation of Agung (2005: 156)

The locations of both temples and the four sample villages are indicated on Map 4.2. Pura Ulun Danu and its surrounding village, Batur, were destroyed in the violent eruption of Mount Batur in 1926. The villagers, unscathed but homeless, began to rebuild their temple, work which is still being continued (2008) to invoke beneficent circumstances and prevent new, violent eruptions. According to legend, Mount Agung and Mount Batur were the result of the splitting of Mount Mahameru, the cosmic mountain and residence of the High God, *Sang Hyang Widhi Wasa*, surrounded by the lesser deities (*cf.* Stuart-Fox 1979). In the conceptual world of the Balinese, *Sang Hyang Widhi Wasa* now lives just above the peak of Mount Agung. In the inner courtyard of each temple in Bali is a *meru* dedicated to Mahameru, while a shrine is dedicated to Mount Agung and another to Mount Batur (*cf.* Hanna 1976). As these examples indicate, major geographical, cosmological and religious motifs are closely intertwined in the Balinese conceptualisation of the world which surrounds them.

The ridge of the volcanoes creates two different geographical areas in Bali: the narrow, steep terrain in the north and the broad, gradually sloping region of the south (*cf.* Panji Tisna 2001b). The north coast can only be cultivated by dry-land agriculture and extensive areas are sparsely populated. In the central-south part, the rivers have excised deep canyons in the soft volcanic ash and sandstone ground in their upper and middle courses and deposited large alluvial plains (*cf.* Agung 2005). The terraced, lower-slope zones characterised by ingenious irrigation systems for wet-rice agriculture and the coast fringed by coconut-palm groves make up the densely populated, economic core zone of Bali (*cf.* Hobart *et al.* 1996). It is this central-south part of Bali, the densely populated area, which is the research area of this study and home to *the* Balinese studied.

4.1.2 Biodiversity

Indonesia holds the second place in the ten ‘Centres of Megadiversity’. These Centres are those geographical areas with the highest level of biodiversity on Earth. Although Indonesia covers only 1.3% of the Earth’s surface, it is estimated to harbour 10% of all flowering plants, 12% of the world’s mammals, 16% of the world’s reptiles and amphibians, 17% of all birds, and more than a quarter of all marine and freshwater fish (*cf.* Solahuddin & Dahuri 1998). The Indonesian Biodiversity Strategy and Action Plan (IBSAP 2003) gives an assessment of over ninety ecosystem types in Indonesia, ranging from alpine forests to deep-sea ecosystems (*cf.* Agung 2005). The Indonesian Country Study on Biodiversity stresses the importance of this biodiversity: ‘*Maintaining biodiversity is fundamental to the integrity of Indonesia’s environment and hence to continue national economic output and the future prosperity of the Indonesian people*’ (Erdelen *et al.* 1998: 4).

Indonesia is situated in the botanical region of Malesia (*cf.* Indonesian Embassy 2007). The richness of the Melanesian region, of which Indonesia is the major portion, is reflected in its accommodation of close to 40,000 species of plants, or about 10 to 12% of the estimated number of plant species in the whole world (*cf.* BAPPENAS 1993). Indonesia ranks fifth in the world for plant diversity (*cf.* Agung 2005). The major vegetation types in Bali include mountain forest, lowland rainforest, deciduous forest and savannah grasslands, and a coastline with its intertidal areas. Moreover, Bali is dominated by man-made steeply terraced rice-fields (*sawah*), interspersed with home gardens and plantations (*cf.* Agung 2005). Indonesian people depend heavily on natural resources to support their daily life; approximately 6,000 species of Indonesian plants are known to be used directly by the local people for food, building materials and much more. Most characteristic is probably the use of plants as the source of raw material for traditional herbal medicine and as indispensable part in ceremonies, customs and traditions (*cf.* Indonesian Embassy 2007).

Ecologically, Indonesia is divided into two major areas: the western and central part of Indonesia, the Sunda Shelf, which was once part of the Asian mainland, and the eastern part, consisting of the islands of the Sahul Shelf. The two shelves are separated by the Wallace Line, indicated on Map 4.1. This marks the divergence in the flora and fauna found on either side, adding to the rich biodiversity. Solahuddin & Dahuri (1998) recognise seven major biogeographic regions in Indonesia, which do not always correspond to provincial boundaries: 1) Sumatra and its offshore islands and groups; 2) Java and Bali; 3) Kalimantan, including Natuna and Anambas islands; 4) Sulawesi, and its offshore islands including Sula; 5) Nusa Tenggara; 6) Maluku; and 7) Irian Jaya, including the Kai and Aru islands. Bali itself displays: ‘*a wealth of biological diversity among its living organisms from all resources, manifest in its flora and fauna dispersed over volcanoes, lakes, calderas and lowlands, together substantiating the characteristic landscape of Bali. The variety in natural resources*

– fragile as they are on the island – encompasses terrestrial, marine and aquatic ecosystems, animals and plants, all providing the population with a range of a natural products which in combination with their traditional way of life has formed the sustained base for their culture, livelihood and survival over many generations’ (Agung 2005: 2).

Recent data on biodiversity status indicate that Bali, and several other Indonesian islands, and for that matter other places on earth, faces a serious biodiversity crisis, particularly in the growing urban and semi-urban areas where there is a high level of ecosystem destruction, species extinction and erosion of genetic resources (*cf.* Agung 2005). The threats to land, forest and water ecosystems are legion; apart from the impact of the natural forces of eruptions, forest fires, earthquakes and floods, increasing threats are directly related to habitat loss and degradation, pollution, over-exploitation, introduction of alien species and global climate change caused by unabated human population growth, unsustainable resource consumption and economic policies with an adverse impact on biodiversity (*cf.* Grifo & Rosenthal 1997; Agung 2005).

Apparent changes in biodiversity are visible in the fact that nowadays virgin forest is largely restricted to mountainous areas, inaccessible areas or areas which are now protected, although in the recent past vast tracts of land were under natural cover (*cf.* Erdelen *et al.* 1998). Areas previously covered by natural primary forests are transformed into unproductive wasteland and residual or secondary forests, considerably different from primary forest in nutrient budgets, species composition, structure, dynamics and stability (*cf.* Schulte 2002). Another example of the degeneration of biodiversity in Bali is the non-sustainable, introduced agricultural practices, including forced land conversion to cash crops, introduction of monocultures and cultivation of high-yielding crops, which caused serious loss of numerous indigenous cultivars, decreasing valuable genetic diversity (*cf.* Agung 2005). Specifically, the research of Solahuddin & Dahuri (1998) showed that the adoption of the new, high-yielding, ‘improved’ varieties of rice have led to the extinction of 1500 local varieties over the last fifteen years. Current attempts to improve biodiversity conservation and sustainable use of natural resources specifically MAC plants are discussed in Chapter 6.

4.2 The Cultural Area of Bali

4.2.1 History

The cultural diversity of Bali is rooted in its history, including the story of its inhabitants adapting to local circumstances over the centuries, the off and on contacts with neighbouring cultures, the waves of immigrants and its undeniable relationship with the neighbouring island of Java. The Indonesian Archipelago began to form towards the end of the Cretaceous Period, 140 to 65 million years ago (*cf.* Smith 1986; Tomascik 1997). During the Pleistocene Era, Bali was part of Java. When the sea level rose at the end of the Ice Age, Bali became a separate island (*cf.* Bernet Kempers 1991; Tarbuck & Lutgens 1993; Lansing 1995). However, according to local legends, Bali was not separated by force of nature from Java, but ‘by an act of a powerful Javanese sage, Sidhimantra, who severed the eastern most part of Java from the rest of the island, to banish his son, Manik Angkeran, for a serious offence. This is said to have taken place only a little less than a thousand years ago. The severed small part of Java later became to be known as Bali’ (Panji Tisna 2001b: 17). Either by dint of mystical powers or the forces of nature, nowadays Bali is separated from Java by the Bali Strait. About 2,5 kilometres at its narrowest point, this strait joins the Bali Sea in the north with the Indian Ocean in the south. Despite their separation, Bali and Java are intertwined and seem to have always been connected in their geography, history, legends and people.

The very first inhabitants of Indonesia probably crossed the China Sea, which lay dry during the Glacial Periods, on foot. They belonged to the species *Homo Erectus*, of which the famous 'Java Man' found at Trinil, Java, was one (cf. De Vos 1995). These first inhabitants lived from hunting and gathering from the sea and the jungle. The introduction of shifting cultivation on swiddens occurred around the Neolithic (cf. Schefold 1990). This development was initiated by the first Austronesian settlers who moved south from Southern China via Taiwan and the Philippines into Indonesia between 4,000 and 5,000 years ago (cf. Hobart *et al.* 1996). These Neolithic immigrants, who reached Indonesia aboard seaworthy canoes with outriggers, were ancestor worshippers. They either displaced or assimilated the earlier hunter and gatherer cultures in most regions in Indonesia (cf. Schefold 1990). It is generally accepted that the use of plants for medicinal purposes in Indonesia dates back to these first settlers. This idea is substantiated by the discovery of Neolithic stone implements which were used in daily activities, almost certainly applied for health and healing practices (cf. Beers 2001).

The Bronze and Iron Ages in Indonesia which commenced around the middle of the First Millennium BC with the introduction of metal-working and rice- growing on irrigated fields by Dongson people from North Vietnam, generated the next great developments (cf. Schefold 1990).¹ During this period more complex social organisations developed, usually integrated with kinship, to ensure the water balance and the upkeep of the terraces was well co-ordinated. Several principles of the *subak*, a present-day Balinese farmers' organisations to regulate and organise the distribution, use and the maintenance of the unique terraced irrigated fields (*sawah*) to ensure the upkeep and water balance of the *sawah* which will be discussed in in Section 4.2.3, have their roots in the developments of the Dongson tradition.

The next great culture complex to reach Indonesia came from India. On the basis of inscriptions, Indian influences are evident from the first century of the present era (cf. Schefold 1990). The Indonesians of the Dongson Period were skilled sailors and it is therefore highly likely that this culture complex was introduced by overseas trading contacts. Contacts with India expanded enormously in the wake of a growing religious interest and the old tribal societies of Sumatra and Java, and consequently of Bali, developed into kingdoms with a Hindu-Buddhist orientation (cf. Schefold 1990). Bali experienced an influx of the first large group of settlers from Java around the fifth century under the Buddhist Sailendra kingdom (cf. Agung 2005). During this period, a feudal system developed which forced the farmers to pay tribute to the courts, enabling the construction of the monumental religious buildings erected in Central Java (cf. Schefold 1990). The reliefs on one of them, the Borobudur, dating AD 800 to 900, depict many aspects of daily life, including plants and scenes of grinding ingredients for women's health and beauty care (cf. Beers 2001).

Hinduism entered Indonesia through Java, where very ancient Hindu inscriptions have been found, dating from circa AD 400. After the initial co-existence of Hindu- and Buddhist-oriented kingdoms, Hinduism spread to Bali. Through a process of dissemination of civilization rather than conquest and colonisation, by 1001 Bali was extensively hinduised (cf. Hanna 1976). Hinduism in Bali today is a modified version of the archaic Indian form. The Balinese created their own form of Hinduism, demonstrated by the fact that Balinese Hinduism is not a Hinduism which any Indian Hindu, ancient or modern, would recognise as her or his own system of beliefs, values and dogmas (cf. Hanna 1976). The main religion of Bali, *Hindu Dharma*, is discussed in Section 4.2.4.

A period of close Javano-Balinese political and cultural contacts between the tenth and fifteenth centuries was inaugurated by the first great Balinese hero, Airlangga. A resident at the court of the king of Java, he succeeded the latter king who was overthrown in a civil war (cf. Hanna 1976). After Airlangga's death, Bali again profited from the Java-Bali relationship

but maintaining a certain degree of independence up to 1284 when Kartanegara, ruler of the Javanese kingdom of Singosari, subjugated it (*cf.* Agung 2005). In 1292, after the fall of Singosari to newly founded Majapahit, Bali regained its independence (*cf.* Agung 2005). This independence lasted until 1343 when General Gadjah Mada made Bali a vassal state of the Hindu-Javanese kingdom of Majapahit (*cf.* Ensink 1978). The first Majapahit governor, Kapakisan, was the founder of a line of princes who usually referred to themselves with the Balinese title of *Dewa Agung* (Great Deity), implying that they ruled independently and by divine right (*cf.* Hanna 1976). Majapahit culture was transferred to Bali during the following 177 years; as if the rich culture of the Javanese Majapahit court (*kraton*) was integrally relocated to the newly built courts (*puri*) in Bali (*cf.* Agung 2005). This strong link between the islands Java and Bali accounts for the many commonalities in present-day Balinese and Javanese spiritual, intellectual and artistic life.

After the collapse of the Majapahit kingdom circa 1520 and with the rise of the new Islamic Javanese kingdom, Mataram, it is hypothesised there was a mass exodus to Bali by Majapahit Javanese Hindus: priests, nobles, soldiers, artists and artisans, causing an even more massive cultural transfusion (*cf.* Hanna 1976; Agung 2005). Thereafter for centuries Balinese-Javanese relations tended to be explosive; Hindu Bali and Muslim Java were separated from each other only by a 3 kilometre-wide strait. This turbulent stretch of water acted as a buffer, being difficult and dangerous to cross (*cf.* Hanna 1976). The immigrant Javanese Hindus had a ready understanding of the original population of Bali, called the *Bali Aga* (Mountain Balinese) or *Bali Mula* (Original Balinese) who decided to withdraw from the Hindu settlers from Java (*cf.* Hobart *et al.* 1996; Agung 2005). Currently both these groups, the Javanese immigrants and the other groups referred to as 'original population' regard themselves, quite correctly in view of their centuries' old settlement in Bali, as the indigenous population of Bali.

The sixteenth century was a Golden Age in Bali. Batu Renggong, who became *Dewa Agung* of Gelgel around the year 1550, welded the various Balinese principalities together into a strongly centralized kingdom, conquering and colonising parts of the island of Sumbawa and of Lombok (*cf.* Hanna 1976). Traces of the colonisation of these islands are still apparent in the close relationship between Bali and Lombok: with Balinese communities in Lombok and Lombok communities in Bali. The Balinese succeeded in creating a more closed society, guarding their own traditions even with the constant intrusion of external politics and foreign traders (*cf.* Hanna 1976). By the end of the sixteenth century, the records show only sporadic visits by European travellers and explorers, lasting at the most a few weeks. Among them was the visit of Francis Drake in 1580, followed shortly afterwards by Magellan and Cornelis de Houtman in 1597 (*cf.* Agung 2005). The customary laws of the early Balinese stating that whatever and whomsoever the waves tossed up on the shore were destined to become the property of the kings proved a deterrent to earlier Asian and later European seafarers, who preferred to sail past Bali to other islands which offered surer and safer profits (*cf.* Hanna 1976).

In the sixteenth and seventeenth centuries rivalry between Bali and the Javanese Mataram kingdom flared up with a series of wars of invasion, in which the Dutch, then busy colonising other Indonesian islands, did not intervene, although the Dutch suspected the English of covertly supporting Bali (*cf.* Hanna 1976). In this period with the exception of a few episodes, Bali enjoyed the benefit of European neglects (*cf.* Hanna 1976). After the initial triumphs during the reign of Batu Renggong, the glory of Gelgel began to wane. After the failed attempt to restore former grandeur and glory in a new *kraton* in Klungkung, this spelled a diminution of central power, making way for the rise of a dozen more or less clearly defined

little independent kingdoms (*cf.* Hanna 1976). By 1800, the power structures in Bali were reduced to nine royal houses.² Eight of these survived, both as geographical and political entities, forming the basis for the Balinese regencies (*kabupaten*). These plus the new regency Denpasar city, constitute the current nine governmental units. The eight regencies which correspond to the former kingdoms are Badung, Bangli, Buleleng, Gianyar, Jembrana, Karangasem, Klungkung and Tabanan (*cf.* Suryani & Jensen 1992). After 1800, when its defences were breached, the previously inviolate Hindu civilization had to contend with more serious religious, commercial and political infiltration by Muslims and Christians (*cf.* Hanna 1976).

Bali was spared from European colonisation until 1846. This began with the Dutch conquest of North Bali, unfortunately orchestrated with excessive punitive expeditions against the Balinese (*cf.* Hanna 1976). It took the Dutch more than sixty years to conquer all of Bali (*cf.* Jensen & Suryani 1992). Until 1906 the Dutch rule was confined to the north and west. This was no sinecure as it was marred by sporadic rebellions, of which the lengthiest, most damaging to all parties was the Banjar War in North Bali in 1868 (*cf.* Rubenstein 1996). The aftermath of the Banjar War allowed the Dutch to consolidate their authority over the north and west and, consequently, they were able to take over the rest of the island between 1906 and 1909, with the final conquest of the kingdoms of Klungkung in 1908 and Bangli in 1909 (*cf.* Robinson 1995; Bagus 1996; Rubenstein 1996).

During this period of Dutch conquest, in 1902 the first tourist visited Bali.³ It was not until 1920 that tourism really expanded, commencing when the KPM, a Dutch steamship line, attracted passengers to fill up the cabins of the ships which were sent to Buleleng to load copra, cattle, coffee and pigs. It was soon reporting as many as 100 tourists a month by the 1930s. This quickly rose to a 250 per month by 1940 (*cf.* Hanna 1976). Drawn by the allure of the cultural and biological beauty, tourism has been expanding ever since this date, leading to an annual influx of 3 million tourists at the peak of Balinese tourism in the first years of the twenty-first century, almost equalling the number of Balinese inhabitants (*cf.* Schulte Nordholt 2007).

With the colonisation of Bali by the Dutch, Western influences systematically infiltrated the existing systems of government, law, education and health (*cf.* Bagus 1996). After the initial massacres and looting, the Dutch introduced reforms and reformulations, often sanctimoniously proclaimed as the fruits of the Ethical Policy (*cf.* Hanna 1976). Following the precepts of this policy, the Dutch did not rule Bali directly; the island was put under a Resident whose functions were to co-ordinate and keep an eye of the general politics, but the *rajas* were left to govern their territories, the everyday affairs of the eight kingdoms (*cf.* Agung 2005). Inspired by nineteenth-century scholarly conceptions of an idealised image of Bali, imbuing the Balinese people with pseudo-ancient identity in an ancient Hindu caste society, the Dutch chose to restore *the* traditional system of royal self-rule (*zelfbestuur*) as part of their 'Restoration policy', thereby reviving the putative 'ancient' cultural, religious, legal and literary practices (*cf.* Liem 2003). Such nineteenth-century European scholars as Van Humbolt, Raffles, Crawfurd, Friederich and Lieferinck busied themselves, as did the Balinese themselves, creating and maintaining this idealised, wondrous past (*cf.* Liem 2003). The latter launched an active, constant debate on the issue of *balisasi* or *kebalian* (being Balinese). The awareness of the indivisible unity of religion (*agama*), tradition (*adat*) and culture (*budaya*), was seen as essential by Balinese themselves if their identity were to remain intact and they were to retain their cultural identity (*cf.* Hobart *et al.* 1996; Picard 1999). By so doing, they contributed to the conservation of the cultural diversity of the world and of Bali specifically. Section 6.2 elaborates on the constant debates on *kebalian*.

The Dutch attempt to reconstruct the Balinese ‘original’ state resulted in a colonial state which ‘*legalized and entrenched a caste hierarchy and a set of rules regarding caste relations and prerogatives which in practice had never existed before*’ (Robinson 1995: 33). Essentially this simple, ‘original’ caste system replaced the complex interrelationships between ever-changing size and status of Balinese family groups, formerly the essential and formative aspect of Balinese culture, politics and economics (*cf.* Schulte Nordholt 1990). Today the importance of the caste system is diminishing, but is still very visible in name-giving, marriages alliances and in ceremonial- and religion-related practices, customs and ownership. The people of the Sudra caste especially have a history of opposition to the privileges reserved for the higher castes (see Section 4.2.3), while the aristocratic caste members, who trace their ancestry to priests and administrators of the Majapahit kingdom, apparently maintain an interest in upholding the ‘original’, most likely newly invented, traditions (*cf.* Ensink 1978).

Life in Bali was fairly agreeable for a short time in the 1930s, not only for the tourists and (non-) famous foreign artists and writers, but also for the Balinese themselves. However the middle of the twentieth century ushered in great misfortune and despair with only short periods of relief. The period of woe commenced with the Japanese occupation (1942-1945). This actually passed without any great bloodshed or destruction, but it did bring the Balinese population severe privation and the imminent prospect of famine and epidemic, because of the Japanese requisition of rice and other food supplies and the shortage of textiles, pharmaceuticals, manufactured goods and spare-parts for the modern machinery already introduced (*cf.* Hanna 1976). It was essential to find alternatives to pharmaceuticals and local herbal medicines and *jamu* fulfilled the need. With the return of the Dutch in 1946, Bali was constituted one of the thirteen administrative districts of the Republic of East Indonesia, which the Dutch sponsored as a rival State to the revolutionary Republic headed by Soekarno and Hatta (*cf.* Hanna 1976). After initially expressed support for a possibly fruitful Dutch-Balinese co-operation, the Balinese turned against the Dutch who attempted to obliterate the Republic by military action (*cf.* Hanna 1976).

In no part of Indonesia was the transition from colonialism to independence (1945) an easy one and in Bali, riven by mutual suspicion between Jakarta and Denpasar because of its previous support of the Dutch, it was especially difficult (*cf.* Hanna 1976). In 1958, the year it became a separate province of Indonesia, the Balinese received acknowledgement of the *Hindu Dharma* as a monotheistic religion by the Ministry of Religion, a requirement for it to become an officially recognized religion (*cf.* Picard 1999).⁴ Hereby they created an official status for this self-proclaimed cornerstone of their *kebalian*. The late Soekarno years (1955-1965) brought serious trouble, induced by profound political, economic, social and cultural changes, to the Balinese people everywhere (*cf.* Hanna 1976; Agung 2005). In late 1962, the observance of the *Eka Dasa Rudra*, hoped by the Balinese to restore balance and intended by President Soekarno to promote tourism, was transformed into a disaster by the eruption of Mount Agung in early 1963, preceded by a frightening plague of rats, leading to famine and disease. These horrors were exceeded by the even more dreadful events of late 1965-early 1966 when there were massacres (*cf.* Picard 1999). Throughout Indonesia, the military coup of 1 October 1965 was the prelude to these massacres, in which homes were burned and immense damage was done to the economy and morale of the island. According to different estimations between 100,000 and a million people were killed (*cf.* Robinson 1995).

Under the New Order of President Soeharto, top priority was given to the stabilisation of the economy, which was realised by the mid-1970s (*cf.* Agung 2005). From the late 1980s the island was increasingly placed under pressure by Jakarta-based investors and by rising

numbers of tourists and migrant workers (*cf.* Schulte Nordholt 2007). Despite its very turbulent and horrific past, at the beginning of the twenty-first century Bali was known as a culturally safe haven, a utopian concept which was again brutally disrupted by the bombings in October 2002 and 2005. Schulte Nordholt (2007) argues that these assaults emphasise the extent to which the population of Bali has had to face fundamental challenges resulting in the wake of economic, political, and religious changes over the past decade (1995-2005).

4.2.2 Cultural Diversity

Indonesia is renowned for its cultural diversity, encapsulated in its national slogan: Unity in Diversity. *Pancasila*, the philosophical basis of the State, was devised to ensure national unity and is composed of five inseparable, interrelated principles namely (*cf.* Agung 2005):

1. belief in the one almighty God;
2. just and civilised humanity;
3. the unity of Indonesia;
4. democracy guided by the inner wisdom in the unanimity arising from deliberation amongst representatives; and
5. social justice for all the people of Indonesia.

According to the 2000 population census, the Republic of Indonesia has 206,264,595 inhabitants (*cf.* BPS 2008).⁵ The population had risen to 222.2 million people in 2006 (*cf.* BPS 2007a). The Republic of Indonesia is fourth largest country in the world (*cf.* BPS 2008). Bali, with a population in 2006 of 3.4 million and a population density of 608 per square kilometres (*cf.* PPB 2007), displays cultural diversity exhibited in a great variety of languages, customs, knowledge, beliefs, values, ceremonies, rituals, institutions, artistic expressions, ways of life and local systems of use, management and conservation of resources (*cf.* Agung 2005).

Throughout the course of history, Bali has been confronted with waves of immigrants, see Section 4.2.1. The majority of the permanent immigrants in Bali can be traced back to Java. As said, there were three moments in history when larger groups of Javanese immigrated to Bali: around the fifth century, in the tenth century and another increase in the sixteenth century. The Javanese Hindu immigrants who arrived in the tenth century enjoyed a good understanding with the original population of Bali. These groups currently live in harmony, respecting each other's different ways of life (*cf.* Hobart *et al.* 1996; Agung 2005). Several of the 'original population' of Bali now live in small, isolated communities mainly in the northern and eastern parts of Bali, in such villages as Bayung Gede, Tenganan, Tejakula, Sembiran, Taro and Trunjan (*cf.* Jensen & Suryani 1992; Agung 2005). Today, the descendants of the Javanese Hindu settlers form the majority of the population and are commonly referred to as *the* Balinese. Their living area, central-south-eastern Bali, is the focus of this study. The western part of Bali and the northern coast strip is populated by higher number of Islamic communities. Immigrants from the developed countries tend to settle in the business and tourist areas and the Ubud area, famous for its artistic communities.

Because of the 'inextricable link' between them, the biological and cultural richness of Bali is threatened by the loss of cultural diversity. As discussed in the theoretical orientation, languages are considered one of the major indicators of cultural diversity. Estimates of the number of languages spoken in Indonesia range from 440 to 742. SIL International states that there are 742 listed languages in Indonesia, of which 737 are indigenous and 5 immigrant (*cf.* Gordon 2005).⁶ The official national language is *Bahasa Indonesia*, introduced at the end of the 1920s by Indonesian nationalists as a symbol of national unity and independence. *Bahasa*

Indonesia is used in all official government communications, printed and spoken, in government health care and educational facilities and the mass media. Most Balinese people are bilingual: Balinese is their first language and *Bahasa Indonesia* is the second language. To work in the tourist industry, many Balinese have mastered more languages. Among the most popular are English, Japanese, French, German, Russian and Chinese.

The Balinese language, which has a wide variety of regional dialects, is characterised by levels of politeness: vulgar (*kasar*), ordinary (*lumbrah*) and modestly respectful (*alus madia*) and respectful (*alus singgih*) (cf. Hobart *et al.* 1996). The Balinese caste system and clan membership determine which level of language is used. This custom is diminishing; most Balinese now use the widely spoken form: Modern Common Balinese. This is a kind of middle language which can be considered a language of compromise between the *kasar* and the *Bali alus* (cf. Hobart *et al.* 1996). Today only a few Balinese still master the respectful levels commonly referred to as *Bali alus* and even fewer still master the nine levels of politeness described by McCauley (1984). Encompassing personal pronouns and words referring to the body and its functions, the choice of level was determined by the relative status of the two people involved, their feeling towards each other, and their feeling towards the subject discussed. In their research, Jensen & Suryani (1992) documented that in many plains villages and cities, Indonesian is becoming the primary language and Balinese is used less frequently, especially in such public areas where people with different ethnic backgrounds mix as office spaces, health care facilities and businesses. In more secluded areas or gatherings where people share the same ethnic background, Modern Common Balinese is still the preferred language.

Although fewer Balinese master all aspects of the Balinese language, some do not master it at all. However, sometimes its use is a conscious, not a practical, decision not to use Balinese, since the different language levels are connected with the controversial caste system. However, Maffi (1999) warns that if the younger generation do not find a way to contain or transpose the traditional knowledge, commonly encompassed in the traditional language, knowledge will be lost. Losing the ability to speak or master a language is directly related to the possible loss of the (intrinsic) knowledge encapsulated in that language, especially knowledge of the use of MAC plants and their traditional applications. Further longitudinal research is required to establish whether the changes in the languages commonly used by the Balinese community members are gradual and conscious enough to transpose the traditional knowledge and support the conservation of the cultural diversity of Bali in all its aspects.

4.2.3 Social Organisation

Bali is famous for its particular social organisation, which has been repeatedly reported to be extremely complex (cf. Jensen & Suryani 1992; Hobart *et al.* 1996; Connor & Rubenstein 1999; Agung 2005). Moreover, Bali always has been characterised by regional differences as the Balinese express themselves: ‘each village has its own *adat*’ (cf. Hobart *et al.* 1996). Despite the obvious differences between the villages, there is a strain of Balinese culture which, in its commonalities within the borders of Bali and in differences to the pan-Indonesian culture, set it apart as a separate culture in the Indonesian Republic. The complexity of Balinese society is actually increasing because of reported disruptions in the formerly strong social organisation, often blamed on the influx of external influences (cf. Agung 2005). The impact on and the anticipation of external influences, considered to jeopardise Balinese culture and its social organization, are discussed in Section 6.2.

Scholars, regardless of their discipline or theoretical background, all agree that Balinese social forms display an enormous spectrum of variations (*cf.* Hobart *et al.* 1996). Balinese reality is a complex machine composed of different systems (social, governmental, religious, *et cetera*), which form the spokes or mini-systems in the machine. The cornerstone of this complex machine is the family. Today an average family is a married couple with their children, hence monogamous marriage, whereas the older generation of the men linked to the *puri* (court) generally had more than one wife, polygynous marriage (*cf.* Suryani & Jensen 1993).⁷ Of the 56.4% of household members who reported they were married, 0.2% was married polygynously. Regional differences in social organisation have always existed in Bali. Looking through the regional differences, Suryani & Jensen (1993) recognised four social systems which bind the Balinese together:

1. the interest and working group system (*seka*); a person can belong to several *seka* and each *seka* is focused on one activity or field of interest;
2. the clan system (*dadia*), which combines extended families and all their ancestors;
3. the stratification system (*kasta*), dividing the community based on their members' functions;
4. the community system (*banjar*)

When designating these four social systems, Suryani & Jensen (1993) excluded two other customary social organisations, namely: the *pamaksan* and the *subak*. The *pamaksan* is the temple congregation (*cf.* Picard 1999). The *subak* is principally a farmers' organisation which embraces a watershed ecosystem and technically plays an important role in water distribution and farming practices in particular watersheds (*cf.* Suradisastira *et al.* 2002). Besides its strengthening of technical cohesion and its advantages for the production of the staple food of Bali, rice, the *subak* provides social benefits. Probably because the main contribution of the *subak* is economic and technical and the *pamaksan* is exclusively connected to the religious setting, these two were not named as one of the binding social systems by Suryani & Jensen (1993). Nevertheless, they do consider the *subak* 'a system of the larger community and an expression of long-standing collaborative action on a grand intercommunity scale'.

The *subak*, Hobart (1996) states, is one of the most important institutions which has agrarian, economic, religious and social characters and is responsible for the existence of several of the *seka*. The *seka*, the Balinese interest and working group system, covers a broad range of activities in daily life, such as planting and harvesting and creative activities for example dance, music (*gamelan*) and painting. So there are *seka* which organise work activities and those which pursue and have an interest in the arts, and those *seka* which are related to age groups. Equality and co-operation of members are the primary rules of these groups.⁸

Bagus (1996) claims that for most peasants the *dadia*, the kin association, remain a key social institution. It encompasses the combined extended families and all their ancestors. In essence, *dadia* are ritual units. They are formed on the basis of alliances between families and are formalised and dedicated to a larger ancestral temple. The degree to which the *dadia* assumes general social functions can differ widely from village to village. Whereas Bagus (1996) and Suryani & Jensen (1993) designate the *dadia* as an important social system, Geertz (1959) states that in some villages the *dadia* organisation is the central focus of social life, the axis around which it revolves; in others it is of relatively secondary importance; and in a few villages, especially semi-urbanized ones, *dadia* may not exist at all.

The caste system in Bali differs from the Indian caste system in which the current Balinese caste system is rooted. As in the Indian caste system, the division of the current system is based on the original functions of the members in the community (cf. Suryani & Jensen 1993). *Sudra* was originally formed by farmers, who also performed tasks for the other castes. The *Satria* assumed roles in the government and the *Wesya* members were involved in business and activities involving public welfare. The *Brahmana* were responsible for the religious ceremonies. Today all the high priests (*pedande*) are still *Brahmana* but most other priest and priestesses (*pemangku*) are members of the *Sudra* caste. 90% of the Balinese population belongs to the *Sudra* caste or lowest of the four castes; the other 10%, the *Brahmana*, the *Satria* and the *Wesya*, are regarded as the aristocracy.

The current caste system has had to withstand challenges over the years. Disruption began with its highly criticized 'reinstallation' by the Dutch colonial administration, which replaced the complex interrelationships between ever-changing size and status of the Balinese family groups (cf. Schulte Nordholt 1990). At the beginning of the 1920s, some members of the *Sudra* caste objected to the social implications of the caste terminology (cf. Bagus 1996). These members set up a new organization called *Surya Kanta* and changed their name to *Jaba*, referring to 'people who are outside the world of the courts'.⁹ Hanna (1976: 142) notes that the importance of caste was diminishing in the 1970s but that at that time: '*The ordinary man in his daily life must be aware of caste ... inclusive of levels of language and permissible contracts of marriage*'. Today, a person's caste is no longer functional or significant to an individual's position in society or in his or her choice of occupation (cf. Suryani & Jensen 1993). Although the weakening of the caste system has brought social freedom to the *Sudra*, the members of the higher castes especially still value it highly.¹⁰

The fourth binding social system is the *banjar*. Depending on the village size, it is made up of one or more organisational units called *banjar*, which are governing groups and are the basis of much of the communal life of the Balinese society (cf. Jensen & Suryani 1992). The original *banjar* of the Balinese communities, *banjar adat*, are subsumed by central government as units on which the regional organisation of the island is built. The central government units are referred to as *banjar dinas*. Usually the 'physical' boundaries of the *banjar dinas* and *banjar adat* co-incide, but there are exceptions. Both types of *banjar* have their own head named *kepala banjar* or *kelian* and both organisations and their heads have different functions. The *kepala banjar dinas*, appointed by the local government, is linked to the central government and passes on its directives and information on such issues as family planning and health education. It is their task to collect the demographic data for the village registration (cf. Jensen & Suryani 1992). The *kepala banjar adat*, chosen by *banjar* members, upholds the customary and religious laws and ceremonies to ensure that the norms and values of the community are maintained and respected by its members. As Suryani & Jensen (1993) indicates the function of the *banjar adat* is to: '*interpret the written and unwritten laws of the country and the banjar in order to ensure the security and peace of the desa and to uphold the honour and good name of banjar and desa. When problems arise, the mechanisms of the banjar, rather than lawyers and courts, settle disputes and meet out punishment*'. The *banjar adat* also assumes responsibility for the care of the *kahyangan tiga*, the village temple trinity (cf. Hanna 1976; Hobart et al. 1996), consisting of three temples:

1. the *pura desa* in which most village ceremonies are held and is situated close to the *balai agung*, the village meeting hall;
2. the *pura puseh*, which commemorates the founding of the community;
3. the *pura dalem*, the temple of the dead.

The *banjar* meeting hall is centrally located in every village. It is an open pavilion, serving as a local clubhouse and gathering place day and night (cf. Suryani & Jensen 1993). The *banjar* meeting hall, often close to or part of the *pura desa*, provides the location for the different health care programmes which are brought to the community, including the monthly mother and child programme incorporating weight and growth control and the immunization programme. Above all, in addition to its *adat* and spatial function, a *banjar* is a social organ: ‘Members of the *banjar* are obliged to help one another perform a number of duties, especially in religious ceremonies such as the burial of *desa* citizen and the construction and maintenance of buildings necessary for the functions of the *banjar*. These are obligatory activities for *banjar* members and take precedence over regular jobs and duties, regardless of whether such members are employed by state institutions or private enterprise’ (Suryani & Jensen 1993: 7). Besides dealing with the traditional rules and customs, the meetings, the laws and ceremonies, the *banjar* also organises work, dances, music and other arts. Although modern *banjar* are not as strictly attended and might have fewer community functions, the *banjar* is still very important in everyday life, providing solutions to cultural or economic problems or settling disputes among its members.

4.2.4 *Hindu Dharma: A Practised Religion*

In the diversity of religions practised there, Bali is no exception in the Indonesian Republic. According to the 2000 census of the 3,146,999 inhabitants in Bali, 2,751,828 were Hindus (87.44%), 323,853 Muslim (10.29%), 23,834 Roman Catholics (0.75%), 30,439 Protestants (0.97%), 16,569 Buddhists (0.53%), and 476 others (0.02%) (cf. BPS 2008). The major difference with the rest of the Archipelago is the main religion which is Hinduism (*Hindu Dharma / Agama Hindu*) and not a form of Islam or Christianity. Hinduism was originally known as *Arya Dharma* or the ‘Aryan Doctrine’. It has no founder, no common creed and is not institutionalised. Hinduism is a flexible faith, able to accept, and in course of time absorb, new ideas and beliefs. The roots of Balinese Hinduism lie in India, but it was developed largely in Java and has been subjected to influences from by Buddhism, the original Balinese (aboriginal) culture and Balinese pre-Hindu animistic and ancestral cults (cf. Covarrubias & Covarrubias 1937; Hanna 1976; Suryani & Jensen 1993; Sacchette 2002).¹¹ Just as in other religions, there are discussions among the followers of the Balinese Hindu faith about purity and the correctness of the way the religion is observed. Some Hindu followers prefer a return to the ‘source’ and plead for a ‘purification’ of their religion, which they translate practically into being closer again to the path of the ‘pure’ Hinduism, a reference to Indian Hinduism. Although these discussions do arise once in while, they are never heated, probably because Balinese Hinduism, as are other forms of Hinduism, has a basic approach to religious life, stressing performance or ritual rather than agreement with established doctrines or theology (cf. McCauley 1984). *Hindu Dharma* proclaims itself open-minded towards other religions. The Balinese preach that all humans are equal and that believing in God is more important than the religion followed.

This openness of the Balinese towards other religions is expressed physically at Pujumandala, located close to Nusa Dua, where the houses of prayer of the five officially accepted religions in Indonesia stand next to each other. All still function today: from right to left, a Hindu temple, a Protestant church, a Buddhist temple, a Roman Catholic church and an Islamic mosque (see Illustration 4.1). Although all these religions are professed in Bali, this study focuses on the Balinese community members living in the ‘cradle of Hindu-Balinese culture’ in the central-south-eastern part of the island (cf. Agung 2005). The majority of the

inhabitants of this area are adherents of the Hindu faith. The results of the household survey support this: 94.5% of the household members (N=1724) indicated Hinduism as their religion, 5.4% Islam and 0.1% Buddhism.



Illustration 4.1 *Pujumandala*, five houses of pray united on one location in Nusa Dua
Photographed by L.N. Leurs (Fieldwork 2006)

Hindu Dharma is more than the main religion of the island, to this day it is extremely powerful in shaping and controlling the daily behaviour of the Balinese (*cf.* Geertz & Geertz 1975; Suryani & Jensen 1993). Unlike the world religions which rely on their core of abstract basic tenets and symbols meaningful to a wide range of people, *Hindu Dharma* is highly localized (*cf.* Picard 1999). It is virtually impossible to conclude whether daily practices are more affected by *Hindu Dharma* or by Balinese culture, *adat*, traditions or practices. The impact of the Balinese religion is highly visible in the daily performance of ceremonies, rituals and offerings at the thousands of temples in the island, in the symbolic use of numbers and colours and in the performance and graphic arts.¹² The expenditure made specifically for the religious aspect of daily life is enormous but it is difficult to give estimates on the exact patterns of expenditure because of such irregular, highly expensive ceremonies as those accompany funerals (*nyaben*) or anniversary of temples (*odalan*).¹³ In contrast to Indian Hinduism, *Hindu Dharma* prescribes no food taboos, but there are several other ways by which the daily diet might be influenced by religion, for instance, temporary religious prescriptions connected to events in the religious calendar or in relation to healing practices.

The Bali-Hindu religion plays a paramount role in behavioural and emotional concepts and practices related to illness, health and healing (*cf.* Suryani & Jensen 1992). The main aspect in the practice of the Balinese religion is the striving to achieve a spiritual balance of

worship between *Tattwa* (philosophy), *Susila* (rules of courtesy) and *Upacara* (rituals). *Tattwa* is marked by the *Panca Srada* (the five principal belief), *susila* by the *tri kaya parisudah* (three major rules of behaviour) and the *upacara* (rituals) are divided into five areas of holy sacrifice (*panca yadnye*) (cf. Suryani & Jensen 1993). Even when not ‘practising’ their religion, Balinese often allow religious concepts to sway their decisions. Hence they balance their *dharma* (duty), *karma* (will, wish or desire) and *artha* (possession), but they might not always be successful and allow, for instance, *artha* (possession) overrule the other aspects, which might result in outright greed or very materialistic behaviour.

The first main aspect of practising the Balinese religion, the *tattwa*, is marked by the *Panca Srada* (five principal beliefs) (cf. Suryani & Jensen 1992):

1. the existence of God (*Sang Hyang Widhi Wasa*), Who can treat and relieve illness;
2. the existence of the eternal soul (*atma*), which also determines mental activity including thinking, emotions, behaviour and personality;
3. belief in the law of reciprocal actions (*karma pala*), every deed has rewards or consequences; of which illness might be one;
4. reincarnation (*punarbhawa*) is repeated until one attains the perfect life;
5. possible unity with God (*moksha*).

The second main aspect of practising the Balinese religion, *susila* (courtesy), has three major rules (*tri kaya parisudah*): 1) to think good thoughts; 2) to speak honestly; and 3) to perform good deeds. The third main aspect of practising the Balinese religion is the most visible in daily life: the *upacara* (rituals). The *upacara* can be classified into five groups, the *panca yadnye* of the Hindu-Balinese religion, named according to the focus or principal addressee of the ritual cycle (cf. Hobart *et al.* 1996):

1. *dewa yadnye*: rituals for gods and (ancestral) deities;
2. *buta yadnye*: rituals for spirits and demons;
3. *resi yadnye*: rituals in which various categories of priests and priestesses are consecrated;
4. *manusia yadnye*: rituals for human beings related to the individual’s life-cycle, in which each milestone in the cycle is marked by a ceremony, the purpose of which is to expiate past wrong deeds and achieve greater perfection in this life (cf. Suryani & Jensen 1993);
5. *pitra yadnye*: rituals embracing the cult of the dead and the subsequent purification of the soul.

Besides the *panca yadnye*, there are several other ceremonies which can be either community-wide or individual, including those at home, at a *banjar*, at an anniversary of the construction or repair of a temple (*odalan*) or calendar-related ceremonies: *nyepi*, *galungan* and *kuningan* to name some of the greatest. Another example of time-related ceremonies is the *tumpek* ceremony, which can be described as thanksgiving ceremony for the gifts of nature to humankind and occur once every Balinese year (about six months of the Gregorian calendar). The five types of *tumpek* are (Suryani & Jensen 1993: 12):

1. *tumpek landep* is to give thanks for all material things made from metal;
2. *tumpek uduh* or *tumpek warige*, for plants;
3. *tumpek andang* or *tumpek uye*, for animals;
4. *tumpek wayang* for puppets;
5. *tumpek kuningan*, for the well-being of the world and what it contains.

The *tumpek* should not be misunderstood as the worshipping of objects. They are special days on which respect for, in the case of the *tumpek uduh*, nature and human appreciation of nature stand central. On these days the Balinese pay their respects to God through the mediation of the trees, to receive the gift of fruits. *Tumpek uduh* or *tumpek warige* is the celebration of all that grows. There is a specific *tumpek* for trees (*kayu*) and one *tumpek* for all other plants (*Tumbuhan*). The ceremonies establish that humans are part of the whole and should respect nature. Respondents indicated that a current problem is that people often perform ceremonies but as a mere gesture and duly present materials; they are no longer really connected to the philosophy behind them. When Balinese are asked about the meaning and symbolism of a certain ceremony, several answers will be given and all of them might be equally valid as McCauley (1984: 98) noted: ‘*it satisfies rather than disturbs the villagers that one ritual has been given several meanings because they admire contrast and elaboration. Things can mean many things at once just as north means the human head, the mountain, Wisnu, black, four, and so on*’. Balinese think that different interpretations or different plausible explanations are mere aspects of one ineffable whole, which is too whole, too complex, for humans to capture in one all-encompassing explanation. The whole set of ceremonies, rituals and offerings which differ greatly in size and complexity, instruct the Balinese on five common themes (McCauley 1984: 106):

1. *scaling of events from simple to complex;*
2. *the importance of hierarchy to harmony;*
3. *the need to regulate time and space;*
4. *the influence of the ancestors;*
5. *the ambivalence about closure which leads to an emotional climax.*

One of the most striking features of Balinese material culture is the beautiful and skilfully constructed offerings. They are the visual part of the regular performance of the *upacara* which are fully integrated into the thinking and attitudes of the Balinese. Daily life, including school time-tables and the organisation of work and office hours, is organised so as to allow the Balinese to perform the multitude of ceremonies which absorb a large portion of their time, savings and are of great significance to modern-day lives (*cf.* Suryani & Jensen 1993). The daily and seasonal practices related to the offerings are the Balinese way of keeping their cultural heritage alive.¹⁴

The process of making an offering, for instance to the gods or God *Sang Hyang Widhi Wasa* which is part of every ceremony, always includes the material and the immaterial. Suryani & Jensen (1993) describe the offerings for the Gods as follows: ‘*They usually contain flowers and betel-nut arranged in a small tray made of woven young palm leaf (banten) along with incense smoke (dupa), and holy water (tirta), accompanied by a high priest’s mantra (i.e. holy chanting to call the gods and God)*’. The making of the offerings is an art in itself. Traditionally, the offerings were made exclusively from natural products, preferably collected by the makers themselves. The contents of the offerings, although this is often denied, have changed over the years. An alteration has taken place in the composition and the elements used in the offerings because of the unavailability of the ingredients or overpricing as a consequence of temporary scarcity. It was reported that there is also a considerable difference in the context of the making of the offerings. From the point of view of someone who is not living in the city, the whole offering has assumed a more private and individual character and has lost its social aspect.

In the cities more people buy the offerings instead of making them themselves. In the rural areas, making offerings is a social occupation and women gather to make them. Nevertheless, changes have not passed rural areas by. There are major changes in the way the supplies are assembled. Here too, formerly the components were collected by the makers themselves, these days most supplies are bought in large quantities from (non-) local suppliers, directly influencing the economic and agricultural aspects of the creation of the offerings. The offerings for greater ceremonies include not only the *banten* but are accompanied by the aesthetically arranged baskets with stacks of fruit, eggs, chickens or ducks, dedicated either to the gods or God, and there are also offerings for the demonic deities (*butakala*). See Illustration 4.2 for some examples of the offerings: *banten* on the left, the stacked offerings in the middle and an offering for the *butakala* on the right.



Illustration 4.2 Illustration of the daily *banten* (left), the stacked offerings (middle) and an offering for the *butakala* (right).
Photographed by L.N. Leurs (Fieldwork 2006)

Ceremonies are usually held at temples or shrines and most of the offerings are presented at such ceremonies and dance performances (*cf.* Jensen & Suryani 1992).¹⁵ Offerings are also made at significant places, such as a work place or dangerous crossings and hung on cars and motor-cycles. The religiously inspired cosmology is represented in the offerings. Those used in the *upacara* represent the human body, the natural world, and the universe as they should be (*cf.* McCauley 1984). In the offerings, the symbolic use of numbers and colours is important. For instance, a white chicken represents the east, a red chicken the south, a yellow chicken the west and a black chicken the north and the multi-coloured chicken represents the centre, each related to their specific gods, altogether a representation of the one God, *Sang Hyang Widhi Wasa*. The Balinese believe that, by creating these offerings and performing the ceremonies, they can correct such problems in the related integrated wholes as natural disasters, factionalism or illness, and moreover that they can prevent future problems. Nevertheless, the limitations of the human species mean that rituals performed by humans are always incomplete and therefore possibly displease the supernatural realm (*cf.* McCauley 1984).

4.2.5 Balinese Hindu Philosophy of Life

‘Good’ cannot exist without ‘Bad’, for every black there is white, represented in the frequently used black and white cloth. Whenever there is *kaja* (towards the mountains), there is *kelod* (towards the sea). The Balinese accept, respect and honour the opposing forces in the world. The basis of their philosophy of life is keeping the balance. The existence of oppositions is incorporated into daily life as well as in such arts as the traditional dance and martial art movements. Gestures with the palm towards the outside are defensive and with the palm turned inwards (towards the face) are inviting. It is impossible to make all the gestures with the palm towards the outside without turning the hand; therefore there is no defence without offence, no invitation without refusal, no good without bad.

The *kaja-kelod* opposition is very important in Bali. It is a vital force in the spatial organisation: *kaja* leads towards the sacred and *kelod* towards the demons or evil. The house shrines (*sanggah*) of each Hindu Balinese house are invariably oriented in the direction of Mount Agung (*kaja*) (cf. Jensen & Suryani 1992).¹⁶ Whole villages are constructed following the axis of the *kahyangan tiga* from the holy temple (*kaja*) to the haunted graveyard (*kelod*), and every house is constructed on the axis from the house shrine (*kaja*) to the refuse pit (*kelod*) (cf. Ensink 1978; Suryani & Jensen 1993). Therefore Bali is indeed ‘the island of the Gods’, a popular slogan used in tourism advertisement, and it is also the island of demons, because there is no sacred without evil. Therefore demons and gods are honoured in the offerings, ceremonies and rituals, which have to be done to keep the balance.

Although Balinese culture recognises dual systems, not all commonly known dual systems are accepted by the Balinese philosophy and dual systems are not the only type of Balinese classification system (cf. Ensink 1978). The mind-body dichotomy of the West is not incorporated into Balinese philosophy (cf. Suryani & Jensen 1993). Understanding the Balinese world presupposes knowledge of more systems of classifications with three, five, seven or eleven elements. For instance, the classification of the five elements: earth, fire, water, wind and air, which determines the tangible world, all essences of material things of the *buana agung* (the world at large) and the *buana alit* (the world in miniature, for instance, the body). This division explains the structure of the human organism on the analogy of the outside world and their interconnection (cf. Hobart *et al.* 1996). These opposing forces play a role in the management of well-being. There are naturalistic and supernatural philosophies and practices to achieve this, as Hanna (1976: 147) states: ‘Both black and white flourish along with witchcraft and exorcism, defilement, and purification. It is a rare Balinese who has not at some time sought out a practitioner for treatment of an ailment, real or imaginary, for advice in matters of love, for retrieval of some lost object, for procurement of a potion or a charm or indeed an antidote to one which is already in the possession of someone else’.

Balinese dual systems should not be mistaken for pure dichotomies; they represent the two extremes of a ‘reality’ of which there is an ‘in-between’. In the *kaja-kelod* opposition, the dichotomy is complemented by the middle world, the secular, a world without special forces; the world where humans live. The twofold quality therefore results in the threefold quality referred to as: *nista* (things located downwards or low), *madia* (middle or neutral) and *utama* (high or lofty), designating the head of things (cf. Hobart *et al.* 1996). In Balinese philosophy the key is not the determination or the achievement of the ‘perfect’, it is keeping the balance between the forces, whether dual or multi-levelled. The easiest example of this is the illustration of the battle between ‘Good’ and ‘Bad’, a popular theme in Balinese mythology, literature and the performance and graphic arts. This battle is never decided. ‘Bad’ is never annihilated, victory must therefore be understood as the restoration of harmony (cf. Ensink 1978).¹⁷

The overall balance concept in the Balinese society, *tri hita karana*, is defined by Agung (2005) as one of the key concepts in the conservation of the bio-cultural diversity of the island. He describes *tri hita karana* as the ancient Balinese-Hindu principle, to be translated as the 'three-happiness-sources', which has virtually become the all-embracing Balinese philosophy of life. It safeguards harmony among the three cosmic dimensions of humans on a virtually daily base. The three cosmic dimensions of humans are: God (referring to all representation of *Sang Hyang Widhi Wasa*, including gods, spirits and ancestors), the *buana agung* (macrocosmos; the entire physical universe), and the *buana alit* (microcosmos; the individual or the soul) (cf. McCauley 1984; Suryani & Jensen 1993; Pitana 2000; Agung 2005). In practice, *tri hita karana* is expressed as '*keseimbangan di antara pawongan, palemahan dan parahyangan*' (keeping in balance between god, nature and fellow humans). Keeping the harmony between the three cosmic dimensions is seen by the Balinese as the basis for good individual health as well as a healthy community (cf. Sacchette 2002).

The basic philosophy keeping the balance is related to the Balinese conceptualisation of the individual. According to the Balinese, a person's personality is formed by the interaction of its four spiritual forces called the *kanda empat* (four siblings) (cf. Connor 1982). The *kanda empat* possess both divine and demonic powers and change their names and seats in the body according to a person's age (cf. Hobart *et al.* 1996). The physical manifestations of the *kanda empat* at birth are blood, amniotic fluid, placenta and the *vernix caseosa*. Respect and offerings are paid to them. Failure to do so might result in working against the person or the causation of illness because of the disruption of the balance (cf. Suryani & Jensen 1993). Connor (1984) proposed the concept of 'unbound self', perceiving Balinese personhood not as unitary, as in the West, but as a personality composed of a fusion of self and the macrocosmos (*buana agung*), including both the natural and supernatural including the sibling spirits or souls and an intermediary spirit (*taksu*).¹⁸ Suryani & Jensen (1993: 217-218) disagree and state that '*the Balinese consciously consider most aspects of the macro-cosmos as parts of their world and as influencing them but not as aspects of their own personality ... they can access their own intermediary spirit (taksu), who may help them communicate with the gods, but contrary to Connor's view, they do not regard their taksu as part of themselves.*'

From birth until the sixth Balinese month ceremony (about 210 days), a baby is constantly carried and never placed directly on the ground or floor, since it is considered to be a 'supernatural' human, thereby complying with the unbound self concept. It is only after the sixth (Balinese) month ceremony (*otonan*), the infant becomes human and will receive her or his name, at this point creating the intermediary. At an *otonan* the four 'sibling spirits' unify and become one with the spirit of the soul. The 'siblings' then become two kinds of spirits *Kala* (responsible for a person's bad thoughts, emotions and deeds) and *Dewa* (responsible for a person's good thoughts, emotions and deeds). These influence the soul throughout life, working with or against a person (cf. Suryani & Jensen 1993). The cycle of all is completed at death when: '*the individual's soul (atma) becomes unified with God or awaits reincarnation and the sibling spirits return to their source (i.e. water, fire, soil and air)*' (cf. Suryani & Jensen 1993).

Respecting the *tri hita karana* principle, McCauley (1984) argues, means avoiding supernatural, social, environmental and/or physical disturbances, by synchronising actions and physical state with the supernatural cycles of activities. Balinese place a high value on maintaining interpersonal relationships and they will sacrifice job responsibilities to preserve good relationships and avoid disruptions and confrontations. To maintain the balance with their fellow humans, Balinese will express their emotions of any type too vehemently (cf. Suryani & Jensen 1993). Nevertheless, the main practice in keeping or restoring the balance

within and between the worlds lies in the execution of the numerous ceremonies, rituals and offerings. The Balinese integrated calendar, the prerogative of the skilful few, often religious priests, is the major practical guide for keeping up with the dates of the enormous number of holidays and grand regional ceremonies in Bali and for the determination of the propitious days for planting and harvesting rice and the scheduling of local ceremonies and rituals to be performed to maintain the balance.¹⁹

The Balinese calendar blends together other, different calendar systems. The basic outline of the current day-integrated calendar is the calendar as we know it in the Europe, the Gregorian calendar, the twelve-month system, 365 days and once every four years 366 days in order to remain synchronic with the solar year. The Gregorian calendar is integrated with two traditional calendars of Bali: the *sasih*, *isaka* or *saka* calendar and the Balinese *wuku*, *pawukon* or *uku* calendar. The *sasih* calendar is a lunar-solar calendar.²⁰ The lunar month ends on the day of the new moon (*tilem*) and the middle of each month is the full moon (*purnama*). The *wuku* year, a Balinese year consists of six months of thirty-five days, hence a *wuku* year is 210 days, which are divided into ten sequences of one-to-ten day weeks (*cf.* Hanna 1976). These are thought of as cycles within cycles, wheels within wheels (*cf.* McCauley, 1984). The most important weeks are the 3, 5 and 7 day week and, according to Geertz (1966), also the six day week.

Certain conjunctions of the different week cycles are considered significant and on these days ceremonies or rituals are performed. The Balinese calendar cuts time into units as the Gregorian calendar does, but this is done not to count and total the units, but to describe and characterise them and to specify their different social, intellectual and religious significance (*cf.* Geertz 1966). The example of the Balinese calendar (Illustration 4.3) shows in the main part the integrated calendars outlined on the Gregorian calendar. In the middle is written the name of the day in the Gregorian calendar and around it the names of the day corresponding to the other calendars. The red dot is used if the date coincides with full moon, when the *purnama* ceremony is held and a black dot if it coincides with the new moon, when the *tilem* ceremony is held. Under the calendar, specific information on the importance of the days which fall within the Gregorian month are listed: the Hindu holidays, the dates of the *odalan* of temples and the auspicious dates (*dewasa ayu*) for various activities. This list helps farmers to determine the best day for planting seeds, for craftsmen to begin working on metal, the traders to start a trading activity, hunters to start hunting and so forth.

The *dewasa ayu* each have their own cycle, therefore correlations differ every year. For instance, July 2006 was a magnificent month because there were many *dewasa ayu* in it. On the right of the calendar all dates and factors which determine the degree of auspiciousness of each date are presented, enabling the Balinese to recognise the good and bad days to execute certain activities, such as building a house, launching a business, changing residence, beginning an important project and it characterises the persons born on each day (*cf.* Geertz 1966; McCauley 1984). For instance, *kajeng kliwon*, which comes every fifteen days, is a potentially bad day, because on this day the evil spirits may easily imbue persons with bad intentions and disturb others. Persons with mental illness generally date the onset of their symptoms to this day (*cf.* Suryani & Jensen 1993). The section at the bottom right, gives a list of national or government holidays such as Independence Day and religious holidays other than Hindu. The top row of the integrated calendar is filled with the information of the month in the Islamic Hijriah calendar, the Javanese calendar, Chinese calendar and the Buddhist calendar.



Illustration 4.3 Example of the Balinese calendar
Photographed by L.N. Leurs (Fieldwork 2006)

Despite the complexity of their calendar, the Balinese essentially believe that it is impossible for humans to control their surroundings. A person may act according her or his best knowledge, thereby attempting to restore the balance of concepts or to achieve a certain goal, but there is no guarantee of success. Another can try to influence but can never control the events. This vision of life can be mistaken for fatalism, but probably in the Balinese religious conceptualisation it is not fatalism but a kind of realism. It is realism, since in the Balinese conceptualisation of the world it is considered impossible for humans to understand omnisciently the consequences of their actions and decisions, let alone those of others.

A person is given the opportunity and has the duty to do her or his best. This is why, in the event of disease, the sufferer is never and simultaneously always to blame for the cause. The important question is not whether it was avoidable but how to proceed from that point and make the best possible decisions. Clearly, illness and diseases are seen as part of everyday reality. They are believed to be caused by natural or supernatural actors or events but, according to the religious teachings, they are never the punishment of God. God's support can be besought to heal but the illness itself is never sent by God. Whether or not a person is cured is believed to be not in human (one's own, a healer's or a doctor's) but in God's hands. It is commonly believed that nature, God's creation, holds a cure for everything but this does not mean that everyone can be cured. By respecting the *tri hita karana* principle, supernatural, social, environmental and/or physical disturbances can be avoided or restored. In Chapter 5 the Balinese community members' perception of health and healing and the utilisation of MAC plants are discussed.

4.3 Life in Four Balinese Villages

4.3.1 Spatial Organisation of the Sample Villages

On the basis of the village statistics available at the Badan Pusat Statistik (BPS) office, which gave an overview of the number of household heads in each village (*desa dinas*) in the four pre-selected areas, four similar sized villages were selected. The 2005 statistics were not available yet at the time of the fieldwork period; therefore the researcher had to use the data available; the 2004 statistics. The four sample villages are in alphabetical order:

- Angantaka, located in the central lowlands, part of district Abiansemai in Badung regency;
- Bengkel, located in the coastal lowlands, part of district Kediri within Tabanan regency;
- Pelapuan, located in the mountains, part of district Busungbiu within Buleleng regency;
- Tumbu, located on the mountain slopes, part of district Karangasem within Karangasem regency.

The locations of the four sample villages are indicated on Map 4.2, the co-ordinates of the sample villages based on the location of the *kepala desa* office are (*cf.* Google Earth 2009):

- Angantaka: 8°35'00'' south latitude and 115°14'23,5'' east longitude;
- Bengkel: 8°35'22'' south latitude and 115°05'35,5'' east longitude;
- Pelapuan: 8°15'59'' south latitude and 114°59'29,5'' east longitude;
- Tumbu: 8°26'50'' south latitude and 115°37'26,5'' east longitude;

Usually the ‘physical’ boundaries of the *banjar dinas* and *banjar adat* are the same. However, in case of the sample villages each shows a divergence. Angantaka is a single *desa dinas*, but consists of two *desa adat*. Bengkel has the same number of *banjar*, even bearing the same names, but the boundaries of the two types of *banjar* geographically differ. Both Pelapuan and Tumbu have fewer *banjar dinas* than *banjar adat*. The composition is of the sample villages is as follows:

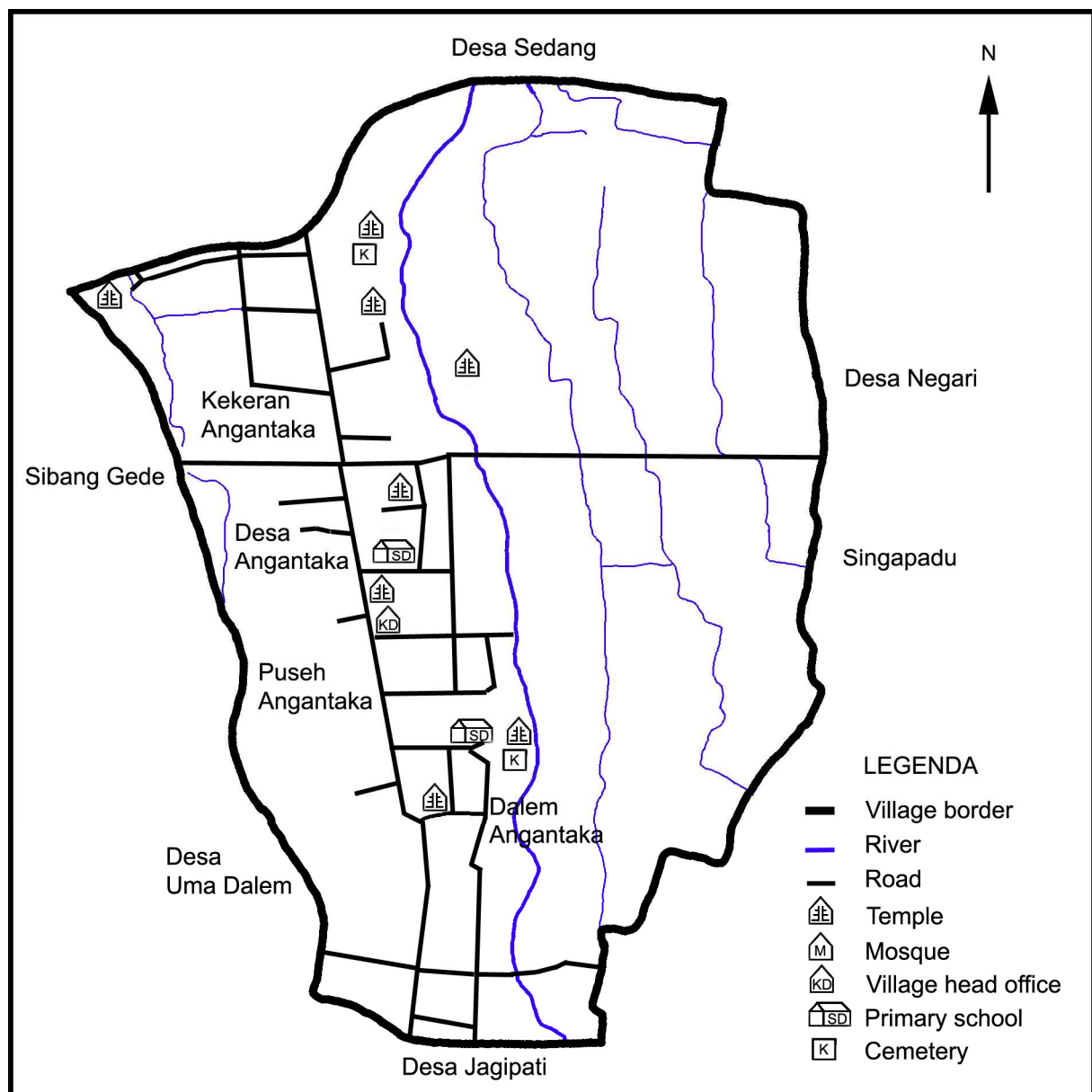
- Angantaka: 1 *desa dinas*, 2 *desa adat*; 4 *banjar dinas* and 4 *banjar adat*;
- Bengkel: 1 *desa dinas*, 1 *desa adat*; 4 *banjar dinas* and 4 *banjar adat*;
- Pelapuan: 1 *desa dinas*, 1 *desa adat*; 3 *banjar dinas* and 4 *banjar adat*;
- Tumbu: 1 *desa dinas*, 1 *desa adat*; 5 *banjar dinas* and 6 *banjar adat*.

Each of the villages has at least one set of three temples, the *kahyangan tiga*, which determines the orientation of a village. As said earlier, the three temples are arranged on a linear axis between the sea (*kelod*) and the mountains (*kaya*). The *pura puseh* (temple of origin) is located on the uphill side (*kaya*), the *pura dalem* is always on the sea side (*kelod*) and the *pura desa* is located between the other two. Typically the *pura dalem* and its usually adjacent cemetery are spatially separated from the village and the houses and living areas are concentrated around the other two temples. The location and proper positioning of the architecture of single buildings and also the village as a whole in the environment is important for the maintenance of a harmonious relationship with the rest of the universe (*cf.* Agung 2005).

The direct relationship between human settlement and its natural environment is encapsulated in the terms *desa* (village) and *tanah desa* (physical environment). Map 4.3 to 4.6 present the whole *tanah desa* of the four sample villages. For each village, the *kahyangan tiga* (temple trinity) is indicated, as are the main roads, rivers and village borders. The description pays special attention to the use of the *sawah* and *ladang*. *Ladang* is the word used for agricultural land used for dry farming. Most of the *ladang* are used for shifting cultivation, a form of agriculture in which a part of the land is used for agriculture for approximately three years. After this period of use, it is left to recover for ten to fifteen years, while another part of the land is used. For each village, it is specifically indicated what type of irrigation is used for the *sawah*, the wet rice-fields.

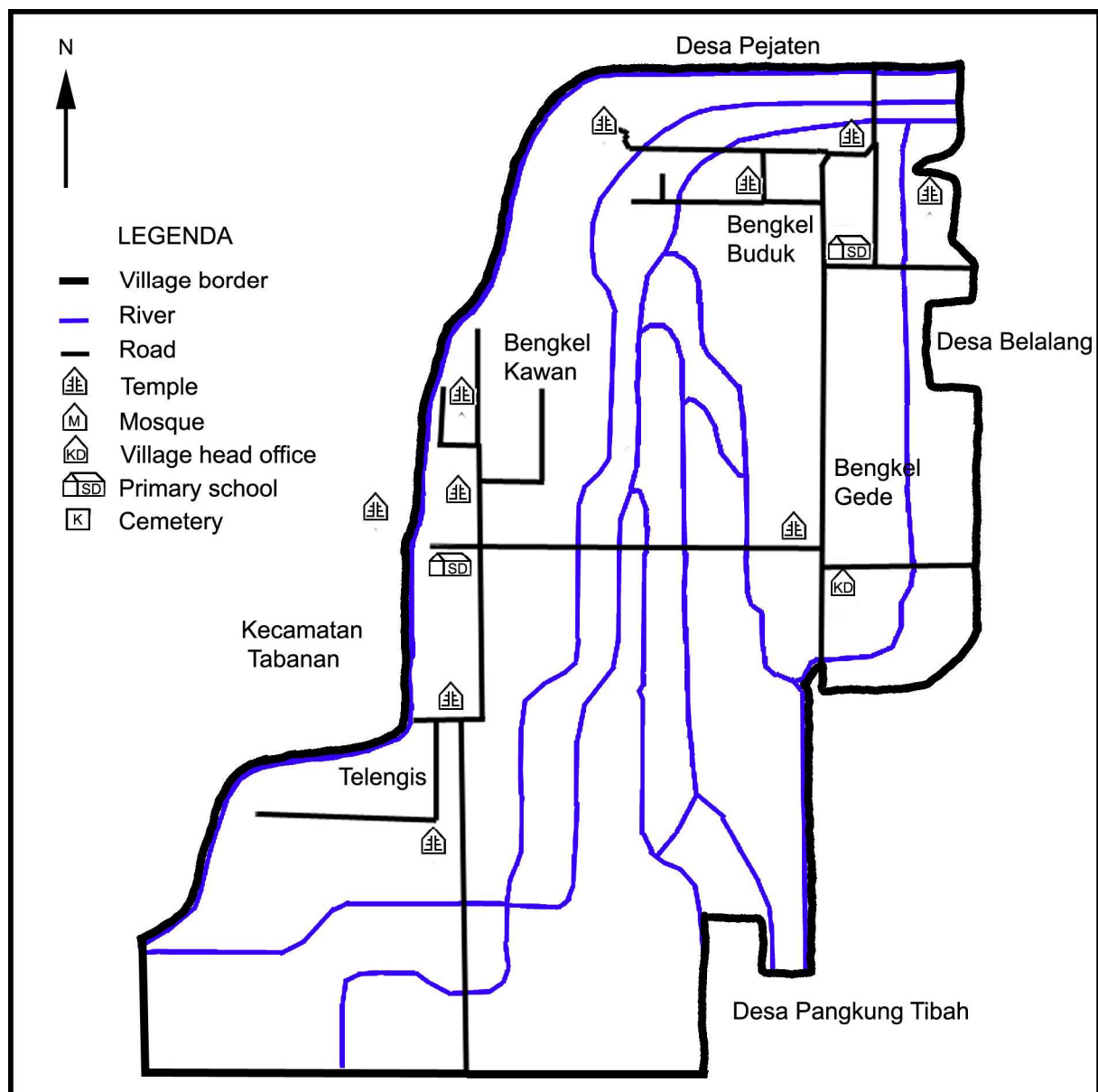
The data for the description and the maps describing the geographical layout of the villages are derived from the materials and statistical reports available at the *desa dinas* offices. The statistical reports are compiled annually by the local administration to report to the central Balinese authorities. The most recent available data was used as an input. For Angantaka and Bengkel, these were the statistical reports covering the period of January to June 2006 and for Pelapuan and Tumbu the statistical reports with the most recent data were the final reports of 2005.

Angantaka is located in the central lowlands of Bali. It covers 239 hectares in total, of which 169.39 (70.9%) hectares is used for *sawah* or *ladang* and all irrigation is provided by a system indicated as simple; there are no technically enhanced or electronic parts in the system; 55.06 (23.0%) hectares are used for dry agriculture. There is no forest within the boundaries of Angantaka. Normally, there is one *kahyangan tiga* (*pura desa*, *pura puseh* and *pura dalem*) in each village. Angantaka has two *desa adat* and both have their own *kahyangan tiga*. In total Angantaka has twenty-seven public temples. Private temples such as the house and family temples are not included in this count. *Desa Angantaka* is located in a fast urbanising area, a short 15 minutes drive away from the capital of Bali, Denpasar. The major road through Angantaka is generally used for local transport, as it is a smaller, parallel road to the major traffic artery connecting north and south Bali. So far Angantaka has no frequent heavy transport.



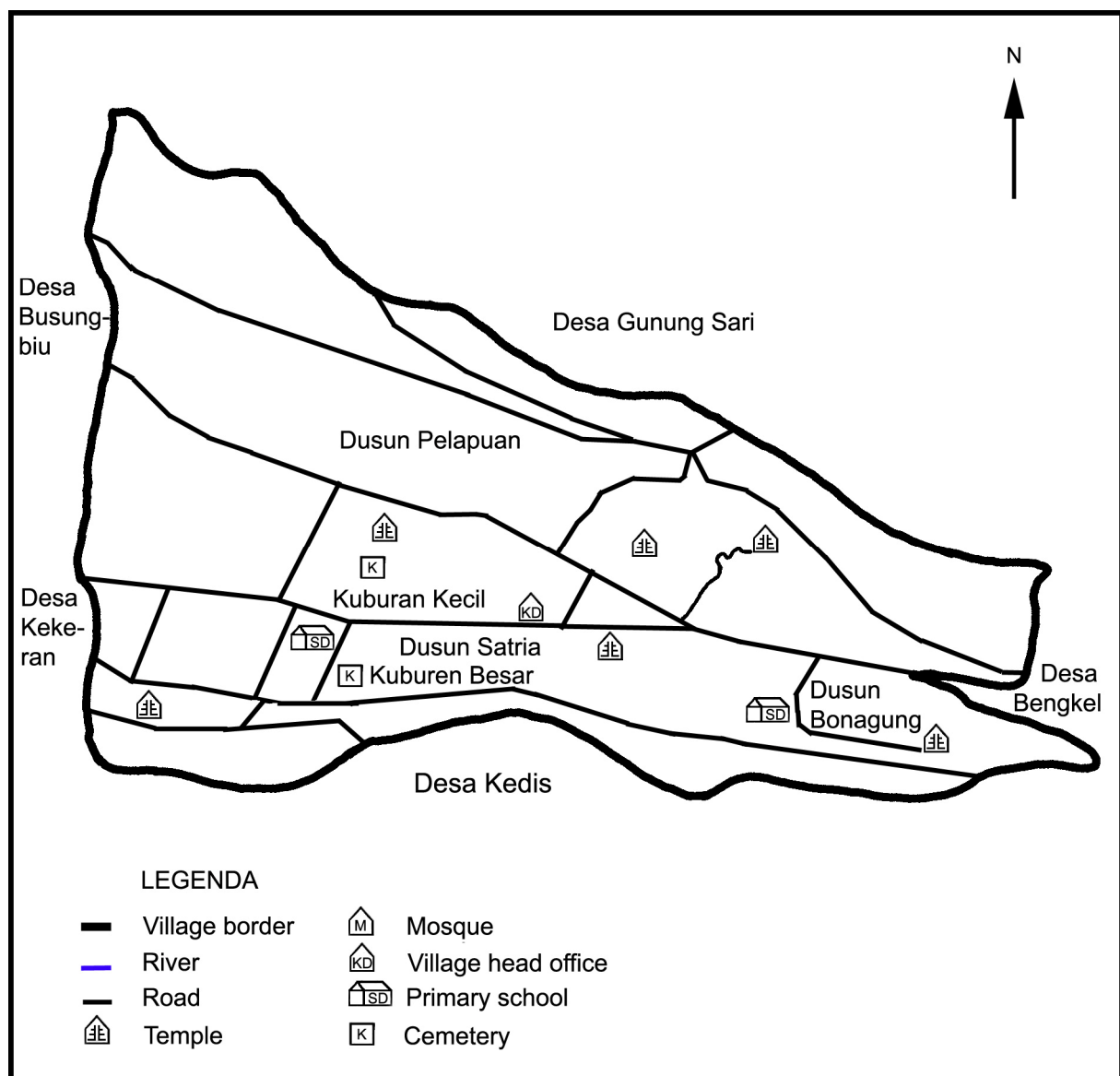
Map 4.3 Schematic layout of the village of Angantaka
Source: Fieldwork 2006

Bengkel is located in the coastal lowlands. In total Bengkel covers 291 hectares. It lies 45 metres above sea level and the surrounding area can be described as very flat. *Sawah* covers 209.46 (72.0%) hectares; all irrigated land. Dry agriculture claims another 42.54 (14.6%) hectares. There is no forest within the boundaries of Bengkel. It has ten public temples, three of the four *banjar* of Bengkel have their own *kahyangan tiga* and the fourth *banjar*, Bengkel Buduk, has a *pura dalem* to itself and shares the other two temples with another *banjar*. There is a division into two between the four *banjar* of Bengkel, visible in the main strip of agricultural land dividing them over the north-south axis. This geographical division is also apparent in social engagement and interactions between the four *banjar*.



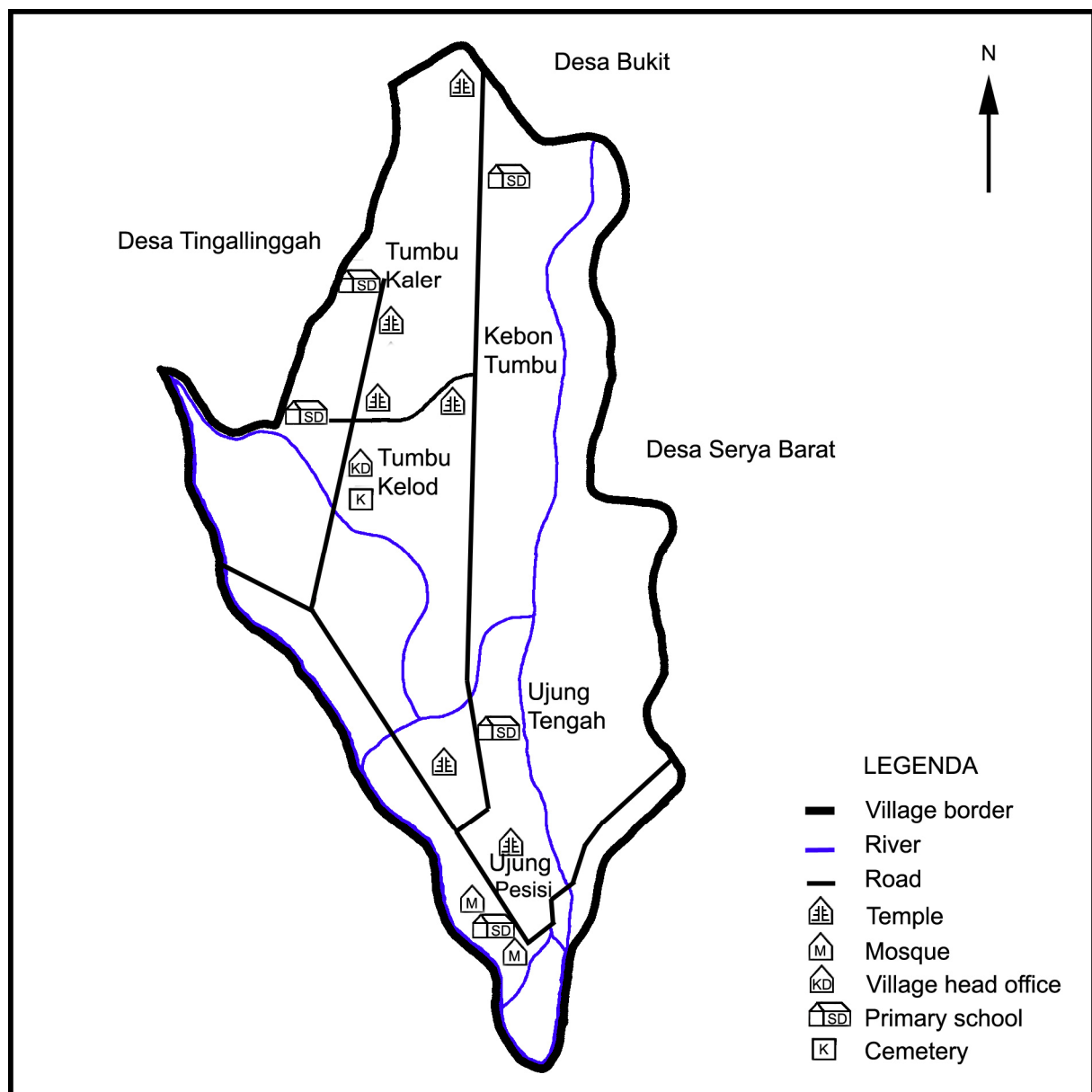
Map 4.4 Schematic layout of the village of Bengkel
Source: Fieldwork 2006

Pelapuan is located in the mountains. In total, Pelapuan covers an area of 375 hectares, with an altitude ranging from 325 to 500 metres above sea level. *Sawah* claims 127 (33.9%) hectares and 115 hectares thereof are reserved solely for the production of rice. The *sawah* are irrigated by a system indicated as semi-technical since mechanical parts have been added to improve the way it works. Dry agriculture covers 236 (62.9%) hectares. Pelapuan is located in the heart to the agricultural part of the island, distant from urban centres and tourist areas. It is situated in a very forest-rich area. The majority of this has been modified and cultivated to meet the agricultural demands, which are mainly concentrated on the production of cloves (*Syzygium aromaticum*, 80 tons), coconuts (*Cocos nucifera*, 50 tons), coffee (several varieties of *Coffea*, 22.5 tons) and cacao (*Theobroma cacao*, 20 tons) and a number of fruits which are produced in smaller tonnages (under 3 tons) such as bananas (various *Musa* species), oranges (various *Citrus* species), durian (*Durio zibethinus*) and *Duku* (*Lansium domesticum*).²¹ Pelapuan has one *kahyangan tiga* and three other public temples.



Map 4.5 Schematic layout of the village of Pelapuan
Source: Fieldwork 2006

Tumbu is located on the slopes of Mount Seraya and combines wide plains and forested hills. Its height above sea level varies from 0 to 100 metres. In total it covers 400 hectares of which 55.25 (13.8%) are used for *sawah*. This is about the same size as the area indicated as living area (50.25 ha, 12.6%). Dry agriculture takes up 189.25 (47.3%) hectares. Tumbu has two mosques serving those of the Islamic faith, visitors or residents of the area. Most residents are the descendants of slaves brought from Lombok to Bali in the transportations of the Balinese kings in the sixteenth century. These community members still affiliate themselves with Lombok although they have no direct family link or property there, as Bali has been their homeland for generations. In total Tumbu has four public temples, one *kahyangan tiga* and three other public temples which forms no part of a *kahyangan tiga*. In 2006, there was an administrative reorganisation adding the *banjar* Ujung Tengah and Ujung Pesisir to the original core, consisting of three *banjar* Tumbu Kelod, Tumbu Kaler, Kebon Tumbu.



Map 4.6 Schematic layout of the village of Tumbu
Source: Fieldwork 2006

4.3.2 Socio-Demographic Profile

Caste, Gender, Age and Household Composition

Table 4.1 presents the caste membership of the households in the sample, based on that of the household head. The fact that the majority of the Balinese people belong to the *Sudra* caste is confirmed in case of Bengkel and Tumbu. 87.0% of the sampled households in Bengkel belong to the *Sudra* caste and all households in the sample who said they belonged to a caste in Tumbu are members of the *Sudra* caste. In Angantaka and Pelapuan the percentages of people belonging to the *Sudra* caste are lower than expected, 78.0% and 56.0% respectively. The high percentage of *Satria* in Pelapuan is especially remarkable considering its geographical location and economic situation. Probably the *Satria* living in Pelapuan are the descendants of the *Satria* caste who filled government posts in Singaraja before Denpasar became the capital in 1958.

Table 4.1 Distribution of caste membership of the household head according to the sample villages (N=400)

Village	Angantaka		Bengkel		Pelapuan		Tumbu		Gen. Total	
	N	%	N	%	N	%	N	%	N	%
No caste	0	0.0	0	0.0	0	0.0	21	21.0	21	5.3
<i>Brahmana</i>	2	2.0	0	0.0	0	0.0	0	0.0	2	0.5
<i>Satria</i>	11	11.0	13	13.0	44	44.0	0	0.0	68	17.0
<i>Wesya</i>	9	9.0	0	0.0	0	0.0	0	0.0	9	2.2
<i>Sudra</i>	78	78.0	87	87.0	56	56.0	79	79.0	300	75.0
Total	100	100	100	100	100	100	100	100	100	100

Source: Household survey 2006

The Balinese community is patrilineal. Following the local *adat*, land and houses are inherited in the male line from one generation to the next. In her studies among the Balinese, Suryani(1984) observed the sons are generally the focus of the family hopes and ambitions. They are the parents' potential source of support and potential helpers in the performance of the customary and religious rituals and obligations. Daughters, in contrast, are regarded as potentially useless since after marriage they enter the families of their husbands and are lost to their own families (*cf.* Suryani 1984). Parents are not unhappy if their daughter marries late or remains unmarried because an unmarried women is highly valued, expressed in the way they are referred to: *nyukle brahma cari* meaning 'the holy woman, still a virgin, loved by God' (*cf.* Jensen & Suryani 1992). Over the years, the preference for male children has not resulted in an over-representation of males in Bali. There is an almost fifty-fifty division between the sexes, slightly favouring the males. According to the population census in 2000, of the total population of 3.15 million, 1.58 million were males and 1.57 million females, the sex ratio was 101.0 in favour of the males (*cf.* BPS 2008). In the year 2006 the population was 3.44 million, 1.75 million males and 1.69 million females, the sex ratio was 101.5 in favour of the males (*cf.* PPB 2006).

On the basis of the overview of the data in the statistical report of Angantaka, Bengkel and Pelapuan and the village monthly overview of population of Tumbu (May 2006), the division by gender for the four villages was as follows: Angantaka: 1617 men (50.3%) and 1596 women (49.7%), Bengkel: 1086 men (48.9%) and 1135 women (51.1%), Pelapuan: 1393 men (48.6%) and 1473 women (51.4%), Tumbu: 1595 men (49.4%) and 1613 women (50.6%). Table 4.2 presents the division of the genders by villages based on the reported sexes of all the household members in the sample (N=1724). Generally, the balance between the

sexes in the sample represents the general tendencies both in the statistical reports of the villages and the 2000 census of Bali, a close to fifty-fifty division. Looking closely at the sample versus the statistical reports of the villages, it transpires that the samples from Angantaka, Bengkel and Tumbu reveal the reverse image of the sex ratio of the statistical reports, whereas Pelapuan shows the same ratio. In conclusion, the household sample shows a representative image for the Balinese society considering the division of the gender.

Table 4.2 Distribution of the gender of the household members according to the sample villages (N=1724)

Village	Angantaka		Bengkel		Pelapuan		Tumbu		General Total	
	N	%	N	%	N	%	N	%	N	%
Male	203	49.5	214	53.4	229	49.9	231	50.9	877	50.9
Female	207	50.5	187	46.6	230	50.1	223	49.1	847	49.1
Total	410	100.0	401	100.0	459	100.0	454	100.0	1724	100.0

Source: Household survey 2006

BPS Bali uses a three-group division related to the age of the population: the young age (*usia muda*) covering 0 to 14 years old, the productive age (*usia produktif*) covering 15 to 64 years old and the old age (*usia tua*) covering 65 and older (*cf.* PPB 2007). The ratio between the age groups shows that between 2000 and 2006 there was a decline in the young age group, from 24.8% (2000) to 23.8% (2006), in favour of a rise in the productive age group from 69.3% (2000) to 69.9% (2006) and in the old age group 5.9% (2000) to 6.4% (2006) (*cf.* PPB 2007). Table 4.3 indicates the ratio of the age group between the household members (N=1724) in the sample. In the sample, the divisions between the age groups show that there are several differences compared to the total population of Bali. In Angantaka the young age group (25.9%) is bigger whereas the old age group (5.1%) is smaller than in the province. In Bengkel with 27.4% the young age group is much bigger, whereas the productive age group with 65.9% is much smaller than in the province. In Pelapuan the productive age group (72.3%) is much larger, whereas the old age group (4.2%) is much smaller and in Tumbu the productive age group (70.7%) is larger and its old age group (5.7%) is smaller than in the province.

Table 4.3 Distribution of the age of the household members according to the sample villages (N=1724)

Village	Angantaka		Bengkel		Pelapuan		Tumbu		General Total	
	N	%	N	%	N	%	N	%	N	%
0 -14 years	106	25.9	110	27.4	108	23.5	107	23.6	431	25.0
15-64 years	283	69.0	264	65.9	332	72.3	321	70.7	1200	69.6
65 and older	21	5.1	27	6.7	19	4.2	26	5.7	93	5.4
Total	410	100.0	401	100.0	459	100.0	454	100.0	1724	100.0

Source: Household survey 2006

Figure 4.1 shows the age of the household members in the sample (N=1724) divided by their sex. Overall there are more males than females. There are more male children (0-14 years old) than female children. The young male age group consists of 231 individuals representing 53.6% of the young age group versus 200 female young age individuals representing the other

46.4% of the young age group. As expected, since females worldwide have a higher life expectancy than males, there are more females, 53 individuals representing 57.0% of the old age group than males, 40 individuals representing 43.0% of the old age group. The oldest person in the sample was a male but the next 7 persons who belong to the oldest age group in the sample were, as was to be expected, all females. Figure 4.1, demonstrates that the population build-up does not have the classic pyramid shape with a broad base of children leading to a small top of the elderly. The Indonesian family planning programmes which have been especially successful in the last two decades account for the smaller base and the old pyramid shape can be found still in the group thirty-five years and older. In the sample there is a distortion which cannot be explained by the recent success of the family programme; the gap around twenty years old. The sample of the Balinese household members was taken from four villages; the gap is the result of community members in their twenties leaving the villages for the cities for driven by economic reasons, which will be further documented in Section 4.3.3.

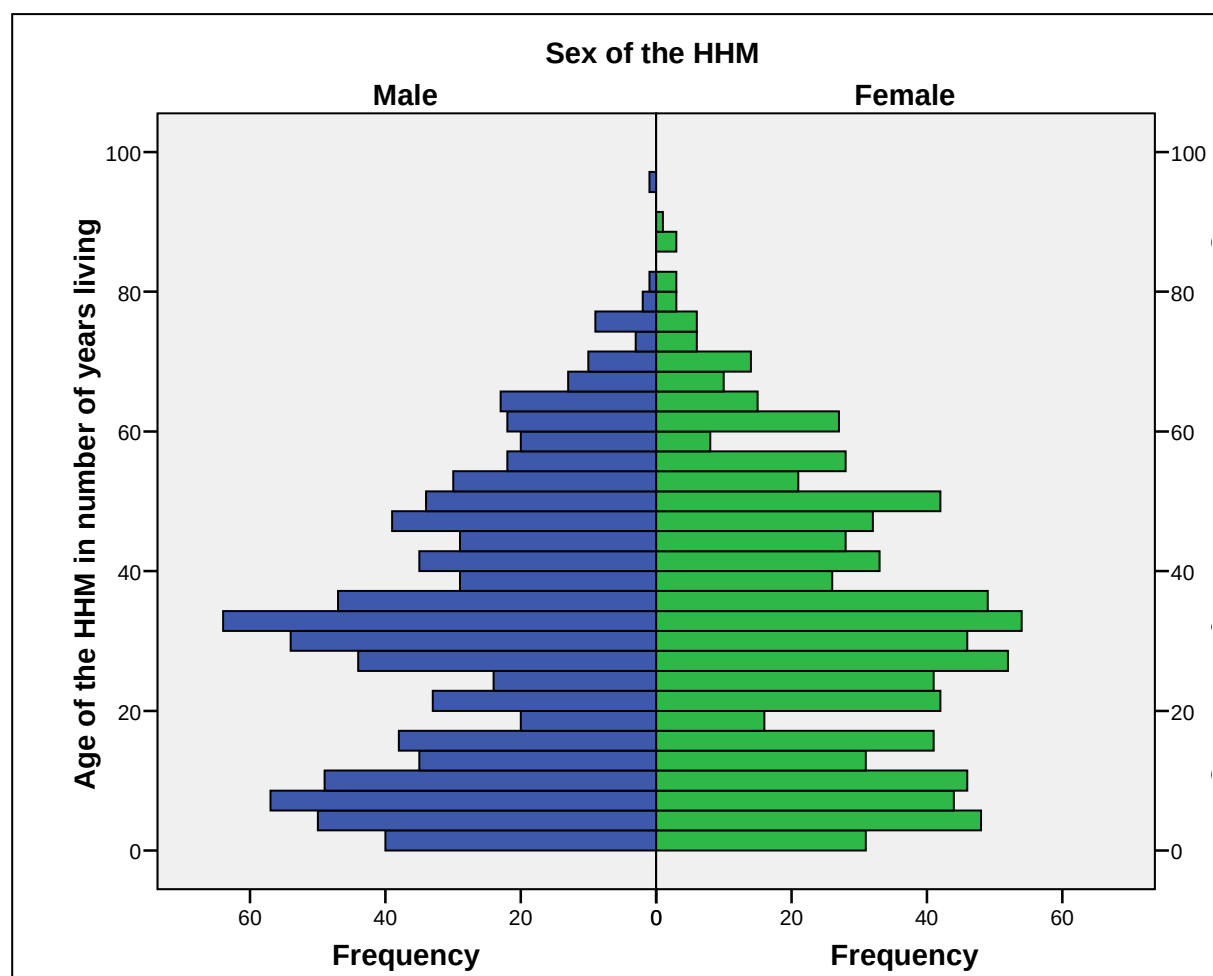


Figure 4.1 Frequency of the household members' age divide by sex (N=1724)
Source: Household survey 2006

There was a total population growth in Bali between 2000 and 2006 of 1.44% (*cf.* DepKes 2007), but it was different in each age group. The young age had a 0.89% rise per year resulting in 0.81 million people of young age in 2006. The productive age had a 1.82% rise

per year resulting in 2.39 million people of productive age in 2006 and a 3.08% rise per year of the old age, resulting in 0.22 million people of old age in Bali (*cf.* PPB 2007). The slowest rise was found in the young age group, again vindicating the success of the family planning programme. It seems the rise per year was largest in the old age group. This is directly related to the rise of the life expectancy at birth throughout the whole of Indonesia. Life expectancy increased from 52.4 in 1980 to 63.4 in 1995 (*cf.* DepKes 2007). WHO indicates that the life expectancy for Indonesians at birth (data 2005) is for males 66 years and for women 69 years, and their healthy life expectancy (HALE) at birth (data 2002) is 57 years for men and 59 for women (*cf.* Pinchuk 2007). The rise in life expectancy and slower rise in healthy life expectancy (HALE) naturally results in an increase of older people, but consequently causes an increase in the incidence of degenerative diseases, usually indicated by a rise in health expenditure (*cf.* WHO 2007a). Such developments require a comprehensive approach to promote health status; as will be discussed in more detail in Chapter 5, Indonesia is using the family as the focal point of the promotive health programmes (*cf.* WHO 2007a).

Education

Education is centrally organized in Indonesia and the national goal is to educate all layers of the population. Education contributes to health behaviour change and it is one of the predisposing factors contributing to people's decisions on health behaviour (*cf.* DepKes 2007). Therefore, this study of health behaviour focusing on the utilisation of MAC plants as any other study on health care utilisation must involve the level of education of the respondents in the analysis. The education of the sample in the four villages is discussed and put into relationship with national educational developments and trends in the following text.

Educational law in Indonesia decrees that children have to attend school from six to fifteen years. In recent years, administrative fees and costs of all school appurtenances have risen yearly for each level of education, from kindergarten up to university. This is a cause for concern since it seems that the positive trend of higher numbers of people with higher education which has occurred in the last decade might be undone. The positive trend pointed out by respondents is that finishing senior high school (SMA) became the standard rather than the previous situation when finishing junior high school or middle school (SMP) used to be the standard. SMP is the logical standard for education since it is in line with the national education law, requiring schooling until fifteen years old, which is normally the year pupils finish SMP. A negative development is that the job market has raised its standards, resulting in the situation in which the minimum requirement for obtaining reasonable and well-paid jobs is a SMA diploma.

Despite the availability of different types of funding and scholarships, education was indicated by numerous community members as very or even too expensive, especially the higher levels of education. Bali has a high percentage of literacy; in 2006 87.15% (*cf.* DepKes 2007). This might explain the shift in focus of the Balinese from the dichotomy of being educated or not to the level of education. The Balinese indicate that the type of education and, more importantly, the type of school a pupil attends co-determines his/her chance of obtaining certain types of jobs or positions. The type of education which is commonly recognized to lead to the better paid jobs was reported by respondents in the villages to be beyond the reach of the lower and middle economic class.

Currently, the trend is to complete senior high school (SMA), hence children tend to stay at school to the age of eighteen. SMA is used in this study as the collective term for SMA (*Sekolah Menengah Atas*), SMU (*Sekolah Menengah Umum*), and SMK (*Sekolah Menengah Kejuruan*) which are three forms of senior high school. SMA and SMU differ from SMK in

their curriculum; students at SMA or SMU are prepared to advance to tertiary education, while students at SMK are prepared to be ready to work after finishing their school without the benefit of tertiary education. The present-day quality of the schooling was questioned by several community members of the generation of people forty and older, especially by those community members who are in an economically challenged position. As they recall, by the end of primary school they would have had a basic knowledge of mathematics, architecture and bookkeeping, plus basic agricultural skills. Children nowadays, in their perception, despite or because of the wide variety of topics covered by the school curriculum, are still deprived of this basic knowledge and skills by the end of junior high school (SMP). This increasing loss of belief in the schooling system might reinforce the economic objections parents have to supporting their children in reaching a higher level of education.

Table 4.4 and 4.5 present the current level of education of the household members in the sample (N=1724) by age group and gender respectively. The results of the division for the household members under fifteen years old are not discussed because they are currently school age or too young to go to school. The level of education is based on the highest educational level finished at the time of the household survey. Following this division all children under the age of twelve would score 'no formal education', since they had not finished any formal education, thereby presenting an incorrect image. Therefore the youngest age group (431 individuals) were excluded from the discussion of Table 4.4 and 4.5. The education level 'college' represents all education after senior high school which are not university.

Table 4.4 Distribution of the level of education of the household members according to age (N=1724)

	0-14 year		15-64 year		65 and older		Total	
	N	%	N	%	N	%	N	%
No formal education	377	87.5	248	20.7	59	63.4	684	39.7
Primary school	54	12.5	304	25.3	25	26.9	383	22.2
Junior high school	0	0.0	221	18.4	2	2.2	223	13.0
Senior high school	0	0.0	326	27.2	4	4.3	330	19.1
College	0	0.0	46	3.8	3	3.2	49	2.8
University	0	0.0	55	4.6	0	0.0	55	3.2
Total	431	100.0	1200	100.0	93	100.0	1724	100.0

Source: Household survey 2006

Table 4.4 shows that a fifth of the household members 15 - 64 years old (1200 individuals) did not have any formal education, about one-quarter finished primary school (25.3%), about one-quarter finished senior high school (27.2%) and fewer than a quarter finished junior high school (18.4%), leaving a small percentage who had finished college (3.8%) or university (4.6%). Focusing on the oldest generation, it is clear that a very high percentage of these people (63.4%) had no formal education at all and only 26.9% finished primary school; the other 9.7% had a higher education and none of them was schooled at an university level. This age group, 65 and older, is the generation born before Independence (1945) and the low level of formal education is consistent with the fact that rural areas especially were deprived of any form of formal schooling in those years.

The productive age group (15-64 years old) showed a much higher level of education. Almost half (46.0%) of the productive age group in the sample had no formal education (20.7%) or had only finished primary school (25.3%). The other half (54.0%) had some higher

education. Corresponding to the recent trend, 18.4% finished junior high school and many more people, 27.2%, finished senior high school. It should be noted that the division between finishing SMA or SMP might become even sharper in years to come since, with the exception of the drop outs, the fifteen to eighteen year olds included in this age group (15-64 years old) who at the time of the household survey were still in the course of completing senior high school (SMA). Therefore, their highest finished education was noted as junior high school (SMP). The educational level of this age group (15-64 years old) is much higher because in growing numbers they have had access to a formal education system. After independence, the formal schooling system, introduced by the Dutch in 1930 which was only available to certain privileged children, was expanded. Now the formal schooling system is available to all children in Bali regardless of their living area. However still only a few finished education after high school; 3.8% finished college and 4.6% finished university.

Table 4.5 Distribution of the level of education of the household members according to sex (N=1724)

	Male		Female		Total	
	N	%	N	%	N	%
<15 years old	231	26.3	200	23.6	431	25.0
No formal education	119	13.6	188	22.2	307	17.8
Primary school	154	17.5	175	20.7	329	19.1
Junior high school	104	11.9	119	14.0	223	12.9
Senior high school	195	22.2	135	15.9	330	19.1
College	34	3.9	15	1.8	49	2.9
University	40	4.6	15	1.8	55	3.2
Total	877	100.0	847	100.0	1724	100.0

Source: Household survey 2006

There are also differences in the level of education based on the community members' ages and gender. Table 4.5 presents the distribution of the educational level by gender for the household members (N=1724). A separate category has been added which includes all household members who were still under fifteen years old at the time of the household survey. Since they all still fall under the educational law of Indonesia it is to be expected that this group will finish junior high school, but have not yet reached the age at which this is possible. To avoid too much distortion, this group has been placed in a separate category. Table 4.5 reveals that males, parallel with what might have been expected in a traditional patrilineal society since resources are commonly spent on the males, are more highly educated than females. Males have a smaller percentage with no formal education (13.6%) versus females (22.2%). With 22.2%, males have a 6.3% higher finishing rate at senior high school than the females (15.9%) and almost two-and-a-half more males (8.5%) have finished tertiary education (college or university) than females (3.6%). In recent years, attitudes have changed and parents aspire to a good education for their children, boys and girls alike. However, especially considering the aspiration for a high level of education, the reported rising economic restraints might persuade parents to begin differentiating again between male and female children, favouring the males. Linking the current situation of the level of education between male and females with the remarks of respondents that higher education offers better chances of well-paid jobs, at the time of the household survey, males were in a stronger position in the job market than females in the four sample villages.

4.3.3 Socio-Economic Profile

The economic growth of Indonesia, despite achievements in realising more economic and political stability in the last few decades, decreased in 2006 to 5.5% versus the 5.7% in 2005 (*cf.* DepKes 2007). Simultaneously, the unemployment rate in Indonesia declined in 2006 to 10.5% versus the 11.2% in 2005. Bali had an unemployment rate in 2006 of 5.3% (*cf.* DepKes 2007). In 2006 Indonesia had a Gross National Income (GNI) per capita of \$1,420 (*cf.* World Bank 2008a). The World Bank ranks Indonesia as a lower-middle-income country (*cf.* World Bank 2008b). In 2005 Indonesia scored 0.728 on the Human Development Index (HDI), ranking as medium on the HDI (*cf.* DepKes 2007). Applying the international criterion of \$1 per day, the proportion of poor people in Indonesia in 2004 was 7%. Applying the Indonesian national poverty line, adapted in 1998, the proportion of poor population in 2004 was 17% (*cf.* WHO 2007b).

Despite the low per capita income, poverty is not as visible in Bali as elsewhere in Indonesia. Bali has very few beggars or homeless, even in the capital city of Denpasar and even fewer in the countryside and there are no shanty towns (*cf.* Jensen & Suryani 1992). The low number of beggars and homeless in Bali is partially explained by the Balinese values which determine that the family remains responsible for all its members at all times. Beggars or homeless people therefore are always someone's responsibility and shame the family they belong to.²² Although less visible, it does not mean that Bali is free of poverty. The poverty percentage rose after the second bombing in 2005 to 10.77% in 2006 (363,832 people), surpassing by far the 8.29% (257,800 people) poverty rate of 1999 (*cf.* PPB 2007).

Bali experienced a small steady economic growth after the national economic crisis in 1997, but this was abruptly halted by the Legian bombing on 12 October, 2002, followed by the negative effect of the war in Iraq and the threat of SARS and war on terrorism in 2003. After a short recovery period, the reconstructed fragile stability was yet again disrupted, this time by the bombing of Kuta and Jimbaran on 1 October, 2005 (*cf.* PPB 2007). Mounting inflation meant that the number of larger and average industries shrank down from 377 enterprises in 2001 to 318 enterprises in 2005. The greatest impact of the negative economic developments was visible in the tourist industry. Using the number of direct tourist arrivals in Bali as an indicator, the first bombing caused a 22.77% drop in direct arrival from 1.29 million in 2002 to less than a million in 2003.

The economic situation in Bali differs per regency (*kapupaten*). Karangasem regency in the east of the island is repeatedly reported in regional and national documents to be the second most economically deprived area. Tumbu, one of the four sample villages, is situated there. The driest area of Bali is located within the boundaries of Karangasem regency and the shortage of water in this area prevents the regency blooming in either an agricultural- or a tourist-driven economy. Buleleng regency stretching from the north of the island towards the east where it borders Karangasem is economically the weakest regency. Pelapuan, one of the four sample villages, is located there.

Especially after the bombing in October 2002, the fragile tourist industry in the north of the Buleleng regency collapsed. Generally, living costs are much higher in the central-south area of Bali compared to the northern and eastern areas where especially shelter, food and clothing are cheaper, but there are few job opportunities. It was frequently reported by respondents that young people originally from Karangasem or Buleleng regency tended to migrate in large numbers to the central-south area of the island to find work. A trend which explains the gap around the twenty-year-old mark in the construction of the household member's ages as presented in Figure 4.1 on page 111.

Besides the permanent migrants either from within or outside Bali who migrated there for numerous reasons, the island is also overwhelmed by temporary immigrants. These temporal immigrants are driven there by economic reasons and their interests range from large investment visits to small-one man operations. The merchants involved in small businesses are mainly from Java or Lombok. They will spend lengthy periods of time alone or accompanied by their families around Balinese holidays and the high tourist season in the island after which they return to their homes outside of Bali. These temporary immigrants all hope to make some money from their smaller or bigger investments in Bali. The Indonesian government tries to monitor the residential changes within its borders to control unwanted migration and overpopulation of populous areas, yet it has been unsuccessful in its endeavours. As an island, Bali keeps attracting economic immigrants, largely because of its tourist industry.

BPS reports that the minimum living requirement per month in the year 2006 in Bali was 742,054 rupiah, whereas the minimum wage was 510,000 rupiah a month (*cf.* BPS 2007a). The results for the reported monthly income of the household in the sample are presented in Table 4.6. Several of the households in the sample had a monthly income lower than the minimum wage and minimum living costs per month of Bali: 30% of the households in the sample in Angantaka, 33% in Pelapuan and 60% in Tumbu. Bengkel did not imitate this trend, as only 5% of the households in the sample had a monthly income below the minimum wage and minimum living costs a month in Bali.

Table 4.6 Distribution of the monthly income of the households according to the sample villages (N=400)

Village	Angantaka		Bengkel		Pelapuan		Tumbu		General Total	
Income*	N	%	N	%	N	%	N	%	N	%
<100 Rp.	2	2.0	0	0.0	0	0.0	4	4.0	6	1.5
101 - 500 Rp.	28	28.0	5	5.0	33	33.0	56	56.0	122	30.5
501 -1000 Rp.	27	27.0	17	17.0	46	46.0	22	22.0	112	28.0
1001- 2000 Rp.	31	31.0	37	37.0	18	18.0	10	10.0	96	24.0
2001- 3000 Rp.	5	5.0	23	23.0	3	3.0	5	5.0	36	9.0
3001- 4000 Rp.	2	2.0	13	13.0	0	0.0	3	3.0	18	4.5
> 4001 Rp.	1	1.0	5	5.0	0	0.0	0	0.0	6	1.5
No income reported	4	4.0	0	0.0	0	0.0	0	0.0	4	1.0
Total	100	100.0	100	100.0	100	100.0	100	100.0	400	100.0

* The income is reported in thousands. 100 Rp. = 100,000 rupiah. At the time of the fieldwork in 2006 the rate was 11.383 rupiah for one euro.

Source: Household survey 2006

Besides examining their monthly income, the socio-economic status (SES) of the household was estimated. This was done on the basis of the following aspects: land- and animal-ownership, type of house and ownership of real-estate, motorized vehicles and electronics. As Hobart *et al.* (1996) pointed out, economic activities in Bali must not: *'be considered exclusively from the point of view of the individual and material satisfaction of needs. Economic action underlies specific socio-cultural rules which set down what is fitting or what is appropriate. As these maxims are laid down in the adat, which is in turn inseparable from religion, many aspects of gainful activity which in western tradition are regarded as being in the sphere of the profane are in Bali bound to religious elements'*. The reports on the different

aspects of the SES are weighted in the sample, to assess the situation locally. The rating of the socio-economic situation of the households was done in the villages sampled, ignoring the regional or national standard. A division of five was used ranging from 1 'Very poor' to 5 'Very rich' presented in Table 4.7. It should be clearly understood that this is not an absolute measurement but a weighted item.

Table 4.7 Distribution of the SES of the households according to the sample villages (N=400)

Village	Angantaka		Bengkel		Pelapuan		Tumbu		General Total	
SES	N	%	N	%	N	%	N	%	N	%
Very poor	11	11.0	7	7.0	34	34.0	37	37.0	89	22.3
Poor	45	45.0	55	55.0	48	48.0	38	38.0	186	46.5
Average	35	35.0	32	32.0	15	15.0	22	22.0	104	26.0
Rich	8	8.0	5	5.0	2	2.0	1	1.0	16	4.0
Very rich	1	1.0	1	1.0	1	1.0	2	2.0	5	1.2
Total	100	100.0	100	100.0	100	100.0	100	100.0	400	100.0

Source: Household survey 2006

Table 4.7 shows that Pelapuan is the poorest village in the sample, with 82% of the households scoring either 'very poor' or 'poor'. Second was Tumbu with 75%. Bengkel came third with 62% and Angantaka had the lowest percentage of very poor or poor households with 56%. This is consistent with the economic description of the four areas to which the villages belong. Pelapuan and Tumbu are located in the regencies, nationally noted as the poorest in Bali, whereas the other two villages are located in economically resilient areas. It was reported by the local authorities that Buleleng (Pelapuan) had 38,000 households which fall into the Balinese category poor (*miskin*). Karangasem (Tumbu), the second poorest, reported 35,000 'poor' households and the same number of households fell into the category just above 'almost poor' (*hampir miskin*).

The Balinese government maintains a support system for the poorest of its population. Those in need receive monetary, food or health care assistance. In the year 2006, 10.81% of the Balinese households were receiving free health care assistance and 36.54% were relying on the programme 'Rice for Poor People' (cf. DepKes 2007). In earlier years it was not necessary to provide food assistance in agricultural areas. These days, it is becoming harder to collect food in and around the farming areas. The current techniques and use of pesticides also make it impossible to breed fish in the rice-fields, once a common practice and on the borders of the fields there are no alternative crops which could provide vegetables. Therefore people in rural areas, as those in urbanised areas, are increasingly dependent on money to provide their daily food for themselves and their families. Growing numbers of households are turning to the government for assistance. For instance, the Angantaka administration spent 5.5 million rupiah on food support and 3.5 million rupiah on housing projects for the poor in 2005.

During the household survey, the respondents were asked to provide the main occupation of each household member. Each occupation reported by the respondents was identified and recoded into the main industries using the Indonesian Standard industrial classification (KLUI) (cf. BPS 2006). KLUI, *Klasifikasi Lapangan Usaha Indonesia*, is divided into five hierarchical categories: Sectors, Sub-sectors, Major Groups, Groups and Sub-groups (cf. Lumbantobing 1997). 'Sectors' refers to the main types of industries. Two of the original nine sectors were not included in the categories presented in Table 4.8, because none of the

respondents reported an occupation in them, namely: 'Mining and Quarrying' and 'Electricity, Gas and Water'. Three categories were added to the KLUI classification to include all the respondents' situations and answers: 'Not economically active', 'Not in the labour force' and 'Other' groupings, encompassing all reported occupations which could not be classified under any of the sectors. The seven sectors included are: 'Agriculture, forestry, hunting and fishery', 'Manufacturing industry', 'Building/Construction', 'Wholesale trade, retail trade, restaurants and hotels', 'Transport and Storage', 'Financing, insurance, real-estate and business services' and 'Community, social and personal services'. Table 4.8 shows the division of the reported professions or main occupations of each household member (N=1724).

Table 4.8 Distribution of the profession of the household members according to the sample villages (N=1724)

Village	Angantaka		Bengkel		Pelapuan		Tumbu		Gen. Total	
	N	%	N	%	N	%	N	%	N	%
Not economically active	106	25.9	110	27.4	108	23.5	107	23.6	431	25.0
Not in labour force	48	11.7	41	10.2	51	11.1	67	14.8	207	12.0
Unemployed	34	8.3	26	6.5	24	5.2	59	13.0	143	8.3
Agriculture, Forestry, Hunting and Fishery	70	17.1	93	23.2	175	38.1	65	14.3	403	23.4
Manufacturing Industry	20	4.9	11	2.8	10	2.2	65	14.3	106	6.2
Building/Construction	7	1.7	19	4.7	3	0.7	4	0.9	33	1.9
Wholesale & Retail trade	53	12.9	39	9.7	27	5.9	31	6.8	150	8.7
Transportation, Storage and Communication	3	0.7	2	0.5	7	1.5	2	0.4	14	0.8
Financing, Insurance, Real-Estate and Business Services	49	11.9	36	9.0	38	8.3	26	5.7	149	8.6
Community, Social and Personal services	14	3.4	24	6.0	14	3.1	27	6.0	79	4.6
Other	6	1.5	0	0.0	2	0.4	1	0.2	9	0.5
Total	410	100	401	100	459	100	454	100	1724	100

Source: Household survey 2006

The conclusion drawn from Table 4.8 is that one-quarter of the household members in the sample was not economically active (25.0%). According to the Indonesian standard, these are all individuals who are younger than fifteen years old (*cf.* BPS 2007b). 12.0% is not part of the labour force which includes by Indonesian standards the students, housewives and retired people (*cf.* BPS 2007b). The majority of the sample was active in the category of 'Agriculture, forestry, hunting and fishery' (23.4%). Other groups were active in the business of 'Wholesale trade, retail trade, restaurants and hotels' (8.7%) and 8.6% was active in the sector 'Financing, insurance, real-estate and business services'. Both these sectors include activities often connected to the tourist industry in Bali. 6.2% of the sample was active in 'Manufacturing industry' and a mere 4.6% was active in the sector 'Community, social and personal services'. In conclusion, obviously the sample villages are still mainly dependent on primary economic

activities: agriculture, forestry, hunting and fishery, as is the case in the other non-urban areas of Bali, regardless of the major role tourism plays these days. The sample villages are located outside the main tourist areas and yet several community members do have, albeit a small, economic connection with tourism. In Bali, tourism is one of the major players in the economy; it brings in the ‘big money’, but, as a respondent said: ‘It is only for the lucky few; normally the foreign investors get the benefits of tourism and the Balinese people get stuck with the waste, literally’.

Table 4.9 Distribution of the main occupation of the household members according to age group (N=1724)

Age groups	0-14		15-24		25-64		65 +		Gen. Total	
	N	%	N	%	N	%	N	%	N	%
Not economically active	431	100	0	0.0	0	0.0	0	0.0	431	25.0
Not in labour force	0	0.0	85	35.7	110	11.4	12	12.9	207	12.0
Unemployed	0	0.0	62	26.1	56	5.8	25	26.9	143	8.3
Agriculture, Forestry, Hunting and Fishery	0	0.0	11	4.6	347	36.1	45	48.4	403	23.4
Manufacturing										
Industry	0	0.0	24	10.1	79	8.2	3	3.2	106	6.2
Building/Construction	0	0.0	2	0.8	31	3.2	0	0.0	33	1.9
Wholesale & Retail										
Trade	0	0.0	8	3.4	135	14.0	7	7.5	150	8.7
Transportation, Storage and communication	0	0.0	1	0.4	12	1.3	1	1.1	14	0.8
Financing, Insurance, Real-Estate & Business Services	0	0.0	37	15.5	112	11.7	0	0.0	149	8.6
Community, Social and Personal Services	0	0.0	6	2.6	73	7.6	0	0.0	79	4.6
Other	0	0.0	2	0.8	7	0.7	0	0.0	9	0.5
Total	431	100	238	100	962	100	93	100	1724	100

Source: Household survey 2006

In all four sample villages, respondents with a wide variety of backgrounds and economically active patterns reported that nowadays times are hard financially. This observation is confirmed by the national and regional tendency presented in the beginning in Section 4.3.3, marking a decline in the economic situation in Bali, in which external factors add to the complexity of achieving attempts to re-establish. Informants indicated that it is especially hard for two age groups to find work and generate a daily income: the starters, the young generation just leaving school, and the elderly. The high unemployment rate is not visible in Table 4.8, which indicates an unemployment percentage for all household members in the sample of 8.3% (N=1724). When the age of the household members is taken into account, as is done in Table 4.9, the previous statements on struggling age groups is supported. In Table 4.9, the main occupation of the household members is distributed by age groups. The group 15-64 years is split into two: 15-24, representing the starters versus the rest of the group, 25-64 year olds. Table 4.9 clearly reveals that in the sample the starters, aged 15 to 24, with

26.1% unemployment, and the elderly with 26.9% unemployment are indeed the groups with the highest unemployment rate versus the 5.8% unemployment of the age group 25 to 64. Since retirement pensions providing a monthly income are usually the privilege of those previously working for the government (teaching, administration, army and so forth), obviously the elderly are the group with the greatest struggle to provide a daily income. Whether and to what extent the economic situation of the households influenced their utilisation or bio-cultural diversity conservation on MAC plants is discussed in Chapter 7.

Notes

- ¹ The Dongson culture is the name of a prehistoric Bronze Age culture derived from the site of excavated settlements in the Red River Valley in North Vietnam: Dongson. The influence of the Dongson culture flourished to other parts of Southeast Asia, including the Indo-Malayan Archipelago in the first millennium BC (cf. Schefold 1990). The Dongson people were skilled at cultivating rice, keeping buffaloes and pigs, fishing and sailing in long dug-out canoes. They also were skilled bronze-casters, as can be seen in the famous Dong Son drums which have been found widely in Southeast Asia and southern China (cf. Schefold 1990).
- ² Geertz & Geertz (1975) describe the nine royal houses as power structures, '*precarious pyramids of traditional allegiances and alliances each including dozens of independent, semi-dependent and quarter-independent rulers*' (Quoted from Agung 2005: 141).
- ³ This first tourist, the Dutch member of parliament, H. Van Kol, is considered a 'tourist' because (Pitana 2000: 6): '*his visit to Bali was not for official affairs or seeking business opportunities, but to entertain himself*'. Mr H. Van Kol (1903) published a massive 826-page travel account, presenting a detailed description of everyday life and current events.
- ⁴ Before the acceptance of *Hindu Dharma* as an official religion, Bali was considered to be *belum beragama* (not yet having a religion) and it was especially the confrontation with strengthening Islam and Christianity which challenged the Balinese to formulate what exactly their Hindu religion was about (cf. Schulte Nordholt 2007).
- ⁵ Official Indonesian statistics from government sources, as those used in this research, always have a high level of accuracy. Nevertheless, these numbers should be seen more as indications, not exact numbers. Except for the census 2000 data or other centrally collected data, the data presented are based on those collected at the lowest organisational units and sifting them through and often re-evaluating them to a subsequent higher level, up to the national level. At every turn at the next administration level, changes and/or mistakes can be made. These explain inconsistencies in the exact numbers, which are nevertheless printed as exact numbers.
- ⁶ SIL International is a private, faith-based, non-profit organisation committed to serving language communities worldwide and building capacity for sustainable language-based development by means of research, translation, training and materials development. SIL also publishes '*Ethnologue*' referred to by Maffi (1999) as the main catalogue of the world's languages.
- ⁷ Once childlessness was a legal reason for divorce (cf. Jensen & Suryani 1992). In the sample, 3.7 per cent of the married household members reported not to have children. More than half of them were younger than thirty and might have been newly weds, still childless. It was reported by several health care providers that fertility problems are rising among the Balinese, further research will be necessary to substantiate this observation and indicate the cause of this rise in reported fertility problems.
- ⁸ Some groups had a more formal character. Among them were the civil guard (the *hansip*, a contraction of *pertahanan sipil*). The sample villages statistical reports indicate the following membership of the *hansip*, the only *seka* which is always reported regionally: Angantaka *hansip* 31 members, Bengkel and Pelapuan 32 each while Tumbu *hansip* consisted of 40 persons.
- ⁹ The founding principles of the *Surya Kanta* organisation in that area were: '*a) to raise moral character; b) to improve the economy; c) to improve and protect the circumstances of people of the jaba group; d) to change those customary laws which are in opposition of progress*' (Bagus 1996: 99-100).
- ¹⁰ Today several of the former members of the aristocracy are integrated into the business world and the *nouveau riche* (former Sudra) to will to try to link themselves to former aristocratic families. Whether of new or old blood, the wealthy aristocratic families still fulfil their old obligations to the public and are socially and economically active in the field of cultural heritage conservation and development. An example

- is making donations for the renovation of the temples, for instance that of *Pura Goa Lawah* (2007), the donation of a single member of the Anak Agung family, one of the many donations by Satria members, matched the donation of the President of Indonesia (10 million rupiah), a fifth of the contribution of the governor of Bali (50 million rupiah).
- ¹¹ An example of other influences is the role of the 'holy water' *tirta*, referred to in Hinduism as *amṛita*, the role *tirta* in *Hindu Dharma* is a heritage of tantrism which played an important role in the ninth and tenth centuries in Indonesia.
- ¹² There is a whole numerology system built around the numbers 3, 5, 7 9 and 11 (*cf.* McCauley 1984). Numerology is an essential part of Balinese symbolism and is reflected in the Balinese calendar, cultural life, religious architecture, *et cetera*. Red, yellow, black, white and *brumbum* (a middle colour made by mixing all colours) are the primary colours with a symbolic meaning (*cf.* Jensen & Suryani 1992). These colours symbolise manifestations of *Sang Hyang Widhi Wasa*, God, in a specific function; one of the gods and his/her assigned wind direction.
- ¹³ The anniversary of a temple is related to the date the building or the renovation of a temple was finished.
- ¹⁴ The opposition states that it is a demeaning way of dealing with the community members and their capability of grasping the essence of their own culture and at the same time an enormous waste of money.
- ¹⁵ Balinese belong to half a dozen or more temples by birth (*cf.* Geertz 1966). When ceremonies are held at those temples of which they are a member, they have to attend the ceremony. In practice, it means that all Balinese Hindus, who are all member of the *Besakih* temple, are expected to attend the *odalan* of the *Besakih* temple, which functions as the unifying centre of worship, transcending family, clan and village temple bounds (*cf.* Stuart-Fox 1979).
- ¹⁶ The *sanggah* dedicated to the ancestors of a family is to the family what the *pura puseh* is to the village
- ¹⁷ The enormous battle between good and evil is dramatized at every *odolan*, in the dance performed in the *Calon Arang* tragedy between *Rangda*, the witch, and *Barong* the beneficent lion. Finally Rangda vanishes still undefeated but the struggle itself always remains undecided (*cf.* Hanna 1976).
- ¹⁸ Suryani and Jensen (1993: 87-88) explain the different meanings of the word *taksu* as following: 'First, it means possession of a body by a god. Secondly, it refers to an inner power – a spiritual power conferred by the gods - which gives an artist intelligence and genuine creativity and helps him to excel beyond what, is customary by the normal performance or execution of his art. Every dancer strives to obtain *taksu* of this sort. Thirdly, *taksu* means the place where a *balian* receives a special power from the gods for the paraphernalia (e.g. ring and cylinder) used in treating his clients'
- ¹⁹ As McCauley (1984: 123-124) indicates: 'The calendar is only understood by a few religious specialists who each year work out the meaning for the next year and its correspondence with the international and Chinese calendars and then publish the resulting scheme so that it is available throughout the island'.
- ²⁰ The inconsistency between the twelve lunar months and twelve solar months, caused by the different number of days in a lunar or solar month, is correlated by adding an intercalary month to the lunar calendar every so often (*cf.* Geertz 1966; Stuart-Fox 1979).
- ²¹ The production indicated is the total over the year 2005.
- ²² Balinese Hindus do not have within their value system the same piety principle as the Muslim society, which determines that good Muslims have to spend 10 per cent of their income on the less fortunate. It is said that the lack of this piety principle further brings down the number of visible beggars.

5 Health and Healing in Bali

In this chapter, the knowledge of, beliefs in and practices with MAC plants among Balinese community members are placed in the wider context of health and healing practices in medically pluralistic Bali. Section 5.1 concentrates on the utilisation of MAC plants. It begins with a description of herbal medicine in Bali, which is a booming business, since the Balinese, as many others, are captivated by the back-to-nature trend. Besides the traditional practices related to the use of fresh MAC plants in home remedies, there is a wide variety of (semi-) industrially produced natural and herbal medicine and related products on the market. The following topic is, the *emic* classification of the MAC plants reported, using the free-listing and pile-sorting techniques. Section 5.1 concludes with a survey of the current use of MAC plants on the basis of the extensive data collected by the household survey, giving an insight into the reported use of MAC plants by gender, age and intended application: curative, promotive or preventive.

Section 5.2 sketches the wider context of community health in Bali and places the utilisation of MAC plants in the plural medical context, focusing on the traditional and modern medical systems. Both medical systems are described succinctly, highlighting the main aspects of the system, major developments, especially on the utilisation of plants for beneficial reasons and the current situation in the sample villages. Section 5.2 concludes with the role of MAC plants in the broad spectrum of curative, promotive and preventive practices in Bali, which often transcend the realm of a single medical system.

In Section 5.3, the focuses are health, illness and disease in Bali. As they are culturally defined concepts, the Balinese worldview is reflected in this conceptualisation. Nevertheless, these same terms are used as global indicators to measure and describe health situations in countries, influencing their health care policies. The utilisation of the health care available is related to the community member's illness behaviour and preferred treatment. In this section the practice of the utilisation of MAC plants is related to the general framework of illness behaviour; the five-stage model of a medical care course devised by Suchman (1965) and Kohn & White's model (1976b), both incorporated into the conceptual model of Slikkerveer (1990), the basis for the multivariate model used in this study for analyses. Section 5.3 ends with the description of *emic* disease classification, an essential part of the community members' perceived morbidity. The *emic* classification is documented and analysed using the techniques of free listing and pile sorting.

5.1 Role of MAC Plants in Health

5.1.1 Herbal Medicine in Bali

Herbal medicine has been used in Bali for centuries. There is a hypothesis that plant use for medicinal purposes in Indonesia can be dated back to the first Neolithic settlers. *Jamu* is a term used by for instance Beers (2001), Slikkerveer (2002) and Williamson (2006), to refer to the part of the integrated system of inner and outer health and beauty of the traditional medical systems found in Indonesia, encompassing powders, pills, ointments, lotions, massage and other traditional health practices. *Jamu* is thought to have originated in the palaces cultures of Java. The Majapahit period was one era in which there was a transference of Javanese culture to Bali, including the use of *jamu*. This was given another impulse when Hindu Javanese fled to Bali after the fall of Majapahit (*cf.* Hanna 1976; Erdelen *et al.* 1998; Agung 2005; Williamson 2006).

Today the Balinese have not forgotten the Javanese roots of *jamu*. If asked to identify *jamu*, respondents refer to the herbal medicine locally produced by Javanese or the herbal products imported from Java. Balinese community members do not use the term *jamu* for their own herbal medicines. They prefer the terms *loloh*, *boreh* or *ramuan*. *Loloh* refers to any mixture of MAC plants which is prepared by grinding the ingredients and adding cold, clean water, either pre-boiled water or bottled spring water. *Boreh* is made in the same way, but instead of adding water to create a potable substance, fluids are added to achieve the right composition to apply the mixture externally directly onto the skin without it slipping off. Examples of *loloh* and *boreh* are shown in Illustration 5.1. *Ramuan* are all preparations made from MAC plants which are neither *loloh* nor *boreh*. Popular ingredients for *boreh* are *cengkeh* (*Syzygium aromaticum*) and *kunyit* (*Curcuma longa* Linn.). *Beras kencur* is the best known *boreh*. This is a compound, customised by adding small amounts of secondary ingredients, but always including uncooked rice and *kencur* (*Kaempferia galanga* Linn.). The same term, *beras kencur*, is used in Java and Sumatra to indicate the same mixture with the basic elements rice and *kencur*.



Illustration 5.1 A *loloh* based on *sambung nyawa* (*Gynura pseudochina* (L.) DC) on the left and prepared and applied *boreh*, *beras kencur*, on the right
Photographed by L.N. Leurs (Fieldwork 2006)

Recipes for herbal medicine and *jamu* are passed down, through the generations orally and in writing. The Balinese made records of the applications of herbal medicine, principally in *lontar usada*. Present-day recipes are a mixture of ancient forerunners, the results of decades of trial and error, and new compounds based on either literature or empirical observation. The reasoning behind the compositions in the ancient recipes is influenced by the philosophies related to the little and great traditional medical systems and the mystical aspects of *Hindu Dharma*. Most such recipes are asserted to be the intellectual property of the traditional

medical system. From 1940 modern medical professionals in Indonesia began to realise and appreciate the true value of the indigenous natural apothecary (*cf.* Beers 2001; Williamson 2006). In June 1940, the 'Second Congress of the Indonesian Physicians Association' was convened in Surakarta. It coincided with the event organised by the 'Mothers' Association of Yogyakarta' which decided to mount a special exposition entitled: 'Traditional Indonesian Remedies'. Before the Congress ended, a motion was passed recommending an in-depth study of traditional medicine and its applications (*cf.* Beers 2001). During the Japanese occupation, the Dai Nippon Government supported herbal medicine by setting up the Indonesian Traditional Medicines Committee in June 1944. This recommended the head of the Indonesian Physicians Association to co-operate with the traditional medicine producers (*cf.* Beers 2001; Williamson 2006).

Traditional medicine received several, mainly economically driven, boosts in recent history. The first boost occurred during the War of Independence when orthodox medicines were in short supply. The second was the decision of the newly installed President Soekarno when he issued the Proclamation of Independence, which stated that the nation must be self-supporting, throwing people back on their own resources because imported pharmaceutical drugs became extremely difficult to obtain. The third came in 1997, in the wake of the economic depression following the drastic devaluation of the Indonesian Rupiah in combination with a pronounced El-Nino event which brought drought and fire hazards. The import of raw materials for synthetic drug production had become virtually non-affordable for the Indonesian drug manufacturing industry (*cf.* Beers 2001; Williamson 2006). In the 1980s, the Research Centre for Traditional Medicine at the Gadj Mada University was set up. Its task is to evaluate experimental batches of traditional medicine products, train *jamu* technical staff and develop raw materials (*cf.* Beers 2001). The setting-up of this research centre was soon followed by another eight herbal medicine testing centres, and even more research centres, both government and privately owned. These work collectively on the quality, efficacy and safety of traditional (mostly herbal) medicine. Mainly because of the economic setbacks, the ongoing evaluation and further legislation passed to improve the efficacy and quality of herbal medicine and, not least, the global rediscovering of 'Mother Nature's treasures', a better climate was created for traditional medicine and the traditional medicine industry has experienced a growth spurt since the last two decades of the century (*cf.* Beers 2001; Lyon 2003).

Today the use of herbal products is a booming business worldwide. As Erdelen *et al.* (1998) noted: '*People generally prefer natural products to "unnatural synthetic" products with various additives*'. Today herbal products for health and healing embrace a much wider scene than that encompassed by the scope of this study: the community members' home remedies using fresh materials derived from (self-) acknowledged MAC plants either self-cultivated or self-gathered. Besides the home remedies, herbal products can be produced by health practitioners on a smaller or larger scale, by cottage-industry productions or by industrial production. Indonesia as a whole has 466 pharmaceutical industrial companies, 1634 traditional drug industries, of which 817 are located in West Papua and 351 in Java, and 894 small traditional drug industries, of which none are located in West Papua and 343 in Java (*cf.* DepKes 2007). Bali has one pharmaceutical industrial company, nine traditional drug industries, six small traditional drug industries and two cosmetic industries, but no medical implements industries or household-health supply industries (*cf.* DepKes 2007).

The *jamu* industry in Java is much bigger. By 1998 there were nearly 700 firms, 79% of which were classified as industrial businesses (*cf.* Lyon 2003).¹ At present more than 50% of the *jamu* (Javanese herbal medicine) on sale is for the enhancement of sexual performance.

There has been an increase in remedies for such diseases of modern life as high blood pressure, diabetes, and high cholesterol and a growth in beauty and skin products (*cf.* Lyon 2003). By 2000, some 7000 cultivated species used as MAC plants had been identified; close to 1000 of these are commonly used in the preparation of traditional medicine, although only 286 plants (those used by major *jamu* producers) are registered in the *Materia Medika Indonesia* at the Department of Health (*cf.* Beers 2001). In the field of health and healing using herbal products, the following specific terms are used:

- herbs which refers to *‘the crude plant material such as leaves, flowers, fruit, seed, stems, wood, bark, roots, rhizomes or other plant parts, which may be used entirely, fragmented or powdered’* (WHO 2000: 3);
- herbal materials, besides herbs, include: *‘plant products such as fresh juices, gums, fixed oils, essential oils, resins and dry powders of herbs’* (WHO 2000: 3);
- herbal medicine is produced by any or a combination of techniques - steaming, roasting, stir-frying, grinding or drying. Herbal medicine includes the use of pure herbs, herbal materials, herbal preparations and finished herbal products which contain an (alleged) active ingredient part of plants or plants materials or a combination;
- herbal preparations are: *‘the basis for finished herbal products and may include comminuted or powdered herbal materials, or extracts, tinctures and fatty oils of herbal materials’* (WHO 2000: 3). Herbal preparations are produced by such physical or biological processes as extraction, fractionation, purification or heating the materials in such other liquids as alcoholic substances or honey;
- finished herbal products consist of: *‘herbal preparations made from one or more herbs. If more than one herb is used, the term mixture herbal product can also be used. Finished herbal products and mixture herbal products may contain excipients in addition to the active ingredients. However, finished products or mixture products to which chemically defined active substances have been added, including synthetic compounds and/or isolated constituents from herbal materials, are not considered to be herbal’* (WHO 2000: 3-4).

There is a marked growth in the number of books, both popular and academic literature, for the general public listing information on, developments in and even instructions on using plants for curative, promotive and preventive health, but none can cover the estimated 700 to 800 plants frequently used by herbalists and skilled community members (*cf.* Beers 2001). Illustration 5.2 shows a small selection of such popular books on herbal remedies and an array of dried materials present at the work-place of a Balinese herbalist active in a collective practice of three traditional healers, with their own specialisations, in the area of Ubud. The current popularity of herbal remedies is most visible in the numerous articles published during the research period (2005-2007) dealing with herbs, herbal medicine and herbal products which can be used for the improvement of people’s health. Herbal home-remedies today are not all self-prepared remedies based on self-cultivated fresh MAC plants. Fresh or dried ingredients are bought in markets and supermarkets, for example, large pre-packed chunks of fresh *aloe vera* leaf. Most commercially produced, finished herbal products are presented in attractive, easily manageable packages, containing ready-to-use powders, pills, capsules, tonics, oils and ointments.



Illustration 5.2 Home-made, dried herbal medicine (left) and a selection of books on herbal remedies (right)
Photographed by L.N. Leurs (Fieldwork 2006)

Following the WHO stipulated international strategies, the Indonesian government is working on integrating (parts) of traditional medicine into its national health care policies. In general, although there is currently no new programme of the Ministry of Health focused purely on the use of MAC plants, the representatives of modern medicine are supportive of the use of MAC plants for minor disorders and illnesses, especially for preventive health care, however they do not support the use during pregnancy.

In Bali, there is no restriction on pregnant women using MAC plants which are also food plants. It is common practice for pregnant women to drink *kelapa muda*, the water of the young coconut, during their pregnancy. Nevertheless, doctors, nurses and midwives will strongly advise against the use of non-food MAC plants, and are especially vehement about the use of *jamu* because the safety of such complex concoctions for pregnant women has not been studied.

Thirty-seven women (2.1% of the household members, N=1724) reported either to have been pregnant in the twelve months prior to the household interview or were still pregnant at the time of the interview. Of the pregnant women, 40.5% (N=37) did not use any MAC plants during their pregnancy, 5.5% used MAC plants very rarely, while 54% reported regular use of MAC plants (once a week to several times a day). Thirteen MAC plants were named for use during the pregnancy. *Beluntas*, *cocor bebek*, *kayu manis*, *kelapa*, *kembang sepatu* and *waru* were reported to be used by these pregnant women on a daily basis.² *Binahong* and *kunyit* were used very rarely, only once or twice during the pregnancy. Plants used for maintaining or restoring health and employed on a more regular basis, but at the most once a week, were: *asam*, *bawang merah*, *cengkeh*, *paye* and *sembung*.

The PKK (women's organisation) and *puskesmas* (health care centres) are the two institutes which assume the primary role in disseminating information on the use of medicinal plants. Such information is integrated into the instruction manuals for *kader* women, publications on home remedies and community health care, and not least, in the practical TOGA programme (see Illustration 5.3 for an impression). TOGA is an abbreviation of *Tanaman Obat keluarGA* (medicinal family garden). As Slikkerveer & Slikkerveer (1995) stated, the TOGA programme is the responsibility of the Department of Nutrition but is often incorporated into the PROMKES programme; the promotive health care programme (*PROMosi KESehatan*). Although it is a mandatory programme, each *puskesmas* and PKK decides on an individual basis how much time and money it wants to spend on the programme. Community members are expected to tend the TOGA gardens in their communities or houses; the Ministry of Health bears the educational and promotive responsibility for TOGA and the plants used.



Illustration 5.3 Information board on use of plants of *puskesmas* Abiansemal II with an impression of the TOGA of *puskesmas* Abiansemal II on the background
Photographed by L.N. Leurs (Fieldwork 2006)

In the four sample villages, only *puskesmas* Pensari, the *puskesmas* of Tumbu, did not actively promote the programme. Their educational TOGA was in the worst shape of the four *puskesmas*. The drought affecting this area meant that keeping a garden was very difficult. Nevertheless, the *puskesmas* Pensari was the most active in integrating the use of herbal medicines with pharmacological medicine. It had a range of industrially produced herbal medicines in stock and, when the resident doctor considered it appropriate, patients, children and adults alike, were presented with the choice between the two alternative medicines. The *puskesmas* of Kediri, responsible for Bengkel, inventoried the households in their working-area which owned an individual TOGA. If a household had as many as five medicinal plants on their property, they are qualified as a household with a TOGA. The *puskesmas* responsible for Pelapuan had an enormous number of plants in their TOGA and the personnel was well-

informed but, the educational boards normally placed next to the plants were removed and kept apart because of the inroads of sun and rain. *Puskesmas* Abiansemal II (responsible for Angantaka) had a clearly painted board depicted in Illustration 5.3 at the entrance of the *puskesmas* indicating the names of the TOGA plants, what the plants could be used for and how. *Puskesmas* Abiansemal II expected that each of their *pustu* (sub-health care centre) to have a TOGA similar to it. Although *puskesmas* Abiansemal II had a very rich TOGA, it was the gardener, not the doctor in charge, who could name the plants and indicate the possible health applications.

5.1.2 *Emic* Classification of MAC Plants

There is no such thing as one ultimate *emic* plant classification. Referring to Randall (1976) and Hays (1981), Alcorn (2000) indicates that ‘uses’ should be interpreted as ‘behavioural responses’ which means that *emic* plant classifications are adaptable, because the plant names and plant uses are tied together and represent more than just the plant morphology. Berlin (1992) disagrees with these authors and argues for the prevalence of perceptual over practical factors in *emic* classifications of plants (*cf.* Maffi 1999). In this study, it emerged that people did have a behavioural response and link the *emic* classifications with the plant uses. This was patently obvious during the execution of the pile sort. In the classification of MAC plants used daily by the Balinese, the process of acculturation and transculturation has actively affected the *emic* classification.

For the study of the *emic* classification of MAC plants, a pile sort was performed in the four villages. The results are represented graphically in a dendrogram (see Appendix VIII). The first clustering consisted of twelve clusters, the second clustering resulted in seven, and in order to not over simplify it, the first result of twelve clusters was selected as the *emic* classification of MAC plants. By using the standardization technique, in which a consistent name is given to all similar names or concepts by which the piles are identified by the respondents, it emerged that the respondents used fourteen different standardized cluster names namely: *asam* (sour plants), *blatur* (fleshy leaved plants), *buah* (fruits), *bunga* (flowers), *daun* (leaves), *jambu* (specific type of fruit), *jarak* (specific type of leaf), *minum* (potables), *obat* (drugs), *pohon/kayu* (trees), *rempah* (spices), *rumput* (weeds, grasses and other field plants), *sayur* (vegetables) and *umbi* (tubers, turnips and rhizomes). On the basis of the standardized categories, the twelve-cluster solution of the hierarchical cluster analysis in alphabetical order was named as follows:

- ‘brushwood & shrubs’ grouping: all MAC plants which can be typified as either brushwood, bushes or shrubs;
- ‘cooking spices’ grouping: all MAC plants mainly known for their spicy, aromatic qualities, such as clove and coriander;
- ‘flowers’ grouping: all MAC plants known for their abundance of flowers such as frangipani trees and hibiscus bushes;
- ‘fragrant leaves’ grouping: mainly trees and bushes with leaves well-known to have a beneficent effect on people’s health and to have strong fragrances, among them *kayu putih* (*Melaleuca leucadendron* L.) best-known from the oil distilled from their leaves;
- ‘fruits and vegetables’ grouping: all MAC plants commonly known as food plants, mainly fruits and some vegetables, such as avocado, lime, coconut, cucumber and tomatoes;
- ‘herbs’ grouping: commonly known herbs specifically known as MAC plants, including *kumis kucing* (Cat’s whiskers, *Orthosiphon aristatus* (Blume) Miq) famous all over

Indonesia for its beneficent effects on the kidneys and renowned effectiveness in treating renal calculus (kidney stones);

- ‘rhizomes’ grouping: all the members of the *Zingiberaceae* and the one member of the *Portulacaceae* family;
- ‘rumpu’ grouping: MAC plants all classified by the respondents as *rumpu* grouping herbs, species, weeds, grasses and other field plants, of which several are domesticated but most are still commonly found in the fields;
- ‘tree leaves’ grouping: trees of which the leaves are mainly known as the part to be used as a MAC plant. About 80% of the MAC plants in this category ascribed to this description; the other 20% are not trees. They are known as MAC plants in relation to utilisation of their leaves and were grouped as ‘*daun*’ leaf by the respondents but the plants are not trees;
- ‘trees’ grouping: a set of reported trees which, besides reported MAC plants, grow tall and several are known for their wood. Examples in this category are trees of the *Magnoliaceae* family and the mahogany tree;
- ‘tubers’ grouping: all tubers, including several common food plants such as shallots, carrots, garlic and cassava;
- ‘weeds and grasses’ grouping: grasses and MAC plants which can be considered weeds since they are non-cultivated.

The denomination of the MAC plants identified by the Balinese community members is simultaneously complex and simple. Simple because the name often betrays an obvious external specific mark of the plant, or the part of the plant mostly used; complex because the name-giving does not seem to be consistent, especially when popular herbal mixtures are concerned. The mixture might be used to indicate a plant or vice-versa. One example is the use of the Indonesian words *cincau* or *daluman*, which are used interchangeably in Bali and usually seem to indicate a mixture, while some people do point out a specific plant, a type of climber, which they name *daluman*. However, *daluman* is commonly known in Indonesian as a gelatinous product extracted from seaweed and therefore is not a reference to a plant at all but to a processed seaweed product. *Sindrong* is another example. It was reported various times in the household survey, apparently as a word for a single plant; whereas *sindrong* is the name for a dried mixture of several parts of different types of plants. Table 5.1 gives an alphabetical overview of the twelve clusters of MAC plants reported identified by the pile sort.

The selected names for the twelve clusters are related to how the respondents referred to the piles they made. In daily life, Balinese often use a simple classification of plants on the basis of the common prefix of a plant name in either Indonesian or Balinese, which intimates the leaf, bark, tree, flower *et cetera*. Hence the plants are categorised according to the part which is most visibly distinctive or commonly used, not necessarily for a medicinal purpose. This underlying distinction was the major element used in the classification during the pile sort. McCauley (1984) documented another example of *emic* classification for specifically medicinal plants into either ‘cold’ or ‘hot’, possibly a simplification of the division into either three or five groups following the *usada* classification: *nyem* (cold) and/or *tis* (fresh), *dumelada* (neutral, tempered), *angat* (warm) and/or *panas* (hot). This hot-cold division did not emerge during the execution of the pile sort. Nevertheless, there were references to the taste of MAC plants such as *asam* (sour) and *pahit* (bitter), but no reference to the hot-cold division, at least not in the verbal explanations given by the respondents.

Table 5.1 Composition of the clusters of the MAC plants reported by respondents of the sample villages

Cluster	Reported MAC plants in the cluster
Brushwood and shrubs	<i>Beluntas, Sambi, Daun Kopok-Kopok, Sembung, Dadap, Daun Korea, Pungut-Pungut, Benalu</i>
Cooking spices	<i>Ketumbar, Tabie Bun, Cengkeh, Jebug Garum</i>
Flowers	<i>Jempiring, Merak, Gunitir, Kamboja, Melati, Kembang Kuning, Kembang Bintang, Kembang Sepatu/Pucuk, Kembang Sepatu/Pucuk Rejuna, Meduri Putih</i>
Fragrant leaves	<i>Bunut, Kerasi, Teh, Temen, Kayu Manis, Kayu Putih, Salam</i>
Fruits and vegetables	<i>Mengkudu, Nangka, Paye, Alpukat, Timun, Nanas, Jeruk Bali, Jeruk Limo, Jeruk Nipis, Pepaya, Belimbing, Belimbing Wuluh, Mahkota Dewa, Kelapa, Kepundung, Jambu Putih, Beras Merah, Delima Putih, Asam, Tomat, Kopi, Bangkuang</i>
Herbs	<i>Binahong, Sambiroto, Kumis Kucing, Seledri, Jarak, Daun Sendok, Kepiduh, Sambung Nyawa</i>
Rhizomes	<i>Ginseng, Kunyit Putih, Temu Ireng, Bangle, Temu Lawak, Isen, Lengkuas, Kunyit Kuning, Jahe, Kencur</i>
Rumput	<i>Adas, Sirih, Jinten, I sep Genti, Kemeniran, Sugi, Lidah Buaya, Cocor Bebek, Andong Merah, I sep Nanah, Kelor, Sida-Sida, Tapak Darah, Semanggi Gunung, Tapak Lima, Andong, Kesimbukan, Blatung, Daun Dewa, Semanggi</i>
Tree leaves	<i>Jambu Biji, Jambu Merah, Cermen, Lempuyak, Sasih Miik, Intaran, Waru, Daun Toktok, Kecibling, Pejo-Pejo, Liligundi, Antawali</i>
Trees	<i>Pule, Gatep, Mahoni, Kendal Bentuka, Sona, Cempaka Putih, Kayu Tulang, Merak Kuning</i>
Tubers	<i>Bawang Merah, Bawang Putih, Singkong, Wortel, Gadung, Talas, Ketela Rambat, Ubi Atus</i>
Weeds and grasses	<i>Alang-Alang, Rumput Teki, Jangut, Kelongka, Mesui, Pasepas, Buah Kelabet, Gambir, Rumput Kelau, Rumput Neroh, Pulosari, Songga, Cincau/Daluman, Karuk, Pacing, Awar-Awar</i>

Source: Fieldwork 2006

Slikkerveer & Slikkerveer (1995) indicate that traditional local classification of the flora in Indonesia encompasses five categories: 1) trees (*jenis pohon*); 2) shrubs (*jenis perdu*); 3) vegetables and herbs (*jenis bumbu dan sayur*); 4) grasses (*jenis rumput*); and 5) creepers (*jenis Tumbuhan merambat*). These five categories are also found within the twelve clusters forming the *emic* classification of the MAC plants reported by the community members. Several of the respondents made different piles of cards in the pile sort which were given same names, for instance, different piles were named ‘*daun*’. Even when the respondents were repeatedly questioned about this division between the two types of ‘*daun*’, the distinction between the two piles was explained by the appearance of the leaf: same type of leaf but still not on the hot-cold division documented by McCauley (1984).

As indicated in section 4.2.2, Bali has a specific language situation. Even when ignoring the situation of several original local languages and an even wider variety of dialects, it is a fact that most people are bilingual: mastering both *bahasa Indonesia* (Indonesian) and common Balinese. This complicates the naming of plants. People often mix Indonesian and

common Balinese in daily practice which has a direct impact on plant identification and naming. Children in primary school are taught the names of plants with both their medicinal and their primary applications. Consequently, at such a young age children are capable of identifying plants by name and application. It is good that the modern schooling programme pays attention to the MAC plants, but the teaching is in Indonesian. Pelapuan, where the primary schoolchildren are taught in their local language to third class, was an exception. This means that people learned the plant names in Indonesian, either at school or by self-education using publications in print or online, and all of these publications were in Indonesian. As pointed out earlier, Indonesian, the national language of Indonesia, differs considerably from the local language, Balinese, in semantics and in conceptualisation, but Balinese do use the languages simultaneously and often mix them. The mixing of the languages when naming plants might have led or lead to misunderstandings when the local names (often a result of this language mixing) and the real plant are connected to the reference made in the literature, usually in the national language Indonesia, which tends to be based on the Javanese conceptualisation as the central government and major media are concentrated in Java.

The best example of this potential confusion in plant names is the plant which the respondents collectively referred to in the household survey as *kayu manis*. *Kayu manis* is such a well-known Indonesian term that it is commonly listed in dictionaries where it is translated as cinnamon (*Cinnamomum verum* or *Cinnamomum zeylancium*). The *kayu manis* named in Indonesian literature always refers to the common cinnamon, but when using the name the Balinese do not refer only to common cinnamon, but referring to MAC plants they mean a completely different plant, namely *Sauropus androgynus* (L.) Merr, which is commonly known in Indonesian as *katuk*. *Katuk*, although known by the Balinese to refer to *Sauropus androgynus* (L.) Merr, is not used in daily conversation or in the household interview. It is obvious that a mistake can readily occur when such name confusions are likely. During research in Bali, it emerged that all respondents were very consistent in which plant they meant: they all meant *Sauropus androgynus* (L.) Merr when using *kayu manis* and no one would even have thought to refer to common cinnamon when discussing *kayu manis* as a MAC plant. There is chance that other plants and plant-name uses might also give serious problems when such a linguistic mix-up can occur.

Each plant reported in the household survey, which was executed in Indonesian as described in Section 3.2.3, was checked. On the basis of the literature study, a link was made between the vernacular plant name (locally used name) and the scientific nomenclature (Latin name). This list of Latin names was crosschecked by a botanist of the Leiden University Branch of the National Herbarium of the Netherlands, using the photographic documentation of the plants. This photographic documentation was done with all the plants pointed out by the Balinese key informants specialised in MAC plants in each sample village, on the basis of their vernacular names. Of the 168 plants named in the household survey, it was not possible to determine the species names of 35 (20.8%) reported plants and of 18 of these plants, 10.7% of the total plants named, the family name and genus name are also unknown.

Thirteen vernacular plant names (7.7%) resulted in two or more scientific names referring to two or more different species. In each case, one of the named species was indeed confirmed to be the intended species. On the basis of the literature research, six of the reported vernacular names of MAC plants (3.6%) were connected to a scientific name which indicated totally different plants. The photographic reference revealed not only another species but in fact a family other than the name linked to in the literature study. Of ten MAC plants (6.0%), the species names found in the literature could not be confirmed by the photographic material, leaving it undecided whether the scientific names were correctly connected. It was established

that these ten plants do belong to the same family, but it is highly questionable whether the scientific names provided in the literature and the vernacular names do refer to the same species. Of five MAC plants (3.0%), it was determined that the species name used in the literature was incorrect for the plant shown in the photographic representations of them. This observation leads to the conclusion that, besides identification of MAC plants, it is also necessary to place the identification of plants in the local context, especially in such complex situations as those in Indonesia, a multi-lingual society.

5.1.3 Reported Use of MAC Plants by the Community Members

Beers (2001) distinguishes four basic functions of Javanese *jamu* and Balinese use their mixtures of MAC plants, *loloh*, *boreh* or *ramuan*, for the same reasons: to treat particular illnesses (curative), to maintain good health (promotive), to relieve aches and pains (curative) and fourthly to addresses particular malfunctions in the body (preventive or promotive). Both single plants and mixtures of MAC plants frequently have multiple uses. During the household interview, respondents were asked to report the primary use of an MAC plant or a combination of MAC plants used by or for each household member in the last twelve months for curative, promotive and preventive care. The term MAC plant was explained to each respondent as a reference to plants (*Tumbuhan*) which can be utilised for health improvement or maintenance or which can be applied as a medicine (*obat*). The common Indonesian term *tanaman obat* (medicinal plants or plant medicine) was not used in the household survey, since it concentrated on the curative or drug aspect of the plant application and did not include the aspects of health improvement or maintenance.

A large number of the plants currently used for health improvement are primarily known as either vegetables or spices and used in the Indonesian and Balinese kitchen, examples are *bawang merah* (shallot), *bawang putih* (garlic), *kunyit* (turmeric), *asam* (tamarind), *minyak kelapa* (coconut oil), *cengkeh* (clove), *jeruk nipis* (lime), *sirih* (betel nut), and *jahe* (ginger) (cf. Hobart *et al.* 1996). These specific plants, although often used for preventive, promotive or curative health and healing practices, would not have been reported if respondents were questioned on *tanaman obat*. Moreover, it was specifically decided to use the term *tumbuhan* and not *tanaman*. *Tumbuhan* (plants) is the noun derived from the verb to grow (*Tumbuh*), whereas *tanaman* (plants) is the noun derived from the verb to plant (*tanam*). For the Balinese *tanaman* refers mainly to cultivated plants or waist-high, leafy plants, whereas *Tumbuhan* refers to literally everything which grows, making the term more applicable and more suitable to the study.

In total, 168 MAC plants were named in the household interview. 117 (69.6%) were reported to have been used for either curative, promotive or preventives reasons by a household member during the previous twelve months. The other 30.4% of plants, reported in the household survey to be known as MAC plants, were not reported to have been used in those twelve months. Of the 117 plants reported to have been used, 105 (89.7%) were used curatively, 55 (47.0%) were used promotively and 49 (41.9%) preventively. None of the MAC plants were reported to be used only for preventive reasons. Five MAC plants were reported to be used only to enhance health and 49 plants were reported to only to be used for curative reasons. The top ten of most reported plants by type of use, namely curative for the reported diseases and promotive or preventive in general are presented in Table 5.2.

Table 5.2 Top ten reported MAC plants by type of use by the household members (N=1724)

Curative			Preventive			Promotive		
MAC plant	N	%	MAC plant	N	%	MAC plant	N	%
<i>Kayu Manis</i>	312	18.1	<i>Kayu Manis</i>	327	19.0	<i>Jahe</i>	223	12.9
<i>Sembung</i>	141	8.2	<i>Sembung</i>	114	6.6	<i>Kayu Manis</i>	152	8.8
<i>Binahong</i>	81	4.7	<i>Binahong</i>	61	3.5	<i>Kunyit</i>	78	4.5
<i>Kunyit</i>	55	3.2	<i>Jahe</i>	38	2.2	<i>Sembung</i>	65	3.8
<i>Bawang</i>	37	2.1	<i>Kunyit</i>	34	2.0	<i>Binahong</i>	53	3.1
<i>Pule</i>	37	2.1	<i>Sambiroto</i>	34	2.0	<i>Kumis Kucing</i>	29	1.7
<i>Dadap</i>	35	2.0	<i>Beluntas</i>	22	1.3	<i>Sambiroto</i>	25	1.5
<i>Kencur</i>	35	2.0	<i>Kumis Kucing</i>	22	1.3	<i>Kencur</i>	23	1.3
<i>Cengkeh</i>	33	1.9	<i>Sirih</i>	21	1.2	<i>Beluntas</i>	16	0.9
<i>Kumis Kucing</i>	27	1.6	<i>Dadap</i>	16	0.9	<i>Jeruk Nipis</i>	16	0.9

Source: Household survey 2006

There is no significant difference between users and non-users of MAC plants when taken into account the household members' gender: 65.1% of the males (N=877) and 62.9% of the females (N=847) reported use of MAC plants versus 34.9% of the males and 37.1% of females who had not used MAC plants in the previous twelve months. There was a perceptible difference in age-group use. In the age groups 0-14 years and 15-25 years old there was a close to fifty-fifty division: 46.9% non-users, versus 53.1% users (N= 431) in the first group and 58.4% non-users versus 41.6% users in the second group. In the age groups 25 to 64 years and 65 and older the division was greater in favour of users: 24.6% of non-users versus 75.4% users in the middle age group and 24.7% non-users versus 75.3% users among the elderly. Different respondents reported that in event of disease or sickness affecting young children, especially when they were still *balita*, they were taken directly to a representative of modern medicine for treatment. This is not apparent in the data, which shows that 46.4% of *balita* (N=138) were non-users versus 53.6% users of MAC plants. Even when concentrating only on the curative use of MAC plants, 48.6% of the *balita* still used MAC plants. This high number of users is attributable to the reported use of curative use of MAC plants in the last twelve months and not a full report of all illnesses and sickness episodes. The reported use does not exclude a visit to a representative of either modern or traditional medicine. It is common for a person, even if treated by a single health practitioner, to undertake complementary health improvement actions, such as the use of MAC plants, which might be beneficent or adverse to the primary treatment. Therefore, even when the *balita* is treated by the doctor, MAC plants might be used to relieve symptoms or suppress aches, for instance, by external use of *beras kencur*.

In her study, McCauley (1984: 153) noted that home remedies were rarely used when people considered themselves ill. This is contradicted by this study and the 2006 records of self-treatment of the Indonesian Ministry of Health (*cf.* DepKes 2007). In this study MAC plant use was reported for 1104 household members (64.0%, N=1724) for curative, preventive or promotive health care. Representatives of the modern medical system supported the observation that in Bali it is common for people to use MAC plants as home remedies. Surely the terms 'rarely' and 'ill' in McCauley's statement can have multiple interpretations, leaving both observations valid. Moreover, the difference in the observations can be explained by two major events in the year 1997, several years after McCauley (1984) observations, which might explain the rise in the use of home remedies noted in the current observation. In 1997, Indonesia experienced serious economic problems which led to a drastic devaluation of the

Indonesian Rupiah and a severe El-Nino event brought drought and fire hazards. Huge problems ensued, all leading up to a situation in which the import of raw materials for synthetic drug production became virtually non-affordable for the Indonesian drug manufacturing industry (Erdelen *et al.* 1998: 2). In such economic straits, the role of traditional medical systems and self-supply of medicine become much more important. Simultaneously, the political climate changed positively towards traditional medicine, as the government and local authorities realised the usefulness of the traditional medical systems. This was revealed in the current, specific department of the Ministry of Health devoted to traditional medicine: the Unit Pelaksana Teknis Daerah Balai Pengembangan Obat Tradisional dan Kesehatan Olah Raga Masyarakat (UPTD. B. POT. KOM). Personnel in the health care centre (*puskesmas*) in Busungbiu specifically made the link with the economic setbacks and a return to alternative or traditional forms of medicine. Informants working in the realm of the traditional medicine emphasised that balance is important and therefore there is not a choice between forms of medicine, if a balance can be maintained, the means used are irrelevant.

Traditional medicine is closely linked to the use of indigenous medicinal plants (Erdelen *et al.* 1998). In Balinese traditional healing, plants are commonly used for the '*biasa*' (usual) diseases: to treat external symptoms or humoral imbalance. Plants are not the first choice of treatment for the '*luar biasa*' (unusual) diseases, which are said to be treated successfully using traditional medicine. In the event of '*luar biasa*' (unusual) diseases, other types of treatments are commonly used: possession or trance of the patient or the healer, meditation, prayers, mantras, fumigation, and holy water (*tirta*) as means to restore the balance upheld by *tri hita karena* concept. Many authors (e.g. Belo 1960; Foster & Anderson 1978; Connor 1986; Suryani & Jensen 1993; Hobart *et al.* 1996) have documented the role of trance and possession in Balinese ceremonies and healing practices. Hobart (1996: 190) indicates that: '*There is no generic term for trance. It is often called nadi from dadi, to become or exist, implying a higher level of reality. Trance is a state of disassociation which may be experienced from very mild to more extreme forms, and in mediums may last from ten seconds to about fifteen minutes.*' Dissociation, the psychological mechanism which operates in the everyday life of normal people and in abnormal mental states as well, is defined by psychiatry as: '*an unconscious 'defence' mechanism through which emotional significance and affects (feelings) are split off, separated, or detached from an idea, situation, object or person*' (cf. APA 1984). If MAC plants are used for the '*luar biasa*' (unusual) diseases, this is done with more ceremony as was done by a *balian* who would perform his fumigation healing in trance and bless each patient after the healing session with virgin coconut oil.

5.2 The Plural Medical System in Bali

5.2.1 Traditional Medicine

WHO (2000: 1) defines traditional medicine as: '*the sum total of the knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health, as well as in the prevention, diagnosis, improvement or treatment of physical and mental illnesses.*' Following this definition, traditional medicine includes all health practices, approaches, knowledge and beliefs incorporating plant-, animal- and mineral-based medicines, spiritual therapies, manual techniques and exercises used to treat, diagnose and prevent illnesses or maintain well-being in the realm of the theories, beliefs and experiences indigenous to a culture. WHO estimates that 80% of the population of developing countries relies on traditional medicines, mostly

plant-derived, for their Primary Health Care needs (*cf.* Van Seters 1997). Approximately, 3.5 billion people in the developing world rely on plants as components of their Primary Health Care (*cf.* Balick & Cox 1997). Traditional healers are known worldwide for their knowledge and make ready use of local flora and fauna in their remedies. Their contribution to community health is recognised and strongly promoted by WHO (*cf.* Bannerman *et al.* 1983; WHO 1993).

Bali provides a wide variety of traditional medical systems, classified as either local or regional, belonging to either the great or little tradition (*cf.* Lewis & Elvin-Lewis 2003). The Chinese and Aryuvedic regional medical systems are available and both these great traditions are based on the humoral concept of health and illness (*cf.* Kurup 1983; Pei 1983). As indicated in the theoretical framework, when using the term traditional medicine, the respondents in this study, Balinese community members, refer to one single, local medical system: the Balinese traditional medical system (*pengobatan Bali*) and they do not use it as an overall concept for all local and regional systems. Considering the extent of its use among the population of Bali, this Balinese medical system can be considered the largest 'local' system in Bali, and the most popular. Hobart (2002) claims the Balinese medical system is existential in its orientation, focused on the subjective experience of human beings. Unquestionably, the Balinese medical system, referred to below as traditional medicine, embraces several principles which can be traced to the humoral concepts of Chinese and Aryuvedic medicine.

Hobart *et al.* (1996) estimate that there are about 2500 different types of traditional healers on Bali. Today these practitioners are, as Sacchette (2002) states: '*an amalgam of the techniques of indigenous healers and the influence of Hinduism.*' As said in Section 4.2.4, Balinese Hinduism permeates all aspects of life, not least the knowledge, beliefs and practices of the Balinese healers; *Hindu Dharma* lies at the core of the treatments used by the *balian* (*cf.* Sacchette 2002). *Balian* is the collective name for various practitioners of Balinese traditional medicine. Although *balian* is frequently translated as 'healer', its practitioners are more than 'folk healers'. The *balian*, as Stephen & Suryani (2000: 7) indicate, can be defined as: '*a consecrated person with many priestly functions who exists and operates alongside other more exclusively religious figures such as the temple priests (pemangku) and high priests (pedanda).*' These *balian* are present in the realm of the traditional medical system and they operate alongside other traditional medical practitioners. Importantly, not all Balinese healers are referred to as a *balian*.

The work performed by the *balian* is closely tied to their cultural beliefs about the causes and cures of illness: a disruption of balance in the *tri hita karana* concept. Practices related to restoring the balance in the body or between body and soul, which should be considered integrated wholes, are referred to as 'healing practices'. Besides their skill in these healing practices, *balian* are often summoned to restore the balance between the *dharma*, *karma* and *artha* of an individual or between an individual and her or his social and/or spiritual environment. Sometimes they even restore the balance in the community or between whole communities. As they are consecrated persons, *balian* are usually highly respected in Balinese society. They are often prominent members of the community who are consulted to solve profane and spiritual problems, not least because of the mystical powers (*kesaktian*) with which they are associated (*cf.* Hobart *et al.* 1996).³ Consistent with the theory of balance which permeates Balinese society, a *balian*, especially one with strong *kesaktian*, has the potential both to restore or disrupt, to cure or cause disease: *balian usada*, for instance, who inspire either fear or adoration are highly respected.

Balian is a wide-ranging term (cf. Connor 1986; Hobart *et al.* 1996; Stephen & Suryani 2000). Not all *balian* heal and not all healers who are part of the Balinese traditional system are called *balian*. Those who are, are designated according to their predominant healing method, namely:

- *balian usada*, who base their practice on their possession of traditional palm-leaf manuscripts, *lontar*. They are held in great respect and awe on account of the mystical power, *kesaktian*, associated with them;
- *balian taksu*, spirit mediums;
- *balian paica*, whose healing is a divinely bestowed gift: *paica*;
- *balian tenung* diviners;
- *balian kebal* or *kebatinan*, who purvey protective amulets, mantras and rituals;
- *balian apun*, specialists in massage and physical manipulation of the patient's body, occasionally combined with supernatural manipulation of mystical forces through mantras and offerings;
- *balian tulung*, bone-setters;
- *balian mana*; traditional midwives.

Balian and other traditional healers employ a wide variety of 'healing' techniques, ranging from skilful manual techniques to magico-religious means, which can be traced back to the tantric ideas of deliverance incorporated into Balinese Hinduism (cf. McCauley 1984). Some healers confine themselves to a single practice, but frequently healers combine techniques and different healing roles. They combine being different types of *balian*. The medical paraphernalia of the healers covers a broad spectrum including medicinal concoctions made from plant extracts with or without the addition of animal and/or mineral substances, holy water (*tirta*), smoke and/or incenses, mystical 'weapons', which are primarily amulets or charms charged with magic by drawings and sacred syllables. Specifically in Bali, ritual possession and trance are also highly institutionalised as healing practices (cf. Hobart *et al.* 1996; Stephen & Suryani 2000). As a collective group, *balian* target a broad sweep of disturbances to health and, besides disease and illness, successfully treat a whole gamut of disorders, but there are limitations. Suryani & Jensen (1993: 17-18) indicated that *balian*: 'treat disorders caused by natural causes, including fractures and infections, as well as those which Western physicians would regard as primarily psychogenic and psychiatrists would regard as mental disorders. *Balian* are often able to recognize mental and physical illnesses outside their scope of care and may refer their clients to practitioners of Western medicine.'

Several informants stated that there is a considerable difference between the reliability of a *balian* and that of other health practitioners. With the exception of the *balian*, other practitioners, traditional and modern alike, are subject to numerous certification requirements, protocols and regulations devised to avoid and guard against malpractice. The Balinese believe that malpractice among *balian* is actually non-existent, despite the lack of any schooling, certification or system to control them. The argument for this absence is based primarily on the reasoning that it is impossible to 'become' a *balian* through sheer personal ambition or a conscious decision; it is a vocation, a person is 'called' by God to become *balian*. Moreover, it is reasoned that charlatans proclaiming themselves *balian* will never succeed in maintaining their scam since; if they do not succeed in healing or helping their patients, people will stop seeking their help and their practice will fail. If malpractice has already occurred, in retrospect such a person will not be referred to as a *balian*. A circular reasoning which indeed proves that there can be no malpractice among *balian*.

As well as *balian*, each of the four villages has several traditional health practitioners in its midst. In Angantaka two persons are well-known *balian*. Bengkel has a renowned *balian* in each of the four *banjar*. About ten *balian* lived in Pelapuan and in Tumbu there were four highly reputable *balian*. During the household interviews, respondents were asked to report on the traditional healers, also referred to as *batra* (a contraction of the words *obat* and *traditonal*, traditional medicine), living closest to their house. The types of healers reported in order of the most reported were: *balian usada*, *balian taksu*, *balian apun*, *balian urut* and *dasar*. Remarkably, knowing that each village had at least two well-known *balian*, 75 respondents (18.8%) reported that their closest traditional healer lived more than 30 minutes away, versus only 10.3% of the respondents (41) who said that they had to travel more than 30 minutes to the closest modern medicine representative or facility. Although remarkable, these reports are explicable. Even though it has been documented that the nearest practitioners of both types of health care are closer than 30 minutes from each community member in the four sample villages, when questioned respondents will refer to the one with whom they are best acquainted as the nearest. Supporting Foster's (1983: 24) statement that '*people chose therapists, not medical systems*'; they report the closest representative, the person, they know, not the person who belongs to a particular system but with whom they are not acquainted.

Considering the extent of the use of medical plants, Ayensu (1983) specifies three types of traditional medical practitioners: 1) the herbalists, plant specialists, who administer plants in all their healing practices, 2) the divine healers, whose practice depends on their purported supernatural powers of diagnosis and only occasionally administer medicinal plants, in principle those which are supposed to be imbued with special spiritual powers, and 3) the 'witch-doctor', the practitioner who is credited with the ability to intercept the evil deeds of a witch or to exorcize the evil spirit which possesses the patient. In the Balinese case, the second and third types of traditional medical practitioners would be referred to as a particular type of *balian*. The first type, the herbalist, is usually a traditional healer not referred to as *balian* but for whom other terms such as *dasar* or *tukang* are used. The *balian usada* is the *balian* with the closest relationship to a herbalist. They derive their knowledge from *lontar*, the medical palm-leaf manuscripts, referred to collectively as *usad*. This does not preclude them being divine healers as well.

In contrast to popular belief, traditional healers, *balian* included, are compensated for their services by their patients. Foster & Anderson (1978: 111) correctly state that: '*In all societies curers receive compensation in some form; tribal and peasant peoples are too realistic to expect them to perform solely for the good of their fellow men*'. It is standard for a Balinese patient to bring the appropriate offerings to a healing session with a *balian*. Illustration 5.4 shows the collection of *lontar* and the offering brought by a patient visible in the background, behind one of the famous *balian*. As keepers of traditional knowledge, *lontar* will be discussed in more detail in Section 6.2.2. It is customary to add money, coins or paper to the offerings for the *balian*. Nowadays this example is followed by Western visitors to the island seeking relief from disturbances to their health in the Balinese medical system. They will add a standardized amount of money, whispered to them by their guides, as an honorarium for the services of the *balian*, although the latter never set this. Most Balinese traditional healers and certainly all *balian* do not stipulate standard honoraria, as the foreigners' practice suggests. The sorts and amounts of payment vary greatly, depending on such factors as the length and cost of professional training, the extent to which powers stem from the 'grace' of a deity, the socio-economic situation of the patient and what the market will bear (*cf.* Foster & Anderson 1978). To shatter yet another stereotype, as the recent

research by Suryani (personal communication) has demonstrated, these days a higher concentration of traditional healers and *balian* is found in urbanised than in rural areas. Reinforcing the statement that Bali presents a truly plural character in its medical systems, which contributes to the health of the Balinese all over the island, unrestricted by geographical or type of settlement boundaries.



Illustration 5.4 A *balian usada* in front of his *lontar*
Photographed by L.N. Leurs (Fieldwork 2006)

5.2.2 Modern Medicine

In Indonesia, as in most other developing countries, modern medicine is the predominant method found in the larger hospitals, but in non-hospital care the traditional and modern health systems operate independently without a clear hierarchy and sometimes in remarkable synergy (*cf.* Van Seters 1997). The introduction of modern medicine to Indonesia can be traced back to the early nineteenth century. Initially, the care provided by modern medicine facilities was restricted to the Dutch and other European communities. From 1925, the Public Health Service (*Dinas Kesehatan Rakyat* or *Dienst voor de Volksgezondheid*) set itself a goal to improve the health status of the general population, commencing with the introduction of good public health education intended to improve community hygiene (*cf.* Hydrick 1942). The improvements then made to the drainage, sanitation and sewerage systems were the foundation of the current health infrastructure in Indonesia. Improvement in health care is intrinsically linked to the political, educational and socio-economic situation of a country. Indonesia has made substantial progress in stabilising political and economic conditions and the national socio-economic survey 2002 showed that, in the past thirty-two years, Indonesia has experienced a major improvement in the area of education (*cf.* WHO 2007b).

Until the beginning of the twentieth century, scepticism reigned supreme among modern medicine professionals and consequently traditional medicine and its applications, including the traditional use of MAC plants, were often dismissed as superstition if not outright quackery. In 1940, when a motion was passed recommending an in-depth study of traditional medicine and its applications, awareness of the true value of its natural pharmacy began to grow among modern medical professionals (*cf.* Beers 2001). The Japanese occupation (1942-1945) inflicted severe privations, with the immediate prospect of famine and epidemics on the Balinese population; the consequence of the requisition of rice and other food supplies by the Japanese and the dearth of textiles, pharmaceuticals, manufactured goods and spare parts for the modern machinery already introduced (*cf.* Hanna 1976). Alternatives to pharmaceuticals were essential and local herbal medicines and *jamu* fulfilled the need. The next important development in the recognition of traditional medicine took place in 1944, when the Ministry of Health set up the Indonesian Traditional Medicine Committee, generating a better climate for the application of plants for medicinal purposes (*cf.* Beers 2001). Greater endorsement followed with the Alma-Ata Declaration (1978), which called upon countries and governments to include traditional medicine in their Primary Health Care systems and to recognize the associated practitioners of traditional medicine as a part of the health care system, particularly in Primary Health Care at the community level. Today, the Balinese Ministry of Health has a separate department specifically for traditional medicine: the Unit *Pelaksana Teknis Daerah Balai Pengembangan Obat Tradisional dan Kesehatan Olah Raga Masyarakat* (UPTD. B. POT. KOM); one of whose main tasks is documentation of and quality and efficacy research on traditional medicine practices, specifically the use of MAC plants.

Nowadays, Balinese modern health practitioners do not oppose the use of MAC plants, although only a few of them actively promote it. As intimated by the head of the Ministry of Health of the regency of Karangasem, the health care facilities at the *puskesmas* (health care centres and health clinics) are mainly oriented towards the administration of pharmaceutical drugs but, when asked, the employees will give their patients the information requested on the use of traditional medicine and of medicinal plants. Each *puskesmas* to which the sample villages are related could present several publications by the Ministry of Health illustrating the use of MAC plants for self-remedy in community health and they all had an educational TOGA, a *Tanaman Obat keluarGA* (family medical garden), where the MAC plants were cultivated.

In its *Repelita* (five year plans), the Indonesian government formulates the major goals for national development. Improvement in the population's health occupies an important place in these plans. The long-term, Second Twenty-five-year Development Plan (1994-2019) identified economic and human development as the keys to national development and self-reliance (*cf.* WHO 2007b). The Millennium Development Goals (MDG) are integrated into this particular twenty-five-year development plan. Since 1976, Primary Health Care has been the number one approach and in 1983 (*Repelita* 4), the government presented an integrated family health package, based on the integration of five major health programmes: 1) mother and child care, 2) family planning, 3) nutrition, 4) immunisation and 5) fighting diarrhoea. In 2006, Primary Health Care concentrated on 1) mother and child care, 2) family planning, 3) improvements in community nutrition, 4) immunisation, 5) improving referral and auxiliary health care services, 6) the control of communicable diseases, focusing on polio, TB, acute respiratory infections, dengue fever, malaria, leprosy, filariasis, anthrax, avian influenza, AIDS, HIV and sexual communicable infections and 7) the provision of health service in the event of disasters (*cf.* DepKes 2007).

In 2000, Indonesia introduced its new vision and mission of the National Health Development in the programme 'Healthy Indonesia 2010' (HI2010), which forced the Ministry of Health and Social Welfare to involve all strata of the community. The goals of HI2010 are (WHO 2007b: 7):

- *to initiate and lead a health orientation in national development;*
- *to maintain and enhance individual, family, and public health plus improving the environment;*
- *to maintain and enhance quality, accessibility, and affordability of health services;*
- *to promote public self-reliance in achieving government health goals.*

In this new vision and mission, four paramount issues represent the pillars in the formulation of a strategy for national health development: 1) initiating health-oriented national development, 2) professionalism, 3) community managed health care programmes and 4) decentralisation (*cf.* WHO 2007b). The main goal of the national health information systems is to support the attainment of Healthy Indonesia 2010. The major obstacle to the realisation of Healthy Indonesia 2010 is the financial situation. The total expenditure on health in Indonesia based on the 2004 data was 2.8% of the Gross Domestic Product and the general government expenditure on health was 32.4% of the total expenditure on health (Pinchuk 2007: 66). By comparison, in the Netherlands the total expenditure on health based on the 2004 data was 9.2% of the Gross Domestic Product and the general government expenditure on health was 62.4% of the total expenditure on health (Pinchuk 2007: 68). The Indonesian government will have to make continuous major investments if it is to realise HI2010. The first step has been taken by making health care accessible to the poorest. The government lowered the subsidy on fuel and the money saved will be reinvested in the population focusing on health care and education.⁴ Respondents reported that they had noticed a difference and that subsidised health care was now part of their daily lives, but as far as they were aware there were no noticeable positive changes in educational programmes. It is just one of the measures the Indonesian government is deploying, but it is doubtful whether it will eventually be able to meet the goals of Healthy Indonesia 2010.

On account of the government financial support system, fees at all of government facilities are very low. A person issued with a *kartu miskin* by the local government can obtain health services at government facilities free of charge. The *kartu miskin* is a central government initiative. Local governments can assist their inhabitants who cannot obtain the *kartu miskin* but still need financial support for health care with *obat bantuan* (financial support system to obtain medicine). Who receives a *kartu miskin* and how high the *obat bantuan* is which a person receives, is decided by the local government and determined by individual case. For instance, *puskesmas* Kediri, to which sample village Bengkel belongs, reported it had issued 2000 *kartu miskin* among the 16,777 persons for whom it provides health care. Therefore, modern health care, focused on primary care provided by government facilities is in principle affordable for all Balinese community members.

Currently all modern medical care providers in Bali follow the national guidelines which are issued by the Ministry of Health and have been passed as national legislation. The goal of the Indonesian government is to strengthen decentralised management, including health care management (*cf.* WHO 2007a). In Bali, this has been realised to regency level (*kabupaten*) for policy making and to district level (*kecamatan*) for the operational responsibility. In 2006, the government medical services and facilities were organised regionally. The organisational structure of the government health system is depicted in Figure 5.1. This decentralisation of

operational responsibility and authority to the local level was introduced under Health Law No. 23 passed in 1992, as a prerequisite for successful and sustainable development (*cf.* WHO 2007b). The decentralisation requires close co-ordination with the centre, especially in the government subsidised part of the health care system and even more regulation is needed for the growing private sector.



Figure 5.1 Organization Structure of the Government Health System
Source: WHO (2007b: 9)

In 2006, Bali had eleven government-run hospitals, two armed-forces hospitals and twenty private hospitals (*cf.* DepKes 2007). The large hospital in Denpasar is a teaching hospital for the Faculty of Medicine of Udayana University. Smaller government-owned hospitals are located in each of the eight regency towns. Parallel to the hospital system is a network of health care centres and health clinics (*puskesmas*) which provides out-patient care. In 2006, Bali had 22 health centres with beds, 84 without beds, in all 110 health centres, which is a ratio of 3.21 per 100,000 population (*cf.* DepKes 2007). There was a health care centre in each of the regencies (*kabupaten*) and each district (*kecamatan*) should have had at least one *puskesmas*. Usually *puskesmas* are supported by two or three auxiliary *puskesmas* (*puskesmas pembantu*).

Villages have at least one family health post (*posyandu*); these are managed by the community with the assistance of health care centre staff (*puskesmas*).⁵ In 2006, Bali had 210 sub-health centres (*puskesmas pembantu*), 4589 integrated family health posts (all providing *posyandu*), 262 village maternal posts and nineteen village pharmacy posts (*cf.* DepKes

2007). In total, the Balinese health care centres had access to the transport facilities offered by 127 four-wheel mobile health centres, thirteen ambulances and 596 motor-cycles (*cf.* DepKes 2007). The Balinese government registered 395 specialists, 554 physicians, 137 dentists, 54 bachelors of nursing, 3360 nurses, 1302 midwives, 68 pharmacists, 230 assistant-pharmacists, 191 bachelors of public health, 458 sanitation experts, 233 dieticians, 262 physiotherapists and 458 technical medics (*cf.* DepKes 2007).

Besides government-organised and funded modern health care, there are many private bio-medical practices in Bali. Several of these practices are owned by government employees, doctors and nurses who work in a public health care facility in the morning and have private practices in the afternoon and evenings, in rented premises or in their own homes. Health care provided in the private practices is not subsidised. In a nutshell, this means that a patient can receive free health care from a particular doctor in the morning at a government facility, whereas a reasonable fee is expected for the same services of that same doctor in the private practice in the afternoon. The private practices often provide the major income for the government-employed health providers and they were surprisingly well used, even though cheaper health care is available. According to McCauley (1984: 150-151), there are three reasons for the popularity of private medical care:

1. *private practice hours are more convenient than clinic hours, because most Balinese farmers and office workers are free in the evening to help take an ill relative to the doctor;*
2. *people say that the doctors and nurses give better care and more powerful medications in their private practice and it is true that they have a greater range of medicines;*
3. *for a person to be cured there must be a “match” of “fit” between healer and patient and therefore it is important that the family seek the proper person, not the most convenient clinic, and this person will be someone with whom the family feels socially at ease.*

In this research twenty-two years after McCauley’s study (1984), all three of the above reasons were still valid. The first reason for the popularity of private medical care is unquestionably still a major factor: private medical-care facilities do offer more convenient opening hours because of their undeniably more commercial character. The third reason suits the Balinese perception of healing, discussed in depth in Section 5.3. However, the second reason is finally losing some ground, however some people were still convinced that better care was given in the private practices by the same doctor, nurse or midwife who worked in the public health care facilities.

This apparently non-rational reasoning is related to the numerous earlier scandals in which the government-subsidised drugs were replaced by placebos and the original drugs ended up on the black market. Doctors working in the *puskkesmas* in the morning hours would prescribe the same type of drugs on the basis of the same diagnosis, but the medicines the patient received at the *puskkesmas* would be a placebo whereas those given by that same doctor in her or his private practice, the ‘more expensive’ one were the originals, hence more effective. These scandals still affect Indonesians’ present-day health behaviour, making them willing to pay, indeed even make them insist on paying, much more for health care than absolutely necessary in order to receive the ‘good’ care. Modern medicine was represented in each of the four sample villages. Within its boundaries, Angantaka has one *puskkesmas pembantu* (*pustu*) where a midwife is present during surgery hours. There are two doctors and two midwives who live and have private practices in the village, only one of the two

midwives was still practising in 2006. Angantaka falls within the working area of *puskesmas* Abiansemal II and the closest hospital is located in Denpasar. Each *banjar* is served by a *posyandu* and a *posyandu usia lanjut* and there is a *puskesmas keliling* who will visit the village at set times (Illustration 5.5).



Illustration 5.5 The *puskesmas keliling* of *puskesmas* Abiansemal II
Photographed by L.N. Leurs (Fieldwork 2006)

Bengkell has one *puskesmas pembantu* (*pustu*), *polindes*, where a midwife is present during office hours. The *posyandu* in Bengkel are very active; each *banjar* has its own and they all provide five volunteers, therefore a total of twenty *kader* women. Bengkel falls under the responsibility of the *puskesmas* of Kediri which is fully staffed (15 persons) and the closest hospital, 15 km away, is located in Tabanan. There are two doctors, two general practitioners and a midwife other than the one who worked in the *polindes* who practise after office hours in their own homes.

Pelapuan has no resident government-paid health personnel. Every *banjar* has a *posyandu* provided by the *puskesmas* Busungbiu I, referred to as the *poliklinik*. The nearest real hospital is a private hospital located in Seritit and the government hospital in Singaraja. There is no health practitioner who has a practice or lives within the boundaries of the village; the nearest private practice of a representative of the modern medicine is a nurse in Busungbiu. Therefore, a representative of the modern medicine only visits Pelapuan during the *posyandu* which is once a month.

Tumbu has one *polindes* located in Ujung Pesisir. It has a high number of *posyandu* namely twenty-six, both the normal *posyandu* (children's vaccinations) and one for elderly are available. Tumbu has two midwives and two nurses living and running a practice within its boundaries. Tumbu is officially within the jurisdiction of *puskesmas* Pensari which provides it with a *posyandu*. With the advent of better roads, the community members will easier access to the *puskesmas* of Amlapura. The nearest and only hospital in Karangasem is located in Amlapura.

5.2.3 Curative, Preventive and Promotive Health Care

Between the realms of modern and the traditional medicine, there is a wide range of other types of medical systems which are linked to the great and little traditions of medicine, folk beliefs and practices. All over Bali, especially in the urbanised areas, there are many certified professionals belonging to one of the professional health care systems, for instance, those practising homeopathy, acupuncture, reiki and shiatsu.⁶ Other people focus on selling the products of one of the great or little traditions such as Javanese *jamu* which is characterised by an extensive industrialised production of competing brands. Finally, there is another range of practitioners, treatments and health products which strictly speaking do not belong to either the traditional or modern medicine and whose practices often teeter on the border between quackery and good practice. These practitioners belong to the type of medicine defined by Buschkens & Slikkerveer (1982) as transitional medicine, which is characterised by vested economic and financial interests (cf. Slikkerveer 1990).

The plural medical system provides the community with a wide range of curative, preventive and promotive health care. A marked characteristic of traditional health systems is that they: *'span a divers range of policy areas that extend beyond the immediate domain of health as conceived by the bio-medicine tradition'* (Bodeker 1997: 1). Traditional medical systems often focus on those fields of bio-medicine in which it has booked fewer results. Today there is a new development among modern health care practitioners creating greater openness towards practices in the other medical systems. A highly visible example is the routine in hospitals under which patients are offered, when considered appropriate by the medical specialist responsible in the hospital, the chance to choose themselves whether they want to be treated by traditional or the modern techniques and approaches. This statement and observation was confirmed by the Department of Health in Tabanan, which stated categorically that the Ministry of Health does not pursue any anti-policy towards traditional medicine. It considers the collaboration of the different medical systems as a positive development and assumes that, with the proper control, it will offer patients a liberty of choice in safe, high-quality treatments.

For generations, traditional medicine has been involved in curative, promotive and preventive community health care as it focuses holistically on both the psycho-biological system (the body and mind of the patient) and their social system. Modern medicine employed in community health care policies currently covers curative, preventive and promotive activities as well as programmes historically rooted in generating a healthy environment for the community by the government. Hospital care is focused on curative health care. In 2006 the ten main diseases suffered by hospital in-patients (109,636 visits) were (cf. DepKes 2007):

1. diarrhoea and gastroenteritis caused by infection (colitis infection);
2. dengue-haemorrhagic fever (DHF);
3. typhoid and paratyphoid fever;
4. complications of pregnancy and delivery;
5. intracranial injury;
6. unknown fever;
7. other injury with trauma and injury without trauma and multiple body area;
8. pneumonia;
9. malaria (including all types of malaria);
10. dyspepsia.⁷

The ten main reasons for hospital out-patient attendance (650,080 visits) were: 1) other acute upper respiratory infections, 2) essential (primary) hypertension, 3) unknown fever, 4) other skin and sub-cutaneous tissue diseases, 5) symptoms and other abnormal clinical and laboratory findings, 6) other injury with trauma and without trauma and multiple body area, 7) other pulmonary tuberculosis, 8) normal pregnancy monitoring, 9) diabetes mellitus, and 10) diarrhoea and gastroenteritis caused by infection (colon infection) (*cf.* DepKes 2007).⁸ At the time of the household survey in 2006, the priorities set for the *puskesmas* of the four sample village were focused on the psycho-biological system of the individual. The top five priorities were:

1. treatment and drug prescription;
2. prevention of infectious diseases (such as dengue-haemorrhagic fever, malaria, diarrhoea, TBC, HIV/AIDS, Bird flu and SARS) and the child immunisation programme;
3. mother and child care (based on the Unicef GOBI-FFF method);⁹
4. nutrition (also formalised in the *posyandu*);
5. health promotion, with a focus on such preventive and promotive health care as checking the water quality, sanitary facilities and creating and maintaining health environments in such public areas as schools, offices and institutions.

Despite, the top five priorities of *puskesmas* and the focus of hospital care on curative health care, the realm of modern Balinese health care embedded in the government-subsidised health care system transcends primary curative, preventive and promotive health care. Following the National Guidelines on State policy issued in 1993, in efforts to contribute to community health, the Ministry of Health is involved in the socio-organisational aspects of life to improve the health and nutritional status of the population by providing better quality health services to all, and promoting a healthy lifestyle, supported by adequate housing and environmental sanitation (WHO 2007b). Bearing in mind these National Guidelines, the Balinese Ministry of Health has formulated and promotes the seven pillars for the optimal functioning of a family:

1. socio-cultural principles (*socio-budaya*), referring to the advice to uphold the norms and values of one's own culture;
2. loving environment (*kasih cinta*), promoting the creation of a loving environment for children and maintaining a good relationship between partners;
3. protection (*lindungan*), this pillar refers to the duty of a family to create a safe haven for all its members and refers to related safe health practices;
4. reproduction (*reproduksi*), this pillar promotes a healthy approach to human reproduction including information about the psychological preparation of and information for youngsters, informing people and reducing sexual health risks, informing and promoting the use of health programmes related to mother and child care;
5. economy (*economi*), the main advice for upholding this pillar is to create a stable economic situation and to save money if possible;
6. education (*pendidikan pertama/utama*), this pillar promotes primary and secondary schooling for all and a good functional, healthy family which is directly related to the education of all the family members;
7. environment/surroundings (*lingkungan*), this pillar was illustrated by pointing out the importance of living in harmony with people, nature and God, a direct reference to the Balinese *tri hita karana* concept.

Besides the curative aspect of health care, the preventive and promotive aspects are attracting growing attention, but they are certainly not new. The provision of preventive health services in Indonesia began in 1804, when the Dutch government introduced smallpox vaccination programmes; smallpox was eradicated in Indonesia in 1974. To this day, the best known and most effective preventive programme is the vaccination programme for *balita* (*bahwah lima tahun*, children up to five years old) formulated in the *posyandu* programme. In 2005, 100% of the villages in Bali were Universal Child Immunisation villages. This dropped to 99.28% in 2006 (*cf.* DepKes 2007). The Universal Child Immunisation (UCI) is a proxy towards the coverage of a complete immunisation for the infant group. A village meets the target of UCI if more than 80% of the infants complete their immunisation course (*cf.* DepKes 2007). A *posyandu* meeting is quite often the time and place when someone from the PKK (*Pemberdayaan dan Kesejahteraan Keluarga*), a national women's organisation, or a health worker employed by the Ministry of Health, will address specific preventive or promotive health issues. During a *posyandu* in Angantaka, special attention was paid to HIV/AIDS, sexually transmitted disease and *demam berdarah*., Illustration 5.6 gives an impression of the meeting. Nowadays besides the normal *posyandu* connected to the mother and child programme, there is a *posyandu usia lanjut*, providing a regular meeting time and place for the elderly to have their vital functions checked. Other preventive activities in which the Department of Health is involved are sanitary measures and health information. All possible media, including the mass media, are involved in creating awareness that a clean surrounding (*lingkungan*) can prevent sickness and diseases.



Illustration 5.6 Health education offered to the community members of Angantaka of during the *posyandu* organised by the *puskesmas*
Photographed by L.N. Leurs (Fieldwork 2006)

In 2006, Indonesia had a percentage of 24.96 healthy households, and Bali had the third highest percentage of healthy household of all provinces with 37.4% (*cf.* DepKes 2007). The environmental indicators needed to qualify as a healthy household are safe water and toilet facilities, appropriateness of area of floor space to the number of occupants, flooring materials, health insurance accessibility and behavioural aspects and, specific for Bali, the growing of at least five medicinal plants on the premises of the house is encouraged. The media is used to mobilising people for prevention of polio (2005), dengue (2005), bird flu (2006) and the constant flare-ups of typhoid, malaria and TBC. Some prevention programmes are funded by the government, among them the programme for providing running water and good sanitation for every household. Others programmes, such as cleaning up the pavements of the roads and maintaining vegetation in and around the villages to avoid dust as much as possible require investments by the community. They are examples of belonging to a programme to maintain a healthy living environment.

The Ministry of Health provides the hygiene controllers who check the hygiene standards of public spaces and buildings, hotels and restaurants. They do not yet have the authority to close down hotels or restaurants if it does not fulfil the requirements, but they do award those which do meet the standards with a star-award system. During the fieldwork in spring 2006, the department was involved in the battle against *demam berdarah* (dengue, haemorrhagic fever), which required action on both living areas and health behaviour to avoid outbreaks of epidemic proportions, especially in the urban areas. Therefore, people were advised to create clean surroundings, to avoid too much still standing water and to 'smoke out'/fumigate their houses to prevent the further spread of the mosquitoes by reducing their possible breeding areas. From the medical point of view, people were informed about the first symptoms of *demam berdarah* and the appropriate measures to take in multi-media campaigns. This involved reporting as soon as possible to the nearest health care facilities where a patient would be treated and their relatives and neighbours would be checked immediately to prevent the outbreak of an epidemic.

Preventive and promotive health care is not confined to the policies and programmes of the Ministry of Health executed by its health personnel. At the *banjar* level, the PKK (*Pemberdayaan dan kesejahteraan keluarga*) a women's organisation with a national character, supported by the national government, operates predominantly in the realm of promotive and preventive health care. The ten fundamental parts of the PKK programme are:

1. live according to and observe the *pancasila*;
2. *gotong royong* (solidarity, mutual help);
3. nutrition;
4. clothing;
5. housing and organisation of the household;
6. schooling in skills and expert knowledge;
7. health care;
8. development of a co-operative work life and living;
9. sustainable / continuity of the living environment;
10. healthy surrounding/environment.

Although national and regional authorities has always paid attention to the promotive, preventive and curative aspects of community health in Bali, there seems to be a growing interest in preventive and promotive health care. This can be traced to two developments: the rise in life expectancy and changes in lifestyle. The rise in life expectancy results in the

increase in the number of older people and, consequently, is expected to bring an increase in the incidence of degenerative diseases, usually presaging a rise in health expenditure (*cf.* WHO 2007a). Therefore the Balinese government has a financial interest in raising the general health level through its encouragement of curative, preventive and promotive activities. Health problems related to changes in lifestyle in Indonesia are associated with changing food habits, smoking and other substance abuse, sedentary lifestyles, lack of exercise and violence (WHO 2007a). The increase in young smokers in Indonesia especially has led to an increase in lifestyle-related health problems. Bali, with 45.7% has the lowest smoking rate in Indonesia, 20% lower than the national smoking rate (*cf.* WHO 2007b). It seems that the anti-smoking campaign has begun to pay off and non-smoking is supported in daily activities. For instance, it was customary to offer smoking appurtenances, cigarettes or the betel leaves, to all helpers for the preparation of the *gibung* diner.¹⁰ Nowadays a third option is offered to the helpers, namely peppermints or other sweets to accommodate those who do not smoke.

Food is a critical aspect of life in Bali. Nowadays Balinese eat what they want and can afford. In the four sample villages it was reported that all people, some with government support, were able to eat three times a day. This expression 'to eat' indicates that three times a day there is an intake of rice, the staple food, with a variety of condiments. If people have less money to spend on the food, it will be spared by cutting down on the condiments containing meat or fish. Vegetables are available in abundance in all four villages. As a consequence of the tourist industry, the range of food products available in Bali has been broadened, for better and for worse.

At the same time as the popularity of organic food products is growing, the fast food industry is booming. The change in the daily diet of the Balinese has resulted in a number of impacts on Balinese health: positive ones such as stronger babies and infants, and children in general grow taller, but there are more negative effects: the rise in obesity, diabetes and cardiac, artery and cholesterol problems. There are no food intake restrictions. Food used to be categorised as: *panas*, *tis* and *dumelada*. Those who are still familiar with this categorisation claim that following the regulations of the classification supports a person in keeping in balance and therefore healthier. People occasionally follow diets regulating their food intake, usually dominated by which foods to avoid, which foods to moderate and which foods do not present any problems in reaching the intended goal such as reducing the negative effect of an illness or disease or attempts to lose or gain weight. But in most cases, whatever the reason, people tend not to comply with them or only temporarily until the worst symptoms disappear.

Promotive and preventive health behaviour is supported by the Balinese cosmovision reflected in traditional medicine. In the cosmovision, keeping the balance is the key to health and healing. Restoring the balance is considered healing or curative actions, whereas keeping the balance or avoiding disturbance of the balance are practices closely related to promotive and preventive actions. The balance which should be kept is related both to the theoretical horizontal and vertical axes of balances in Balinese cosmology. The horizontal axis refers to being in balance with other people and nature, whereas the vertical balance means keeping in balance with the underworld and God (upperworld). Keeping the balance is something a person should aspire to and, at a certain level, such precautions as wearing amulets to prevent the malefactions of bad spirits tipping the balance can be made in the vertical line or as protection. Small children wear protective jewellery which is given to them at the first *otonan* ceremony, the moment they really enter the world of men, around their arms and legs. Another example is always placing the head of the bed towards either north or east; in fact

always in the *kaya* (facing the mountain) direction. Failure to do so may result in illness. Suryani (2006: personal communication) states that in order to live a healthy life, Balinese should approach health in a holistic way, including the physical and mental well-being of a person, and her or his social and cultural surroundings, again referring to both the horizontal and vertical axes of balances in the Balinese cosmovision. To restore balance to a person fully his/her spirit should also be in good health. Suryani (2006: personal communication) introduces this approach as the *bio-psycho-spirit-sosiobudaya* concept presented in Figure 5.2. The three integrated aspects of the concept are bio (body), psycho (mind) and spirit of a person. These three intertwined concepts interact with a person's *sosiobudaya* (the socio- cultural context), all of which has to be place in one environment. Suryani (1995) indicates that the *bio-psycho-spirit- sosiobudaya* combination treatment is widely accepted in Balinese treatment and that psychiatry in Bali has been using this approach since 1988. Since Suryani insists there is an interrelationship between physical and mental disorders, she wants to take it further than just the mind-body dualism and besides the biological and psychological factors includes the social factors and spiritual aspects. In psychosomatic disorders especially this might give deeper insights. Suryani refers to Kleinman (1988) who also used a similar technique but had little time to converse with his patients because of their number.

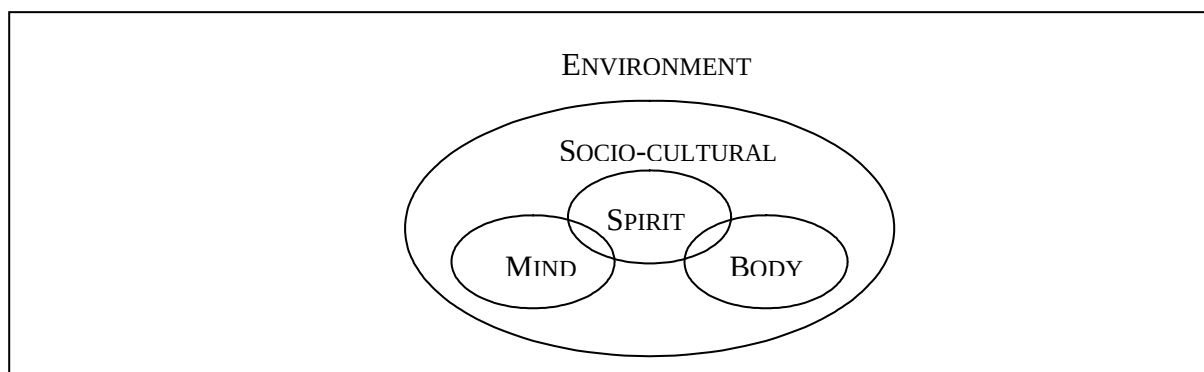


Figure 5.2 The *bio-psycho-spirit- sosiobudaya* concept for health maintenance and restoring
Source: Suryani (2006: personal communication)

One visible side of the promotive and preventive health behaviour is the great numbers of people engaging in sports activities, promoted by the Ministry of Health in its programmes for a healthy life style. Of all the household members, 37.5% (N=1724) engage at least once a week or more in sport of some kind; 25.1% on a regular monthly basis but not as much as once a week and; whereas 37.1% never engage in sports activities. Team sports such as soccer and volleyball are very popular and many people exercise early in the morning or just before sunset. Sports education is part of the school programme and each government employee does sport every Friday morning. Sport is promoted as way to keep in shape, make social contacts and/or improve health. Several people will engage in meditation as a health practice reinforcing their physical and emotional strength. As said, there is a wide range of promotive and preventive practices available, directed at the individual and at the community: the person within his/her social and physical environment. The utilisation of MAC plants, as discussed in Section 5.1, is a significant part of preventive and promotive practices in which community members indulge to restore, improve or maintain their health.

5.3 Health, Illness and Disease in Bali

5.3.1 Cultural Concepts and Global Indicators

Health and its interrelated concepts linked to ill-health such as ‘dis-ease’, ‘ill-ness’ and ‘dis-order’ are culturally defined concepts (*cf.* Kleinman 1980; Waxler 1981; Bannerman *et al.* 1983; Nichter 2001). Disease involves pathology and, at the one level, it is obviously biological (*cf.* Foster & Anderson 1978). However, socio-psychological and cultural factors play a role in inducing disease and the alteration of the environment in which a person receives care as a patient is purely cultural. Westerners are accustomed to think of diseases in terms of germs and viruses and often use illness as an interchangeable term, but from a cultural point of view illness is: ‘*the social recognition that a person is unable to fulfil his normal roles adequately and that something must be done about the situation*’ (Foster & Anderson 1978: 40). Illness all over the world assumes several social roles, depending on the cultural and geographical determinants. Illness may provide release from intolerable pressure, help to account for personal failure, to attract attention, earn a ‘vacation’. It even may be used as a social control device. Concepts of health and its interrelated concepts such as disease, are biological and evolutionary concepts (*cf.* Pellegrino & Thomasma 1981). As a whole ‘healing’ is a process which is embedded in a spectrum of interconnected social relations, embodied dispositions and diverse modes of knowing (*cf.* Connor 2001). Each culture defines its own disease theory system encompassing the beliefs about the nature of health, the causes of diseases and the remedies and healing practices; an ideational, conceptual system, an intellectual construct, a part of the cognitive orientation of the members of a society (Foster & Anderson 1978). When a person is considered ‘ill’, is defined in each culture within the scope of a disease theory system and socio-historical events.

Worldwide, policy makers, including the Indonesian Ministry of Health, tend to follow the WHO definition of health: ‘*health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*’ (WHO 2006b: 1). WHO recognises in its Eleventh General Programme of Work covering a ten-year period from 2006-2015, health as a worldwide shared resource and a shared responsibility (*cf.* WHO 2006a). The determinants and the measures required to improve the health of populations, communities, families and individuals set by WHO are used by policy makers as guidelines for the maintaining and development of health policies and programmes internally. The health indicators defined by WHO are gathered into four groups of health determinants: 1) the mortality and burden of diseases; 2) the health-service coverage; 3) risk factors; and 4) health-system resources which are put into relation with data on inequities and demographic and socio-economic statistics (*cf.* WHO 2008a). The following estimated rates were reported for Bali (2005-2010): an infant mortality rate of 20 per 1,000 live births; life expectancy at birth of 72.4 years; net reproduction rate of 0.89 and a total fertility rate of 1.629; and the under-fives mortality rate (2002-2003) was 19 per 1,000 live births (*cf.* DepKes 2007).

Aware of the WHO health determinants, Indonesia closely monitors per province incidence rates of malaria, TB, AIDS, and pneumonia cases among under-fives, leprosy, communicable diseases which can be prevented by immunisation (polio, measles, *tetanus neonatorum*, diphtheria, pertussis and hepatitis B), diarrhoea outbreaks and dengue (haemorrhagic fever). For Bali, the following data were reported in 2006: the incidence rate of malaria has risen from 0.08 (2001) to 0.55; there were 1374 new cases of TB pulmonary AFB+; AIDS had a case rate of 11.44 per 100,000 population thereby ranking fifth of all Indonesian provinces, with 173 newly reported cases in 2006; 21.69% of pneumonia cases among under-fives; a prevalence rate of 0.52 leprosy per 10,000 and 168 new cases detected;

544 cases of measles, 23 cases of diphtheria, 83 cases of pertussis and 24 cases of hepatitis B; and 3,596 cases of dengue/haemorrhagic fever (*cf.* DepKes 2007). Bali had no cases of polio, *tetanus neonatorum* or diarrhoea outbreaks in 2006 (*cf.* DepKes 2007).

Despite the fact that WHO international put together health indicators which are accepted in Indonesia and Bali as valid indicators at the macro-level, health and its interrelated concepts remain culturally defined concepts. Cultural settings determine what defines the 'complete' physical, mental and social well-being expressed in the health definition and cultural settings define the aetiology of diseases and the illnesses. Balinese conceptualise the world around them as one of dynamically integrated wholes, which can be used to describe the universe, the world of men and the human body. Disturbances in any integrated whole will cause disharmony (*cf.* McCauley 1984). Keeping the balance within the *tri hita karana* concept is a highly important contribution to health, well-being and happiness, since imbalance between them imposes illness (*cf.* McCauley 1984; Suryani & Jensen 1992; Pitana 2000; Sacchette 2002). There are many ways by which this balance can be disrupted. It can be disrupted intentionally by not following a prescribed diet, using black magic or witchcraft and it can be disrupted unintentionally due to accidents or contracting an infection or bacteria. The examples just given are disruption of the horizontal axis of the Balinese cosmovisions. They are disruption of the connection between an individual and his/her fellow humans or nature. Disruptions in the vertical axis of the Balinese cosmovisions are the disruption of the connection between an individual and God, with all its representation including the gods and ancestors. Whatever caused the imbalance, whether natural (such as fractures or infections) or supernatural factors (mistakes in ceremonies or evil spirits), Balinese believe that these can cause such symptoms as anxiety or depression, other mental disorders and all types of physical illness (*cf.* Suryani & Jensen 1993).

Healing, in the Balinese conceptualisation, essentially means the restoring of the balance in integrated wholes or between aspects of *tri hita karana*. This conceptualisation of health transcends the boundaries of the individual medical systems and is part of the integral perception of what health and its interrelated concepts connected to ill-health are and how this can be dealt with. Balinese community members usually believe that doctors and other representatives of the modern medical system are able to treat only diseases caused by natural factors (naturalistic) successfully (*cf.* Connor 1984). Naturalistic diseases and illnesses are those believed to be caused by natural causes. The cause is impersonal and in systemic terms, health prevails when: '*the insensate elements in the body, the heat, the cold, the humors or dosha, the yin and yang, are in balance appropriate to the age and condition of the individual in his natural and social environment*' (Foster & Anderson 1978: 53).

Traditional healers and their wide range of treatments are often called in for support for degenerative diseases including heart and artery and cholesterol problems, hypertension, cancers, rheumatism, *asam urat* and asthma. The *balian* are specifically said to be able to understand and treat problems with an abnormal course of events or which are caused by supernatural factors (*cf.* Connor 1984). This type of disease or called personalistic. Personalistic diseases and illnesses are those believed to: '*be caused by the active, purposeful intervention of a sensate agent who may be a supernatural being (a deity or a god), a nonhuman being (such as a ghost, ancestor, or evil spirit), or a human being (a witch or sorcerer). The sick person literally is a victim, the object of aggression or punishment directed specifically against him, for reasons that concern him alone*' (Foster & Anderson 1978: 53). The restoration of balance and course to be undertaken will depend on the alleged cause of the diseases or illness, which might be naturalistic or personalistic. The appropriate course of action will be determined by the *balian* and, especially in the case of personalistic

diseases, this does not always requires an active involvement of the patient; the *balian* will act as an intermediary restoring the balance upset by the supernatural or non-human being or counteract the actions of the witch or sorcerer. Because of the interrelationship of the *tri hita karana* concept and the perception of health, illness and disease, a patient seeking advice from a *balian* might be recommended to make changes in his/her physical or social environment to rebalance the macrocosmos or to perform action to harmonise with God so as to restore the balance within the body (the microcosmos), and hence be cured.

5.3.2 Decision Making and Illness Behaviour

In this study, an adaptation of the multivariate models applied by Agung (2005) and Ibui (2007) based on the multivariate model of Slikkerveer (1990) is used to study the Balinese community members' knowledge of, beliefs in and practices with MAC plants. The utilisation of health care, in this case the application of MAC plants, is highly complex and affected by biological, psychological, social and cultural factors. On the basis of her health survey in Bali, McCauley (1984) concluded that in choosing among health treatments alternative, people were influenced by costs, social distrust, a concern with harmony, belief in the need to regulate the use of time and space, respect for the values represented by the ancestors, and a fear of confrontation. Slikkerveer's model integrates the factors determining the decision making and illness behaviour as specified in Section 3.1.2.

As Slikkerveer (1990: 69) indicates, the utilisation of health care can be regarded as: '*a specific form of consumer behaviour in which interactions between the individual's psycho-biological system and the social system take place*'. The five stage model of medical-care course devised by Suchman (1965) and Kohn & White's (1976b) model emphasising perceived morbidity as a strong determinant in the course of health care give the foundation of the identification of the variables in the block of factors used in the multivariate model. This study focuses on the self-treatment of community members using MAC plants for curative, promotive or preventive health care. Although developed in relation to curative health care leading to an engagement with health professionals, an analogy of Suchman's (1965) five stages of illness behaviour can be applied to the community members preventive and promotive health behaviour and to self-treatment. The health practice studied is the utilisation of home remedies of fresh MAC plants for curative, preventive and promotive reasons which might be encouraged by self-treatment or the advice of a professional. Below is a general description of Balinese health care utilisation and the analogy for self-treatment and preventive and promotive health care in relation to Suchman's (1965) and Kohn & White's (1976b) model, validating the multivariate model for these types of treatment and health care.

As described in Section 2.2.3, Suchman's (1965) classic study divided the sequence of medical events representing major transition points involving new decisions about the future course of medical care into five stages (*cf.* Suchman 1965): 1) the symptom-experience stage, 2) the assumption of the sick-role state, 3) the medical-care contact stage, 4) the dependent-patient role stage and 5) the recovery or rehabilitation state. Stage 1, the symptom-experience stage is a necessity; if a person does not consider it remotely possible that something is wrong, he/she will neither engage in a course of medical care with professional medical care nor commence self-treatment. The assumption of the sick role state (Stage 2) does not happen before a person is hindered or prevented from continuing the course of her/his daily behavioural pattern.

Depending on the course of a disease or illness and highly susceptible to the perceived morbidity, the shift from Stage 1 to 2 can happen within a few minutes, after a few hours or after several days, weeks or even months. The analogy for the self-treatment with the five

stage model is that a person will undergo the symptom-experience stage and the assumption of the sick role as in any other situation. The differentiation begins in Stage 3, in which case the person does not become a patient, although it could be argued that the role of patient and 'health provider' resides in a single person. In the course of self-treatment, the person certainly does not take the decision to seek professional health care but to undertake health practices personally. Stage 1 in case of preventive and promotive health care is the realisation stage instead of symptom experience stage; a person has to acknowledge that they might be at risk in order to undertake preventive action or consider it a possibility to improve their general condition, eventually leading to engaging in promotive health practices. Stage 2 in case of preventive and promotive health care is not the assumption of the sick-role state but the decision that it is possible to prevent a distortion of health, improve or maintain the health situation.

In Stages 3 and 4 of the medical-care process, several sequential and sometimes simultaneous decisions are made by patients or their caretakers. First, a decision will be made to use professional medical care or not. Buschkens & Slikkerveer (1982) use the term 'non-action patients' for persons who, when discovering that they are ill on the basis of self-diagnosis when they become aware of their perceived morbidity or in some cases are given a professional diagnosis, do nothing to ensure recovery. The 'action patients' can resign themselves to self-treatment or any health care practitioner. Whether self-treatment is socially acceptable depends on the severity of the disturbances in the natural and social system and the perceived morbidity as described in Kohn & White's model (1976b). The 'WHO model' using four blocks of variables: predisposing factors, enabling factors, perceived morbidity factors and health-service system factors, can be applied directly to the decision for self-treatment instead of the contact with health care practitioner.

Self-treatment is very common in Bali. In a non-acute onset of symptoms indicating a disturbance in health, Balinese will always treat themselves for a period of two to three days to 'get rid' of the symptoms. Self-treatment can be as simple as a change in daily behaviour pattern (for instance, taking a rest) or as the administration of non-prescription drugs, herbal remedies or fresh MAC plants. During this initial period of self-treatment, people might alternate the practices available with each other and as a whole these actions may take several days to some weeks, especially if symptoms diminish or are dormant for a while. The Ministry of Health reports a 64.46% self-treatment in Bali in 2006, the proportion of population having self treatment based on modern medicine was 79.83%, based on traditional medicine 54.33% and 9.40% had a different character (*cf.* DepKes 2007). Remarkably, during the reference month there was a slightly higher percentage of self-treatment in urban areas (65.30%) than the rural areas (63.54%) (*cf.* DepKes 2007).

When Balinese enter Stage 3, contacting a health care practitioner, they will base their decision in choosing between modern or traditional practitioners on the perceived morbidity. It is of the utmost importance, whether by self- or professional diagnosis, the illness is naturalistic or personalistic. Respondents indicated that in Bali it is common in all naturalistic diseases to consult a modern, trained practitioner, often a medical doctor, before consulting a *balian*. In principle, *balian* are consulted in case of long periods of sickness, without the expected results from previous treatments or interventions, and in the case of periods of odd sickness or personalistic diseases, for example, *sakit pemali*; a disease caused by doing forbidden things, such as not respecting something holy or violating a taboo. Its symptoms are a feeling of piercing pain under the lungs close to the stomach. Considering the preventive and promotive health care in the Balinese situation, Stage 3 involves a much wider professional scope and 'self-treatment', better described as personal initiatives. There is a

much higher incidence of engaging in preventive and promotive health activities. Some preventive practices are commonly accepted as such: following a diet, engaging in sports activities and the application of MAC plants. Several other Balinese preventive and promotive actions might not be considered health practices outside the Balinese setting. Among these are the making offerings and engagement in socio-cultural events such as *gamelan* playing as a stress-releaser. The Balinese believe that a person's soul is involved in illness and that they will become vulnerable to illness if the three factors: the microcosmos (*buana alit*), the macrocosmos (*buana agung*) and God (*Sang Hyang Widhi Wasa*) are not in equilibrium (cf. Suryani & Jensen 1993).

During stage 4, the dependent patient role, a wide variety of actions and treatments can be undertaken on the basis of professional advice or personal decisions reinforcing or counteracting other health actions. In their quest to restore health, the Balinese undertake a multitude of actions, thereby searching for the identification of the proper diagnosis and therapy. These actions are intended to intervene on the psycho-biological system, namely, manual or biochemical treatments (the personal system) or on the surroundings of an individual, for example offerings or reconciliation with neighbourhood or family (the social system). During fieldwork, informants confirmed that it is essential to 'stay in balance' and to find the appropriate treatment. Regardless of the disease, illness or disorder from which a patient is suffering, caused by either naturalistic or personalistic agents, it is believed that if a person is to be ready to restore health, five criteria must be met. The individual (patient) has to have:

1. <i>niat</i>	a plan, intention (to heal);
2. <i>percayaan</i>	trust;
3. <i>sabar</i>	patience, an internal calm, tolerance;
4. <i>diagnosis & terapi</i>	identification of the right diagnose and therapy; and
5. <i>keadaan</i>	sufficient means (to cover possible costs).

To have a plan (*niat*) means that a person has to really have the intention to be cured. The 'non-action patients' Buschkens & Slikkerveer (1982) identified do not have *niat* in Balinese terms. Furthermore, patients truly have to trust or believe in their intention to heal. *Percayaan* encapsulates the intrinsic motivation of a person, expressing their compliance with advice, treatment and medication. To be *sabar* indicates the readiness of an individual to accept what ever will happen to them in the course of the sickness. The fourth and the fifth criteria are very profound, a wrong diagnosis, the wrong treatment or the inadequate means to see the intended practitioner or follow the intended treatment will hinder the restoration of health. It is common for people to spend a large amount of time, energy and money on locating the proper specialist, doctor or traditional healer. Despite their link with the philosophy of Balinese traditional medicine, these five criteria are valid for the restoration of health within the whole Balinese medical plural system. Importantly, they do not guarantee the restoration of health. In each medical system limitations are acknowledged. If the situation in which health may be restored is granted one, these five criteria will ensure that this is so.

In case of self-treatment, Stage 4 is virtually non-existent; the person does not become a patient besides playing a double role of simultaneously being patient and 'health provider'. In all other possible situation, Stage 4 is present and the sick person will assume the patient role, but cogently in this case the 'professional' might be a relative or peer person. In case of preventive and promotive health practices which are not designated 'self-treatment', Stage 4 is present if the preventive or promotive health practices are prescribed or directed by others,

who might be the same professionals who conduct curative health practices or might be a professional not even active in ordinary health care, such as personal trainers, yoga teachers and the like. In general the Balinese tend not to look for a treatment but for a solution which will restore the balance and help them to recover health.

Therefore, there is no single medicine or treatment in the Balinese conceptualisation for a disease, illness or disorder. Taking into consideration, the holistic approach to health and healing which eschews simply addressing the biomedical actors, the treatment or medicine has to suit the patients absolutely. Patients will continue to search until the appropriate remedy is found within the scope of the plural medical system. Consequently, it is to be expected that the Balinese keep switching treatments, medicines, in fact shopping around for a healer. Even when a patient is resigned to a single health practitioner, complementary health improvement actions, which might be beneficent or adverse to the primary treatment, are resorted to and quite often this is the utilisation of MAC plants. Kohn & White's model (1976b) accounts for the restarting of the cycle; if Stage 5 is not reached, the medical care contact stage will be re-entered and a new decision will be made for the follow-up to the illness behaviour, which might be a second type of self-treatment or seeking contact with either one of the three health care sectors. The most general example of this follow-up of treatments is when the initial self-treatment with MAC plants or over-the-counter drugs in the first two to three days of the onset of symptoms has not produced the intended results. A re-evaluation of them will lead either to the decision to engage in professional health care, commonly a medical doctor, or, when results are disappointing, the *balian* is consulted.

5.3.3 *Emic Disease Classification*

In the previous section the community members' decision making and illness behaviour were discussed using the general theory of illness behaviour: the five-stage model of medical care course devised by Suchman (1965) and Kohn & White (1976b) model, pinpointing the continuous adaptations in the individual actions undertaken to remedy the situation on the basis of their perceived morbidity in the social and personal systems, specifically of the utilisation of MAC plants for promotive, preventive or curative health care. Decisions in the medical care process are made depending principally on the perceived morbidity and such so-called 'invisible' factors as the alleged burden of disease, the *emic* disease classifications, the alleged aetiology, the use-value, norms, myths, taboos and cosmology (*cf.* Leakey & Slikkerveer 1991a). Regardless of the decision - no medical contact, self-treatment or a specific health practitioner in the medical pluralistic situation -, the illness behaviour is unmistakably connected to the understanding of how the Balinese classify illness, since illness beliefs, behaviour and health care activities are interrelated (*cf.* Hobart *et al.* 1996). The perceived morbidity of a disease, often based on self-diagnosis, is a major actor in the decision process. Undoubtedly therefore the specific views which the Balinese entertain of diseases co-determine which actions will be undertaken (*cf.* Hobart *et al.* 1996).

In the social sciences, as mentioned earlier a division is made between *emic* and *etic* classifications. The *emic* classifications, which are the focus of this research, are: '*those drawn from the way local people perceive things through their own eyes and classify objects in their own language*' (Martin 1995: 11). Given that classifications are closely connected to local aetiologies and worldviews, the local disease classification used by the members of the community in Bali can be very different from the Western classification of diseases, which is closely connected with the way modern medicine classifies diseases. Modern medicine classifies diseases in terms of: '*a single taxonomy with universal categories. In the reference of this taxonomic system, each known disease keeps its identity wherever it might appear and*

independent of the social context' (Lieban 1977: 21). The technique of pile sorting was used to study the *emic* classification of disease, illnesses and other disturbances of health. The *emic* disease classification represents the perception of the community. It is the result of an acculturation or transculturation process in which the reciprocal nature of the traditional and modern medical system stands out.¹¹ The *emic* disease classification is the community members' perspective and, although based on the philosophy of the Balinese traditional medical system, it integrates elements of both the modern and other medical systems. Waxler (1981) points out that each society has its own specific definition of the kinds of behaviours, dysfunctions, even feelings, also referred to as symptoms, which are named and treated as 'illnesses'. Therefore all the reported names in response to questions about identifying a disease, illnesses and other disturbances of health are included in the pile-sort analysis studying the Balinese *emic* disease classification.

The results of the pile sort of the Balinese *emic* disease classification are represented graphically in a dendrogram (see Appendix IX). The first clustering consisted of eighteen clusters, the second of ten clusters. This second clustering was chosen to represent the *emic* disease classification of the Balinese community members. The denominated ten-cluster solution is based on the names of the standardized categories, in alphabetical order:

- 'brain' groups those diseases which are related to the (mal) functioning of the brain, also referring to the disturbance of thoughts which are located in the brain;
- 'coughing' groups the diseases of which the main symptom is being bothered by a (continuous) cough;
- 'external' groups the diseases, of which the common factor is that they have visible symptoms on the exterior of the human body. Most of them are caused by external agents;
- 'fever' groups the diseases of which the main symptom assigned to them is a fever or a feverish feeling, often referred to as a hot-cold feeling;
- 'head/throat' groups the diseases all of which are situated around the head, face and upper throat area;
- 'internal system' groups the diseases which share the characteristic that they are internal diseases which effect the whole functioning of the human body negatively;
- 'intestines/stomach' groups, the diseases which are gastro-enteric and/or related to the digestive system;
- 'organs' groups the diseases which are assigned to distortions or inflammations of the internal organs, including the heart, liver, kidneys and lungs;
- 'restricted movement' groups the diseases which have in common that the main symptom is that the person cannot move their limbs in a normal, comfortable way mostly resulting in difficulties in walking and other locomotion;
- 'skin' groups the diseases which have in common that the main symptoms are such visible distortions of the skin as rashes, ulcers, boils and the like.

Every year during the reference month, the Indonesian Ministry of Health lists the health complaints of the population by province. In 2006, 33.96% of the Balinese reported a health complaint during the reference month: fever (48.31%), headaches (18.90%), cough (49.77%), common cold (47.18%), diarrhoea (5.19%), asthma (6.82%), toothache (5.73%) and other complaints (16.22%) (*cf.* DepKes 2007). The *emic* classification of disease bears a certain similarity to the categorisation of the Ministry of Health, especially the first four categories in both classifications, indicating the practical overlap present between the different medical systems contained within the *emic* disease classification.

In Table 5.3 an alphabetical overview is given of the disease names by clusters resulting from the pile sort. A cross-check was made and the Balinese respondents in all four villages could find themselves in this ten-category classification. The *emic* disease classification presented reveals that not aetiology but locations, symptoms and types of discomforts were the prevailing categorical factors in the *emic* classification. The reason aetiology might not be a major aspect in the *emic* classification of diseases is because Balinese acknowledge a wide variety of causes of the disruption of harmony, for illnesses and disease or a single symptom or disease might be caused by a variety of actors and pertinently Balinese do not distinguish between the causes of physical sickness, misfortune or emotional and mental difficulties (cf. Hobart *et al.* 1996).

Table 5.3 Composition of the clusters of the diseases reported by respondents in the sample villages

Cluster	Reported diseases in the cluster
Brain	<i>Epilepsi, Gangguang otak, Stress, Stroke, Susah tidur</i>
Coughing	<i>Asma, Batuk, Batuk Darah, TBC</i>
External	<i>Bau badan, Bengkak, Gondok, Ketombe, Luka-luka, Memar,</i>
Fever	<i>Demam, Demam berdarah, Flu, Kedinginan, Malaria, Masuk angin, Panas, Panas dalam, Pilek, Tifus</i>
Head/throat	<i>Nafsu makan, Mimisan, Migraine, Paringitis, Penyakit mata, Pusing, Sakit gigi, Sakit kepala, Sakit mata, Sakit tenggorokan, Seriawan, Sesak Nafas,</i>
Internal system	<i>Anemia, Darah rendah, Darah tinggi, Hernia, Kanker, Kanker payudara, Keputihan</i>
Intestines/stomach	<i>Diare, Keracunan, Mencret, Muntah, Perut kembung, Sakit maag, Sakit perut, Sakit uluhati</i>
Organs	<i>Batu ginjal, Kencing batu, Kencing manis, Kolik, Radang ginjal, Radang usus, Radang paru, Sakit ginjal, Sakit jantung, Sakit jantung koroner, Sakit kelenjar prostat, Sakit kuning</i>
Restricted movement	<i>Asam urat, Flu tulang, Kesemutan, Keseleo, Lumpuh, Patah tulang, Pegal, Rematik, Sakit Pinggang, Sakit tulang</i>
Skin	<i>Alergi kulit, Bisul, Cacar, Eksem, Gatal, Panu</i>

Source: Household survey 2006

Table 5.4 shows the disease reported according to the *emic* disease classification related to the reported curative use of MAC plants. Five hundred and twenty-five household members reported no disease, illness or other health-related discomfort in the twelve months just elapsed, they score in the 'no disease reported'. Table 5.4 reveals that overall more than half of the respondents in a disease cluster stated using MAC plants for the reported disease, with the exception of the unspecified disease cluster 'Other' where less than half of the respondents (40%) in that cluster reported using MAC plants. Specifically high are the percentages of use for the diseases clusters, 'Organs' (86.4%), 'Internal (system)' (85.2%) and 'External' (80%). By far the lowest reported use of MAC plants was for 'Brain' and 'Skin' diseases. From the reports it is impossible to deduce whether the use of the MAC plants for the reported disease was exclusive, complementary or for secondary symptoms or discomfort during the disease episode. This might be a logical explanation for the report of high MAC plant use in all the clusters and in-depth study focusing on the daily use of MAC plants is necessary to establish this distinction.

Table 5.4 Distribution of utilisation of MAC plants according to reported disease cluster (N=1724)

Disease cluster	Not applicable		No Use		Use		General Total	
	N	%	N	%	N	%	N	%
Brain	0	0.0	5	45.5	6	54.5	11	100.0
Coughing	0	0.0	40	38.1	65	61.9	105	100.0
External	0	0.0	2	20.0	8	80.0	10	100.0
Fever	0	0.0	186	29.6	442	70.4	628	100.0
Head/throat	0	0.0	39	35.1	72	64.9	111	100.0
Internal system	0	0.0	4	14.8	23	85.2	27	100.0
Intestines/stomach	0	0.0	19	27.9	49	72.1	68	100.0
Organs	0	0.0	3	13.6	19	86.4	22	100.0
Restricted movement	0	0.0	25	22.9	84	77.1	109	100.0
Skin	0	0.0	12	44.4	15	55.6	27	100.0
Other	0	0.0	3	60.0	2	40.0	5	100.0
Not specified	0	0.0	15	19.7	61	80.3	76	100.0
No disease reported	525	100.0	0	0.0	0	0.0	525	100.0
Total	525	30.5	353	20.5	846	49.1	1724	100.0

Source: Household survey 2006

In-depth interviews revealed that another division complements or co-exists alongside the *emic* classification presented: an overall division between the *biasa* (usual) and *luar biasa* or *pepasanga* (unusual) and the theoretical division of the diseases following the *usada* into *panas* (hot), *nyem* (cold) and *sebaa* (neutral or middle). Laderman (2001) describes the usual – unusual division in her study of Malay healing and she attributes this division to incidence and not suspected aetiology. The ‘usual’ diseases (*biasa*) are those which have a natural origin and progress in the manifest world (*sekala*), whereas the ‘unusual’ (*luar biasa*) diseases are those which have a ‘supernatural’ origin and/or an ‘unnatural’ process; hence have a connection to the unseen world (*niskala*). A disease therefore can be redefined during the sickness process, on account of incidence or new insights into either one of the categories, thereby shifting from a ‘usual’ (*biasa*) diseases to a ‘unusual’ (*luar biasa*) disease or the other way around.

The distinction between ‘usual’ and ‘unusual’ disease affects illness behaviour and treatments. The type of disease, in the classification presented and whether it is considered ‘usual’ or ‘unusual’ has a direct effect on the preferred treatment. Modern medicine is used for all ‘usual’ or naturally caused diseases and is commonly the first choice for all (perceived) severe acute diseases with a normal onset (*cf.* Suryani & Jensen 1993). Traditional medicine is reserved for illnesses and diseases which are persistent, ‘unusual’ or ‘personalistic’ or semi-acute, in which case they are often used simultaneously with modern medicine depending on the patient’s preferences (*cf.* McCauley 1984). More pertinently, if a disease is clearly ‘unusual’ it is said that healing, if at all possible, can only be effectuated by a *balian* and cannot be treated by modern medicine (*cf.* Suryani & Jensen 1992; Hobart *et al.* 1996). Since only *balian* are able to understand and restore the equilibrium of the *tri hita karana*, whose disharmony the Balinese perceive influences the illnesses or disease (*cf.* Suryani & Jensen 1993; Pitana 2000).

In this chapter, the reported use of the MAC plants by household members is presented specified by type of use, curative preventive and promotive. Clearly, the use of fresh MAC plants plays an important role in self-medication and self-treatment. The alternatives to fresh MAC plant use are enormous, even within herbal treatments there is a very wide range from local, pre-prepared mixtures to all the industrially produced ‘modern’ herbal medicines in different forms. As the results presented demonstrate, the utilisation of MAC plants should be analysed in a context broader than that obviously expected related to such determinants as age, gender and type of disease. In Chapter 7 the Balinese community members’ knowledge of, beliefs in and practices with MAC plants in relation to the utilisation and bio-cultural diversity conservation of MAC plants will be analysed on the household level to attain an insight into the main factors influencing their behaviour.

Notes

- ¹ In fact, commercial production is dominated by a few large firms like *Jamu Cap Jago* (1918) and *Jamu Cap Portret Nyonya Meneer* (1919) (cf. Lyon 2003).
- ² See Appendix VI for the complete overview of reported MAC plants, the names and types of reported use.
- ³ *Kesaktian* is ambivalent and amoral, it is easily converted into different ends, good as well as evil (cf. Hobart *et al.* 1996).
- ⁴ In 2006 petrol was 4500 Rupiah a litre, in remoter areas as for instance in Pelapuan, located up in the mountains, the price was higher (5000 Rupiah a litre).
- ⁵ The chief focus of the regularly held *posyandu* is the immunization programme and basic mother child care. The community has to provide a location where the *posyandu* can be held and five volunteers, with a minimum of junior high school education, who support the health personnel provided by the *puskesmas*.
- ⁶ Lewis and Elvin Lewis (2003: 12) indicate that: ‘Of systems and therapies that utilize plants, the most puzzling and paradoxical is homeopathy. It uses micro doses of potential toxins from plants, animals, or minerals to provoke defence and self-regulatory responses. ... There is no known mechanism of action to explain homeopathic medicines, yet controlled clinical trials have shown efficacy beyond a placebo effect. It is currently a medical enigma.’
- ⁷ The International Classification of Disease codes (ICD) of the reported disease are: 1) A09, 2) A91, 3) A01, 4) O20-O23, O25-O29, O61-O63, O67, O69-O71, O73-O75 and O81-O83, 5) S O6, 6) R 50, 7) no codes defined, 8) J12 and J18, 9) B50-B54 and 10) K 30 (cf. DepKes 2007).
- ⁸ The ICD codes only have been specified for category 9) E14 and 10) A09 (cf. DepKes 2007).
- ⁹ The Unicef GOBI-FFF method stands for :
 - Growth monitoring, the monthly weighing of the *balita*, notation on the charts
 - Oral-rehydration therapy, providing children with diarrhoea with clean water supplemented with salt and sugar
 - Breast feeding, promotion of breast feeding and breast feeding only during the first three months
 - Immunisation, immunisation against the six most important child diseases: measles, whooping cough, diphtheria, tetanus, TBC and polio.
 - Female education, raising the education level of females
 - Family spacing: spreading the birth intervals to prevent overburdening the mother
 - Food supplements: extra food supplements for the mothers during the pregnancy so they maintain their strength.
- ¹⁰ The *gibung* festive meal is a traditional sharing of food, for example at weddings, for which groups of eight men or women separately will eat from the same dish.
- ¹¹ Acculturation has been defined by Redfield, Linton & Herskovits (1936: 258) as following: ‘*Acculturation comprehends those phenomena which result when groups of individuals having different cultures come into continuous first-hand contact with subsequent changes in the original cultural patterns of either or both groups*’. Transculturation has been defined by Ortiz (1970: ix) as: ‘*It is a process in which both parts of the equation are modified, a process from which a new reality emerges, transformed and complex, a reality that is not a mechanical agglomeration of traits or even a mosaic but a new phenomenon, original and independent.*’

6 Bio-Cultural Diversity Conservation in Bali

The theme of this chapter is the bio-cultural diversity conservation of MAC plants by Balinese community members. Since Bali is located in one of the mega-diversity centres of the world, the biodiversity conservation of the flora and fauna encapsulated in a wide variety of ecosystems might benefit not only Bali but also the rest of the Archipelago and the rest of the world. This study of biodiversity conservation focuses on the sustainable use of natural resources, MAC plants, in the wider scope of the social, economic, cultural, ecological and political value of sustainable development. The sustainable use of natural resources is more realistic than the hands-off conservation approach, which is out of step with the Balinese cosmovision in which humans are an integrated part of the cosmos.

Sections 6.1 and 6.2 respectively discuss both the biodiversity conservation and the cultural diversity conservation of MAC plants, focusing on the actions of the Balinese themselves and the reported behaviour in the household survey. Change itself is not a determinant in the loss of cultural diversity, since cultures are dynamic concepts: traditions are renewed and captured by each generation when a cultural legacy is inherited. Nevertheless, it is essential that the change occurring in a society is initiated or at least consciously harnessed or controlled by the community members themselves and not by external agents; the latter leads to the replacement or even annihilation of cultural strains, practices, morals or values. As will be described in this chapter, the Balinese actively monitor the essence of being Balinese (*kebalian*).

Section 6.3 puts the bio-cultural diversity conservation of the island and the sustainable use of natural and social resources into relationship with the ancient Balinese-Hindu principle *tri hita karana*. *Tri hita karana* is the *corpus* in the Knowledge-Belief-Practice complex of Bali. *Tri hita karana* offers guidance in maintaining the harmonious relationships between and within the human world (*pawongan*), the natural world (*palemahan*) and the spiritual world (*parahyangan*); basically a practical traditional way of ensuring the ‘newly’ re-invented, bio-cultural complex and, as such, the principle by which the Balinese can conserve their bio-cultural diversity sustainably. This is followed by a discussion of the threats and the opportunities of tourism. Tourism is often blamed as the source of natural and social deterioration in Bali, inevitably also influencing the utilisation of MAC plants. This utilisation certainly contributes to the improvement of the community health in Bali, but it only makes a positive contribution if approached with caution. Therefore, it is essential that the traditional knowledge of, beliefs in and practices with MAC plants are transferred to the younger generation to ensure the development and sustainable implementation of MAC plant utilisation, so these will continue to be available to future generations.

6.1 Biodiversity Conservation

6.1.1 Biodiversity Conservation and Sustainable Development

The term sustainable development was coined by the Brundtland Commission in the early 1980s and in 1992 the Earth Summit in Rio de Janeiro added the principles of sustainable development to its Agenda 21; in simple terms it meant creating a better life for more of the world’s people by remaining in harmony with nature (*cf.* Ismail 1998). Sustainable development is defined as ‘*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*’ (Spellerberg 1998: 1).

Although sustainable development links up with social, economic, cultural, ecological and political perspectives, fundamentally it refers to the sustainable use of biological diversity, the foundation of all sustainability, since it is the very basis of ecosystems which provide us with life-supporting systems (*cf.* Spellerberg 1998).

Solahuddin and Dahuri (1998: 103) argued that the sustainability of biological resources in Indonesia was threatened on several fronts: *'loss or removal of natural habitats, overuse and over-exploitation of species, pollution, introduction of new species, and the potentially catastrophic effects of global climate changes including ozone depletion and global warming'*. Besides the external pressures on the habitat in Bali exerted by economic development, globalisation and tourism, which lead to increased population pressure on land, forest and water ecosystems, the ecosystems in Bali are threatened by the impact of the natural forces of eruptions, forest fires, earthquakes, floods and tectonic earthquakes (*cf.* Hobart *et al.* 1996; Agung 2005). Remarkably, Bali has been treated gently in the last series of earthquakes and volcano eruptions which afflicted the neighbouring islands of Sumatra and Java in the two years after the estimated 9.2 magnitude earthquake, caused by the movement of the tectonic plates, which triggered the tsunami disaster on 26 December 2004.

Unmistakably, the environmental threats to biodiversity have different roots. There is still considerable debate about what generates some threats, such as global climate change, and consensus is far from being reached on the actual causes. Solahuddin and Dahuri (1998) identify seven major anthropogenic factors in the threats to the sustainability of biological resources in Indonesia:

1. lack of awareness, particularly in the government and private sectors, of the strategic value of biodiversity for sustainable economic development;
2. a combination of increasing population pressure, poor land-use practices and development policies;
3. poverty and limited alternative livelihoods affect a big proportion of the Indonesian people;
4. lack of relevant knowledge, skills, equipment, and capital to carry out integrated planning and management of the utilisation of biological resources on an optimal, sustainable basis;
5. insufficient policy implementation and enforcement of laws related to national resource use and the environment;
6. lack of co-ordination among agencies, mainly because of 'sectoral egoism';
7. top-down approaches in planning and managing the utilisation of natural resources and biodiversity which, in many cases, have ignored the customary laws, *adat* rights, indigenous knowledge and community-based management.

Solahuddin and Dahuri (1998) identify five of these seven anthropogenic factors as the direct responsibility of the Indonesian government. The second and the third causes, although still in the realm of government responsibility, are more complex. For years the government has been relatively successful in implementing its family planning campaign, nevertheless the population is still increasing.

From the sustainable development perspective, the most fundamental challenge is to maintain sustainable economic growth so as to overcome poverty and, simultaneously, ensure the sustainable capacity of natural ecosystems and their resources. The 1945 Indonesian Constitution, which stresses the need for the wise and sustainable use of natural resources to achieve economic and social development, provides the basis for natural resource and biodiversity management in Indonesia. This is reflected in the adoption of the Basic Law on

Forestry (1967), followed by the other significant legislation affection biodiversity management in Indonesia (*cf.* Solahuddin & Dahuri 1998):

- PP No. 4/1982 concerning basic provisions for the management of the living environment;
- PP No. 9/1985 addressing issues concerning fisheries;
- Presidential degree No.23/24 July 1990 concerning management of protected areas;
- PP No.20/1990 concerning the control of water pollution;
- KEP-O3, MENLH II 1991 waste water standards for operating enterprises;
- PP No.24/1992 spatial use management co-ordinating and integrating the sustainable management of the sea;
- Draft PP 1992 Marine environment pollution control.

In 1992, leaders of all Southeast Asian countries, including Indonesia, signed the Convention of Biological Diversity acknowledging the importance of the environment and signalling their intention to participate in the international quest for sustainable development (*cf.* Martin & Idrus 1998). The Convention on Biological Diversity is a legally binding global treaty which encompasses three equally important and complementary objectives: the conservation of biodiversity; the sustainable use of its components; and the fair and equitable sharing of benefits arising from the utilisation of genetic resources. Theoretically, the ever-expanding and improving legislation adopted by the Indonesian government, which directly affects all its provinces including Bali, shows its intention to transform awareness of the strategic value of biodiversity for sustainable economic development into policies and actions. In practice, it has transpired that the various sectoral policies on biodiversity management in forestry, agriculture, and environment have experienced great difficulty in the implementation of the Convention of Biological Diversity. The National Agenda 21 of Indonesia (1992) was never adopted in the planning and implementation process of national development nor in sectoral activities. Neither have various other international conventions and declarations on biodiversity management been implemented (*cf.* Agung 2005).

Table 6.1 Distribution of the perceived impact of the government on the biodiversity conservation of MAC plants according to the sample villages (N = 400)

Village	Angantaka		Bengkel		Pelapuan		Tumbu		General Total	
Perceived impact	N	%	N	%	N	%	N	%	N	%
Don't know	1	1.0	8	8.0	0	0.0	0	0.0	9	2.2
Very low impact	5	5.0	31	31.0	2	2.0	1	1.0	39	9.8
Low impact	21	21.0	60	60.0	2	2.0	4	4.0	87	21.8
Average impact	37	37.0	1	1.0	22	22.0	13	13.0	73	18.2
High impact	36	36.0	0	0.0	61	61.0	79	79.0	176	44.0
Very high impact	0	0.0	0	0.0	13	13.0	3	3.0	16	4.0
Total	100	100.0	100	100.0	100	100.0	100	100.0	400	100.0

Source: Household survey 2006

The respondents in the four sample villages were asked to indicate how they rated the impact of their government on the biodiversity conservation of MAC plants. From Table 6.1 it can be concluded that there is a considerable difference in the perception of government impact between the villages. In Bengkel the respondents defined the impact of their government on

biodiversity conservation of MAC plants as low (60.0%) to very low (31.0%). In Angantaka the government was perceived to have a normal (37.0%) to high (36.0%) impact, whereas in Pelapuan and Tumbu the majority considered the government to have a high impact on biodiversity conservation of MAC plants, 61.0% and 79.0% of the respondents respectively. A logical explanation for this difference is that both Pelapuan and Tumbu are located in richly forested areas and their water supplies are subject to serious seasonal problems; two topics which are well addressed by Indonesian legislation affecting biodiversity. This elucidates why the respondents in these two villages consider the government has a higher impact on biodiversity conservation in general, and specifically on MAC plants.

At the present stage of social and economic development in Indonesia, wildlife is considered to be in need of protection (*cf.* IBSAP 2003). In order to safeguard and protect wildlife, the Directorate of Nature Conservation and Wildlife Management (PPA) has set the target of designating about 10% of land as reservation areas. The PPA has adopted modern natural conservation practices, which emphasise the conservation of the entire ecosystem as its main conservation tool. At present, there are 320 nature reservations and national parks in Indonesia, and more are proposed (*cf.* Indonesian Embassy 2007). The management of the wealth of biological resources and ecosystems in Indonesia is formally co-ordinated by the Directorate General of Forest Protection and Nature Conservation of the Indonesian Ministry of Forestry. Agricultural land-use systems are managed by the Ministry of Agriculture which is empowered to do so, whereas the National Institute of Science (LIPI) represents the scientific authority. Scientists from LIPI, national institutes and local universities of Indonesia conduct their own research programmes as well as collaborate with foreign scientists on such diverse topics as taxonomy, ecology, fisheries production, plant and animal husbandry, soil science, silviculture and germplasm research (*cf.* Solahuddin & Dahuri 1998). Bowing to the growing pressure from both indigenous and traditional communities and from international and national organisations, institutions and NGOs concerned both by the local and global implications of biodiversity loss in Indonesia, the government has expressed a promising Vision of a Future Indonesia in the Indonesian Biodiversity Strategy and Action Plan 2003-2020 (2003) (*cf.* Agung 2005). Nevertheless, the implementation of conservation practices and the management of biodiversity without the involvement or participation of the local people has been shown to be virtually non-feasible (*cf.* Agung 2005).

Confronted with constant threat and fear of further loss of biodiversity, Bali is no exception in Indonesia. Severe habitat disturbance, exacerbated by over-exploitation and depletion of resources, has already threatened vulnerable species populations in the island seriously, and resources are being exploited at a rate far beyond the traditional subsistence requirements of the local population. The majority of these actions have been perpetrated by with the central government, whose objective is to accumulate a surplus for national economic growth, improved infrastructure and development of the tourism industry (*cf.* Agung 2005). Nevertheless, efforts have been made to protect the biodiversity of the island. The inland, western part of Bali has been declared a wild-life reservation area called Bali Barat. Bali Barat covers 570 square km², 10.1% of the province of Bali. The altitude of the area rises from 0 to 1414 metres providing a safe haven for monsoon forest, montane forest and semi-evergreen rainforest habitats (*cf.* Solahuddin & Dahuri 1998). However, in the eastern part of Bali, there is almost no primary forest left, just scattered secondary forest. Besides mounting international and central government concern with the problem, in the last decade the mass media have been continuously drawing attention to the imminent catastrophe if there is further loss of biodiversity. For example, the *Bali Post* warned its readers in 2004 that 286,983 ha of their beloved province, totalling 563,286 ha, is critically endangered, illustrating the

seriousness with such examples as: the wild forest in Bali is decreasing and might be much less than 20% of the width of the island and a dramatic number of springs have disappeared and almost all rivers in Bali are running dry.

In recent years, the population of Bali has increased but there is no more new land which can be used for rice cultivation. Even more seriously highly productive land around the urban areas, as well as such natural habitats as mangroves, estuaries and upland forests, are under growing threat of conversion to other land use, primarily housing, government buildings, private businesses, recreation areas, infrastructure and public facilities and monocultures of cash crops (*cf.* McCauley 1984; Solahuddin & Dahuri 1998; Agung 2005). Traditionally, land was owned by the Balinese and land would be passed to the next generation through the male line. Under the rules of inheritance, commoners' land can be considerably divided. With the rise of tourists and foreign investors, many Balinese have sold their land which has resulted in short-term economic gain.



Illustration 6.1 Proclamation of regulations on the designation of the land
Photographed by L.N. Leurs (Fieldwork 2006)

Nowadays, rules which forbid selling the land to non-Balinese persons are set by the Indonesian and Balinese authorities. These law enforcements are intended to protect Balinese land and literally prevent the island passing into the hands of foreigners. The results are legal constructions in which the whole of the real-estate property on the land belongs to a foreigner perhaps with an Indonesian, but mostly with a non-Indonesian, background, whereas the land itself is still owned by a Balinese person. Sadly therefore these general laws have not had the intended results. Bali has a shortage of agricultural land and rice (the staple food) has to be imported to provide all Balinese with their daily needs.¹ Therefore new regulations have been created in an attempt to maintain the true purpose of agricultural land. For instance, in Angantaka road signs proclaim (see Illustration 6.1) the regulations for the land, stating that the agricultural land cannot be used for any other purpose, such as living area, roads or other

building and that even after a sale the land will have to continue to be used for agriculture. The only exception is made for people already belonging to the *banjar adat* who may use the land for a different purpose if they can replace the area of land by the same area which will be used for agricultural purposes before any new purpose is officially assigned to the land in question.

One of the goals set in the Convention on Biological Diversity (CBD), which has not been formulated in law, is that there has already been a revival or reinvention of organic agriculture. Several respondents reported they had gone 'back' to the original form of agriculture. They farmed organically, namely refraining from use of pesticides and planting another strain of rice, said to be preferable the so-called original mountain strain of rice. In the mountainous areas, which proved intractable to the overtures of the 'Green Revolution', the rice strain originally used in Bali was not replaced by the high-yielding varieties of rice then introduced. The high-yielding varieties give a higher yield, up to three harvests a year, with the help of special chemical fertilisers and, since they are more vulnerable, they require more intensive use of pesticides. This has proved disastrous to the biodiversity in the *sawah*, since the pesticides used to kill the deleterious insects are also fatal to other animal and plant species. The *sawah* have been reduced to mono-crop fields by the Green Revolution. Once, various sorts of growth commonly considered weeds and other small 'useful' plants would grow in and around the *sawah*, several of them used as food or MAC plants.

Currently a number of Bali-based NGOs is involved at several levels in stimulating the Balinese to 'return to nature', by promoting a sustainable way of living. One example is the *Yayasan Cinta Ibu Pertiwi* organisation which provides information on the use and dangers of pesticides, as well as reforestation, organic agriculture, organic food and traditional medicine, in an attempt to stimulate people to adopt a sustainable way of dealing with their resources. The back-to-nature trend is attracting many supporters in the realm of agriculture and beyond, affecting such common daily behaviour as a person's basic diet. The essence of the 'back-to-nature' approach in the daily diet is trying to avoid chemical substances in all foods including rice, vegetables, fruit, meat or fish. The Balinese believe that there is a direct connection between a person's health and the quality of their diet. *Puskesmas* Pensari reports that there were several malnutrition cases in its area, primarily caused by economic restraints and secondly because of a dearth of knowledge. The Ministry of Health is currently striving to improve this situation and several local and international NGOs are working towards improving people's diets. This involves looking at a person's intake and simultaneously creating awareness of how food is produced, extolling organic agriculture. Several informants repeatedly recalled that in recent history Balinese people were more long-lived than the present population. They claimed it was quite common for there to be healthy centenarians. Now having to contend with industrialisation, pollution and the lack of physical exercise this is no longer the case. Regardless of their personal situation or active involvement in conservation projects, several informants were firmly convinced that the rediscovery of a more balanced way of living, a sustainable way of life, would benefit both biodiversity in Bali and the quality of life of the Balinese.

6.1.2 Biodiversity Conservation of MAC Plants

Alcorn (2000) indicates that the resource perception of a plant affects its management. Recognition of a shortage or threat of extinction is a greater stimulus to providing legislation on specific species to stop further damage, than when this is not the case. However, having legislation is no guarantee or a motivation for the general public to adopt sustainable practices with MAC plants if they do not sense or recognise the pending crisis. In order to establish

whether the Balinese community members would indeed experience a need for sustainable practices in their personal environment, they were asked about both the finding-places and their perceptions of the current number of MAC plants.

Of the respondents, 94.0% (N=400) indicated that the nearest finding-place of MAC plants was closer than 15 minutes from their houses. In 82.4%, the nearest finding-place referred to within this range was the respondent's own garden and in 11.6% the finding-place was in the same village. The other 5.5% indicated that the nearest finding-place was, between 15 and 30 minutes away, for which a variety of finding- places, either private or public property, was reported, and only 0.5% of the respondents indicated a finding-place was farther away, referring to the *sawah*. MAC plants, in general, without focusing on particular species, were perceived by the community members to be in the near vicinity. The TOGA programme is the chief reason for this perception. Since, as indicated before, a collection of five medicinal plants is already referred to as a TOGA, the variety of MAC plants close at hand tends to be low. Commonly, the collection of MAC plants in the garden has a double function. They are MAC plants which are also food plants or they are MAC plants which are also aesthetically appealing garden plants. It is difficult to decide which of the other two functions of the plants prevails in the decision about planting these MAC plants nearby.



Illustration 6.2 Impression of home gardens containing MAC plants
Photographed by L.N. Leurs (Fieldwork 2006)

Illustration 6.2 is an illustration of a home garden, which is indeed a TOGA, because there are five medicinal plants available. The reports on the proximity of the finding place of MAC plants explain the high level of users, which was apparent in Section 5.1, making the utilisation of MAC plants an easy option. Another conclusion which can be drawn from the report on the proximity of the MAC plants is that people tend to see their direct environment as the closest finding place, therefore MAC plants are cultivated in their direct surroundings

and the utilisation of MAC plants is not necessarily destructive to the environment. If obvious destruction has already taken place, the replacement of the original vegetation for living area, is not considered. The enquiry into the closest finding-place reports exactly this: it is where MAC plants can be found. Therefore, it does not give any information on where the MAC plants or the parts of the MAC plants actually used by the community members originally are harvested or collected from.

The respondents in all four villages were asked to indicate their perception of the current number of MAC plants in various possible finding-places: the forest, *ladang*, *sawah*, village area, neighbours garden and their own gardens. Table 6.2 gives an overview of the perceived number of MAC plants by finding-place. Table 6.2 shows an agreement among the respondents on the perception that the forest is still the location with the largest number of MAC plants. Considering the other finding places, the *ladang*, the village itself and the neighbours' gardens are considered to have an average number of MAC plants by slightly more than 40% of the respondents (N= 400). The majority rate their own garden as a place where only a small (45.7%) or even a very small number (25.7%) of MAC plants can be found. Consistent with the earlier conclusion related to the definition of TOGA, the variety of MAC plants found in the gardens is likely to be low. Broadly speaking, the conclusion must be that there is a general consensus among the Balinese community members that MAC plants are not available in large numbers in their direct surroundings. Very remarkably, 90 respondents (22.5%) had no idea of the number of MAC plants to be found in the forest, and 46 respondents (11.5%) were ignorant of the number of MAC plants in the village, which indicates a true absence of knowledge or a very low interest in or affinity with non-cultivated MAC plants, since all the other finding-places, the *ladang*, *sawah* and gardens, are cultivated areas. One herbal specialist in Tumbu confirmed this statement by saying that the people of his village had used MAC plants more often in the past than they currently do and that they do not know what has happened to the plants they used to use. Moreover, his fellow villagers were completely unaware that some plants with which they are acquainted are in fact MAC plants and that several MAC plants, which used to be applied, have disappeared.

Table 6.2 Distribution of the perceived amount of MAC plants according to finding-place (N=400)

Place	Forest		<i>Ladang</i>		<i>Sawah</i>		Village		N. garden*		Own garden	
Amount	N	%	N	%	N	%	N	%	N	%	N	%
Don't know	90	22.5	6	1.5	2	0.5	46	11.5	8	2.0	5	1.3
Very small	11	2.7	51	12.7	120	30.0	67	16.7	29	7.3	103	25.7
Small	14	3.5	144	36.0	199	49.7	74	18.5	187	46.7	183	45.7
Average	148	37.0	186	46.5	74	18.5	170	42.5	171	42.7	102	25.5
Large	124	31.0	13	3.3	5	1.3	43	10.8	5	1.3	7	1.8
Very Large	13	3.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	400	100	400	100	400	100	400	100	400	100	400	100

*N.Garden = Neighbours' Garden Source: Household survey 2006

More often than not, biodiversity policies and the conservation behaviour of people are directly related to the economic value of plants. The main reason organic agriculture is gaining in popularity is there is a rise in demand for this type of food, offering a real possibility to compensate the loss in quantity. This is obvious in organic rice production, which can be sold at higher prices as its high quality is recognised. This development is still

new and it is uncertain where it will lead, considering that the rice production is still one of the major factors in economic growth. Other examples of how economic values favouring this 'production' are sometimes mistaken for conservation actions towards certain plant species is the case of the *kamboja* (frangipani) tree (*Plumeria acuminata* Ait). In the household survey the *kamboja* tree is reported as a MAC plant, but the reason for cultivating this tree lies in its economic value. Hotels pay up to a 100,000 rupiah for the tree even when still a sapling, since it is enormously popular for both practical and aesthetic reasons. The shape of the tree, resembling a natural parasol, provides cool shady areas and it creates an exotic atmosphere; a flowering tree in the hotel gardens. Biodiversity is both protected and endangered by the economic value of certain species. Species are protected when they are worth money and conversely other species are destroyed because species with a high monetary value have been overproduced. The woodcarving industry, a traditional craft in Bali, made the wood for this craft very valuable, but owing to a lack of conservation measures, almost all wood for carvings is now imported from Java since the demand for wood supplies cannot be met by Balinese forests. The same problem is reported by the companies which process coconut shells for furniture and decorative articles. Bali no longer can supply the material. As in the case of the wood, the coconut shells are imported from Java.

Many studies indicate a world-wide decline in (MAC) plant resource recognition. According to Alcorn (2000), the increased availability of manufactured medicines which substitute some herbal remedies is a factor which affects the medicinal plant resource recognition. People may know that a given plant has a medicinal value but do not perceive it as a personal resource, as in the case of the *kamboja* tree. Key informants, specifically the traditional leaders and healers, strongly concur with this perception, despite the collective report of the knowledge of, beliefs in and practices with 168 MAC plants by the respondents in the four sample villages. The key informants stated that, and generally speaking many of the Balinese are no exception to this rule, nowadays humans neither respect nor value nature. Humans focus too much on the material, the technical world and this is their reason for reporting a change in nature has taken place in Bali. The most obvious illustration of this observation, they pointed out, was their observation that there are almost no big trees left in Bali. As one of the informants said, the trees disappeared because: 'We (*humans*) no longer receive them.' This expression is directly linked with the Balinese perception of cosmology and their philosophy of life, the *tri hita karana* which influences bio-cultural diversity conservation, which will be elaborated on in Section 6.3.

6.2 Cultural Diversity Conservation

6.2.1 Cultural Diversity Conservation in Bali

The term culture refers to the socio-cultural system, a totality of socially transmitted behaviour patterns, arts, beliefs, institutions and all other products of human work and thought; a system of symbols and meaning, operating as a determinative structure for human behaviour. Balinese culture refers to the collective of patterns, traits and products expressed by the Balinese people. Balinese culture is a living system, therefore culture should not be perceived as a static, autonomous structure of meaning, but as being in a state of perpetual flux (*cf.* Altwaijri 1997; Posey 1999a; Tomlinson 1999; Agung 2005; Slikkerveer 2005). Conservation of culture should therefore not be understood in the sense of maintaining a status quo, but should include the process of incorporating new elements into the current set of Balinese traditions and values. To this day the Balinese maintain an active, constant and conscious debate among themselves, both in focus groups and in the mass media means on

(re-)defining their Balinese-ness (*kebalian*). At a local level the Balinese are actively involved and absorbed in this continuous dialogue of *kebalian* in which they balance the desire to change and evolve with a fear of the disintegration of traditional cultural values (cf. Liem 2003). The centre of attention in these debates is that they themselves, the Balinese, keep control of their culture, the continuously changing structure, instead of outsiders regardless of their origin - other inhabitants of Bali, Indonesians or non-Indonesians - taking over. An illustration of this constant fight to retain the right to and the control of defining their own culture has attracted international media attention at the beginning of 2006, namely the reiteration of the rejection of the passing of the pornography bill as law, specifically supported by the Balinese. This bill tabled and supported by national Muslim parties in an attempt to protect Muslim values and norms would in essence have made several of the Balinese traditions and customs illegal.²

Scholars have documented a continuous change in religious, cultural, artistic, social and economic expressions in Bali over a thousand years (cf. Hanna 1976; Jensen & Suryani 1992; Robinson 1995; Hobart *et al.* 1996; Picard 1996; Vickers 1996b; Connor & Rubenstein 1999; Picard 1999; Pitana 2000; Panji Tisna 2001b; Suryani 2003). Vickers (1996b: 7) indicates that these changes: *'range from the influence of mainland Southeast Asian Dongson technologies and art to the coming of Indian religion at the beginning of the previous millennium to interaction with Islam and Europe of the last five hundred years'*. Agung (2005) states that until recently Balinese culture, traditions and customs have changed little in comparison to the golden age of the sixteenth century, and that the Balinese culture has persisted fairly undisturbed by the constant influx of immigrants, the Islamisation of the surrounding islands, Dutch colonisation, Japanese occupation and the inclusion of the island in the independent Republic of Indonesia. The claim to the immutability of Balinese culture ignores the practices of introducing reinvented traditions, of which the 'reintroduction' of the 'traditional' system of royal self-rule (*zelfbestuur*) by the Dutch as part of their 'Restoration Policy' is an example (see Section 4.2.1). The phrase 'until recently' in Agung's statement refers to the rapidly growing number of visible changes in Balinese culture, traditions and customs over the last four to five decades and refers implicitly, indeed even blames, to the exponential growth of tourism and globalisation at the end of the twentieth century. It might be argued that the intensity of external influences on the Balinese society in the last few decades has increased, and this might have a causal relationship to changes in traditions. However, change itself is not the arbiter of cultural diversity, since traditions are never wholly static; they are renewed and captured by each generation when it assumes the cultural heritage of those preceding it (cf. Giddens 1990).

Balinese have always had an active awareness of their own culture (cf. Salan & Maretzki 1983). They make efforts to define a Balinese identity and to improve living conditions, despite the visible external influences in the modern tourist and entrepreneurial industries. Vickers (1996: 27) indicates that *'Balinese have always had to identify and externalize their culture for others (as well as for themselves), whether ancient Javanese princes, Bugis pirates, or sixteenth-century Dutch sailors. ... Within the discourse on tourism and culture, "culture" has taken on a rarefied status, as Balinese seek to identify for their interlocutor's tourists, academics and development planners alike what is essentially Balinese.'* As Picard (1996) pointed out, Balinese culture was heavily affected by the Dutch colonial rulers and, from the 1920s, the people of Bali were 'Balinised' as a result of social control mechanisms designed to stifle political agitation and to create a front against militant Muslims in Java. Studying the concept of modernity in the Balinese society, Vickers (1996b: 6) noted, in addition to the great number of technological developments and social impacts these might

have, that ‘*the Balinese have been able to establish some kind of agency in a process by which otherwise they are identified as passive recipients of Western initiatives.*’

This active awareness led to many debates on social and cultural issues during the 1920s and 1930s with participants from a diversity of groups and institutions, including Balinese political leaders, young, Western-educated Balinese and Dutch scholar-administrators (*cf.* Liem 2003). With the establishment of the Indonesian nation, the focus of the debates changed to the Balinese position in the Indonesian State. Inevitably affected by the post-1965 disillusionment and frustration under the New Order engendered by unfulfilled hopes for the future, the debates again concentrated on the redefinition of the Balinese identity, since this period of time aroused a general feeling of alienation in one’s own home or ‘nation’ (*cf.* Liem 2003). To this day it is not easy to overlook the fact that many Balinese are involved in a constant discussion of their own heritage, usually expressing anxiety about the deterioration caused by tourism which degenerates cultural practices to the level of attractions. This robs them of much of their cultural integration and meaning (*cf.* Salan & Maretzki 1983; Pitana 2000; Ramseyer 2001). The Balinese also invest in the maintenance of their cultural heritage, sponsoring renovations and maintenance programmes. Illustration 6.3 presents the newly renovated *Taman Ujung* or *Ujung Water Palace* of the late king of the Klungkung dynasty located in Tumbu.³



Illustration 6.3 The newly renovated *Taman Ujung* in Tumbu
Photographed by L.N. Leurs (Fieldwork 2007)

The re-evaluation of the Balinese identity should not be mistaken for its constant reformulation. Suryani (1988) claims that, despite external changes especially those as evident as technological advances, as a living dynamic system the basic elements of Balinese culture have remained remarkably stable. Conformism was never part of the Balinese culture. This is expressed in the important ‘cultural difference’ concept of *desa-kala-patra* which takes into

account the differences from village to village (*desa*), from time to time (*kala*) and from cultural pattern to cultural pattern (*patra*) (cf. Jensen & Suryani 1992; Pitana 2000; Ramseyer 2001; Agung 2005). The Balinese celebrate their differences but their core, the basic elements, remains the same and it makes them all Balinese. In the words below, Suryani & Jensen (1992) indicate that these basic elements - the customs, religious dances and trance-possession ceremonies - not to mention the character of the Balinese have remained remarkably stable from the 1940s to the 1990s, illustrating the perseverance of basic elements: *'Although materialism has increasingly affected the Balinese, especially the younger generation, and television programming has had its effects, these still happen within the context of the conservative force of the culture. Balinese youth may wear Western jeans and aspire to a motorcycle or a car with stereo speakers, but they still wear the traditional sarong when they eagerly attend traditional drama and dances presented at traditional local sites, even in the popular tourist cities of Ubud and Kuta Beach'* (Jensen & Suryani 1992: 125). Illustration 6.4 gives an impression of the active involvement of young Balinese people in traditional ceremonies, both as performers and spectators.



Illustration 6.4 Young Balinese people actively involved in attending traditional drama and dances both as spectators and performers
Photographed by L.N. Leurs (Fieldwork 2006)

Bali has had and still has a constant influx of non-Balinese, foreigners and other Indonesians to contend with. This unstoppable flow of people from outside has been blamed by the Balinese for much of the crime, prostitution and drug trafficking (cf. Panji Tisna 2001b). Settling down in Bali and living in communities, therefore on the grounds of a certain *banjar*, the foreigners are required to pay their *banjar* taxes as the other Balinese members of the *banjar* do. It is repeatedly reported that people will pay these taxes, as such respecting the *banjar*, regardless of whether they actively join in *banjar* activities or not. Overlooking the numerous examples of other Indonesians, specifically Javanese, blending into the *banjar*,

respondents consider the constant influx of the Javanese immigrants, temporary or permanent, as more threatening to the conservation of their culture than the millions of tourists of other origins. Probably historical events exert an effect on the current emotional attitude, but it is especially the Javanese and to a lesser extent people from Lombok who are blamed for the negative train of effects linked to the external influx of people (*cf.* Panji Tisna 2001b).

It is highly unlikely that globalization, bringing an ever greater number of external influxes to Bali, directly into their houses through the mass media and more importantly bringing Bali into contact with the external world, will achieve an unified global culture (*cf.* Tomlinson 1999). However, the whole process of globalization as well as tourism does undoubtedly affect existing cultures. Despite the goals of the active debate among Balinese on *kebalian*, the current loss of cultural heritage is visible in the erosion of the Traditional Ecological Knowledge which supports the preservation of the biodiversity and in the disappearance of local languages and wisdom, customary *adat* institutions, beliefs, philosophies and rituals, community values, sustained conservation management systems, not to mention the role of the sexes and dealing with health and diseases in the social context (*cf.* Hobart *et al.* 1996; Slikkerveer 1999; Ramseyer 2001; IBSAP 2003; Agung 2005).

6.2.2 Cultural Conservation of MAC Plants

The cultural conservation of MAC plant is part of the conservation of the developed patterns of resource use and resource management by the Balinese; in the broader sense their Traditional Ecological Knowledge (TEK) system and in their ethno-botanical knowledge systems (EKS) in the confined sense of focusing on the plants. Cultural conservation is fully encapsulated in the Knowledge-Belief-Practice complex. Maintenance of the cultural heritage is inextricably linked to the transference of knowledge and beliefs and by the way it operationalises practices. The Balinese have had a written tradition for centuries, which gives them the advantage over oral traditions, since although knowledge might be less widespread, the conservation of knowledge, beliefs and the description of practices has occurred less actively, it can still be recalled and reintegrated into the current culture as long as the written documentation of generations is not lost or disappears. The primary written source of the traditional application of MAC plants is the ‘books of healing’, the *lontar usada* (*cf.* Panji Tisna 2001a). Hobart (2002: 60-61) divides the *lontar*, which have been influenced by the classical Sanskrit system of Ayurvedic medicine and tantric ideas, into three groups:

1. *tutur*, predominantly metaphysical, cosmological and mystical in orientation. They have such graphic titles as *Kanda Empat Buta* (Treatise of the Four Demons), *Kanda Empat* (Treatise of the Four Spirit Siblings) or *Siwa-Budha* (Treatise of Siwa-Buddha);
2. *wariga*, divinatory and ‘magical’ manuscripts, in which frequent references are made to the Dark One, the Goddess Kali or Durga. An important manuscript in this group is *Taru Pramana* (Treatise on Life-giving Plants) on medicinal plants;
3. other *lontar*, the manuscripts or manuals which discuss different illnesses/diseases and how to diagnose them.

By order of the Indonesian Ministry of Health, several projects have been carried out to conserve the traditional knowledge of MAC plants, for example, the project between 1984 and 1986 to transpose the texts on the use of medicinal plants from the original *lontar*, the classical palm-leaf manuscripts, into book form (DKPDT 1985; DKPDT 1986). During the project, the texts were not simply copied from the *lontar* but were translated and re-organised

into Indonesian, using Latin instead of Balinese script. This obvious conservation attempt to safeguard traditional knowledge from being lost failed to comprehend the Balinese-ness of the original function and contents of the original *lontar* texts.

Lontar are valued for their content, and moreover are deemed to be sacred objects in themselves, receptacles of mystic power, *kesaktian*, enshrined in the sacred scripts (*aksara modre*). This energy can be conferred on others through the vehicle of suitable incantations, offerings and holy water (*tirta*) which has been in contact with the manuscripts (*cf.* Hobart *et al.* 1996; Panji Tisna 2001a). Several of the original *lontar* have been copied by hand onto new *lontar* which are conserved in *Gedong Kirtya*, Singaraja, a library and museum which is specialised in the collecting, copying and preservation of *lontar*, *prasati*, inscriptions engraved onto metal plates, and old books printed in Balinese, Kawi (Old Javanese), Dutch, English and German.⁴ Illustration 6.5 gives an impression of one of the rooms at the *Gedong Kirtya* where the *lontar* are preserved. Note that offerings are brought daily to these *lontar*, even though most of them are copies.



Illustration 6.5 Impression of the *lontar* preserved in *Gedong Kirtya*, Singaraja
Photographed by L.N. Leurs (Fieldwork 2006)

The copying process initiated by the Ministry of Health means the contents are altered from those in the original *lontar*. The most obvious alteration is that the books of the Ministry are compilations of several different *lontar* which were originally written in (Old) Balinese. Furthermore, the original *lontar* are written metaphorically, not as practical guidelines. The instructions related to the use of medicinal plants in *lontar* are not simply a listing of plant names, with specific instructions about their application to certain illnesses and diseases or vice-versa as presented in the work of the Balinese Ministry of Health (*cf.* DKPDT 1985; DKPDT 1986). For example, the leaves of the *beluntas* (*Pluchea indica* (L.) Less.) can be used to reduce a fever. The instructions in the *lontar* do not refer to the plant *beluntas*; in the

lontar it can be referred to as *rangeda ing lalu*. *Rangedan (janda)* corresponds to *belu* and *lalu* is the same as *lewat* which corresponds to *mentas*, giving *balu mentas*, hence it should be understood as a reference to *beluntas*.

Respondents indicated that education and experience are indispensable to interpret the *lontar* correctly; even so it is still an art which allows plenty of room for misinterpretation. Most of the recipes are also written as interpretative texts, which makes the whole even more complex. There are many different *lontar*, all by a different author, and copies and rewritings of *lontar* add to the complexity of understanding them. To this day, interest in the *lontar* is still very much alive and there are various *lontar*-reading clubs (*seka*) which meet in the evening to study the *lontar* collectively. McCauley's (1984: 98-99) report on such clubs substantiates the interpretative character of the *lontar* texts: 'One man reads the manuscript which is written in old Balinese and then the others take turns explaining the meaning in modern Balinese. These explanations need not be philologically correct; as with other explanations the speaker is free to relate what he has heard to whatever he chooses.'

Herein lies a paradox in the cultural conservation of MAC plants knowledge. The conservation, by transcribing the *lontar* presented above already removes it from its context. Balinese traditions require a person to be spiritually ready to read the *lontar*. If he/she is not ready, they should not trespass upon this particular knowledge. This resembles the complexity of the conservation of the knowledge of the *balian* since a person cannot choose to become a *balian*; it is a vocation. The active conservation by transferring the knowledge on MAC plants in relation to the Balinese belief system, including the relation to the *tri hita karana* principle and Balinese cosmology preserved in the *lontar* and by *balian* as well as the *pemangku*, *pedande* and other traditional 'scholars' by, for instance, actively recruiting students, is not encapsulated in the Balinese culture.

Several respondents, for instance, indicated that there were no longer any *balian usada* who was still practising in their village because she or he was too old. In making this remark, none of them really wondered why nobody else took over. It is considered to be part of life, the way things go. It is even harder to find people who are skilled in the relationships between Balinese cosmology and use of MAC plants, for instance, its representation in the customary practice of chewing betel nut, presented to guests at important ceremonies.

The customary practice of presenting and chewing the betel nut always consists of five elements: the betel leaf, *tenang*, *gambir* (which creates the red colour), slaked lime and tobacco (see Illustration 6.6). The five elements symbolise 'who we are' (a person and his/her four siblings). Creating from these five elements again awakens the realisation that 'we' are all born alike and connected to nature and simultaneously connect the individual to her or his surroundings since 'five' also represents the five directions of the cosmos.

The dearth in the transfer of traditional knowledge is described by Seters (1997), who indicates that traditional healers are often skilled botanists but that their talent for locating the requisite plants is rapidly being doomed to oblivion, since it is often not documented and the younger generation have different ambitions. Therefore it is necessary to keep promoting such projects as that executed in the 1980s and the now numerous other projects in which the Balinese are actively engaged in documenting and preserving their traditional knowledge of MAC plants. They might not capture the whole context of the traditional knowledge, although this should be their goal.



Illustration 6.6 Example of a box serving the five elements for the betel nut chewing
Photographed by L.N. Leurs (Fieldwork 2006)

In the household interviews, the cultural conservation of the MAC plants was operationalised by letting the respondents report their practices and knowledge of the taboos, the *tumpek* for plants, namely the proper practices to preserve the knowledge and the rituals and the rules which need to be followed when cutting down, harvesting or planting an MAC plant. The *tumpek* are well known: 94.8% knows the *tumpek* for plants and 94.6% actually performs the *tumpek* ritual. As discussed in Section 4.2.4, knowing the *tumpek* rituals by name and even performing them is no indication of the full cultural conservation, since people often perform the ceremonies as mere gestures, presented materials and made no link to the philosophy behind the practice.

In contrast only 25.3% of the respondents (N=400) could name taboos on MAC plants and only 2.3% of respondents observed the taboos. An example of a taboo which used to be followed is the negative advice warning against planting when a person is considered to be 'dirty'/in a state of uncleanness (*kotor*), for instance a person during a period of mourning or women during menstruation. The main practices referred to in relation to good and bad actions and the required rituals and rules are: respecting the Balinese calendar by aiming for or avoiding certain days on which to perform activities related to MAC plants and making the appropriate offerings when planting or harvesting MAC plants.⁵ Therefore the respondents frequently indicated that a good action for planting is to bring *canang* (*sari*), which refers to the offering itself or to *sesajen*, the verb referring to performing the act of making an offering. The Balinese calendar provides a fixed point of reference for farmers since it indicates the *dewasa ayu* (good days) for planting and harvesting. This is not a specification for MAC plants but for plants in general. For example, it is a general rule that it is not good to plant on *kajeng kliwon* and a person's birth date should be borne in mind for its effect in relation to the numerology and philosophy of the Balinese cosmovision, the result of the planting.

The traditional Balinese attitude towards plants and animals is moral in nature, and it is founded on the belief that different kinds of beings co-exist in different ways, times and places. Plants and animals are potential agents of physical and spiritual influences and not just recipients. In this respect, Hobart (1996) cautioned against the very term ‘natural world’ in the Balinese context as this suggests a scientific outlook in which ‘natural species are viewed as external to the system of the systems of the human worlds’, whereas in the cosmovision of the Balinese this is an integrated whole. As is the case with the transfer of *Hindu Dharma*, a practised religion, it is most likely that the dissemination of the knowledge of MAC plants is focused on the practices shorn of the belief aspect, consequently downsizing the cultural heritage to actions without transferring the theoretical and philosophical reasoning. Although there is a certain level of active involvement of the community members in the cultural conservation of knowledge of, beliefs in and practices with MAC plants, just above half, 56.0%, of the respondents reported they had actively spread knowledge specifically to children and neighbours. It is essential to ensure that the conservation practices promoted do not generate the opposite effect if the knowledge, belief and practices are fragmented and extracted from their integrated context.

6.3 Bio-Cultural Diversity Conservation

6.3.1 *Tri Hita Karana: The Balinese Cosmology*

There is an ‘inextricable link’ between nature, society, language and culture (*cf.* Martin & Idrus 1998; Posey 1999a; Slikkerveer 2000b). Therefore cultural survival and cultural diversity are indisputably part and parcel of environmental conservation and biodiversity; the loss of either can cause the loss of both (*cf.* Stevens 1997). The Balinese worldview is regarded as the way in which the Balinese society endeavours to understand or to make sense of the reality confronting it and consequently formulates appropriate ways to acquire an ‘ideal way of life’ within its environmental confines. In doing so, it forms and sets the context for the conceptualisation of the ‘inextricable link’. Sterling (1990) defines worldview as a set of assumptions about reality and the world, inspired by one or several co-existing traditions, faiths, ideologies and philosophies. The basic tenet of the Balinese worldview distilled from the elaborate teachings of Balinese Hinduism and preserved in the *lontar*, modern printed texts, songs and other forms of oral traditions, lies so claims Panji Tisna (2001b) in Balinese Hinduism and its *panca sradha* (five principal beliefs): belief in *Sang Hyang Widhi Wasa*, *atma*, *karmapala*, *samasra* and *moksha*. As discussed in Section 4.2.4, the main aspect of practising Balinese religion is essentially about trying to attain a spiritual balance of worship between *Tattwa* (philosophy), *Susila* (courtesy) and *Upacara* (rituals) (*cf.* Suryani & Jensen 1993).

The Balinese cosmovision divides the universe into three related dimensions (*tri loka*) encompassing the underworld *buhr*, the world of humans *bwah* and the world of the gods, spirits and ancestors, *swah*. The related concept, *tri angga*, also subdivides everything else in the Balinese cosmos into three components: *nista*, *madya* and *utama* (*cf.* McCauley 1984; Suryani & Jensen 1993; Pitana 2000; Agung 2005). This sub-division into three components conceptualises all aspects of the Balinese daily life. Agung (2005: 6) specifies that: ‘*nista* (smallest/lowest), *madya* (mid size/mid point) and *utama* (biggest/highest) extends to both natural (*sekala*) and spiritual (*niskala*) aspects of the universe ranging from the Hindu trinity (*trimurti*) of *Brahma*, *Shiwa* and *Wisnu* to the three times recital of the common Hindu mantras (*trisanthya*) in daily life’. *Tri hita karana*, the primeval Balinese-Hindu principle, gives guidance in maintaining the harmonious relationships between the three components of

the worlds or other conceptualisations. *Tri hita karana*, Agung (2005: 290) states originates in: ‘the ancient holy book of the Yayur Weda. However it is more clearly defined in Chapter III, verse 10 of the Bhgawad Gita which point to Prajapati (God), praja (humankind) and kamadalu (nature)’. Following *tri hita karana* enables the Balinese to achieve the ultimate Balinese Hindu goal of ‘happiness and prosperity’ (*jagadhita*) by maintaining the ‘Sacred Balance’ within the *tri loka* and to achieve the highest state of spiritual and physical well-being and prosperity (*moksha*) by maintaining and restoring harmony between the elements of the universe: the *buana alit* (microcosmos of the individual) and the *buana agung* (macrocosmos of the universe) (cf. Panji Tisna 2001b; Agung 2005).

The state of balance might be established or imbalance might be repaired by: ‘performing of sacred rituals and work (*yadnya*) for God and all of His manifestations. In doing so, there are certain guidelines to be followed and adhered to. The principal ones are the three ways that liberate (*tri kaya parisudha*): right thinking, speech and action, compassion towards all creatures (*tat twam asi*), and the notion of flexibility in dealing with space, and human factors (*desa kala patra*) respectively’ (Panji Tisna 2001b: 21). The *desa kala patra* concept is defined by Pitana (2000: 42) as a: ‘human ecology concept, in which man and society always try to adjust to environment which has an influence to their life’. The source of *Desa kala patra* is the sacred text the *Wrehaspati Tatwa* which expounds one of the most important philosophies of harmony and balance because fundamentally it is a philosophy of adaptation, advising mankind to be prepared to face the changes brought by time, since all acts and behaviour should be fit the place (*desa*), time (*kala*) and condition (*patra*) (cf. Agung 2005). It is quite common that behaviour inspired by the *desa kala patra* principle results in the practice or a conscious decision not to undertake any action at a certain time or place. Such behaviour is easily mistaken by outsiders to be passive or even fatalistic. This is a misunderstanding since Balinese are very actively involved in planning future actions and, as both Balinese academic contributions and public and political discourses reveal, the future of the conservation of their island and biodiversity conservation by the people.

Tri hita karana Agung (2005: 1) explains: ‘has been for centuries leading local people’s behaviour in all aspects of life, including the maintenance or restoration of a harmonious relationship with their environment. For the Balinese, the implementation of this principle in their intervention strategies into the environment embodies their conception of conservation of the diversity of life, and is well expressed in their practice of use, management and conservation of diverse resources’. Fundamentally, the *tri hita karana* concept reflects the conservation and management practices and attitudes of the Balinese (cf. Pitana 2000; Agung 2005). Posey (1999b) admits that traditional practices are extremely pragmatic but recognises that people generally think this knowledge emanates from a spiritual basis leading to the conclusion that knowledge of the environment: ‘depends not only on the relationship between humans and nature, but also between the visible world and the invisible spirit world’ (Posey 1999b: 4). In the Balinese case, the *tri hita karana* concept encapsulates this spiritual basis of Balinese knowledge of the ‘proper’ dealing with the environment. The principle teaches the Balinese to be respectful towards nature and use its resources sustainably. Moreover, it inspires the Balinese to be, as Pitana (2000: 79) says: ‘strongly tied to the traditional customary law, characterized by the collective of social-religious activities’. *Tri Hita Karana* therefore is the embodiment of a framework, a key concept, in the Balinese conservation of bio-cultural diversity.

Key informants, both religious and *adat* leaders or those studying Balinese religion or *adat*, all know and have studied the concepts of *tri hita karana* and *tri loka* and observe their practical implications as reflected negatively or positively in the world around them. For

example, they indicate that the temple trinity (*kahyangan tiga*) is a physical representation of *tri loka* representing the world above, ‘our’ world and the world below, in each village. Nevertheless, when pre-testing the questionnaire to be administered in the household interviews, it emerged that the interviewers had to clarify the concept of *tri hita karana* to the household members. This clarification was necessary as various respondents did not recognise the scholarly words ‘*tri hita karana*’. When it was explained to the respondents that *tri hita karana* was the encapsulation of the Balinese principle that a person has to live in harmony with God, nature and fellow human beings, they understood that the words *tri hita karana* stand for principles with which they were acquainted. Respondents agreed that the concept of *tri hita karana* has the possibility to motivate people to be respectful towards nature, but currently not all Balinese bother with this sustainable, respectful way of dealing with nature. This neglect does not invalidate the fact that the *tri hita karana* principle has the potential to support a sustainable way of life. Observations and interviews with a wide variety of community members in all four villages indicate that people apply the principle in their daily doings, for instance, manifested in the system of mutual help known as *saling metulung* or *gotong royong*.



Illustration 6.7 Balinese government-sponsored advertisement: ‘Keep Bali Beautiful’
Photographed by L.N. Leurs (Fieldwork 2006)

The ‘inextricable link’ between biological and cultural conservation is a concept to which the Balinese community members take an active approach. Several semi- and non-governmental groups there are involved in establishing sustainable living or conservation projects, either by their involvement in or influence on the policy-making process. They pursue active research or devise community projects focused on the conservation of either biological and/or cultural resources and diversity. Local organisations such as AMAN, *Alliansi Masyarakat Adat Nusa*, are consciously striving towards achieving a redefinition and conservation of Balinese society.

Another example of a local Balinese NGO is *Yayasan Wisnu*, located in Kerobakan, which is actively involved in several communities in the districts of Karangasem and Gel-Gel. Their approach to community resource management reveals the principle of *tri hita karana*. The *Yayasan Wisnu* focuses its programmes on the biological aspects of conservation, specifically on land and water conservation, sustainable energy use and the production, identification and conservation of local flora and fauna. It is also closely involved in such cultural aspects as social, cultural and economic stability by identifying and stimulating local production, strong community cohesion and the optimal use of local human resources potential. The goal of *Yayasan Wisnu* is creating a better world for the next generation by incorporating the ideas and activities of the younger generation. This will be achieved by co-operation with the local communities. The slogan of the organisation is 'Keep Bali Beautiful', encompassing both nature and culture. The same slogan is used by the Balinese government, but as apparent from their preference for displaying photographs on billboards (see Illustration 6.7), the slogan seems to be weighted towards nature.

Today teaching the children the cultural traditions of Bali is being given higher priority. There are various private initiatives to create opportunities for the children to learn dances and other material and performance arts. In the school curriculum, the bulk of the time in the lessons focused on religion is spent teaching the philosophy and knowledge behind the practices such as the preparations and bringing of the offerings. Biology classes teach the children the conservation of biodiversity and the application of plants for medical, aromatic or cosmetic purposes. Lessons about MAC plants are part of the class IPA *Ilmu Pengobatan Alam*, lessons about natural healing. *Universitas Dharma Hindu* is an educational institution specialized in the teaching of non-medical and para-medical healing techniques and students can take their Diploma 4 in *usada* here. As one respondent correctly noted, here is yet another paradox in the conservation of the Balinese culture: certainly the school system provides a cogent means to spread Balinese knowledge, beliefs and practices but it is modelled on the Western system, supplementing the contemporary scientific approach with an anthropocentric vision. Hence it contradicts the Balinese cosmovision and related principles for which humans are an integrated part of the whole cosmos.

The value of the *tri hita karana* principle in current and future community resource management, which includes the social, cultural and economic aspects of the community, is precious because the content of this principle is both familiar and 'makes sense' to the Balinese. In order to be successful, community resource management programmes and initiatives should concentrate on reinforcing local institutions, including the *desa/banjar adat*, *subak*, *pura* and *seka* and raising the level of the understanding and knowledge of the making of artefacts. Specifically they should stress the local knowledge and philosophy underlying Balinese practices and material and performance arts. It is believed that realising such community resource management will revive the *gaya* (powerful, energetic) way of local life, making optimal use of the local potential and resources. The power of the *tri hita karana* principle is so obvious it even is commercialised for the tourism industry. For example, the following text which was used in a commercial advertisement for a hotel: '*Keeping with these ancient customs of balancing and thanking our relationship with nature, the creator and with each other, we hope your stay will indeed be very special.*' Obviously this commercialisation of the principle creates yet another paradox, since tourism is often theorised, as will be discussed in the paragraphs below, to be the very embodiment of the degeneration or even the destruction of bio-cultural diversity in Bali.

6.3.2 Threat versus Enrichment: Tourism in Bali

Bali is famous for its tourism; 'Bali Island of the gods' and 'Bali paradise on earth' are slogans used in the industry to promote the island worldwide. It has been impossible to separate Bali from tourism for many decades, in fact since the beginning of the twentieth century (*cf.* Pitana 2000). Tourism in Bali is as famous as it is notorious. In the years prior to the bombings, Bali used to receive 2.5 million tourists a year (*cf.* Picard 1996). In 2007, the number had climbed back to 1.66 million direct arrivals, a rise of 32.10% compared to 2006, the year of the household survey, when 1.25 million direct arrivals were recorded (*cf.* DPPD 2008). Bali has one of the highest per capita incomes of all the Indonesian provinces (*cf.* Warren 1994). This high per capita income is probably generated by tourism and the tourist-related industries. Two-third of the total population lives in the south-western part, the same area where most of the development projects and tourism occur. However, these economic-benefit creating industries are the major motivators behind land alienation and ecological degradation on many fronts (*cf.* Aditjondro 1995; Connor & Rubenstein 1999).

The effects of tourism are studied academically and cogently are monitored by the Balinese themselves. Tourism confronts the Balinese with a dilemma: is it not that what attracts tourism successfully to the island - its glorious natural scenery and its artistic and ceremonial culture - which might be destroyed by tourism? The original decision of the local and national governments to concentrate and limit tourism and tourist resorts to the Nusa Dua region has failed and physically tourism has spread all over the island, with the greatest concentration in the south, ranging from Legian via Kuta to Sanur, basically incorporating the whole southern coast of Bali.⁶ Other centres of tourism are located in the north, around Lovina, and in the east, around Amed, and in the island centre concentrating in the area of Ubud. Since the incorporation of Bali into the Netherlands East Indies at the turn of the nineteenth century, the Balinese have been engaged in formulating their own identity and to this day they tend to agree that, as long as they are aware of the indivisible unity of religion (*agama*), tradition (*adat*) and culture (*budaya*), their identity will remain intact (*cf.* Hobart *et al.* 1996; Picard 1999).

There are different types of tourism. A major distinction is made between conventional or mass tourism and alternative forms of tourism. Obviously the impact on the host country or society of the types of tourism is remarkably different. Major variables used to distinguish between different types of tourism are: the context, type of facilities, locations, developers and ownership, development process, market and marketing and the impact (*cf.* Pearce 1992). Recognising the possible overlaps between the types, following the basic classifications of Smith (1989), Agung (2005: 58-59) indicates that the following five types of tourism are present in Bali:

1. ethnic tourism focused on experiencing or 'actively observing' the traditional customs of indigenous or the 'exotic' people;
2. cultural tourism focused on observing, recording the daily life of local communities and disappearing lifestyles and hand-made arts and craft, studying agricultural and architectural aspects of societies;
3. historical tourism inspired by visits to historical museums and buildings;
4. ecotourism focused on the relationship between local people and their environment, marked by visits or active contribution to local villages, livelihood systems and small-scale industries; and
5. recreational tourism focused on 'Sand, Sea and Fun'.

Recreational tourism is commonly linked to mass tourism, whereas the other four types are known as alternative forms of tourism. Mass tourism is usually the type blamed for the negative impacts on local culture and nature. Yet, principally related to the extent of the other four types of tourism, they might just as well have major negative aspects on local cultures. Although different impacts can be assigned to different types of tourism, tourism itself is a factor which cannot be ignored in the bio-cultural diversity conservation of Bali. Pitana (2000) demonstrates that tourism has an impact on cultural diversity which is apparent in the constant re-evaluation of their identity by the Balinese and on the biodiversity conservation of the island, specifically in relation to the competition for the use of such natural resources as water, and land. The competition for land has resulted in the drastic decrease in the area of rice-fields, a fall of an estimated 1000 ha every year between 1987-1990 in the fertile areas in South Bali (*cf.* Pitana 2000). Generally water is not a problem in Bali. The weather patterns provide enough water over the island throughout the year and the excessive rains in the mountains are distributed by the numerous streams and rivers to the rice-paddies. An exception is the desolate western part of the island, which constantly has to battle a shortage of water and certain areas have to contend with a persistent shortage of water (*cf.* Jensen & Suryani 1992). However, the excessive demands of the tourism industry spell an increasing lack of water and are causing drinking water shortages (*cf.* Aditjondro 1995).

Table 6.3 Perceived impact of tourism on the utilisation, cultural diversity and biodiversity of MAC plants (N=400)

Perceived impact on	Utilisation of MAC Plants		Cultural diversity of MAC plants		Biodiversity of MAC plants	
Level of impact	N	%	N	%	N	%
Don't know	51	12.7	55	13.7	58	14.5
Very little impact	93	23.3	97	24.2	90	22.5
Little impact	172	43.1	120	30.0	168	42.0
Average impact	73	18.3	107	26.8	75	18.7
High impact	9	2.3	19	4.8	8	2.0
Very high impact	1	0.3	2	0.5	1	0.3
Total	400	100.0	400	100.0	400	100.0

Source: Household survey 2006

Respondents in the four sample village do not distinguish between types of tourists other than their land of origin: tourism and the tourist form one whole. The respondents indicated their perceived impact of tourism on the use of MAC plants and the cultural- and biodiversity conservation of MAC plants. As Table 6.3, reveals, the respondents do not acknowledge a great difference in the impact of tourism on the three aspects of MAC plants. The impact on the cultural diversity of MAC plants is conceived to be a little higher, scoring 26.8% on average impact versus respectively 18.3% and 18.7% on the utilisation and biodiversity and 4.8% impact versus respectively 2.3% and 2.0% on utilisation and biodiversity. This could be explained by the fact that various Balinese herbalists and *balian* are visited by a large number of foreign patients seeking their advice. Consequently, community members might begin to re-evaluate their own perception of the value of use of MAC plants.

The local awareness of Balinese identity has put the 'loss of land', land used for commercial purposes or the tourist industry into a wider context than just the economic loss to the original owners: the Balinese. In Balinese culture, the loss of land is a 'religious' impoverishment since the land is associated with the traditional religious activities, embedded

in the practices related to the *desa kala patra* and *tri hita karana* concepts. Looking at tourism from this perspective, expressed in terms of the loss of 'traditional' land, tourism is indeed a direct threat to the cultural diversity as the 'lands' play a crucial role in the customary practices through which the Balinese operationalise their culture. Another direct threat to the Balinese culture generated by tourism is the major impact made by conglomerates on the economic situation in the last few decades. These violate long-standing customary taboos or modern conservation regulations (*cf.* Aditjondro 1995). In addition to the property needed for the hotel buildings and their environs, the 'need' for recreation meant the laying-out of golf courses. If all investment plans prior to the first bombing had been executed, thirty golf courses would now exist in Bali, a 5621 square kilometre island. The twenty-six new investments (originally planned to be built after 1995) would have occupied more than 3000 hectares of land (*cf.* Aditjondro 1995).

Tourism brings opportunities for the legitimate circuit. This involves introducing new forms of tourism, for example eco-tourism, which promotes the environment and creates economic opportunities. Simultaneously, tourism offers chances to the illegal circuit, including prostitution and drug use. Social change in Balinese society are blamed partly on the influx of foreigners. It is commonly stated that change came to Bali as mass tourism began. One of the discourses which became important was the outside threat - the foreign to which Balinese culture had to resist. Ironically, the resulting dichotomy in Balinese tradition versus tourist-born modernity was the same dichotomy which led to Western anxieties about the 'dangers' of tourism. Bali, the archetypical oriental paradise, which has played a part in Western modernity as an exemplar of what is lost in the process of becoming modern. Tourism has been a force for modernisation and of conserving the past as a frozen 'tradition'. In this sense, tourism is the major manifestation of the Western imposition of 'tradition' on Bali. Despite the colonial creation of tourism in Bali, however, the industry has proven to be vital to development in Indonesia (*cf.* Vickers 1996b). Aditjondro (1995: 8-14) sums up the major adverse, first and second generation, ecological and the higher and lower levels of social impacts of the luxury tourism developments by conglomerates in Bali:

- the depletion of coastal coral reefs, constantly mined for limestone;
- the soil abrasion/erosion, weakening of the structure of beaches, leading to foreign loans for emergency beach reconstructions in Sanur, Nusa Dua, Tanah Lot and currently Kuta;
- use of fertile agricultural land, for non-agricultural purposes. Records show that since tourism development began to rocket, agricultural land has been diminishing;
- increasing lack of water and drinking water shortages, experienced by inhabitants and farmers, created by the enormous demands of luxury hotels. Estimates varying from 500 to 3900 litres a day, and the average use of 2000 cubic meters of water a day for a 18-hole golf course to an average of 77 litres a person per day used by Balinese;
- the increasing noise pollution created by Ngurah Rai Airport;
- land alienation problems, displacements of farms, homes, beaches and fishing waters;
- misuse of public funds, put into tourism instead of community- oriented projects;
- the decline in the democratic decision-making process because of the increasingly smaller circle of decision makers in the development projects, often excluding the community;
- the southward migration of 'drop-out' farmers, looking for jobs in the tourism industry in the southern tip of the island;
- electricity black-outs and burn-outs, results of the overburden in demand for electricity;
- disruption of socio-religious events, for example, when hotel property blocks the ways to such place of devotion as temples and/or beaches.

Besides the obvious downsides of the impact of tourism - the negative impact on land and water resources and the others examples summed up above - tourism does have some positive effects. The most obvious is the cash flow which gives a distinct economic boost. Furthermore, tourism has stimulated the diversification and improvement in agricultural products. Tourists ask for a wider variation of plants than the traditional food plants of Bali and require a higher standard in the quality of the food (*cf.* Pitana 2000). Most main roads in Bali are dual carriageways but the constant transportation of supplies for both the Balinese and the tourism business results in constant traffic jams and overuse of the road systems. The upshot is constant road works, some undertaken by the *saling metulung* or *gotong royong* principle involving the community in the maintenance of their physical environment. Tourist attractions usually ask two entrance fees, one for the non-Indonesian and one for Indonesian tourists, but often there is a third, the lowest rate or free access for the Balinese. The money raised from the entrance fees is used to maintain the sites and consequently generates money from outsiders to maintain places of interest, including various temples and historical sites, and importantly keeps them accessible to the Balinese themselves. A true tourist activity such as 'watching the dolphins' in Lovina is now canalised and precautions are made to safeguard both the dolphins and the reefs, formally threatened by fishing practices.

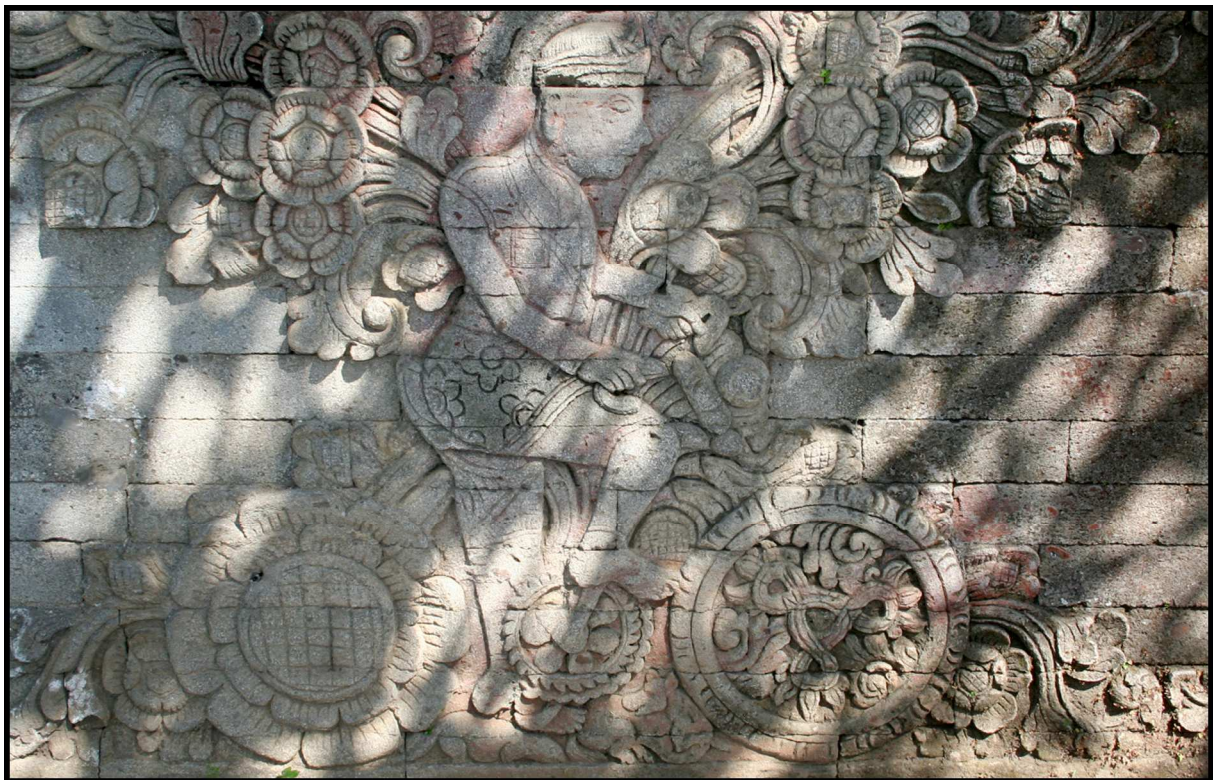


Illustration 6.8 Relief of the *Meduwe Karang* temple showing a tourist on his bicycle
Photographed by L.N. Leurs (Fieldwork 2006)

Aspects of tourism have been integrated into present-day Balinese society by the process of '*kebalian*'. Examples are the village *seka* groups which provide regular dance performances for tourists at hotels and other sites, stimulating the younger generation to learn the traditional dances. Tourism and the foreign influences are incorporated into Balinese architecture. The most remarkable example is a carving of a cyclist on Meduwe Karang temple located at Kubutambahan, 11km east of Singaraja (see Illustration 6.8). It is commonly believed that the

cyclist depicted in the relief is the Dutch artist W.O.J. Nieuwenkamp who was exploring the island by bicycle in 1904. Not least tourism has given a positive boost to the appreciation of the Balinese traditional health and healing techniques. There are numerous successful spas, which practices are based on traditional knowledge, to be found all over the island used by both the Balinese themselves and the tourists. Healers and skilled massagers provide services on hotel premises or hotel staff will escort guests to the place where they have their practices. In general, it seems that the Balinese community members are not conscious of any high impact of tourism on the utilisation, cultural diversity and biodiversity of MAC plants. The respondents had to indicate whether they thought the impact of tourism was positive or negative. Remarkably almost all respondents classified this impact as positive. This supports Wilpert's (2001) remark that tourism, for better or worst, gets more credit than it should for the radical changes in the Balinese culture. He argues that change is caused largely by the Balinese themselves and other Indonesians living in Bali, often inspired by the modern materialistic way of thinking.

6.3.3 Enrichment versus Threat: MAC Plant Utilisation

The utilisation of MAC plants as a valuable contribution to community health care has been documented in the previous paragraphs. Although, the practices connected to the traditional medical system, including the use of plants, were essentially marginalised during the setting-up of the national health care system based on modern medicine; they have recently been rediscovered and recognised as one of the great contributors to community health care. Adopting the international strategies of WHO, the Indonesian government is working on integrating (parts) of traditional medicine into its national health care policies. A separate department of the Ministry of Health is responsible for studying, documenting and analysing the traditional use of MAC plants, with an emphasis on medicinal plants. The PKK and *puskesmas* are two institutions set up under the aegis of modern medicine which have a primary role in disseminating information on the use of medicinal plants, thereby incorporating traditional medicine into the national health system. Information on the use of medicinal plants and herbal products is integrated into, hence formalised in the instruction manuals for *kader* women, publications on home remedies and community health care and incorporated into the practical TOGA programme. Undoubtedly, the use of MAC plants enriches community health by strengthening its armoury and, since these practices substantiate the 'inextricable link' between biodiversity and cultural diversity, they support the conservation of the belief and knowledge on which the utilisation of MAC plants is based.

Nevertheless, in the obvious enrichment supplied by the use of MAC plants for the restoration or maintenance of health lurks a menacing threat. The main argument adduced by medicinal professionals cast a jaundiced eye on the use of herbal medicine, be they domestically or industrially produced, fresh or dried, is that quality control and the determination of the efficacy of the concoctions is extremely difficult to control; basically proof of user safety based on clinical trials is absent for the majority of the current applications. The use of herbal medicine is riddled with a long tradition of trial and error. Clinical trials of herbal medicines are nowadays implemented worldwide, but are far from comprehensive. Only some trials focus on testing the herbal medicines as a whole, the majority tend to concentrate on isolating the bio-active components. Even fewer trials focus on the possible interaction between herbal medicines and pharmaceutical drugs. The diversity of potential interactions ranges from a decrease or increase in its bio-availability, exacerbation of its working, additive effect, to antagonistic to or incompatibility with (pharmaceutical) drugs (*cf.* Lewis & Elvin-Lewis 2003). Because of their character, trials conducted on herbal

medicines are very time-consuming and complex. Herbal medicine compositions usually involve a large number of ingredients; single plant applications are rare, combinations are also the most popular in home treatments. Therefore, herbal medicine often consists of a dozen or more chemical components. Adding to the complexity, the active ingredients are frequently complemented with secondary, inactive items, used to make the medicine palatable or to mask unpleasant odours (*cf.* Beers 2001). Acknowledging that *jamu* are very effective, Lyon (2003) indicates other side-effects and warns that they might present a danger as they mask the effects of poor living conditions and conceal chronic diseases caused by parasites.

Even when researchers succeed in determining the quality and/or efficacy of a herbal recipe, this does not eradicate the problem of controlling the quality of the ingredients themselves: the plants. The quality of the plant for its intended use is determined by the place where it grows. The soil type, climate and altitude have a major impact on the properties of any one plant and therefore its efficacy and quality. After harvesting, the preparation of the herbal medicine is equally important: Is it used fresh or dry? How long and at what temperature has it been stored? What are the details of the extraction procedure (*cf.* Lewis & Elvin-Lewis 2003). Although, if controlled by well-intentioned laws and policies, the clinical testing of industrially produced herbal medicine might be possible and economically feasible, there are no such tests which are either simple or reasonable enough. There is not even any intention to test or create a test which could control the quality of all the home-made herbal medicine and herbal self-medication.

Consciousness of the proof delivered by the hundreds of years of trial and error has produced fundamental discussions about if and to what extent regulations on efficacy and quality control should be set for home-made herbal medicine or self-medication based on plants. Moreover, indeed there is a thin line in daily practice between the use of the plants as a medicine or their use simply as a part of the daily diet, apparently ruling out the necessity of a separate quality control of MAC plants. However, looking at various MAC plants there is a very thin line between their potential to cure or to poison. Paying due heed to the specific linguistic situation of Bali, in which the official language is not the same as the local language and national publications on medicinal plants are usually written by a wide variety of people who all have *bahasa Indonesia* as their second language, importantly misconceptions could easily arise about the names given to plants in national and/or regional literature and the local names of plants, adding to the complexity and the possibility of a confusion between different species. The specific utilisation of plants differs between the ethnic groups in Indonesia. A plant species used in Bali might not be used for the same disease in Java or vice-versa. Naturally differences with other Indonesian islands which have different types of flora and fauna are even greater. Same names adopted by the local application of the Indonesian language might refer to totally different species, as illustrated by the difference in meaning of *kayu manis* in Bali and Java in Section 5.1.2.

People comprehend knowledge of the application of MAC plants in a wide variety of meanings, all differing in both quality and their actual knowledge of the topic. All knowledge, including the names of the MAC plants, the recognition of the plant, its possible uses and methods of preparation and recipes, are collected by sharing information orally with relatives, neighbours, friends or herbal specialists or by learning, either formally in schooling or self-study using *lontar*, books and/or the Internet. The possible plants applications are revealed to some community members in dreams by the plants themselves. Finally there is the deceptively simple empirical trial-and-error technique. Regardless of how someone has acquired her or his knowledge of the application of the MAC plants, the user frequently does not understand what makes it work and, even if research is carried out, the users, the

community members who have no specific background as a herbalist or scientist, often have no idea what the bio-active components of the plant are or what the bio-active components in the herbal mixture are. Furthermore, preparation of *jamu*, or in the Balinese case *lolah*, *boreh* or any type of *ramuan*, should be executed in hygienic surroundings. Wet mixtures especially should not be stored too long, since they are a perfect breeding ground for bacteria. One section of the botanical gardens in Bali is specifically devoted to medicinal plants, tacitly recognising the value of these plants for health and healing. At the entrance visitors are given a stern warning about the dangers of uncontrolled use of (MAC) plants (see Illustration 6.9).

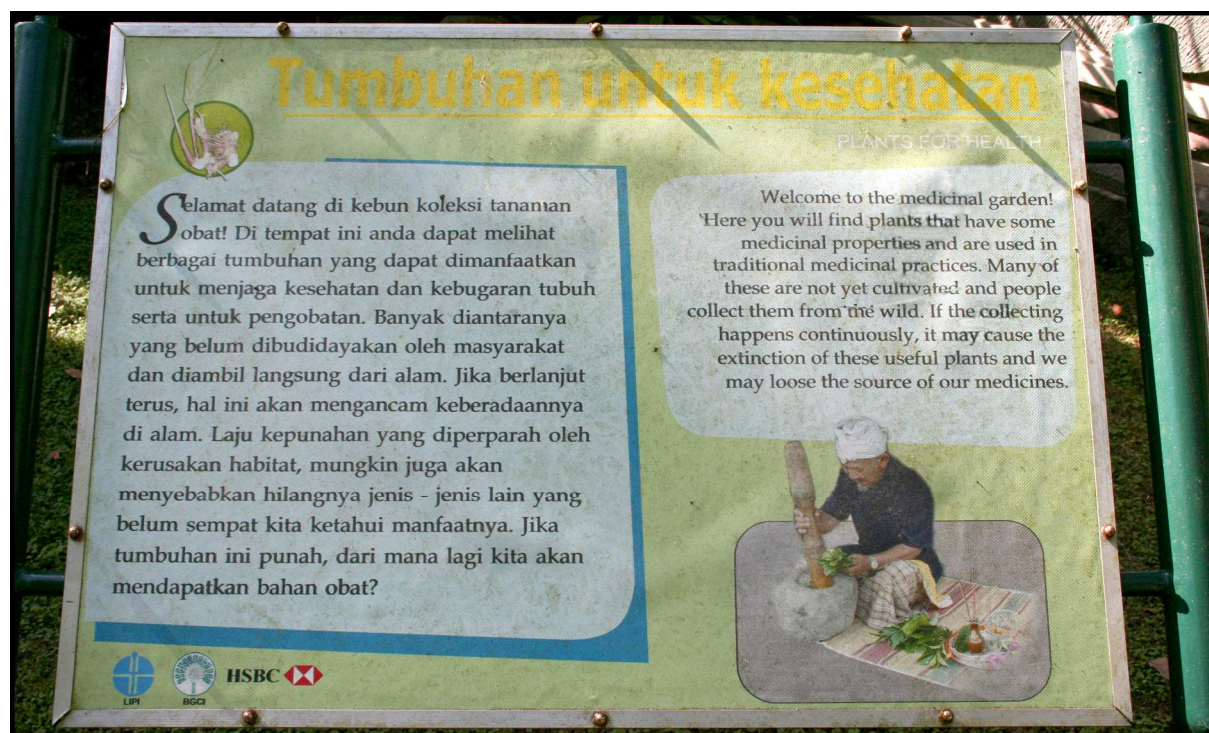


Illustration 6.9 Information and warning board about medicinal plants at the botanical gardens Photographed by L.N. Leurs (Fieldwork 2006)

In addition to the issues of efficacy, quality of ingredients and types of preparation, account has to be taken of the unregulated or inappropriate use of traditional medicines and practices which can have negative or dangerous consequences (*cf.* WHO 2003). WHO (2003) gives two examples as an illustration of such unregulated or inappropriate use: the herb 'Ma Huang' (*Ephedra*) traditionally used in China to treat respiratory congestion which was marketed in the United States as a dietary aid. Overdoses led to at least a dozen deaths, heart attacks and strokes. The other example comes from Belgium where seventy or more people required a kidney transplantation or dialysis for interstitial fibrosis of the kidney after taking a herbal preparation made from the wrong species of plants as slimming treatment. A Balinese respondent gave the example of the use of *singkong* (cassava) which is commonly used as a vegetable. The leaves have some medicinal properties, but there are poisonous varieties of the *singkong* plant and certainly not all people do know the difference between the species which all have the same local name: *singkong*.

One of the main contributions to the re-invention or revival of the use of MAC plants was awareness of the possible strong side-effects of pharmaceutical medicine. Respondents report that they do not know of a medical plant which has any side-effects as strong as those of

pharmaceutical drugs. In their perception, the worst that can happen in case of an overdose of an MAC plants is that they might become sensitive to external stimuli, feel nauseous or have diarrhoea; all considered to be far less negative than the side-effects of pharmaceutical drugs. Nevertheless, plants produce chemical substances, often secondary metabolites, in self-defence and such plant products may be harmful to humans (*cf.* Lewis & Elvin-Lewis 2003). Many plants have evolved poisonous compounds. Both the toxic and non-toxic compounds found in plants are the bases of successful pharmaceuticals, herbal preparations and traditional medicines and, although risks should never be underestimated, death from plant poisoning is generally infrequent and rare among medicinal plant users. If the dosage is not exceeded and the material is correctly labelled, the side-effects of medicinal plants are low, but there are potential interactions which should be heeded when they are administered simultaneously with pharmaceuticals (*cf.* Lewis & Elvin-Lewis 2003).

In the paragraphs above, the possible threat of the utilisation of MAC plants for human health has been discussed. At this point the number one, major obstacle to the recognition of the value of MAC plants in relation to bio-cultural diversity conservation must be discussed. There are numerous of examples of the forests of the world are being depleted at an alarming rate by businesses, causing habitat or ecosystem destruction and there is over-exploitation as a consequence of the popularity of MAC plants (*cf.* Ayensu 1983; Akerele *et al.* 1991; WHO 1993; Food and Agriculture Organization of the United Nations. 1996; Erdelen *et al.* 1998). Alcorn (2000: 25) states that '*the change in the resource status of a plant can alter its management and thereby the ethno-botanical process to which it is subjected*'. Therefore, at the very least, the resource designation affects the use of a plant and its management. It must be realised that the resource evaluation is not an objective consideration. Certainly it is formed by the individual's context but her or his personal understanding of this context must also never be overlooked (*cf.* Alcorn 2000). The popularity of the use of certain plants changes over time. *Salam*, for instance, is now growing in popularity, whereas *sirih* has already been popular for a very long time, probably because of its connection to its magico-religious significance in Balinese life. *Mengkudu* is used for practically everything these days; until quite recently the fruits of the *mengkudu* were still being thrown away before it was rediscovered that previously the elderly used the ripe fruits to cure *buyan hati* (a stomach ache or an ulcer) currently named *maag*. Therefore the fruits have gained an economic value which they did not previously have.

The present status of the plants commonly used for maintaining and restoring health is not clear. Many lists have been compiled by different types of research, listing the rare medicinal plants of Indonesia, but these lists vary considerably in species composition, probably because of the lack of clarity on what criteria the rarity was assessed (*cf.* Erdelen *et al.* 1998). Some generalisations can be made on the basis of the various lists, as indicated by Erdelen *et al.* (1998: 14): '1) *the majority of rare medicinal plants are trees*, 2) *most of the rare plants are rain forest species*, 3) *potentially endangered are also species used for the jamu industry that are still collected from the wild (of the 55 most important species of plants used for jamu about ¼ are still collected from forest)*, and 4) *highly esteemed species (e.g. Pimpinella pruatjan, used as an aphrodisiac) already has become extremely rare or even locally extinct because of over-harvesting of wild populations*'

The International Union for the Conservation of Nature and Natural Resources (IUCN) is the main international authority on the conservation status of species. In 1963, the IUCN created a Red List of Threatened Species, also known as the IUCN Red List or Red Data List. The IUCN Red List is the most comprehensive inventory of the global conservation status of plant and animal species. Since their adoption by the IUCN Council in 1994, the IUCN Red

List Categories have gained widespread international recognition (*cf.* IUCN 1996). IUCN defines nine categories, the two final categories - data deficient and not evaluated - are used to complement the seven other categories which indicate the risk level of global extinction of species. These seven categories used by IUCN are (IUCN 2001: 14-15)⁷:

1. *extinct* (EX): when there is no reasonable doubt that the last individual has died. A taxon is presumed 'Extinct' when exhaustive surveys in known and/or expected habitat, at appropriate times, and throughout its historical range have failed to record an individual. Surveys should be over a time-frame appropriate to the life-cycle and life-form of the taxon;
2. *extinct in the wild* (EW): when a taxon is known to survive only in cultivation, in captivity or as a naturalized population far outside its past range. A taxon is 'presumed EW' when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), and throughout its historical range have failed to record an individual. Over a time frame, surveys should be appropriate to the life-cycle and life-form of the taxon;
3. *critically endangered* (CR): a taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild;
4. *endangered* (EN): a taxon is 'Endangered' when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild;
5. *vulnerable* (VU): A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild;
6. *near threatened* (NT): a taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future; and
7. *least concern* (LC): a taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

All 168 MAC plants named in the household interview have been cross-checked in 2008 against the IUCN Red List⁸. Seven are included on the IUCN Red List. *Jebug garum* (*Myristica fragrans* Houtt.) received the label data deficient, meaning there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status. More information is required and the threatened classification is not yet appropriate. The six other MAC plant names, five species, are on the IUCN red list and have received one of the seven IUCN categories. All other named MAC plants are not on the IUCN list; therefore they have not yet been evaluated against the criteria and have not even been studied in order to receive the status data deficient. Three species received the category least concern (LC), hence are currently not under threat, namely: *kayu tulang* or *tujuh ulang* (*Euphorbia tirucalli* L.), *pule* (*Alstonia scholaris* (L.) R. Br.), and *delima putih* (*Punica granatum* L.). Two species received the category vulnerable (VU), and are considered to be facing a high risk of extinction in the wild: *cendana* (*Santalum album* Linn.) and *mahoni* (*Swietenia macrophylla* King). In the household interview, *cendana* is reported to be known and used by the household members. The reports of use of both of these species

were very low. *Mahoni*, an introduced species to Bali, was reported to be known as a MAC plant but no one actually used it. In conclusion, it can be stated that the two species marked as vulnerable (VU) on the IUCN red list are not in great demand in their status as MAC plants freshly administered for self-treatment. However, it was not within the scope of this research to examine the demand for these two species in the industrial herbal products industry. *Cendana* and *mahoni* are both very popular timbers in high demand for carpentry and related applications. *Cendana*, also known as sandalwood, is best known and is in high demand for its aromatic substances, since it is a very popular scent used in many applications.

Education on the efficacy, quality and safety of the use of plants for health and healing practices is essential. The aim will be to pay heed to the wide variety of possible applications since generally a single MAC plant can be applied to treat more than a single symptom. For instance, the *curcuma* family (*temu-temuan*) has a wide range of applications and, apart from the home use, several trials are currently being conducted to try to use the plants in modern medicine. At the very least, community members should be aware of the possible side-effects of MAC plants and they should be able to recognise the right species. Therefore in all forthcoming publications on MAC plants based on the local or vernacular names of plants, especially those for self-treatment, it is highly recommended that references to the botanical or scientific names of plants, accompanied by preferably unquestionable photographic identification are included. At least, using samples the Ministry of Health should control the correctness of the link between the local and scientific names and add these to its own publications. National regulations should be implemented to protect those species in need of protection. In conclusion, it can be said that, although the application of MAC plants is an enrichment for community health, warnings should be given not to turn their application into a threat to either human health directly or threaten them indirectly by over-harvesting and causing further loss of biodiversity.

Notes

- ¹ When both tourism and population were flourishing, it was necessary to start importing rice in order to feed all the Balinese and tourists visiting the island. Economically this resulted in a competition between the imported rice and locally produced rice. Currently the imported rice is more highly valued for its quality. It has a much better quality-price relationship than the locally produced variety. Therefore the Balinese are trying to generate a better value for their rice. Currently (2006) there are several experiments with organic approaches to agriculture and the re-introduction of the original strain of rice which would result in healthier and more nutritious rice, which could compete with the imported rice.
- ² Despite the fierce opposition to the bill on pornography at the beginning of 2006, it was passed at the beginning of 2009. It has been suggested that its approval, although it was claimed it would not be fully implemented in the near future, should be viewed in light of the presidential election of July 2009.
- ³ *Taman Ujung* or *Ujung* Water Palace was constructed by the late king of Karangasem, I Gusti Bagus Jelantik, who reigned in Karangasem from 1909 until 1945. This water palace was built on a majestic scale to welcome and lodge important guests and kings from neighbouring realms, besides providing pleasure for the king and his immediate family. *Taman Ujung* was severely damaged by the violent eruption of Mount Agung in 1963 and was damaged again by the earthquake in 1979.
- ⁴ The *Gedong Kirtya* was founded in June 1928 by I.J.J. Calon, who at the time was the Regent of Bali and Lombok, and the last king of Buleleng, Anak Agung Panji Tisna.
- ⁵ Hindu Dharma advises making the appropriate offerings whenever planting, harvesting or cutting plants, as such respecting *Dewi Sri*, the deity who is the guardian of plants, most importantly, rice plants.
- ⁶ There were four main reasons Nusa Dua was chosen as an enclave tourist resort: firstly its geographical location; secondly the availability of the land; thirdly the suitability of the area from a physical point of view; and fourthly because the Nusa Dua region is an unproductive region (*cf.* Pitana 2000).

- ⁷ For the three categories, endangered (CR), endangered (EN) and vulnerable (VU) specific criteria, A to E, are to be met. A refers to the specific criteria in relation to the reduction in population size. B refers to the specific criteria in relation to geographical range in the form of either extent of occurrence or area of occupancy or both. C refers to the specific criteria in relation to the decline in estimated population size. D refers to the specific criteria in relation to the estimated population size. E refers to the specific criteria in relation to the probability of extinction in the wild. See IUCN (2001: 16-23) for the specific description of the criteria for each category.
- ⁸ The IUCN Red list has been consulted in December 2008 available at <http://www.iucnredlist.org/>.

7 Analyses of MAC Plant Utilisation and Conservation

This chapter presents the statistical analyses which were used to prepare and analyse the Balinese community members' knowledge of, beliefs in and practices with MAC plants in connection with the utilisation of these plants, the biodiversity conservation of MAC plants and the cultural diversity conservation of MAC plants. Section 7.1 presents the steps taken to translate the documented, measurable phenomena collected by means of the household survey into indented variables on the basis of their indicators. The ideal situation is to measure each indicator by a single phenomenon, however only a small group, the demographic 'hard' data, is measured by a single question and consequently the original answers are used in the analysis. In all other cases, it was not possible to measure the intended variable by a single phenomenon. Therefore, in those cases multiple phenomena and sometimes multiple indicators were used to recode the raw data into the intended variable defined within the conceptual model. All variables are recoded either by qualitative methods or by the calculation method; both techniques and the particularities on the recoding of each variable are discussed in Section 7.1.

Section 7.2 discusses the quantitative analyses of the variables identified in the blocks of factors in the conceptual model. First, a descriptive analysis is made using bivariate analysis on the basis of cross tabulations. The significance of each cross tabulation between each independent and intervening variable versus each of the three dependent variables is examined employing the Chi-square calculation, the measurement of association by either the gamma value or Cramer's V and the correlation by the Spearman Rank Correlation Coefficient (Spearman's Rho). The bivariate analyses are a point of embarkation from which to build a general impression of the relative impact of each of the independent and intervening variables on each of the intertwined dependent variables.

This chapter concludes with the presentation of the multivariate analyses. The non-linear generalised canonical analysis, known by the acronym OVERALS - an explanatory technique which uses the idea of optimal scaling -, is used for the multivariate analyses. First OVERALS is applied to the total set of variables in which all the blocks of factors is involved as separate sets. Thereafter, the mutual inter-relations between the blocks of factors are analysed one on one, by applying OVERALS to each pair of blocks, yielding information on the relative strength of the block of factors in relation to each other in the multiple regression analysis. The OVERALS analysis gives valuable information on the structural relationships between the independent and intervening variables and the three dependent variables: the utilisation of MAC plants, biodiversity conservation of MAC plants and cultural conservation of MAC plants. This explanatory technique makes it possible to identify the independent and intervening variables which have a stronger effect in their interrelationships on the three dependent variables and the relative strength of the various blocks of factors within the conceptual model.

7.1 Preparation of the Dataset

7.1.1 Recoding by Qualitative Method

The quantitative data was collected by means of the household survey at the level of measurable phenomena. Some of this collected data was presented in the previous chapters in discussions of the different separate aspects of the utilisation and bio-cultural diversity

conservation of MAC plants by the Balinese community members. The data generated at the level of measurable phenomena, although creating an extensive dataset of valuable qualitative information at the daily practical level, is too extensive to analyse the interrelationships of the three behaviours with the other variables directly. As intended, the data at the level of measurable phenomena are recoded into intended categories of the variables as presented in the overviews in Section 3.1.3. The data preparation process began with the cleaning of the raw data, first by correcting the misspellings of the interviewers; second by checking for inconsistencies by means of the control variables built into the household survey; third the inconsistencies were corrected; and fourth the answers reported in the ‘other’ category of the closed questions were incorporated into the answer categories. After the cleaning of the raw data, the answer categories were recoded into the intended categories of the variables as presented in Section 3.1.3. In the paragraphs below, the recoding of each variable is discussed. The recoding of the original answers into the categories for the intended variables was done by one of the following three methods:

1. no recoding, the original answer category equals the intended answer category;
2. recoding into the specific variable by qualitative methods;
3. recoding into the specific variable by the calculation method.

The variables which needed no recoding are presented in Table 7.1. The table indicates the concept, the block of factors they belong to, the name of the variable and the name used for these variables in the analyses, the ‘SPSS name’. All variables presented in Table 7.1 were measured by a single question and the original answers in the raw data fit the categories of the intended variable. It is apparent in table 7.1 that all the variables which needed no recoding are those measuring ‘hard’ demographic data.

Table 7.1 Overview of the variables which needed no recoding

Concept	Variable	SPSS name
Socio-demographic factors	Village	Village
Socio-demographic factors	Sex	Sex
Socio-demographic factors	Ethnic affiliation	Ethnic
Socio-demographic factors	Caste	Caste
Socio-demographic factors	Religion	Religion
Socio-demographic factors	Marital status	Marital
Socio-demographic factors	HH-composition	HHcomposition
Enabling Factors	Family income	IncomeHH
Enabling Factors	Geographic distance to modern medicine	DistanceMM
Enabling Factors	Geographic distance to traditional medicine	DistanceTM
Enabling Factors	Geographic distance to MAC plants	DistanceMAC

The indicator of the variable ‘HH-composition’ is the number of household members of which the household consisted at the time of the household survey. As a measure of control, respondents were asked to report the number of children and the number of adults in the household separately. This control mechanism was used during the cleaning stage of the data

to check for inconsistencies with age of household members and relations to household head. Strictly speaking there was a small recoding for this variable: the number of children reported was added to the number of reported adults.

A second group of variables which was measured by a single question in the household survey had to be recoded because the original answers did not fit the answer categories of the intended categories directly. This recoding was done using qualitative methods; therefore the types of recoding were different. The basis for the recoding was formed by the findings drawn from qualitative research techniques related to the phenomena measured. Table 7.2 gives an overview of the variables which have been recoded by qualitative methods indicating the concept, the block of factors, they belong to, the name of the variable and the name used for these variables in the analyses, the ‘SPSS name’. Below the table the recoding technique of each of the variables is discussed separately.

Table 7.2 Overview of the variables measured by a single question recoded by qualitative methods

Concept	Variable	SPSS Name
Socio-demographic factors	Age	Age
Socio-demographic factors	Formal education	Education
Socio-demographic factors	Place of birth	Birthplace
Socio-demographic factors	Profession	Profession
Perceived morbidity	Reported disease	RepDisease
Institutional factors	Awareness of local institutions linked to MAC plant use	AwareMAC
Institutional factors	Awareness of local institutions linked to biodiversity of MAC plants	AwareBio
Institutional factors	Awareness of local institutions linked to cultural diversity of MAC plants	AwareCult

Age (SPSS name: Age)

The actual dates of birth are recorded as a measurement of the respondents’ age. The age of the persons, expressed in number of years alive at the end of 2006, is calculated based on those reported birthdates; thereafter a grouping of five year intervals was made. The youngest household head in the sample is seventeen and the oldest household head seventy-eight, therefore the lowest category of age of the household heads ranks from sixteen to twenty and the highest from seventy-six to eighty, which differs from the indented categories presented in Section 3.1.3 including all ages.

Formal education (SPSS name: Education)

The variable ‘formal education’ is measured by a single question indicating the level of education attended and whether or not this level of education was finished. The categories of the variable ‘Education’ indicate the level of education completed by the respondent. The categories are: no formal education, primary school level, junior high school level, senior high school level, college level or university level. For each respondent who indicated beginning but not finishing an educational level, the formal education is set at the level of education which the person did finish.

Place of birth (SPSS name: Birthplace)

For each household member the name of the place of birth was recorded. As a first step each reported place name, which was not the sample village itself, was recoded in the regency (*kabupaten*) to which the place belongs. Thereafter in relation to the sample village to which the household belongs, it was established whether the place of birth was in the same regency or not, in which case the answer is recoded into the category 'Elsewhere in Bali'. All reported birth-places located outside of Bali were recoded into the category 'Outside Bali'.

Profession (SPSS name: Profession)

Originally about forty different professions were reported as the main occupation of the respondents. The intended categories for the variable profession presented in Section 3.1.3 consist of a fairly small number, namely ten categories. These categories are related to the main industries based on the Indonesian Standard Industrial Classification: *Klasifikasi Lapangan Usaha Indonesia* (KLUI). KLUI divides Indonesian industries into five hierarchical categories: sectors, sub-sectors, major groups, groups and sub-groups (*cf.* Lumbantobing 1997). The main industries are the sectors in these five hierarchical categories. It should be noted that two sectors were not included in the new categories, since none of the respondents reported an occupation in them, namely: 'Mining and Quarrying' and 'Electricity, Gas and Water'. Four categories were added to the KLUI classification in order to include all the respondents' answers: 'Not economically active', 'Not in labour force', 'Unemployed' and 'Other'. When recoding the original answers each individual was checked to see whether they did not fall into one of the first three added categories; 'Not economically active', 'Not in labour force', or 'Unemployed', following the Indonesian standards for these groups. By these standards 'Not in labour force' are all individuals who are younger than fifteen years old, 'Not economically active' are all students, housewives and retired people, and 'Unemployed' are people, older than fifteen years old and not part of the category 'Not economically active' (*cf.* BPS 2007b). All other reported main occupations were recoded according to the KLUI division. If the main activity could not be recoded into one of the KLUI categories; it was recoded in the 'Other' category.

Reported disease (SPSS name: RepDisease)

The variable 'Reported disease' is linked to the questions asking respondents to indicate for themselves and for all the other household members whether they had suffered an illness, disease or any other type of disturbance of health in the last 12 months. If this was the case, they were asked to identify the illness, disease or any other type of distortion of health by a name. There were eighty-nine different names for illnesses, diseases and other distortions of health reported. By means of the pile-sorting technique, the *emic* classification was identified and used as the intended categories to which three categories were added: the 'Other' category, the 'Not specified' category and the 'No disease reported' category (see Section 5.3.3). The other category is used for all diseases which could not be placed in the intended categories and the 'not specified' category is used when the respondents were unable to identify the disease. 2% of the household heads, 8 respondents (N=400), reported not to have suffered any illness, disease or other distortions of health in the last 12 months.

Awareness of institutions (SPSS names: AwareMAC, AwareBio and AwareCult)

The awareness of institutions variables are: 'AwareMAC', the respondents' awareness of local institutions related to MAC plant utilisation, 'AwareBio', the respondents' awareness of local institutions on biodiversity of MAC plants, and 'AwareCult', the respondents' awareness of local institutions concerned with the cultural diversity of MAC plants. These

variables were each measured by a single question asking the people to give examples of the local institutions they know which are active locally, nationally or even internationally in MAC plant utilisation, biodiversity conservation or cultural diversity conservation. Many people were not aware of any institutional activities; generally respondents gave a maximum of three examples. Therefore the following recoding was applied: the category ‘No awareness’, includes all respondents who could not give any example. Respondents who could give one, two or three examples were recoded into respectively: ‘Little awareness’, ‘Average awareness’ and ‘High awareness’. This recoding was done to establish an order among the respondents in the sample. It should be noted that the term ‘average’ makes sense for the coding of the answer categories since it creates an order in them. The term average does not really refer to something as an average or normal level of awareness. Since most people could not give any or just one single example, the average category should not be mistaken for the ‘normal’ standard of awareness of institutions locally active or locally based in relation to the utilisation or biocultural diversity conservation of MAC plants.

7.1.2 Recoding by Calculation Method

Several of the intended variables could not be measured by a single question at the level of measurable phenomena. They had to be measured by a set of questions at the level of measurable phenomena. These sets of answer categories are recoded with the calculation method into the categories belonging to the intended variables.

Table 7.3 Overview of the variables recoded by calculation methods

Concept	Variable	SPSS name
Psycho-social factors	Knowledge of MAC plants use	KnowMAC
Psycho-social factors	Knowledge of Modern Medical System	KnowMMS
Psycho-social factors	Knowledge of Traditional Medical System	KnowTMS
Psycho-social factors	Knowledge of Biodiversity conservation of MAC Plants	KnowBio
Psycho-social factors	Knowledge of Cultural diversity conservation of MAC Plants	KnowCult
Psycho-social factors	Knowledge of Tri hita karana	KnowTHK
Psycho-social factors	Belief in MAC plant use	BeliefMAC
Psycho-social factors	Belief in Modern Medical System	BeliefMMS
Psycho-social factors	Belief in Traditional Medical System	BeliefTMS
Psycho-social factors	Belief in Biodiversity conservation of MAC plants	BeliefBio
Psycho-social factors	Belief in Cultural Diversity conservation of MAC plants	BeliefCult
Psycho-social factors	Belief in Tri hita karana	BeliefTHK
Enabling factors	Social Economic Status (SES)	SES
Intervening factors	Government	Government
Intervening factors	Tourism	Tourism
Intervening factors	Increased use of resources	Overuse
Dependent factors	Utilisation of MAC plants	UseMAC
Dependent factors	Biodiversity Conservation (BDC) of MAC plants	BioMAC
Dependent factors	Cultural Diversity Conservation (CDC) of MAC plants	CultMAC

Table 7.3 presents the concept of the variables recoded with the method of calculation indicating the concept, the block of factor it belongs to, the name of the variable and the name used for these variables in the analyses, and the 'SPSS name', which is used to indicate the variables in the discussion of the bivariate and multivariate analyses. The variables in Table 7.3 are recoded by calculation based on the technique of additive scaling (*cf.* De Heus *et al.* 1995).

In order to recode the answers of the set of questions measuring different aspects of the intended variable, answers in a set have to have the same measurement level and their content has to be compatible. This is an absolute requirement to carry out the recoding by calculation. In its process, the recoding by calculation uses a scale of which the lowest and highest value is determined by the sample population and not by a theoretical scale. If a theoretical division, in which the theoretical possibility establishes the lowest and highest value, were used, it would have resulted in an over-representation of average scores and there would be only a few or even no scores in the lowest and highest possible score. This would produce no valuable information about the sample population. In the calculation methods followed, the sample itself determines the lowest and highest value, ensuring that a non-normative and more realistic validation is reached. Since the sample determines the ranges, possible follow-up studies using the same questionnaire and same recoding can compare tendencies between the different periods of time or regions, but no comparison can be made between the actual results. The recoding by calculation has been done the following six steps:

- firstly, the frequencies of the answers given for each question in a set are checked for any inconsistencies, that is missing values or scores outside of the expected ranking;
- secondly, it is determined whether there are missing values or whether there are values which should be treated as missing values in the set. If there are no missing values or values which should be treated as missing values, the next step is skipped and the fourth step is executed immediately;
- thirdly, a new variable is made which counts the number of questions per each respondent pertaining to one set related to one intended variable, excluding the questions for which the respondent scored a missing value;
- fourthly, a new variable is computed in which the scores on each question in the same set are added together. If there are any missing values in the set, a new variable is calculated in the same way as just described but the total is divided by the new variable made in the third step;
- fifthly, based on the frequency of the new variable made in the fourth step, the lowest and highest score in the new variable are determined;
- finally, the actual recoding into the intended five categories of the variables. The actual values of the new variable created in the fourth step are recoded into the five categories based on their score in the interval set between the lowest and highest score. The intervals are determined by the subtraction of the lowest score from the highest score.

The 'knowledge' and 'belief' variables all had to be measured by a set of questions since they relate to very complex indicators: the knowledge of and belief in the use of MAC plants, modern health care, traditional health care, biodiversity conservation, cultural diversity conservation and *tri hita karana*. The indicators are operationalised in sets of phenomena. Moreover, if the knowledge variables were to have been measured by a single question asking the respondent to indicate her or his knowledge of that indicator, it would have given a representation of the respondent's character rather than their level of knowledge. A modest

person would be inclined to indicate her or his knowledge of a topic to be low or average, regardless of whether she or he is known to be a specialist on the topic. A vain person on the other hand or somebody who uses a totally different inherent scale might indicate a high or even very high knowledge, while they have only a basic knowledge on the topic.

There were three different methods applied to measure the phenomena. Two methods were used for the knowledge questions and one method was used for the belief questions. The first method to measure the knowledge variables was asking the respondents to give up to five examples of each phenomenon. This method was used for the variables 'KnowMAC', 'KnowMMS' and 'KnowTMS'. The original answers were checked, for each correct example. One point was given producing a scale ranging from '0' to '5': '0' stands for the lowest level of knowledge, 'Don't know' and '5' stands for the highest level of knowledge, '5 correct examples'. The second technique for measuring knowledge was to ask the respondents to give an explanation. If done correctly, the respondent received a point for that specific question. This technique was used for the variables 'KnowBio', 'KnowCult' and 'KnowTHK'. For all the belief variables, the different indicators had to be valued on a scale ranking from one to five, very little to very much, which equals the score, one to five. If the respondent answered 'Don't know', the answer noted for that question was a zero.

In the second step of the six steps of the calculation method, it was determined whether there are missing values. It should be noted that special attention had been paid to the 'don't know' answer, which had to be treated differently to the knowledge and belief questions. In the knowledge questions an 'I do not know' is equal to 'I can not give an example'. Therefore, in the knowledge questions the 'I do not know' equals 0 as a score, but if a respondent answered a belief question with 'I do not know', this does not equal a wrong answer or no answer as it does in the knowledge questions. When a respondent answered with 'I do not know' to a question related to an aspect of the belief variables, this does not equal a score lower than very low. It either expressed no interest in the topic or a feeling of inability by the respondent to judge what was asked. This could be the case if a respondent did not have any prior experience with the phenomenon dealt with in the question. Although it was not required, respondents often feel that they should have had prior experience, preferably practical, to judge, for instance, the effectiveness of the phenomenon asked about. Therefore the 'don't know' answers related to belief variables were treated as missing values and not as a score of zero, implying a lower score than very low.

The enabling factors

The socio-economic situation (SES) of the household is the most complex specific variable in the whole sets of variables. This variable consists of multiple indicators which have been measured separately to calculate a person's socio-economic status in the sample. It has been operationalised using the following measurable phenomena: land ownership, animal ownership, type of house, real-estate ownership, ownership of motorised vehicles and ownership of electronics. As a control factor, the interviewers had to indicate the socio-economic status of the household in question as: 'Very poor', 'Poor', 'Average', 'Rich' or 'Very rich'. The indicators were not measured by compatible categories and therefore each indicator first had to be recoded into the intended categories. 'Very poor' (1), 'Poor' (2), 'Average' (3), 'Rich' (4) and 'Very rich' (5). The land ownership indicator was measured by phenomena with compatible answers which could then be recalculated into the intended categories. Animal ownership was all measured by recording the number of animals owned by type of animal; it was recoded into the intended categories by assessing the number of animals owned in the situation of the sample village, taking into calculation the potential value of

animals by procreation. A similar process was done for the non-directly compatible phenomena of type of house, real-estate ownership, motorised vehicles and electronics ownership.

After the individual recoding of the indicators, the values were compatible and therefore the recoding into the variable 'SES' has been carried out following the six steps described. After the recalculation into the 'SES', the variable has been cross-checked with the control variable built into the household survey; the assessment of the SES of a respondent by the interviewers. According to the assessment of the interviewers, no household was rated very poor. This is to be expected since the interviewers rated the SES of the households on their observations of the houses where they were received by the respondents. When comparing the results of the interviewers' observations and the calculated SES values at an individual level, it turned out that 117 household had exactly the same rating and 214 household were recoded one class lower than assessed by the interviewers and only fifty-five cases scored two classes lower. Living conditions in Bali are reasonable and therefore none of the interviewers classified a household as very poor, yet considering the non-visible wealth in the house as the calculated SES, it is logical that several households in the sample are ranked lower than the assessments of the interviewers.

In the case of fourteen households, the interviewers rated the SES lower than the outcome of the recoding, which was unexpected. It is the researcher's opinion, as indicated above, that the interviewers rated the SES higher than the 'actual' SES of the respondent. The explanation for this anomaly would be that aspects of the non-visual, and therefore concealed from the interviewer, are involved in making these household richer in the sample. Thirteen households were recoded one class higher than the interviewers' assessments; four were recoded into 'Average', five into 'Rich' and four into 'Very rich'. These households scored especially high on real estate and land and animal ownership, supporting the explanation of the non-visible aspects. A detailed explanation will be given of the one household which scored two categories higher in the recoding. The recoding assessment for this household was 'Very rich' and the assessment of the interviewer was 'Average'. This household scored average on type of house and ownership of electronics, the two indicators directly visible for the interviewers, but it was the non-directly visible aspects which scored very high: land, animal, motorised vehicle ownership and real estate. Based on the result of the control variable, for the whole sample and the individual comparisons with the interviewers' assessments, the researcher is convinced that the SES recoding is representative of an estimation of the actual socio-economic situation of the households on the basis of the six indicators.

The intervening factors

The variables 'Government', 'Tourism' and 'Overuse' were each measured by asking the respondents to indicate their perceived impact of the three items on the three main subjects: health care improvement, the sustainable use, management and conservation of natural resources, representing biodiversity conservation, and the preservation of the local culture, the operationalisation of cultural diversity conservation. The perceived impact could be indicated on a scale from one to five, which equals the score, 1 to 5 or by 'Don't know' which equals a missing value. Since all questions related to one variable were measured in this identical way, the categories are compatible and the recoding by calculation was done to identify the general score on the variables 'Government', 'Tourism' and 'Overuse'.

The dependent factors

The utilisation of MAC plants was measured through the indication of frequency of use during the past 12 months by the respondents for the reported disease and for preventive health care, promotive health care and other curative health care treated with MAC plants. Since the respondents were asked to give an example and not the complete, total use during the last 12 months, the recorded utilisation should be seen as an indication and not as 'the' utilisation of MAC plants. The recoding into the intended five categories has been done based on the original answer categories. Since the same answer categories were used for each question, they were compatible and recordable. Special attention was paid to excluding those answers which count as missing variables, such as incomplete answers or the 'none' reports, stating that no MAC plants were used. The variable 'biodiversity conservation behaviour of MAC plants' is measured by a set of four questions on practices related to sustainable use of plants:

- practices which ensure the re-growth of the MAC plants after cutting (from) it;
- practices which minimise the damage when harvesting from a MAC plant and will ensure the plant will flourish again;
- the practices involved in planting a MAC plant;
- the identification of another practice which ensures the sustainable use of MAC plants, thereby promoting the biodiversity conservation of MAC plants.

The answers to all four questions were recoded in value 1 if the practices are performed correctly in the light of current insights into agricultural and horticultural techniques and a value of zero if they were not performed correctly. When the respondents did not perform the practice in question with MAC plants, they scored missing on the question, since it is not possible to indicate whether they handled the plant sustainably, if they did not use it at all. After these actions were applied to the raw data, the answer categories were compatible and further recoding into the five intended categories by the calculation technique was applied following the six-step procedure. The variable 'cultural diversity conservation behaviour of MAC plants' was measured in a similar way by a set of seven questions. As in the case of the BioMAC variable, a missing value was assigned if the respondent did not cut (from), harvest or had planted a MAC plant. The set of seven questions related to different phenomena in which the cultural diversity conservation has been operationalised are:

- the performance of rituals by obeying local rules when cutting (from) a MAC plant;
- the performance of rituals by obeying local rules when harvesting from a MAC plant;
- the performance of rituals by obeying local rules when planting a MAC plant;
- following the taboos concerning MAC plants;
- the identification and performance of another action by which the local knowledge of MAC plants is preserved;
- transferring knowledge to another person on MAC plants;
- performing the *tumpek* for plants or trees.

7.2 Quantitative Analyses

7.2.1 Bivariate Analyses

The multivariate model for use and conservation of MAC plants presented in Section 3.1.2 is the basis for the statistical analyses of the quantitative data collected about the utilisation and bio-cultural diversity conservation behaviour towards MAC plants by community members in the 'Knowledge-Belief-Practice' complex. The conceptual model is an adaptation of previous findings in the (medical) social sciences, indicating that various categories of factors are related to the utilisation of medical services and bio-cultural cultural conservation behaviour, but one-to-one relationships between behaviour and a single factor are difficult to establish. Although the individual independent or intervening variable does have a relationship to the dependent variables which can be documented and explained by qualitative research techniques, multivariate analysis is necessary to analyse the interrelated interactions between all the independent, intervening and dependent variables.

The results of univariate explorative analyses of each of the variables (N=400) demonstrated that five variables showed too little differentiation in their categories to be included in any of the bivariate or multivariate statistical analyses. These were the variables: 'Sex', 'Ethnic', 'Religion', 'Marital' and 'Birthplace'. The first four of these variables showed an over-representation in a single answer category of 94.5% or higher: respectively 96.0% in the category 'Male' of the variable 'Sex'; 95.3% in the category 'Balinese' of the variable 'Ethnic'; 94.5% in the category 'Hindu Bali' of the variable 'Religion'; and 96.0% in the category 'Married monogamously' of the variable 'Marital'. The variable 'Birthplace' showed only 5.5% respondents in the category 'Outside the regency', while the other scored in the category 'Same village' (88.6%) and in the category 'Same regency' (5.8%) adding up to 94.4% in categories indicating that the household head was still living in the same area in which they were born. 'Birthplace' as well as the other four variables, 'Sex', 'Ethnic', 'Religion' and 'Marital', have been excluded from the dataset for further analysis since the over-representation in the single category cannot provide any valuable information for this sample on differentiation between the respondents for these variables in relation to utilisation and bio-cultural diversity conservation of MAC plants.

The inferential techniques carried out are those based on the bivariate analyses statistics appropriate to the type of data involved, mainly non-dichotomous categorical data, namely: cross tabulations and the Spearman Rank Correlation Coefficient. The bivariate analyses are a point of embarkation to reach a general impression of the relative influence of each of the variables in the block of factors on the dependent variables. Bivariate analysis examines whether one variable relates to another, more specifically what the shape, direction or strength of the relationship is (*cf.* Weinberg & Abramowitz 2002). A bivariate analysis focuses on the association between two variables, and although it does imply co-variation, it should not be mistaken for causation (*cf.* Rosnow & Rosenthal 2002; Field 2005). The results of the bivariate analyses are presented in Table 7.4 to 7.9, which present the ninety tables with:

- the observed counts and percentages of the cross tabulation;
- the values of Pearson's Chi-square (Chi-square, X^2);
- the corresponding measures of association either the gamma value (γ) or Cramer's V (V); and
- the Spearman Rank Correlation Coefficient (Spearman's Rho, r).

The expected counts required to calculate the Pearson's chi-square test have been performed but are not presented in the tables (*cf.* Miller *et al.* 2002; Field 2005). The data used for the statistical analysis are those generated by means of the household survey of the dataset in which N equals 400, that is the 400 households represented by the household heads. In preparation for further statistical analysis, the level of measurements of each SPSS variable introduced in Section 7.1 was established following the, in SPSS pre-defined, three division levels of measurements:

1. the nominal level of measurement;
2. the ordinal level of measurement;
3. the scale level of measurement, which combines the interval and ratio level determined in general statistics.

The ratio level is the highest possible measurement level in statistics and accounts for data which have a numerical character with a zero point for the trait being observed, therefore making it possible to make meaningful multiplicative or ratio comparisons (*cf.* Weinberg & Abramowitz 2002).

The highest statistical level of measurement of the variables in this dataset is the interval measurement level. Variables in the interval measurement level have data which are measured on a scale along the whole of which intervals are equal. The following variables seem to display the interval measurement level, all the psycho-social factors 'KnowMAC', 'KnowMMS', 'KnowTMS', 'KnowBio', 'KnowCult', 'KnowTHK', 'BeliefMAC', 'BeliefMMS', 'BeliefTMS', 'BeliefBio', 'BeliefCult' and 'BeliefTHK'; 'SES' of the enabling factors; all the intervening factors 'Government', 'Tourism' and 'Overuse' and the dependent factors 'UseMAC', 'BioMAC' and 'CultMAC'.

All these variables have data which are scored on a scale ranking from very low to very high in a five-scale ranking order, based on a recoding using the calculation technique. The original answers to these variables often involved questions for which the respondents were asked to choose their answers on a scale measuring from very low (1) to very high (5). Such data, for which the researcher hopes the psychological distances between subsequent categories are equal, are called quasi-interval data. Strictly speaking, the researcher never knows for certain that the assumption of equal intervals in the case of quasi-interval data has been fulfilled (*cf.* De Heus *et al.* 1995). Although De Heus *et al.* (1995) state that it would be most likely without significant consequences to perform statistical techniques which require interval data with quasi-interval data, in order to not to overestimate the power of the variables in this study, all quasi-interval variables have been treated as ordinal variables.

Variables in the ordinal measurement level are those in which the categories of data can be ordered. For ordinal data, it is not possible to tell what the exact differences between them are, but the values are ranked and information about their level is possible (*cf.* Field 2005). The variables with a clearly ordinal measurement level are in the socio-demographic factors 'Age', 'Education' and 'HHcomposition'; in the enabling factors 'DistanceMM', 'DistanceTM' and 'DistanceMAC'; and all the institutional factors 'AwareMAC', 'AwareBio' and 'AwareCult'.

The nominal measurement level means that the numbers assigned to the category merely represent names (*cf.* Field 2005). There is no intrinsic order between these categories. The variables with a nominal measurement level in the dataset are in the socio-demographic factors 'Village', 'Caste', 'Birthplace' and 'Profession'; in the enabling factors 'IncomeHH'; and the perceived morbidity factors 'RepDisease'. Although a different measurement level

could have been anticipated, the variable 'IncomeHH' has the nominal level, because it includes the category 'No income reported'. This makes it impossible to rank all the categories in 'IncomeHH'. It can be concluded that all the variables used in the dataset of the statistical analyses are categorical data of either the nominal or ordinal measurement level.

Besides the cross tabulation, the Spearman Rank Correlation Coefficient (Spearman's Rho, r) is calculated. The Spearman Rank Correlation Coefficient (Spearman's Rho) is a special formula of the Pearson Correlation Coefficient, a method to measure the direction and strength of the linear relationship. Pearson Correlation values approximately equal to 0.50 are considered strong, approximately equal to 0.30 are moderate and approximately equal to 0.10 are weak (*cf.* Cohen 1988; Weinberg & Abramowitz 2002; Field 2005). The requirement for using the Spearman Rank Correlation Coefficient is that both variables involved have to have at the minimum the ordinal measurement level. Each of the three dependent variables meets this criterion since all have the ordinal level of measurement. Therefore the Spearman's Rho of each of the independent and intervening variables of the ordinal measurement level will be given. Spearman's Rho indicates whether the variables or not are related and, if they are related, whether the relationship is positive or negative (*cf.* Field 2005). A positive relation indicates that if respondents score more highly on the dependent variables, they will also do so on the independent variable or vice-versa. A negative relationship indicates that a higher score on the dependent variables relates to a lower score on the independent variable or visa versa.

The Pearson's Chi-square (X^2) test of independence allows the determination of whether or not there is a statistically significant association between two variables (*cf.* Miller *et al.* 2002). The confidence level for this study is set at 95%, which translates into a Pearson's Chi-square indicating a significant relation between the variables involved if the value is smaller than 0.050. Since Pearson's Chi-square does not rely as most statistical tests do on such assumptions as having continuously normally distributed data, two important assumptions always have to be fulfilled (*cf.* Field 2005):

1. each respondent can score only in one cell of the cross tabulation;
2. no expected frequencies should be below 1 and no more than 20% of expected frequencies should be below 5.

The first assumption is fulfilled for all cross tabulations presented in Table 7.4 to 7.9. Whether the second assumption is fulfilled is indicated behind every Pearson's Chi-square value (X^2) in the tables by either yes or no. If the second assumption is not fulfilled it means that the value of the Pearson's Chi-square cannot be used to determine whether or not there is a statistically significant association between the two variables. In the following paragraphs the bivariate analysis towards the dependent factors will be discussed for each set of factors. The relationship between two variables will only be discussed in more detail if one of the following three situations is applicable to the bivariate relationship:

1. the relationship between the two variables can be established by the Pearson's Chi-square (the second assumption is fulfilled) and the relation is significant, meaning that the Pearson's Chi-Square (X^2) value is smaller than 0.050;
2. a moderate Spearman Rank Correlation Coefficient, the r value is approximately 0.30;
3. a strong Spearman Rank Correlation Coefficient, the r value is approximately 0.50.

Table 7.4: Distribution of the socio-demographic variables over the dependent variables (N=400)

Village	UseMAC										BioMAC										CultMAC									
	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total				
Angantaka	N 21	9	28	30	12	8	34	13	29	16	3	29	40	20	8	3	29	40	20	8	3	29	40	20	8	100				
%	21.0%	9.0%	28.0%	30.0%	12.0%	8.0%	34.0%	13.0%	29.0%	16.0%	3.0%	29.0%	40.0%	20.0%	8.0%	3.0%	29.0%	40.0%	20.0%	8.0%	3.0%	29.0%	40.0%	20.0%	8.0%	100.0%				
Bengkel	N 7	5	21	62	5	2	5	30	51	12	15	40	34	6	5	15	40	34	6	5	15	40	34	6	100					
%	7.0%	5.0%	21.0%	62.0%	5.0%	2.0%	5.0%	30.0%	51.0%	12.0%	15.0%	40.0%	34.0%	6.0%	5.0%	15.0%	40.0%	34.0%	6.0%	5.0%	15.0%	40.0%	34.0%	6.0%	100.0%					
Pelapuan	N 33	31	28	8	0	13	43	9	20	15	3	63	20	10	4	3	63	20	10	4	3	63	20	10	100					
%	33.0%	31.0%	28.0%	8.0%	0.0%	13.0%	43.0%	9.0%	20.0%	15.0%	3.0%	63.0%	20.0%	10.0%	4.0%	3.0%	63.0%	20.0%	10.0%	4.0%	3.0%	63.0%	20.0%	10.0%	100.0%					
Tumbu	N 23	22	18	18	19	8	37	6	41	8	5	40	36	16	3	5	40	36	16	3	5	40	36	16	100					
%	23.0%	22.0%	18.0%	18.0%	19.0%	8.0%	37.0%	6.0%	41.0%	8.0%	5.0%	40.0%	36.0%	16.0%	3.0%	5.0%	40.0%	36.0%	16.0%	3.0%	5.0%	40.0%	36.0%	16.0%	100.0%					
	X²= 0.000 (Yes) V= 0.322										X²= 0.000 (Yes) V= 0.257										X²= 0.000 (Yes) V= 0.200									
Age	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total				
16-20 years	N 1	1	0	1	0	0	1	0	1	1	0	1	2	0	0	0	1	2	0	0	0	1	2	0	0	3				
%	33.3%	33.3%	0.0%	33.35%	0.0%	0.0%	33.3%	0.0%	33.3%	33.3%	0.0%	33.3%	66.7%	0.0%	0.0%	0.0%	33.3%	66.7%	0.0%	0.0%	0.0%	33.3%	66.7%	0.0%	0.0%	100.0%				
21-25 years	N 0	3	0	0	2	0	3	0	1	1	0	3	2	0	0	0	3	2	0	0	0	3	2	0	0	5				
%	0.0%	60.0%	0.0%	0.0%	40.0%	0.0%	60.0%	0.0%	20.0%	20.0%	0.0%	60.0%	40.0%	0.0%	0.0%	0.0%	60.0%	40.0%	0.0%	0.0%	0.0%	60.0%	40.0%	0.0%	0.0%	100.0%				
26-30 years	N 11	5	7	7	0	2	13	2	10	3	3	12	8	5	2	3	12	8	5	2	3	12	8	5	2	30				
%	36.7%	16.7%	23.3%	23.3%	0.0%	6.7%	43.3%	6.7%	33.3%	10.0%	10.0%	40.0%	26.7%	16.7%	6.7%	10.0%	40.0%	26.7%	16.7%	6.7%	10.0%	40.0%	26.7%	16.7%	6.7%	100.0%				
31-35 years	N 19	7	14	14	3	8	13	11	20	5	4	27	16	7	3	7.0%	47.4%	28.1%	12.3%	5.3%	7.0%	47.4%	28.1%	12.3%	5.3%	57				
%	33.3%	12.3%	24.6%	24.6%	5.3%	14.0%	22.8%	19.3%	35.1%	8.8%	9	26	19	10	3	7.0%	47.4%	28.1%	12.3%	5.3%	7.0%	47.4%	28.1%	12.3%	5.3%	100.0%				
36-40 years	N 14	8	18	20	7	6	17	12	24	8	13.4%	38.8%	28.4%	14.9%	4.5%	13.4%	38.8%	28.4%	14.9%	4.5%	13.4%	38.8%	28.4%	14.9%	4.5%	67				
%	20.9%	11.9%	26.9%	29.9%	10.4%	9.0%	25.4%	17.9%	35.8%	11.9%	8.0%	42.0%	36.0%	10.0%	4.0%	8.0%	42.0%	36.0%	10.0%	4.0%	8.0%	42.0%	36.0%	10.0%	4.0%	100.0%				
41-45 years	N 12	3	9	20	6	7	10	6	21	6	0	21	18	5	2	8.0%	42.0%	36.0%	10.0%	4.0%	8.0%	42.0%	36.0%	10.0%	4.0%	50				
%	24.0%	6.0%	18.0%	40.0%	12.0%	14.0%	20.0%	12.0%	42.0%	12.0%	0.0%	42.0%	36.0%	10.0%	4.0%	8.0%	42.0%	36.0%	10.0%	4.0%	8.0%	42.0%	36.0%	10.0%	4.0%	100.0%				
46-50 years	N 6	8	13	16	5	2	18	8	12	8	0	21	18	5	4	0.0%	43.8%	37.5%	10.4%	8.3%	0.0%	43.8%	37.5%	10.4%	8.3%	48				
%	12.5%	16.7%	27.1%	33.3%	10.4%	4.2%	37.5%	16.7%	25.0%	16.7%	0.0%	43.8%	37.5%	10.4%	8.3%	0.0%	43.8%	37.5%	10.4%	8.3%	0.0%	43.8%	37.5%	10.4%	8.3%	100.0%				
51-55 years	N 9	12	13	11	3	5	14	7	14	8	0	17	15	12	4	0.0%	35.4%	31.3%	25.0%	8.3%	0.0%	35.4%	31.3%	25.0%	8.3%	48				
%	18.8%	25.0%	27.1%	22.9%	6.3%	10.4%	29.2%	14.6%	29.2%	16.7%	0.0%	35.4%	31.3%	25.0%	8.3%	0.0%	35.4%	31.3%	25.0%	8.3%	0.0%	35.4%	31.3%	25.0%	8.3%	100.0%				
56-60 years	N 3	6	7	14	3	0	12	4	13	4	0	17	11	4	1	0.0%	51.5%	33.3%	12.1%	3.0%	0.0%	51.5%	33.3%	12.1%	3.0%	33				
%	9.1%	18.2%	21.2%	42.4%	9.1%	0.0%	36.4%	12.1%	39.4%	12.1%	0.0%	51.5%	33.3%	12.1%	3.0%	0.0%	51.5%	33.3%	12.1%	3.0%	0.0%	51.5%	33.3%	12.1%	3.0%	100.0%				
61-65 years	N 2	6	7	9	5	0	7	6	14	2	5	14	8	1	1	17.2%	48.3%	27.6%	3.4%	3.4%	17.2%	48.3%	27.6%	3.4%	3.4%	29				
%	6.9%	20.7%	24.1%	31.0%	17.2%	0.0%	24.1%	20.7%	48.3%	6.9%	17.2%	48.3%	27.6%	3.4%	3.4%	17.2%	48.3%	27.6%	3.4%	3.4%	17.2%	48.3%	27.6%	3.4%	3.4%	100.0%				
66-70 years	N 4	5	4	2	1	1	6	1	6	2	1	8	5	2	0	6.3%	37.5%	6.3%	37.5%	12.5%	0.0%	6.3%	37.5%	6.3%	37.5%	16				
%	25.0%	31.3%	25.0%	12.5%	6.3%	6.3%	37.5%	6.3%	37.5%	12.5%	6.3%	37.5%	6.3%	37.5%	12.5%	6.3%	37.5%	6.3%	37.5%	12.5%	0.0%	6.3%	37.5%	6.3%	37.5%	100.0%				
71-75 years	N 1	3	3	2	0	0	5	0	3	1	0	3	5	1	0	0.0%	33.3%	55.6%	11.1%	0.0%	0.0%	33.3%	55.6%	11.1%	0.0%	9				
%	11.1%	33.3%	33.3%	22.2%	0.0%	0.0%	55.6%	0.0%	33.3%	11.1%	0.0%	33.3%	55.6%	11.1%	0.0%	0.0%	33.3%	55.6%	11.1%	0.0%	0.0%	33.3%	55.6%	11.1%	0.0%	100.0%				
76-80 years	N 2	0	0	2	1	0	0	1	2	2	0	2	3	0	0	0.0%	40.0%	60.0%	0.0%	0.0%	0.0%	40.0%	60.0%	0.0%	0.0%	5				
%	40.0%	0.0%	0.0%	40.0%	20.0%	0.0%	0.0%	20.0%	40.0%	40.0%	0.0%	40.0%	60.0%	0.0%	0.0%	0.0%	40.0%	60.0%	0.0%	0.0%	0.0%	40.0%	60.0%	0.0%	0.0%	100.0%				
	X²= 0.071 (No) γ= 0.096 r= 0.106*										X²= 0.628 (No) γ= 0.064 r= 0.066										X²= 0.636 (No) γ= 0.024 r= 0.024									
Education	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total				
No formal education	N 13	23	27	18	11	5	32	11	34	10	1	43	35	10	3	1.1%	46.7%	38.0%	10.9%	3.3%	1.1%	46.7%	38.0%	10.9%	3.3%	92				
%	14.1%	25.0%	29.3%	19.6%	12.0%	5.4%	34.8%	12.0%	37.0%	10.9%	1.1%	46.7%	38.0%	10.9%	3.3%	1.1%	46.7%	38.0%	10.9%	3.3%	1.1%	46.7%	38.0%	10.9%	3.3%	100.0%				
Primary school	N 20	14	25	33	9	8	34	13	34	12	11	40	34	14	2	10.9%	39.6%	33.7%	13.9%	2.0%	10.9%	39.6%	33.7%	13.9%	2.0%	101				
%	19.8%	13.9%	24.8%	32.7%	8.9%	7.9%	33.7%	12.9%	33.7%	11.9%	10.9%	39.6%	33.7%	13.9%	2.0%	10.9%	39.6%	33.7%	13.9%	2.0%	10.9%	39.6%	33.7%	13.9%	2.0%	100.0%				
Junior high school	N 13	10	11	16	3	5	19	9	14	6	2	24	17	8	2	3.8%	45.3%	32.1%	15.1%	3.8%	3.8%	45.3%	32.1%	15.1%	3.8%	53				
%	24.5%	18.9%	20.8%	30.2%	5.7%	9.4%	35.8%	17.0%	26.4%	11.3%	3.8%	45.3%	32.1%	15.1%	3.8%	3.8%	45.3%	32.1%	15.1%	3.8%	3.8%	45.3%	32.1%	15.1%	3.8%	100.0%				
Senior high school	N 31	12	21	32	7	9	27	14	43	10	9	43	29	14	8	8.7%	41.7%	28.2%	13.6%	7.8%	8.7%	41.7%	28.2%	13.6%	7.8%	103				
%	30.1%	11.7%	20.4%	31.1%	6.8%	8.7%	26.2%	13.6%	41.7%	9.7%	8.7%	41.7%	28.2%	13.6%	7.8%	8.7%	41.7%	28.2%	13.6%	7.8%	8.7%	41.7%	28.2%	13.6%	7.8%	100.0%				
College	N 6	5	4	7	4	3	4	4	8	7	2	11	6	5	2	7.7%	42.3%	23.1%	19.2%	7.7%	7.7%	42.3%	23.1%	19.2%	7.7%	26				
%	23.1%	19.2%	15.4%	26.9%	15.4%	11.5%	15.4%	15.4%	30.8%	26.9%	7.7%	42.3%	23.1%	19.2%	7.7%	7.7%	42.3%	23.1%	19.2%	7.7%	7.7%	42.3%	23.1%	19.2%	7.7%	100.0%				
University	N 1	3	7	12	2	1	3	7	8	6	1	11	9	1	3	4.0%	44.0%	36.0%	4.0%	12.0%	4.0%	44.0%	36.0%	4.0%	12.0%	25				
%	4.0%	12.0%	28.0%	48.0%	8.0%	4.0%	12.0%	28.0%	32.0%	24.0%	4.0%	44.0%	36.0%	4.0%	12.0%	4.0%	44.0%	36.0%	4.0%	12.0%	4.0%	44.0%	36.0%	4.0%	12.0%	100.0%				
	X²= 0.086 (Yes) γ= 0.015 r= 0.015										X²= 0.275 (No) γ= 0.083 r= 0.079										X²= 0.356 (No) γ= 0.014 r= 0.013									
Total	N 84	67	95	118	36	31	119	58	141	51	26	172	130	52	20	6.5%	43.0%	32.5%	13.0%	5.0%	6.5%	43.0%	32.5%	13.0%	5.0%	400				
%	21.0%	16.8%	23.8%	29.5%	9.0%	7.8%	29.8%	14.5%	35.3%	12.8%	6.5%	43.0%	32.5%	13.0%	5.0%	6.5%	43.0%	32.5%	13.0%	5.0%	6.5%	43.0%	32.5%	13.0%	5.0%	100.0%				
X²= Pearson's Chi-Square: (Yes) / (No)= indication of fulfillment of the second assumption; V= Cramer's V; γ= Gamma; r= Spearman's Rho; Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed)																														

Table 7.4 (continued): Distribution of the socio-demographic variables over the dependent variables (N=400)

Caste	UseMAC										BioMAC										CultMAC										
	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total
No caste	N	3	4	2	6	6	1	10	1	8	1	1	10	1	8	1	4	14	2	1	0	21									
	%	14.3%	19.0%	9.5%	28.6%	28.6%	4.8%	47.6%	4.8%	38.1%	4.8%	19.0%	66.7%	9.5%	4.8%	19.0%	66.7%	9.5%	4.8%	0.0%	100.0%										
Brahmana	N	1	0	1	0	0	1	1	0	0	0	50.0%	50.0%	0.0%	0.0%	0	0	0	1	0	2										
	%	50.0%	0.0%	50.0%	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%										
Satria	N	17	15	16	18	2	6	16	12	22	12	8.8%	23.5%	17.6%	32.4%	17.6%	2	26	24	10	68										
	%	25.0%	22.1%	23.5%	26.5%	2.9%	8.8%	23.5%	17.6%	32.4%	17.6%	8.8%	23.5%	17.6%	32.4%	17.6%	2.9%	38.2%	35.3%	14.7%	8.8%	100.0%									
Wesya	N	3	0	4	1	1	0	6	0	1	2	0.0%	66.7%	0.0%	11.1%	22.2%	0	3	2	0	9										
	%	33.3%	0.0%	44.4%	11.1%	11.1%	0.0%	66.7%	0.0%	11.1%	22.2%	0.0%	66.7%	0.0%	11.1%	22.2%	0.0%	33.3%	22.2%	0.0%	44.4%	100.0%									
Sudra	N	60	48	72	93	27	23	86	45	110	36	7.7%	28.7%	15.0%	36.7%	12.0%	20	129	101	40	300										
	%	20.0%	16.0%	24.0%	31.0%	9.0%	7.7%	28.7%	15.0%	36.7%	12.0%	7.7%	28.7%	15.0%	36.7%	12.0%	6.7%	43.0%	33.7%	13.3%	3.3%	100.0%									
X ² = 0.096 (No) V=0.122 X ² = 0.122 (No) V= 0.119 X ² = 0.000 (No) V= 0.182																															
Profession	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total
Not in labour force	N	2	3	3	4	0	1	2	3	5	1	8.3%	16.7%	25.0%	41.7%	8.3%	1	6	3	1	1	12									
	%	16.7%	25.0%	25.0%	33.3%	0.0%	8.3%	16.7%	25.0%	41.7%	8.3%	8.3%	16.7%	25.0%	41.7%	8.3%	8.3%	50.0%	25.0%	8.3%	100.0%										
Unemployed	N	5	3	4	2	1	1	5	3	6	0	6.7%	33.3%	20.0%	40.0%	0.0%	0	8	5	1	15										
	%	33.3%	20.0%	26.7%	13.3%	6.7%	6.7%	33.3%	20.0%	40.0%	0.0%	6.7%	33.3%	20.0%	40.0%	0.0%	0.0%	53.3%	33.3%	6.7%	100.0%										
Agriculture, Forestry, Hunting and Fishery	N	27	35	50	45	18	11	58	18	65	23	6.3%	33.1%	10.3%	37.1%	13.1%	11	80	57	24	175										
	%	15.4%	20.0%	28.6%	25.7%	10.3%	6.3%	33.1%	10.3%	37.1%	13.1%	6.3%	33.1%	10.3%	37.1%	13.1%	6.3%	45.7%	32.6%	13.7%	1.7%	100.0%									
Manufacturing Industry	N	11	4	8	7	5	5	12	4	11	3	14.3%	34.3%	11.4%	31.4%	8.6%	2	11	16	5	35										
	%	31.4%	11.4%	22.9%	20.0%	14.3%	14.3%	34.3%	11.4%	31.4%	8.6%	14.3%	34.3%	11.4%	31.4%	8.6%	5.7%	31.4%	45.7%	14.3%	2.9%	100.0%									
Building/Construction	N	0	1	5	13	1	0	5	8	6	1	0.0%	25.0%	40.0%	30.0%	5.0%	4	4	10	0	20										
	%	0.0%	5.0%	25.0%	65.0%	5.0%	0.0%	25.0%	40.0%	30.0%	5.0%	0.0%	25.0%	40.0%	30.0%	5.0%	20.0%	20.0%	50.0%	0.0%	10.0%	100.0%									
Wholesale trade, Retail trade	N	10	8	8	13	0	3	11	7	12	6	7.7%	28.2%	17.9%	30.8%	15.4%	2	16	9	4	39										
	%	25.6%	20.5%	20.5%	33.3%	0.0%	7.7%	28.2%	17.9%	30.8%	15.4%	7.7%	28.2%	17.9%	30.8%	15.4%	5.1%	41.0%	23.1%	10.3%	20.5%	100.0%									
Restaurants and Hotels	N	6	0	2	4	0	2	3	1	5	1	16.7%	25.0%	8.3%	41.7%	8.3%	0	7	3	2	12										
	%	50.0%	0.0%	16.7%	33.3%	0.0%	16.7%	25.0%	8.3%	41.7%	8.3%	16.7%	25.0%	8.3%	41.7%	8.3%	0.0%	58.3%	25.0%	16.7%	0.0%	100.0%									
Transportation, Storage and Communication	N	13	8	6	13	4	5	14	5	14	6	11.4%	31.8%	11.4%	31.8%	13.6%	4	18	15	7	44										
	%	29.5%	18.2%	13.6%	29.5%	9.1%	11.4%	31.8%	11.4%	31.8%	13.6%	11.4%	31.8%	11.4%	31.8%	13.6%	9.1%	40.9%	34.1%	15.9%	0.0%	100.0%									
Financing, Insurance, Real Estate & Business Services	N	9	4	9	16	7	3	7	9	17	9	6.7%	15.6%	20.0%	37.8%	20.0%	2	21	12	6	45										
	%	20.0%	8.9%	20.0%	35.6%	15.6%	6.7%	15.6%	20.0%	37.8%	20.0%	6.7%	15.6%	20.0%	37.8%	20.0%	4.4%	46.7%	26.7%	13.3%	8.9%	100.0%									
Community, Social and Personal Services	N	1	1	0	1	0	0	2	0	0	1	0.0%	66.7%	0.0%	0.0%	33.3%	0	1	0	2	3										
	%	33.3%	33.3%	0.0%	33.3%	0.0%	0.0%	66.7%	0.0%	0.0%	33.3%	0.0%	66.7%	0.0%	0.0%	33.3%	0.0%	33.3%	0.0%	66.7%	0.0%	100.0%									
Other	N	1	1	0	1	0	0	2	0	0	1	0.0%	66.7%	0.0%	0.0%	33.3%	0	1	0	2	3										
	%	33.3%	33.3%	0.0%	33.3%	0.0%	0.0%	66.7%	0.0%	0.0%	33.3%	0.0%	66.7%	0.0%	0.0%	33.3%	0.0%	33.3%	0.0%	66.7%	0.0%	100.0%									
X ² = 0.034 (No) V= 0.182 X ² = 0.434 (No) V= 0.152 X ² = 0.008 (No) V= 0.193																															
HHcomposition	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total
1 or 2 HH Members	N	5	7	7	7	3	3	6	4	9	7	10.3%	20.7%	13.8%	31.0%	24.1%	6	28	12	35	8	29									
	%	17.2%	24.1%	24.1%	24.1%	10.3%	10.3%	20.7%	13.8%	31.0%	24.1%	10.3%	20.7%	13.8%	31.0%	24.1%	13.8%	58.6%	13.8%	13.8%	0.0%	100.0%									
3 HH Members	N	22	13	22	26	6	6	28	12	35	8	6.7%	31.5%	13.5%	39.3%	9.0%	7	31	34	13	4	89									
	%	24.7%	14.6%	24.7%	29.2%	6.7%	6.7%	31.5%	13.5%	39.3%	9.0%	6.7%	31.5%	13.5%	39.3%	9.0%	7.9%	34.8%	38.2%	14.6%	4.5%	100.0%									
4 HH Members	N	22	13	31	51	8	12	39	17	46	11	9.6%	31.2%	13.6%	36.8%	8.8%	8	50	43	18	6	125									
	%	17.6%	10.4%	24.8%	40.8%	6.4%	9.6%	31.2%	13.6%	36.8%	8.8%	9.6%	31.2%	13.6%	36.8%	8.8%	6.4%	40.0%	34.4%	14.4%	4.8%	100.0%									
5 HH Members	N	21	19	16	14	11	5	31	16	19	10	6.2%	38.3%	19.8%	23.5%	12.3%	2	37	30	8	4	81									
	%	25.9%	23.5%	19.8%	17.3%	13.6%	6.2%	38.3%	19.8%	23.5%	12.3%	6.2%	38.3%	19.8%	23.5%	12.3%	2.5%	45.7%	37.0%	9.9%	4.9%	100.0%									
6 or more HH Members	N	14	15	19	20	8	5	15	9	32	15	6.6%	19.7%	11.8%	42.1%	19.7%	5	37	19	9	6	76									
	%	18.4%	19.7%	25.0%	26.3%	10.5%	6.6%	19.7%	11.8%	42.1%	19.7%	6.6%	19.7%	11.8%	42.1%	19.7%	6.6%	48.7%	25.0%	11.8%	7.9%	100.0%									
X ² = 0.095 (Yes) γ= -0.006 r= -0.007 X ² = 0.139 (Yes) γ= 0.045 r= 0.042 X ² = 0.297 (No) γ= 0.017 r= 0.016																															
Total	N	84	67	95	118	36	31	119	58	141	51	7.8%	29.8%	14.5%	35.3%	12.8%	26	172	130	52	20	400									
	%	21.0%	16.8%	23.8%	29.5%	9.0%	7.8%	29.8%	14.5%	35.3%	12.8%	7.8%	29.8%	14.5%	35.3%	12.8%	6.5%	43.0%	32.5%	13.0%	5.0%	100.0%									
X ² = Pearson's Chi-Square; (Yes) / (No)= indication of fulfillment of the second assumption; V= Cramer's V; γ= Gamma; r= Spearman's Rho; ** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed)																															

χ^2 = Pearson's Chi-Square; (Yes) / (No) = indication of fulfillment of the second assumption; V = Cramer's V; γ = Gamma; r = Spearman's Rho;

* Correlation is significant at

Bivariate analyses of the socio-demographic variables and the dependent variables

The Pearson's Chi-squares fulfilling both assumptions, see Table 7.4, indicate a very strongly significant association between the socio-demographic variable 'Village' and each of the three dependent variables ($X^2 = 0.000$). Nevertheless, the Cramer's V indicate a weak relationship with 'UseMAC' ($V = 0.322$), 'BioMAC' ($V = 0.257$) and 'CultMAC' ($V = 0.200$). The values of Spearman's Rho indicate a negative relationship between 'HHcomposition' and 'UseMAC', while all other Spearman's Rho values present a positive relationship towards the three dependent variables. All Spearman's Rho values indicate a weak relationship.

Examining the cross tabulation of 'Village' and 'UseMAC' shows that Bengkel has the highest number of respondents with a high utilisation of MAC plants (62.0% high use and 5.0% very high use). Angantaka has the second highest number of respondents with a high utilisation of MAC plants (30.0% high use and 12.0% very high use). Pelapuan has the highest number of respondents with a low utilisation of MAC plants (33.0% very low use and 31.0% low use). Tumbu has the second highest number of respondents with a low utilisation of MAC plants (23.0% very low use and 22.0% low use). On the basis of the general assumption that the utilisation of MAC plants is strongly connected with traditional medical systems, the exact opposite of these results would have been expected. Angantaka, the most urbanized area located in the vicinity of Denpasar with various facilities related to modern health care, it expected to have the lowest utilisation of MAC plants, whereas Pelapuan located in the mountain area with less access to modern health care and more access to plant materials in the surrounding forests would have a higher utilisation. These antithetical findings support the earlier statements that utilisation of MAC plants should be seen as a feature located in the medically pluralistic system of Bali and not as an exclusive part of any of the medical systems.

Considering the cross tabulation of 'Village' and 'BioMAC'. Pelapuan has the highest number of respondents with a low level of biodiversity conservation (13.0% very low and 43.0% low). Angantaka has the highest number of respondents with a high level of biodiversity conservation behaviour (51.0% high and 12.0% very high). These results were expected in relation to the reported utilisation of MAC plants in both sample villages. Nevertheless, they are surprising since the biodiversity conservation of MAC plants has been operationalised in relation to common agricultural, more specifically horticultural, techniques and Bengkel and Pelapuan are agricultural areas, which generate the majority of their income from agricultural business. The negative attitude towards biodiversity conservation of MAC plants might be explained by the fact that most of the MAC plants were reported to be found in the vicinity of people's own gardens and such plants are considered to be easy replaceable. Moreover, the seeming abundance of plant materials in the Pelapuan area might lower the urgency, whereas the area around Bengkel has a lower plant variation and requires more intensive agricultural and horticultural techniques to obtain results.

The most striking aspect of the cross tabulation between 'Village' and 'CultMAC' is the unexpectedly low cultural conservation of MAC plants in Bengkel (15.0% very low, 40.0% low) seemingly contradicting the high utilisation of MAC plants there. Pelapuan and Tumbu, which have the highest number of respondents with a low utilisation, do show the expected low cultural diversity conservation; respectively (3.0% very low, 63.0% low) and (5.0% very low and 40.0% low). The cultural diversity conservation behaviour produced this low cultural diversity conservation because the majority of community members in Bengkel do not report performing any rituals which would reflect an observation of local rules when cutting, harvesting or planting MAC plants. However, they did transfer knowledge on MAC plants to others and performed the tumpek.

Table 7.5: Distribution of the psycho-social variables over the dependent variables (N=400)

KnowMAC					UseMAC					BioMAC					CultMAC								
	N	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total	
Very little knowledge	%	85.7%	14.3%	0.0%	0.0%	0.0%	42.9%	42.9%	0.0%	14.3%	0.0%	0.0%	28.6%	14.3%	42.9%	14.3%	0.0%	28.6%	14.3%	42.9%	14.3%	100.0%	
Little knowledge	N	38	26	28	23	1	19	35	16	31	15	4	55	32	17	8	4	55	32	17	8	116	
Average knowledge	%	32.8%	22.4%	24.1%	19.8%	0.9%	16.4%	30.2%	13.8%	26.7%	12.9%	3.4%	47.4%	27.6%	14.7%	6.9%	10.7%	45.5%	32.6%	8.6%	2.7%	100.0%	
Considerable knowledge	N	28	21	43	74	21	7	61	32	66	21	20	85	61	16	5	20	85	61	16	5	187	
Very considerable knowledge	%	15.0%	11.2%	23.0%	39.6%	11.2%	3.7%	32.6%	17.1%	35.3%	11.2%	10.7%	45.5%	32.6%	8.6%	2.7%	10.7%	45.5%	32.6%	8.6%	2.7%	100.0%	
Very considerable knowledge	N	9	14	19	17	10	2	16	7	32	12	1	22	31	11	4	1	22	31	11	4	69	
	%	13.0%	20.3%	27.5%	24.6%	14.5%	2.9%	23.2%	10.1%	46.4%	17.4%	1.4%	31.9%	44.9%	15.9%	5.8%	1.4%	31.9%	44.9%	15.9%	5.8%	100.0%	
	N	3	5	5	4	4	0	4	3	11	3	3	1	8	5	2	1	8	5	2	21		
Very considerable knowledge	%	14.3%	23.8%	23.8%	19.0%	19.0%	0.0%	19.0%	14.3%	52.4%	14.3%	4.8%	38.1%	23.8%	23.8%	9.5%	4.8%	38.1%	23.8%	23.8%	9.5%	100.0%	
	N	3	5	5	4	4	0	4	3	11	3	3	1	8	5	2	1	8	5	2	21		
	%	14.3%	23.8%	23.8%	19.0%	19.0%	0.0%	19.0%	14.3%	52.4%	14.3%	4.8%	38.1%	23.8%	23.8%	9.5%	4.8%	38.1%	23.8%	23.8%	9.5%	100.0%	
$\chi^2 = 0.000$ (No) $\gamma = 0.295$ $r = 0.256^{**}$ $\chi^2 = 0.000$ (No) $\gamma = 0.260$ $r = 0.214^{**}$ $\chi^2 = 0.006$ (No) $\gamma = 0.054$ $r = 0.041$																							
KnowMMS					UseMAC					BioMAC					CultMAC								
	N	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total	
Very little knowledge	%	0.0%	28.6%	42.9%	28.6%	0.0%	28.6%	42.9%	0.0%	14.3%	14.3%	14.3%	14.3%	0.0%	14.3%	14.3%	14.3%	14.3%	42.9%	14.3%	14.3%	100.0%	
Little knowledge	N	17	13	21	27	8	5	27	14	31	9	7	41	28	8	2	7	41	28	8	2	86	
Average knowledge	%	19.8%	15.1%	24.4%	31.4%	9.3%	5.8%	31.4%	16.3%	36.0%	10.5%	8.1%	47.7%	32.6%	9.3%	2.3%	8.1%	47.7%	32.6%	9.3%	2.3%	100.0%	
Considerable knowledge	N	38	30	39	52	17	13	51	28	58	26	8	73	58	23	14	8	73	58	23	14	176	
Very considerable knowledge	%	21.6%	17.0%	22.2%	29.5%	9.7%	7.4%	29.0%	15.9%	33.0%	14.8%	4.5%	41.5%	33.0%	13.1%	8.0%	4.5%	41.5%	33.0%	13.1%	8.0%	100.0%	
Very considerable knowledge	N	29	20	29	34	11	11	35	16	47	14	10	53	39	18	3	10	53	39	18	3	123	
	%	23.6%	16.3%	23.6%	27.6%	8.9%	8.9%	28.5%	13.0%	38.2%	11.4%	8.1%	43.1%	31.7%	14.6%	2.4%	8.1%	43.1%	31.7%	14.6%	2.4%	100.0%	
	N	0	2	3	3	0	0	0	3	0	4	1	0	4	2	0	0	0	4	2	0	8	
Very considerable knowledge	%	0.0%	25.0%	37.5%	37.5%	0.0%	0.0%	37.5%	0.0%	50.0%	12.5%	0.0%	50.0%	25.0%	25.0%	0.0%	0.0%	50.0%	25.0%	25.0%	0.0%	100.0%	
	N	0	2	3	3	0	0	0	3	0	4	1	0	4	2	0	0	0	4	2	0	8	
	%	0.0%	25.0%	37.5%	37.5%	0.0%	0.0%	37.5%	0.0%	50.0%	12.5%	0.0%	50.0%	25.0%	25.0%	0.0%	0.0%	50.0%	25.0%	25.0%	0.0%	100.0%	
$\chi^2 = 0.933$ (No) $\gamma = -0.035$ $r = -0.030$ $\chi^2 = 0.757$ (No) $\gamma = 0.032$ $r = 0.026$ $\chi^2 = 0.524$ (No) $\gamma = 0.017$ $r = 0.014$																							
KnowTMS					UseMAC					BioMAC					CultMAC								
	N	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total	
Very little knowledge	%	40.0%	30.0%	10.0%	10.0%	10.0%	20.0%	40.0%	20.0%	20.0%	0.0%	10.0%	60.0%	10.0%	20.0%	0.0%	10.0%	60.0%	10.0%	20.0%	0.0%	100.0%	
Little knowledge	N	33	30	31	38	13	12	50	23	42	18	9	57	55	17	7	9	57	55	17	7	145	
Average knowledge	%	22.8%	20.7%	21.4%	26.2%	9.0%	8.3%	34.5%	15.9%	29.0%	12.4%	6.2%	39.3%	37.9%	11.7%	4.8%	6.2%	39.3%	37.9%	11.7%	4.8%	100.0%	
Considerable knowledge	N	35	30	46	67	20	12	56	24	79	27	11	90	62	23	12	11	90	62	23	12	198	
Very considerable knowledge	%	17.7%	15.2%	23.2%	33.8%	10.1%	6.1%	28.3%	12.1%	39.9%	13.6%	5.6%	45.5%	31.3%	11.6%	6.1%	5.6%	45.5%	31.3%	11.6%	6.1%	100.0%	
Very considerable knowledge	N	10	4	15	11	2	5	9	7	16	5	5	18	9	9	1	42	18	9	9	1	42	
	%	23.8%	9.5%	35.7%	26.2%	4.8%	11.9%	21.4%	16.7%	38.1%	11.9%	11.9%	42.9%	21.4%	21.4%	2.4%	11.9%	42.9%	21.4%	21.4%	2.4%	100.0%	
	N	2	0	2	1	0	0	0	0	2	2	1	0	1	3	1	0	0	1	3	1	5	
Very considerable knowledge	%	40.0%	0.0%	40.0%	20.0%	0.0%	0.0%	0.0%	40.0%	40.0%	20.0%	0.0%	0.0%	20.0%	60.0%	20.0%	0.0%	0.0%	20.0%	60.0%	20.0%	0.0%	100.0%
	N	2	0	2	1	0	0	0	0	2	2	1	0	1	3	1	0	0	1	3	1	5	
	%	40.0%	0.0%	40.0%	20.0%	0.0%	0.0%	0.0%	40.0%	40.0%	20.0%	0.0%	0.0%	20.0%	60.0%	20.0%	0.0%	0.0%	20.0%	60.0%	20.0%	0.0%	100.0%
$\chi^2 = 0.321$ (No) $\gamma = 0.079$ $r = 0.064$ $\chi^2 = 0.392$ (No) $\gamma = 0.141$ $r = 0.111^{*}$ $\chi^2 = 0.486$ (No) $\gamma = -0.014$ $r = -0.010$																							
KnowBio					UseMAC					BioMAC					CultMAC								
	N	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total	
Very little knowledge	%	55.6%	11.1%	22.2%	11.1%	0.0%	44.4%	55.6%	0.0%	0.0%	0.0%	11.1%	11.1%	11.1%	33.3%	44.4%	0.0%	11.1%	11.1%	33.3%	44.4%	100.0%	
Little knowledge	N	7	3	3	3	0	5	6	1	4	0	1	3	3	6	3	16	3	3	6	3	16	
Average knowledge	%	43.8%	18.8%	18.8%	18.8%	0.0%	31.3%	37.5%	6.3%	25.0%	0.0%	6.3%	18.8%	18.8%	37.5%	18.8%	100.0%	6.3%	18.8%	18.8%	37.5%	100.0%	
Considerable knowledge	N	10	8	3	10	2	6	9	5	8	5	6	16	6	4	1	18.2%	48.5%	18.2%	12.1%	3.0%	100.0%	
Very considerable knowledge	%	30.3%	24.2%	9.1%	30.3%	6.1%	18.2%	27.3%	15.2%	24.2%	15.2%	18.2%	48.5%	18.2%	12.1%	3.0%	18.2%	48.5%	18.2%	12.1%	3.0%	100.0%	
Very considerable knowledge	N	18	22	30	48	11	9	43	30	42	5	7	62	51	7	2	5.4%	48.1%	39.5%	5.4%	1.6%	100.0%	
	%	14.0%	17.1%	23.3%	37.2%	8.5%	7.0%	33.3%	23.3%	32.6%	3.9%	5.4%	48.1%	39.5%	5.4%	1.6%	5.4%	48.1%	39.5%	5.4%	1.6%	100.0%	
	N	44	33	57	56	23	7	56	22	87	41	11	90	67	31	14	213	11	90	67	31	213	
Very considerable knowledge	%	20.7%	15.5%	26.8%	26.3%	10.8%	3.3%	26.3%	10.3%	40.8%	19.2%	5.2%	42.3%	31.5%	14.6%	6.6%	5.2%	42.3%	31.5%	14.6%	6.6%	100.0%	
	N	84	67	95	118	36	31	119	58	141	51	26	172	130	52	20	400	26	172	130	52	400	
	%	21.0%	16.8%	23.8%	29.5%	9.0%	7.8%	29.8%	14.5%	35.3%	12.8%	6.5%	43.0%	32.5%	13.0%	5.0%	6.5%	43.0%	32.5%	13.0%	5.0%	100.0%	
Total																						400	
$\chi^2 =$ Pearson's Chi-Square; (Yes) / (No) = indication of fulfillment of the second assumption; V = Cramer's V; γ = Gamma; r = Spearman's Rho; * Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed)																							

Table 7.5 (continued): Distribution of the psycho-social variables over the dependent variables (N=400)

KnowCult	UseMAC										BioMAC										CultMAC									
	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total				
Very little knowledge	N 13	4	5	15	2	9	7	9	13	1	23.1%	17.9%	23.1%	33.3%	2.6%	15.4%	51.3%	25.6%	7.7%	0	39									
%	33.3%	10.3%	12.8%	38.5%	5.1%	23.1%	17.9%	23.1%	33.3%	2.6%	15.4%	51.3%	25.6%	7.7%	0.0%	39											100.0%			
Little knowledge	N 48	29	46	41	19	17	66	29	58	13	9.3%	36.1%	15.8%	31.7%	7.1%	3.3%	43.7%	42.1%	9.8%	1.1%	183									
%	26.2%	15.8%	25.1%	22.4%	10.4%	9.3%	36.1%	15.8%	31.7%	7.1%	3.3%	43.7%	42.1%	9.8%	1.1%	183											100.0%			
Average knowledge	N 9	18	19	35	10	4	19	13	42	13	4.4%	20.9%	14.3%	46.2%	14.3%	14.3%	47.3%	22.0%	14.3%	2.2%	91									
%	9.9%	19.8%	20.9%	38.5%	11.0%	4.4%	20.9%	14.3%	46.2%	14.3%	14.3%	47.3%	22.0%	14.3%	2.2%	91											100.0%			
Considerable knowledge	N 11	14	22	25	5	1	25	6	24	21	1.3%	32.5%	7.8%	31.2%	27.3%	1.3%	36.4%	26.0%	18.2%	18.2%	77									
%	14.3%	18.2%	28.6%	32.5%	6.5%	1.3%	32.5%	7.8%	31.2%	27.3%	1.3%	36.4%	26.0%	18.2%	18.2%	77											100.0%			
Very considerable knowledge	N 3	2	3	2	0	0	2	1	4	3	0.0%	20.0%	10.0%	40.0%	30.0%	0.0%	10.0%	30.0%	40.0%	20.0%	10									
%	30.0%	20.0%	30.0%	20.0%	0.0%	0.0%	20.0%	10.0%	40.0%	30.0%	0.0%	10.0%	30.0%	40.0%	20.0%	10											100.0%			
$\chi^2 = 0.034$ (No) $\gamma = 0.097$ $r = 0.086$ $\chi^2 = 0.000$ (No) $\gamma = 0.293$ $r = 0.250^{**}$ $\chi^2 = 0.000$ (No) $\gamma = 0.227$ $r = 0.189^{**}$																														
KnowTHK																														
Very little knowledge	N 29	27	33	27	18	14	54	12	48	6	10.4%	40.3%	9.0%	35.8%	4.5%	10.4%	47.8%	28.4%	9.7%	3.7%	134									
%	21.6%	20.1%	24.6%	20.1%	13.4%	10.4%	40.3%	9.0%	35.8%	4.5%	10.4%	47.8%	28.4%	9.7%	3.7%	134											100.0%			
Little knowledge	N 8	2	4	6	2	2	7	2	8	3	9.1%	31.8%	9.1%	36.4%	13.6%	4.5%	13.6%	50.0%	18.2%	13.6%	22									
%	36.4%	9.1%	18.2%	27.3%	9.1%	9.1%	31.8%	9.1%	36.4%	13.6%	4.5%	13.6%	50.0%	18.2%	13.6%	22											100.0%			
Considerable knowledge	N 33	31	47	74	11	9	43	42	69	33	4.6%	21.9%	21.4%	35.2%	16.8%	5.1%	43.4%	33.7%	13.8%	4.1%	196									
%	16.8%	15.8%	24.0%	37.8%	5.6%	4.6%	21.9%	21.4%	35.2%	16.8%	5.1%	43.4%	33.7%	13.8%	4.1%	196											100.0%			
Very considerable knowledge	N 14	7	11	11	5	6	15	2	16	9	12.5%	31.3%	4.2%	33.3%	18.8%	2.1%	41.7%	31.3%	16.7%	8.3%	48									
%	29.2%	14.6%	22.9%	22.9%	10.4%	12.5%	31.3%	4.2%	33.3%	18.8%	2.1%	41.7%	31.3%	16.7%	8.3%	48											100.0%			
$\chi^2 = 0.030$ (Yes) $\gamma = 0.024$ $r = 0.020$ $\chi^2 = 0.000$ (Yes) $\gamma = 0.198$ $r = 0.158^{**}$ $\chi^2 = 0.055$ (No) $\gamma = 0.145$ $r = 0.110^*$																														
BeliefMAC																														
Hardly any effect	N 3	1	1	3	0	4	1	0	2	1	37.5%	12.5%	12.5%	37.5%	0.0%	12.5%	37.5%	0.0%	25.0%	25.0%	8									
%	37.5%	12.5%	12.5%	37.5%	0.0%	50.0%	12.5%	0.0%	25.0%	12.5%	37.5%	12.5%	37.5%	0.0%	25.0%	12.5%	37.5%	0.0%	25.0%	25.0%	8						100.0%			
Some effect	N 18	14	10	6	2	3	19	5	14	9	6.0%	38.0%	10.0%	28.0%	18.0%	2.0%	52.0%	36.0%	8.0%	2.0%	50									
%	36.0%	28.0%	20.0%	12.0%	4.0%	6.0%	38.0%	10.0%	28.0%	18.0%	2.0%	52.0%	36.0%	8.0%	2.0%	50											100.0%			
Average effect	N 47	37	51	51	13	21	67	27	61	23	10.6%	33.7%	13.6%	30.7%	11.6%	8.0%	45.2%	28.1%	14.1%	4.5%	199									
%	23.6%	18.6%	25.6%	25.6%	6.5%	10.6%	33.7%	13.6%	30.7%	11.6%	8.0%	45.2%	28.1%	14.1%	4.5%	199											100.0%			
Considerable effect	N 14	15	32	56	18	3	30	25	60	17	2.2%	22.2%	18.5%	44.4%	12.6%	5.9%	37.0%	39.3%	12.6%	5.2%	135									
%	10.4%	11.1%	23.7%	41.5%	13.3%	2.2%	22.2%	18.5%	44.4%	12.6%	5.9%	37.0%	39.3%	12.6%	5.2%	135											100.0%			
Very considerable effect	N 2	0	1	2	3	0	2	1	4	1	0.0%	25.0%	12.5%	50.0%	12.5%	0.0%	37.5%	37.5%	12.5%	12.5%	8									
%	25.0%	0.0%	12.5%	25.0%	37.5%	0.0%	25.0%	12.5%	50.0%	12.5%	0.0%	37.5%	37.5%	12.5%	12.5%	8											100.0%			
$\chi^2 = 0.000$ (No) $\gamma = 0.378$ $r = 0.308^{**}$ $\chi^2 = 0.000$ (No) $\gamma = 0.190$ $r = 0.149^{**}$ $\chi^2 = 0.144$ (No) $\gamma = 0.095$ $r = 0.071$																														
BeliefMMS																														
Hardly any effect	N 0	0	0	2	1	0	2	0	1	0	0.0%	66.7%	0.0%	33.3%	0.0%	0.0%	0.0%	66.7%	0.0%	33.3%	3									
%	0.0%	0.0%	0.0%	66.7%	33.3%	0.0%	66.7%	0.0%	33.3%	0.0%	0.0%	66.7%	0.0%	33.3%	0.0%	0.0%	0.0%	66.7%	0.0%	33.3%	3						100.0%			
Some effect	N 5	6	8	6	10	1	11	3	9	11	14.3%	17.1%	22.9%	17.1%	28.6%	2.9%	31.4%	8.6%	25.7%	31.4%	35									
%	14.3%	17.1%	22.9%	17.1%	28.6%	2.9%	31.4%	8.6%	25.7%	31.4%	14.3%	17.1%	22.9%	17.1%	28.6%	2.9%	31.4%	8.6%	25.7%	31.4%	35						100.0%			
Average effect	N 33	26	37	59	11	7	47	16	75	21	19.9%	15.7%	22.3%	35.5%	6.6%	4.2%	28.3%	9.6%	45.2%	12.7%	166									
%	33.3%	26.3%	37.3%	59.0%	11.0%	7.0%	47.3%	16.7%	75.0%	21.0%	19.9%	15.7%	22.3%	35.5%	6.6%	166											100.0%			
Considerable effect	N 21	21	30	39	9	8	31	27	41	13	17.5%	17.5%	25.0%	32.5%	7.5%	6.7%	25.8%	22.5%	34.2%	10.8%	120									
%	17.5%	17.5%	25.0%	32.5%	7.5%	6.7%	25.8%	22.5%	34.2%	10.8%	17.5%	17.5%	25.0%	32.5%	7.5%	120											100.0%			
Very considerable effect	N 25	14	20	12	5	15	28	12	15	6	32.9%	18.4%	26.3%	15.8%	6.6%	19.7%	36.8%	15.8%	19.7%	7.9%	76									
%	32.9%	18.4%	26.3%	15.8%	6.6%	19.7%	36.8%	15.8%	19.7%	7.9%	32.9%	18.4%	26.3%	15.8%	6.6%	76											100.0%			
$\chi^2 = 0.001$ (No) $\gamma = 0.183$ $r = -0.160^{**}$ $\chi^2 = 0.000$ (No) $\gamma = -0.250$ $r = -0.211^{**}$ $\chi^2 = 0.001$ (No) $\gamma = -0.128$ $r = -0.103^*$																														
Total	N 84	67	95	118	36	31	119	58	141	51	21.0%	16.8%	23.8%	29.5%	9.0%	7.8%	29.8%	14.5%	35.3%	12.8%	400									
%	21.0%	16.8%	23.8%	29.5%	9.0%	7.8%	29.8%	14.5%	35.3%	12.8%	21.0%	16.8%	23.8%	29.5%	9.0%	400											100.0%			
$\chi^2 =$ Pearson's Chi-Square; (Yes) / (No) = indication of fulfillment of the second assumption; V = Cramer's V; γ = Gamma; r = Spearman's Rho; * Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed)																														

Table 7.5 (continued): Distribution of the psycho-social variables over the dependent variables (N=400)

UseMAC																	BioMAC										CultMAC									
BeliefTMS					Very low	Low	Average	High	Very High	Very low					Low	Average	High	Very High	Very low					Low	Average	High	Very High	Total								
Hardly any effect					N	5	3	0	4	5	4	5	1	4	3	1	7	3	4	2	1	7	3	4	2	17										
					%	29.4%	17.6%	0.0%	23.5%	29.4%	23.5%	29.4%	5.9%	23.5%	17.6%	23.5%	41.2%	17.6%	23.5%	11.8%	5.9%	41.2%	17.6%	23.5%	11.8%	100.0%										
Some effect					N	26	15	23	6	2	9	29	9	14	11	32	23	11	5	1	32	23	11	5	72											
					%	36.1%	20.8%	31.9%	8.3%	2.8%	12.5%	40.3%	12.5%	19.4%	15.3%	12.5%	44.4%	31.9%	15.3%	6.9%	1.4%	44.4%	31.9%	15.3%	6.9%	100.0%										
Average effect					N	41	37	45	57	17	15	68	18	73	23	93	53	24	9	18	93	53	24	9	197											
					%	20.8%	18.8%	22.8%	28.9%	8.6%	7.6%	34.5%	9.1%	37.1%	11.7%	9.1%	47.2%	26.9%	12.2%	4.6%	9.1%	47.2%	26.9%	12.2%	4.6%	100.0%										
Considerable effect					N	12	12	25	46	11	3	17	27	46	13	6	38	47	13	2	6	38	47	13	2	106										
					%	11.3%	11.3%	23.6%	43.4%	10.4%	2.8%	16.0%	25.5%	43.4%	12.3%	5.7%	35.8%	44.3%	12.3%	1.9%	5.7%	35.8%	44.3%	12.3%	1.9%	100.0%										
Very considerable effect					N	0	0	2	5	1	0	0	3	4	1	0	2	4	0	2	0	2	4	0	2	8										
					%	0.0%	0.0%	25.0%	62.5%	12.5%	0.0%	0.0%	37.5%	50.0%	12.5%	0.0%	25.0%	50.0%	0.0%	25.0%	0.0%	25.0%	50.0%	0.0%	25.0%	100.0%										
						$\chi^2=0.000$ (No) $\gamma=0.315$ $\Gamma=0.266^{**}$										$\chi^2=0.000$ (No) $\gamma=0.223$ $\Gamma=0.186^{**}$										$\chi^2=0.016$ (No) $\gamma=0.005$ $\Gamma=0.003$										
BeliefBio					Very low	Low	Average	High	Very High	Very low					Low	Average	High	Very High	Very low					Low	Average	High	Very High	Total								
Very little importance					N	3	3	2	0	0	3	0	1	3	1	3	1	1	3	3	0	1	1	3	3	0	8									
					%	37.5%	37.5%	25.0%	0.0%	0.0%	37.5%	0.0%	12.5%	37.5%	12.5%	37.5%	12.5%	12.5%	37.5%	37.5%	0.0%	12.5%	12.5%	37.5%	37.5%	0.0%	100.0%									
Little importance					N	1	2	2	0	0	0	1	0	3	1	0	2	1	1	1	0	2	1	1	1	5										
					%	20.0%	40.0%	40.0%	0.0%	0.0%	0.0%	20.0%	0.0%	60.0%	20.0%	0.0%	40.0%	20.0%	20.0%	20.0%	0.0%	40.0%	20.0%	20.0%	20.0%	100.0%										
Average importance					N	34	22	23	32	11	15	50	22	24	11	6	59	41	12	4	6	59	41	12	4	122										
					%	27.9%	18.0%	18.9%	26.2%	9.0%	12.3%	41.0%	18.0%	19.7%	9.0%	4.9%	48.4%	33.6%	9.8%	3.3%	4.9%	48.4%	33.6%	9.8%	3.3%	100.0%										
Considerable importance					N	38	30	60	70	19	13	57	30	92	25	19	92	64	29	13	19	92	64	29	13	217										
					%	17.5%	13.8%	27.6%	32.3%	8.8%	6.0%	26.3%	13.8%	42.4%	11.5%	8.8%	42.4%	29.5%	13.4%	6.0%	8.8%	42.4%	29.5%	13.4%	6.0%	100.0%										
Very considerable importance					N	8	10	8	16	6	0	11	5	19	13	0	18	21	7	2	0	18	21	7	2	48										
					%	16.7%	20.8%	16.7%	33.3%	12.5%	0.0%	22.9%	10.4%	39.6%	27.1%	0.0%	37.5%	43.8%	14.6%	4.2%	0.0%	37.5%	43.8%	14.6%	4.2%	100.0%										
						$\chi^2=0.145$ (No) $\gamma=0.174$ $\Gamma=0.140^{**}$										$\chi^2=0.000$ (No) $\gamma=0.314$ $\Gamma=0.244^{**}$										$\chi^2=0.195$ (No) $\gamma=0.061$ $\Gamma=0.045$										
BeliefCult					Very low	Low	Average	High	Very High	Very low					Low	Average	High	Very High	Very low					Low	Average	High	Very High	Total								
Very little importance					N	3	3	1	4	1	3	2	1	5	1	3	2	5	3	2	0	2	5	3	2	0	12									
					%	25.0%	25.0%	8.3%	33.3%	8.3%	25.0%	16.7%	8.3%	41.7%	8.3%	16.7%	41.7%	25.0%	16.7%	0.0%	16.7%	41.7%	25.0%	16.7%	0.0%	100.0%										
Little importance					N	27	11	16	33	14	13	31	20	27	10	14	44	35	6	2	14	44	35	6	2	101										
					%	26.7%	10.9%	15.8%	32.7%	13.9%	12.9%	30.7%	19.8%	26.7%	9.9%	13.9%	43.6%	34.7%	5.9%	2.0%	13.9%	43.6%	34.7%	5.9%	2.0%	100.0%										
Average importance					N	10	7	13	16	4	4	16	8	18	4	2	21	18	6	3	2	21	18	6	3	50										
					%	20.0%	14.0%	26.0%	32.0%	8.0%	8.0%	32.0%	16.0%	36.0%	8.0%	4.0%	42.0%	36.0%	12.0%	6.0%	4.0%	42.0%	36.0%	12.0%	6.0%	100.0%										
Considerable importance					N	40	38	62	59	15	10	61	27	87	29	8	96	62	34	14	8	96	62	34	14	214										
					%	18.7%	17.8%	29.0%	27.6%	7.0%	4.7%	28.5%	12.6%	40.7%	13.6%	3.7%	44.9%	29.0%	15.9%	6.5%	3.7%	44.9%	29.0%	15.9%	6.5%	100.0%										
Very considerable importance					N	4	8	3	6	2	1	9	2	4	7	0	6	12	4	1	0	6	12	4	1	23										
					%	17.4%	34.8%	13.0%	26.1%	8.7%	4.3%	39.1%	8.7%	17.4%	30.4%	0.0%	26.1%	52.2%	17.4%	4.3%	0.0%	26.1%	52.2%	17.4%	4.3%	100.0%										
						$\chi^2=0.149$ (No) $\gamma=-0.054$ $\Gamma=-0.043$										$\chi^2=0.021$ (No) $\gamma=0.175$ $\Gamma=0.141^{**}$										$\chi^2=0.018$ (No) $\gamma=0.222$ $\Gamma=0.169^{**}$										
BeliefTHK					Very low	Low	Average	High	Very High	Very low					Low	Average	High	Very High	Very low					Low	Average	High	Very High	Total								
Very little importance					N	20	15	19	15	3	9	24	9	26	4	12	42	12	4	2	12	42	12	4	2	72										
					%	27.8%	20.8%	26.4%	20.8%	4.2%	12.5%	33.3%	12.5%	36.1%	5.6%	12.5%	58.3%	16.7%	5.6%	2.8%	16.7%	58.3%	16.7%	5.6%	2.8%	100.0%										
Little importance					N	7	6	9	6	0	2	10	2	8	6	0	14	8	4	2	0	14	8	4	2	28										
					%	25.0%	21.4%	32.1%	21.4%	0.0%	7.1%	35.7%	7.1%	28.6%	21.4%	0.0%	50.0%	28.6%	14.3%	7.1%	0.0%	50.0%	28.6%	14.3%	7.1%	100.0%										
Average importance					N	27	16	29	55	10	8	23	32	53	21	11	64	49	9	4	11	64	49	9	4	137										
					%	19.7%	11.7%	21.2%	40.1%	7.3%	5.8%	16.8%	23.4%	38.7%	15.3%	8.0%	46.7%	35.8%	6.6%	2.9%	8.0%	46.7%	35.8%	6.6%	2.9%	100.0%										
Considerable importance					N	22	27	31	37	19	12	48	15	46	15	2	45	51	29	9	2	45	51	29	9	136										
					%	16.2%	19.9%	22.8%	27.2%	14.0%	8.8%	35.3%	11.0%	33.8%	11.0%	1.5%	33.1%	37.5%	21.3%	6.6%	1.5%	33.1%	37.5%	21.3%	6.6%	100.0%										
Very considerable importance					N	8	3	7	5	4	0	14	0	8	5	1	7	10	6	3	3.7%	25.9%	37.0%	22.2%	11.1%	27										
					%	29.6%	11.1%	25.9%	18.5%	14.8%	0.0%	51.9%	0.0%	29.6%	18.5%	3.7%	25.9%	37.0%	22.2%	11.1%	0.0%	25.9%	37.0%	22.2%	11.1%	100.0%										
						$\chi^2=0.024$ (Yes) $\gamma=0.123$ $\Gamma=0.110^{*}$										$\chi^2=0.001$ (No) $\gamma=-0.001$ $\Gamma=-0.001$										$\chi^2=0.000$ (No) $\gamma=0.381$ $\Gamma=0.315^{*}$										
Total					N	84	67	95	118	36	31	119	58	141	51	26	172	130	52	20	6.5%	43.0%	32.5%	13.0%	5.0%	400										
					%	21.0%	16.8%	23.8%	29.5%	9.0%	7.8%	29.8%	14.5%	35.3%	12.8%	6.5%	43.0%	32.5%	13.0%	5.0%					100.0%											

χ^2 = Pearson's Chi-Square; (Yes) (No)= indication of fulfillment of the second assumption; V= Cramer's V; γ = Gamma; Γ = Spearman's Rho; Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed)

Bivariate analysis of the psycho-social variables and the dependent variables

The Pearson's Chi-square fulfilling both assumptions, see Table 7.5, indicates a strongly significant association between the psycho-social variables 'KnowTHK' and 'BeliefTHK' towards 'UseMAC' ($X^2= 0.030$ and $X^2=0.024$) and a very strongly significant association between 'KnowTHK' towards 'BioMAC' ($X^2= 0.000$). Nevertheless, as the gamma values show, the relationship with gamma values of respectively 0.024, 0.123 and 0.198 is weak. The values of Spearman's Rho of the psycho-social variables and the dependent variables indicate a negative relationship between 'KnowTMS' and 'CultMAC', 'BeliefMMS' and 'BioMAC', 'BeliefMMS' and 'CultMAC', 'BeliefCult' and 'UseMAC' and 'BeliefTHK' and 'UseMAC', while all other Spearman's Rho values of the psycho-socio variables present a positive relationship. The majority Spearman's Rho values indicate a weak relationship, with the exception of those indicating a moderate relationship: 'KnowMAC' and 'UseMAC' ($r=0.256$), 'KnowBio' and 'BioMAC' ($r=0.300$), 'BeliefMAC' and 'UseMAC' ($r=0.308$), 'BeliefTMS' and 'UseMAC' ($r=0.266$) and 'BeliefTHK' and 'CultMAC' ($r=0.315$). This moderate relationship is translated into a scrambled relationship, except in the case of 'BeliefMAC' and 'UseMAC', in which the expected relationship emerges, low belief in MAC plants results in low utilisation and high belief in high utilisation. The cross tabulation of 'BeliefTMS' and 'UseMAC' patently reveals that a high confidence in the traditional medical system translates into high utilisation of MAC plants with a zero response to 'Very low' and 'Low'. From the cross tabulation 'KnowMAC' and 'UseMAC' it is obvious that respondents who have little knowledge have a low utilisation; 85.7% with very little knowledge score 'Very low' and 14.3% 'Low', but in the higher categories the relationship is not so clearly spelled out, indicating that a high level of knowledge does not necessarily lead to a higher utilisation of MAC plants, whereas a little knowledge does lead to a lower intensity of utilisation. In the case of the relationship between 'KnowBio' and 'BioMAC', 'BeliefTHK' and 'CultMAC' there is an unequivocal clarification that low scores on the psycho-social variable correspond to low scores on the dependent variable but higher knowledge about MAC plants does generate a higher score on the dependent variable.

The cross tabulation of 'KnowTHK' and 'UseMAC', in blatant contradiction to the expectation that a higher level of knowledge on *tri hita karana* would result in a higher utilisation of MAC plants, shows little to no correlation between the two extreme levels of knowledge and the intensity of utilisation. The largest group of respondents in the 'Very little' category of 'KnowTHK' are the MAC plant average users (24.6%) and in the 'Very considerable knowledge' category the very low users (29.2%). In the other two categories of 'KnowTHK', the highest scoring in the category does meet expectations: 36.4% on 'Very low' within 'Little knowledge' and 37.8% 'High use' in the category 'Considerable knowledge'. The cross tabulations of 'KnowTHK' and 'BioMAC' show a similarly distorted image considering the expectation that a higher score on 'KnowTHK' would result in more sustainable behaviour towards the biodiversity of MAC plants. The 'Little knowledge' category of 'KnowTHK' even shows the exact opposite of what would have been expected by scoring slightly more on the low categories (9.1% on very low and 31.8% on 'Low') than on the high categories of 'BioMAC' (36.4% on high and 13.6% on 'Very high'). The categories 'Considerable knowledge' and 'Very considerable knowledge' do show the expected scores; although with only a small difference between high and low scores on the 'BioMAC' categories. The cross tabulation of 'BeliefTHK' and 'UseMAC' does show the clear reference between them expected, but not in the highest category of 'BeliefTHK' where again the opposite scores appear, instead of what was expected the highest score is the 'Very low' category of 'UseMAC' (29.6 %).

Table 7.6: Distribution of the enabling variables over the dependent variables (N=400)

	UseMAC					BioMAC					CultMAC						
	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total	
IncomeHH																	
< 100.000 Rp	N	1	16.7%	50.0%	16.7%	1	3	33.3%	66.7%	0.0%	0	4	0	0.0%	0.0%	0	6
100.000 - 500.000 Rp	N	25	23.8%	27.0%	17.2%	14	11	9.0%	36.1%	9.8%	32.8%	12.3%	41.0%	36.9%	13.9%	4.1%	122
501.000 - 1.000.000 Rp	N	32	18	26	29	7	6	40	35.7%	11.6%	35.7%	11.6%	45.5%	32.1%	8.9%	7.1%	112
1.001.000 - 2.000.000 Rp	N	16	11	22	38	9	8	21	20	35	12	8	8.3%	45.8%	29.2%	13.5%	96
2.001.000 - 3.000.000 Rp	N	6	3	6	19	2	3	5	12	14	2	3	8.3%	38.9%	33.3%	16.7%	36
3.001.000 - 4.000.000 Rp	N	2	2	5	7	2	1	2	11.1%	38.9%	5.6%	2	5.6%	38.9%	22.2%	16.7%	18
> 4.000.000 Rp	N	2	2	0	2	0	0	1	16.7%	0.0%	33.3%	0	0.0%	33.3%	33.3%	16.7%	6
No income reported	N	0	0	0	1	2	0	2	0.0%	50.0%	0.0%	25.0%	0.0%	25.0%	50.0%	25.0%	6
	N	X ² = 0.009 (No)	V = 0.175				X ² = 0.002 (No)	V = 0.184				X ² = 0.916 (No)	V = 0.107				
SES																	
Very poor	N	20	20	27	14	8	8	39	9.0%	43.8%	9.0%	30.3%	7.9%	7	5	43	89
Poor	N	36	32	46	58	14	16	47	8.6%	25.3%	18.8%	33.3%	14.0%	26	13	84	186
Average	N	24	9	17	41	13	6	28	5.8%	26.9%	12.5%	41.3%	13.5%	14	8	39	104
Rich	N	3	4	4	4	1	1	4	6.3%	25.0%	12.5%	37.5%	18.8%	3	0	4	16
Very rich	N	1	2	1	1	0	0	1	0.0%	20.0%	0.0%	60.0%	20.0%	1	0	2	5
	N	X ² = 0.072 (No)	≠ 0.118	≠ 0.099*			X ² = 0.232 (No)	≠ 0.174	≠ 0.143**			X ² = 0.283 (No)	≠ 0.146	≠ 0.115**			
DistanceMM																	
> 1 hour	N	0	1	0	0	0	0	1	0.0%	100.0%	0.0%	0.0%	0.0%	0	0	0	1
45-6 minutes	N	0	1	1	0	0	0	0	0.0%	50.0%	50.0%	50.0%	0.0%	0	0	2	2
3-45 minutes	N	10	9	14	4	1	3	10	7.9%	26.3%	10.5%	31.6%	23.7%	5	2	14	38
15-3 minutes	N	21	27	29	22	7	5	34	4.7%	32.1%	11.3%	38.7%	13.2%	14	4	50	106
< 15 minutes	N	53	29	51	92	28	23	74	9.1%	29.2%	16.2%	34.4%	11.1%	28	20	106	253
	N	X ² = 0.001 (No)	≠ 0.255	≠ 0.191**			X ² = 0.614 (No)	≠ 0.103	≠ 0.073			X ² = 0.794 (No)	≠ 0.008	≠ 0.005			
DistanceTM																	
> 1 hour	N	8	10	9	1	2	3	10	10.0%	33.3%	6.7%	23.3%	26.7%	8	2	12	30
45-6 minutes	N	7	3	7	3	0	1	8	5.0%	40.0%	20.0%	20.0%	15.0%	3	6.7%	40.0%	100.0%
3-45 minutes	N	6	9	9	4	2	2	11	6.7%	36.7%	0.0%	33.3%	23.3%	0	5.0%	40.0%	100.0%
15-3 minutes	N	22	21	34	55	12	7	31	4.9%	21.5%	19.4%	41.7%	12.5%	18	3.3%	40.0%	100.0%
< 15 minutes	N	41	24	36	55	20	18	59	10.2%	33.5%	13.6%	34.1%	8.5%	15	5.6%	41.7%	100.0%
	N	X ² = 0.003 (No)	≠ 0.141	≠ 0.117*			X ² = 0.012 (No)	≠ 0.131	≠ 0.107*			X ² = 0.338 (No)	≠ 0.076	≠ 0.058			
DistanceMAC																	
> 1 hour	N	0	1	0	0	0	0	0	0.0%	100.0%	0.0%	0.0%	0.0%	0	0	0	1
3-45 minutes	N	0	0	1	0	0	1	0	0.0%	0.0%	0.0%	0.0%	0.0%	0	0.0%	100.0%	100.0%
15-3 minutes	N	9	8	3	2	0	4	9	18.2%	40.9%	13.6%	22.7%	4.5%	1	0.0%	0.0%	22
< 15 minutes	N	75	58	91	116	36	26	110	19.9%	15.4%	24.2%	30.9%	9.6%	50	4.5%	31.8%	100.0%
	N	X ² = 0.018 (No)	≠ 0.537	≠ 0.183**			X ² = 0.660 (No)	≠ 0.384	≠ 0.126*			X ² = 0.525 (No)	≠ 0.087	≠ 0.025			
Total	N	84	67	95	118	36	31	119	21.0%	16.8%	23.8%	29.5%	9.0%	7.8%	12.8%	6.5%	400
	N	X ² = Pearson's Chi-Square; (Yes) (No)= indication of fulfillment of the second assumption; V= Cramer's V; * Gamma, != Spearman's Rho; Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed)															

X² = Pearson's Chi-Square; (Yes) / (No) = indication of fulfillment of the second assumption; V = Spearman's V; γ = Gamma; γ = Spearman's rho; * Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed)

Table 7.7: Distribution of the perceived morbidity variable over the dependent variables (N=400)

Rep/Disease	UseMAC										BioMAC										CultMAC									
	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total									
Fever	N 17	24	33	66	13	7	39	28	58	21	15	68	47	16	7	153														
%	11.1%	15.7%	21.6%	43.1%	8.5%	4.6%	25.5%	18.3%	37.9%	13.7%	9.8%	44.4%	30.7%	10.5%	4.6%	100.0%														
Coughing	N 5	3	2	5	1	4	8	4	0	0	1	7	6	2	0	16														
%	31.3%	18.8%	12.5%	31.3%	6.3%	25.0%	50.0%	25.0%	0.0%	0.0%	6.3%	43.8%	37.5%	12.5%	0.0%	100.0%														
Head/Throat	N 10	5	6	10	1	5	7	5	10	5	2	10	14	5	1	32														
%	31.3%	15.6%	18.8%	31.3%	3.1%	15.6%	21.9%	15.6%	31.3%	15.6%	6.3%	31.3%	43.8%	15.6%	3.1%	100.0%														
Intestines/Stomach	N 4	4	5	6	4	1	10	0	12	0	2	10	5	4	2	23														
%	17.4%	17.4%	21.7%	26.1%	17.4%	4.3%	43.5%	0.0%	52.2%	0.0%	8.7%	43.5%	21.7%	17.4%	8.7%	100.0%														
Movement restricted	N 8	13	14	9	6	3	22	5	15	5	1	30	13	5	1	50														
%	16.0%	26.0%	28.0%	18.0%	12.0%	6.0%	44.0%	10.0%	30.0%	10.0%	2.0%	60.0%	26.0%	10.0%	2.0%	100.0%														
Skin	N 0	0	2	0	0	0	0	0	2	0	0	0	2	0	0	2														
%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%														
External	N 1	2	0	0	2	0	4	0	1	0	0	0	4	1	0	5														
%	20.0%	40.0%	0.0%	0.0%	40.0%	0.0%	80.0%	0.0%	20.0%	0.0%	0.0%	0.0%	80.0%	20.0%	0.0%	100.0%														
Organs	N 0	1	2	3	0	0	1	3	2	0	0	2	4	0	0	6														
%	0.0%	16.7%	33.3%	50.0%	0.0%	0.0%	16.7%	50.0%	33.3%	0.0%	0.0%	33.3%	66.7%	0.0%	0.0%	100.0%														
Brain	N 1	0	1	0	0	0	0	0	1	0	0	1	1	0	0	2														
%	50.0%	0.0%	50.0%	0.0%	0.0%	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	50.0%	50.0%	0.0%	0.0%	100.0%														
Internal (system)	N 0	4	1	3	1	0	4	1	2	2	0	6	2	0	1	9														
%	0.0%	44.4%	11.1%	33.3%	11.1%	0.0%	44.4%	11.1%	22.2%	22.2%	0.0%	66.7%	22.2%	0.0%	11.1%	100.0%														
Other	N 0	1	1	1	0	0	0	0	3	0	0	2	0	1	0	3														
%	0.0%	33.3%	33.3%	33.3%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	66.7%	0.0%	33.3%	0.0%	100.0%														
Not specified	N 5	5	15	5	7	1	10	4	12	10	0	12	17	6	2	37														
%	13.5%	13.5%	40.5%	13.5%	18.9%	2.7%	27.0%	10.8%	32.4%	27.0%	0.0%	32.4%	45.9%	16.2%	5.4%	100.0%														
No disease reported	N 33	5	13	10	1	10	14	7	23	8	5	24	15	12	6	62														
%	53.2%	8.1%	21.0%	16.1%	1.6%	16.1%	22.6%	11.3%	37.1%	12.9%	8.1%	38.7%	24.2%	19.4%	9.7%	100.0%														
	X ² =0.000 (No) V=0.267										X ² =0.001 (No) V=0.228										X ² =0.405 (No) V=0.176									
Total	N 84	67	95	118	36	31	119	58	141	51	26	172	130	52	20	400														
%	21.0%	16.8%	23.8%	29.5%	9.0%	7.8%	29.8%	14.5%	35.3%	12.8%	6.5%	43.0%	32.5%	13.0%	5.0%	100.0%														

X² = Pearson's Chi-Square; (Yes) / (No) = indication of fulfillment of the second assumption; V = Cramer's V; γ = Gamma; r = Spearman's Rho;

* Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed)

Table 7.8: Distribution of the institutional variables over the dependent variables (N=400)

	UseMAC										BioMAC					CultMAC				
	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Very low	Low	Average	High	Very High	Total				
AwareMAC																				
No awareness	N 53	33	62	97	26	24	65	48	106	28	22	114	89	32	14	271				
	% 19.6%	12.2%	22.9%	35.8%	9.6%	8.9%	24.0%	17.7%	39.1%	10.3%	8.1%	42.1%	32.8%	11.8%	5.2%	100.0%				
Little awareness	N 23	19	22	10	7	5	35	5	21	15	3	31	30	12	5	81				
	% 28.4%	23.5%	27.2%	12.3%	8.6%	6.2%	43.2%	6.2%	25.9%	18.5%	3.7%	38.3%	37.0%	14.8%	6.2%	100.0%				
Average awareness	N 7	15	9	9	1	2	15	5	13	6	1	26	9	5	0	41				
	% 17.1%	36.6%	22.0%	22.0%	2.4%	4.9%	36.6%	12.2%	31.7%	14.6%	2.4%	63.4%	22.0%	12.2%	0.0%	100.0%				
High awareness	N 1	0	2	2	2	0	4	0	1	2	0	1	2	3	1	7				
	% 14.3%	0.0%	28.6%	28.6%	28.6%	0.0%	57.1%	0.0%	14.3%	28.6%	0.0%	14.3%	28.6%	42.9%	14.3%	100.0%				
	$\chi^2=0.000$ (No) $\gamma=-0.222$ $r=-0.163^{**}$										$\chi^2=0.006$ (No) $\gamma=-0.040$ $r=-0.028$					$\chi^2=0.065$ (No) $\gamma=0.058$ $r=0.038$				
AwareBio																				
No awareness	N 52	32	61	93	23	24	63	47	102	25	21	114	83	30	13	261				
	% 19.9%	12.3%	23.4%	35.6%	8.8%	9.2%	24.1%	18.0%	39.1%	9.6%	8.0%	43.7%	31.8%	11.5%	5.0%	100.0%				
Little awareness	N 24	23	25	9	6	4	38	6	26	13	3	34	36	11	3	87				
	% 27.6%	26.4%	28.7%	10.3%	6.9%	4.6%	43.7%	6.9%	29.9%	14.9%	3.4%	39.1%	41.4%	12.6%	3.4%	100.0%				
Average awareness	N 7	12	9	13	5	3	16	5	11	11	2	22	11	8	3	46				
	% 15.2%	26.1%	19.6%	28.3%	10.9%	6.5%	34.8%	10.9%	23.9%	23.9%	4.3%	47.8%	23.9%	17.4%	6.5%	100.0%				
High awareness	N 1	0	0	3	2	0	2	0	2	2	0	2	0	3	1	6				
	% 16.7%	0.0%	0.0%	50.0%	33.3%	0.0%	33.3%	0.0%	33.3%	33.3%	0.0%	33.3%	0.0%	50.0%	16.7%	100.0%				
	$\chi^2=0.000$ (No) $\gamma=-0.143$ $r=-0.106^*$										$\chi^2=0.002$ (No) $\gamma=0.012$ $r=0.010$					$\chi^2=0.101$ (No) $\gamma=0.122$ $r=0.081$				
AwareCult																				
No awareness	N 52	36	63	98	27	24	66	48	109	29	21	116	96	29	14	276				
	% 18.8%	13.0%	22.8%	35.5%	9.8%	8.7%	23.9%	17.4%	39.5%	10.5%	7.6%	42.0%	34.8%	10.5%	5.1%	100.0%				
Little awareness	N 28	21	21	9	4	5	40	6	18	14	4	34	23	17	5	83				
	% 33.7%	25.3%	25.3%	10.8%	4.8%	6.0%	48.2%	7.2%	21.7%	16.9%	4.8%	41.0%	27.7%	20.5%	6.0%	100.0%				
Average awareness	N 4	10	11	9	3	2	11	4	13	7	1	20	11	5	0	37				
	% 10.8%	27.0%	29.7%	24.3%	8.1%	5.4%	29.7%	10.8%	35.1%	18.9%	2.7%	54.1%	29.7%	13.5%	0.0%	100.0%				
High awareness	N 0	0	0	2	2	0	2	0	1	1	0	2	0	1	1	4				
	% 0.0%	0.0%	0.0%	50.0%	50.0%	0.0%	50.0%	0.0%	25.0%	25.0%	0.0%	50.0%	0.0%	25.0%	25.0%	100.0%				
	$\chi^2=0.000$ (No) $\gamma=-0.216$ $r=-0.156^{**}$										$\chi^2=0.003$ (No) $\gamma=-0.048$ $r=-0.032$					$\chi^2=0.183$ (No) $\gamma=0.060$ $r=0.038$				
Total	N 84	67	95	118	36	31	119	58	141	51	26	172	130	52	20	400				
	% 21.0%	16.8%	23.8%	29.5%	9.0%	7.8%	29.8%	14.5%	35.3%	12.8%	6.5%	43.0%	32.5%	13.0%	5.0%	100.0%				
X ² = Pearson's Chi-Square; (Yes) / (No)= indication of fulfillment of the second assumption; V= Cramer's V; γ = Gamma; r = Spearman's Rho; Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed)																				

χ^2 = Pearson's Chi-Square; (Yes) / (No)= indication of fulfillment of the second assumption; γ = Cramer's V; γ = Gamma; r = Spearman's Rho; * Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed)

Table 7.9: Distribution of the intervening variables over the dependent variables (N=400)

	UseMAC										BioMAC										CultMAC											
	Very low		Low		Average		High		Very High		Very low		Low		Average		High		Very High		Very low		Low		Average		High		Very High		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Government																																
Very low impact	8	11.6%	6	8.7%	13	18.8%	36	52.2%	6	8.7%	3	4.3%	6	8.7%	27	39.1%	42.0%	5.8%	4	5.8%	7	10.1%	25	36.2%	31	44.9%	4	5.8%	2	2.9%	69	100.0%
Low impact	6	9.0%	3	4.5%	17	25.4%	37	55.2%	4	6.0%	2	3.0%	7	10.4%	13	19.4%	32	47.8%	13	19.4%	10	14.9%	35	52.2%	16	23.9%	2	3.0%	4	6.0%	67	100.0%
Average impact	19	26.8%	12	16.9%	15	21.1%	15	21.1%	10	14.1%	8	11.3%	36	50.7%	4	5.6%	17	23.9%	6	8.5%	2	2.8%	23	32.4%	25	35.2%	14	19.7%	7	9.9%	71	100.0%
High impact	31	32.0%	21	21.6%	22	12.1%	11	11.3%	11	11.3%	12	12.4%	43	44.3%	7	7.2%	26	26.8%	9	9.3%	3	3.1%	48	49.5%	28	28.9%	15	15.5%	3	3.1%	97	100.0%
Very high impact	20	20.8%	25	26.0%	28	18.8%	5	5.2%	5	5.2%	6	6.3%	27	28.1%	7	7.3%	37	38.5%	19	19.8%	4	4.2%	41	42.7%	30	31.3%	17	17.7%	4	4.2%	96	100.0%
	$\chi^2=0.000$ (Yes) $\gamma=-0.270$ $r=-0.274^{**}$										$\chi^2=0.000$ (Yes) $\gamma=-0.070$ $r=-0.065$										$\chi^2=0.001$ (No) $\gamma=0.095$ $r=0.087$											
Tourism																																
Very low impact	34	20.7%	17	10.4%	39	23.8%	64	39.0%	10	6.1%	15	9.1%	31	18.9%	45	27.4%	59	36.0%	14	8.5%	18	11.0%	80	48.8%	50	30.5%	10	6.1%	6	3.7%	164	100.0%
Low impact	30	21.4%	23	16.4%	29	20.7%	37	26.4%	21	15.0%	11	7.9%	46	32.9%	10	7.1%	53	37.9%	20	14.3%	7	5.0%	55	39.3%	46	32.9%	22	15.7%	10	7.1%	140	100.0%
Average impact	17	21.0%	25	30.9%	24	29.6%	11	13.6%	4	4.9%	5	6.2%	35	43.2%	3	3.7%	25	30.9%	13	16.0%	1	1.2%	33	40.7%	29	35.8%	15	18.5%	3	3.7%	81	100.0%
High impact	1	10.0%	2	20.0%	3	30.0%	4	40.0%	0	0.0%	0	0.0%	4	40.0%	0	0.0%	3	30.0%	3	3.0%	0	0.0%	2	20.0%	3	30.0%	4	40.0%	1	10.0%	10	100.0%
Very high impact	2	40.0%	0	0.0%	0	0.0%	2	20.0%	1	20.0%	0	0.0%	3	60.0%	0	0.0%	1	20.0%	1	10.0%	0	0.0%	2	40.0%	2	20.0%	1	10.0%	0	0.0%	5	100.0%
	$\chi^2=0.000$ (No) $\gamma=-0.128$ $r=-0.114^*$										$\chi^2=0.000$ (No) $\gamma=-0.003$ $r=-0.005$										$\chi^2=0.013$ (No) $\gamma=0.275$ $r=0.217^{**}$											
Overuse																																
Very low impact	13	12.1%	5	4.7%	25	23.4%	57	53.3%	7	6.5%	4	3.7%	11	10.3%	35	32.7%	47	43.9%	10	9.3%	11	10.3%	44	41.1%	44	41.1%	5	4.7%	3	2.8%	107	100.0%
Low impact	10	15.2%	9	13.6%	11	16.7%	25	37.9%	11	16.7%	3	4.5%	17	25.8%	7	10.6%	31	47.0%	8	12.1%	6	9.1%	29	43.9%	22	33.3%	7	10.6%	2	3.0%	66	100.0%
Average impact	44	28.6%	40	26.0%	37	24.0%	21	13.6%	12	7.8%	17	11.0%	57	37.0%	13	8.4%	48	31.2%	19	12.3%	8	5.2%	72	46.8%	46	29.9%	22	14.3%	6	3.9%	154	100.0%
High impact	16	22.9%	12	17.1%	22	31.4%	14	20.0%	6	8.6%	7	10.0%	32	45.7%	3	4.3%	15	21.4%	13	18.6%	1	1.4%	26	37.1%	16	22.9%	18	25.7%	9	12.9%	70	100.0%
Very high impact	1	33.3%	1	33.3%	0	0.0%	1	10.0%	0	0.0%	0	0.0%	2	66.7%	0	0.0%	0	0.0%	1	33.3%	0	0.0%	1	33.3%	2	66.7%	0	0.0%	0	0.0%	3	100.0%
	$\chi^2=0.000$ (Yes) $\gamma=-0.281$ $r=-0.266^{**}$										$\chi^2=0.000$ (Yes) $\gamma=-0.190$ $r=-0.173^{**}$										$\chi^2=0.001$ (No) $\gamma=0.198$ $r=0.165^{**}$											
Total	84	21.0%	67	16.8%	95	23.8%	118	29.5%	36	9.0%	31	7.8%	119	29.8%	58	14.5%	141	35.3%	51	12.8%	26	6.5%	172	43.0%	130	32.5%	52	13.0%	20	5.0%	400	100.0%
$\chi^2=$ Pearson's Chi-Square; (Yes) / (No)= indication of fulfillment of the second assumption; V= Cramer's V; $\gamma=$ Gamma; $r=$ Spearman's Rho; Correlation is significant at the 0.01 level (2-tailed); ** Correlation is significant at the 0.05 level (2-tailed)																																

Bivariate analysis of the enabling, perceived morbidity and institutional variables and the dependent variables

None of the Pearson's Chi-square between the enabling variables, perceived morbidity or institutional variables and any one of the dependent variables fulfils both assumptions; see Table 7.6, Table 7.7 and Table 7.8. It is impossible to establish whether there is a significant association based on the Pearson's Chi-square values between the enabling, perceived morbidity and institutional variables and the dependent variables. The values of Spearman's Rho of the enabling variables and the dependent variables indicate a negative relationship between 'DistanceMM' and 'BioMAC', 'DistanceMM' and 'CultMAC', 'DistanceTM' and 'BioMAC', and 'DistanceTM' and 'CultMAC', while all other Spearman's Rho values of the enabling variables display a positive relationship towards the dependent variables. The perceived morbidity variable has the nominal measurement level, so no Spearman's Rho value with the dependent variables could be calculated. The values of Spearman's Rho of the institutional variables and the dependent variables indicate a negative relationship between 'AwareMAC' and 'UseMAC', 'AwareMAC' and 'BioMAC', 'AwareBio' and 'UseMAC', and 'AwareCult' and 'UseMAC', while all other Spearman's Rho values of the enabling variables show a positive relationship with the dependent variables. All Spearman's Rho values, negative and positive alike, indicate a weak relationship. None of the bivariate analyses between the enabling, perceived morbidity and institutional variables and the dependent variables will be discussed in more detail, as they do not fulfil the assumptions of both the Pearson's Chi-square test and the weak relationship indication by the Spearman's Rho, Bivariate analysis of the perceived morbidity variable and the dependent variables.

Bivariate analysis of the intervening variables and the dependent variables

The Pearson's Chi-squares fulfilling both assumptions, see Table 7.9, indicate a very strongly significant association between the intervening variables 'Government' and 'Overuse' and the dependent variables 'UseMAC' and 'BioMAC'. In all four cases, the value of Pearson's Chi-Square is equal to 0.000. Nevertheless, the gamma values indicate weak relationships with a value of -0.270 for 'Government' and 'UseMAC', 0.070 for 'Overuse' and 'BioMAC', -0.281 for 'Overuse' and 'UseMAC' and -0.190 for 'Overuse' and 'BioMAC'. The values of Spearman's Rho indicate a positive relationship between the three intervening variables, 'Government', 'Tourism' and 'Overuse' and 'CultMAC', whereas all other Spearman's Rho values present a negative relationship, signifying a negative relationship between the three intervening variables and the dependent variables 'UseMAC' and 'BioMAC'. The Spearman's Rho values, both negative and positive, indicate a weak relationship, with the exception of the two sets of variables which have a moderate relationship: 'Government' and 'UseMAC' ($r=-0.274$), and 'Overuse' and 'UseMAC' ($r=-0.266$).

The respondents were asked to give their opinion of the impact of the government, tourism and the increasing burden on natural resources on MAC plant utilisation, the biodiversity conservation of MAC plants and the cultural diversity of MAC plants, which are presented in the intervening variables, 'Government', 'Tourism' and 'Overuse'. Besides their opinion of level of impact, respondents were asked to indicate whether they perceived this impact positively or negatively, regardless of the size. In the case of the variable 'Government', the majority of the respondents indicated this impact to be positive: the underlying individual questions were indicated in between 96.5% to 97.3% as positive, and only 0.35% to 0.5% of the respondents indicated the perceived impact to be negative. The remaining percentage of the respondents did not indicate the impact as either positive or negative. As the cross tabulation reveals, there is a moderately negative relationship between

the variables 'Government' and 'UseMAC' indicating that respondents who perceived the government had little impact on MAC plant utilisation score higher on utilisation of MAC plants; 'Very low impact', scores 52.2% on high and 8.7% on 'Very high', and 'Low impact', scores 55.2% on 'High' and 6.0% on 'Very high'. Respondents who perceived the government had a great impact on the utilisation and bio-cultural diversity conservation of MAC plants had a low utilisation of MAC plants; 'High impact' scores 32.0% on 'Very low' and 21.6% on 'Low' and 'Very high impact' scores 20.8% on 'Very low' and 26.0% on 'Low'. This cross tabulation indicates that respondents who recognise a palpable impact of the government have a tendency to use fewer MAC plants and they perceive the impact of the government as a positive one.

The cross tabulation between 'Government' and 'BioMAC' shows a similar finding. Respondents who indicate a low positive impact of the 'Government, more or less 'do it themselves' and have a higher score on biodiversity conservation behaviour 'BioMAC'; 'Very low impact' scores 42.0% on 'High' and 5.8% on 'Very high' and 'Low impact' scores 47.8% on 'High' and 19.4% on 'Very high'. The respondents who perceive a high impact of the government have a low score on 'BioMAC': 'Very low' (12.4%) and 'Low' (44.3%). A distortion is found among the respondents who indicate a very high impact of the government, who again score highly themselves on the 'BioMAC': 'High (38.5%) and 'Very high' (19.8%). The explanation for this tendency might be that these respondents are closely connected with government institutions, either by their occupations or their personal interest and consequently are aware of the efforts the Indonesian and Balinese governments are making to safeguard the biodiversity of the country as a whole. Pertinently these respondents also portray the desired behaviour. The cross tabulation of 'Tourism' and 'CultMAC' has a moderately positive relationship based on the r value which is 0.217. Remarkably, a great number of the respondents (72.8% and 76.5%) indicate the impact of tourism to be positive *versus* 7.8% to 9.8% who marked it as negative. The rest of the respondents did not express an opinion of the impact of tourism as either negative or positive. The cross tabulation shows a tendency that, if a respondent considers tourism to have little impact on the utilisation and bio-cultural diversity of MAC plants, this results in a lower cultural diversity behaviour towards the MAC plants and vice-versa. Nevertheless, this pattern is not confirmed by the respondents indicating a very high impact of tourism, which again seems to be in favour of a lower score on 'CultMAC'.

The r value of -0.266 indicates a moderately negative relationship between the variables 'Overuse' and 'UseMAC', indicating that respondents who perceived little impact of 'Overuse' have a higher utilisation of MAC plants. A similar picture is found in the cross tabulation of 'Overuse' and 'BioMAC' where the high scores for the respondents indicating a small impact tally with the high conservation behaviour and a high impact coincides with low conservation behaviour. At first sight, it makes sense that if people perceive a higher burden on natural resources they might react by adapting their utilisation pattern and attitudes towards conservation in light of their perception; nevertheless the respondents were greatly divided on whether the impact they perceived was negative or positive. An increased burden by itself surely would be advocated by most as negative, nevertheless, if the increased burden on natural resources is recognised, the respondents might note it as a positive impact since such a realisation might result in a raised awareness of how what is given is dealt with. Regardless of how the increased burden on natural resources is explained, as either a positive or negative development, it seems to be irrelevant to the respondents' utilisation of MAC plants and there is more relevance in the reported level of the impact of the increased burden of natural resource on the utilisation and bio-cultural diversity conservation of MAC plants.

It is clear from the results of the bivariate analysis presented in Table 7.4 to 7.9 that, although some relationships are significant and do partially confirm the expectations, there are no strong one-to-one relationships between any one of the independent or intervening variables and one of the three dependent variables. Hence, the bivariate analysis does not have the power to yield strong relational analyses. Discussing some of the bivariate analyses in more detail, it became apparent that, although relations are established, additional data is necessary to explain the relationships. The bivariate analysis reconfirms that the behaviour of the community members is related to the variables documented. The multivariate analyses presented in the next sections will interrelate with the various variables within the blocks of factors of the multivariate model, allowing more insights into the community members' utilisation and bio-cultural diversity conservation of MAC plants.

7.2.2 Multivariate Analysis of the Variables by OVERALS

The multivariate model presented in Section 3.1.2 covers the interrelationships within and between the variables in the block of factors in relation to the three dependent variables. The multivariate analyses give a deeper understanding of how the variables interact and relate to one another. Although the term multivariate analysis is not used consequently in the social sciences, undeniably it does provide a simultaneous analysis of multiple independent and dependent variables (*cf.* Tabachnick & Fidell 1989). The most common multivariate analysis techniques for categorical data, the type of data involved in this study, are: *'the 'basic correlation analysis to measure the general relationship among variables, 'cluster analysis' to assess similarities or dissimilarities among variables, 'principal component analysis' to determine variance among variables, and 'regression analysis to establish quantitative relationships among variables and prediction'* (Agung 2005: 108-109).

The present multivariate analysis, the OVERALS function developed by the Faculty of Social and Behavioural Sciences of Leiden University, is used in accordance with the findings of Slikkerveer (1990), Agung (2005) and Ibui (2007). The OVERALS algorithm was described by Gifi (1990) and Van der Burg, de Leeuw & Verdegaal (1984), also see Verdegaal (1986), Van de Geer (1987), Van der Burg, de Leeuw & Verdegaal (1988), and Van der Burg (1983). Characteristic features of OVERALS, conceived by De Leeuw (1984), are the partitioning of the variables into K sets and the ability to specify any of a number of measurement levels for each variable separately. Analogous to the situation in multiple regression and canonical correlation analysis, OVERALS focuses on the relationships between sets; any particular variable contributes to the results only in as much as it provides information which is independent of the other variables in the same set. The advantage of this type of analysis over classical multivariate analysis (MVA) is that it can handle categorical data which do not have *a priori* quantifications to be treated numerically. Therefore its transformation graphs need not be straight, hence nonlinear multivariate analysis (*cf.* Van de Geer 1993). OVERALS has the following advantages over other models (*cf.* Agung 2005):

- it is not causality-based but highly interactive;
- it is able to discriminate between variables: a capacity to distinguish one variable which is more important than the other, enabling ranking or priority listing;
- it can categorise variables in their blocks of factors;
- in quantification, it is able to transform subjective variables at the individual level to variables at the system level;
- it includes the prior 'invisible' socio-cultural factors, the belief aspects, as variables which are taken as a full part of this totally interrelated model.

As discussed in Section 3.1, the conceptual model used is an adaptation of the models used by Slikkerveer (1990), Agung (2005) and Ibui (2007). It is operationalised in 7 blocks of factors:

1. the pre-disposing socio-demographic factors, encompassing the variables: 'Village', 'Age', 'Education', 'Caste', 'Profession' and 'HHcomposition';
2. the pre-disposing psycho-social factors, encompassing the variables: 'KnowMAC', 'KnowMMS', 'KnowTMS', 'KnowBio', 'KnowCult', 'KnowTHK', 'BeliefMAC', 'BeliefMMS', 'BeliefTMS', 'BeliefBio', 'BeliefCult', 'BeliefTHK';
3. the enabling factors, encompassing the variables: 'IncomeHH', 'SES', 'DistanceMM', 'DistanceTM' and 'DistanceMAC';
4. the perceived morbidity factors, encompassing the variables: 'RepDisease';
5. the institutional factors, encompassing the variables: 'AwareMAC', 'AwareBio' and 'AwareCult';
6. the intervening factors, encompassing the variables: 'Government', 'Tourism' and 'Overuse';
7. the dependent factors, encompassing the variables: 'UseMAC', 'BioMAC' and 'CultMAC'.

OVERALS is a nonlinear, generalized canonical correlation analysis which corresponds to categorical canonical correlation analysis with optimal scaling. The variables included in an OVERALS analysis can be nominal, ordinal or interval. In this dataset, all the variables are either nominal or ordinal and there can be more than two sets of variables (*cf.* Van de Geer 1993; Garson 2008). In this study, six independent sets will be used versus one dependent set, consisting of the three dependent variables: 'UseMAC', 'BioMAC' and 'CultMAC'. Variables must have positive integers and zeros, therefore negative values are treated as system-missing. In the first stage of the preparation of the dataset, as presented in Section 7.1, these requirements have been taken into account. Since all variables are categorical data, negative values did not occur and during the recoding stages care has been taken that none of the categories have a value of zero.

In OVERALS, the sets of variables are compared to an unknown compromise set defined by the object scores. OVERALS uses optimal scaling, which quantifies categorical variables and then treats them as numerical variables, applying nonlinear transformations to find the best-fitting model. The order of the categories is not retained for nominal variables but values are created for each category so that the goodness of fit is maximised. For ordinal variables, the order is retained and values maximising fit are created. Stability of OVERALS results can be obtained by using the Bootstrap method (*cf.* Van der Burg & De Leeuw 1988). In general, the *eigenvalues* and the canonical correlation co-efficients are very stable if the sample size is not too small. Here the datasets used for the multivariate analysis consist of 400 respondents. Van der Burg, Noordermeer & De Haes (2000) find that confidence intervals for component loadings are larger than for *eigenvalues* but still stable. The confidence intervals for category quantifications are the largest ones. The description of the OVERALS analysis results is usually restricted to the canonical correlation co-efficients and component loadings.

In this OVERALS analysis, every variable in every block of factors is put into correlation with all the other variables. This analysis was performed by the OVERALS analysis in which seven sets were used. Each set corresponds to one of the seven blocks of factors presented in the conceptual model. The iteration process of the OVERALS analysis stopped at 35, which was where convergence test value was reached. The *eigenvalue* of the first dimension is 0.557 and the *eigenvalue* of the second dimension is 0.411, leading to the sum fit of 0.968. Table

7.10 presents the distribution of component loadings for the two dimensions in the OVERALS analysis. The strong independent and intervening variables, those with a value of 0.5 or greater, either positive or negative, are marked in grey. The independent and intervening variables of moderate strength, with a value between 0.3 and 0.5, either positive or negative, are indicated by underscoring.

Table 7.10 Values of the component loadings of the 33 variables (N=400)

Set	Variable			Dimension 1	Dimension 2
1	Village (a, b)	Dimension	1	<u>0.933</u>	-0.011
			2	-0.061	<u>0.768</u>
	Age (c, d)			0.028	-0.159
	Education (c, d)			<u>0.300</u>	<u>0.455</u>
	Caste (a, b)	Dimension	1	<u>0.160</u>	-0.253
			2	0.058	<u>0.544</u>
	Profession (a, b)	Dimension	1	0.238	0.042
			2	0.015	0.210
	HHcomposition (c,			0.051	0.083
	KnowMAC (c, d)			-0.319	-0.422
2	KnowMMS (c, d)			-0.128	0.027
	KnowTMS (c, d)			-0.175	0.063
	KnowBio (c, d)			0.071	-0.306
	KnowCult (c, d)			-0.188	0.247
	KnowTHK (c, d)			<u>0.350</u>	<u>0.342</u>
	BeliefMAC (c, d)			0.273	-0.141
	BeliefMMS (c, d)			-0.146	<u>0.530</u>
	BeliefTMS (c, d)			0.289	-0.044
	BeliefBio (c, d)			-0.157	0.027
	BeliefCult (c, d)			-0.211	0.174
	BeliefTHK (c, d)			-0.245	<u>0.349</u>
3	IncomeHH (a, b)	Dimension	1	<u>0.662</u>	0.263
			2	0.233	<u>0.448</u>
	SES (c, d)			-0.039	0.208
	DistanceMM (c, d)			<u>0.357</u>	0.482
	DistanceTM (c, d)			0.296	-0.017
	DistanceMAC (c,			0.098	0.145
4	RepDisease (a, b)	Dimension	1	<u>0.555</u>	0.133
			2	0.211	<u>0.350</u>
5	AwareMAC (c, d)			0.180	0.007
	AwareBio (c, d)			<u>0.316</u>	-0.324
	AwareCult (c, d)			0.299	-0.367
6	Government (c, d)			-0.934	0.070
	Tourism (c, d)			-0.482	-0.322
	Overuse (c, d)			-0.536	<u>0.461</u>
7	UseMAC (c, d)			0.545	-0.124
	BioMAC (c, d)			0.460	-0.192
	CultMAC (c, d)			-0.191	0.301

a: Optimal Scaling Level: Multiple Nominal; b: Projections of the Multiple Quantified Variables in the Object Space.

c: Optimal Scaling Level: Ordinal; d: Projections of the Single Quantified Variables in the Object Space.

Source: Household survey 2006

The strong (0.5 or larger) and moderate (0.3 till 0.5) independent and intervening variables on the first and the second dimension in the OVERALS analysis based on their component loading values are:

On dimension 1:

- -0.934 'Government'
- 0.933 'Village'
- 0.662 'IncomeHH'
- 0.555 'RepDisease'
- -0.536 'Overuse'
- 0.482 'Tourism'
- 0.357 'DistanceMM'
- 0.350 'KnowTHK'
- -0.319 'KnowMAC'
- 0.316 'AwareBio'
- 0.300 'Education'

On dimension 2:

- 0.768 'Village'
- 0.544 'Caste'
- 0.530 'BeliefMMS'
- 0.482 'DistanceMM'
- 0.461 'Overuse'
- 0.455 'Education'
- 0.448 'IncomeHH'
- -0.422 'KnowMAC'
- -0.367 'AwareCult'
- 0.350 'RepDisease'
- 0.349 'BeliefTHK'
- 0.342 'KnowTHK'
- -0.324 'AwareBio'
- -0.322 'Tourism'
- -0.306 'KnowBio'

There are twelve variables of moderate strength on the first or the second dimension in the OVERALS solution: 'Education', 'KnowMAC', 'KnowBio', 'KnowTHK', 'BeliefTHK', 'IncomeHH', 'DistanceMM', 'RepDisease', 'AwareBio', 'AwareCult', 'Tourism' and 'Overuse', but in the bivariate analyses between the independent and intervening variables and the dependent variables, only five emerge in the one-to-one relationship with the dependent variables: 'KnowMAC', 'KnowBio', 'KnowTHK', 'BeliefTHK' and 'Overuse'. There are seven strong variables on the first or the second dimension in the OVERALS solution: 'Village', 'Caste', 'BeliefMMS', 'IncomeHH', 'RepDisease', 'Government' and 'Overuse', but only the variables 'Village', 'Government' and 'Overuse' are discussed separately in the bivariate analyses since they fulfilled the requirements. Since several of the bivariate analyses could not be used because both essential assumptions for the utilisation of the Pearson's Chi-Square were not fulfilled, it has already been established that a bivariate analyses of the variables influencing the utilisation and bio-cultural diversity conservation behaviour of MAC plants is not sufficient to allow an analysis of the relationships between the variables. Nevertheless, three variables, 'Village', 'Government' and 'Overuse' had already emerged as variables of interest, although they only presented weak relations.

On the basis of the values of the component loadings presented in Table 7.10 and the graphic representation of the solution of the OVERALS analysis presented in Figure 7.1, it is clear that 'BioMAC' and 'CultMAC' are the dependent variables dominating the first dimension, whereas 'CultMAC' dominates the second dimension. Figure 7.1 shows that the dependent variables 'UseMAC' and 'BioMAC' correlate in both strength and direction, whereas 'CultMAC' has an opposite correlation with the other two variables, indicating that a remarkably low use of MAC plants and low conservation of biodiversity is related to a high cultural conservation. The solution of utilisation and bio-cultural diversity conservation behaviour are most strongly affected on the first and the second dimension by the variables: 'Village', 'Caste', 'BeliefMMS', 'IncomeHH', 'RepDisease', 'Government' and 'Overuse'.

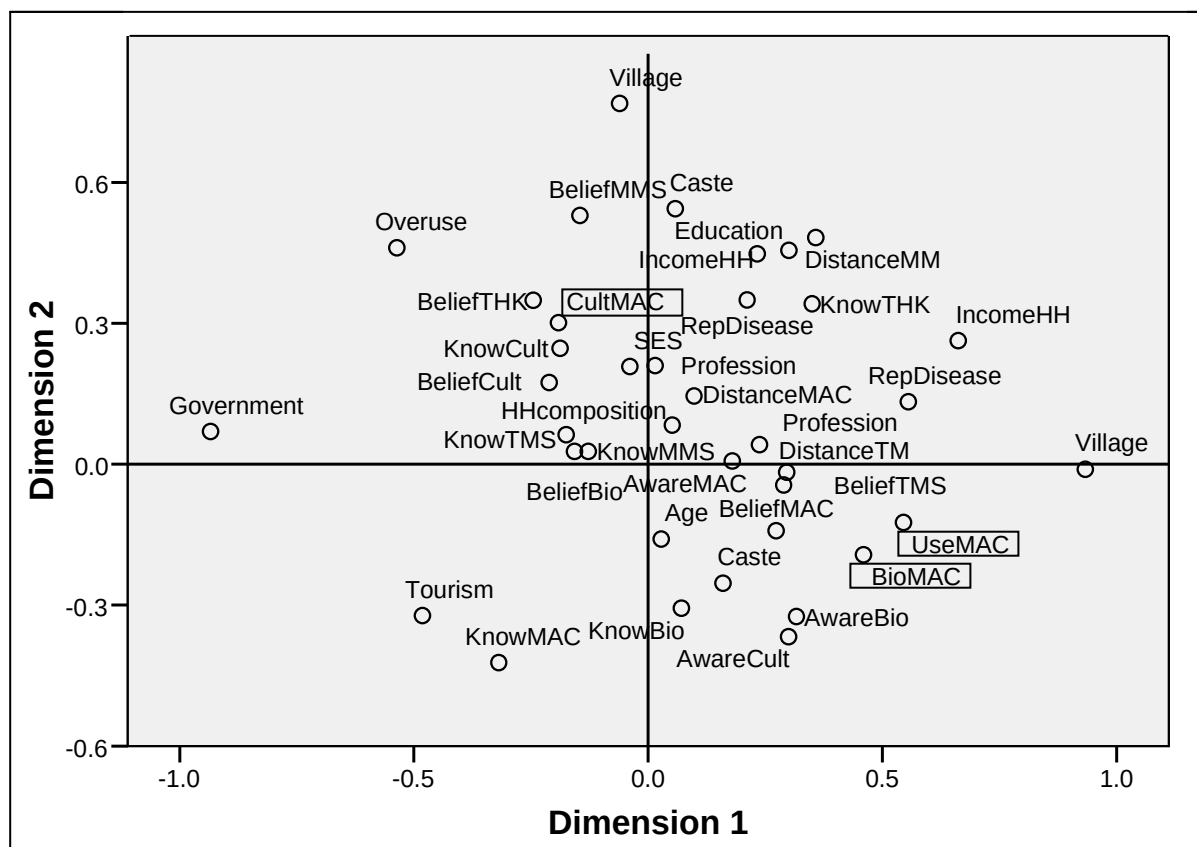


Figure 7.1 OVERALS analysis of MAC plant utilisation and bio-cultural diversity conservation
Source: Household survey 2006

‘Village’ is the strongest variable on both dimensions in the solution of the OVERALS analysis. In the bivariate analysis, ‘Village’ also emerged as one of the strong factors which is surely to be expected in an analysis of MAC plant utilisation and bio-cultural diversity conservation of MAC plants. This assumption is prompted because where someone lives is practically speaking that person’s bio-cultural diversity surroundings. Each of the villages was selected in a different geographical area, indicating a difference in the biological surroundings between the villages, but not among them. The *desa kala patera* principle means that in Balinese culture there is a ready acceptance that each village has its own cultural pattern. The villages Angantaka and Pelapuan score more highly on the cultural diversity conservation, whereas Tumbu and Bengkel score more highly on the use of MAC plant and the biodiversity conservation of MAC plants. Noting the characters of the villages, it could be assumed that in Angantaka, where the government is setting up a programme to achieve the ‘*desa sehat*’ (healthy village) label, people would be concerned with the transfer of knowledge and therefore score highly on the variable ‘CultMAC’. In Pelapuan the reason is different. It is the only village which does not have any practitioners of the modern medicine living in its area and economically it is heavily dependent on the success of the harvest, which explains why the conservation of knowledge specifically of MAC plants scores highly there. Tumbu and Bengkel both score more highly on the biodiversity conservation and utilisation of MAC plants.

The variables 'Caste' and 'BeliefMMS' are strong in the OVERALS analysis, with a correlation to 'CultMAC': the higher the caste, the higher the cultural conservation level. This confirms the indicated involvement of the higher caste in the historical conservation of such knowledge as the preservation learning about MAC plants in the *lontar* by the priests and *balian* and far greater active involvement in the *kebalian* discussions, of which a goal is the conservation of Balinese-ness, including traditional knowledge systems. It is remarkable that strong belief in the modern medical systems tallies with a degree of high cultural diversity conservation behaviour. It makes sense considering that most Balinese, as other people in the world, recognise the shortcomings of the modern medical system and therefore take an active approach towards the conservation of knowledge of, beliefs in and practices towards MAC plants in the hope that modern medicine might be able to distil new or improved practices from this knowledge. The variables 'IncomeHH' and 'RepDisease', both strong variables in the total OVERALS solution, are situated in a different quadrant to the dependent variables indicating that, although both these variables are strong in the total solution of MAC plant utilisation and bio-cultural diversity conservation, there is no direct relationship between these two variables and the dependent variables.

The variable 'Government' correlates only with the dependent variables 'UseMAC' and 'BioMAC' and not with 'CultMAC'. There is a negative relationship between these variables; hence high scores on the perceived impact of the government on MAC plant utilisation and bio-cultural diversity conservation correspond to low scores on MAC plant utilisation and biodiversity conservation of MAC plants. The majority of the respondents perceived the impact of the government as positive. Therefore, there is an indication that a high perceived impact of the government on MAC plant utilisation and bio-cultural diversity conservation results in the opposite behaviour: low utilisation of MAC plants. The previous description shows that the Indonesian Ministry of Health supports the utilisation of MAC plants for health and healing, but cautions about such aspects as efficacy, quality and safety in this utilisation. Although the community health care centres do have an educative role with regard to MAC plant utilisation, there are only few examples of modern health care practitioners actually working with them; they prefer bio-medical drugs in their curative, preventive and promotive care. Therefore the positive impact of respondents can be understood as the cautious utilisation of MAC plants, resulting in a lower utilisation conforming to government policies. However, the relationship becoming apparent in this solution indicates the opposite effect of government policies on biodiversity conservation. People who perceived a high impact of the government and rated this as positive display a low biodiversity behaviour. The interpretation of these results for the sample is that, if a weak impact of the government on biodiversity conservation is perceived, people will take matters into their own hands and present a high biodiversity conservation behaviour. Further research will be necessary to clarify whether the Balinese community will relinquish their biodiversity conservation behaviour if government policies are made stricter; hopefully, an unlikely and an undesirable outcome in view of the imminent biodiversity crisis.

The co-variation of 'Overuse' with the dependent variables is the highest. 'Overuse' and 'CultMAC' have a positive relationship indicating that, if people exhibit a high cultural diversity conservation behaviour, they perceive a high impact of the increased use of resources. 'Overuse' has a negative relationship to both 'BioMAC' and 'UseMAC', indicating that a perceived low impact of the increased use of resources correlates with a high utilisation of MAC plants. This negative relationship is to be expected, since the perception of abundance illuminates in these factors. If a community member wants to use a MAC plant, they will certainly not be stopped from doing so if in their perception is only a low impact of

over-use on resources. The same reverse relationship between ‘Overuse’ and ‘BioMAC’, a low perceived impact of increased use of resources on the utilisation and bio-cultural diversity of MAC plants correlated with a high biodiversity conservation behaviour of the respondents, is harder to explain. It is very possible that there is a certain degree of optimism and people impute their own behaviour marked by high biodiversity conservation behaviour towards MAC plants onto others, indicating that the increased utilisation of resources does not necessarily have to have a negative impact. As indicated, earlier respondents were markedly divided about whether the impact of increased burden they perceived was negative or positive. Therefore it is possible to validate that those people who report a low impact and a high biodiversity conservation behaviour do indeed not necessarily perceive this impact as negative as is commonly done. Follow-up research will be necessary to clarify such specific relationships.

Of the twelve moderate strength variables in the first or the second dimension in the OVERALS solution, only four show a co-variation with the dependent variables: ‘KnowBio’, ‘AwareBio’, ‘AwareCult’ and ‘BeliefTHK’. The other eight variables displaying a moderate strength on either the first or the second dimension of the OVERALS solution do not show a co-variation with the dependent variable dominant on that dimension. ‘KnowBio’, ‘AwareBio’ and ‘AwareCult’ are variable with a reasonable strength and have a close positive interrelationship with the variables ‘UseMAC’ and ‘BioMAC’ in the total solution. The ‘inextricable link’ between biodiversity and cultural diversity conservation behaviour is very apparent, since the projected centroids with a higher score on ‘AwareCult’ relate to higher scores on ‘UseMAC’ and ‘BioMAC’.

The analysis affirms that knowledge and awareness of biodiversity conservation of MAC plants obviously affects their use and biodiversity conservation positively. The variable of moderate strength in the total OVERALS solution but with a strong connection with the dependent variable ‘CultMAC’ is ‘BeliefTHK’. The high correlation between the variables ‘BeliefTHK’ and ‘CultMAC’ reconfirms the important role the Balinese Hindu principle of *tri hita karana* encompassing the Balinese cosmovision which guides the Balinese in their daily practices and, as shown by this analysis, specifically in the cultural conservation of MAC plants as it stresses the importance of knowledge of, beliefs in and practices towards MAC plants.

7.2.3 Multiple Regression Analysis of the Blocks of Factors

The previous sections discussed the bivariate analyses of the independent and intervening variables towards the dependent variables and the multivariate analysis of every variable of every block of factors in relation to each other. In this multiple regression analysis, the block of factors is compared to the other block of factors to determine the relative strength of the block of factors towards each other. The most commonly used multivariate measures of association, expressed as functions of the *eigenvalues* of the product matrix, are used to determine this relative strength. The multiple correlation co-efficient (ρ_d) is related to the *eigenvalues* (E_d). The formula used to calculate the multiple correlation co-efficient (ρ_d) is $\rho_d = 2 \times E_d - 1$ (cf. Van der Burg 1983). In order to calculate the multiple correlation co-efficient (ρ_d), an OVERALS analysis is made between each block of factors of the conceptual model, the in total 21 two sets OVERALS analyses. The strongest variables in each OVERALS analysis is established on the basis of the values of the variables components loadings. Table 7.11 presents the two strongest variables in each solution.

Table 7.11 Strongest variables within the two sets OVERALS analyses on the two dimensions

Analysis	Two strongest variables on dimension 1				Two strongest variables on dimension 2			
	Name 1	Value	Name 2	Value	Name 1	Value	Name 2	Value
1↔2	Village	.913	KnowMAC	-.729	KnowTHK	.673	Belief THK	.636
1↔3	IncomeH	.918	Village	.686	Village	.655	DistanceM	.547
1↔4	RepDiseas	.882	Age	-.641	RepDisease	.857	Village	.681
1↔5	Village	1.37	AwareCult	-.318	Village	.882	Caste	-.391
1↔6	Government	-.959	Village	.948	Overuse	.797	Village	.655
1↔7	Village	.789	UseMAC	-.783	CultMAC	.844	Caste	.448
2↔3	IncomeH	.816	KnowTHK	.540	DistanceTM	-.693	DistanceM	-.490
2↔4	RepDiseas	.843	BeliefTHK	-.377	RepDisease	.835	KnowMAC	-.418
2↔5	BeliefTM	-1.40	BeliefMAC	-.241	BeliefBio	-1.03	KnowMAC	-.686
2↔6	Overuse	.777	Government	.720	Tourism	-.885	BeliefMMS	.511
2↔7	CultMAC	.741	KnowBio	-.523	BioMAC	-.688	UseMAC	-.543
3↔4	RepDiseas	.830	SES	.476	RepDisease	.826	DistanceTM	.638
3↔5	IncomeH	1.39	DistanceMAC	-.182	DistanceMAC	1.34	IncomeHH	.324
3↔6	Government	-.836	IncomeHH	.699	Overuse	.731	DistanceM	-.496
3↔7	UseMAC	.685	DistanceM	.575	BioMAC	-.655	IncomeHH	.609
4↔5	RepDiseas	1.41	Aware (3x)*	(-).049	RepDisease	1.41	Aware(2x)**	(-).033
4↔6	RepDiseas	.824	Government	-.742	RepDisease	.798	Overuse	.544
4↔7	RepDiseas	.840	UseMAC	.783	RepDisease	.797	BioMAC	-.792
5↔6	Government	-1.37	Overuse	-.955	Overuse	.935	Tourism	.480
5↔7	UseMAC	-1.07	CultMAC	.937	CultMAC	.974	UseMAC	.722
6↔7	Overuse	.835	Government	.659	CultMAC	.551	UseMAC	.515

* Aware (3x) refers to the equal scoring of AwareMAC (.049), AwareBio (-0.049) and Aware Cult (.049)

** Aware (2x) refers to the equal scoring of AwareBio (-0.33) and AwareCult (0.33)

Source: Household survey 2006

In the first column, headed 'Analysis', the OVERALS analysis is defined by the number of the block of factors involved; the two sets used. Table 7.11 is divided into two blocks: the left block consisting of four columns indicates the two strongest variables of the OVERALS solution on the first dimension and the four columns in the right present the strongest two variables of the OVERALS solution on the second dimension. The strongest variable in the solution to each dimension is presented in the 'Name 1' column; the second strongest variable in the 'Name 2' column. The names of the variables are followed by the value of their component loadings in the solutions to the particular dimension. In the twenty-one OVERALS analyses presented, there are six variables which do not emerge in any of the solutions as one of the two strongest variables on either the first or the second dimension: 'Education', 'Profession', 'HHcomposition', 'KnowMMS', 'KnowTMS' and 'KnowCult'.

These six variables do not have a strong effect on the solution of any of the OVERALS analyses in which they are involved. Reverting to the bivariate analysis, where the independent variables and intervening variables were cross-related to Block 7, the dependent variables, the Pearson chi-square test of these six variables could not be established or they showed no significance in relation to any of the three dependent variables. None of these six variables was of any interest in the bivariate analysis in relation to the Spearman's correlation

co-efficient, since all values of r indicated weak relationships. The other twenty-seven of the thirty-three variables involved in the OVERALS analyses are one of the two strongest variables on either the first or the second dimension in at least one of the OVERALS solutions. Each individual variable has been included in six of the twenty-one OVERALS analyses.

The variables 'Village', 'RepDisease', 'Government', 'Overuse' and 'UseMAC' came out as one of the two strongest variables on the basis of their components loading on either one of or even both dimensions of all the six analyses in which they occurred. 'IncomeHH' occurred as strongest variable in five of the six analyses. 'DistanceMM' and 'CultMAC' appeared as strongest in four of the six analyses. 'BioMAC' and 'KnowMAC' were strongest in three of the six analyses. The other variables appeared as one of two strongest variables in two or only one analyses. 'Village', 'RepDisease', 'Government', 'Overuse' and 'IncomeHH' emerged also as strong variables in the multivariate OVERALS analysis including seven sets of variables. However, the variables 'DistanceMM' and 'KnowMAC' lose strength when being put into relationship with all the sets of variables involved in the knowledge of, beliefs in and practices with MAC plant utilisation and bio-cultural diversity conservation. Table 7.12 gives an overview of the calculated multiple correlation co-efficients (ρ_1 and ρ_2) between the seven blocks factors of the conceptual model.

Table 7.12 Calculated multiple correlation co-efficients of the OVERALS analysis between the seven blocks of factors of the conceptual model

Block $\leftrightarrow$ Block	Multiple Correlation Coefficient on the first dimension (ρ_1)	Multiple Correlation Coefficient on the second dimension (ρ_2)
1 $\leftrightarrow$ 2	2 x 0.899 -1= 0.798	2 x 0.828 -1= 0.656
1 $\leftrightarrow$ 3	2 x 0.890 -1= 0.780	2 x 0.784 -1= 0.568
1 $\leftrightarrow$ 4	2 x 0.778 -1= 0.556	2 x 0.735 -1= 0.470
1 $\leftrightarrow$ 5	2 x 1.000 -1= 1.000	2 x 0.982 -1= 0.964
1 $\leftrightarrow$ 6	2 x 0.926 -1= 0.852	2 x 0.729 -1= 0.458
1 $\leftrightarrow$ 7	2 x 0.788 -1= 0.576	2 x 0.716 -1= 0.432
2 $\leftrightarrow$ 3	2 x 0.801 -1= 0.602	2 x 0.762 -1= 0.524
2 $\leftrightarrow$ 4	2 x 0.711 -1= 0.422	2 x 0.697 -1= 0.394
2 $\leftrightarrow$ 5	2 x 1.000 -1= 1.000	2 x 0.975 -1= 0.950
2 $\leftrightarrow$ 6	2 x 0.824 -1= 0.648	2 x 0.797 -1= 0.594
2 $\leftrightarrow$ 7	2 x 0.780 -1= 0.560	2 x 0.764 -1= 0.528
3 $\leftrightarrow$ 4	2 x 0.689 -1= 0.378	2 x 0.682 -1= 0.364
3 $\leftrightarrow$ 5	2 x 1.000 -1= 1.000	2 x 1.000 -1= 1.000
3 $\leftrightarrow$ 6	2 x 0.784 -1= 0.568	2 x 0.698 -1= 0.396
3 $\leftrightarrow$ 7	2 x 0.702 -1= 0.404	2 x 0.654 -1= 0.308
4 $\leftrightarrow$ 5	2 x 1.000 -1= 1.000	2 x 1.000 -1= 1.000
4 $\leftrightarrow$ 6	2 x 0.680 -1= 0.360	2 x 0.640 -1= 0.280
4 $\leftrightarrow$ 7	2 x 0.706 -1= 0.412	2 x 0.634 -1= 0.268
5 $\leftrightarrow$ 6	2 x 0.995 -1= 0.990	2 x 0.945 -1= 0.890
5 $\leftrightarrow$ 7	2 x 0.928 -1= 0.856	2 x 0.915 -1= 0.830
6 $\leftrightarrow$ 7	2 x 0.732 -1= 0.464	2 x 0.626 -1= 0.252

Source: Household survey 2006

The *eigenvalue* for each dimension shown in Table 7.12 equals 1 minus the average loss for the dimension and indicates how much of the relationship is shown by each dimension for each solution. The *eigenvalues* of both dimensions add up to the total fit. The maximum fit value equals the number of dimensions, which is two in all cases, and, if obtained, indicates that the relationship is perfect. Most remarkably, the sum of the multiple correlation coefficients is exactly 2 in two cases: between Blocks 3 and Block 5 and between Blocks 4 and 5. Perfect fits are rare. Their occurrence in this analysis is very probably because Block 4, 'Perceived morbidity', consists of single multiple nominal variables and it is therefore possible to find a perfect correlation between this block of factors and other blocks of factors. Even more interesting is the perfect fit between Block 3 'Enabling factors' and Block 5 'Institutional factors', which does make sense since the distance to an institution and an individuals' economic status elements incorporated in the variables in Block 3 are likely to affect the knowledge and acquaintance which influence the perception of institutions expressed in the variables of Block 5. There are more high correlations, based on a multiple correlation co-efficient higher than 0.750, if the dimensions are considered separately.

The high correlations between blocks on the first dimension are:

- 1.000 between Block 1 'Socio-demographic factors' and Block 5 'Institutional factors'
- 1.000 between Block 2 'Psycho-social factors' and Block 5 'Institutional factors'
- 1.000 between Block 3 'Enabling factors' and Block 5 'Institutional factors'
- 1.000 between Block 4 'Perceived morbidity' and Block 5 'Institutional factors'
- 0.990 between Block 5 'Institutional factors' and Block 6 'Intervening factors'
- 0.856 between Block 5 'Institutional factors' and Block 7 'Dependent factors'
- 0.852 between Block 1 'Socio-demographic factors' and Block 6 'Intervening factors'
- 0.798 between Block 1 'Socio-demographic factors' and Block 2 'Psycho-social factors'
- 0.780 between Block 1 'Socio-demographic factors' and Block 3 'Enabling factors'

The high correlations between blocks on the second dimension are:

- 1.000 between Block 3 'Enabling factors' and Block 5 'Institutional factors'
- 1.000 between Block 4 'Perceived morbidity' and Block 5 'Institutional factors'
- 0.964 between Block 1 'Socio-demographic factors' and Block 5 'Institutional factors'
- 0.950 between Block 2 'Psycho-social factors' and Block 5 'Institutional factors'
- 0.890 between Block 5 'Institutional factors' and Block 6 'Intervening factors'
- 0.830 between Block 6 'Intervening factors' and Block 7 'Dependent factors'

Concentrating on the interrelation of the block of dependent factors (Block 7), it is apparent from Figure 7.2 and the overview in Table 7.12 that the highest correlation on the first dimension (0.856) is Block 5 'Institutional factors' and the highest correlation on the second dimension (0.830) is also with Block 5 'Institutional factors'. Focusing on the one-to-one relationship of the various block of factors, it is obvious that the second strongest influence on the dependent factors comes from the block of the psycho-social factors, 0.560 (ρ_1) and 0.528 (ρ_2). Since the psycho-social factors are the second strongest block of factors in the multiple regression analysis, this substantiates that such so-called 'invisible' factors as belief systems and local philosophies of nature and the environment, play a determining role in forming the Balinese community members' MAC plant utilisation and the bio-cultural diversity conservation of MAC plants.

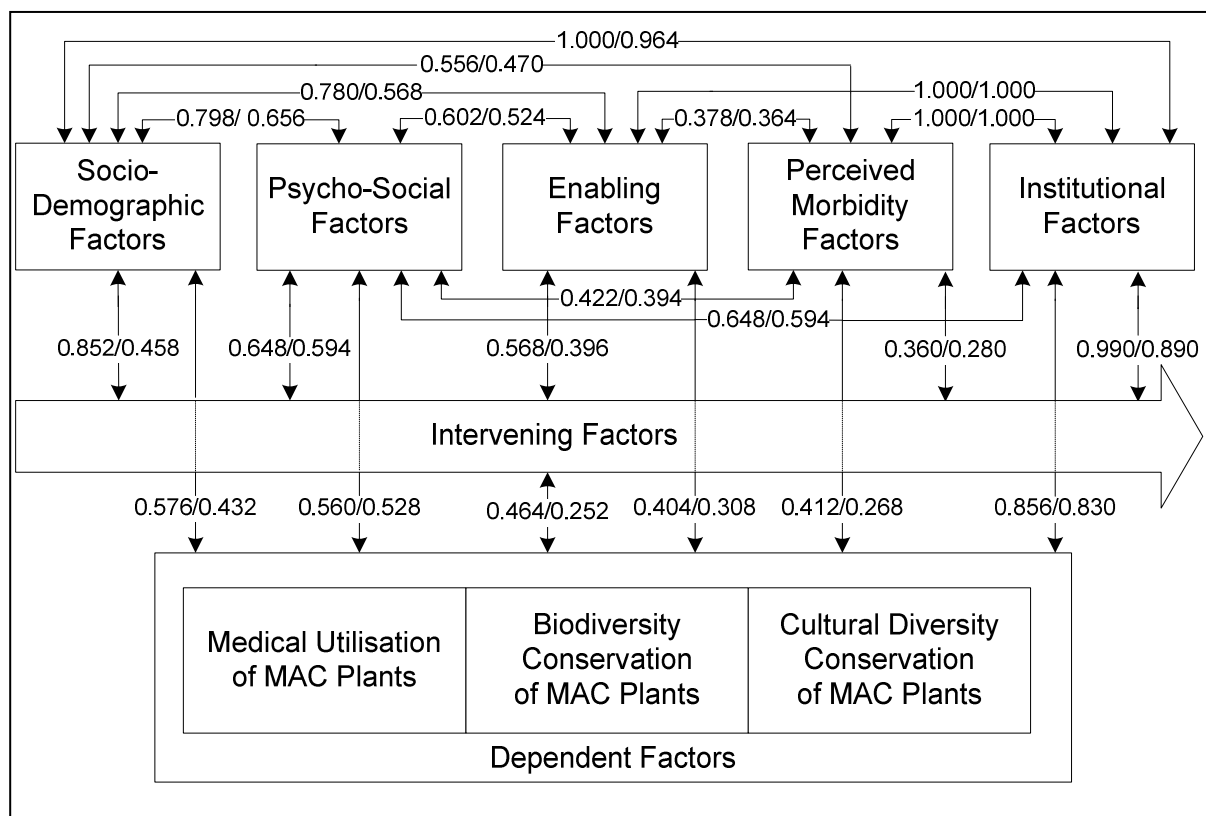


Figure 7.2 The conceptual model indicating the calculated multiple correlation co-efficients between the blocks of factors for the utilisation and bio-cultural diversity behaviour of MAC plants.

Source: Household survey 2006

From the overview in Table 7.11, the following variables in the block of psycho-social factors emerged as one of the two strongest variables in an OVERALS solution preceding the multiple regression analysis: 'KnowMAC', 'BeliefMAC', 'KnowBio', 'BeliefBio', 'KnowTHK', 'BeliefTHK' and 'BeliefMMS'. 'KnowBio' emerged specifically in relation to Block 7 'the dependent factors', indicating that the strongest variables in the OVERALS analysis between these two blocks from the set of psycho-social factors is the knowledge of the bio-cultural conservation of MAC plants. As indicated earlier, throughout the descriptive parts of this study, for centuries *tri hita karana* has guided local people's behaviour in all aspects of life, including the maintenance or restoration of a harmonious relationship with their environment. The multiple regression analysis reconfirms this vision and reaffirms that Balinese believe that keeping the balance by abiding by the *tri hita karana* concept is very important in terms of local use, management and conservation of nature (*cf.* Agung 2005) and for health, well-being and happiness, since imbalance between them courts illness (*cf.* McCauley 1984; Suryani & Jensen 1992; Pitana 2000; Sacchette 2002).

The multiple correlation co-efficients between the block of intervening factors and the block of dependent factors are the highest when each block of factor is considered separately in relation to the block of dependent factors. Individually these variables did not emerge as strong variables in any of the other analyses. In the bivariate analyses it was impossible to establish whether there was a significant association between the institutional variables on the basis of the Pearson's Chi-square values and the values of Spearman's Rho and the dependent variables indicated a weak direct relationship. In the OVERALS analyses, the institutional

variables emerged as variables of moderate strength as presented in Section 7.2.2. However, overall Block 5, 'Institutional factors', has the highest correlation with the other blocks in the solutions. Block 5, 'Institutional factors', presents a perfect fit (1.000) on both dimensions with Block 3, 'Enabling factors', and Block 4, 'Perceived Morbidity', including the strong variables 'IncomeHH' and 'RepDisease' of the OVERALS analysis. Block 5 'Institutional factors', correlates with 1.000 (ρ_1) and 0.964 (ρ_2) with Block 1, 'Socio-demographic factors', including the strong variables 'Village' and 'Caste' of the OVERALS analysis; with 0.990 (ρ_1) and 0.890 (ρ_2) with Block 6, 'Intervening Factors', to which the strong variables 'Government' and 'Overuse' belong in the OVERALS analysis; and finally with .648 (ρ_1) and .594 (ρ_2) with Block 2, 'Psycho-Social Factors', to which the strong variable of the OVERALS analysis 'BeliefMMS' belongs.

Hence, Block 5, 'Institutional factors', emerges as the strongest block of variables in the multiple regression analyses, indicating that the block of dependent variables is most heavily influenced by the 'Awareness of local institutions linked to MAC plant use', 'Awareness of institutions linked to biodiversity of MAC plants' and 'Awareness of institutions linked to cultural diversity of MAC plants', since these variables cover the interrelationship with the other variables and blocks of factors, influencing the Balinese community members' behaviour towards the medical utilisation of MAC plants, biodiversity conservation of MAC plants and the cultural diversity of MAC plants.

8 Conclusions and Implications

8.1 Conclusions

Nowadays, the global community has begun to recognise the alarming decline in the biodiversity of the Earth and the serious consequences this holds for human health and well-being. The Indonesian government acknowledges that maintaining the biodiversity of the country is fundamental to the integrity of its environment and its loss will have a negative impact on its economic development plans and the health of its people. Indonesia ranks second in the world top ten of ‘centres of megadiversity’. In the diversity of plants, Indonesia ranks fifth in the world. However, recent data on the biodiversity status of Indonesia and Bali indicate that they are facing a serious biodiversity crisis and that programmes and policies issued to protect biodiversity are failing at both national and regional levels. Policies and legislation to encourage sustainable development and the actual management of bio-cultural diversity have proved very difficult, if not impossible, to implement without the local peoples’ involvement or participation. The involvement or participation of the latter is necessary since essentially realising a sustainable use of natural and human resources represents a change or adaptation in the utilisation, management and conservation practices. Both require that people change their way of living, their behaviour. This study supports Pitana’s (1999) observation that in present-day Bali, globalisation and localisation do occur simultaneously and his vision of globalisation; if global structures can affect the local, globalisation should at the least offer the possibility for the local also to intervene in the global. It indicates that at the same time the exogenous modernising processes are strengthening, the local processes are being reinforced. Therefore it is essential to know what is happening at the local level.

The recognition of the consequences of biodiversity loss, the growing awareness of the ‘inextricable link’ between biodiversity and cultural diversity, the difficulty in realising and implementing policies and legislation protecting biodiversity in Indonesia and Bali, and the need to know what is happening locally, demand more attention be paid to the underlying human-plant relationships and interactions. This medical anthropological study with an ethno-botanical approach documents, describes and analyses the undeniable interconnectivity of local community health, biodiversity and cultural diversity at the level of the community members from a local *emic* point of view. In contrast to other medical anthropological research, which although acknowledging the complexity of pluralistic medical configuration marking the nations of the world, focuses mainly on the description of the way people choose between treatments of modern or traditional medicine, this study concentrates on the often overlooked, most common form of therapy, self-care. The common practice of the preparation and use of fresh MAC plants as home remedies is studied in the realistic context of the mainly plural medical system of present-day Bali. Therefore, the general aim of this study is to document, describe and analyse the Balinese community members’ knowledge of, beliefs in and practices with medicinal, aromatic and cosmetic (MAC) plants relating to community health and bio-cultural diversity conservation of MAC plants.

In order to substantiate the theoretical orientation of this study, an overview of the relevant theoretical foundation of current ethno-botanical research and specifically of ethno-botanical knowledge systems, the developments on medical pluralism in medical anthropology, especially in relation to medical systems, community health and health care utilisation and the concepts of bio-cultural diversity conservation based on the ‘inextricable link’ between biodiversity and cultural diversity, is given in Chapter 2. Following these current developments, the main approach, the Ethnosystems Approach introduced in Section

3.1.1, of this study, places the *emic* point of view central in the study of human-plant relationships in Bali, focusing on the Knowledge-Belief-Practice complex of the health and healing practices in the form of preparation and use of fresh MAC plants as home remedies. The Ethnosystems Approach puts the *emic* point of view central and introduces a more dynamic, comparative dimension to the field of ethno-botany, combining a *horizontal* and a *vertical* comparison between systems of plant utilisation, management and conservation.

To realise the general aim, data collection and analyses using complementary qualitative and quantitative research techniques were carried out to document, describe and analyse the various categories of factors related to the community members' reported use of fresh MAC plants as home remedies in the wider scope of the Balinese pluralistic medical configuration and whether the community members' behaviour exhibits a sustainable character towards both the conservation of the diversity of MAC plants in terms of genes, species and ecosystems preservation and to the conservation of the local knowledge of, beliefs in and practical applications of the MAC plants. The theoretical orientation documented in Chapter 2 supports the application of the Knowledge-Belief-Practice complex as a basic approach for studying human behaviour, making it possible to assess the rather complicated bio-cultural diversity conservation behaviour of respondents as one integrated complex of human-environment relationships and interactions. Particular attention is paid to such so-called 'invisible' factors as belief systems and local philosophies of nature and environment, which play a determining role in forming the Balinese community members' MAC plant utilisation and the bio-cultural diversity conservation of MAC plants. The Ethnosystems Approach and the conceptual model are the framework for the formulation and identification of the data to be collected and the basis of the quantitative analyses assessing the Balinese systems of knowledge, beliefs and practices in a more dynamic context of processes of development and change. On the basis of the implementation of the main research methodology and the pursuit of the selected research methods and techniques on data collection and analyses introduced in Chapter 3, the seven specific objectives for this study in Bali stated in Section 1.4 have been achieved and the main results are presented below.

Firstly, a description of the Balinese research setting as a unique part of the developing nation Indonesia with its own distinctive geography, population and culture is provided in Chapter 4. Immediately with the description of the research area focused on the geography of the island in Section 4.1.1, the unquestionable intertwining of the biological and cultural aspects of the island is apparent. Their geography is conceptualised by the Balinese as a physical representation of the Balinese cosmology. This is demonstrated by the fact that the highest mountain, Mount Agung, is both its religious and its geographical centre, since it is essential to make sense of the Balinese expression of direction by the terms *kaja* (towards the mountain) and *kelod* (towards the sea) and defines the orientation of Balinese villages, which are formed along the line of the *kahyangan tiga* (the temple trinity) set on the *kaja* - *kelod* axis.

The brief historical overview in Section 4.2.1, demonstrates that the Balinese have always had to identify and externalise their culture for others, distancing themselves from the Javanese, with whom the Balinese have a shared history which has left traces in every aspect of life, specifically in the socio-cultural and religious aspects, or by defying or internalising the influx of external influences which began with the colonisation of Bali by the Dutch when Western ways of life were systematically introduced into such areas as government, law, education and health. This continues today in the constant influx of immigrants and tourist visiting the island. As a reaction to these developments, the Balinese launched an active, on-

going debate about the issue of identifying what is essentially Balinese. This discussion of *kebalian* or *balisasi* accepts the indivisible unity of religion (*agama*), tradition (*adat*) and culture (*budaya*) as a necessity for keeping Balinese identity intact. This indivisible unity of religion, tradition and culture influences the particularly highly complex social organisation, as is shown in Section 4.2.3, and all aspects of everyday life.

Hindu Dharma, the religion practised in Bali is discussed in Section 4.2.4. It continues to exert an extremely powerful influence, shaping and controlling the daily behaviour of the Balinese and their perception of life. The five principle beliefs of the *Tattwa* (philosophy) of *Hindu Dharma* are especially paramount in the behaviour and emotional concepts and practices related to illness, health and healing. The *tumpek*, part of the *upacara* (rituals), are inextricably related to the philosophy on bio-cultural diversity, intended specifically to clarify that humans are part of the world and that they should respect nature. *Hindu Dharma* is the major motivator behind the Balinese philosophy of life: keeping the balance.

Understanding the Balinese conceptualisation of life presupposes knowledge of systems of multiple classifications and the understanding that the achievement of the goal is not expressed by attaining the perfect, as in highest or biggest, but by achieving balance between forces to which Section 4.2.5 gives an introduction. The overall balance concept in the Balinese society, *tri hita karana*, has virtually become the all-embracing Balinese philosophy of life, safeguarding the harmony between and in the human world (*pawongan*), the natural world (*palemahan*) and the spiritual world (*parahyangan*) on an almost daily basis. Keeping the harmony between the three dimensions is seen by the Balinese as the basis for a good individual health and a healthy community. The main practice of keeping or restoring the balance in and between the worlds lies in the performance of numerous ceremonies, rituals and offerings. The integrated Balinese calendar is the practical guide to identify the numerous Balinese ‘holy-days’, grand regional ceremonies, propitious days for planting and harvesting, the scheduling of local ceremonies and rituals, all to obtain the desired balance.

The socio-demographic and socio-economic profiles in Section 4.3 focus on the four sample villages, each located in one of the four pre-selected areas part of the so-called ‘cradle of Hindu-Balinese culture’, the central-south-eastern part of Bali: the central lowlands (Angantaka), the coastal lowlands (Bengkel), the mountains (Pelapuan), and on the mountain slopes (Tumbu). On the basis of complementary qualitative and quantitative surveys, the composition of the village populations is discussed in relation to the community members’ caste, age, gender, household composition, education level and socio-economic status, all set in the wider context of current Balinese and Indonesian developments.

Secondly, the *emic* perspective of the knowledge of, beliefs in and utilisation of fresh MAC plants reported as home remedies are described and analysed in Section 5.1. Clearly, present-day MAC plant utilisation must be placed in the current situation in which herbal and ‘natural’ products are a booming business, also in Bali. Their popularity is visible in the wide range of commercially produced or finished herbal products which are presented in attractive, easy-to-use packages, containing ready-to-use powders, pills, capsules, tonics, oils and ointments. More and more books, both popular and academic, are being published for the general public containing information about, developments in and even instructions on using plants for curative, promotive and preventive purposes. Naturally, these influence the Balinese community members’ knowledge behaviour towards MAC plants.

The Balinese make a distinction between home-made herbal medicine, products of fresh MAC plants by referring to how they are prepared and how they are supposed to be applied: *loloh*, *boreh* or *ramuan*. *Loloh* refers to any mixture of MAC plants which is prepared by

grinding the ingredients and adding cold, clean water, either pre-boiled or bottled spring water. *Boreh* is made in the same way, but instead of adding water to create a potable substance, fluids are added to attain the proper emulsification to apply the mixture externally directly onto the skin without the mixture slipping off. *Ramuan* are all preparations of MAC plants which are not *loloh* or *boreh*. As demonstrated in Section 5.1.1, present-day recipes are a mixture of ancient counterparts, often recorded in *lontar*, the results of decades of trial and error and new varieties which community member acquire either from literature or empirical experiment on the basis of their own experience or the stories of others.

Thirdly, the construction of the Balinese *emic* MAC plant classification is presented in Section 5.1.2. This was documented by means of the techniques of free listing and pile sorting. The cluster analysis resulted in a categorisation of the MAC plants into twelve clusters: 'Brushwood and shrubs', 'Cooking spices', 'Flowers', 'Fragrant leaves', 'Fruits and vegetables', 'Herbs', 'Rhizomes', '*Rumput*', 'Tree leaves', 'Trees', 'Tubers' and 'Weeds and grasses'. The *emic* classification of the reported MAC plants combines physical appearance, plant part used and the commonly known application, which is distinctly different from its application as an MAC plant. This *emic* classification is closer to Berlin's (1992) vision of *emic* classifications, displaying a prevalence of perceptual factors over practical ones. However, the classification does not exclude Alcorn's (2000) vision that *emic* plant classifications are adaptive, since 'uses' should be interpreted as 'behavioural', in which the plant names and plant uses are tied together and represent more than just the morphology. What this lay *emic* classification shows is that the Balinese categorise MAC plants in a practical framework, closely related to their daily reality and physical location of things. They are not really adopting either the more theoretical division of (popular) science or the cosmovision of the traditional medical system. Through the processes of acculturation and transculturation, the current *emic* classification of MAC plants, incorporates modern and traditional theoretical and philosophical elements in its basic reasoning behind the categorisation.

Fourthly, in Section 5.2 a description is given of the complex aspects of the pluralistic medical configuration in Bali affecting community health and the Balinese knowledge, beliefs and practices pertaining to promotive, preventive and curative health and healing practices, in terms of traditional and modern medicine. Medical pluralism is approached by this study as a cultural and social construct whose dynamics affect the utilisation behaviour of the Balinese community members and transcend the type of health and healing practices in the individual medical systems.

Section 5.2.1 the wide variety of traditional medical systems in Bali, which can be classified as either local or regional medical systems, belonging to either the great or little traditions. However, the term traditional medicine (*obat Bali asli*, *obat asli* or *pengobatan tradisional*) used by the Balinese community members refers to a single, local medical system, their own Balinese medical system. 'Healing practices' in the Balinese traditional system are all related to restoring the balance of integrated wholes, such as the psycho-physical balance between body and soul or between person and community. Each of the four sample villages had several traditional health practitioners in their midst. The types of healers reported were in order of popularity: *balian usada*, *balian taksu*, *balian apun*, *balian urut* and *dasar*. The *balian usada* is the *balian* most closely related to a herbalist. They base their knowledge on the *lontar*, the medical palm-leaf manuscripts, collectively referred to as *usada*, however they are always also divine healers. Remarkably, knowing that each village had at

least two well-known *balian*, several respondents reported that they had to travel a long way to the closest traditional healer. The fact that the respondents do not refer to the physically nearest but the interpersonal nearest representative supports Foster' (1983: 24) statement that '*people chose therapists, not medical systems*'.

Section 5.2.2 presents the modern medical system as dominant in the larger hospitals and government-organised care in Bali. The community members in each of the four sample villages had access to modern health care facilities at a reasonable distance and each sample village except for Pelapuan had a resident government-paid health professional within its borders. Despite their initial scepticism, significant endorsements of the importance of traditional medicine in community health care has meant that modern medical professionals in Indonesia are beginning to acknowledge the true value of its natural pharmacy. The main health goals are set by central government in the *repelita*'s (five-year plans) and the twenty-five-year development plan (1994-2019), into which the Millennium Development Goals (MDG) are integrated. Primary Health Care has been the main approach since 1976. In 2000, the Indonesian government introduced its new vision and mission enshrined in the programme 'Healthy Indonesia 2010' (HI2010), which compels the Ministry of Health and Social Welfare to involve all strata of the community, yet again places the promotion of public self-reliance and community health central. The ministry is actively involved in the monitoring of the quality, safety and efficacy of medicinal plants and of information about medicinal plants. The PKK (National Women's Organisation) and the *puskesmas* (health care centres) are the two institutions which play a primary role in disseminating information about the use of medicinal plants for the ministry.

The medical plural system, including the modern and traditional systems, provides a wide range of curative, preventive and promotive techniques and practices for community health, to which Section 5.2.3 is an introduction. Traditional medicine involved in curative, promotive and preventive community health care focuses on a holistic approach to both the psycho-biological system (the body and mind of the patient) and the social system of the patients, working both on restoring the balance (curative) and keeping the balance (promotive and preventive). Suryani (1995) incorporates this approach to health in a holistic way in the Balinese tradition in her *bio-psycho-spirit-sosio-budaya* concept. Bio (body), psycho (mind) and a person's spirit (wider concept than the mind) are the intertwined concepts which interact with the socio-cultural context in the environment, thereby integrating the perception on health and healing with the 'inextricable link' between cultural diversity and biodiversity. Modern medicine, the main medical system in the national health care system of Indonesia, has several realms in which it operates. It dominates current curative, preventive and promotive activities in community health care policies. The mounting attention paid to preventive and promotive health care by the government and community members alike is related to two developments: the rise in life expectancy and the changes in lifestyle. The analysis of the reported use of MAC plants for each household members (n=1724) in the sample in relation to the type of use, curative, preventive and promotive generated a top ten MAC plants for each of the three indented uses. As presented in Section 5.1.3, the three top tens consist of different plants. What is remarkable is that the top three for curative and preventive use are exactly the same plants, whereas promotive use relies on a different top three.

Although each medical system has a clear disease classification, the community members have their own *emic* classification which is suitable to the current plural medical situation; traces of both medical systems are found again in this *emic* classification of diseases introduced in Section 5.3.3. By means of the free-listing and pile-sort techniques, the

classification of the diseases reported by the community members to have prevailed in the previous 12 months has been set into a classification of ten clusters: 'Brain', 'Coughing', 'External', 'Fever', 'Head/throat', 'Internal system', 'Intestines/stomach', 'Organs', 'Restricted movement' and 'Skin'. The quantitative analyses, presented in Section 5.3.3 indicate that more than half of the respondents in each disease cluster reported having used MAC plants for the reported disease, except in the case of the unspecified disease cluster 'Other', in which fewer than half of the respondents (40%) reported having used MAC plants. Specifically high are the percentages of use for the diseases clusters, 'Organs' (86.4%), 'Internal (system)' (85.2%) and 'External' (80%). By far the lowest reported use of MAC plants is for 'Brain' and 'Skin' diseases. Analysis showed no significant difference in gender between the users and non-users of MAC plants for curative, preventive or promotive health care. However, in the case of age groups, there is a fifty-fifty division between users and non-users in the two groups under twenty-six years old and three-quarters of each of the two age groups above twenty-five years old reported being users. Various respondents reported that in the case of disease or sickness of young children, especially when they are still *balita* (children under five years old), they are usually taken directly to a representative of modern medicine for treatment. This is not apparent in the data, which shows that 46.4% of *balita* (N=138) are non-users versus 53.6% users of MAC plants. Even when concentrating only on the curative use of MAC plants, 48.6% of the *balita* still use MAC plants. Overall there was a very high plant utilisation of MAC plants reported among the community members for curative, preventive and promotive reasons.

Fifthly, the Balinese community members' knowledge of, beliefs in and practices with fresh MAC plants in relation to the sustainable use of these plants substantiating the biodiversity conservation of the island are described and analysed in Section 6.1. In this study biodiversity conservation refers to the multi-disciplinary practices intended to protect and manage the MAC plant diversity in terms of genes, species and ecosystem preservation in order to avoid a decline in biodiversity. In 1992, leaders of all Southeast Asian countries, including Indonesia, signed the Convention on Biological Diversity, thereby acknowledging the importance of the environment and signalling their intention to participate in the international quest for sustainable development (*cf.* Martin & Idrus 1998). Theoretically, the ever-expanding and improving legislation passed by the Indonesian government directly influences all its provinces including Bali and demonstrates its intention to change the awareness of the strategic value of biodiversity to sustainable economic development. In practice, it transpires that the various sectoral policies on biodiversity management in forestry, agriculture, and environment have experienced great difficulty with the planning and implementation of the Convention of Biological Diversity. Nevertheless, as evident in Section 6.1.1, in all the sample villages except for Bengkel, the community members perceived a high or even very high impact of the government in relation to the biodiversity conservation. The highest scoring occurred in Tumbu and Pelapuan, both located in forest areas where seasonal water supplies are problematic. As these are two topics which are pertinently addressed by the government, this might explain the perception of the respondents.

As illustrated in Section 6.1.2, the majority of the respondents report the finding-place of MAC plants to be 'very close'. The proximity of the MAC plants indicates that they are probably cultivated in people's own gardens. Overall, it can be concluded that there is a consensus among the Balinese community members that MAC plants are not available in large numbers in their direct surroundings. Most remarkably, ninety respondents (22.5%) had no idea of the number of MAC plants to be found in the forest, and forty-six respondents

(10.5%) had no idea of the number of MAC plants to be found in the village, which indicates either a true absence of knowledge or a very low interest in or affinity with non-cultivated MAC plants, since all the other finding-places, the *ladang*, *sawah* and gardens are cultivated areas. A herbal specialist in Tumbu confirmed this statement by saying that the people of his village had used MAC plants more often in the past than they currently do and that his fellow villagers have no awareness at all that some plants with which they are acquainted are in fact MAC plants and that several MAC plants which used to be applied have disappeared.

Unquestionably, as documented in Section 6.3.3, the use of MAC plants forms an enrichment in the strengthening of community health and since these practices substantiate the 'inextricable link' between biodiversity and cultural diversity. They can support the conservation of the beliefs and knowledge which are the basis of the utilisation of MAC plants. The threats to MAC plant utilisation lies at the individual level, at which the incorrect use of MAC plants causes safety and efficiency concerns. Secondly, the quality of MAC plants is difficult to control as a consequence of the complex interaction of the numerous variables involved in both the growing and the processing period. In Bali and in the whole of Indonesia, the language situation means that plant identification by laymen is complicated. Biologically, the possible threats to the application of MAC plants are even more dramatic. There are numerous of examples of world forests being depleted at an alarming rate by business concerns, causing habitat or ecosystems destruction and over-exploitation because of the popularity of MAC plants.

In Section 6.3.3, all 168 MAC plants named in the household interview have been cross-checked with the IUCN Red List. Seven MAC plants named in the household interview are incorporated into this list. *Jebug garum* (*Myristica fragrans* Houtt.) received the label data deficient, meaning there is inadequate information to make a direct or indirect, assessment of its extinction risk on the basis of its distribution and/or population status. More information is required and the threatened classification is not yet appropriate. The six other MAC plant names, five species, are on the IUCN Red List and received one of the seven IUCN categories. All other named MAC plants are not on the IUCN list; therefore they have not yet been evaluated against the criteria, nor indeed even studied in order to receive the category data deficient. Three species were categorised least concern (LC), therefore are currently not under threat namely: *kayu tulang* or *tujuh ulang* (*Euphorbia tirucalli* L.), *pule* (*Alstonia scholaris* (L.) R. Br.), and *delima putih* (*Punica granatum* L.). Two were categorised as vulnerable (VU) and are considered to be facing a high risk of extinction in the wild: *cendana* (*Santalum album* Linn.) and *mahoni* (*Swietenia macrophylla* King). In the household interview, *cendana* is reported to be known and used by the household members. The reports on use of both of these species were very low. *Mahoni*, introduced to Bali, was only known to be a MAC plant but no use was reported. In conclusion, it can be stated that the two species marked as vulnerable (VU) on the IUCN Red List are not in great demand as MAC plants freshly administered for self-treatment. However, it was not in the scope of this research to examine the demand of these two species in the industrial herbal products industry. *Cendana* and *mahoni* are both very popular timbers, in great demand for carpentry and related applications. *Cendana*, also known as sandalwood, is best known and is much sought-after for its aromatic substances, since it is a very popular scent used in many applications.

Sixthly, the Balinese community members' knowledge of, beliefs in and practices with MAC plants in relation to the preservation of the cultural diversity in Bali are described and analysed in Section 6.2. Indonesia celebrates its cultural diversity in its national motto: 'Unity in Diversity'. Although a seemingly open concept, it is narrowed down in its application.

Some cultural forms seem to be more exposed, or if an evaluation is made, more appreciated than others. In the Balinese case, *the* Balinese are indeed the majority Hindu population of Bali. These Balinese refer to other indigenous groups in the island from whom they are not descended as the original Balinese, called *Bali Aga* (Mountain Balinese) or *Bali Mula* (Original Balinese); a distinction usually unnoticed at a national level. In relation to the wider context of the Republic of Indonesia, the largest Muslim country in the world, the Hindu Balinese are themselves a minority.

Languages are considered one of the major indicators of cultural diversity. Mainly for practical reasons, Indonesia has introduced one language, *Bahasa Indonesia*, to be learned by all in order to facilitate communication between the different original languages; estimates of the number of languages spoken range from 440 to 742. Balinese is marked by courtesy levels and a wide variety of regional dialects. Today only a few Balinese actually master all courtesy levels. A kind of middle language, common modern Balinese, is used which can be considered a compromise between two courtesy levels. Moreover, under various circumstances, either geographical areas such as working-places where different Indonesian ethnicities work together or fields of expertise, specifically education and health care facilities, Indonesian, not Balinese, is almost always used as a means of communication.

The cultural conservation of MAC plants, revealed in Section 6.2.2, lies in the conservation of the patterns of resources use and management developed by the Balinese: in their Traditional Ecological Knowledge (TEK) system in the broader sense and in their ethno-botanical knowledge systems (EKS) focusing on the plants. Cultural conservation is encapsulated in the Knowledge-Belief-Practice complex. Maintaining a cultural heritage requires the transference of knowledge and beliefs and its operationalisation in practice. Maffi (1999) warns that if the younger generation has not found a way to contain the knowledge, belief and practices previously preserved in the local languages, carriers of cultural and social expertise, will disappear. This will lead directly to the loss of the (intrinsic) knowledge captured in the language. Conservation of the language is only one way of conservation. What is most essential is that a culture is aware of the necessity to transfer the content of languages or valuable local knowledge, belief and practices, including those related to health and healing practices so these will not be lost.

As Section 6.2.2 illustrates, several projects are working on trying to conserve the written sources about the applications of plants for health and healing. Some copy the original *lontar* by hand or prepare them for digitalisation, but there are also those who work on translations in order to spread the knowledge and make it widely available among the community members. In essence, this second practice of conservation especially signals an alteration in form, content and the context of the original texts. Here lies a paradox in the cultural conservation of MAC plant knowledge described in the *lontar*. By rewriting this knowledge, it is removed from its context. Balinese traditions require a person to be spiritually ready to read the *lontar*. The Balinese believe that a person not prepared should not be involved in this particular knowledge. This is similar to the complexity of the conservation of the knowledge of the *balian* since this is a vocation, not a learned profession. The active conservation by transferring the knowledge on MAC plants in relation to the Balinese belief system, including the relation to the *tri hita karana* principle and Balinese cosmology preserved in the *lontar* and by *balian* as well as *pemangku*, *pedande* and other traditional ‘scholars’ by, for instance, an active search for students, is not part of Balinese culture.

Tourism is often indicated as the strongest negative force connected to globalisation and the materialisation of present-day societies, disrupting the Balinese identity, thereby incurring a loss of cultural diversity in the area. Section 6.3.2 sums up the major threats of tourism,

although different impacts can be assigned to the five types of tourism. These threats are the increased competition for the use of natural resources, specifically land, water and natural building materials, misuse of public funds for tourist development programmes instead of community-oriented programmes, the ‘feeding’ of such illegal circuits as prostitution and drug use, the violation of long-standing customary taboos or modern conservation regulations and the southward migration of ‘drop-out’ farmers. Nevertheless, as Section 6.3.2 illustrates, tourism also brings enrichments to the island. The obvious cash flow gives an economic boost and generates money to maintain such places of interest as temples and historical sites and keeps them accessible to the Balinese themselves. Less visible tourism has stimulated the diversification and improvement of agricultural products.

The foreign interest in the Balinese traditional medical system affects the perceived value and use of MAC plants positively. Nevertheless, the negative aspects of tourism overshadows the positive in both number and gravity. However, it should be questioned whether it is truly ‘tourism’ which causes all these negative aspects. Is there perhaps a shift in the Balinese culture and thinking or veiled socio-economic or socio-cultural inequalities which make the Balinese ‘allow’ these radical changes to happen? Change itself is not a determinant for the loss of cultural diversity, since cultures are dynamic concepts; traditions are renewed and recaptured by each generation when taking over the cultural inheritance from those preceding. Nevertheless, it is essential that change occurring in a society is initiated or at least consciously handled by the community members themselves and not by external agents; the latter leads to the replacement or even to the annihilation of cultural strains, practices, morals or values. In public scientific and communal debates, the Balinese actively monitor the essence of being Balinese. This does not signal a striving for conformism. The concept of *desa-kala-patra* leaves room for cultural difference in place, time and cultural pattern.

Seventh and lastly, the interrelationships of the various categories of factors are analysed, identifying the interaction among the various factors of the Balinese community members’ utilisation and bio-cultural diversity conservation of MAC plants in Chapter 7. The Ethnosystems Approach has produced a more realistic way of documenting and analysing the local systems on the basis of empirically measurable criteria. The multivariate conceptual model makes it possible to assess the rather complicated bio-cultural diversity conservation behaviour of respondents as one integrated complex of human-environment relationships and interactions connecting the individual to the system level, supported by the multivariate analyses presented in Section 7.2.

The multivariate OVERALS analysis presented in Section 7.2.2, identified seven strong variables on the first or the second dimension in the OVERALS solution: ‘Village’, ‘Caste’, ‘BeliefMMS’, ‘IncomeHH’, ‘RepDisease’, ‘Government’ and ‘Overuse’. The variables IncomeHH and RepDisease, both strong variables in the total OVERALS solution, are situated in a different quadrant to the dependent variables indicating that, although both these variables are strong in the total solution of MAC plant utilisation and bio-cultural diversity conservation, there is no direct relationship between these two variables and the dependent variables. The variables ‘Caste’ and ‘BeliefMMS’ are strong in the OVERALS analysis with a correlation to ‘CultMAC’. The higher the caste, the higher the cultural conservation level, thereby confirming the indicated involvement of the higher caste in the historical conservation of such knowledge as the conservation of knowledge on MAC plants in the *lontar* by the priest and *balian* and their more highly active involvement in the *kebalian* discussion which the goal is the conservation of Balinese-ness, including traditional knowledge systems. It is remarkable that a strong belief in the modern medical systems corresponds to a high cultural

diversity conservation behaviour. However, this does make sense, considering that most Balinese as others worldwide recognise the shortcomings of the modern medical system and therefore take an active approach towards the conservation of knowledge of, beliefs in and practices with MAC plants in the hope that modern medicine might be able to distil new or improved practices from this knowledge.

The other three variables, 'Overuse', 'Government' and 'Village', not only emerged as strong variables in the total OVERALS analysis but also in the bivariate and multiple regression analysis presented in Section 7.2.1 and Section 7.2.3 respectively. The relationship found in the solution between 'Government' and the dependent variables 'BioMAC' and 'UseMAC' was that a marked perception impact of the government on MAC plant utilisation and bio-cultural diversity conservation results in the opposite behaviour: low utilisation of MAC plants. The majority of the respondents perceived the impact of the government as positive. This positive impact can be understood as the cautious utilisation of MAC plants, bearing in mind safety and quality issues incorporated in the government policies, resulting in a lower utilisation. The negative relationship between 'Government' and 'BioMAC' indicates that the Balinese will take matters into their own hands and demonstrate high biodiversity conservation behaviour if they perceive a low impact by the government.

As expected, 'Village' emerged as one of the strong factors in all analyses. In practical terms, the 'Village' represents someone's bio-cultural diversity surroundings. Each of the villages is selected in a different geographical area, thereby marking a difference in their biological surroundings but not among them. The *desa kala patera* principle means that there is a broad acceptance in the Balinese culture that each village will have its own cultural pattern. The OVERALS analysis also revealed the 'inextricable link' between biodiversity and cultural diversity conservation behaviour documented by the interrelationship in the solution of AwareCult and the dependent variables UseMAC and BioMAC. In the analyses, it is affirmed that the knowledge and awareness of biodiversity conservation of MAC plants obviously have a positive effect on the use and biodiversity conservation of MAC plants. The high correlation between the variables BeliefTHK and CultMAC reconfirms the important role of the Balinese Hindu principle of *tri hita karana* for the utilisation and bio-cultural diversity conservation of MAC plants.

From the multiple regression analysis presented in Section 7.2.3, it can be concluded that the 'Institutional factors' obtrude as the strongest block of factors influencing the dependent factors. Therefore, the block of dependent variables is most strongly influenced by the variables 'Awareness of local institutions linked to MAC plant use', 'Awareness of institutions linked to biodiversity of MAC plants' and 'Awareness of institutions linked to cultural diversity of MAC plants'. Individually these variables did not stand out as strong variables in any of the other analyses. In the bivariate analyses, it was impossible to establish whether there was a significant association between the institutional variables and the dependent variables on the basis of the Pearson's Chi-square values and the values of Spearman's Rho which indicated a weak direct relationship. In the OVERALS analyses, the institutional variables emerged as displaying moderate strength. However, since the institutional variables cover the strongest interrelationship with all the other variables and blocks of factors influencing the Balinese community members' behaviour, they are the strongest indicators of the dependent factors. The second strongest block factor in the multiple regression analysis is the psycho-social factor, thereby affirming that such so-called 'invisible' factors as belief systems and local philosophies of nature and environment play a determining role in forming the Balinese community members' MAC plant utilisation and the bio-cultural diversity conservation of MAC plants.

8.2 Implications

8.2.1 Theoretical and Methodological Implications

This study makes a further contribution to the theory development of the multi-disciplinary fields of medical anthropology, ethno-science, bio-cultural diversity and sustainable development. It provides more documentation and argumentation which assist in the perception of the practical, problem-solving indigenous knowledge part of the Traditional Ecological Knowledge (TEK), demonstrating that it is more than merely 'common knowledge'. It is scientific since the data are empirical, experimental and systematic and consequently compatible with global science. They bridge the artificial gap between 'scientific' knowledge and 'traditional' knowledge. As illustrated in Section 6.3.1, the results underscore the importance which the Balinese cosmovision - specifically, the *tri hita karana* principle and such 'invisible' belief factors as belief systems and local philosophies of nature and environment - has on the utilisation and bio-cultural diversity conservation of MAC plants in the complex interaction of the blocks of factors of the ethno-botanical/medical-anthropological processes influencing the Balinese community members' behaviour.

On the basis of the empirical data collected by complementary qualitative and quantitative research techniques in four sample villages in what is known as the Balinese cradle of life, the utilisation of MAC plants is placed realistically in its pluralistic medical configuration, showing that the utilisation of fresh MAC plant for health and healing practices transcends the boundaries of the knowledge and belief systems pertaining to one single medical system. The lay corpus-cosmos-praxis or knowledge-practices-belief, which combines theories and approaches from the main medical systems into an integrated whole, legitimising the utilisation of MAC plants in the medical pluralistic situation, is substantiated by the *emic* classification of MAC plants and the *emic* classification of diseases.

In this study, the community members' decision making and illness behaviour are placed in the framework of the general theory of illness behaviour: the five-stage model of medical care course devised by Suchman (1965) and Kohn & White's model (1976b), encompassing the continuous adaptations in the individual actions undertaken to remedy the situation based on perceived morbidity in the social and personal system of the specific case of utilisation of MAC plants for promotive, preventive or curative health care. Decisions made in the medical care process depend mainly on the perceived morbidity and such so-called 'invisible' factors as the alleged burden of disease, the *emic* disease classifications, the alleged aetiology, the use-value, norms, myths, taboos and cosmology (*cf.* Leakey & Slikkerveer 1991a). Regardless of the decision to seek no medical contact, self-treatment or a specific health care provider in the medical pluralistic situation, the illness behaviour is unmistakably connected to the understanding of how the Balinese classify illness, since illness beliefs, behaviour and health care activities are interrelated.

The methodological implications are closely related. The goal of medical anthropological research is the comprehensive description and interpretation of the bio-cultural interrelationships between human behaviour, past and present, and health and disease levels. The methodology used in this study, the Ethnosystems Approach, allows such a comprehensive description. This study uses the ethno-scientific analysis of the medicinal plant resource perception and use in the context of action-related decisions made by local Balinese people in real-life situations as a general approach. This approach generates new information about the factors related to the ethno-botanical/medical-anthropological processes operating in the socio-medical environment of Balinese communities, obviously linking the bio-cultural interrelationships between human behaviour to the biological systems around them and to the

biological system they represent. The application of the Ethnosystems Approach and the multivariate conceptual model defined in this study also substantiate the concept of 'Evidence-Based Bio-Cultural Conservation' which promotes the selection, analysis, understanding, evaluation and integration of meaningful and applicable evidence of bio-cultural management and conservation into community development activities. Building on the work of the conservation of medicinal plants by Akerele, Heywood & Synge (1991) and Bodeker *et al.* (1997), the bulk of the theoretical orientation for this model has been provided by Martin (1994; 1995), who focuses on the complex issues related to the convergence of ethno-botany and conservation in the global people and plants initiative of WWF, UNESCO and Kew, in his perspective on ethno-botany, health care and biodiversity conservation.

The study also endorses the conceptual model as a suitable instrument to document, study and analyse social behaviour and contribute to the refining of the structuring of the translation of the model into measurable indicators and to the analysis of the quantitative data using both bivariate and multivariate analyses. The bivariate analyses clarified that, although some relationships are significant and do partially confirm the expectations, there are no strong one-to-one relationships between any one of the independent or intervening variables and one of the three dependent variables. Obviously the bivariate analysis can give no strong relational analyses of the Knowledge-Belief-Practice complex. Discussing some of the bivariate analyses in more detail, it became apparent that, although relationships are established, additional data is necessary to explain them. The bivariate analysis reconfirms that the behaviour of the community members related to the various variables documented in the conceptual model has to be supported by multivariate analyses able to document the interrelationship in the blocks of factors of the multivariate model, giving more insight into the community members' utilisation and bio-cultural diversity conservation of MAC plants.

8.2.2 Practical Implications

The practical implications of the study include the identification of factors which strongly contribute to the utilisation of MAC plants and bio-cultural diversity conservation of MAC plants from a community members' perspective as presented in the conclusions. Besides the reconfirmation of the role of such so-called 'invisible' factors as belief systems and local philosophies of nature and environment, in the multiple regression analysis it emerged that the institutional factors 'Awareness of local institutions linked to MAC plant use', 'Awareness of local institutions linked to biodiversity of MAC plants' and 'Awareness of local institutions linked to cultural diversity of MAC plants' heavily influence the dependent variables, since they have such strong multiple correlation co-efficients with all the other block of factors. It is extremely useful to document and study this relationship in more detail since it means that creating awareness of the existence of institutions can influence the Balinese community members' behaviour. However, the direction of this influence, positive or negative, can diverge according the interrelationship of the variables. Therefore, greater differentiation will have to be made in order to analyse whether there are direct relationships between characteristics of the institutions and the affect of their awareness on the utilisation and bio-cultural diversity conservation of MAC plant. Similarly, a deeper investigation will have to be made into whether, as a result of the existence of the negative relationship between 'Government' and 'BioMAC', the Balinese community will desist from its biodiversity conservation behaviour if government policies become more exigent; hopefully an unlikely outcome since it is highly undesirable considering the imminent biodiversity crisis.

Overall, there was a high report of MAC plant utilisation among the community members for curative, preventive and promotive reasons. However, from the reports it is impossible to

deduce whether the use of the MAC plants for the disease reported is exclusive utilisation, complementary utilisation to other treatments or for secondary symptoms or to ease discomfort during the disease episode. Today, the application of plants for health and healing is part of the self-reliance perspective of the Indonesian government. The Balinese Ministry of Health even has a separate department dedicated to traditional medicine: the Unit Pelaksana Teknis Daerah Balai Pengembangan Obat Tradisional dan Kesehatan Olah Raga Masyarakat (UPID. B. POI. KOM). The ministry is actively involved in the monitoring information about medicinal plants. Information on the use of medicinal plants and herbal products is integrated into the instruction manuals for *kader* women, publications on home remedies and community health care and, not least, into the practical TOGA programme. The TOGA programme falls under the aegis of the Department of Nutrition but is often incorporated into the PROMKES programme; the promotive health care programme (*PROMosi KESehatan*). Although it is a mandatory program, each *puskesmas* and PKK decides for itself the intensity of time and money it wants to spend on the programme. Community members have to care for the TOGA gardens in their communities or houses; the Ministry of Health bears the educational and promotive responsibility for TOGA and the plants used. Each of the four *puskesmas* responsible for one of the sample villages did indeed have a TOGA, however the educational function of the gardens is fast diminishing and the publications are becoming out-dated. Furthermore, the TOGA programme does indeed plant medicinal plants in the gardens of the Balinese community members but variation is low and, because these plants are cultivated in the vicinity, it is unclear whether in the long term this will not result in a greater distancing of community members' broader knowledge and management of the MAC plants diversity in terms of genes, species and ecosystems preservation.

More specifically, because of the multi-language situation in Bali, the decline in face-to-face information transferral and the rise in the popularity of MAC plants, as a consequence of the 'back-to-nature' trend, more intensive education will be necessary about the efficacy, quality and safety of the use of plants for health and healing practices. This is an attempt to respect the wide variety of possible applications, since generally a single MAC plant can be applied to treat more than a single symptom. For example, the *curcuma* genus (*temu-temuan*) of the Zingiberaceae family has a wide range of applications and, besides the home-use, several trials are currently being conducted to use the plants in a modern medical setting. Not least, community members should become aware of the possible side-effects of MAC plants and they should be able to recognise the right species. Therefore, a strict recommendation should be made to include in all forthcoming publication about MAC plants, especially those directed at home use without interference or consultation of an herbal expert, a reference to the botanical or scientific names of plants with preferably indisputable photographic identification on the basis of the local or vernacular names of plants. The Ministry of Health should check, at least sample-based, the correctness of the link between the local names and scientific names and also add them in its own publications and the national regulations should be implemented more strictly to protect those species in trouble. In conclusion, it can be said that, although the application of MAC plants is an enrichment of community health, legislation and policies should be directed towards preventing MAC plant utilisation becoming a threat to either human health or biodiversity in Bali.

This study acknowledges the 'inextricable link' between nature, society, language and culture, conceptualised in the term bio-cultural diversity, expressing the relationship between biological and cultural diversity affirmed in the Declaration of Belém (1988). Today, the stark fact of the enormous, rapid extinction of the biodiversity of plant and animal species poses a threat to the eventual survival of humankind. However, even more alarming is the loss of

cultural diversity in terms of disappearing traditional knowledge and, relevant to the topic of this study, the traditional knowledge of MAC plants, which in some cases seems to surpass the loss of the plant species themselves. The *tri hita karana* principle fulfils and will fulfil a great role in community resource management, which includes the social, cultural and economic aspects of the community, because the content of the *tri hita karana* principle is both familiar to and ‘makes sense’ to the Balinese. In order to be successful, community resource-management programmes and initiatives should concentrate on reinforcing the local institutions, including the *desa/banjar adat*, *subak*, *pura* and *seka*. It is believed that achieving such community resource-management would revive the *gaya* (powerful, energetic) way of local living, thereby making optimal use of the local potential and resources. In relation to the bio-cultural diversity behaviour of community members towards MAC plants and the island of Bali in general, there is extensive documentation showing that numerous community members are willing to assume their responsibility to safeguard the future for the next generation. However, future development and implementation plans for new directives on sustainability and sustainable development must always take the economic situation of the area into consideration and implement programmes as much as possible bottom-up instead of top-down. There are numerous good initiatives among the community members, therefore new legislation and policy development, if possible also funding, should be directed towards creating space for these community initiatives to grow. If so, in the spirit of *tri hita karana* and *desa kala patera* the Balinese can contribute to the conservation of the bio-cultural diversity of the island without conformism, celebrating their Unity in Diversity.

Appendix I: Declaration of Alma Ata (1978)

International Conference on Primary Health Care , Alma-Ata, USSR, 6-12 September 1978

The International Conference on Primary Health Care , meeting in Alma-Ata this twelfth day of September in the year Nineteen hundred and seventy-eight, expressing the need for urgent action by all governments, all health and development workers, and the world community to protect and promote the health of all the people of the world, hereby makes the following

Declaration:

I

The Conference strongly reaffirms that health, which is a state of complete physical, mental and social wellbeing, and not merely the absence of disease or infirmity, is a fundamental human right and that the attainment of the highest possible level of health is a most important world-wide social goal whose realization requires the action of many other social and economic sectors in addition to the health sector.

II

The existing gross inequality in the health status of the people particularly between developed and developing countries as well as within countries is politically, socially and economically unacceptable and is, therefore, of common concern to all countries.

III

Economic and social development, based on a New International Economic Order, is of basic importance to the fullest attainment of health for all and to the reduction of the gap between the health status of the developing and developed countries. The promotion and protection of the health of the people is essential to sustained economic and social development and contributes to a better quality of life and to world peace.

IV

The people have the right and duty to participate individually and collectively in the planning and implementation of their health care .

V

Governments have a responsibility for the health of their people which can be fulfilled only by the provision of adequate health and social measures. A main social target of governments, international organizations and the whole world community in the coming decades should be the attainment by all peoples of the world by the year 2000 of a level of health that will permit them to lead a socially and economically productive life. Primary Health Care is the key to attaining this target as part of development in the spirit of social justice.

VI

Primary Health Care is essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination. It forms an integral part both of the country's health system,

of which it is the central function and main focus, and of the overall social and economic development of the community. It is the first level of contact of individuals, the family and community with the national health system bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process.

VII

Primary Health Care :

1. reflects and evolves from the economic conditions and sociocultural and political characteristics of the country and its communities and is based on the application of the relevant results of social, bio-medical and health services research and public health experience;
2. addresses the main health problems in the community, providing promotive, preventive, curative and rehabilitative services accordingly;
3. includes at least: education concerning prevailing health problems and the methods of preventing and controlling them; promotion of food supply and proper nutrition; an adequate supply of safe water and basic sanitation; maternal and child health care , including family planning; immunization against the major infectious diseases; prevention and control of locally endemic diseases; appropriate treatment of common diseases and injuries; and provision of essential drugs;
4. involves, in addition to the health sector, all related sectors and aspects of national and community development, in particular agriculture, animal husbandry, food, industry, education, housing, public works, communications and other sectors; and demands the coordinated efforts of all those sectors;
5. requires and promotes maximum community and individual self-reliance and participation in the planning, organization, operation and control of Primary Health Care , making fullest use of local, national and other available resources; and to this end develops through appropriate education the ability of communities to participate;
6. should be sustained by integrated, functional and mutually supportive referral systems, leading to the progressive improvement of comprehensive health care for all, and giving priority to those most in need;
7. Relies, at local and referral levels, on health workers, including physicians, nurses, midwives, auxiliaries and community workers as applicable, as well as traditional practitioners as needed, suitably trained socially and technically to work as a health team and to respond to the expressed health needs of the community.

VIII

All governments should formulate national policies, strategies and plans of action to launch and sustain Primary Health Care as part of a comprehensive national health system and in coordination with other sectors. To this end, it will be necessary to exercise political will, to mobilize the country's resources and to use available external resources rationally.

IX

All countries should cooperate in a spirit of partnership and service to ensure Primary Health Care for all people since the attainment of health by people in any one country directly concerns and benefits every other country. In this context the joint WHO/UNICEF report on Primary Health Care constitutes a solid basis for the further development and operation of Primary Health Care throughout the world.

X

An acceptable level of health for all the people of the world by the year 2000 can be attained through a fuller and better use of the world's resources, a considerable part of which is now spent on armaments and military conflicts. A genuine policy of independence, peace, détente and disarmament could and should release additional resources that could well be devoted to peaceful aims and in particular to the acceleration of social and economic development of which Primary Health Care , as an essential part, should be allotted its proper share. The International Conference on Primary Health Care calls for urgent and effective national and international action to develop and implement Primary Health Care throughout the world and particularly in developing countries in a spirit of technical cooperation and in keeping with a New International Economic Order. It urges governments, WHO and UNICEF, and other international organizations, as well as multilateral and bilateral agencies, nongovernmental organizations, funding agencies, all health workers and the whole world community to support national and international commitment to Primary Health Care and to channel increased technical and financial support to it, particularly in developing countries. The Conference calls on all the aforementioned to collaborate in introducing, developing and maintaining Primary Health Care in accordance with the spirit and content of this Declaration.

Appendix II: Declaration of Belém (1988)

Leading anthropologists, biologists, chemists, sociologists and representatives of several indigenous populations met in to discuss common concerns at the First International Congress of Ethnobiology and to found International Society of ethnobiology.

Major concerns outlined by conference contributors were the study of the ways that indigenous and rural populations uniquely perceive, utilize, and manage their natural resources and the development of programs that will guarantee the preservation of vital biological and cultural diversity.

This declaration was articulated.

As ethnobiologists, we are alarmed that:

SINCE

- Tropical forests and other fragile ecosystems are disappearing;
- Many species, both plant and animal, are threatened with extinction;
- Indigenous cultures around the world are being disrupted and destroyed.

AND GIVEN

- That economic, agricultural and health conditions of people are dependent on these resources;
- That native people have been stewards of 95% of the world's genetic resources, and
- That there is an inextricable link between cultural and biological diversity.

WE, MEMBERS OF THE INTERNATIONAL SOCIETY OF ETHNOBIOLOGY STRONGLY URGE ACTIONS AS FOLLOWS:

- Henceforth, a substantial proportion of development aid must be covered to efforts aimed at ethnobiological inventory, conservation, and management programs;
- Mechanisms be established by which indigenous specialists are recognized as proper Authorities and are consulted in all programs affecting them, their resources, and their environments;
- All other inalienable human rights be recognized and guaranteed, including cultural and linguistic identity;
- Procedures must be developed to compensate native peoples for the utilization of their knowledge and their biological resources;
- Educational programs must be implemented to alert the global community to the value of ethnobiological knowledge for human well-being;
- All medical programs include the recognition of and respect for traditional healers and the incorporation of traditional health practices that enhance the health status of these populations;
- Ethnobiologists make available the results of their research to the native peoples with whom they have worked, especially including dissemination in the native language;
- Exchange of information should be promoted among indigenous and rural peoples regarding conservation, management, and sustainable utilization of resources.

----Belem, Brazil, July 1988----

Appendix III: The Chiang Mai Declaration (1988)

We, the health professionals and plant conservation specialists who have come together for the first time at the WHO/IUCN/WWF International Consultation on Conservation of Medicinal Plants, held in Chiang Mai, 21-26 March 1988, do hereby reaffirm our commitment to the collective goal of 'Health for All by the Year 2000' through the Primary Health Care approach, and to the principles of conservation and sustainable development outlined in the World Conservation Strategy.

We:

Recognize that medicinal plants are essential in Primary Health Care , both in self-medication and in national health services.

Are alarmed at the consequences of loss of plant biodiversity around the world.

View with grave concern the fact that many of the plants that provide traditional and modern drugs are threatened.

Draw the attention of the United nations, its agencies and Member States, other international agencies and their members, and non-governmental organizations to:

- the vital importance of medicinal plants in health care ;
- the increasing and unacceptable loss of these medicinal plants due to habitat destruction and unsustainable harvesting practices;
- the fact that plant resources in one country are often of critical importance to other countries;
- the significant economic value of the medicinal plants used today and the great potential of the plant kingdom to provide new drugs;
- the continuing disruption and loss of indigenous cultures, which often hold the key to finding new medicinal plants that may benefit the global community;
- the urgent need for international co-operation and co-ordination to establish programmes for conservation of medicinal plants to ensure that adequate quantities are available for future generations.

We, the members of the Chiang Mai International Consultation, hereby call on all people to commit themselves to Save The Plants, That Save Lives.

Chiang Mai Tailand, 26 March 1988

Source: Akerele, O., V.H. Heywood, & H. Synge (1991) *The Conservation of Medicinal Plants*. Cambridge University Press.

Appendix IV: Leipzig Declaration (1996)

Leipzig Declaration on Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture

1. In recognition of the essential importance of plant genetic resources for food and agriculture, in particular for the food security of present and future generations, the representatives of one hundred and fifty States and fifty four Organizations have gathered together in Leipzig, at the invitation of the Food and Agriculture Organization of the United Nations, at the Fourth International Technical Conference for Plant Genetic Resources. We have done so to assert and renew our commitment to the conservation and sustainable utilization of these resources and to the fair and equitable sharing of the benefits arising from the use of plant genetic resources for food and agriculture, recognizing the desirability of sharing equitably benefits arising from the use of traditional knowledge, innovations and practices relevant to the conservation of plant genetic resources for food and agriculture and their sustainable use. We are convinced that these efforts can be an essential contribution to achieving the objectives, and facilitating implementation of, the Convention on Biological Diversity and Agenda 21.

2. Recognizing that states have sovereign rights over their plant genetic resources for food and agriculture, we also confirm our common and individual responsibilities in respect of these resources.

3. These resources are the basis of natural and directed evolution in the plant species most critical to the survival and well-being of human beings. All countries require plant genetic resources if they are to increase food supplies and agricultural production sustainably and meet the related challenges of changes in the environment, including climate change. We are conscious of the intrinsic value of this biological diversity and of its ecological, social, economic, scientific, educational, cultural, and aesthetic importance.

4. Plant genetic resources for food and agriculture are the product of natural evolution and human intervention. We acknowledge the roles played by generations of men and women farmers and plant breeders, and by indigenous and local communities, in conserving and improving plant genetic resources. Through their efforts, much has been, and is still being, accomplished to collect, conserve, improve and sustainably use plant genetic resources for food and agriculture.

5. We are aware, however, of the serious threats to the security of plant genetic resources and acknowledge that efforts to conserve, develop, and sustainably use genetic diversity should be improved. This diversity is being lost in the fields and other ecosystems of virtually all countries, even in genebanks. Though the number of genebanks has Leipzig Declaration increased rapidly in recent decades, many cannot meet minimum international standards. An alarmingly high number of stored accessions are in need of regeneration, indicating that much of the material collected and conserved in the past is now endangered.

6. Major gaps and weaknesses exist in national and international capacity to conserve, characterize, evaluate, and sustainably use plant genetic resources to increase world food security and contribute to sustainable development. The crucial linkage between conservation and utilization should be improved. Existing diversity in crop species is not used to the extent possible for increased food production or for improving the sustainability of production systems. Institutional capacity, structures and programmes should be reviewed to address these deficiencies. It is necessary to strengthen national capabilities, particularly in developing countries.

7. We recognize the interdependence of countries and peoples regarding plant genetic resources for food and agriculture. Access to and the sharing of both genetic resources and technologies are essential for meeting world food security and needs of the growing world population, and must be facilitated. Such access to and sharing of technologies with developing countries should be provided and/or facilitated under fair and most favourable terms, including on concessional and preferential terms, as mutually agreed to by all parties to the transaction. In the case of technology subject to patents and other intellectual property rights, access and transfer of technology should be provided on terms which recognize and are consistent with the adequate and effective protection of intellectual property rights. We affirm the need to promote international and regional cooperation among countries, intergovernmental organizations, non-governmental organizations, and the private sector.

8. In particular, we acknowledge the pressing need to sustain existing ex situ collections and in situ habitats of plant genetic resources. It is important that this diversity be made more useful and valuable to breeders, farmers, and indigenous and local communities, by providing better and more accessible documentation. We recognize the need for substantial and long-term support and incentives for national and international plant breeding programmes, including initiatives to adapt and enhance genetic materials for further development by plant breeders. We call for a new and more productive partnership between scientists and farmers to build upon the ongoing efforts of farmers to manage and improve their plant genetic resources, especially in marginal areas.

9. Our primary objective must be to enhance world food security through conserving and sustainably using plant genetic resources. This will require integrated approaches combining the best of traditional knowledge and modern technologies. Means are needed to identify, increase, and share fairly and equitably the benefits derived from the conservation and sustainable use of plant genetic resources.

10. At the Fourth International Technical Conference for Plant Genetic Resources, to help fulfil our objectives, we have adopted a Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. This Plan provides a coherent framework for activities in the field of in situ and ex situ conservation, in sustainable utilization of plant genetic resources, as well as in institution- and capacity building. It will contribute to creating synergies among on-going activities, as well as more efficient use of available resources. We are convinced of the utmost importance of long-term national commitments to integrated national plans and programmes, and for indispensable national, regional and international cooperation.

11. This Global Plan of Action is an important element of the FAO Global System for Conservation and Utilization of Plant Genetic Resources. The Global System presently includes, amongst other elements, an International Undertaking on Plant Genetic Resources currently under revision. We believe it important to complete the revision of the International Undertaking on Plant Genetic Resources and to adjust the Global System, inline with the Convention on Biological Diversity.

12. We undertake to honour our commitments by taking the necessary steps to implement the Global Plan of Action in accordance with our national capacities.

13. We have gathered in Leipzig, aware of our responsibilities and the difficulties ahead, but confident that progress can and should be achieved. We stress the need for integrating the conservation and sustainable use of plant genetic resources for food and agriculture in agricultural policy as an essential element for food security. We invite attention to be paid to the Global Plan of Action at the World Food Summit, to be held in November 1996. We invite all people to join us in our common cause.

Adopted this 23rd day of June, 1996.

Appendix V: Health in the Millennium Development Goals (2006)

Health Targets	Health indicators
Goal 1: Eradicate extreme poverty and hunger	
Target 1 Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day	
Target 2 Halve, between 1990 and 2015, the proportion of people who suffer from hunger	4. Prevalence of underweight children under five years of age
	5. Proportion of population below minimum level of dietary energy consumption
Goal 2: Achieve universal primary education	
Target 3 Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	
Goal 3: Promote gender equality and empower women	
Target 4 Eliminate gender disparity in primary and secondary education, preferably by 2005, and at all levels of education no later than 2015	
Goal 4: Reduce child mortality	
Target 5 Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate	13. Under-five mortality rate
	14. Infant mortality rate
	15. Proportion of one-year-old children immunized against measles
Goal 5: Improve maternal health	
Target 6 Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio	16. Maternal mortality ratio
	17. Proportion of births attended by skilled health personnel
Goal 6: Combat HIV/AIDS, malaria and other diseases	
Target 7 Have halted by 2015 and begun to reverse the spread of HIV/AIDS	18. HIV prevalence among pregnant women aged 15-24 years
	19. Condom use rate of the contraceptive prevalence rate
	20. Ratio of school attendance of orphans to school attendance of non-orphans aged 10-14 years
Target 8 Have halted by 2015 and begun to reverse the incidence of malaria and other major diseases	21. Prevalence and death rates associated with malaria
	22. Proportion of population in malaria-risk areas using effective malaria prevention and treatment measures
	23. Prevalence and death rates associated with tuberculosis
	24. Proportion of tuberculosis cases detected and cured under DOTS (Directly Observed Treatment Short-course)

Health Targets		Health indicators
Goal 7: Ensure environmental sustainability		
Target 9 Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources		29. Proportion of population using solid fuels
Target 10 Halve by 2015 the proportion of people without sustainable access to safe drinking-water and sanitation		30. Proportion of population with sustainable access to an improved water source, urban and rural
Target 11 By 2020 to have achieved a significant improvement in the lives of at least 100 million slum dwellers		31. Proportion of population with access to improved sanitation, urban and rural
Goal 8: Develop a Global Partnership for Development		
Target 12 Develop further an open, rule-based, predictable, non-discriminatory trading and financial system		
Target 13 Address the special needs of the least developed countries		
Target 14 Address the special needs of landlocked countries and small island developing states		
Target 15 Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term		
Target 16 In cooperation with developing countries, develop and implement strategies for decent and productive work for youth		
Target 17 In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries		46. Proportion of population with access to affordable essential drugs on a sustainable basis
Target 18 In cooperation with the private sector, make available the benefits of new technologies, especially information and communications		
Sources: 'Implementation of the United Nations Millennium Declaration', Report of the Secretary-General, A/57/270 (31 July 2002), first annual report based on the 'Road map towards the implementation of the United Nations Millennium Declaration', Report of the Secretary-General, A/56/326 (6 September 2001); United Nations Statistics Division, Millennium Indicators Database, verified in July 2004; World Health Organization, Department of MDGs, Health and Development Policy (HDP). www.who.int/mdg		

(WHO 2006a: 38-39)

Appendix VI: List of Reported MAC plants

Vernacular name	Family	Genus and species	Use	Cur	Pro	Pre	Preg
Adas	Apiaceae	<i>Foeniculum vulgare</i> Mill.	X	X			
Alang-alang	Poaceae	<i>Imperata cylindrica</i> (L.) P.Beauv. var. <i>koenigii</i> (Benth.) Druce	X	X			
Alpukat	Lauraceae	<i>Persea americana</i> Mill.	X	X	X	X	
Andong	Liliaceae	<i>Cordyline fruticosa</i> (L.) A.Chev.	X	X			
Andong Merah	Liliaceae	<i>Cordyline fruticosa</i> (L.) A.Chev.	X	X			
Antawali	Menispermaceae	<i>Tinospora tuberculata</i> Beumee ex K. Heyne					
Asam	Fabaceae	<i>Tamarindus indica</i> L.	X	X	X	X	X
Awar awar	Moraceae	<i>Ficus septica</i> Burm f.	X	X			
Bangkuang	Fabaceae	<i>Pachyrrhizus erosus</i> Urb.	X	X		X	
Bangle	Zingiberaceae	<i>Zingiber cassumunar</i> Roxb.					
Bawang Merah	Liliaceae	<i>Allium cepa</i> L.	X	X	X	X	X
Bawang Putih	Liliaceae	<i>Allium sativum</i> L.	X	X			
Belimbing	Oxalidaceae	<i>Averrhoa carambola</i> L.	X	X		X	
Belimbing Besi	Oxalidaceae	<i>Averrhoa carambola</i> L.	X	X			
Belimbing Wuluh	Oxalidaceae	<i>Averrhoa bilimbi</i> L.	X		X	X	
Beluntas	Asteraceae	<i>Pluchea indica</i> (L.) Less.	X	X	X	X	X
Benalu	-----	-----	X	X			
Beras Merah	Poaceae	<i>Oryza sativa</i> L.					
Binahong	Basellaceae	<i>Basella alba</i> L.	X	X	X	X	X
Blatung (berduri)	Cactaceae	<i>Opuntia</i> spec.					
Buah Jepang	Cucurbitaceae	<i>Sechium edule</i> (Jacq.) Sw.					
Buah Kelabet	-----	-----					
Buah Merah	Thymelaeaceae	<i>Phaleria macrocarpa</i> Boerl.	X	X			
Bunut	Moraceae	<i>Ficus</i> spec.					
Cabai	Solanaceae	<i>Capsicum annum</i> L.	X	X			
Cempaka (Kuning)	Magnoliaceae	<i>Magnolia champaca</i> (L.) Baill. ex Pierre					
Cempaka Putih	Magnoliaceae	<i>Magnolia x alba</i> (DC.) Figlar	X	X			
Cendana	Santalaceae	<i>Santalum album</i> L.	X	X			
Cengkeh	Myrtaceae	<i>Syzygium aromaticum</i> (L.) Merr. & L.M. Perry	X	X	X	X	X
Cermen	Euphorbiaceae	<i>Phyllanthus acidus</i> (L.) Skeels					
Cincau (Pohon)	-----	-----					
Cocor Bebek	Crassulaceae	<i>Kalanchoe pinnata</i> (Lam.) Pers.	X	X	X		X
Dadang Gentis	Acanthaceae	<i>Clinacanthus nutans</i> Lindau	X	X			
Dadap	Fabaceae	<i>Erythrina</i> spec.	X	X	X	X	
Daluman	-----	-----	X		X		
Daun Dewa	Asteraceae	<i>Gynura pseudochina</i> (L.) DC.	X	X			
Daun Gamal	Fabaceae	-----					
Daun Kopok-Kopok	-----	-----	X	X			
Daun Korea	Boraginaceae	<i>Symphytum officinale</i> L.	X	X		X	
Daun Sendok	Plantaginaceae	<i>Plantago major</i> L.					
Daun Toktok	Solanaceae	<i>Physalis</i> spec.	X	X		X	
Dedani	-----	-----					
Delima Putih	Lythraceae	<i>Punica granatum</i> L.	X	X	X		
Gadung	Dioscoreaceae	<i>Dioscorea hispida</i> Dennst.					
Gambir	Rubiaceae	<i>Uncaria gambier</i> Roxb.	X	X			
Gatep	Fabaceae	<i>Inocarpus fagiferus</i> (Parkinson) Fosberg					
Ginseng	Portulacaceae	<i>Talinum paniculatum</i> (Jacq.) Gaertn.	X	X	X	X	
Gumitir	Asteraceae	<i>Cosmos caudatus</i> Kunth					

It is indicated with an 'X' whether a plant has been reported as used during the previous 12 months for either one of the possible uses (Use), curative (Cur), promotive (Prom), preventive (Pre) or during pregnancy (Preg).

Source: Household survey 2006

Vernacular name	Family	Genus and species	Use	Cur	Pro	Pre	Preg
Intaran	Meliaceae	<i>Azadirachta indica</i> A. Juss.	X	X		X	
Isen	Zingiberaceae	<i>Alpinia purpurata</i> K. Schum.	X	X			
Isep Nanah (Hijau, Biru)	Euphorbiaceae	<i>Euphorbia</i> spec.					
Isep Getih (Merah)	-----	-----					
Jahe	Zingiberaceae	<i>Zingiber officinale</i> Roscoe	X	X	X	X	
Jahe Merah	Zingiberaceae	<i>Zingiber officinale</i> L. var.	X		X		
Jambu Biji	Myrtaceae	<i>Psidium guajava</i> L.	X	X		X	
Jambu Merah	Myrtaceae	<i>Syzygium malaccense</i> (L.) Merr. & L.M.Perry	X	X		X	
Jambu Putih	Myrtaceae	<i>Syzygium aqueum</i> Alston					
Jangut	-----	-----	X		X		
Jarak	Euphorbiaceae	<i>Jatropha curcas</i> L.	X	X		X	
Jarak Jawa	Euphorbiaceae	<i>Jatropha multifida</i> L.					
Jarak Kliki	Euphorbiaceae	<i>Jatropha gossypifolia</i> L.	X		X	X	
Jebug Garum	Myristicaceae	<i>Myristica fragrans</i> Houtt.	X	X	X		
Jempiring	Rubiaceae	<i>Gardenia jasminoides</i> Ellis					
Jeringo	Fabaceae	<i>Archidendron jiringa</i> (Jack) I.C.Nielsen					
Jeruju	Acanthaceae	<i>Acanthus ilicifolius</i> L.					
Jeruk Bali	Rutaceae	<i>Citrus maxima</i> (Burm.f.) Merr.	X	X			
Jeruk Limo	Rutaceae	<i>Citrus limon</i> (L.) Burm.f.					
Jeruk Nipis	Rutaceae	<i>Citrus aurantiifolia</i> (Christm.) Swingle	X	X	X	X	
Jinten	Lamiaceae	<i>Plectranthus amboinicus</i> (Lour.) Spreng.	X	X			
Juwet	Myrtaceae	<i>Syzygium cumini</i> (L.) Skeels	X	X			
Kalinge	-----	-----	X	X			
Kamboja	Apocynaceae	<i>Plumeria acuminata</i> Ait.	X	X			
Kangkung	Convolvulaceae	<i>Ipomoea aquatica</i> Forssk.	X		X		
Karuk	Piperaceae	<i>Piper sarmentosum</i> Wall.	X	X			
Kayu Api	Avicenniaceae	<i>Avicennia</i> spec.	X	X			
Kayu Manis	Euphorbiaceae	<i>Sauropus androgynus</i> Merr.	X	X	X	X	X
Kayu Putih	Myrtaceae	<i>Melaleuca leucadendra</i> L.	X	X		X	
Kayu Tulang	Euphorbiaceae	<i>Euphorbia tirucalli</i> L.	X	X			
Kecibling	Acanthaceae	<i>Sericocalyx crispus</i> (L.) Bremek	X	X			
Kedondong	Anacardiaceae	<i>Spondias dulcis</i> G.Forst.	X	X			
Kelapa	Arecaceae	<i>Cocos nucifera</i> L.	X	X	X	X	X
Kelongkang	Fabaceae	<i>Psophocarpus tetragonolobus</i> DC.	X		X		
Kelor	Moringaceae	<i>Moringa oleifera</i> Lam.	X	X	X	X	
Kembang Bintang	Campanulaceae	<i>Laurentia longiflora</i> (L.) E. Wimm.					
Kembang Kuning	Fabaceae	<i>Senna surattensis</i> (Burm. f.) H.S. Irwin & Barneby	X	X			
Kembang Sepatu /pucuk I	Malvaceae	<i>Hibiscus rosa-sinensis</i> L.					
Kembang Sepatu /pucuk rejuna II	Malvaceae	<i>Malvaviscus arboreus</i> Cav.	X	X			X
Kemeniran	Euphorbiaceae	<i>Phyllanthus niruri</i> L.					
Kencur	Zingiberaceae	<i>Kaempferia galanga</i> L.	X	X	X	X	
Kendal Betuka	Boraginaceae	<i>Cordia dichotoma</i> G.Forst.	X	X			
Kepiduh	Apiaceae	<i>Centella asiatica</i> (L.) Urb.	X	X	X	X	
Kepundung	Euphorbiaceae	<i>Baccaurea racemosa</i> Müll.Arg.	X	X	X		
Kerasi	Verbenaceae	<i>Lantana camara</i> L.	X	X	X		
Kesimbukan	Rubiaceae	<i>Paederia foetida</i> L.					
Ketela rambat	Convolvulaceae	<i>Ipomoea batatas</i> (L.) Lam.	X	X			
Ketumbar	Apiaceae	<i>Coriandrum sativum</i> L.	X	X	X	X	

It is indicated with an 'X' whether a plant has been reported as used during the previous 12 months for either one of the possible uses (Use), curative (Cur), promotive (Prom), preventive (Pre) or during pregnancy (Preg).

Source: Household survey 2006

Vernacular name	Family	Genus and species	Use	Cur	Pro	Pre	Preg
Kopi	Rubiaceae	<i>Coffea arabica</i> L.					
Kumis Kucing	Lamiaceae	<i>Orthosiphon aristatus</i> (Blume) Miq.	X	X	X	X	
Kunyit	Zingiberaceae	<i>Curcuma longa</i> L.	X	X	X	X	X
Kunyit Putih	Zingiberaceae	-----	X	X	X	X	
Lempuyak	Verbenaceae	<i>Lantana camara</i> L.	X		X		
Lengkuas	Zingiberaceae	<i>Alpinia galanga</i> Willd.	X	X	X	X	
Lidah Buaya	Aloaceae	<i>Aloe vera</i> (L.) Burm.f.	X		X	X	
Liligundi	Verbenaceae	<i>Vitex trifolia</i> L.					
Lombok Bun	Piperaceae	<i>Piper retrofractum</i> Vahl					
Mahkota Dewa	Thymelaeaceae	<i>Phaleria macrocarpa</i> Boerl.	X	X	X	X	
Mahoni	Meliaceae	<i>Swietenia macrophylla</i> King					
Meduri putih	Asclepiadaceae	<i>Calotropis gigantea</i> (L.) W.T.Aiton					
Melati	Oleaceae	<i>Jasminum sambac</i> (L.) W.Aiton	X	X			
Mengkudu	Rubiaceae	<i>Morinda citrifolia</i> L.	X	X	X	X	
Merak	Fabaceae	<i>Caesalpinia pulcherrima</i> (L.) Sw.	X	X	X	X	
Merak Kuning	Fabaceae	<i>Caesalpinia pulcherrima</i> (L.) Sw.					
Mesui	Lauraceae	<i>Cinnamomum</i> spec.	X	X			
Miana	Lamiaceae	<i>Plectranthus scutellarioides</i> (L.) R.Br.	X	X			
Murbai	Moraceae	<i>Morus alba</i> L.					
Nanas	Bromeliaceae	<i>Ananas comosus</i> (L.) Merr.	X	X			
Nangka	Moraceae	<i>Artocarpus heterophyllus</i> Lam.	X	X			
Pacing	Costaceae	<i>Costus speciosus</i> Sm.	X				X
Padi	Poaceae	<i>Oryza sativa</i> L.	X	X		X	
Pasepas	Cucurbitaceae	<i>Coccinia grandis</i> (L.) Voigt					
Paye	Cucurbitaceae	<i>Momordica charantia</i> L.	X	X	X	X	X
Pejo-pejo	-----	-----					
Pepaya	Caricaceae	<i>Carica papaya</i> L.	X	X	X	X	
Piling-Piling	Fabaceae	<i>Abrus precatorius</i> L.					
Pisang	Musaceae	<i>Musa</i> spec.	X	X	X		
Pule	Apocynaceae	<i>Alstonia scholaris</i> (L.) R. Br.	X	X	X	X	
Pulosari	Araliaceae	<i>Schefflera</i> spec.	X		X		
Pungut-Pungut	-----	-----	X	X			
Purna Jiwa	Fabaceae	<i>Euchresta horsfieldii</i> Benn.					
Rumput Kelau	-----	-----					
Rumput Neroh	-----	-----	X	X	X		
Rumput Teki	Cyperaceae	<i>Cyperus rotundus</i> L.	X	X			
Salam	Myrtaceae	<i>Syzygium polyanthum</i> Walp.					
Sambi	Sapindaceae	<i>Schleichera oleosa</i> (Lour.) Oken	X	X			
Sambiroto	Acanthaceae	<i>Andrographis paniculata</i> Nees	X	X	X	X	
Sambung Nyawa	Asteraceae	<i>Gynura pseudochina</i> (L.) DC.	X	X	X	X	
Samen	-----	-----					
Sasih Miik	-----	-----	X	X			
Selasih miik	Lamiaceae	<i>Ocimum</i> spec.					
Seledri	Apiaceae	<i>Apium graveolens</i> L.					
Semanggi	Oxalidaceae	<i>Oxalis corniculata</i> L.	X	X			
Semanggi Gunung	Apiaceae	<i>Hydrocotyle sibthorpioides</i> Lam.	X	X			
Sembung	Asteraceae	<i>Blumea balsamifera</i> DC.	X	X	X	X	X
Sembung Bikul	-----	-----					
Sereh	Poaceae	<i>Cymbopogon citratus</i> Stapf	X		X		
Sida Sida	Malvaceae	<i>Sida cordifolia</i> L.					
Singkong	Euphorbiaceae	<i>Manihot esculenta</i> Crantz	X	X	X		
Sirih	Piperaceae	<i>Piper betle</i> L.	X	X	X	X	
Sona	Fabaceae	-----	X	X			

It is indicated with an 'X' whether a plant has been reported as used during the previous 12 months for either one of the possible uses (Use), curative (Cur), promotive (Prom), preventive (Pre) or during pregnancy (Preg).

Source: Household survey 2006

Vernacular name	Family	Genus and species	Use	Cur	Pro	Pre	Preg
<i>Songga</i>	-----	-----	X	X			
<i>Sugi</i>	Dracaenaceae	<i>Dracaena</i> spec.	X	X			
<i>Suren</i>	Meliaceae	<i>Toona sureni</i> Merr.					
<i>Tabie Bun</i>	Piperaceae	<i>Piper</i> spec.	X	X	X		
<i>Talas</i>	Arecaceae	<i>Colocasia esculenta</i> (L.) Schott					
<i>Tapak Dara</i>	Apocynaceae	<i>Catharanthus roseus</i> (L.) G. Don	X	X		X	
<i>Tapak Liman</i>	Asteraceae	<i>Elephantopus scaber</i> L.	X	X	X		
<i>Teh</i>	Theaceae	<i>Camellia sinensis</i> Kuntze					
<i>Temen</i>	Acanthaceae	<i>Graptophyllum pictum</i> Griff.	X	X	X	X	
<i>Temu Ireng</i>	Zingiberaceae	<i>Curcuma aeruginosa</i> Roxb.					
<i>Temu Lawak</i>	Zingiberaceae	<i>Curcuma xanthorrhiza</i> D.Dietr.	X	X	X	X	
<i>Tiga Ting</i>	-----	-----	X	X			
<i>Timun</i>	Cucurbitaceae	<i>Cucumis sativus</i> L.	X	X		X	
<i>Tomat</i>	Solanaceae	<i>Solanum lycopersicum</i> L.	X	X	X	X	
<i>Tujuh Tulang</i>	Euphorbiaceae	<i>Euphorbia tirucalli</i> L.	X	X			
<i>Ubi atus</i>	Dioscoreaceae	-----	X	X			
<i>Waru</i>	Malvaceae	<i>Hibiscus tiliaceus</i> L.	X	X	X	X	X
<i>Wijaya Kusuma</i>	Cactaceae	-----					
<i>Wortel</i>	Apiaceae	<i>Daucus carota</i> L.	X	X			

It is indicated with an 'X' whether a plant has been reported as used during the previous 12 months for either one of the possible uses (Use), curative (Cur), promotive (Prom), preventive (Pre) or during pregnancy (Preg).

Source: Household survey 2006

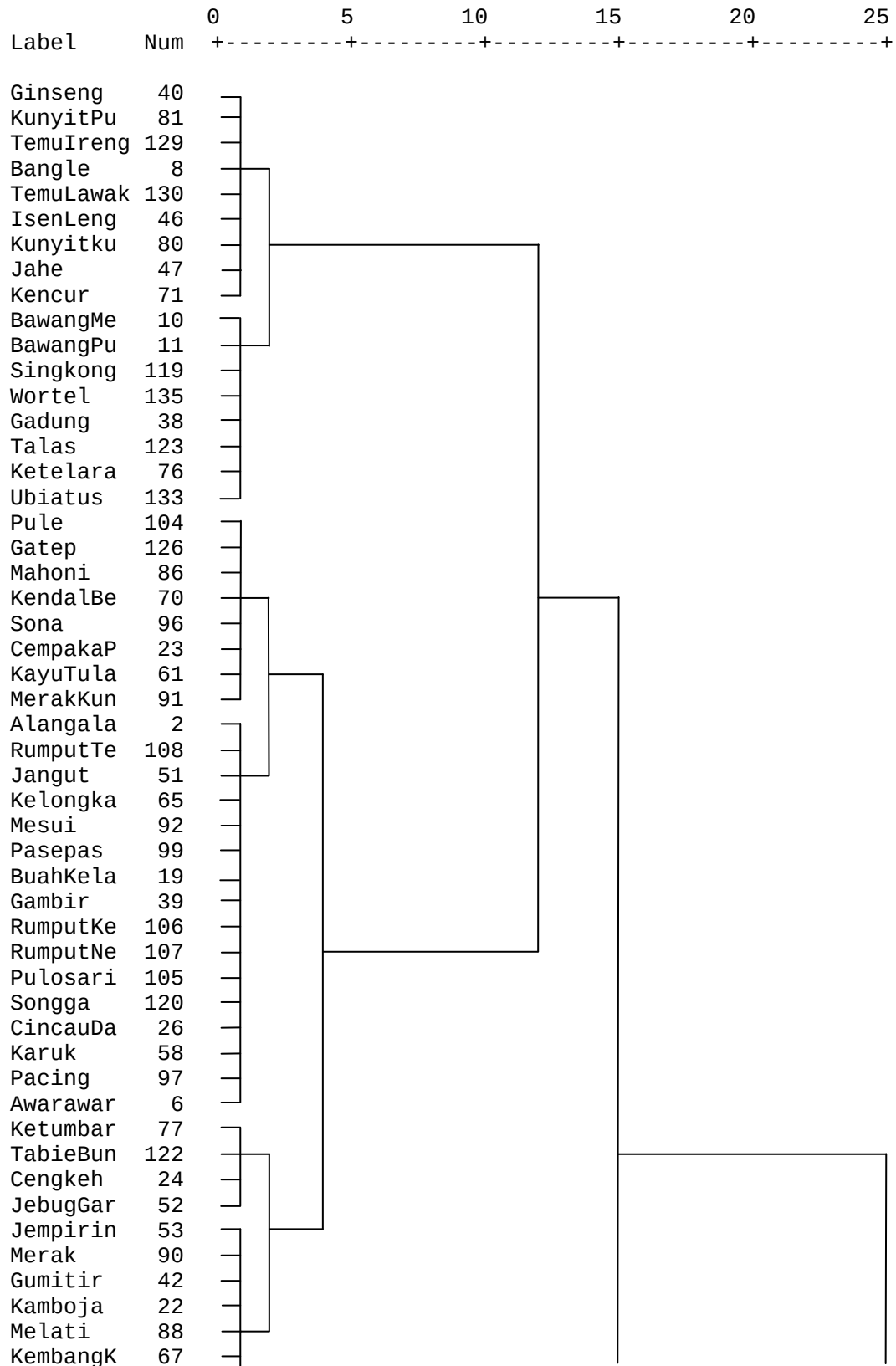
Appendix VII: Division of the Stratified Sample

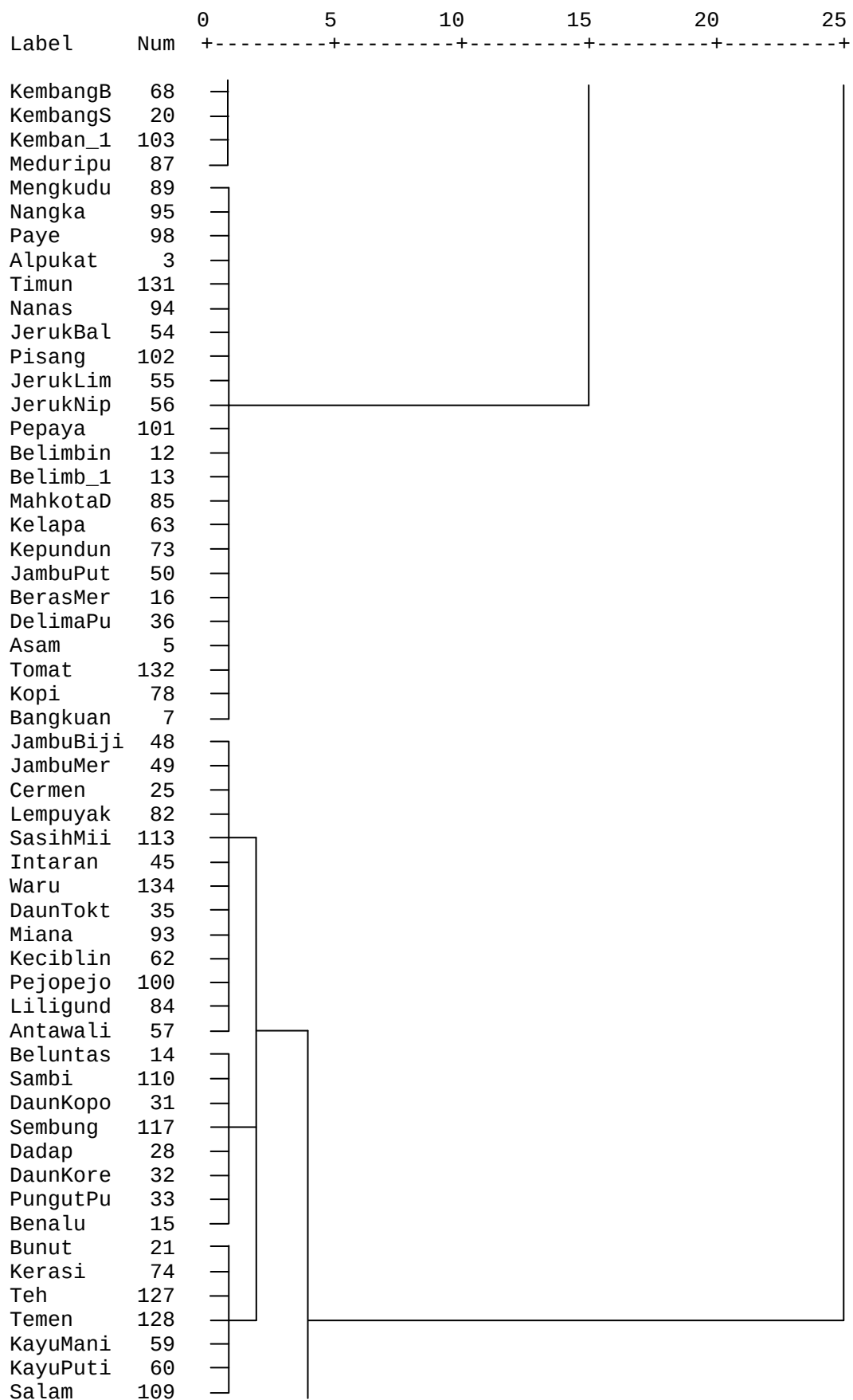
Based on the data provided by the local authorities the following selections have been made for the respondents to be included in the household survey:

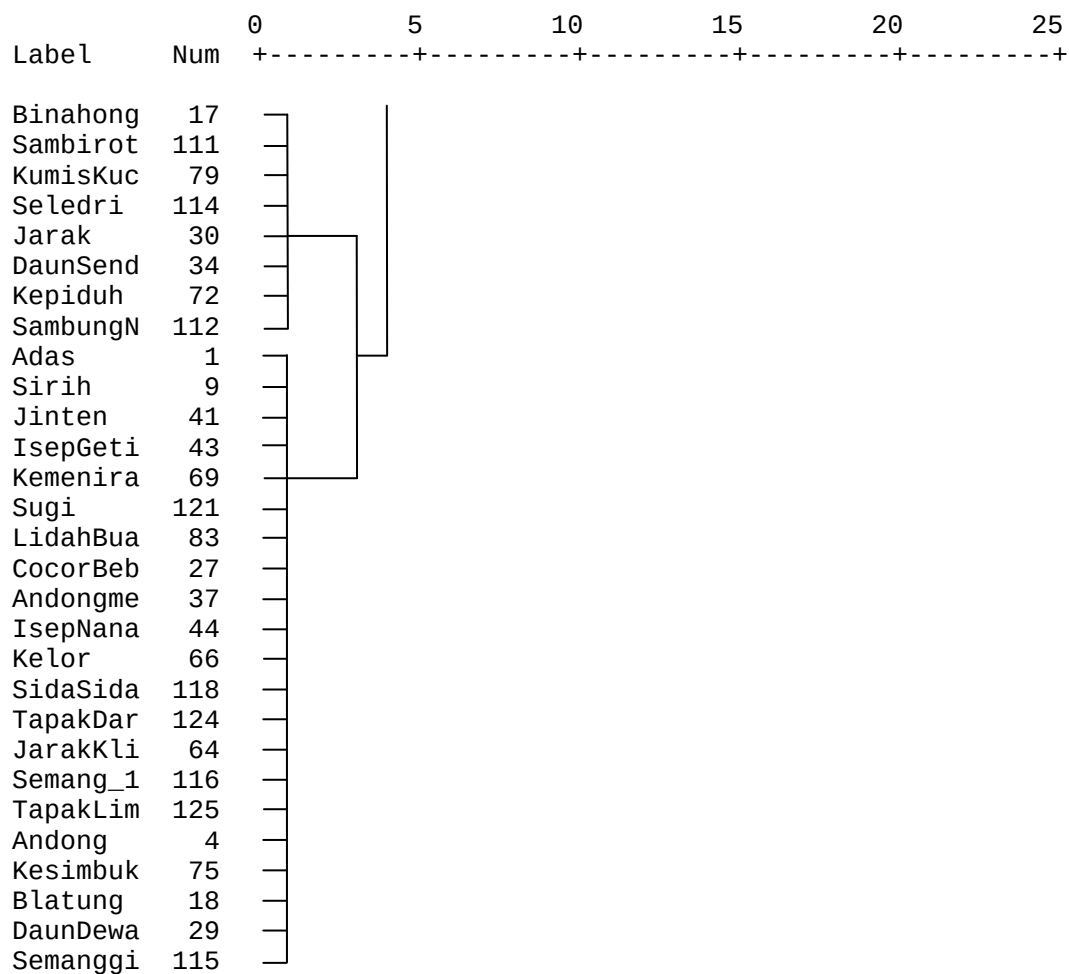
1. The authorities of Angantaka presented a registration of 881 household heads divided over four *dusun*:
 - a. Kekeran Angantaka: 167 household heads of which 19 respondents were selected
 - b. Dalem Angantaka: 217 household heads of which 25 respondents were selected
 - c. Desa Angantaka: 249 household heads of which 28 respondents were selected
 - d. Puseh Angantaka: 248 household heads of which 28 respondents were selected
2. The authorities of Bengkel presented a registration of 579 household heads divided over four *dusun*:
 - a. Bengkel Buduk: 120 household heads of which 21 respondents were selected
 - b. Bengkel Gede: 175 household heads of which 30 respondents were selected
 - c. Bengkel Kawan: 141 household heads of which 24 respondents were selected
 - d. Telengis: 143 household heads of which 25 respondents were selected
3. The authorities of Pelapuan presented a registration of 646 household heads divided over three *dusun*:
 - a. Dusun Satria: 162 household heads of which 25 respondents were selected
 - b. Dusun Pelapuan: 329 household heads of which 51 respondents were selected
 - c. Dusun Bonagung: 155 household heads of which 24 respondents were selected
4. The authorities of Tumbu presented a registration of 830 household heads divided over five *dusun*:
 - a. Tumbu Kelod: 221 household heads of which 27 respondents were selected
 - b. Tumbu Kaler: 179 household heads of which 21 respondents were selected
 - c. Kebon Tumbu: 39 household heads of which 5 respondents were selected
 - d. Ujung Tengah: 223 household heads of which 27 respondents were selected
 - e. Ujung Pesisir: 168 household heads of which 20 respondents were selected

Appendix VIII:Dendrogram of the MAC Plants

Dendrogram using Ward Method Rescaled Distance Cluster Combine



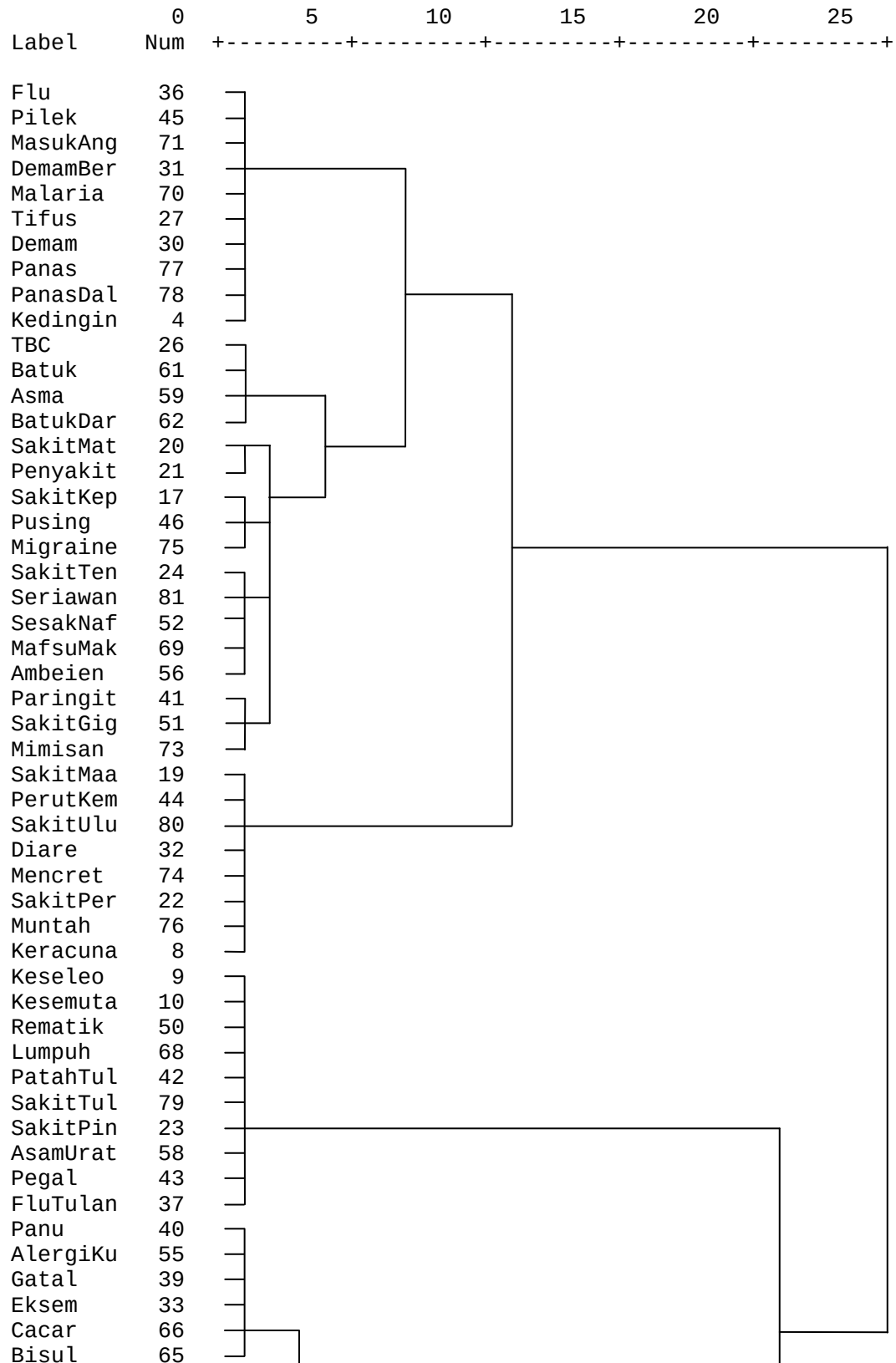


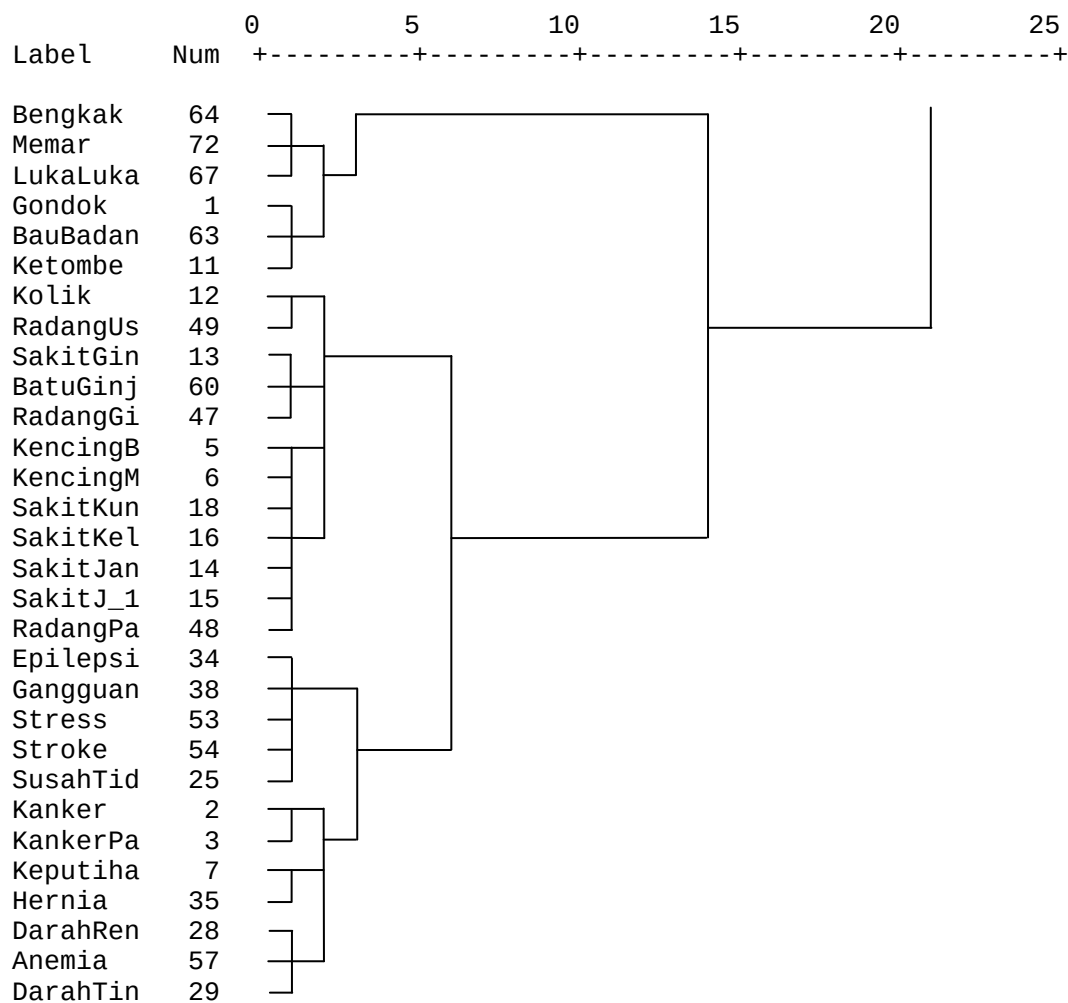


Abbreviation	Extended name	Abbreviation	Extended name	Abbreviation	Extended name
Alangala	Alangalang	JambuMer	Jambu Merah	Kesimbuk	Kesimbukan
Andongme	Andong Merah	JambuPut	Jambu Putih	Ketelara	Ketelarambat
Bangkuan	Bangkuang	JarakKli	Jarak Kliki	KumisKuc	Kumis Kucing
BawangMe	Bawang Merah	JebugGar	Jebug Garum	Kunyitku	Kunyit kuning
BawangPu	Bawang Putih	Jempirin	Jempiring	KunyitPu	Kunyit Putih
Belimb_1	Belimbing Wuluh	JerukBal	Jeruk Bali	LidahBua	Lidah Buaya
Belimbin	Belimbing	JerukLim	Jeruk Limo	Liligund	Liligundi
BerasMer	Beras Merah	JerukNip	Jeruk Nipis	MahkotaD	Mahkota Dewa
BuahKela	Buah Kelabet	KayuMani	Kayu Manis	Meduripu	Meduri Putih
CempakaP	Cempaka Putih	KayuPuti	Kayu Putih	MerakKun	Merak Kuning
CincauDa	Cinca uDaluman	KayuTula	Kayu Tulang	PungutPu	Pungut Pungut
CocorBeb	Cocor Bebek	Keciblin	Kecibling	RumputKe	Rumput Kelau
DaunKopo	Daun KopokKopok	Kelongka	Kelongkang	RumputNe	Rumput Neroh
DaunKore	Daun Korea	Kembang_1	Kembang Sepatu Pucuk Rejuna	RumputTe	Rumput Teki
DaunSend	Daun Sendok	KembangB	Kembang Bintang	Sambiro	Sambiroto
DaunTokt	Daun Toktok	KembangK	Kembang Kuning	SambungN	Sambung Nyawa
DelimaPu	Delima Putih	KembangS	Kembang Sepatu Pucuk	SasihMii	Sasih Miik
IsenLeng	Isen Lengkuas	Kemenira	Kemeniran	Semang_1	Semanggi Gunung
IsepGeti	Isep Getih Merah	KendalBe	Kendal Betuka	TapakDar	Tapak Dara
IsepNana	Isep Nanah Hijau	Kepundun	Kepundung	TapakLim	Tapak Liman

Appendix IX: Dendrogram of the Diseases

Dendrogram using Ward Method Rescaled Distance Cluster Combine





Abbreviation	Extended Name	Abbreviation	Extended Name
AlergiKu	Alergi Kulit	PerutKem	Perut Kembang
BatuGinj	Batu Ginjal	RadangGi	Radang Ginjal
BatukDar	Batuk Darah	RadangPa	Radang Paru
DarahRen	Darah Rendah	RadangUs	Radang Usus Buntu
DarahTin	Darah Tinggi	SakitGig	Sakit Gigi
DemamBer	Demam Berdarah	SakitGin	Sakit Ginjal
FluTulan	Flu Tulang	SakitJ_1	Sakit Jantung Koroner
Gangguan	Gangguan Otak	SakitJan	Sakit Jantung
KankerPa	Kanker Payudara	SakitKel	Sakit Kelenjar Prostat
Kedingin	Kedinginan	SakitKep	Sakit Kepala
KencingB	Kencing Batu	SakitKun	Sakit Kuning Lever
KencingM	Kencing Manis	SakitMaa	Sakit Maag
Keputiha	Keputihan	SakitMat	Sakit Mata
Keracuna	Keracunan Makanan	SakitPer	Sakit Perut
Kesemuta	Kesemutan	SakitPin	Sakit Pinggang
MafsuMak	Mafsu Makan	SakitTen	Sakit Tenggorokan
MasukAng	Masuk Angin	SakitTul	Sakit Tulang
PanasDal	Panas Dalam	SakitUlu	Sakit Uluhati
Paringit	Paringitis	SesakNaf	Sesak Nafas
PatahTul	Patah Tulang	SusahTid	Susah Tidur
Penyakit	Penyakit Mata		

Glossary

<i>Adat</i>	a word of Arabic origin borrowed by Islamized populations in the Archipelago to refer to indigenous ‘customary law’ as opposed to imported ‘(religious) law’ (<i>syariah, hukum</i>). Introduced to Bali by the Dutch, the word ‘ <i>adat</i> ’ replaced a varied terminology for variable local customs (<i>kerta, palakerta, dresta, catur dresta, sima, tat krama, tat loka cara</i>) which had a field of meanings covering ritual obligations, social institution, legal regulation, and ancestral evocation
<i>Angat</i>	warm; part of the classification of plants following the <i>usada: nyem</i> (cold) or <i>tis</i> (fresh), <i>dumelada</i> (neutral, tempered), <i>angat</i> (warm) and <i>panas</i> (hot)
<i>Agama</i>	religion
<i>Agama Hindu</i>	Hinduism
<i>Alus madia</i>	modestly respectful Balinese language level
<i>Alus singgih</i>	modestly respectful Balinese language level
<i>Arya Dharma</i>	Hinduism was originally known as <i>Arya Dharma</i> or the ‘Aryan way’
<i>Atma</i>	human soul; eternal soul which determines mental activity including thinking, emotions, behaviour and personality
<i>Aturan awig</i>	user and owners right defined by local rules; adat right
<i>Bahasa Bali</i>	Balinese language
<i>Bahasa Indonesia</i>	Indonesian language
<i>Bali Aga</i>	original Balinese people also called <i>Bali Mula</i>
<i>Balian</i>	traditional healer
<i>Balian apun</i>	or <i>balian uat</i> ; masseur; a traditional healer who uses techniques of massage
<i>Balian kebal</i>	or <i>balian kebatinan</i> ; a traditional healer who specializes in the use of magic paraphernalia such as an amulet, to enhance the client’s spiritual strength
<i>Balian kebatinan</i>	or <i>balian kebal</i> ; a traditional healer who specializes in the use of magic paraphernalia such as an amulet, to enhance the client’s spiritual strength
<i>Balian manak</i>	midwife
<i>Balian paica</i>	traditional healer who bases her or his healing on a <i>paica</i> , a divinely bestowed gift;
<i>Balian taksu</i>	spirit medium
<i>Balian tenung</i>	diviner
<i>Balian tulung</i>	bonesetter
<i>Balian usada</i>	traditional healer who uses traditional manuscripts (<i>lontar</i>) on healing
<i>Bali Mula</i>	original Balinese people also called <i>Bali Aga</i>
<i>Balisasi</i>	or <i>kebalian</i> ; being Balinese; strong Balinese cultural identity
<i>Banjar</i>	village neighbourhood association; hamlet or ward; the organizational unit of a village whose tasks relate to religion, customs and government; the governmental and organizational unit of a village in this sense also referred to as <i>dusun</i>
<i>Banten</i>	religious offering; woven young palm leaf trays for offerings
<i>Barong</i>	fabulous creature; a lion, dragon, or pig-like figure which features prominently in Balinese dramas and ceremonies, especially during <i>galungan</i> ; at the village temple it symbolizes God and protects the people
<i>Besakih</i>	see <i>Pura Besakih</i>
<i>Brahmana</i>	member of the priestly caste
<i>Brumbum</i>	a ‘middle’ colour made by mixing all colours and a symbol of the god Siwa

<i>Buana agung</i>	macrocosmos; the universe; the world at large; the great world opposite of <i>buana alit</i>
<i>Buana alit</i>	microcosmos; man and his world; the world in miniature; the human body in its physical and spiritual aspects opposite of <i>buana agung</i>
<i>Budaya</i>	culture
<i>Buhr</i>	the underworld
<i>Butakala</i>	demon deity; demon; ogre; evil spirit
<i>Buta yadnye</i>	ceremonies, one of the five classifications of Hindu ritual, the so called <i>panca yadnya</i> ; <i>Bhuta</i> means element; and <i>kala</i> , another word for demon, means time or energy, to create harmony in the world of man and the world of nature, i.e. to placate the demons, is the purpose of the <i>bhuta yadnya</i> ceremonies
<i>Boreh</i>	ointment, liniment, or poultice made from natural ingredients, intended for external use
<i>Bwah</i>	the human world
<i>Calon Arang</i>	story of a witch who creates a devastating epidemic, usually used of a dance-drama form in which the witch is represented by the figure of Rangda
<i>Canang (sari)</i>	one of the commonest small offerings, consisting of a small tray of woven coconut leaves on which are placed perfumed flowers, betel nuts, rice, and sometimes other ingredients, for instance <i>balian</i> clients often place a cash donation on the tray
<i>Caru</i>	set of offerings for the <i>butakala</i> ; sacred sacrifice
<i>Dadia</i>	clan system; clan group
<i>Desa dinas</i>	official/governmental village; village as defined by the central government division
<i>Desa kala patra</i>	a philosophy of adaptation by advising mankind to be prepared to face the changes of time, since all acts and behaviour should be fit the place (<i>desa</i>), time (<i>kala</i>) and condition (<i>patra</i>); concept which takes into account the differences from village to village (<i>desa</i>), from time to time (<i>kala</i>) and from cultural pattern to cultural pattern (<i>patra</i>);
<i>Dewa</i>	a manifestation of God; a god; a holy ancestor
<i>Dewa Agung</i>	title for members of the <i>puri</i> 'your highness', literally 'an elevated godly being'
<i>Dewa yadnye</i>	ceremonies, one of the five classifications of Hindu ritual, the so called <i>panca yadnya</i> ; ceremonies directed to the gods; sacrificial deed; communal practice for the gods
<i>Dewasa Ayu</i>	auspicious dates; good dates
<i>Dharma</i>	virtue; eternal standards of good behaviour according to one's caste. <i>Dharma</i> is a key word in Hinduism meaning duty, right, virtue, morality, law, truth and righteousness. <i>Dharma</i> is the way which leads to salvation or liberation (<i>moksha</i>).
<i>Dumelada</i>	neutral, tempered; part of the classification of plants following the <i>usada</i> : <i>nyem</i> (cold) or <i>tis</i> (fresh), <i>dumelada</i> (neutral, tempered), <i>angat</i> (warm) and <i>panas</i> (hot)
<i>Dinas</i>	government; official
<i>Dupa</i>	incense smoke
<i>Dusun</i>	organizational unit or neighbourhood

<i>Eka dasa rudra</i>	purification ceremony held on the last day of the <i>Saka</i> century; a ceremony intended to turn the malevolent forces of the world into benevolent ones, and thus the highest level of exorcist ritual. The <i>Eka Dasa Rudra</i> is the most sacred of all Balinese temple festivals held at the <i>Besaki</i> temple once in a hundred Balinese 210-days years
<i>Galungan</i>	holy day; ceremony held every 210 days celebrating victory of good versus bad, marked by visits of the gods and ancestors' spirits to earth
<i>Gamelan</i>	traditional orchestra or music from Balinese xylophone-like instruments, drums, gongs, and flutes
<i>Gedong</i>	pavilion closed in on all sides, in household architecture, the brick pavilion in the more sacred, mountain ward direction (<i>kaja</i>) of the house yard where the most senior person or couple often sleeps
<i>Gedong Kirtya</i>	a library and museum located in Singaraja which is specialised in collecting, copying and preservation of <i>lontar</i> , <i>prasati</i> , manuscripts engraved in metal plates, and old books
<i>Gunung Agung</i>	the highest mountain in Bali located in the regency Karangasem, sacred to the Balinese Hindus since on its slope the mother temple <i>Pura Besakih</i> is located
<i>Hindu Dharma</i>	official name for the Balinese Hinduism
<i>Hijriah</i>	Muslim calendar
<i>Hyang</i>	purified spirit of the dead, also used to refer to a deity, especially as part of a title, e.g., <i>Ida Sang Hyang Widi Hasa</i>
<i>Isaka</i>	synonym for the <i>Sasih</i> calendar, a lunar-solar calendar explain also called <i>Saka</i>
<i>Jaba</i>	commoner caste, the people generally known as 'outsiders' or <i>jaba</i> , but later referred to as members of the <i>sudra</i> caste
<i>Jamu</i>	from origin Javanese word to indicate a mixture of local herbs, used for a variety of promotive, preventive and curative care
<i>Kabupaten</i>	regency
<i>Kahyangan tiga</i>	temple trinity: <i>Pura puseh</i> , <i>Pura Balai Agung</i> or <i>pura desa</i> and <i>Pura Dalem</i>
<i>Kaja</i>	Balinese spatial position lying north; towards the mountains; on the uphill side
<i>Kajeng kliwon</i>	the ceremony held every 15 days; conjunction of the first day of the Balinese three-day calendar and the fifth day of the Balinese five-day calendar
<i>Kala</i>	the sibling spirit which influences bad thinking and deed, if a person has a good relationship with <i>kala</i> , the spirit will help him; demonic spirit
<i>Kali yuga</i>	the 'age of chaos'
<i>Kanda empat</i>	the four siblings of a human being, accompanying a person since birth (amniotic fluid, blood, venix caseosa and placenta)
<i>Karma</i>	the result of deeds, good and bad, accumulated throughout ones life or in previous lives
<i>Karma pala</i>	the Hindu doctrine of deed and commensurate retribution
<i>Kartu miskin</i>	'card of poverty', official registered proof of poverty, which gives access to monetary support and free health care
<i>Kasar</i>	vulgar Balinese language level

<i>Kasta</i>	the stratification system, denoting status by birth (or for woman by marriage) from highest to lowest: <i>Brahmana</i> , <i>Ksatria</i> , <i>Wesia</i> and <i>Sudra</i> or <i>Jaba</i>
<i>Kawi</i>	an ancient form of Javanese; archaic Javanese; the language of poetry formerly included the languages known to Dutch linguists as Old Javanese and Middle Javanese
<i>Kebalian</i>	or <i>balisasi</i> ; being Balinese; strong Balinese cultural identity
<i>Kecamatan</i>	district
<i>Kelian (banjar) adat</i>	hamlet or village official with responsibilities in the sphere of ritual practice and customary law
<i>Kelian banjar</i>	hamlet official with responsibilities in the sphere of governmental services
<i>Kelian desa</i>	village official with responsibilities in the sphere of governmental services
<i>Kelod</i>	Balinese spatial position lying south; towards the sea; direction associated with the unclean and evil spirit activity
<i>Kepala banjar</i>	hamlet official with responsibilities in the sphere of governmental services
<i>Kepala banjar adat</i>	hamlet official with responsibilities in the sphere of ritual practice and customary law
<i>Kepala desa</i>	village official with responsibilities in the sphere of governmental services
<i>Kepala desa adat</i>	village official with responsibilities in the sphere of ritual practice and customary law
<i>Kepala keluarga</i>	family head
<i>Kerta</i>	judiciary court
<i>Kesaktian</i>	spiritual power also referred to as <i>sakti</i> , <i>kasaktian</i> or <i>kasakten</i> ; power, a force or ability to intervene and influence events in the <i>niskala</i> and <i>sekala</i>
<i>Kraton</i>	palace; name for the Javanese Majapahit courts
<i>Kolot</i>	old fashioned, conservative, backward-looking
<i>Kuningan</i>	holy day; ceremonies held 10 days after <i>Galungan</i> marking the return of the god and ancestors' spirit back to heaven after their visit to Earth
<i>Loloh</i>	infusion, decoction, or elixir made from natural ingredients, intended for internal use
<i>Lontar</i>	classical palm-leaf manuscript
<i>Lumbrah</i>	ordinary Balinese language level
<i>Madia</i>	mid-level; middle point; referring to the different grades of ceremonies: high (<i>utama</i>), middle (<i>madia</i>), low (<i>nista</i>)
<i>Mahabharata</i>	one of the two major Sanskrit epics of ancient India, the other being the Ramayana. With more than 74,000 verses, long prose passages, and about 1.8 million words in total, the Mahabharata is one of the longest epic poems in the world
<i>Maha Dewa</i>	'Great God'
<i>Maju</i>	to progress
<i>Mantra</i>	holy chanting to call the gods
<i>Manusia yadnye</i>	ceremonies, one of the five classifications of Hindu ritual, the so called <i>panca yadnya</i> ; life cycle rituals, rites de passage; sacrificial deed; communal activity for a social event
<i>Materia medica</i>	medical material/substance; a Latin medical term for the body of collected knowledge about the therapeutic properties of any substance used for healing

<i>Mecaru</i>	a ceremony with offerings and sacrifices to placate the demon deities and <i>kala</i>
<i>Meru</i>	Distinctive architectural feature which is a shrine set up on a short base and topped by a succession of increasingly smaller roofs. These buildings are reconstructions of the sacred Indian mountain – mount <i>Meru</i> or <i>Sumeru</i> – which was thought to be the centre of the universe or the universe itself shaped as a mountain surrounded by seven circular continents separated by seven circular seas.
<i>Mligia</i>	or <i>ngukur</i> ; highest level of post cremation ritual; the ceremony marking unification with God in the Hindu religion
<i>Moksha</i>	ultimate goal in Balinese life: the state of absolute liberation when the soul becomes one with the Supreme Being
<i>Nadi</i>	term to indicate trance; deducted from <i>dadi</i> to become or exists
<i>Ngaben</i>	cremation ceremony; the dead ceremonies
<i>Ngrorasin</i>	ceremony held twelve days after death
<i>Ngrupuk</i>	a series of ceremonies done in the evening before <i>nyepi</i> (Balinese new year).
<i>Ngukur</i>	or <i>mligia</i> ; highest level of post cremation ritual; the ceremony marking unification with God in the Hindu religion
<i>Niskala</i>	beyond the realm of the sense, the super- , or better, supranatural; the intangible versus the tangible (<i>sekala</i>)
<i>Nista</i>	low; inferior; referring to the different grades of ceremonies: high (<i>utama</i>), middle (<i>madia</i>), low (<i>nista</i>)
<i>Nyem</i>	cold; part of the classification of plants following the <i>usada</i> : <i>nyem</i> (cold) or <i>tis</i> (fresh), <i>dumelada</i> (neutral, tempered), <i>angat</i> (warm) and <i>panas</i> (hot) or the theoretical division of the diseases following the <i>usada</i> into <i>panas</i> (hot), <i>nyem</i> (cold) and <i>sebaa</i> (neutral or middle, hot-cold).
<i>Nyepi</i>	Balinese new year, first day of the <i>saka</i> year; <i>nyepi</i> is observed by an eerie day of silence: no work is conducted and no light or fire is lit
<i>Obat bantuan</i>	Government financial support system to obtain medicine
<i>Obat warung</i>	prescription free drugs (<i>obat</i>) sold in small stores (<i>warung</i>)
<i>Odalan</i>	anniversary festival of a temple, <i>odalan</i> means ‘coming out’, ‘emergence,’ ‘appearance’, therefore it is not the day on which the temple was built but the day on which it is, and since it has been in existence always has been, ‘activated,’ on which the gods come down from the heavens to inhabit it.
<i>Otanan</i>	the Balinese birthday, a celebration held every six months, which refers to a year according to the Balinese calendar
<i>Paica</i>	divinely bestowed gift
<i>Panas</i>	hot; part of the classification of plants following the <i>usada</i> : <i>nyem</i> (cold) or <i>tis</i> (fresh), <i>dumelada</i> (neutral, tempered), <i>angat</i> (warm) and <i>panas</i> (hot) or the theoretical division of the diseases following the <i>usada</i> into <i>panas</i> (hot), <i>nyem</i> (cold) and <i>sebaa</i> (neutral or middle, hot-cold).
<i>Pancasila</i>	the five ground principles of the Indonesian Republic: 1) belief in the one and only God, 2) just and civilized humanity, 3) the unity of Indonesia, 4) democracy guided by the inner wisdom in the unanimity arising out of deliberation amongst representatives and 5) social justice for the whole of the people of Indonesia.
<i>Panca srada</i>	the five principle beliefs

<i>Panca yadnye</i>	the five classifications of Hindu ritual: <i>buta yadnya</i> , <i>dewa yadnya</i> , <i>manusa yadnya</i> , <i>pitra yadnya</i> and <i>resi yadnya</i>
<i>Pawintenan</i>	a ceremony marking the attainment of the status of a holy person
<i>Pedanda</i>	Balinese Hindu High priest, literate in the <i>lontar</i> manuscripts and having a Brahmana title
<i>Pemangku</i>	local temple priest; temple keeper; a priest of the temple with less authority than a high priest; priest who organizes the religious duties of the <i>subak</i>
<i>Penyakit biasa</i>	‘usual’ disease; which have a natural origin and process within the manifest world (<i>sekala</i>)
<i>Penyakit luar biasa</i>	‘unusual’ disease; diseases which have a ‘supernatural’ origin and/or an ‘unnatural’ process, thus have a connection with the unmanifest world (<i>niskala</i>).
<i>Pitra</i>	spirit of the dead which has been purified by cremation
<i>Pitra yadnye</i>	ceremonies, one of the five classifications of Hindu ritual, the so called <i>panca yadnya</i> ; sacrificial deed for the dead and the ancestors; rituals to purify the souls of the dead and thus allow them to be reborn
<i>Polindes</i>	<i>Pondok Bersalin Desa</i> ; village delivery post
<i>Prasati</i>	manuscripts engraved in metal plates
<i>Punarbhawa</i>	several times reincarnation to reach <i>moksha</i> , the final redemption
<i>Pura</i>	temple
<i>Pura Balai Agung</i>	or <i>pura desa</i> ; the village temple; temple where religious matters are discussed
<i>Pura Besakih</i>	the most holiest and biggest temple in Bali; the ‘mother’ temple, located on the slopes of the highest mountain, <i>Gunung Agung</i> (Suryani & Jensen 1993: 3)
<i>Pura dalem</i>	temple of the dead
<i>Pura desa</i>	or <i>pura Balai Agung</i> ; the village temple; temple where religious matters are discussed
<i>Pura puseh</i>	temple of the ancestors; temple of origin; temple where the founders of the village are remembered
<i>Puri</i>	palace of the nobility; a palace of former kings or a house of the second and third castes
<i>Purnama</i>	ritual which occurs every fifteen days (as does <i>tilem</i>); day of the full moon, an auspicious day for conduction séances and many other ceremonies
<i>Puskesmas</i>	<i>Pusat Kesehatan Masyarakat</i> ; Public Health Centre is a health centre provided by government in all districts (<i>kecamatan</i>) in Indonesia to facilitate health serving of the people
<i>Pustu</i>	<i>Puskesmas Pembantu</i> ; Subsidiary Public Health Centre is a health facility which assists the Public Health Centre (<i>puskesmas</i>) to serve people health in the work area of the Public Health Centre (<i>puskesmas</i>)
<i>Raja</i>	a king; ruler
<i>Ramayana</i>	one of the two major Sanskrit epics of ancient India, the other being the Mahabharata, the Ramayana consists of 24,000 verses in seven books, and 500 cantos, and tells the story of Lord Rama, whose wife Sita is abducted by the demon (Rakshasa) king of Lanka, Ravana. Thematically, the epic explores themes of human existence and the concept of dharma
<i>Ramuan</i>	mixture; name for all preparations with MAC plants which are not <i>loloh</i> or <i>boreh</i>

<i>Rangda</i>	the witch in classical Balinese drama well known to all Balinese
<i>Resi yadnye</i>	ceremonies, one of the five classifications of Hindu ritual, the so called <i>panca yadnya</i> ; rituals to consecrate a priest; ceremonies directed to holy men
<i>Sad Kahyangan</i>	the six temples; the six most sacred temples of Bali, although which temples are included in the six varies by region, commonly the following four temples are included in the selection: <i>pura Agung Besakih</i> , <i>pura Ulun Danu Batur</i> , <i>pura Luhur Uluwatu</i> and <i>pura Goa Lawah</i>
<i>Saka</i>	synonym for the <i>Sasih</i> calendar, a lunar-solar calendar also called <i>Sasih</i> or <i>Isaka</i>
<i>Sanggah</i>	the house shrine
<i>Sang Hyang Widhi Wasa</i>	God; the Almighty; the Supreme Being
<i>Sasak</i>	the people of Lombok; also used to refer to the island of Lombok
<i>Sasih</i>	the <i>Sasih</i> calendar, a lunar-solar calendar also called <i>Isaka</i> or <i>Saka</i>
<i>Satria</i>	caste of the royalty, government officials and warriors; caste members which held chief responsibility in the realm of government, in Bali usually covering those with the titles of <i>Cokorda</i> , <i>Dewa</i> , and <i>Anak Agung</i>
<i>Sawah</i>	wet-rice fields
<i>Sebaa</i>	neutral, middle, hot-cold; part of the theoretical division of the diseases following the <i>usada</i> into <i>panas</i> (hot), <i>nyem</i> (cold) and <i>sebaa</i> (neutral or middle, hot-cold)
<i>Seka</i>	interest and working group or clubs of the village (e.g. for gamelan musicians, drama performers, unmarried women, priests, students, et cetera)
<i>Sekala</i>	the manifest world, the world perceived by the senses; natural aspects; the tangible versus the intangible (<i>niskala</i>)
<i>Siwa</i>	or <i>Shiwa</i> ; the god of destruction
<i>Subak</i>	traditional water irrigation system; irrigation societies, they have an average land included of 85 hectares and they are responsible for the rotating use of water
<i>Sudra</i>	caste of the farmers and common men; its usage not considered flattering, and most commoners prefer the term <i>jaba</i>
<i>Surya Kanta</i>	organisation with founding principles to raise moral character; to improve the economy; to improve and protect the circumstances of people of the <i>Jaba</i> group; and to change those customary laws which are in opposition of progress
<i>Swah</i>	the spiritual world; the heavenly part of <i>tri loka</i>
<i>Taru premana lontar</i>	the ancient indigenous pharmacopoeia of Bali
<i>Tilem</i>	ritual which occurs every fifteen days (as does <i>purnama</i>)
<i>Tirta</i>	holy water
<i>Tis</i>	Fresh; part of the classification of plants following the <i>usada</i> : <i>nyem</i> (cold) or <i>tis</i> (fresh), <i>dumelada</i> (neutral, tempered), <i>angat</i> (warm) and <i>panas</i> (hot)
<i>Tri angga</i>	tripartite order (<i>nista</i> , <i>madya</i> and <i>utama</i>) or respectively small, medium and large
<i>Tri hita karana</i>	the ancient Balinese-Hindu principle, three-happiness-sources, which has virtually become the all-embracing Balinese philosophy of life to safeguard harmony among the three cosmic dimensions of humans, their environment and their gods, spirits and ancestors on a virtually daily base

<i>Tri loka</i>	cosmos conceptualisation of three interrelated world: the underworld (<i>buhr</i>), the human world (<i>bwah</i>) and the spiritual world of the gods (<i>swah</i>)
<i>Tumpek</i>	a day in every 35 days by the Balinese calendar; considered to be important for holding ceremonies for specific environmental elements; a thanks-given ceremonies for the gifts of natures to human kind
<i>Tumpek andang</i>	thanks-giving ceremony for animals same as <i>tumpek uye</i>
<i>Tumpek kuningan</i>	thanks-giving ceremony for the well being of the world and its contents
<i>Tumpek landep</i>	thanks-giving ceremony for all material and things made form metal
<i>Tumpek uduh</i>	thanks-giving ceremony for plants, same as <i>tumpek warige</i>
<i>Tumpek uye</i>	thanks-giving ceremony for animals same as <i>tumpek andang</i>
<i>Tumpek warige</i>	thanks-giving ceremony for plants, same as <i>tumpek uduh</i>
<i>Tumpek wayang</i>	thanks-giving ceremony for puppets
<i>Upacara</i>	ceremonies
<i>Usada</i>	traditional <i>lontar</i> manuscripts on healing
<i>Utama</i>	high; superior; referring to the different grades of ceremonies: high (<i>utama</i>), middle (<i>madia</i>), low (<i>nista</i>)
<i>Wali</i>	old Javanese word meaning ‘tribute’, ‘obligation’ or ‘gift’
<i>Wesya</i>	caste of the merchants
<i>Wisnu</i>	god of creation
<i>Wrehaspati Tatwa</i>	holy scripture of the Balinese <i>Hindu Dharma</i> faith
<i>Wuku</i>	explain also referred to as <i>pawukon</i> or <i>uku</i>
<i>Yadnye</i>	sacrificial deed
<i>Vernix caseosa</i>	the soft cheesy-like material which covers the newborn’s skin
<i>Zelfbestuur</i>	Dutch term to indicate self-government

Abbreviations

ASEAN	Association of South East Asian Nations originally formed by six countries (Brunei, Indonesia, Malaysia, Philippines, Singapore, and Thailand) and later expanded to include Cambodia, Laos, Myanmar, and Vietnam
BPS	Badan Pusat Statistik is a non-departmental government institution directly responsible to the president. BPS-Statistics Indonesia is the national institution and each province has its own department as in the case of Bali: <i>BPS Provinsi Bali</i> .
CAM	Complementary and Alternative Medicine
CBD	Convention on Biological Diversity
FAO	The United Nations Food and Agriculture Organisation
FES	Field of Ethnological Study, one of the three basic concepts of the Ethnosystems Approach, the approach this study follows.
GPA	Global Plan of Action
HALE	Healthy life expectancy; Average number of years which a person can expect to live in 'full health' by taking into account years lived in less than full health due to disease and/or injury
HDI	Human Development Index; the global standard, HDI is categorized into high (>0.799), medium (0.500-0.799) and low (<0.500).
HP	Historical Perspective, one of the three Leiden basic of the Ethnosystems Approach, the approach this study follows.
IKS	Indigenous Knowledge Systems
ILO 169	International Labour Organisation Convention 169
IUCN	The International Union for the Conservation of Nature
KLUI	<i>Klasifikasi Lapangan Usaha Indonesia</i> ; the Indonesian Standard Industrial Classification
LEAD	Leiden Ethnosystems and Development Program
MAC	Medicinal, Aromatic and Cosmetic (plants)
MEDUSA	is the name for the network on 'Identification, Conservation and Use of Wild Plants in the Mediterranean Region'. The network was formally established was formally established in June 1996, by CIHEAM (Centre International des Hautes Etudes Agronomiques Méditerranéennes) and its constituent organ MAICh (Mediterranean Agronomic Institute of Chania) (Heywood & Skoula 1999)
MDG	Millennium Development Goals
OVERALS	is the acronym used for the nonlinear canonical correlation analysis with k sets of variables
PROSEA	Plant Resources of South–East Asia, an international cooperative programmes with the main goal of documenting information on plant resources in South–East Asia
PHC	Primary Health Care
PKK	<i>Pemberdayaan dan Kesejahteraan Keluarga</i> , womens organisation focussed on health and family welfare
PV	Participant's View, one of the three basic concepts of the Ethnosystems Approach, the approach this study follows.
REPELITA	<i>Rencana Pembangunan Lima Tahun</i> ; Five Year Development Plans
SPSS	Statistical Package for the Social Sciences

TOGA	<i>Tanaman Obat keluarGA</i> ; medical family garden
TEK	Traditional Ecological Knowledge
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
WCMC	World Conservation Monitoring Centre
WECD	World Commission on Environment and Development
WHO	The World Health Organisation, a specialized agency of the United Nations created in 1948 with primary responsibility for international health matters and public health.
WWF	World Wide Fund for Nature

Summary

This ethno-botanical study has been conducted in four sample villages in the so-called ‘Cradle of Hindu-Balinese Culture’, the central-south-eastern part of Bali, Indonesia. The general aim is to document, describe and analyse the Balinese community members’ knowledge of, belief in and practices with medicinal, aromatic and cosmetic (MAC) plants in relation to community health and bio-cultural diversity conservation of MAC plants. The Ethno-systems Approach, the leading approach of this study, places the *emic* point of view central in studying the human-plant relations in Bali and focuses on the Knowledge-Belief-Practice complex of the health and healing practice in the form of the preparation and use of fresh MAC plants as home remedies. In order to realise the general aim, and taking into consideration that there are three main aspects on which this study focuses, namely community health, the conservation of MAC plant resources and the preservation of the local culture on MAC plants, seven specific objectives are realised and documented in this study:

- *firstly*: to provide a description of the Balinese research setting as a unique part of the developing nation, Indonesia, with its own distinctive geography, population and culture;
- *secondly*: to describe and analyse the *emic* perspective on the knowledge, belief and utilisation of fresh MAC plants;
- *thirdly*: to present the construction of the Balinese *emic* MAC plant classification;
- *fourthly*: to describe the complex aspects of the pluralistic medical configuration in Bali affecting community health and the Balinese knowledge, beliefs and practices pertaining to promotive, preventive and curative health and healing practices, in terms of traditional and modern medicine;
- *fifthly*: to describe and analyse Balinese knowledge of, belief in and practices pertaining to fresh MAC plants in relation to the sustainable use of these plants, substantiating the biodiversity conservation of the island;
- *sixthly*: to describe and analyse Balinese knowledge of, beliefs in and practices pertaining to MAC plants in relation to the preservation of the cultural diversity of the island;
- *finally*: to analyse the interrelationships between the various categories of factors, identifying the interaction among the factors on the Balinese community members’ utilisation and bio-cultural diversity conservation of MAC plants.

The context, in which this study is placed is introduced in Chapter 1: Bali, often praised as ‘Paradise on Earth’, the application of plants for human health, the complex health and healing system in Bali, the consequences of biodiversity loss for human health, the concept of cultural diversity in a globalising world and the need for bio-cultural diversity conservation to safeguard the community members’ knowledge, beliefs and practices concerning MAC plants. Bali, with its profound natural and cultural beauty, has been particularly well-studied, not least by the Balinese themselves. The Balinese and the Indonesian authorities are actively engaged in achieving the status of a developed country, aiming at political, economic and social stability and realising a high level of community health contributing to the ideal image as depicted by the slogan of the Balinese Ministry of Health programme on community health ‘*Perilaku hidup bersih & sehat*’; ‘Live clean and healthy’. Indonesia is following the World Health Organisation (WHO) by favouring the application of, preferably scientifically approved, traditional medicine and utilisation of plants to improve its Primary Health Care, thereby reducing poverty and generating ‘Health for All’ or, in the case of Bali, realise the ideal of a ‘Paradise on Earth’.

The term MAC plants, the abbreviation of medicinal, aromatic and cosmetic plants, is used in this study to refer to each plant reported by the respondents, the Balinese community members, to be applicable to some kind of health and healing purpose. As new uses for medicinal plants are discovered and popularised, conservation in terms of sustainability is increasingly becoming an issue; concern about the growth is inexorably accompanied by a critical need for the conservation of both species and their habitats. The medically pluralistic system in present-day Bali, in which the utilisation of MAC plants is encapsulated, is a system in which the several medical systems can be truly said to co-exist alongside each other; each with its own *materia medica*, medical paraphernalia, health and healing practices and techniques, disease classifications, disease aetiology and conceptualisation of the human body. The two main medical systems in Bali are bio-medical medicine, referred to as modern medicine, and the Balinese traditional medical system, commonly referred to by the terms *obat Bali asli* or *obat asli* or *pengobatan tradisional*; traditional medicine in this study.

The majority of the people do not choose between the systems but generate, maintain or secure health by relying on different medical systems chronologically or simultaneously. The community members' conceptualisation of health and healing is not restricted to a single system; they have created their own local disease theories and categorisations which ineluctably affect their health and healing practices and their illness behaviour. The underlying conceptualisation binding everything together is the Balinese concept of dynamically balanced, integrated wholes which is used to describe the universe, the world of humans, the human body and certain offerings. A disturbance in any integrated whole is usually thought to be caused by disharmony which might presage illness. The term community health as used in this study refers to that branch of the health service which aims to achieve the highest level of physical, mental, social, moral and spiritual health for all citizens on a community basis. Community health is shaped by the interrelationship between both the medical and social systems. The state of health of a community is co-determined by political, economic and socio-cultural factors which directly control the availability, accessibility, affordability and quality of, for example, facilities, personnel, programmes, interventions or materials. Essential to the concept of community health is that it does not focus solely on curative health care; it specifically includes the health preventive and health promotive activities.

Currently, the global community has begun to be more acutely aware of the alarming decline in the biodiversity of the Earth and the serious consequences this might have on human health and well-being. However, even more alarming is the loss of cultural diversity in terms of disappearing traditional knowledge which in some cases seems to surpass the loss of the plant species themselves. Currently, the impoverishment of biological resources in many countries is regarded as an antecedent to a decline in community or cultural diversity. Indications of this are provided in diet, medicine, language and social structure. Nowadays, a growing amount of attention is being paid to the negative impact of globalisation, tourism and modernity on present-day cultural diversity, especially in the smaller indigenous communities. Balinese society and culture have been exposed to international influences to an almost overwhelming degree over the past few decades. The growth of mass tourism in particular has had a major impact on the island, not to mention the expansion of the economy and not least the authority of metropolis and capital of Indonesia, Jakarta. The Balinese themselves engage in an active, constant debate on the issue of what is known as *balisasi* or *kebalian* (being Balinese) and they are convinced that it is necessary for their identity to remain intact to be aware of the indivisible unity of religion (*agama*), tradition (*adat*) and culture (*budaya*).

Unavoidably, in a medical anthropological study with an ethno-botanical focus, a decision has to be made about the place of humans in today's world. Humans in this study are seen as an integral part of bio-cultural diversity, not merely as observers but as users of the biological diversity and participators in cultural diversity. The growing global awareness of the 'inextricable link' between biodiversity and cultural diversity insists that more attention should be paid to the underlying human-plant relations and interactions as envisaged by the discipline of ethno-botany. Retaining the Balinese cultural identity and retaining the Balinese Traditional Ecological Knowledge (TEK), embodying such concepts as *desa kala patra* and specifically the *tri hita karana* principle, contribute to the conservation of the bio-cultural diversity of the world and specifically of Bali.

In Chapter 2, the point of embarkation for the theoretical orientation is the Knowledge-Belief-Practice complex used as a basic approach to study human behaviour, making it possible to assess the rather complicated utilisation and bio-cultural diversity conservation behaviour of the respondents as one integrated complex of human-environment relationships and interactions. The utilisation and bio-cultural diversity conservation of MAC plants is studied within the framework of ethno-botany and medical anthropology. This study, focusing on the (traditional) use of medicinal plants and the management of plant diversity by the Balinese communities, is set primarily within the methodological field of anthropology. The Knowledge-Belief-Practice complex is incorporated in the Balinese Ethno-botanical Knowledge Systems (EKS) conceptualised in this study as a specification of Traditional Ecological Knowledge (TEK). TEK is theorised to form the basis for local decision making in areas of contemporary life, including natural resource management, nutrition, food preparation, health, education and community and social organisation. EKS focuses on the botanical knowledge of local communities framed in their own, *emic*, classifications according to cultural principles in this study specifically fresh MAC plants used as home remedies by community members for health and healing purposes.

Health care in Bali is characterised by a plural medical system. This study follows the definition of a medical system, which stresses the medical-ecological interaction between behaviour and the socio-cultural structure and places a medical system in its historical-geographical context, thereby capturing the dynamics inherent in a medical system. Community members find themselves in a situation where they can subscribe to a wide range of therapies, practices, explanations, knowledge and beliefs constructs. Therefore, they see themselves as confronted by a highly complicated situation in their health seeking behaviour. Regardless of the preference for no medical contact, self-medication or a specific health care provider in the medically pluralistic situation, illness behaviour remains unmistakably connected to the understanding of how the Balinese classify the interrelated concepts of illness, their illness beliefs, behaviour and health care activities. The current *emic* disease classification of Bali integrates concepts and perceptions of the disease theory of the different medical systems, of which each has a disease theory to develop curative as well as promotive and preventive health care. The analysis of the relationships and interactions between the different factors of the health and healing behaviour derived from epidemiological, behavioural, and sociological models assumes that health behaviour in essence can be regarded as a form of consumer behaviour.

The term biodiversity conservation refers to the multidisciplinary practices intended to protect and manage all aspects of biodiversity: efforts to avoid a decline in biodiversity. The complex continuum of possible approaches to conservation forms the 'bio-centric' vision, promoting a human hands-off approach, at one extreme, and the 'anthropocentric' vision, promoting the linkage relationship between environmental protection and sustainable

development by stressing the integration of human needs in conservation, at the other. When conservation is used in this study, it relates to the second approach: sustainable development stressing the integration of human needs. The use of natural resources, whether these resources are used for medicine, food, shelter or clothing, is necessary for human survival. Consequently, conservation should not be understood literally as the maintenance of a *status quo*, but thought of in a more dynamic sense.

Cultural diversity, the variety or pluri-formity of human social structures, belief systems and strategies for adapting to situations in different parts of the world, is most apparent in the obvious cultural differences which exist between peoples. It is debatable whether these differences are merely incidental artefacts arising from patterns of human migration or whether they represent an evolutionary trait which is the key to our success as a species. Despite wide-ranging differences, it has become apparent that, although constant change is inherent in human societies and cultures, cultural diversity as a whole is declining. Recently, the complementary importance of cultural diversity, reflected in the Traditional Ecological Knowledge (TEK) relating to natural-resource management, including the use and conservation of plants and animals, has been widely documented in various sectors of knowledge, including anthropology, botany and medicine. Globalisation looms largely in the minds of many as an enormous threat to cultural diversity, given its slumbering potential to evolve into a dictatorial regime relying solely on the capitalist market-oriented consumer society, which would therefore marginalise any cultural perspective other than the economic. However, globalisation in this study is conceptualised not as the anti-thesis of identity, nor its substitute, but as a possible promoter of the diversity of culture and the flourishing of identities focusing on the situation in which globalisation and localisation tend to occur simultaneously. Therefore, the exogenous modernising processes strengthen, while the local processes are simultaneously reinforced.

There is an 'inextricable link' between nature, society, language and culture. The reassessment of the 'inextricable link' between nature and culture arouses renewed attention in the context of conservation, because of the obvious correlations and interactions between humans and their ecosystems; evolving into the so-called bio-cultural diversity model of conservation which seeks to integrate both the preservation of human life-styles and natural life forms. This study documents the link between nature and culture pertaining to the loss of language and knowledge specifically for the use of medicinal plants, in the wake of acculturation and plant and habitat destruction. This process is a major concern for the often elaborated and lengthy traditional healing programmes, which also encompass spiritual and sometimes moral roles, often applied in addition to the use of herbal therapies. The Balinese believe that keeping the balance by observing the *tri hita karana* concept is extremely important in terms of local use, management and conservation of nature and for health, well-being and happiness, since imbalance between them imposes illness.

This study uses the Knowledge-Belief-Practice complex as a basic approach to study human behaviour, leading to the analysis on the utilisation and bio-cultural diversity conservation of MAC plants. The research methodology and the specific methods and techniques applied in this study are presented in Chapter 3. The leading methodological approach in this study, the Ethnosystems Approach, features three basic elements: the Historical Perspective (HP), the Leiden concept of 'Field of Ethnological Study' (FES) and the Participant's View (PV). The focus of ethno-methodology is concentrated on the practical, everyday, common-sense reasoning of community members with respect to their lay methods. The ethno-botanical knowledge systems approach, which is part of the Ethnosystems Approach developed by the LEAD Programme of Leiden University in the Netherlands,

introduces a more dynamic and comparative dimension to the field of ethno-botany, combining a *horizontal* and *vertical* comparison between the individual and systems of plant use, management and conservation. The multivariate model allows patterns of behaviour in the Knowledge-Belief-Practice complex to be studied. Each of the variables belonging to one of the blocks of factors in the multivariate model have been operationalised into empirically measurable criteria. The blocks of factors in the model are: the pre-disposing factors, divided into the socio-demographic factors and the psycho-social factors, the enabling factors, the perceived morbidity factors, the institutional factors, the intervening factors and the dependent factors, divided into cultural diversity behaviour of MAC plants, biodiversity behaviour of MAC plants and medical utilisation of MAC plants.

The various qualitative and quantitative methods and techniques used to collect the data are divided into four separate blocks. The first block introduces participant observation and the interviewing techniques used throughout the fieldwork to collect mainly qualitative data. In the second block, free listing and pile sorting are described. These are the quantitative techniques by which the *emic* disease and *emic* MAC plant classifications are documented. The third block sets out the line of reasoning leading to the specific type of ethno-botanical survey applied in this study, combining ethno-botany and social anthropology. The feature of the fourth block is the way the household survey, the main tool for the collection of the extensive data to document the variables defined on the basis of the conceptual model, was conducted. On the basis of the empirical data collected by qualitative and quantitative research techniques, the utilisation of MAC plants is placed in its realistic medical pluralism context. Descriptive and inferential statistical techniques, univariate - bivariate, multivariate or multiple regression analyses - have been performed principally on the first of the two datasets created using the data collected by the household survey: the data on the households (N=400) and the data on the household members (N=1742).

The research setting of this study, the island of Bali, Indonesia, is presented in Chapter 4. It concentrates on the geographical, historical and socio-demographic aspects of human life related to the three main aspects of this study: community health, the utilisation and conservation of MAC plants and the preservation of the local culture. As the field of ethnological study to which the island of Bali belongs, the Republic of Indonesia is the broader context. Indonesian people depend heavily on natural resources to support their daily life; approximately 6,000 species of Indonesian plants are known to be used directly by the local people, for food, building materials, the sources of raw material for traditional Indonesian herbal medicine and as an indispensable part of ceremonies, customs and traditions. Recent data on biodiversity status indicate that Bali, and several other Indonesian islands, and for that matter other places on earth, faces a serious biodiversity crisis, particularly in the growing urban and semi-urban areas where there is a high level of ecosystem destruction, species extinction and erosion of genetic resources.

After the short introduction to the geography and biodiversity of Bali in the broader scope of the Republic of Indonesia, renowned as one of the world centres of mega biodiversity, more attention is paid to the Balinese themselves. This commences with an introduction to the large-scale general developments from prehistory, followed by a brief discussion of major historico-political developments fixing the roots of the current cultural diversity in Bali, its undeniably close relationship with the neighbouring island of Java and the positive attitude of its people towards the utilisation of MAC plants. The focus of this research is on one of the present-day Balinese cultures, the largest group living in central-south-eastern Bali and often referred to as *the* Balinese. Despite the active debate among Balinese about *balisasi* or *kebalian* (being Balinese), a new challenge has risen to maintain the essence of being

Balinese. Fewer Balinese still master all aspects of the Balinese language, while some do not master Balinese at all. Losing the ability and mastery of a language is directly related to possible loss of the (intrinsic) knowledge captured in the language, including the knowledge related to (traditional) utilisation of MAC plants.

Bali is famous for its particular social organisation, which has been repeatedly reported to be extremely complex. Despite the obvious differences between Balinese villages, expressed by the saying ‘each village has its own *adat*’, there is a strain of Balinese culture which, in its commonalities within the borders of Bali and in differences to the pan-Indonesian culture, set it apart as a distinct sub-culture in the Indonesian Republic. The keystones of *the* Balinese, as essential parts of the Balinese cultural identity, are described. This begins with the social organisation focusing on the interest and working group system (*seka*), the clan system (*dadia*), the stratification system (*kasta*), and the community system (*banjar*).

Secondly, *Hindu Dharma*, which is more than the main religion of the island, is extremely powerful in shaping and controlling the daily behaviour of the Balinese. Unlike the world religions which rely on their core of abstract basic tenets and symbols meaningful to a wide range of people, *Hindu Dharma* is highly localised. It is well-nigh impossible to conclude whether daily practices are affected more by *Hindu Dharma* or by the Balinese culture, *adat*, traditions or practices. Specifically, the Bali-Hindu religion is paramount in behavioural and emotional concepts and practices related to illness, health and healing.

Thirdly, the Balinese philosophy of life and the concept *tri hita karana*, which are major factors in shaping Balinese social life and the community members’ utilisation and bio-cultural diversity conservation behaviour of MAC plants, is discussed. In Balinese philosophy, the key is not the determination or achievement of the ‘perfect’, it is keeping the balance between the forces. The overall balance concept in Balinese society, *tri hita karana*, has virtually become the all-embracing Balinese philosophy of life safeguarding harmony among the three cosmic dimensions of humans: God (referring to all representation of *Sang Hyang Widhi Wasa*, including gods, spirits and ancestors), the *buana agung* (macrocosmos; the entire physical universe), the *buana alit* (microcosmos; the individual or the soul) on a virtually daily basis. Respecting the *tri hita karana* principle means avoiding supernatural, social, environmental and/or physical disturbances, by synchronising actions and bodily state to the supernatural cycles of activities. The Balinese calendar, described briefly, supports the community members in keeping track of the cycle of activities and indicates the right moments to perform actions so as to restore or maintain the balance.

In order to cover with the sample villages the environments in which the majority of the study population settlements are located, a village was selected at random in each one of the pre-determined areas. The description commences with a short geographical orientation of the four selected sample villages which are listed in alphabetical order:

- Angantaka located in the central lowlands, part of district Abiansemai in Badung regency;
- Bengkel, located in the coastal lowlands, part of district Kediri in Tabanan regency;
- Pelapuan, located in the mountains, part of district Busungbiu in Buleleng regency;
- Tumbu, located on the mountain slopes, part of district Karangasem in Karangasem regency.

The description of the research setting concludes with the socio-demographic and socio-economic profiles of the four sample villages. As the data indicates there were no peculiarities in the socio-demographic profiles of the villages. The caste of the majority of the respondents is *Sudra* and the villages have a close to 50-50 per cent division between males and females.

The difference in level of education in the sample can be related to villagers' ages, coinciding with the developments in the national schooling programme and the villagers' gender which still exhibits a preference for males to be more highly educated than females. The socio-economic profile includes the collective income of the households in the sample, which is collectively higher in Bengkel, even though the most respondents with the highest incomes live in Angantaka. Tumbu has the most households with the lowest income. Considering the socio-economic status of the households in the sample, Angantaka has the highest number of households in the categories 'Rich' and 'Very rich', but it is Pelapuan, not Tumbu located in the poorest Balinese regency, with the highest number of households scoring in the categories 'Very poor' and 'Poor'. In the final part of the socio-economic description, specific attention is paid to the occupation of the household members and the unemployment rate in relation to age showing that unemployment is particularly high among starters (15-24 year olds) and the elderly (65 years or older).

The broad spectrum of health and healing practices in medically pluralist Bali influencing and forming community health and the knowledge, belief and practices concerning MAC plants of the Balinese is discussed in Chapter 5. Traditional medicine, specifically the utilisation of MAC plants, has received several, mainly economically driven, boosts in recent Indonesian history. The first boost was during the Indonesia's War of Independence when orthodox medicine was in short supply. The second came as a consequence of the decision of the first president, Soekarno, that the nation must be self-supporting. The third boost came in 1997, in the wake of the economic depression following the drastic devaluation of the Indonesian Rupiah in combination with the pronounced El-Niño event bringing drought and fire hazards. At that stage, the import of raw materials for synthetic drug production had become almost non-affordable for the Indonesian drug manufacturing industry. The utilisation of MAC plants, the reliance on own resources, is now promoted by the modern medical system, following the WHO international strategies of integrating traditional medicine into the national health care policies, specifically visible in the *Tanaman Obat keluarGA* (medical family garden) or TOGA programme function as role-model gardens with medicinal plants at every *puskesmas* (*Pusat Kesehatan Masyarakat*; Public Health Centre).

The classification of MAC plants in daily use among the Balinese is a result of the process of acculturation and transculturation. From the analyses of the *emic* classification of MAC plants, it became apparent that the Balinese do have a behavioural response and link the *emic* classification with the most popular use of the plant. The twelve clusters solution of the hierarchical cluster analysis in alphabetical order are: 'Brushwood and shrubs', 'Cooking spices', 'Flowers', 'Fragrant leaves', 'Fruits and vegetables', 'Herbs', 'Rhizomes', '*Rumput*', 'Tree leaves', 'Trees', 'Tubers' and 'Weeds and grasses'. Slikkerveer & Slikkerveer (1995) indicate that traditional local classification of the flora in Indonesia encompasses five categories: 1) trees (*jenis pohon*), 2) shrubs (*jenis perdu*), 3) vegetables and herbs (*jenis bumbu dan sayur*), 4) grasses (*jenis rumput*), and 5) creepers (*jenis tumbuhan merambat*). Each of these five categories is found in the 12 clusters forming the *emic* classification.

The nomenclature of the individual MAC plants is simultaneously complex and simple. Simple because the name often betrays an obvious external specific mark of the plant or the part of the plant commonly used. Complex because the name-giving does not seem to be consistent, especially when popular herbal mixtures are concerned. The mixture might be used to indicate a plant or vice-versa. The multi-language situation complicates the naming of plants. People do mix Balinese and Indonesian. They learn the plant names and applications in Indonesian, either in the school system or by self-education, on the basis of publications in print or online, usually in Indonesian. Although Indonesian is very different from Balinese,

both semantically and also in conceptualisation, the Balinese do use the languages simultaneously and often tend to mix them. The mixing of the languages when naming plants could lead to misunderstandings when the local names (often a result of this language mixing) are connected to the plant name used in the national Indonesian language, which is more likely to be based on the Javanese conceptualisation as central government and major media are based in Java. This leads to the conclusion that, besides identification of MAC plants it is necessary to place their identification into the local context, especially in such complex situations as in Indonesia, a multi-lingual society. This demands that specific attention be paid to the name-giving in national publications.

The Balinese community members do not use the Javanese term *jamu* for their own herbal medicines. They prefer the terms *loloh*, *boreh* or *ramuan*. *Loloh* refers to any mixture of MAC plants which is prepared by grinding the ingredients and adding cold, clean water, either pre-boiled water or bottled spring water. *Boreh* is made in the same way, but instead of adding water to create a potable substance, fluids are added to achieve the right consistency to apply the mixture externally, directly onto the skin without it slipping off. *Ramuan* are all preparations made from MAC plants which are neither *loloh* nor *boreh*. Balinese use their mixtures of MAC plants for four basic functions: 1) to treat particular illnesses (curative); 2) to maintain good health (promotive); 3) to relieve aches and pains (curative) and 4) to addresses particular malfunctions of the body (preventive or promotive).

In total 168 MAC plants were named in the household interview. 117 plants (69.6%) were reported to have been used for either curative, promotive or preventives purposes during the previous twelve months by a household member. The other 30.4% plants, reported in the household survey to be known as MAC plants, were not reported to have been used in those 12 months. Of the 117 plants reported to have been used, 105 (89.7%) were used curatively, 55 (47.0%) were used promotively and 49 (41.9%) preventively. None of the reported used MAC plants was applied for preventive reasons only. Five MAC plants were reported to have been used solely for health promotion and forty-nine plants were reported to have been used for curative purposes only. The top ten plants reported by type of use shows no significant difference in plants used, indicating a fairly common use of several plants for multiple applications rather than a highly specified use of plants for specific goals. The analysis shows no significant difference between users and non-users of MAC plants considering the household members' gender, 65.1% of males (N=877) and 62.9% of females (N=847) reported use of MAC plants versus 34.9% of males and 37.1% of females who had not used MAC plants in the previous 12 months. Considering the age groups, there was a difference between users and non-users. In the age groups 0-14 years and 15-25 years old there is a close to fifty-fifty division: 46.9% non-users, versus 53.1% users (N= 431) in the first group and 58.4% non-users versus 41.6% users in the second group. In the age groups 25 to 64 years old and 65 and older the division is greater in favour of users: 26.6% non-users versus 75.4% users in the middle age group and 24.7% non-users versus 75.3% users among the elderly.

The description of the wider context of community health in Bali, the medical pluralism, is focused on the role of fresh MAC plants in the traditional and modern medical systems for either promotive, preventive or curative practices. The reported use does not exclude a visit to a representative of either modern or traditional medicine. It is common for a person even if he or she is treated by a single health practitioner to turn to such complementary health improvement actions as the use of MAC plants, which might have a beneficial effect on the primary treatment. Several informants stated that there is a considerable difference between the reliability of a *balian* and the reliability of other health practitioners. Practitioners, traditional and modern alike with the exception of the *balian*, are subject to numerous forms

of training, protocols and regulations created to avoid and punish malpractice, Balinese believe that malpractice among *balian* is actually non-existent, despite their lack of any specific schooling, certification or control system. For both types of health care it was documented that the nearest practitioners are closer than 30 minutes from each community member in the four sample villages. However, supporting Foster's (1983: 24) statement that '*people chose therapists, not medical systems*'; the respondents report as their closest representative, not the person who belongs to a particular system geographically closest to them but to the person with whom they are best acquainted.

There are three types of traditional medical practitioners to be considered in relation to the use of MAC plants: 1) the herbalist, a plant specialist who administers plants in all their healing practices; 2) the divine healers, whose practice depends upon their purported supernatural powers of diagnosis and who only occasionally administer medicinal plants, in principle those who are supposed to have special spiritual powers, the *balian* and 3) the 'witch doctor', the practitioner who is credited with the ability to intercept the devil deeds of a witch or to exorcise the evil spirit which possesses the patient. In Indonesia, as in most other developing countries, modern medicine is the dominant method of healing used in the larger hospitals, but in non-hospital care the traditional and modern health systems operate independently without a clear hierarchy and sometimes in great synergy. Until the beginning of the twentieth century, scepticism ruled among the modern medical professionals, therefore traditional medicine and its applications, including the traditional use of MAC plants, were often decried as common superstition and plain quackery. Nowadays, Balinese modern health practitioners do not oppose the use of MAC plants, although only few of them actively promote their use.

Promotive and preventive health behaviour is supported by the Balinese cosmovision reflected in traditional medicine and modern medicine. Modern medicine integrates promotive and preventive health in its policies and the local organisation of community health care observing the national health programmes integrating the Millennium Development Goals. In traditional health, in the cosmovision the harmonious balance concept is the key to health and healing. Restoring the balance can be considered either healing or curative actions whereas keeping the balance or avoiding a disturbance of the balance are practices closely related to promotive and preventive actions. In order to live a healthy life, Balinese approach health in a holistic way, including the physical and mental well-being of a person as well as her or his social and cultural surroundings, thereby referring to both the horizontal and vertical axes of balances within the Balinese cosmovision. The horizontal axis refers to being in balance with other people and nature, whereas the vertical balance means keeping balance with the underworld and God (upper world). Suryani (2006: personal communication) introduces this approach as the *bio-psycho-spirit-sosiobudaya* concept. The three integrated elements of the concept are bio (body), psycho (mind) and spirit of a person. These three interact with a person *sosiobudaya* (the socio-cultural context), all of which have to be placed within a person's environment.

The Balinese conceptualisation of health, illness and disease combines the concepts of the different medical systems, thereby generating a 'new', seemingly integrated disease theory system which stands out in the *emic* disease classification. This 'new' disease theory system is 'seemingly' integrated; because it places different perspectives derived from the different systems next to or on top of each other, rather than generating a new whole, truly integrated system, free of internal conflicts or double reasoning. On the basis of the pile-sort analysis, a ten-cluster solution emerged, in alphabetical order: 'Brain', 'Coughing', 'External', 'Fever', 'Head/throat', 'Internal system', 'Intestines/stomach', 'Organs', 'Restricted movement' and

'Skin'. The *emic* classification of disease bears a certain similarity to the categorisation of the Indonesian Ministry of Health inventories, indicating the practical overlap which exists between the different medical systems, here revealing the incorporation of modern classification in the current *emic* disease classification. The reported diseases have been put in relation to the reported curative use of MAC plants. More than half of the respondents in each disease cluster reported the use of MAC plants for their reported disease, except in the case of the unspecified disease cluster 'Other'. Here fewer than half the respondents (40%) reported using MAC plants. Specifically high are the percentages of use of MAC plants for the diseases clusters, 'Organs' (86.4%), 'Internal (system)' (85.2%) and 'External' (80%). The lowest reported use of MAC plants was for the categories 'Brain' and 'Skin diseases'.

Bio-cultural diversity conservation focuses on the sustainable use and conservation of MAC plants and the preservation of MAC plants in the local culture, on the basis of the reported behaviour of the Balinese in the sample villages, as is discussed in Chapter 6. In this study biodiversity conservation refers to the multidisciplinary practices intended to protect and manage MAC plants diversity in terms of the preservations of genes, species and ecosystems in order to avoid a decline in biodiversity. Sustainable use of natural resources is a more realistic approach to bio-cultural diversity conservation than the hands-off conservation approach, which is out of kilter with the Balinese cosmovision in which humans are an integrated part of the cosmos. In 1992, leaders of all Southeast Asian countries, including Indonesia, signed the Convention of Biological Diversity, hereby acknowledging the importance of the environment and signalling their intention to participate in the international quest for sustainable development. More often than not, biodiversity policies and the conservation behaviour of people are directly related to the economic value of plants. Having legislation, implemented or not is obviously no guarantee or motivation for the general public to apply sustainable practices to MAC plants if they do not experience or recognise the imminent crisis. Overall, it can be concluded that there is a general consensus among the Balinese community members that MAC plants are not available in large quantities in their direct surroundings. It is most remarkable that ninety respondents (22.5%) had no idea of the number of MAC plants to be found in the forest, and forty-six respondents (10.5%) had no idea of the number of MAC plants to be found in the village, which indicates either absence of knowledge or a low interest in or affinity with non-cultivated MAC plants, since all the other finding places, such as the *ladang*, *sawah* and gardens, are cultivated areas. A sense of urgency should be aroused among the community members, since the implementation of conservation practices and the sustainable management of the biodiversity of Indonesia without local peoples' involvement or participation has shown to be virtually impossible.

The cultural conservation of MAC plants by the Balinese is embedded in their conservation patterns of resource use and management, their Traditional Ecological Knowledge (TEK) system in the broad sense and in their ethno-botanical knowledge systems (EKS). Change itself is not a determinant of the loss of cultural diversity, since cultures are dynamic systems; traditions are being renewed and recaptured by each generation during the transference of the cultural inheritance. Nevertheless, it is essential that the change occurring in a society is initiated or at least consciously directed or controlled by the community members themselves and not by external agents. The latter often leads to the replacement or even annihilation of cultural traditions, practices, morals or values. Continuance of the cultural heritage is embedded in the transference of knowledge and belief and by its operationalisation in practices. However, there is a paradox in the cultural conservation of MAC plants knowledge. Conservation of the knowledge of MAC plants, for example in the transcribing of the *lontar*, removes it from its context. Balinese traditions require a person to

be spiritually ready to read the *lontar*. If a person is not ready spiritually, she or he should not dabble in this particular knowledge. Several respondents, for instance, indicated that there were no longer *balian usada* in their village who still practised because she or he was too old. None of the respondents really wondered why nobody else had taken up the practice, as it is considered to be part of the course of life; whatever will be, will be. It is even harder to find people who are familiar with the relationship between Balinese cosmology and the use of MAC plants.

The bio-cultural diversity conservation of the island and the sustainable use of natural and cultural resources in relation to the ancient Balinese-Hindu philosophy of *tri hita karana* are inextricably entwined. *Tri hita karana* forms the *corpus* in the Knowledge-Belief-Practice complex of Bali. The concept provides guidance in maintaining the harmonious relationships between and within the human world (*pawongan*), the natural world (*palemahan*) and the spiritual world (*parahyangan*). It inexorably ushers in a traditional, practical way of performing the 'newly', re-invented, bio-cultural complex and therefore embodies the principle by which the Balinese can conserve their bio-cultural diversity sustainably. In order to be successful, every community resource management programme or initiative should concentrate on reinforcing the local institutions, including the *desa/banjar adat*, *subak*, *pura* and *seka*, thereby raising the level of understanding of the knowledge and philosophy underlying the present-day Balinese practices, including their material and performances arts. The Balinese believe that realising such a form of a community resource management would bring back the *gaya* (powerful, energetic) way of local life, thereby making optimal use of the local potential and resources.

Social change in Balinese society is partly blamed on the influx of foreigners. It is often stated that change arrived just as mass tourism began in Bali. Ironically, the resulting dichotomy in Balinese tradition versus tourist-born modernity was the same dichotomy which expressed Western anxieties about the 'dangers' of tourism. Bali the oriental paradise has played a part in Western modernity as an example used to show what is lost in the process of becoming modern. Tourism has been a force of modernisation and of conservation of the past as a frozen 'tradition'. Besides the obvious downsides of the impact of tourism on resources such as the negative impact on land and water resources among others, there are some positive effects of tourism. The most obvious being the cash flow which has caused an economic boost. Furthermore, tourism has stimulated the diversification of and improvement in agricultural products. Respondents in the four sample village do not acknowledge a great difference in the impact of tourism on the three aspects of MAC plants; the impact on cultural diversity of MAC plants is experienced a little more highly, scoring 26.8% on the average impact versus about 18% in case of utilisation and biodiversity and 4.8% high impact versus about 2% on utilisation and biodiversity. This phenomenon can be explained by the fact that various Balinese herbalists and *balian* receive a high number of foreign patients seeking their advice, as such encouraging the community members to re-evaluate their own perception of the significance of the use of MAC Plants.

The utilisation of MAC plants which brings an obvious enrichment to community health, simultaneously poses a considerable threat to the health of an individual. The main argument of modern medical professionals who have a negative attitude towards the use of herbal medicine, be it home or industrially produced, fresh or dried, is the fact that quality control and the determination of the efficacy of the concoctions is extremely difficult; moreover, basic proof of users' safety on the basis of clinical trials is often absent for the majority of traditional herbal medicines. The use of herbal medicine has a long tradition, partly based on trial and error. The specific utilisation of plants differs between the ethno-cultural groups

living in diverse ecosystems in Indonesia. A plant species used in Bali might not be used for the same disease in Java or vice-versa, and differences are even greater with ethno-cultural groups in other Indonesian islands characterised by different types of flora and fauna. Same local names adopted by the local application from the Indonesian language may very well refer to different species, as is illustrated by the difference between Bali and Java of the *kayu manis*. Furthermore, preparations of *jamu* or in the Balinese case *loloh*, *boreh* or any type of *ramuan* should be carried out in hygienic surroundings and wet mixtures especially should not be kept long since they are a perfect breeding ground for bacteria. One section of the botanic garden of Bali is specifically devoted to medicinal plants, recognising the value of these plants for health and healing. At the entrance, however, visitors find a clear warning of the possible threats of the uncontrolled use of (MAC) plants.

In addition to the debate on the efficacy and quality of the ingredients and the manner of preparation, there is the unregulated or inappropriate use of traditional medicines and practices which can have negative or dangerous effects. Unconsidered and uncontrolled use of MAC plants can also lead to overharvesting and will induce further loss of biodiversity because of ecosystem disruptions. All 168 MAC plants named in the household interviews have been cross-checked in 2008 with the IUCN Red List. Seven MAC plants named in the household interviews are incorporated into the IUCN Red List. In conclusion, it can be stated that the two species marked as vulnerable (VU) on the IUCN Red List are not in great demand in their application as freshly used MAC plants for self treatment. Nevertheless, it is not within the scope of this research to examine the demand for these two species for the industrial herbal products. The utilisation of MAC plants certainly contributes to the improvement of the community health in Bali. However, it only makes a positive contribution if used properly and with caution. Therefore, it is essential that the traditional knowledge, beliefs and practices concerning MAC plants are transferred to the younger generation in order to develop and implement sustainable ways of MAC plant utilisation. Only in this way will both the MAC plants and MAC plant knowledge, beliefs practices remain at the disposal of future generations.

The interrelationships of the various categories of factors are analysed, identifying the interaction between the various factors in relation to the Balinese community members' utilisation and bio-cultural diversity conservation of MAC plants in Chapter 7. Firstly, the steps taken to translate the documented measurable data collected by the household surveys into categories of the variables are mentioned. Thereafter, the statistical analyses conducted at the household level are presented. The statistical analyses are conducted in order to obtain an insight into the main factors interacting with the Balinese community members' behaviour. Bivariate, multivariate and multiple regression statistical analyses of the variables and the blocks of factors of the multivariate model are used to assess, understand and explain the interrelationships of the various blocks of factors of MAC plant utilisation and bio-cultural diversity conservation. It is clear from the results of the bivariate analysis presented that, although some relationships are significant and do confirm only certain assumptions, there are no strong one-to-one relationships between any one of the independent or intervening variables and one of the three dependent variables. Hence, in this study the bivariate analysis is less suitable to bring strong interactions to light.

In addition, the multivariate model makes it possible to assess this rather complicated bio-cultural diversity conservation behaviour of respondents as one integrated complex of human-environment relationships and interactions connecting the individual with the system level. The multivariate OVERALS analysis identifies seven strong variables on the first or second dimension in the OVERALS solution: *Village* ('Village'), *Caste* ('Caste'), *Belief in Modern*

Medical System ('BeliefMMS'), *Family income* ('IncomeHH'), *Reported disease* ('RepDisease'), *Government* ('Government') and *Increased use of resources* ('Overuse'). The variables *Family income* ('IncomeHH') and *Reported disease* ('RepDisease'), both strong variables in the total OVERALS solution, are situated in a different quadrant to the dependent variables indicating that, although both these variables are strong in the total solution, there is no direct relationship between these two variables and the dependent variables. The variables *Caste* ('Caste') and *Belief in Modern Medical System* ('BeliefMMS') are strong in the OVERALS analysis with a correlation to *Cultural Diversity Conservation of MAC plants* ('CultMAC'). The higher the caste, the higher the cultural conservation level, thereby confirming the indicated involvement of the higher caste in, for instance, the conservation of knowledge of MAC plants in the *lontar* by the priest and *balian* and their more active involvement in the *kebalian* discussion of which one goal is the conservation of the Balinese-ness, including traditional knowledge systems. It is remarkable that a strong belief in the modern medical systems corresponds to a high cultural diversity conservation behaviour. This interesting relationship, however, can be explained by the fact most Balinese, as other people worldwide, recognise the shortcomings of the modern medical system and therefore have a positive approach towards the conservation of knowledge, beliefs and practices concerning MAC plants, in the hope that modern medicine might be able to develop new or improved medicines on the basis of on such traditional knowledge and practice.

The other three variables *Increased use of resources* ('Overuse'), *Government* ('Government') and *Village* ('Village') emerge both in as strong variables in the total OVERALS analysis and in the multiple regression analysis. The relationship found in the solution between *Government* ('Government') and the dependent variables *Biodiversity conservation of MAC plants* ('BioMAC') and *Utilisation of MAC plants* ('UseMAC') indicates that a highly perceived impact of the government on MAC plant utilisation and bio-cultural diversity conservation results in the opposite behaviour, namely: relatively low utilisation of MAC plants. The majority of the respondents perceived the impact of the government as positive. This positive impact can be understood as the cautious utilisation of MAC plants bearing in mind safety and quality issues incorporated in government policies, which in turn leads to lower utilisation. The negative relationship between *Government* ('Government') and *Biodiversity conservation of MAC plants* ('BioMAC') indicates that the Balinese will take matters into their own hands and present a high biodiversity conservation behaviour if they perceive a low impact of the government.

As expected, *Village* ('Village') came out as one of the strong factors in all analyses, in practice representing someone's bio-cultural diversity environment. Each of the villages was selected in a different geographical area, thereby marking the difference in their biological environment. The principle of *desa kala patera* which is widely accepted in Balinese culture means that each village has its own cultural pattern. The OVERALS analysis also shows the 'inextricable link' between biodiversity and cultural diversity conservation behaviour documented by the interrelationship in the solution of *Awareness of local institutions linked to cultural diversity of MAC plants* ('AwareCult') and the dependent variables *Utilisation of MAC plants* ('UseMAC') and *Biodiversity conservation of MAC plants* ('BioMAC'). These analyses affirm that the knowledge and awareness of biodiversity conservation of MAC plants obviously do have a positive effect on the use and biodiversity conservation of MAC plants. The high correlation between the variables *Belief in Tri hita karana* ('BeliefTHK') and *Cultural Diversity Conservation of MAC plants* ('CultMAC'), reconfirms the important role of the Balinese Hindu principle of *tri hita karana* in the utilisation and bio-cultural diversity conservation of MAC plants.

The conclusion of the multiple regression analysis confirms that the ‘Institutional factors’ emerge as the strongest block of factors interacting with the dependent factors. Therefore, the block of dependent variables has the strongest relationship with the variables *Awareness of local institutions linked to MAC plant use* (‘AwareMAC’), *Awareness of local institutions linked to biodiversity of MAC plants* (‘AwareBio’) and *Awareness of local institutions linked to cultural diversity of MAC plants* (‘AwareCult’), individually these variables do not come forward as strong variables in any of the other analyses. In the bivariate analyses, it could not be established whether there was a significant association on the basis the Pearson’s Chi-square values and while the values of Spearman’s Rho between the institutional variables and the dependent variables indicate a weak direct relationship. In the OVERALS analyses the institutional variables stand out as variables of moderate strength. However, since the institutional variables control the strongest interaction with all the other variables and blocks of factors influencing the Balinese community members’ behaviour, they are the strongest indicators of the dependent factors. The second strongest block of factors in the multiple regression analysis is the psycho-social factors, thereby defining that such so-called ‘invisible’ factors as belief systems and local philosophies of nature and the environment, are strong factors in determining the Balinese community members utilisation and conservation of MAC plants.

The conclusions of this study of the Balinese community members’ knowledge of, belief in and practices with MAC plants for community health, the use and conservation of MAC plant resources and the preservation of the local culture on MAC plants are presented in Chapter 8. In conclusion, this medical anthropological/ethno-botanical study documents, describes and analyses the undeniable interconnectivity of local community health, biodiversity and cultural diversity, at the level of the community members from an *emic* point of view, thereby paying special attention to the underlying human-plant relations and interactions. Currently, the global community is beginning to recognise the alarming decline in the biodiversity of the Earth and the serious consequences this holds for human health and well-being. The government of Indonesia acknowledges that maintaining the biodiversity of the country is fundamental to the integrity of its environment, and that its loss will impact negatively on the economic development plans of the country, as well as the health of its people. Indonesia ranks second in the worldwide top ten of ‘centres of megadiversity’. In the diversity of its plants, Indonesia ranks fifth in the world. However, recent data on biodiversity status in Indonesia and Bali indicate that they are facing a serious biodiversity crisis and that biodiversity protection programmes and policies are failing at both national and regional levels. The implementation of policies and legislation in relation to sustainable development and the actual management of bio-cultural diversity in Indonesia have been proven to be very difficult, if not impossible without the local people’s involvement or participation, since they have to change their way of living, adapting their behaviour. Supporting the vision of Pitana (1999) on globalisation, namely: that if global structures can affect the local structures, globalisation should at the very least usher in the possibility that the local structures can also intervene in the global structures, and his observation that today in Bali, globalisation and localisation do occur simultaneously. The theoretical orientation supports the application of the Knowledge-Belief-Practice complex as a basic approach to the study of human behaviour and makes it possible to assess the rather complicated bio-cultural diversity conservation behaviour of respondents as one integrated complex of human-environment relationships and interactions. Particular attention has been paid to the Balinese cosmovision, specifically *tri hita karana* and the so-called ‘invisible’ factors - belief systems and local philosophies of nature and the environment - which are strong factors in determining the Balinese community

members' use and conservation of MAC plants. The Ethno-systems Approach and the conceptual model provide a suitable framework for the formulation and identification of the data to be collected and the basis of the quantitative analyses assessing Balinese systems of knowledge, beliefs and practice in a more dynamic context of processes of development and change. On the basis of the implementation of the main research methodology and the execution of the selected research methods and techniques on data collection and analysis, the seven specific objectives of this study in Bali have been achieved. The main results described in the preceding chapters are elaborated on by specific objective in Chapter 8.

Finally, the theoretical, methodological and practical implications are described. This study seeks to contribute to further theory development in the multidisciplinary fields of medical anthropology, medical ethno-botany, bio-cultural diversity conservation and sustainable development. It also contributes to the more detailed documentation and argumentation by which to perceive the practical problem-solving offered by indigenous knowledge, part of the Traditional Ecological Knowledge (TEK), is more than mere 'common knowledge' and is in its own way scientific. Indeed, since it is empirical, experimental and systematic and as such compatible with modern science, it bridges the artificial gap between 'scientific' knowledge and 'traditional' knowledge. The utilisation of MAC plants is placed in its realistic pluralistic medical configuration showing that the practices of fresh MAC plant utilisation for health and healing practices transcend the boundaries of the knowledge and belief systems belonging to one single medical system. The Corpus-Cosmos-Praxis or Knowledge-Belief-Practice complex of the local people combines theories and approaches from the main medical systems into an integrated whole, legitimising the utilisation of MAC plants in the medically pluralistic situation, and is substantiated by the *emic* classification of MAC plants and the *emic* classification of diseases.

As a general approach, this study uses the ethno-scientific analysis of the medicinal plant resource perception and use in the context of action-related decisions made by local Balinese people in real-life situations. This approach generates new information about the factors related to the ethno-botanical/medical-anthropological processes which operate in the socio-medical environment of Balinese communities, obviously linking the bio-cultural interrelationships between human behaviour and the biological systems around them. The application of the Ethno-systems Approach and the defined multivariate model of this study help substantiate the concept of 'Evidence-Based Bio-Cultural Conservation', which promotes the selection, analysis, understanding, evaluation and integration of meaningful and applicable evidence of bio-cultural management and conservation in community development activities. The statistical analysis reconfirm that the utilisation and conservation of MAC plants of the community members has to be supported by multivariate analyses in order to document the interrelationships in the blocks of factors of the multivariate model.

The practical implications of the study include the identification of factors which contribute strongly to the utilisation and conservation of MAC plants from a community members' perspective as presented in Chapter 7 and in the conclusions. Overall, the community members reported numerous applications of MAC plant utilisation for curative, preventive and promotive reasons. Whether the use of the MAC plants for the reported disease is exclusive utilisation, complementary utilisation to other treatments or used for secondary symptoms or discomfort during the disease episode is, however beyond the scope of the present study.

The TOGA programme does indeed achieve the goal that medicinal plants are part of the gardens of the Balinese community members, but the variation is low, which might in the long term result in a greater distancing of community members' broader knowledge and

management of the MAC plants diversity in terms of preservation of genes, species and ecosystems. Although TOGA is a mandatory programme, each *puskesmas* (*Pusat Kesehatan Masyarakat*; Public Health Centre) and *Pemberdayaan dan Kesejahteraan Keluarga* (PKK, Women's Organisation for Health and Family Welfare) decide the intensity of time and money to be spent on the programme, influencing the effect. More specifically, because of the multilingual situation in Bali, the decline in face-to-face information transference contacts and the rise in the popularity of the use of MAC plants, in the wake of the 'back to nature' movement, more education will be necessary to stress the efficacy, quality and safety of the use of plants for health and healing practices. This will be an attempt to respect the wide variety of possible applications, since generally a single MAC plant can be applied to treat more than a single symptom. Above all the community members should become aware of the possible side-effects of MAC plants and they should be able to recognise the right species. Therefore, it is strongly recommended that besides local or vernacular names of plants, a reference to the botanical or scientific names is included in all forthcoming publications on MAC plants, preferably with unequivocal photographic identification. Especially since people use these publications for home use without any intervention or consultation with a herbal expert. In conclusion it is obvious from this dissertation that the application of MAC plants is an enrichment of community health, however legislation and policies should ensure that MAC plant utilisation does not become a threat to either human health or biodiversity in Bali.

The *tri hita karana* philosophy fulfils a major role in current and future community resource management practices, which include the social, cultural and economic aspects of the community. This is because the contents of the *tri hita karana* are familiar to the Balinese people. In order to be successful, programmes and initiatives directed towards community resource management should concentrate on reinforcing the local institutions, including the *desa/banjar adat*, *subak*, *pura* and *seka*. It is believed that the realisation of this type of community resource management will revive the *gaya* (powerful, energetic) way of local living, thereby making optimal use of the local potential and resources. In relation to the bio-cultural diversity conservation behaviour of community members towards MAC plants and the island of Bali in general, it has been extensively documented that community members are willing to assume their responsibility in order to safeguard a future for the next generation. There are numerous good initiatives among the community members, new legislation and policy development, if possible funding, should be directed towards the creation of space for these community initiatives to grow. Then the Balinese in the spirit of *tri hita karana* and *desa kala patera* can contribute to the conservation of the bio-cultural diversity of the island.

Samenvatting

Deze etnobotanisch studie is uitgevoerd in vier dorpen in de zogenoemde ‘Bakermat van de Hindu-Balinese Cultuur’, het centraal zuidoostelijke deel van Bali, Indonesië. Het algemene doel is het documenteren, beschrijven en analyseren van kennis, geloof en gebruik met betrekking tot medicinale, aromatische en cosmetische (MAC) planten in relatie tot de volksgezondheid en het behoud van de bioculturele diversiteit van MAC planten van de Balinese lokale bevolking. De *Etnosystems Approach*, de hoofdenadering van dit onderzoek, plaatst het *emic* perspectief centraal in de studie van de relatie tussen mensen en planten in Bali en concentreert zich op het Kennis-Geloof-Gebruik complex, ook bekend als *Corpus-Cosmos-Praxis* complex, in relatie tot gezondheidszorg door middel van het gebruik en de bereiding van verse MAC planten. Om het algemene doel te realiseren in relatie tot de drie aspecten waarop deze studie zich richt, namelijk de volksgezondheid, de bescherming van MAC planten en het behoud van de plaatselijke cultuur gerelateerd aan MAC planten, zijn er zeven specifieke doelstellingen gerealiseerd en gedocumenteerd in deze studie:

- *ten eerste*: het presenteren van een algemene beschrijving van het onderzoeksgebied Bali, als een unieke provincie van Indonesië, met een eigen specifieke geografie, bevolking en cultuur;
- *ten tweede*: het beschrijven en analyseren van het *emic* perspectief van de kennis, geloof en gebruik in relatie tot verse MAC planten;
- *ten derde*: het documenteren van de *emic* classificatie van MAC planten in Bali;
- *ten vierde*: het beschrijven van de complexe aspecten van de pluralistische medische configuratie in Bali die van invloed zijn op de volksgezondheid en de Balinese kennis, geloof en gebruik met betrekking tot promotieve, preventieve en curatieve gezondheidszorg in relatie tot de traditionele en de moderne geneeskunde;
- *ten vijfde*: het beschrijven en analyseren van de relevantie van de Balinese kennis, geloof en gebruik met betrekking tot MAC planten in relatie tot het duurzaam gebruik van deze planten, die bijdraagt aan de bescherming van de biodiversiteit van Bali;
- *ten zesde*: het beschrijven en analyseren van de relevantie van de Balinese kennis, geloof en gebruik met betrekking tot MAC planten in relatie tot het behoud van de culturele diversiteit van het eiland;
- *ten slotte*: het analyseren en identificeren van de (inter)relaties en interacties tussen de verschillende categorieën van de factoren gerelateerd aan de Balinese lokale bevolking hun gebruik en behoud van de bioculturele diversiteit van MAC planten.

In hoofdstuk 1 wordt een algemene introductie gegeven op de verschillende onderdelen waarbinnen deze studie wordt geplaatst: Bali, vaak geprezen als ‘Paradijs op Aarde’, de toepassing van planten in de lokale gezondheidszorg, het complexe medische systeem in Bali, de gevolgen van het verlies van biodiversiteit voor de gezondheid van de mens, het concept van culturele diversiteit in een globaliserende wereld en de noodzaak van het behoud van de bioculturele diversiteit ter bescherming van kennis, geloof en gebruik met betrekking tot MAC planten van de lokale bevolking.

Bali heeft een rijke cultuur en natuur, die uitgebreid bestudeerd en gedocumenteerd is, ook door de Balinezen zelf. De Balinese en de Indonesische regering werken momenteel actief aan het bereiken van de status van ‘*developed country*’ waarbij deze zich richten op het bereiken van politieke, economische en sociale stabiliteit en het realiseren van een hoge

kwaliteit van gezondheidszorg. Dit draagt bij tot het realiseren van het ideaalbeeld, samengevat in de slogan van het Balinese Ministerie van Volksgezondheid voor het volksgezondheid programma '*Perilaku hidup bersih & sehat*' ('Leef rein en gezond'). Indonesië volgt het advies van de Wereld Gezondheid Organisatie (WHO) en steunt het gebruik van, bij voorkeur wetenschappelijk erkende, traditionele geneeskunde en planten ter verbetering van de primaire gezondheidszorg (*Primary Health Care*), met als doel de armoede terug te dringen en 'Gezondheid voor Iedereen' (*Health for All*) te realiseren. Indirect zou deze benadering een bijdrage kunnen leveren aan het ideaalbeeld van Bali als 'Paradijs op Aarde'.

De term MAC planten, de afkorting die staat voor medicinale, aromatische en cosmetische planten, wordt in deze studie gehanteerd voor elke plant waarvan door de respondenten van deze studie, namelijk de lokale bevolking, is aangegeven dat deze gebruikt kan worden ten behoeve van de gezondheidszorg. Momenteel worden er steeds meer toepassingsmogelijkheden van medicinale planten ontdekt en worden ze steeds meer gebruikt. Daarom wordt het duurzaam gebruik van deze planten een steeds belangrijker aandachtspunt. De bezorgdheid over de teelt en het gebruik gaan onverbiddelijk vergezeld van een noodzakelijke aandacht voor de instandhouding van zowel de plantsoorten als hun leefgebieden.

Het pluralistische medisch systeem van Bali, vormt het kader voor het gebruik van MAC planten en is een systeem waarin verschillende medische systemen daadwerkelijk naast elkaar bestaan. Elk heeft zijn eigen *materia medica*, medische *paraphernalia*, methoden, praktijken, classificaties van ziekte, etiologieën en conceptualisering van het menselijk lichaam. De twee belangrijke medische systemen in Bali zijn de biomedische geneeskunde, ook wel moderne geneeskunde genoemd, en het etnomedische systeem, benoemd als *obat Bali asli*, *obat asli* of *pengobatan tradisional*, en in dit onderzoek aangeduid als de traditionele geneeskunde. Echter, de meerderheid van de Balinezen kiest niet voor één van de systemen. Zij verwerven, handhaven of stellen hun gezondheid veilig door zich te wenden tot de verschillende medische systemen, zowel opeenvolgend als gelijktijdig. De perceptie van gezondheid en geneeskunde van de lokale bevolking is ook niet beperkt tot de denkbeelden van één enkel systeem. De bevolking heeft inderdaad eigen lokale gezondheidstheorieën en ziekteclassificaties gecreëerd die onvermijdelijk gevolgen hebben voor hun perceptie van gezondheid en hun gezondheids- en ziektegedrag. De verbindende factor hierbij is het Balinese concept van het behoud en het herstellen van het evenwichtige tussen en binnen de componenten van het universum. Disharmonie in de relaties kan een voorbode zijn van ziekte.

De term volksgezondheid (*community health*) in deze studie omvat alle diensten en maatregelen met het doel om het hoogste niveau van fysieke, psychische, sociale, morele en geestelijke gezondheidstoestand voor alle burgers te bereiken. Volksgezondheid wordt gevormd door zowel medische als sociale systemen. De staat van de gezondheid van een gemeenschap wordt bijgevolg mede bepaald door politieke, economische en sociaal-culturele factoren die rechtstreeks de beschikbaarheid, toegankelijkheid, betaalbaarheid en kwaliteit beïnvloeden van bijvoorbeeld voorzieningen, personeel, programma's, interventies en materialen. Essentieel voor het concept volksgezondheid is dat het niet alleen gericht is op de curatieve zorg. Het omvat specifiek ook alle preventieve zorg en activiteiten gericht op het behoud en management van de gezondheid.

De mondiale gemeenschap wordt zich steeds meer bewust van het alarmerend verlies van de biodiversiteit van de aarde dat ernstige gevolgen heeft voor de gezondheid en het welzijn van de mensheid. Nog meer verontrustend is echter het verlies van culturele diversiteit in termen van het verdwijnen van de traditionele kennis, dat zelfs het verlies van bijvoorbeeld bepaalde plantensoorten lijkt te overstijgen. Momenteel wordt het verlies van de biologische

rijkdommen in veel landen zelfs beschouwd als een voorbode van het verlies van maatschappelijke en culturele diversiteit. De eerste tekenen hiervan uit zich reeds in de voedingspatronen, het gebruik van geneesmiddelen, de lokale talen en sociale structuren.

Tegenwoordig wordt er in toenemende mate aandacht besteed aan de negatieve gevolgen van de globalisering, toerisme en moderniteit voor de huidige culturele diversiteit, vooral voor de kleinere inheemse gemeenschappen. De Balinese samenleving en cultuur zijn het grootste gedeelte van de afgelopen decenia blootgesteld aan internationale invloeden. In het bijzonder heeft de groei van het massatoerisme, alsmede de uitbreiding van de (industriële) economieën en niet in de laatste plaats het gezag van Jakarta, hoofdstad van Indonesië, grote gevolgen gehad voor het eiland. De Balinezen onderhouden een actief debat over hetgeen bekend is geworden als *balisasi* of *kebalian* ('het Balinees-zijn') en men is ervan overtuigd dat het essentieel is voor het behoud van de eigen cultuur om zich bewust te zijn van de ondeelbare eenheid tussen hun godsdienst (*agama*), tradities (*adat*) en cultuur (*budaya*).

In het kader van een medisch antropologische en etnobotanische studie, wordt een keuze gemaakt worden ten aanzien van de plaats van de mens in het universum. Mensen worden in deze studie gezien als een geïntegreerd onderdeel van de bioculturele diversiteit. Ze zijn dus niet alleen de observator, maar ook de gebruikers van de biologische diversiteit en participanten in de culturele diversiteit. De stijgende bewustwording van het 'onlosmakelijk verband' tussen biodiversiteit en culturele diversiteit vereist dat er meer aandacht wordt besteed aan de onderliggende (inter)relaties tussen mensen en planten als een belangrijk kenmerk van de moderne etnobotanie, als een zelfstandige discipline. Behoud van de Balinese culturele identiteit en de Balinese Traditionele Ecologische Kennis (TEK), die gebaseerd zijn op de lokale filosofische concepten zoals het *tri hita karana* principe omvat, die bijdragen tot de bescherming en behoud van de bioculturele diversiteit in Bali en de rest van de wereld.

De theoretische benadering met het Kennis-Geloof-Gebruik (*Knowledge-Belief-Practice*) complex als centraal concept wordt geïntroduceerd in hoofdstuk 2. Het complex wordt gebruikt als een fundamentele benadering voor de studie van het menselijk gedrag. Hierdoor is het mogelijk het complexe gedrag van de respondenten in relatie tot het gebruik en behoud van de bioculturele diversiteit van MAC planten te benaderen als één geïntegreerd complex van relaties en interacties tussen de mens en zijn omgeving. Deze medisch antropologische en etnobotanische studie naar het gebruik en het behoud van de bioculturele diversiteit van MAC planten concentreert zich op het (traditionele) gebruik van MAC planten en het beheer van de plant diversiteit door de Balinese gemeenschap en past met name de antropologische methodologie toe. Het Balinese Kennis-Geloof-Gebruik complex komt naar voren in het Etnobotanische Kennis Systemen (EKS), een onderdeel van de Traditionele Ecologische Kennissystemen (TEK). TEK ligt mede aan de basis van lokale besluitvorming op verschillende domeinen van het dagelijkse leven zoals het beheer van natuurlijke hulpbronnen, voeding, de bereiding van levensmiddelen, gezondheidszorg, onderwijs en de maatschappelijke organisatie. EKS concentreert zich op de botanische kennis van de lokale bevolking zoals de lokale *emic* classificatie die de eigen culturele principes volgt en hoofdonderwerp van deze studie het gebruik van verse MAC planten als zelfzorgmiddelen.

De gezondheidszorg van Bali wordt gekenmerkt door een pluralistisch medisch systeem. Deze studie volgt de definitie van een medisch systeem, waarin de medisch-ecologische interactie tussen het gedrag en de sociaal-culturele structuur benadrukt wordt en een medisch systeem in zijn historisch-geografische context geplaatst wordt en waarin de dynamiek van het medisch systeem te uitdrukking komt. Balinezen kunnen binnen dit pluralistisch medisch systeem een beroep doen op een breed scala van therapieën, gebruiken, verklaringen, kennis, geloven en overtuigingen. Zij worden geconfronteerd met een uiterst complexe situatie bij

hun gezondheids- dan wel ziektegedrag. Ongeacht de keuze voor het vermijden van medisch contact, het overgaan op zelfmedicatie of beroep doen op een medisch specialist van één van de medische systemen, wordt hun gedrag beïnvloedt door de met elkaar verweven concepten van gezondheid en ziekte, classificatie van ziekte en de beschikbare diensten in gezondheidszorg. De huidige Balinese *emic* ziekteclassificatie integreert concepten en ideeën van elk van de ziekte-theorieën behorende tot één van de verschillende medische systemen waarop zowel de curatieve als promotieve en preventieve gezondheidszorg van de systemen gebaseerd zijn. De analyse van de relaties en interacties tussen de verschillende factoren van epidemiologische, sociologische en gedragsmodellen gaat ervan uit dat gezondheidsgedrag beschouwd kan worden als een vorm van het consumentengedrag.

Met de termen van instandhouding, behoud en bescherming van biodiversiteit worden de multidisciplinaire praktijken bedoeld ter bescherming en beheer van alle aspecten van biodiversiteit: alle inspanningen die een verlies van de biodiversiteit trachten te voorkomen. Het complexe continuüm van alle mogelijke benaderingen voor deze instandhouding wordt gevormd door aan het ene uiteinde de ‘*bio-centric*’ visie, die geen menselijke bemoeienissen toelaat en aan het andere uiteinde de ‘*antropocentric*’ visie, die milieubescherming direct koppelt aan duurzame ontwikkeling waarbij de menselijke behoeften geïntegreerd zijn in de instandhouding. Deze studie volgt de tweede benadering van instandhouding: de duurzame ontwikkeling waarbij de integratie van de menselijke behoeften wordt benadrukt. Het gebruik van natuurlijke bronnen, zoals voor geneeskunde, voeding, onderdak of kleding, zijn noodzakelijk voor het overleven van de mensheid. Bijgevolg dient ‘instandhouding’ niet letterlijk te worden begrepen als het onderhoud van een status quo, maar in een meer dynamische zin.

Culturele diversiteit, de variatie in menselijke sociale structuren, geloofsystemen en strategieën voor het aanpassen aan de situaties in verschillende delen van de wereld, is het meest zichtbaar in de (materiële) culturele verschillen die bestaan tussen volken. Het is onduidelijk of deze verschillen voortkomen uit louter toevallige ontwikkelingen die voortvloeien uit de patronen van de menselijke migratie of het gevolg zijn van het evolutionaire proces. Hoewel constante verandering inherent is aan de menselijke samenlevingen en culturen, is het ondanks de grote verschillen duidelijk dat de algehele culturele verscheidenheid tans afneemt. Onlangs is het belang van culturele diversiteit, wat tot uiting komt in de Traditionele Ecologische Kennis (TEK) met betrekking tot natuurlijke hulpbronnen inclusief het gebruik en behoud van planten en dieren, op grote schaal gedocumenteerd in diverse disciplines, waaronder de antropologie, de botanie en de geneeskunde. Globalisering wordt veelal gezien als de grootste bedreiging voor culturele verscheidenheid, omdat het zich potentieel kan ontwikkelen tot een dictatoriaal regime dat zich uitsluitend richt op de kapitalistische georiënteerde consumptiemaatschappij, en elk andere culturele ideologie dan de economische marginaliseert. Deze studie beschouwt globalisering niet als de tegenstelling van een identiteit, noch de plaatsvervanger, maar juist als een mogelijke motivator van de verscheidenheid van cultuur en de ontplooiing van identiteiten in een situatie waarbij globalisatie en lokalisatie gelijktijdig plaatsvinden. Een situatie waarbij de exogene modernisatie processen versterken, terwijl tegelijkertijd lokale processen worden versterkt.

De herwaardering van het onlosmakelijk verband tussen natuur en cultuur genereert een vernieuwde aandacht in het kader van conservatie door de voor de hand liggende correlaties en interacties tussen mensen en hun ecosystemen. Dit ontwikkelt zich tot het zogenaamde bioculturele diversiteit model van conservatie; dat het behoud van de menselijk levensstijlen en de natuurlijke levensvormen integreert. Dit onderzoek documenteert de link tussen natuur

en cultuur op het gebied van het verlies van taal en kennis van het gebruik van MAC planten, in het kader van acculturatie en de vernietiging van planten en hun habitat. Dit proces is van grote invloed op de vaak ingewikkelde en tijdrovende traditionele genezingswijzen die veelal ook een spirituele en soms een moreel karakter kent en welke vaak gebruikt worden als aanvulling op het gebruik van kruidentherapieën. De Balinezen geloven dat het behouden van de balans door het respecteren van het *tri hita karana* concept zeer belangrijk is ten aanzien van het lokaal gebruik, beheer en behoud van natuur en voor hun gezondheid, welzijn en geluk, aangezien de verstoring van het evenwicht kan leiden tot ziekte.

Deze studie maakt gebruik van het Kennis-Geloof-Gebruik complex als een fundamentele benadering voor de studie van het menselijk gedrag, hetgeen leidt tot de analyse van het gebruik en het behoud van de bioculturele diversiteit van MAC planten. De methodologie en de specifieke methoden en technieken toegepast in deze studie worden gepresenteerd in Hoofdstuk 3. De hoofdbenadering van deze studie, de *Etnosystems Approach*, kent drie basis elementen: het historisch perspectief (HP), het Leidse concept van 'Field of Ethnological Study' (FES) en het Participanten Perspectief (*Participant View*, PV). Het zwaartepunt van de *Etnosystems Approach* ligt bij de praktische, alledaagse, methoden op basis van gezond verstand uitgevoerd door de lokale bevolking. De Etnobotanische Kennis Systemen benadering, onderdeel van de *Etnosystems Approach* ontwikkeld door het LEAD program van Universiteit Leiden in Nederland, introduceert een meer dynamische en comparatieve dimensie aan de etnobotanische discipline, door de combinatie van de horizontale en verticale vergelijking tussen individuen en systemen van gebruik, beheer en behoud van planten. Het conceptueel model maakt het mogelijk gedragspatronen binnen het Kennis-Geloof-Gebruik complex te analyseren. Elk van de variabelen behorend tot één van de blokken van factoren in het conceptueel model is geoperationaliseerd in empirisch meetbare criteria. De blokken van factoren in het model zijn: de achtergrond factoren, onderverdeeld in de sociaaldemografische en de psychosociale factoren, de faciliterende factoren, de ervaren morbiditeit factoren, de institutionele factoren, de interveniërende factoren en de afhankelijke factoren, onderverdeeld in het gedrag ten aanzien van het behoud van culturele diversiteit van MAC planten, bescherming van MAC planten en medicinaal gebruik van MAC planten.

De verschillende kwalitatieve en kwantitatieve methoden en technieken die gebruikt zijn voor het verzamelen van de gegevens zijn onderverdeeld in vier afzonderlijke blokken. Het eerste blok introduceert de *participant observation* en de interview technieken die tijdens het veldwerk voornamelijk gebruikt zijn voor het verzamelen van kwalitatieve gegevens. In het tweede blok worden de *free listing* en *pile sorting* techniek beschreven. Dit zijn de kwantitatieve technieken waarmee de *emic* classificaties van ziekte en MAC plant zijn gedocumenteerd. Het derde blok bevat de toelichting op de specifieke etnobotanische dataverzameling toegepast in deze studie; een combinatie van etnobotanische en sociale antropologische technieken. Het vierde blok gaat in op de wijze waarop het huishoudenonderzoek is uitgevoerd, het belangrijkste instrument voor het verzamelen van de uitgebreide gegevens die de variabelen benoemt in het conceptuele model onderbouwen. Op basis van de empirische gegevens verzameld door kwalitatieve en kwantitatieve onderzoekstechnieken, wordt het gebruik van MAC planten geplaatst in zijn realistische pluralistische medische context. Descriptieve en verklarende statistische technieken - univariaat, bivariaat, multivariaat en meervoudige regressie analyses - zijn voornamelijk uitgevoerd op de eerste van de twee datasets die gecreëerd zijn met behulp van de gegevens die verzameld tijdens het huishoudenonderzoek: de eerste dataset bevat de gegevens over de huishoudens (n = 400) en tweede dataset bevat de gegevens over de leden van de huishoudens (n = 1742).

Het onderzoeksgebied van deze studie, het Indonesische eiland Bali, wordt geïntroduceerd in hoofdstuk 4. De beschrijving concentreert zich op de geografische, historische en sociaal-demografische aandachtspunten van het dagelijks leven in relatie tot de drie belangrijkste aspecten van deze studie: volksgezondheid, het gebruik en de bescherming van MAC planten en het behoud van de lokale cultuur ten aanzien van MAC planten. De Republiek Indonesië, als het gebied van etnologische studie (FES) waartoe het eiland Bali behoort, vormt hierbij de bredere context. Indonesiërs zijn zeer afhankelijk van natuurlijke hulpbronnen ter ondersteuning van hun dagelijks leven. Van ongeveer 6.000 Indonesische plantsoorten is bekend dat ze worden gebruikt door de lokale bevolking. Deze planten worden niet alleen gebruikt als levensmiddelen, bouwmaterialen of als basis voor de traditionele Indonesische kruidengeneesmiddelen maar ook als een onmisbaar onderdeel van plechtigheden, gebruiken en tradities. Recente gegevens over de status van de biodiversiteit geven aan dat Bali, en verscheidene andere Indonesische eilanden, evenals vele plaatsen elders op aarde geconfronteerd worden met een ernstige crisis in biodiversiteit, vooral in de groeiende stedelijke en semi-stedelijke gebieden waar de vernietiging van het ecosysteem, het uitsterven van soorten en erosie van genetische hulpbronnen hoog is.

Na de korte inleiding op de Balinese geografie en biodiversiteit als onderdeel van de Republiek Indonesië, één van de wereldcentra van mega-biodiversiteit, wordt er aandacht besteed aan de Balinezen zelf. De inleiding start met enkele algemene ontwikkelingen uit de prehistorie, gevolgd door een korte discussie van grote historisch-politieke ontwikkelingen waarin de wortels van de huidige culturele diversiteit van Bali liggen. Daarnaast wordt de onmiskenbaar nauwe relatie met het naburige eiland van Java en de positieve houding van de bevolking ten opzichte van het gebruik van MAC planten belicht. De focus van dit onderzoek ligt bij één van de huidige samenlevingen in Bali. Het is en omvat de grootste etnische groep die leeft in het centralezuidoostelijke deel van het eiland en waaraan men refereert als men spreekt over ‘de Balinezen’. Ongeacht het levendige debat dat onder Balinezen gevoerd wordt over *balisasi* of *kebalian* (het ‘Balinees zijn’), zijn er nieuwe bedreigingen voor de handhaving van de essentie van het Balinees zijn. Steeds minder Balinezen beheersen nog alle aspecten van de Balinese taal, en sommige spreken in het geheel geen Balinees. Het verliezen van de bekwaamheid en beheersing van een taal is direct verbonden aan het eventuele verlies van de (intrinsieke) kennis die een taal omvat, inclusief de kennis die gelieerd is aan het traditionele gebruik van MAC planten.

Balinezen zijn bekend om hun bijzondere sociale organisatie, die herhaaldelijk benoemd is in studies als zeer complex. Ondanks de duidelijke verschillen tussen de verschillende Balinese dorpen, zoals naar voren komt in het gezegde ‘elk dorp zijn eigen *adat*’, wordt de Balinese cultuur gemarkeerd door verschillende gemeenschappelijke elementen en die sterk verschillen van de pan-Indonesische cultuur. Hierdoor onderscheidt Bali zich als een afzonderlijke subcultuur binnen de Indonesische Republiek. De fundamentele elementen als essentiële delen van de Balinese culturele identiteit, worden beschreven. Allereerst de sociale organisatie die zich richt op het interesse- en werkgroepen (*seka*), het clansysteem (*dadia*), het stratificatiesysteem (*kasta*), en het gemeenschapssysteem (*banjar*). Ten tweede *Hindu Dharma*, de religie van de Balinezen, die buitengewoon krachtig is in de vormgeving en de controle van het dagelijks leven. In tegenstelling tot de wereldgodsdiensten, die afhankelijk zijn van hun kern van abstracte basisprincipes en symboliek die betekenis hebben voor verschillende bevolkingsgroepen, is *Hindu Dharma* in hoge mate gelokaliseerd. Het is bijna onmogelijk om na te gaan of de dagelijkse praktijken meer beïnvloed worden door *Hindu Dharma* of door de Balinese cultuur, *adat*, de tradities of gebruiken. *Hindu Dharma* is van het grootste belang bij de emotionele concepten en gebruiken gerelateerd aan ziekte en gezondheid. Ten derde wordt

de Balinese levensfilosofie en in het bijzonder *tri hita karana* besproken. Deze vormen zeer sterke factoren in het sociale leven en het gebruik en behoud van bio-culturele diversiteit van MAC planten in Bali. In de Balinese filosofie ligt de nadruk niet op het bepalen of de verwezenlijking van het perfecte, maar op het behoud van de balans tussen krachten. *Tri hita karana* kan gezien worden als de allesomvattende Balinese levensbeschouwing die de harmonie waarborgt tussen de drie kosmische dimensies van de mens: God (alle vertegenwoordiging van *Sang Hyang Widhi Wasa*, inclusief de goden, geesten en voorouders), de *buana agung* (de macrocosmos; het gehele fysieke universum), en de *buana alit* (de microcosmos; het individu of de ziel). Het respecteren van *tri hita karana* betekent het voorkomen van bovennatuurlijke, sociale, ecologische en/of fysieke verstoringen door acties en de lichamelijke staat af te stemmen op de bovennatuurlijke cycli. De Balinese kalender, kort beschreven in deze studie, helpt de Balinezen om deze cyclus van activiteiten bij te houden en geeft de beste momenten aan om acties uit te voeren teneinde het evenwicht te herstellen of te handhaven.

De geselecteerde dorpen dienen de verschillende omgevingen waarin de meerderheid van de bestudeerde bevolkingsgroep zich bevindt te ondervangen. Daarom is er op a-selecte wijze één dorp geselecteerd in elk van de vooraf bepaalde gebieden. De omschrijving van de vier geselecteerde dorpen begint met een korte geografische beschrijving, in alfabetische volgorde:

- Angantaka, district Abiansemal, regentschap Badung, in de centrale laaglanden;
- Bengkel, district Kediri, regentschap Tabanan, in de kustgebieden van de laaglanden;
- Pelapuan, district Busungbiu, regentschap Buleleng, in het berggebied;
- Tumbu, district Karangasem, regentschap Karangasem, gelegen op de berghellingen.

De omschrijving van het onderzoeksgebied wordt afgesloten met de sociaal-demografische en sociaal-economische profielen van de vier geselecteerde dorpen. Uit de gegevens komen geen bijzonderheden naar voren in het sociaal-demografische profiel van de vier dorpen. De meerderheid van de respondenten behoort tot de *Sudra* kaste en de dorpen vertonen een bijna gelijke verhouding tussen mannelijke en vrouwelijke inwoners. Het verschil in het niveau van onderwijs binnen de dorpen kan enerzijds gerelateerd worden aan de leeftijden van de dorpsbewoners waaruit de samenhang met de ontwikkelingen in het nationale schoolprogramma blijkt en anderzijds aan het geslacht van de dorpelingen waaruit blijkt dat meer mannen dan vrouwen hoger zijn opgeleid. Uit het sociaal-economische profiel blijkt dat het aantal hoge en allerhoogste collectieve inkomens van huishoudens hoger is in Bengkel, hoewel de meeste huishoudens met het allerhoogste inkomen zich in Angantaka bevinden. Tumbu heeft de meeste huishoudens met de allerlaagste inkomens. Gezien de sociaal-economische status van de huishoudens heeft Angantaka het hoogste aantal huishoudens in de categorieën 'Rijk' en 'Zeer rijk'. Maar het is Pelapuan en niet Tumbu, dat gelegen is in het armste Balinese regentschap, dat de meeste huishoudens heeft die scoren in de categorieën 'Zeer arm' en 'Arm'. In het laatste deel van de sociaal-economische beschrijving wordt specifiek aandacht besteed aan de beroepen van de leden van de huishoudens en het werkloosheidspercentage in relatie tot de leeftijd, waaruit blijkt dat de werkloosheid zeer hoog is onder starters (15-24 jarigen) en onder de ouderen (65 jaar of ouder).

Het brede spectrum van activiteiten in de gezondheidszorg in het medisch pluralistische Bali die de volksgezondheid en de kennis, geloof en het gebruik met betrekking tot MAC planten beïnvloeden wordt besproken in hoofdstuk 5. De traditionele geneeskunde, specifiek het gebruik van MAC planten, heeft meerdere, vooral economisch gedreven, impulsen in de recente Indonesische geschiedenis gekend. De eerste impuls was tijdens de Indonesische

Onafhankelijkheidsoorlog, toen de orthodoxe geneeskunde een schaars goed werd. De tweede ontstond als gevolg van het besluit van de eerste president Soekarno, dat de nieuwe natie in de eigen behoefte diende te voorzien. De derde impuls deed zich in 1997 voor in de nasleep van de economische depressie na de drastische devaluatie van de Indonesische roepia in combinatie met de neveneffecten van El-Niño zoals droogte en bosbranden. Hierdoor werd de invoer van grondstoffen voor de productie van synthetische medicijnen vrijwel onbetaalbaar voor de Indonesische farmaceutische industrie. Het gebruik van MAC planten en het vertrouwen op eigen middelen wordt nu ook bevorderd vanuit het moderne medische systeem. Dit in navolging internationale strategieën van de WHO die het integreren van de traditionele geneeskunde in de nationale gezondheidszorg bevorderen. Deze integratie is met name zichtbaar in het programma *Tanaman Obat keluarGA* (TOGA) ('Medische familie tuinen'), waardoor er voorbeeld van tuinen met geneeskrachtige planten op elke *puskesmas* (*Pusat Kesehatan Masyarakat*; gezondheidcentra) terug te vinden zijn.

De classificatie van MAC planten voor het dagelijks gebruik is een gevolg van de processen van acculturatie en transculturatie. Uit de analyses van de *emic* classificatie van MAC planten blijkt dat de Balinese wel degelijk de gebruikskomponent opnemen in hun classificatie, aangezien er in de *emic* classificatie rekening wordt gehouden met het meest populaire gebruik van de plant. De volgende twaalf clusters van de hiërarchische clusteranalyse naar voren: 'Kreupelhout en struiken', 'Specerijen', 'Bloemen', 'Aromatische bladeren', 'Fruit en groenten', 'Kruiden', 'Rizomen', 'Rumpu', 'Boom bladeren', 'Bomen', 'Knollen' en 'Onkruid en grassen'. Slikkerveer & Slikkerveer (1995) geven aan dat de plaatselijke traditionele indeling van de flora in Indonesië vijf categorieën omvat: 1) bomen (*jenis pohon*), 2) struiken (*jenis perdu*), 3) fruit en kruiden (*jenis bumbu dan sayur*), 4) grassen (*jenis rumput*), en 5) kruipende of klimmende gewassen (*jenis tumbuhan merambat*). Elk van deze vijf categorieën zijn ook terug te vinden in de hier gepresenteerde *emic* classificatie met 12 clusters.

De nomenclatuur van de individuele MAC planten is enerzijds complex en anderzijds ook eenvoudig. Eenvoudig omdat de naam van de plant vaak verwijst naar een vanzelfsprekend extern specifieke kenmerk of het deel van de plant dat gewoonlijk wordt gebruikt. Complex omdat de naamgeving veelal niet consistent lijkt te zijn, in het bijzonder wanneer een naam zowel een populaire kruidenmengsels aanduidt als een specifieke plant. De meertaligheid van Indonesië bemoeilijkt de naamgeving van planten. In het dagelijkse leven worden zowel het Balinees als het Indonesisch gebruikt. Zo leert men vaak de namen en toepassingen van de plant in het Indonesisch, hetzij in het schoolstelsel of als autodidact op basis van geprinte of online publicaties waarvan het merendeel in het Indonesisch zijn. Hoewel het Indonesisch en Balinees verschillend zijn, zowel semantisch als conceptueel, gebruiken Balinezen de talen vaak naast of door elkaar heen. De vermenging van talen kan in het kader van de naamgeving van planten leiden tot misverstanden, met name wanneer een lokale naam (vaak al het resultaat van een taalvermenging) wordt gekoppeld aan de naam die gebruikt wordt in de nationale Indonesische taal. Het Indonesisch is hoogstwaarschijnlijk meer gerelateerd aan de Javaanse conceptualisering aangezien de centrale regering en de belangrijkste media gestationeerd zijn op Java. Dit leidt tot de conclusie dat, naast identificatie van MAC planten, het noodzakelijk is om deze identificatie ook te relateren aan de lokale context van de gebruikte termen, vooral in complexe situaties zoals meertalig Indonesië. Dit vereist dat er specifieke aandacht dient te worden besteed aan de nomenclatuur in de nationale publicaties.

De Balinezen verkiezen boven de term *jamu*, de termen *loloh*, *boreh* of *ramuan* voor hun eigen kruidengeneesmiddelen. *Loloh* verwijst naar een mengsel van MAC planten dat wordt geproduceerd door het toevoegen van koud, schoon water, hetzij gekookt water of bronwater aan de fijn gemalen ingrediënten. *Boreh* wordt op dezelfde manier bereid, maar in plaats van water toe te voegen zodat het drinkbaar wordt, wordt er net voldoende water toegevoegd om een substantie te verkrijgen die rechtstreeks op de huid kan worden aangebracht. *Ramuan* omvat alle bereidingen van MAC planten die geen *loloh* of *boreh* zijn. Balinezen gebruiken de bereidingen van MAC planten voor vier fundamentele functies: 1) het behandelen van specifieke aandoeningen (curatief), 2) het behoud van een goede gezondheid (promotief), 3) het verminderen of wegnemen van pijn (curatief) en 4) het behandelen van specifieke verstoring van het lichaam (preventief of promotief).

In totaal zijn er 168 MAC planten gerapporteerd in het huishouden onderzoek, waarvan er 117 planten (69,6%) in de twaalf maanden voorafgaand aan het onderzoek door een lid van het huishouden zijn gebruikt voor curatieve, promotieve of preventieve doeleinden. Een derde (30,4%) van de gerapporteerde MAC planten, zijn niet daadwerkelijk gebruikt in de afgelopen twaalf maanden. Van de 117 gebruikte planten, zijn 105 (89,7%) planten curatief gebruikt, 55 (47,0%) promotief en 49 (41,9%) preventief. Geen van de gerapporteerde gebruikte MAC planten werden alleen preventief toegepast. Vijf MAC planten zijn alleen als promotief gebruikt en 49 planten zijn alleen curatief gebruikt. Er is geen significant verschil tussen de tien meest gerapporteerde planten per type gebruik, hetgeen duidt op een tamelijk eenzijdig gebruik van bepaalde planten voor meervoudige doelen en niet een uniek gebruik van een plant voor een specifieke doel. Uit de analyse blijkt er geen significant verschil te bestaan tussen gebruikers en niet-gebruikers van MAC planten in relatie tot de sekse van de respondenten: 65,1% van de mannen (n = 877) en 62,9% van de vrouwen (n = 847) rapporteert gebruik van MAC planten versus 34,9% van de mannen en 37,1% van de vrouwen die geen gebruik maakt van MAC planten in de twaalf voorafgaande maanden. In relatie tot de leeftijdsgroepen, bestaat er wel een verschil tussen gebruikers en niet-gebruikers. In de leeftijdsgroepen 0-14 jarigen en 15-25 jarigen is er sprake van een bijna evenwichtige verdeling: 46,9% niet-gebruikers versus 53,1% gebruikers (n = 431) in de eerste groep en 58,4% niet-gebruikers versus 41,6% gebruikers in de tweede groep. In de leeftijdsgroepen van 25 tot 64 jarigen en de 65-plussers is de splitsing groter ten gunste van de gebruikers: 26,6% niet-gebruikers versus 75,4% gebruikers in de eerste leeftijdsgroep en 24,7% niet-gebruikers versus 75,3% gebruikers onder de groep van 65-plussers.

De beschrijving van de bredere context van volksgezondheid in Bali, het medische pluralisme, richt zich vooral op de rol van verse MAC planten in zowel de traditionele als het moderne medische systeem voor hetzij promotief, preventief dan wel curatief gebruik. Het gerapporteerde gebruik sluit een bezoek aan een vertegenwoordiger van een of beide systemen niet uit. Het is algemeen bekend, dat een patiënt zelfs indien hij of zij wordt behandeld door een functionaris van een enkel medisch systeem, hij of zij complementaire acties naar eigen oordeel zal uitvoeren zoals het gebruik van MAC planten, ongeacht of deze acties een gunstig effect op de primaire behandeling hebben. Verscheidene informanten verklaarden, dat er in hun visie een aanzienlijk verschil bestaat tussen de betrouwbaarheid van een *balian* en andere professionals in de gezondheidszorg. Met uitzondering van de *balian* zijn functionarissen van zowel de traditionele als de moderne medische systemen onderworpen aan talrijke eisen met betrekking tot opleiding, certificering en regelingen die ingesteld zijn om onprofessioneel gedrag te voorkomen en medische nalatigheid of misdrijven te bestraffen. Ondanks de afwezigheid van specifieke scholingseisen, certificering of controlesysteem voor *balian*, geloven de Balinezen dat onprofessioneel gedrag onder *balian*

niet voorkomt, omdat dit een roeping is en geen beroep. In elk van de vier geselecteerde dorpen was van beide medische systemen een praktiserend vertegenwoordiger binnen dertig minuten van elke dorpsinwoner bereikbaar. In aansluiting op Foster's (1983: 24) stelling dat 'patiënten therapeuten kiezen en geen medische systemen', noemen de respondenten als de meest nabije vertegenwoordiger van een medisch systeem, niet de functionaris op die geografisch het dichtst bij hen staat, maar diegene met wie zij zelf het meest vertrouwd zijn.

Er zijn drie soorten van traditionele genezers die in verband worden genoemd met het gebruik van MAC planten: 1) kruidengenezers (herbalisten), plantkundigen die planten gebruiken in alle genezingspraktijken; 2) spirituele genezers, wiens praktijken berusten op veronderstelde bovennatuurlijke krachten voor het stellen van diagnoses en die slechts incidenteel geneeskrachtige planten toedienen, zoals de *balian*, en 3) 'heksen dokters', die geacht worden het vermogen te hebben te interveniëren bij duivelse acties door een heks, of een kwade geest. In Indonesië, evenals in de meeste ontwikkelingslanden, overheerst de moderne geneeskunde in de grotere ziekenhuizen, maar in de niet-ziekenhuis sector werken de traditionele en moderne gezondheidszorg systemen zonder een duidelijke hiërarchie, en soms onafhankelijk van elkaar of soms in nauwe samenwerking met elkaar. Tot het begin van de twintigste eeuw stelde de modern getrainde medici zich uiterst sceptisch op ten aanzien van traditionele geneeskunde. Daardoor werden de traditionele geneeskunde en toepassingen, waaronder het lokale gebruik van MAC planten, vaak gedegradeerd tot bijgeloof of ronduit kwakzalverij. Hoewel tegenwoordig, de moderne medici in Bali niet tegen het gebruik van MAC planten zijn, bevorderen slechts enkele van hen het gebruik actief.

Promotief en preventief gezondheidsgedrag, ondersteund door het Balinese wereldbeeld, komen tot uiting in zowel de traditionele als de moderne geneeskunde. De moderne geneeskunde integreert niet alleen promotief en preventief gezondheidszorg in haar beleid, maar ook de lokale organisatie van de volksgezondheid. Hierbij integreren de nationale programma's voor de volksgezondheid ook de Millennium Ontwikkelingsdoelen. In de traditionele gezondheidszorg is het wereldbeeld, het concept van harmonisch evenwicht, de sleutel voor het bereiken, behouden of herstellen van de gezondheid. Het herstel van de balans kan worden bereikt door genezende of curatieve acties. Acties ten aanzien van het behouden van de balans dan wel het vermijden van de verstoring van de balans zijn vormen van promotieve en preventieve praktijken van gezondheidszorg. Om een gezond leven te leiden, benaderen de Balinezen gezondheid op een holistische wijze met inbegrip van het lichamelijke en geestelijke welzijn van het individu, evenals haar of zijn sociale en culturele omgeving. Hiermee wordt zowel naar de horizontale als naar de verticale as van evenwicht binnen het Balinese wereldbeeld verwezen. De horizontale as verwijst naar het in evenwicht zijn met andere mensen en de natuur, terwijl het verticale evenwicht verwijst naar het behouden van het evenwicht met de onderwereld en God (bovenwereld). Suryani (2006: Persoonlijke communicatie) introduceert deze benadering als het *bio-psycho-spirit-sosiobudaya* concept. De drie geïntegreerde elementen van dit concept zijn *bio* (lichaam), *psycho* (geest) en de *spirit* van een persoon. Deze drie interacteren met de individuele *sosiobudaya* (de sociaal-culturele context), wat in zijn geheel geplaatst dient te worden in de persoon zijn of haar fysieke omgeving.

De Balinese conceptualisering van gezondheid en ziekte combineert de concepten van de verschillende medische systemen, hetgeen bijdraagt aan een nieuw, schijnbaar geïntegreerd systeem van ziekte-theorieën dat naar voren komt in de *emic* ziekteclassificatie. Dit nieuw systeem is geïntegreerd omdat het de verschillende perspectieven afgeleid van de verschillende systemen naast of aanvullend op elkaar plaatst. Het omvat echter geen nieuw geheel, geïntegreerd systeem dat vrij van interne conflicten of dubbele redeneringen.

Op basis van de *pile sort* analyse, komt een oplossing van tien clusters naar voren, die benoemd zijn als: 'Hersenen', 'Hoesten', 'Extern', 'Koorts', 'Hoofd/keel', 'Interne systeem', 'Darmen/maag', 'Organen', 'Bewegingsbeperkingen' en 'Huid'. Deze *emic* ziekteclassificatie vertoont een zekere overeenkomst met de kwalificatie die gehanteerd wordt door het Indonesische Ministerie van Volksgezondheid. Dit duidt op de praktische overlap die bestaat tussen de verschillende medische systemen en geeft de integratie weer van de biomedische ziekteclassificatie in de huidige *emic* classificatie van de lokale bevolking. Uit de analyse van de gerapporteerde ziekten in relatie tot het gemelde curatieve gebruik van MAC planten blijkt, dat in elke ziektecluster meer dan de helft het gebruik van MAC planten wordt gemeld, behalve in het geval van de cluster 'Overigen' waartoe de onbepaalde ziekten behoren. In dit laatste cluster wordt slechts 40% gebruik van MAC planten gerapporteerd. Verder is er sprake van een laag gerapporteerd gebruik bij de categorieën 'Hersenen' en 'Huidziekten'. Er zijn bijzondere hoge rapportages gemeten voor het gebruik van MAC planten voor de ziekteclusters, 'Organen' (86,4%), 'Interne systeem' (85,2%) en 'Extern' (80%).

In hoofdstuk 6 wordt het behoud van de bioculturele diversiteit toegespitst op duurzaam gebruik en bescherming van MAC planten, evenals het behoud van de lokale cultuur ten aanzien van MAC planten op basis van het gerapporteerde gedrag van de dorpsbewoners besproken. In deze studie verwijst het behoud van de biodiversiteit naar de multidisciplinaire praktijken die bedoeld zijn om de diversiteit van MAC planten te beschermen en te beheren in termen van het behoud van genen, soorten en ecologische systemen ter voorkoming van een verlies van de biodiversiteit. Duurzaam gebruik van natuurlijke hulpbronnen is een meer realistische aanpak van het behoud van bioculturele diversiteit dan de benadering van het 'uitsluiten van menselijke interventie' die niet aansluit op het Balinese wereldbeeld waarbij de mens een geïntegreerd onderdeel is van het universum. In 1992 is de *Convention of Biological Diversity* ondertekend door de leiders van de Zuidoost Aziatische landen, waaronder Indonesië, waarmee zij het belang hebben erkend van het milieu en hun voornemen hebben bevestigd om mee te werken aan het internationale streven naar duurzame ontwikkeling. Meestal is het beleid en gedrag van de mens met betrekking tot het behoud van biodiversiteit rechtstreeks verbonden aan de economische waarde van planten. Wetgeving, al of niet toegepast, geeft geen enkele garantie of motivatie voor het brede publiek om duurzame praktijken met betrekking tot MAC planten uit te voeren als men zelf de dreigende crisis niet ervaart of onderkent. Over het algemeen kan gesteld worden dat men het er in de Balinese gemeenschap over eens is, dat MAC planten niet (meer) in grote hoeveelheden beschikbaar zijn in de directe omgeving. Het meest opmerkelijk is dat 90 respondenten (22,5%) aangeven dat zij geen idee hebben van het aantal MAC planten die te vinden zijn in het woud, en 46 respondenten (10,5%) geen idee van het aantal MAC planten hebben, die in het dorp te vinden zijn. Dit duidt op ofwel het ontbreken van kennis of een lage interesse in wilde MAC planten, omdat alle gecultiveerde vindplaatsen zijn, zoals de *ladang*, *sawah*, evenals de tuinen. Er zal een gevoel van urgentie gewekt moeten worden, omdat aangetoond is dat toepassing van bescherming en duurzaam beheer van de biodiversiteit van Indonesië zonder de participatie van de lokale bevolking praktisch onmogelijk is.

Het culturele behoud van MAC planten door de Balinezen is ingebed in hun filosofie van natuur en milieu met betrekking tot het gebruik en beheer van (natuurlijke) bronnen, gebaseerd op het Traditionele Ecologische Kennis systeem (TEK), en in het bijzonder in het Etnobotanische Kennis Systeem (EKS). Verandering op zichzelf is geen factor in het verlies van culturele diversiteit, aangezien culturen dynamische systemen zijn; tradities worden vernieuwd en nieuwe vormen aannemen door elke generatie tijdens de overdracht van het culturele erfgoed. Desalniettemin is het van essentieel belang, dat de wijzigingen die zich in

een samenleving voordoen door de lokale bevolking worden ingeleid of ten minste bewust worden gericht of gecontroleerd, en niet door externe factoren. Wanneer dit wel het geval is, leidt dit vaak tot vervanging of zelfs vernietiging van culturele tradities, gewoonten, normen en waarden. Voortzetting van het cultureel erfgoed is ingebed in de overdracht van kennis en overtuigingen en door die toe te passen in handelingen en gebruiken. Er schuilt een paradox in de culturele instandhouding van de kennis van MAC planten. Behoud van deze kennis, op de wijze zoals in het voorbeeld dat gegeven wordt over de *lontar* geschriften, plaatst de kennis uit zijn context en stelt deze kennis vervolgens beschikbaar voor vrijwel iedereen. Volgens de Balinese traditie mogen slechts diegenen die zich geestelijk er op voorbereid hebben de *lontar* lezen. Als men nog onvoldoende voorbereid is, dient men zich niet in deze specifieke kennis verdiepen. Verscheidene respondenten gaven bijvoorbeeld aan dat er bij hen in het dorp geen praktiserend *balian usada* meer aanwezig waren omdat die inmiddels te oud waren geworden. Geen van deze respondenten vroeg zich af waarom niemand het beroep had overgenomen, omdat zij het beschouwen als een deel van het leven beschouwen en uitgaan van het principe dat wat moet gebeuren, zal gebeuren. Het is nog moeilijker om mensen te vinden die bekend zijn met de relatie tussen de Balinese kosmologie en het gebruik van MAC planten, dat een duidelijke verarming van de culturele tradities in het eiland aangeeft.

Het behoud van de bioculturele diversiteit van het eiland en het duurzaam gebruik van natuurlijke en culturele bronnen zijn onlosmakelijk met de eeuwenoude Balinese Hindu filosofie van *tri hita karana* verbonden. *Tri hita karana* is onderdeel van het *corpus* in het Kennis-Geloof-Gebruik complex van Bali. Het concept vormt de leidraad voor het behoud van de harmonische relaties tussen en binnen de menselijke omgeving (*pawongan*), de natuurlijke omgeving (*palemahan*) en de spirituele omgeving (*parahyangan*). Op een traditionele, praktische wijze geeft het invulling aan de uitvoering van het huidige bioculturele complex en het vertegenwoordigt het principe waardoor de Balinezen hun bioculturele diversiteit kunnen behouden op duurzame wijze kunnen behouden. Teneinde succesvol te zijn, zou elk programma of initiatief met betrekking tot het beheer van lokale bronnen zich moeten concentreren op de versterking van de plaatselijke instituten, zoals de *desa/banjar adat*, *subak*, *pura* en *seka*. Op deze wijze zou de kennis en filosofie achter de hedendaagse Balinese praktijken waaronder de beeldende en uitvoerende kunsten, verbreed kunnen worden. De Balinezen geloven dat het realiseren van een dergelijke vorm van beheer van gemeenschappelijke bronnen de *gaya* (krachtige, energieke) wijze van leven weer terugbrengen waarbij optimaal gebruik gemaakt wordt van het lokale potentieel aan bronnen en middelen.

De sociale veranderingen in de Balinese samenleving worden gedeeltelijk geweten aan de toestroom van buitenlanders. Er wordt vaak beweerd dat de veranderingen zijn begonnen met de komst van het massatoerisme in Bali. Het is ironisch, dat de daaruit voortvloeiende dichotomie tussen de Balinese traditie en de moderniteit van het toerisme dezelfde is als de dichotomie tussen de Westerse angst voor de ‘gevaaren’ van toerisme en die moderniteit. De visie op Bali als het ‘oosterse paradijs’, heeft ook een rol gespeeld in de Westerse moderniteit als voorbeeld om aan te tonen wat er verloren gaat in het proces van modernisering. Toerisme is zowel de kracht van de modernisering als van het behoud van het verleden, weliswaar als een bevroren traditie. Naast de bekende negatieve gevolgen van het toerisme, zoals het negatieve effect op de land- en watervoorraden, zijn er ook positieve effecten. Het meest vanzelfsprekende is de toevloed van buitenlandse valuta die een economische impuls veroorzaakt. Verder heeft het toerisme variatie en verbetering in landbouwproducten gestimuleerd. De respondenten van de vier dorpen geven aan geen groot verschil te onderkennen in de effecten van het toerisme op de drie onderzochte aspecten van MAC

planten: de gevolgen voor culturele diversiteit van MAC planten wordt iets hoger ingeschat met een score van 26,8% 'gemiddelde impact' en 4,8% 'hoge impact' versus 18% 'gemiddelde impact' en 2% 'hoge impact' in relatie tot de bescherming van de biodiversiteit en het gebruik van MAC planten. Dit verschijnsel kan gedeeltelijk worden verklaard door het feit dat bijvoorbeeld verschillende Balinese kruidengenezers en *balian* een redelijk aantal buitenlandse patiënten behandelen, hetgeen de dorpsleden motiveert om hun eigen perceptie op het belang van het gebruik van MAC planten bij te stellen.

Het gebruik van MAC planten lijkt een vanzelfsprekende verrijking voor de volksgezondheid, maar tegelijkertijd kan het een ernstige bedreiging vormen voor de individuele gezondheid. Een belangrijk argument van de moderne medici voor hun negatieve houding ten opzichte van het gebruik van kruidengeneesmiddelen wordt gevormd door het feit dat de kwaliteitscontrole en de bepaling van werkzaamheid van deze middelen zeer moeilijk is. Bovendien is voor de meerderheid van de traditionele kruidengeneesmiddelen het bewijs van veiligheid voor gebruikers door middel van klinische proeven vaak afwezig. Het gebruik van kruidengeneesmiddelen kent een lange traditie, deels gebaseerd op bevindingen (*trial and error*). Er is vaak een groot verschil in de wijze waarop planten gebruikt worden tussen de etnisch-culturele groepen die in de uiteenlopende ecosystemen in Indonesië leven. Een plantensoort die wel in Bali gebruikt wordt, kan mogelijk anderszins niet voor de dezelfde ziekte in Java gebruikt worden of omgekeerd. Deze verschillen zijn nog groter met de etnisch-culturele groepen in de andere Indonesische eilanden die door een andere flora en fauna gekenmerkt worden. Dezelfde lokale namen die in het lokale taalgebruik vanuit de Indonesische taal zijn overgenomen kunnen verwijzen naar verschillende soorten, zoals het voorbeeld van *kayu manis* dat het verschil tussen Bali en Java illustreert. Bovendien dient de bereiding van de Balinese *loloh*, *boreh* of elke soort van *ramuan* te gebeuren in een hygiënische omgeving en kunnen vochtige mengsels niet lang bewaard worden omdat die de ideale voedingsbodem voor bacteriën vormen. In de botanische tuin van Bali heeft men een gedeelte specifiek gewijd aan medicinale planten, waarmee de waarde van deze planten voor de volksgezondheid wordt onderstreept. Bezoekers vinden bij de ingang van dit gedeelte echter ook een waarschuwing die wijst op de mogelijke gevaren van het ongecontroleerde gebruik van (MAC) planten.

In aanvulling op het debat over werkzaamheid en kwaliteit van de ingrediënten en de wijze van bereiding speelt de vraag over het ongecontroleerde of onjuist gebruik van traditionele medicijnen die negatieve of gevaarlijke gevolgen kunnen hebben. Ondoordacht en ongecontroleerd gebruik van MAC planten leidt tot 'overgebruik' (*overharvesting*), dat een groter verlies van de biodiversiteit tot gevolg heeft vanwege de verstoring van het ecosysteem. Alle 168 MAC planten die in het huishoudenonderzoek genoemd werden, zijn getoetst in 2008 aan de IUCN *Red List*. Zeven van de genoemde MAC planten zijn in deze lijst opgenomen. De twee soorten die als kwetsbare gemarkeerd zijn worden niet of nauwelijks thuis als vers ingrediënt in MAC plant bereidingen gebruikt. Het valt buitend de doelstellingen van deze studie om te onderzoeken hoe groot de vraag naar deze twee soorten is ten behoeve van de industrieel geproduceerde geneesmiddelen op basis van planten. Het gebruik van MAC planten kan zeker bijdragen tot de verbetering van de volksgezondheid maar dan dienen zij op de juiste wijze en met de nodige voorzichtigheid te worden gebruikt. Het is daarom van essentieel belang dat de traditionele kennis, geloof en gebruik van MAC planten worden overgedragen aan de jongere generatie om het duurzame gebruik van MAC planten in praktijk te brengen en verder te ontwikkelen. Alleen op deze manier zullen zowel de MAC planten zelf alsook de kennis, het geloof en het gebruik met betrekking tot MAC planten beschikbaar blijven voor toekomstige generaties beschikbaar blijven.

De analyses van de onderlinge relaties tussen de verschillende categorieën van factoren en de interactie van de verschillende factoren van de lokale bevolking met hun gebruik en behoud van bioculturele diversiteit van MAC planten wordt in hoofdstuk 7 besproken. Allereerst worden de stappen toegelicht die genomen zijn om via het huishoudonderzoek verzamelde gegevens om te zetten in de categorieën van de beoogde variabelen in het model. Daarna worden de statistische analyses gepresenteerd die op het niveau van het huishouden zijn uitgevoerd. Deze analyses zijn bedoeld om inzicht te verkrijgen in wat de belangrijkste factoren zijn voor het gedrag van de Balinezen. Bivariate, multivariate en meervoudige regressie analyses van de variabelen en blokken van factoren binnen het conceptueel model worden gebruikt voor het beoordelen, begrijpen en verklaren van de onderlinge interacties tussen de verschillende blokken van factoren in relatie tot het gebruik en het behoud van de bioculturele diversiteit van MAC planten. De resultaten van de gepresenteerde bivariate analyse wijzen erop dat, alhoewel sommige relaties enige significantie tonen, er geen sterke één-op-één relaties voorkomen tussen één van de onafhankelijke of interveniërende variabelen en één van de drie afhankelijke variabelen. Hieruit blijkt dat de bivariate analyse in deze studie minder geschikt is om sterke relatie zichtbaar te maken.

In aanvulling hierop maakt het multivariate model het mogelijk om het gedrag van de respondenten ten aanzien van het behoud van bioculturele diversiteit als één geïntegreerd complex van relaties tussen mens en planten te beschouwen, evenals de interacties die het individu met het systeem verbinden. De multivariate OVERALS analyse identificeert zeven sterke variabelen op de eerste of tweede dimensie in de OVERALS oplossing: *Dorp* ('Village'), *Kaste* ('Caste'), *Geloof in het moderne medische systeem* ('BeliefMMS'), *Gezinsinkomen* ('IncomeHH'), *Gerapporteerde ziekte* ('RepDisease'), *Overheid* ('Government') and *Toenemend gebruik van bronnen* ('Overuse'). De variabelen *Gezinsinkomen* ('IncomeHH') and *Gerapporteerde ziekte* ('RepDisease'), beiden sterke variabelen in de totale OVERALS oplossing, zijn geprojecteerd in een ander kwadrant dan de afhankelijke variabelen. Hoewel beide variabelen sterk zijn in de totale OVERALS oplossing, geeft dit aan, dat er geen directe relatie is tussen deze twee variabelen en de afhankelijke variabelen. De variabelen *Kaste* ('Caste') and *Geloof in het moderne medische systeem* ('BeliefMMS') vertonen een sterke correlatie in de OVERALS analyse met *Behoud van de culturele diversiteit van MAC planten* ('CultMAC'). Hoe hoger de kaste, hoe hoger de score op gedrag dat bijdraagt aan het behoud van de culturele diversiteit Dit herbevestigt de benoemde betrokkenheid in deze studie van de hogere kasten in deze studie bijvoorbeeld door het behoud van de kennis van MAC planten door vastlegging in de *lontar* door de priester en *balian*. Een ander voorbeeld is de actieve betrokkenheid van hogere kasten bij het *kebalian* debat, dat onder andere als doel heeft het behoud van het Balinees-zijn met inbegrip van de traditionele kennis systemen. Het is opmerkelijk dat een sterk geloof in het moderne medische systeem correspondeert met een hoge score op het gedrag dat bijdraagt aan het behoud van de culturele diversiteit. Deze specifieke relatie kan worden verklaard door het feit dat de meeste Balinezen, evenals bevolkingsgroepen elders ter wereld, de tekortkomingen van het moderne medische systeem erkennen en daarom een positieve benadering hebben ten aanzien van het behoud van kennis, geloof en gebruik met betrekking tot MAC planten.

Deze positieve benadering is gebaseerd op de hoop dat de moderne geneeskunde in staat is om nieuwe of verbeterde medicijnen te ontwikkelen op basis van deze traditionele kennis en gebruiken. De andere drie variabelen *Toenemend gebruik van bronnen* ('Overuse'), *Overheid* ('Government') en *Dorp* ('Village') komen naar voren als sterke variabelen naar voren in zowel de OVERALS analyse, als in de multivariate regressie analyse. Uit de relatie, die teruggevonden wordt in de OVERALS oplossing tussen *Overheid* ('Government') en de

afhankelijke variabelen *Beschermingsgedrag van de biodiversiteit van MAC planten* ('BioMAC') en *Gebruik van MAC planten* ('UseMAC'), blijkt dat als de invloed van de overheid als zeer hoog wordt beschouwd, dit resulteert in op het gebruik en het behoud van de bioculturele diversiteit van MAC planten dit resulteert in een tegenovergestelde gedrag. Een relatief laag gebruik van MAC planten. De meerderheid van de respondenten geeft aan dat men de invloed van de overheid als positief ervaart. In een dergelijk geval zou het kunnen betekenen dat indien het gebruik van MAC planten met inachtneming van veiligheid en kwaliteit eisen opgenomen is in het overheidsbeleid, dit mogelijk zou kunnen leiden tot een lager gebruik van MAC planten. De negatieve relatie tussen *Beschermingsgedrag van de biodiversiteit van MAC planten* ('BioMAC') en *Overheid* ('Government') lijkt er op te wijzen dat indien de Balinezen slechts een kleine invloed van de overheid ervaren, zij zelf actie ondernemen en zij een hoge score vertonen op de bescherming van de biodiversiteit.

Zoals verwacht, komt *Dorp* ('Village') naar voren als een van de sterke factoren in alle analyses naar voren. In de praktijk vertegenwoordigt dit een persoon zijn of haar bioculturele omgeving. Elk van de dorpen is gekozen in een ander geografisch gebied, waardoor het door een verschil in biologische omgeving gekenmerkt wordt. Het *desa kala patera* principe wordt alom geaccepteerd in de Balinese cultuur en geeft aan dat elk dorp een eigen cultureel patroon heeft. De OVERALS analyse documenteert het onlosmakelijk verband tussen het gedrag ten aanzien van het behoud van biodiversiteit en culturele diversiteit in de wederzijdse relaties in de oplossing van *Bewust zijn van plaatselijke instanties gekoppeld aan de culturele diversiteit van MAC planten* ('AwareCult') en de afhankelijke variabelen *Gebruik van MAC planten* ('UseMAC') en *Beschermingsgedrag van de biodiversiteit van MAC planten* ('BioMAC'). Deze analyse bevestigt dat de kennis en bewustzijn van instituties met betrekking tot het behoud van de culturele diversiteit van MAC planten een positief effect hebben op het gebruik en bescherming van de biodiversiteit van MAC planten. De hoge correlatie tussen de variabelen *Geloof in tri hita karana* ('BeliefTHK') en *Behoud van de culturele diversiteit van MAC planten* ('CultMAC'), bevestigt de belangrijke rol van het Balinese Hindu filosofie *tri hita karana* in het gebruik en behoud van de bioculturele diversiteit van MAC planten.

De conclusies van de meervoudige regressie analyse geven aan dat het blok van de institutionele factoren naar boven komt als het sterkste blok van factoren in de interactie met het blok van de afhankelijke factoren. Het blok van afhankelijke variabelen vertoont de sterkste relatie met de variabelen *Bewust zijn van plaatselijke instanties gekoppeld aan het gebruik van MAC planten* ('AwareMAC'), *Bewust zijn van plaatselijke instanties gekoppeld aan de bescherming van de biodiversiteit van MAC planten* ('AwareBio') en *Bewust zijn van plaatselijke instanties gekoppeld aan de culturele diversiteit van MAC planten* ('AwareCult'), hoewel deze variabelen niet als sterke variabelen in een van de andere analyses naar voren komen. In de bivariate analyse kan aan de hand van de Pearsons Chi-square waarden niet worden vastgesteld of er sprake is van een significante relatie, terwijl de waarden van Spearman's Rho duiden op een zwakke directe relatie tussen elke van de institutionele variabelen en de afhankelijke variabelen duiden. In de OVERALS analyse komen de institutionele variabelen naar voren als variabelen van gematigde sterkte. Aangezien de institutionele variabelen de sterkste interactie met alle andere variabelen en blokken van factoren vertonen, die het gedrag van de Balinese lokale bevolking beïnvloeden, zijn dit de sterkste indicatoren van alle afhankelijke factoren. Het tweede sterkste blok van factoren, dat uit de meervoudige regressie analyse naar voren komt is het blok van de psycho-sociale factoren, dat aangeeft dat de 'onzichtbare' factoren, zoals de geloofsystemen en lokale filosofieën van natuur en milieu, sterke factoren zijn bij het gebruik en het behoud van de Balinese lokale bevolking van MAC planten.

De conclusies van deze studie van kennis, geloof en praktijken met betrekking tot MAC planten van de lokale bevolking voor de volksgezondheid, het gebruik en het behoud van de plaatselijke cultuur met betrekking tot MAC planten wordt gepresenteerd in hoofdstuk 8. Deze medisch antropologische/etnobotanische studie documenteert, beschrijft en analyseert de onbetwistbare verbondenheid van volksgezondheid, biodiversiteit en culturele diversiteit op het niveau van de lokale bevolking vanuit een *emic* perspectief, waarbij in het bijzonder aandacht besteed wordt aan de onderliggende relaties en interacties tussen mensen en planten. Momenteel begint men overal ter wereld te zien dat het alarmerende verlies van biodiversiteit van de aarde ernstige gevolgen heeft voor gezondheid en welzijn van de mens. De Indonesische regering erkent dat de bescherming van de biodiversiteit van het land van fundamenteel belang is voor het milieu, en dat verlagende van de biodiversiteit een negatieve weerslag heeft op de economische ontwikkelingsplannen van het land, evenals op de gezondheid van haar inwoners. Indonesië neemt de tweede plaats in op de wereldranglijst van centra van mega-diversiteit, en neemt de vijfde plaats in op de wereldranglijst van plant diversiteit. Recente gegevens over de status van de biodiversiteit van Indonesië en Bali geven aan dat er sprake is van een ernstige crisis in biodiversiteit en dat programma's en beleid ter bescherming van biodiversiteit zowel op nationaal als op regionaal niveau falen. Het is reeds aangetoond dat de implementatie van het beleid en de wetgeving met betrekking tot duurzame ontwikkeling, evenals het feitelijke beheer van de bioculturele diversiteit heel moeilijk zo niet onmogelijk is zonder de participatie van de plaatselijke bevolking. Dit sluit aan op de visie van Pitana (1999) op globalisering, dat indien wereldwijde structuren de lokale structuren kunnen beïnvloeden, globalisering op zijn allerm minst de mogelijkheid omvat dat de lokale structuren kunnen interveniëren op de wereldwijde structuren, en de observatie dat in Bali, globalisering en lokalisatie zich inderdaad gelijktijdig voordoen.

De theoretische oriëntatie van dit onderzoek ondersteunt de toepassing van het Kennis-Geloof-Gebruik complex als een fundamentele benadering van de studie van menselijk gedrag, en maakt het mogelijk om het complexe gedrag van de respondenten met betrekking tot het behoud van de bioculturele diversiteit te beoordelen als één geïntegreerd complex van relaties en interacties tussen mensen en planten. In het bijzonder is er aandacht besteed aan het Balinese wereldbeeld, specifiek aan de filosofie van *tri hita karana* en de 'onzichtbare' factoren - systemen van kennis en geloof ten aanzien van de natuur en het milieu - die sterke factoren blijken te zijn in relatie tot het gebruik en behoud van MAC planten door de lokale bevolking. De *Etnosystems Approach* en het conceptueel model bieden een geschikt kader voor de formulering en identificatie van de te verzamelen gegevens en een goede basis voor de kwantitatieve analyses die de Balinese systemen van kennis, geloof en gebruik beoordelen in een meer dynamische context van ontwikkelings- en veranderprocessen. Op basis van de uitvoering van de belangrijkste onderzoeksstrategie en de specifieke onderzoeksmethoden en technieken voor de verzameling en analyse van data zijn de zeven specifieke doelstellingen van deze studie in Bali behaald. De belangrijkste uitkomsten die beschreven zijn in de voorgaande hoofdstukken worden per specifieke onderzoeksdoelstelling nader in hoofdstuk 8 uitgewerkt.

Tenslotte worden in hoofdstuk 8 de theoretische, methodologische en praktische implicaties beschreven. Deze studie beoogt aan de verdere theorie ontwikkeling in het multidisciplinaire gebied van de medische antropologie, de medische etnobotanie, het behoud van bioculturele diversiteit en duurzame ontwikkeling bij te dragen. Het draagt ook bij tot de meer gedetailleerde documentatie en argumentatie ter conceptualisering van de oplossing praktische problemen die geboden wordt door de lokale kennis als onderdeel van de traditionele ecologische kennis (TEK). Aangezien TEK empirisch, experimenteel en

systematisch is en als zodanig verenigbaar met de moderne wetenschap, overbruggt het de kunstmatige kloof tussen ‘wetenschappelijke’ kennis en ‘traditionele’ kennis. Het omvat meer dan louter algemene lokale kennis en kan op zichzelf als ‘wetenschappelijk’ worden beschouwd. Het gebruik van MAC planten is geplaagd in de dagelijkse realiteit van het medisch pluralisme waaruit blijkt dat het gebruik van verse MAC planten voor de volksgezondheid de grenzen overstijgt van de kennis en overtuigingen die behoren tot één enkel medisch systeem. Het Kennis-Geloof-Gebruik complex van de plaatselijke bevolking combineert theorieën en benaderingen van de belangrijkste medische systemen in een groter geheel, dat het gebruik van MAC planten in dergelijk pluralistisch systeem legitimeert. Deze combinatie van theorieën wordt verder onderbouwd door de beschreven *emic* classificatie van MAC planten en van ziekten.

Deze studie gebruikt als hoofdbenadering de etno-wetenschappelijke analyse van de perceptie van natuurlijke bronnen en het gebruik van medicinale planten in relatie tot het praktisch gebruik van de Balinezen. Deze benadering genereert nieuwe informatie over de factoren, die in verband staan met de etno-botanische/medisch-antropologische processen die operationeel zijn in de sociaal-medische omgeving van Balinese gemeenschappen. Hier wordt een duidelijke koppeling gemaakt tussen de bioculturele interacties tussen het menselijk gedrag en de biologische systemen. De toepassing van de *Etnosystems Approach* en het beschreven conceptueel model van deze studie ondersteunen het concept van ‘*Evidence-based Biocultural Conservation*’, dat de selectie, analyse, inzicht, evaluatie en de integratie van zinvolle en toepasselijk bewezen biocultureel management en natuurbehoud in het kader van ontwikkelingsprojecten bevordert. De statistische analyses bevestigen dat het gebruik en gedrag met betrekking tot het behoud van MAC planten verklaard dienen te worden door multivariate analyses om de onderlinge relaties en interacties tussen de blokken van factoren in het conceptuele model nader te bepalen.

De praktische gevolgen van de studie omvatten de identificatie van factoren, die sterk bijdragen aan het gebruik en behoud van MAC planten vanuit het perspectief van de lokale bevolking, zoals gepresenteerd in hoofdstuk 7 en in de conclusies. De lokale bevolking rapporteerden talrijke mogelijke toepassingen van MAC planten voor curatieve, preventieve en promotieve redenen. Het is echter niet mogelijk om uit het gerapporteerde gedrag af te leiden of gebruik van de MAC planten voor de gemelde ziekte exclusief of complementair is ten opzichte van andere behandelingen, of dat het de bedoeling is om het reduceren van secundaire symptomen of ongemakken tijdens de ziekte episode. Vervolgonderzoek kan hier zeker meer inzicht in verschaffen.

Het TOGA programma behaalt de doelstelling dat er geneeskrachtige planten in de Balinese tuinen aanwezig zijn, maar de variatie van de gekozen planten is laag, hetgeen wellicht op de lange termijn wellicht tot een vermindering van de kennis en het beheer van de diversiteit van MAC planten kan leiden met betrekking tot de bescherming van genen, soorten en ecosystemen. Hoewel het een verplicht programma is, bepalen de *puskesmas* (*PUSat KESehatan MASjarakat*; gezondheidscentrum) en *Pemberdayaan dan Kesejahteraan Keluarga* (PKK, Organisatie van vrouwen voor de gezondheid en het welzijn van het gezin) de intensiteit in tijd en geld die besteed wordt om de programma’s uit te voeren. Mede vanwege de meertalige situatie in Bali, is er gezien de teruggang in de directe overdracht van informatie tussen personen en de stijging van de populariteit van het gebruik van MAC planten, specifiek meer onderwijs nodig om de doelmatigheid, kwaliteit en veiligheid van het gebruik van planten voor de volksgezondheid te benadrukken. Daarbij dient men de grote verscheidenheid van de verschillende mogelijke toepassingen trachten te respecteren, aangezien in het algemeen één MAC plant gebruikt kan worden voor meer dan één

symptoom. Daarbij is het van belang, dat de lokale bevolking zich ervan bewust wordt wat de mogelijke bijwerkingen van MAC planten zijn en in staat zijn om de juiste soort te herkennen. Het wordt daarom sterk aanbevolen om naast lokale of gangbare namen van de planten ook een verwijzing naar de botanische of wetenschappelijke naam in alle toekomstige publicaties over MAC planten op te nemen, bij voorkeur ondersteund door een fotografische identificatie van de planten. Dit is vooral van belang indien men deze publicaties gebruikt voor zelfzorg en er geen sprake is van de tussenkomst of het raadpleging van een kruiden- of plantdeskundige. Als een belangrijke conclusie komt uit dit proefschrift naar voren, dat het gebruik van MAC planten een verrijking is voor de volksgezondheid, maar dat wetgeving en beleid er mede voor moet zorgen dat het gebruik van MAC planten noch de volksgezondheid noch de biodiversiteit van Bali schaadt.

De *tri hita karana* filosofie speelt een belangrijke rol bij het huidige en toekomstige beheer van de gemeenschappelijke, sociale, culturele en economische, grondstoffen, bronnen en middelen. Dit komt vooral omdat de Balinezen vertrouwd zijn met de inhoud van de *tri hita karana* filosofie. Elk succesvol programma of initiatief dat gericht is op het beheer van dergelijke lokale bronnen zou zich ook moeten concentreren op het versterken van de plaatselijke instituties, zoals de *desa/banjar adat*, *subak*, *pura* en *seka*. De Balinezen geloven dat het realiseren van een dergelijke vorm van beheer van gemeenschappelijke bronnen de *gaya* (krachtig, energiek) wijze van leven weer terugbrengt, waarbij optimaal gebruik gemaakt wordt van de lokale potentieel, bronnen en middelen. In het kader van het gedrag van de lokale bevolking in relatie tot het behoud van de bioculturele diversiteit van MAC planten en van Bali in het algemeen, wordt uitvoerig gedocumenteerd dat lokale bevolking bereid is om haar verantwoordelijkheid te nemen om een toekomst voor de volgende generatie te waarborgen. Er worden talrijke goede initiatieven vanuit de lokale bevolking genomen. Nieuwe wetgeving en beleid, en indien mogelijk financiering, moeten gericht worden op het creëren van verdere mogelijkheden tot ontplooiing voor deze lokale initiatieven. Slechts dan kunnen de Balinezen in het licht van het *tri hita karana* en *desa kala patera* een verdere bijdragen leveren aan het behoud van de bioculturele diversiteit van het eiland.

Ringkasan

Penelitian etnobotani ini dilakukan di empat desa di daerah yang disebut sebagai ‘tempat kelahiran budaya Hindu Bali’, yaitu di bagian tengah dan tenggara pulau Bali, di Indonesia. Tujuan utama penelitian ini adalah untuk mendokumentasikan, mendeskripsikan dan menganalisis pengetahuan, kepercayaan dan penggunaan tumbuhan obat, aromatik dan kosmetik (MAC, ‘*medicinal, aromatic* dan *cosmetic*’) dalam kaitannya dengan kesehatan masyarakat dan konservasi keragaman biokultural tumbuhan MAC yang dilakukan masyarakat Bali. Pendekatan Etnosistem, digunakan sebagai pendekatan utama dalam studi ini, yang menempatkan perspektif *emic* dalam hubungan antara manusia dengan tumbuhan dengan fokus pada kompleks pengetahuan, kepercayaan dan penggunaan, yang disebut juga sebagai kompleks *Corpus-Cosmos-Praxis*, serta diterapkan ketika penyiapan dan penggunaan dari tumbuhan MAC segar untuk memelihara kesehatan diri sendiri. Tujuan utama memperlihatkan bahwa ada tiga aspek utama yang menjadi fokus studi ini, yakni kesehatan masyarakat, konservasi sumber daya tumbuhan MAC dan pemeliharaan kultur lokal yang berhubungan dengan tumbuhan MAC. Ada tujuh tujuan khusus yang didokumentasikan dalam studi ini:

- *pertama*: deskripsi mengenai daerah penelitian yaitu Bali, sebagai suatu bagian yang unik di Indonesia sebagai negara berkembang, dengan geografi, populasi dan kultur yang khas.
- *kedua*: deskripsi dan analisis perspektif *emic* dalam pengetahuan, kepercayaan dan penggunaan tumbuhan MAC segar;
- *ketiga*: penyajian konstruksi penggolongan tumbuhan MAC berdasarkan *emic* pada masyarakat Bali;
- *keempat*: deskripsi mengenai aspek yang kompleks dari konfigurasi kesehatan majemuk yang mempengaruhi kesehatan masyarakat beserta pengetahuan, kepercayaan dan penggunaan MAC pada masyarakat Bali yang berhubungan dengan pelaksanaan promosi kesehatan, pencegahan penyakit dan pengobatan, baik pengobatan modern ataupun tradisional;
- *kelima*: deskripsi dan analisis pengetahuan tentang kepercayaan dan penggunaan yang berhubungan dengan tumbuhan MAC segar dalam hubungan dengan pelestarian tumbuhan-tumbuhan, serta kesinambungan konservasi keragaman hayati di Bali;
- *keenam*: deskripsi dan analisis pengetahuan, kepercayaan dan penggunaan yang berhubungan dengan tumbuhan MAC dalam hubungan dengan pemeliharaan keragaman budaya di pulau Bali;
- *ketujuh*: analisis mengenai hubungan timbal balik antara berbagai faktor, serta identifikasi interaksi di antara faktor-faktor yang berhubungan dengan penggunaan dan konservasi biokultural keragaman tumbuhan MAC oleh masyarakat Bali.

Dalam Bab 1 konteks studi ini menjelaskan: Bali, sering disebut sebagai ‘Surga Dunia’, yang mengaplikasikan berbagai tumbuhan untuk kesehatan manusia, yang melaksanakan sistem kesehatan yang kompleks di Bali, yang kehilangan keragaman hayati sebagai konsekuensi untuk kesehatan manusia, yang mempunyai konsep keragaman budaya dalam globalisasi dunia dan mempunyai kebutuhan akan konservasi keragaman biokultural untuk melindungi pengetahuan, kepercayaan dan penggunaan dari tumbuhan MAC oleh masyarakat. Bali, dengan keindahan alam dan kebudayaannya, sering dijadikan bahan studi bagi orang Bali sendiri. Pemerintah Bali dan Indonesia sedang terlibat aktif dalam mencapai status negara

berkembang, dengan menjaga stabilitas politik, sosial dan ekonomi dan untuk merealisasikan peningkatan kesehatan masyarakat. Penggambaran ideal program kesehatan masyarakat seperti '*Perilaku Hidup Bersih & Sehat*' oleh dinas kesehatan Provinsi Bali turut berperan dalam mencapai status tersebut. Indonesia melaksanakan program WHO (*World Health Organisation*) dengan mendukung penerapan secara ilmiah pengobatan tradisional dan tumbuh-tumbuhan untuk meningkatkan pelayanan *Primary Health Care*, agar dapat mengurangi kemiskinan, serta menerapkan 'Kesehatan untuk Semua' (*Health for All*) khususnya di Bali. Ini merupakan upaya untuk mewujudkan harapan ideal sebagai 'Surga Dunia'.

Istilah tumbuhan MAC, yang merupakan singkatan dari tumbuhan *medicinal*, *aromatic* dan *cosmetic*, dalam studi ini merujuk pada berbagai tumbuhan yang disebut oleh para responden, semuanya orang Bali, termasuk jenis tumbuhan yang biasa dipakai untuk tujuan kesehatan. Dewasa ini, pemanfaatan tumbuhan obat baru mendapat perhatian, sehingga konservasi dalam arti pelestarian terus meningkat menjadi satu isu penting; tidak dapat dielakkan bahwa species dan habitatnya merupakan kebutuhan kritis untuk konservasi tumbuhan. Sistem medis yang beragam di Bali, dalam konteks penggunaan tumbuhan MAC, adalah suatu sistem dimana didalamnya tercakup beberapa sistem medis. Setiap sistem medis memiliki masing-masing *materia medica* (ilmu tentang obat itu sendiri), sarana kesehatan, kesehatan dan praktek penyembuhan serta berbagai tekniknya, termasuk penggolongan penyakit, etiologi penyakit serta konseptualisasi tentang tubuh itu sendiri. Dua sistem medis utama di Bali yaitu pengobatan biomedis, disebut sebagai pengobatan modern, dan sistem medis tradisional Bali disebut 'obat Bali asli', 'obat asli' atau 'pengobatan tradisional', di dalam studi ini disebut sebagai pengobatan tradisional.

Umumnya, orang tidak memilih antara sistem yang ada, tetapi memilih secara berurutan atau secara bersamaan untuk mempertahankan, memelihara atau meningkatkan kesehatannya berdasarkan pada sistem medis yang berbeda. Konseptualisasi tentang kesehatan dan penyembuhan pada masyarakat Bali tidak terbatas hanya kepada satu sistem yang tunggal. Mereka telah menciptakan berbagai teori tentang penyakit serta penggolongannya, yang mempengaruhi persepsi kesehatan dan penyembuhan dalam mempraktekkan perilaku hidup sehat mereka. Konsep yang mengintegrasikan semua ini adalah konsep Bali terhadap keseimbangan dinamis dalam satu-kesatuan, contohnya alam semesta, dunia, tubuh manusia dan sesaji. Apabila terjadi gangguan akan terjadi ketidakseimbangan, hal ini ditandai dengan timbulnya penyakit. Istilah kesehatan masyarakat (*community health*) dalam studi ini, memandang semua layanan dan tujuan kesehatan untuk meraih tingkat tertinggi dalam kesehatan fisik, mental, sosial, moral dan jiwa bagi semua warga komunitas. Kesehatan masyarakat dibentuk oleh hubungan timbal balik antara kedua sistem medis dan kehidupan sosialnya. Status kesehatan dari suatu komunitas berhubungan dengan faktor-faktor sebagai berikut: politik, sosio-kultural dan ekonomis yang secara langsung menghambat ketersediaan layanan khusus, keterjangkauan dan kualitasnya. Sebagai contoh adalah keberadaan fasilitas kesehatan, tenaga kesehatan, program kesehatan, dan sarana kesehatan. Hal penting dalam konsep kesehatan masyarakat tidak hanya terfokus semata-mata pelayanan penyembuhan; tetapi secara khusus memasukkan juga pencegahan dan promosi kesehatan.

Pada saat ini, komunitas global mulai menyadari kekhawatiran akan kemunduran dan berkurangnya keragaman hayati di muka bumi serta konsekuensinya bagi kesehatan dan kesejahteraan manusia. Bagaimanapun, yang lebih mengkhawatirkan adalah hilangnya keragaman budaya dalam arti hilangnya pengetahuan tradisional yang dalam beberapa hal dapat terlihat dengan hilangnya spesies tumbuhan itu sendiri. Namun, bahkan menjadi tanda bahaya hilangnya keragaman kebudayaan sehubungan dengan hilangnya pengetahuan

traditional yang dalam beberapa kasus melebihi hilangnya spesies tumbuhan itu sendiri. Indikasi-indikasi ini terlihat dalam bentuk kebiasaan makan, pengobatan, bahasa dan struktur sosial. Dewasa ini, telah meningkat perhatian pada dampak negatif dari globalisasi dan pariwisata terhadap pembaharuan keanekaragaman budaya masa kini, yang terutama berpengaruh pada sekelompok masyarakat asli. Dalam beberapa dasawarsa terakhir ini, masyarakat dan budaya Bali telah diterpa terus menerus oleh pengaruh berbagai budaya internasional. Khususnya pertumbuhan pariwisata massal yang memberi dampak besar, terutama karena perluasan ekonomi dan besarnya otoritas Jakarta sebagai ibukota Indonesia. Orang Bali sendiri terlibat aktif secara terus menerus dalam perdebatan tentang isu yang dikenal sebagai '*Balinisasi*' atau '*kebalian*' dan mereka yakin bahwa yang penting adalah tetap satu kesatuan kultur dan tetap sadar dalam kesatuan agama, adat dan kebudayaan Bali.

Dalam studi antropologi medis dengan fokus etno-botani, seorang harus membuat keputusan tentang posisi manusia di bumi. Manusia dalam studi ini, dilihat sebagai satu bagian integral dari keragaman biokultural, tidak hanya sebagai peninjau tetapi juga sebagai pemakai yang berpartisipasi dalam keragaman hayati dan budaya. Berkembangnya kesadaran dalam 'hubungan yang tak dapat dihindarkan' antara keragaman hayati dan budaya tetap menekankan bahwa sebaiknya lebih banyak perhatian diberikan kepada hubungan dan interaksi manusia dengan kekayaan tumbuhan dari sudut pandang etnobotani. Dalam mempertahankan identitas budaya Bali dan Pengetahuan Ekologis Tradisional (TEK, *Traditional Ecological Knowledge*), pengembangan konsep sebagai *desa kala patra* dan secara spesifik prinsip *tri hita karana*, memiliki peran dalam konservasi keragaman biokultural di dunia dan khususnya di Bali.

Dalam Bab 2 disampaikan titik awal orientasi teoritis, dengan kompleks pengetahuan-kepercayaan-penggunaan sebagai konsep utama. Konsep itu yang digunakan sebagai suatu pendekatan dasar dalam mempelajari perilaku manusia, yang juga memungkinkan untuk menilai perilaku yang sangat kompleks dari para responden dalam hubungannya dengan penggunaan dan konservasi keragaman biokultural tumbuhan MAC. Penggunaan dan konservasi keragaman biokultural tumbuhan MAC dipelajari dalam kerangka ilmu Etnobotani dan Antropologi Medis. Studi ini, berfokus pada penggunaan (tradisional) tanaman obat dan pengelolaan keragaman tumbuhan oleh komunitas Bali dan untuk itu terutama digunakan metodologi bidang Antropologi. Kompleks pengetahuan-kepercayaan-penggunaan disatukan dengan *Ethno-Botanical Knowledge Systems* (EKS) orang Bali, kemudian dikonsepsikan dalam studi ini sebagai suatu spesifikasi dari Pengetahuan Ekologis Tradisional (TEK). TEK digunakan sebagai teori dasar untuk pengambilan keputusan lokal di dalam berbagai aspek kehidupan kini, termasuk pengelolaan sumber daya alami, gizi, pengolahan makanan, kesehatan, pendidikan dan organisasi sosial. EKS berpusat pada pengetahuan botani dari komunitas lokal, seperti penggolongan *emic* menurut prinsip-prinsip kebudayaan di dalam budaya yang khusus. Dalam penelitian ini tumbuhan MAC yang segar digunakan oleh masyarakat untuk tujuan kesehatan dan penyembuhan.

Pelayanan kesehatan di Bali memiliki sifat sistem medis yang beragam. Studi ini mengikuti definisi dalam suatu sistem medis, menempatkan interaksi medis-ekologis diantara perilaku dan struktur sosio-kultural serta menempatkan sistem medis di dalam konteks historis-geografis, sehingga dapat menangkap dinamika yang melekat dalam suatu sistem medis. Masyarakat menemukan sendiri manfaatnya serta membentuk sistem medis yang beragam melalui cakupan luas pada berbagai terapi, praktek, penjelasan, pengetahuan dan kepercayaan. Oleh karena itu, mereka melihat dirinya dihadapkan pada suatu situasi yang rumit didalam perilaku pencarian kesehatan. Bagaimanapun, penentuan pilihan untuk tidak melakukan pengobatan, atau untuk mengobati diri sendiri, atau untuk memilih layanan

kesehatan tertentu, dipengaruhi oleh perilaku kesehatan mereka sendiri. Perilaku kesehatan mereka saling berhubungan dengan konsep-konsep yang saling terkait, misalnya penggolongan penyakit, kepercayaan terhadap penyakit, perilaku dan aktivitas terhadap pelayanan kesehatan. Penggolongan penyakit secara *emic* orang Bali kini terintegrasi konsep dan persepsi mengenai penyakit. Teori-teori dari sistem medis yang berbeda, masing-masing mempunyai suatu teori penyakit untuk mengembangkan pengobatannya sendiri, seperti halnya pada pelayanan, pencegahan dan promosi kesehatan. Analisis hubungan dan interaksi antara berbagai faktor yang berbeda dari model epidemiologi, kemasyarakatan dan ilmu perilaku, memperlihatkan perilaku kesehatan dalam wujud perilaku konsumen.

Istilah konservasi keragaman hayati dilihat dalam praktek multidisiplin untuk melindungi dan mengatur semua aspek dari keragaman hayati: usaha untuk menghindari suatu kemunduran didalam keragaman hayati. Kontinum yang kompleks memungkinkan semua pendekatan kepada konservasi dalam bentuk pandangan '*bio-centric*', hal ini menjelaskan bahwa manusia tidak berpengaruh atau turut berperan. Pada pendekatan lainnya, yaitu '*anthropocentric*', memperlihatkan hubungan pertalian antara konservasi lingkungan dan pembangunan berkesinambungan dengan menekankan pengintegrasian kebutuhan manusia dalam konservasi. Konservasi yang dimaksud dalam studi ini, berhubungan dengan pendekatan yang kedua: pembangunan berkelanjutan yang menekankan pada pengintegrasian kebutuhan manusia. Pemakaian sumber daya alam, yang didayagunakan untuk pengobatan, makanan, tempat perlindungan atau pakaian, adalah penting bagi kemakmuran manusia. Sebagai konsekwensi, konservasi tidak harus dipahami secara harfiah sebagai pemeliharaan dari suatu keadaan, tetapi pemikiran dalam sesuatu yang dinamis.

Keragaman budaya, dengan berbagai ragam dari bentuk struktur sosial, sistem kepercayaan memiliki cara beradaptasi dalam berbagai situasi dalam benua yang berbeda, sehingga perbedaan budaya adalah realita. Hal ini adalah kenyataan, perbedaan-perbedaan tersebut bukanlah perkembangan yang terbentuk secara kebetulan, akan tetapi berkembang dari pola-pola migrasi manusia, ataukah perkembangan itu suatu evolusi yang merupakan kunci keberhasilan manusia sebagai suatu spesies. Namun perbedaan besar itu adalah kenyataan, meskipun perubahan terjadi secara terus menerus dan menjadi ciri kehidupan berbagai bangsa dengan masing-masing kebudayaannya, akan tetapi keragaman budaya tersebut secara keseluruhan mulai menurun. Dewasa ini, keragaman budaya yang dicerminkan dalam TEK, yang berhubungan secara komplementer dengan pengelolaan sumber daya alam termasuk didalamnya penggunaan dan konservasi tumbuhan-tumbuhan serta hewan, telah secara luas didokumentasikan dalam berbagai ilmu, termasuk antropologi, ilmu tumbuh-tumbuhan dan medis. Globalisasi sering dilihat sebagai satu ancaman besar terhadap keragaman budaya, yang memiliki potensi untuk meningkat menjadi suatu kekuatan seperti diktator yang berorientasi kapitalis terhadap masyarakat sebagai konsumen, dan memarjinalkan berbagai perspektif budaya untuk kepentingan ekonomi semata. Akan tetapi, globalisasi dalam studi ini dikonseptualisasikan bukan sebagai anti-tesis dari suatu identitas, ataupun sebagai pengganti, akan tetapi sebagai suatu pendorong untuk keragaman budaya dan pengembangan identitas yang terfokus pada situasi dimana globalisasi dan lokalisasi bersama-sama hadir. Oleh sebab itu, penguatan proses modernisasi jatuh dalam waktu yang sama dengan proses-proses lokal.

Maka terdapat 'hubungan tak terhindarkan' (*inextricable link*) antara alam, bangsa, bahasa dan kebudayaan. Dalam konteks konservasi, hubungan tersebut menjadi perhatian baru akibat hubungan korelasi dan interaksi yang terjadi antara manusia dan ekosistemnya. Lambat laun hubungan tersebut berkembang menjadi model konservasi keragaman biokultural yang mengintegrasikan pelestarian kehidupan manusia dan alam. Studi ini mendokumentasikan

hubungan antara alam dan kebudayaan sehubungan dengan hilangnya bahasa dan pengetahuan khususnya dalam penggunaan tumbuhan MAC. Dengan terjadinya proses akulturasi dan hancurnya habitat tumbuhan, proses ini menarik perhatian besar dan dijabarkan dalam program penyembuhan secara tradisional yang tak berkesudahan. Hal tersebut juga meliputi unsur rohani dan kadang peran moral, yang sering kali diterapkan sebagai tambahan dalam pemakaian terapi herbal. Orang Bali percaya dengan mempertahankan keseimbangan didasarkan pada konsep *tri hita karana* yang berkaitan dengan pengelolaan konservasi alam untuk kesehatan, kesejahteraan dan kebahagiaan, jika ketidakseimbangan terjadi maka hal itu akan menimbulkan penyakit.

Studi ini menggunakan kompleks pengetahuan-kepercayaan-penggunaan sebagai suatu pendekatan dasar untuk mempelajari perilaku manusia, mengarahkan pada analisis penggunaan dan konservasi keragaman biokultural tumbuhan MAC. Metodologi riset dan metoda dan beberapa teknik khusus diterapkan dalam studi ini yang disajikan dalam Bab 3. Pendekatan metodologis utama yang digunakan adalah, Pendekatan Etnosistem (*Ethnosystem Approach*), dengan menggunakan tiga elemen dasar, yaitu: Perspektif Historis (*Historical Perspective*, HP), konsep yang dikembangkan di Leiden Kajian Studi Etnologi (*'Field of Ethnological Study'* atau FES) dan Pandangan dari Partisipan (*Participant View*, PV). Fokus dari Etnometodologi dikonsentrasikan pada hal-hal praktis, sehari-hari, serta alasan-alasan sederhana yang dipahami oleh masyarakat. Pendekatan sistem pengetahuan etnobotani, sebagai bagian dari Pendekatan Etnosistem, dikembangkan oleh Program LEAD di Universitas Leiden di Belanda, memperkenalkan suatu dimensi yang dinamis dan komparatif pada bidang etnobotani, mengkombinasikan perbandingan vertikal dan horisontal antara individu dan sistem penggunaan, pengelolaan dan konservasi tumbuhan. Model *multivariate* memungkinkan analisis pola perilaku dalam kompleks pengetahuan - kepercayaan - penggunaan. Masing-masing variabel berada dalam satu blok (*block*) yang terdiri dari faktor-faktor, dalam model *multivariate* dioperasionalisasikan kedalam kriteria-kriteria ukuran secara empiris. Kelompok faktor-faktor tersebut adalah: faktor-faktor yang mempengaruhi, yang dibagi dalam faktor sosio-demografi dan faktor psikososial, faktor pendukung, faktor pandangan pada morbiditas, faktor kelembagaan, faktor intervensi dan faktor yang dipengaruhi, yang terbagi dalam perilaku keragaman budaya terhadap tanaman MAC dan penggunaan tumbuhan MAC bagi kesehatan.

Berbagai teknik kualitatif dan kuantitatif digunakan dalam pengumpulan data di lapangan penelitian yang dibagi dalam empat kelompok terpisah. Blok pertama memperkenalkan observasi-partisipasi dan berbagai teknik wawancara yang digunakan dalam kerja lapangan untuk mengumpulkan sebagian besar data kualitatif. Blok kedua, menggunakan teknik *free listing* dan *pile sorting*, yang digunakan untuk mendokumentasikan penggolongan penyakit dan tumbuhan MAC secara *emic*. Blok ketiga menjelaskan metodologi dalam studi ini, pendekatan etnosistem melalui tiga pendekatan mengkombinasikan ilmu Etnobotani dan Antropologi Sosial. Blok keempat menggambarkan cara yang digunakan dalam survai rumah tangga, alat utama dalam pengumpulan data dengan cara mendokumentasikan berbagai variabel berdasarkan *conceptual model*. Atas dasar data empirik yang dikumpulkan melalui berbagai teknik penelitian kualitatif dan kuantitatif tersebut, penggunaan tumbuhan MAC ditempatkan dalam konteks keberagaman medis yang realistik. Berbagai teknik statistik deskriptif menjelaskan analisis – *univariate*, *bivariate*, *multivariate* dan *multiple regresi* – pada umumnya digambarkan dalam dataset pertama. Ada dua dataset yang dibuat berdasarkan data yang dikumpulkan dalam survai rumah tangga: dataset pertama tentang rumah tangga (N=400) dan dataset kedua tentang anggota rumah tangga (N=1742).

Daerah penelitian dalam studi ini adalah pulau Bali di Indonesia, yang telah dijelaskan dalam Bab 4. Konsentrasi dalam deskripsi ini adalah menghubungkan aspek geografis, sosiodemografik dan historis dari kehidupan manusia dalam hubungannya dengan tiga aspek utama studi ini yaitu: kesehatan masyarakat, penggunaan dan konservasi tumbuhan MAC serta pemeliharaan kebudayaan lokal di Bali. Dalam studi ini, Indonesia merupakan konteks yang lebih luas sebagai *Field of Ethnological Study* untuk pulau Bali. Orang Indonesia sangat bergantung pada sumber alam untuk mendukung hidup mereka sehari-hari; lebih-kurang 6.000 spesies tumbuhan Indonesia dikenal dan digunakan secara langsung oleh masyarakat lokal, untuk makanan, bahan bangunan, bahan baku untuk membuat jamu dan untuk pengobatan tradisional yang juga merupakan perlengkapan yang sangat penting untuk upacara adat dan tradisi. Data terbaru tentang status keragaman hayati menunjukkan bahwa Bali, dan beberapa pulau-pulau Indonesia lainnya, termasuk juga beberapa tempat lain di dunia, menghadapi suatu krisis keragaman hayati yang serius, terutama sekali di daerah perkotaan di mana terjadi kehancuran ekosistem, kepunahan spesies dan erosi sumber daya genetika yang sangat tinggi.

Setelah pembahasan yang singkat mengenai geografi dan keragaman hayati Bali dan lingkungan yang lebih luas yaitu Indonesia, perhatian lebih banyak ditujukan kepada orang Bali sendiri. Pertama-tama perkembangan secara umum dari prasejarah akan dibahas, diikuti oleh diskusi singkat tentang perkembangan historis-politik yang merupakan dasar keragaman budaya Bali dewasa ini, hubungan yang erat dengan pulau Jawa, serta sikap yang positif dari manusia kepada penggunaan tumbuhan MAC. Fokus riset ini adalah masyarakat Bali masa kini, terutama masyarakat yang tinggal di bagian tengah dan tenggara pulau Bali. Masyarakat tersebut yang dikenal sebagai orang Bali. Perdebatan yang terjadi diantara orang Bali sendiri tentang *Balinisasi* atau *Kebalian*, merupakan suatu tantangan baru yang muncul untuk memelihara esensi orang Bali. Jumlah orang Bali yang menguasai semua aspek dari Bahasa Bali berkurang, bahkan beberapa orang Bali tidak menguasai Bahasa Bali sama sekali. Kehilangan kemampuan dan penguasaan dari suatu bahasa secara langsung terkait dengan hilangnya kemungkinan dari pengetahuan (intrinsik) untuk menangkap bahasa itu, termasuk pengetahuan yang berkaitan dengan penggunaan (tradisional) tumbuhan MAC.

Masyarakat Bali dikenal sebagai masyarakat yang memiliki organisasi sosial yang khusus, dan banyak peneliti menyatakan organisasi sosial Bali sangat kompleks. Mengesampingkan perbedaan-perbedaan yang nyata antara desa-desa Bali, yang dinyatakan oleh ungkapan '*satu desa, satu adat*', adalah suatu permasalahan dari kebudayaan Bali. Diantara persamaan kebudayaan Bali dan perbedaannya dengan keseluruhan kebudayaan Indonesia, Bali seakan-akan terpisah sebagai suatu sub-kebudayaan tersendiri di Indonesia. Elemen-elemen dasar dari bagian yang esensial dari identitas Bali telah dipaparkan. Pertama, dimulai dengan diskusi mengenai organisasi sosial: sistem kelompok kerja dan peminatan (*seka*), sistem klen (*dadia*), sistem stratifikasi (*kasta*), dan sistem komunitas (*banjar*).

Kedua, *Hindu Dharma* yang tidak hanya sekedar agama utama di Bali, sangat kuat dalam membentuk dan mengendalikan perilaku keseharian orang Bali. Tidak seperti agama-agama dunia lainnya yang biasanya bersandar pada ajaran-ajaran yang abstrak dengan menggunakan lambang-lambang, hal ini tidak berlaku untuk *Hindu Dharma* yang sangat bersifat lokal. Sangat sulit untuk menyimpulkan apakah kegiatan keseharian lebih dipengaruhi *Hindu Dharma* atau oleh kebudayaan Bali, *adat*, tradisi juga praktiknya. Khususnya, agama Hindu-Bali dijunjung tinggi dalam konsep-konsep perilaku dan secara emosional juga pelaksanaannya yang berkaitan dengan sakit, sehat dan penyembuhan.

Ketiga, deskripsi filsafat hidup orang Bali dan konsep *tri hita karana*. Keduanya merupakan faktor utama yang mempengaruhi kehidupan sosial dan penggunaan serta perilaku konservasi keragaman biokultural tumbuhan MAC di Bali. Dalam filsafat hidup orang Bali, kunci utama tujuan kehidupan bukan saja untuk meraih prestasi 'sempurna', tetapi memelihara keseimbangan antara berbagai kekuatan. *Tri hita karana*, pada hakekatnya menjadi filsafat hidup orang Bali dalam menjaga harmoni antara tiga dimensi kosmis manusia: Tuhan (mengacu pada semua representasi *Sang Hyang Widhi Wasa*, termasuk para dewa, roh-roh dan nenek moyang), *buana agung* (makrokosmos; seluruh alam semesta), *buana alit* (mikrokosmos; orang-perorangan atau jiwa) dalam kehidupan sehari-hari secara hakiki. Menghormati prinsip *tri hita karana* untuk menghindari gangguan-gangguan supernatural, sosial, lingkungan dan/atau fisik, dengan melakukan tindakan dan status jasmani yang serasi dengan siklus supernatural. Kalender Bali, digambarkan secara ringkas dalam studi ini, untuk mendukung anggota komunitas untuk tetap berada dalam lingkaran aktivitas dan menunjukkan waktu yang tepat untuk memperbaiki dan memelihara keseimbangan.

Semua desa-desa sebagai sampel penelitian ditentukan dengan pertimbangan lingkungan dimana populasi itu tinggal, sebuah desa dipilih secara acak dari area yang sudah ditentukan sebelumnya. Uraian dimulai dengan suatu orientasi geografis singkat dari empat desa yang terpilih dan yang disusun menurut abjad:

- Angantaka, kecamatan Abiansemal, kabupaten Badung, di daerah sentral;
- Bengkel, kecamatan Kediri, kabupaten Tabanan, di daerah pantai;
- Pelapuan, kecamatan Busungbiu, kabupaten Buleleng, di daerah pegunungan;
- Tumbu, kecamatan Karangasem, kabupaten Karangasem, di daerah kemiringan.

Deskripsi mengenai empat daerah penelitian digambarkan dengan profil kondisi sosio-ekonomi dan sosio-demografik. Data masing-masing desa tidak menunjukkan kekhususan dalam profil sosiodemografiknya. *Kasta* mayoritas responden adalah *Sudra* dan keempat desa terpilih memiliki presentasi yang mendekati 50-50 persen antara penduduk laki-laki dan perempuan. Perbedaan tingkatan pendidikan dapat dikaitkan dengan usia mereka, juga berhubungan pengembangan program pendidikan yang berlaku di sekolah nasional, dimana jenis kelamin laki-laki memiliki peluang lebih daripada perempuan. Profil sosio-ekonomi menggambarkan pendapatan kolektif rumah tangga, pendapatan responden di desa Bengkel lebih tinggi, walaupun demikian kebanyakan responden dengan pendapatan tertinggi tinggal di Angantaka. Tumbu memiliki pendapatan rumah tangga yang paling rendah. Dengan mempertimbangkan status sosio-ekonomi rumah tangga, rumah tangga di Angantaka memperoleh jumlah yang tertinggi dalam kategori 'Kaya' dan 'Sangat kaya', akan tetapi Pelapuan, dan bukan Tumbu, merupakan kabupaten termiskin di Bali, dengan jumlah yang tertinggi dalam angka dengan kategori 'Sangat miskin' dan 'Miskin'. Di bagian akhir dari uraian sosio-ekonomi, perhatian khusus diberikan pada anggota rumahtangga yang menganggur sehubungan dengan usia awal (15-24 tahun) dan usia lanjut (65 tahun ke atas).

Spektrum yang luas mengenai praktik kesehatan dan penyembuhan dalam kesehatan masyarakat Bali yang majemuk mempengaruhi dan membentuk komunitas sehat dalam pengetahuan, kepercayaan, dan pelaksanaan yang berkaitan dengan tumbuhan MAC, disajikan dalam Bab 5. Pengobatan tradisional, khususnya pemanfaatan tumbuhan MAC, berkembang karena didukung oleh faktor ekonomi, melalui beberapa tahapan sejarah di Indonesia. Pertama, pada masa Perang Kemerdekaan Indonesia ketika pengobatan dengan bahan-bahan kimia terbatas. Kedua, ketika keputusan dari Presiden pertama, Soekarno, bahwa Indonesia harus dapat mencukupi kebutuhannya sendiri (*berdikari*). Ketiga, pada tahun 1997, ketika

terjadi depresi ekonomi yang menyebabkan devaluasi drastis dari nilai Rupiah yang juga berhubungan dengan peristiwa *El-Niño*, yang menyebabkan musim kering yang mempunyai risiko akan adanya kebakaran. Pada masa-masa itu, impor bahan baku kimia untuk produksi obat tidak mungkin dilakukan karena harga yang sangat mahal bagi industri farmasi di Indonesia. Penggunaan dan kepercayaan terhadap tumbuhan MAC, kini juga dipromosikan oleh sistem medis modern, sesuai dengan strategi internasional WHO yang menyatakan pengintegrasian pengobatan tradisional ke dalam pelayanan kesehatan nasional. Secara khusus terlihat dalam program Tanaman Obat keluarga atau TOGA yang kemudian diterapkan dalam kebun percontohan di setiap Puskesmas.

Klasifikasi tumbuhan MAC dalam penggunaannya adalah akibat dari proses akulturasi dan transkulturasi. Hasil analisis klasifikasi *emic* tumbuhan MAC terlihat bahwa orang Bali mengklasifikasikan tumbuhan MAC berdasarkan penggunaan paling populer dari tumbuhan tersebut. Dari analisis susunan pengelompokan secara hierarkhis, terdapat dua belas kelompok yang disusun menurut abjad: 'Belukar' (*Brushwood and shrubs*), 'Bumbu' (*Cooking spices*), 'Bunga-bunga' (*Flowers*), 'Daun-daun yang harum' (*Fragrant leaves*), 'Buah dan sayuran' (*Fruits and vegetables*), 'Rempah-rempah' (*Herbs*), 'Akar-akaran' (*Rhizomes*), 'Rumput', 'Daun pepohonan' (*Tree leaves*), 'Pohon-pohonan' (*Trees*), 'Umbi-umbian' (*Tubers*) and 'Rumput liar' (*Weeds and grasses*). Slikkerveer & Slikkerveer (1995) menunjukkan bahwa penggolongan lokal tradisional dari tumbuh-tumbuhan di Indonesia meliputi lima kategori: 1) jenis pohon, 2) jenis perdu, 3) jenis sayur-sayuran dan bumbu-bumbu, 4) jenis rumput, dan 5) jenis tumbuhan merambat. Masing-masing dari lima kategori ini terdapat dalam keduabelas kelompok secara *emic* tersebut.

Nomenklatur masing-masing tumbuhan MAC dapat dikatakan kompleks sekaligus sederhana. Sederhana, karena nama tumbuhan sering dengan jelas menunjukkan bagian dari tanaman yang biasa digunakan. Kompleks, karena nama tumbuhan yang diberikan tidak konsisten, terutama bila dicampur tumbuhan lain yang lebih dikenal. Ramuan tersebut dapat menunjukkan tanaman dan sebaliknya. Situasi multibahasa mempersulit penamaan tumbuh-tumbuhan. Orang-orang mencampur Bahasa Bali dan Bahasa Indonesia. Mereka mempelajari nama-nama tumbuhan dan penggunaannya dalam Bahasa Indonesia, baik disekolah maupun bila belajar sendiri. Publikasi cetak ataupun *online*, biasanya menggunakan Bahasa Indonesia. Meski Bahasa Indonesia sangat berbeda dengan Bahasa Bali, secara semantik dan konseptual, orang Bali biasa menggunakan sekaligus dan sering kali kedua bahasa itu bercampur. Pencampuran bahasa dalam penamaan tumbuhan-tumbuhan dapat menjurus pada kesalah-pahaman ketika nama lokal (bisa merupakan campuran dari bahasa lain) dihubungkan dengan nama tumbuhan yang menggunakan Bahasa Indonesia sebagai bahasa nasional, yang mungkin didasari konseptualisasi Jawa karena pemerintah pusat dan media-media besar berada di pulau Jawa. Dapat disimpulkan bahwa disamping mengidentifikasi tumbuhan MAC, perlu dilakukan identifikasi dalam konteks lokal, terutama di dalam situasi multibahasa yang kompleks seperti di Indonesia. Catatan ini penting diperhatikan dalam penerbitan nasional.

Orang Bali tidak menggunakan istilah Jawa 'jamu', mereka menggunakan istilah *loloh*, *boreh* atau ramuan. *Loloh* merupakan campuran dari tumbuhan MAC yang disiapkan dengan menggiling ramuan dan menambahkan air bersih yang dingin, baik yang sudah dimasak maupun air mineral yang dibotolkan. *Boreh* dibuat dengan cara yang sama, tetapi tidak ditambahkan air agar dapat diminum, cairan ditambahkan untuk mencapai konsistensi yang benar agar dapat dioleskan secara eksternal langsung pada kulit. Ramuan adalah semua campuran dari tumbuhan MAC yang tidak termasuk dalam istilah *loloh* ataupun *boreh*. Orang Bali menggunakan campuran dari tumbuhan MAC dalam empat fungsi dasar: 1) untuk

pengobatan penyakit tertentu (*curative*); 2) untuk memelihara kesehatan (*promotive*); 3) untuk pengobatan rasa sakit dan nyeri (*curative*) dan 4) untuk mencegah dan memperbaiki bagian tubuh yang tidak berfungsi (*preventive* atau *promotive*).

Secara keseluruhan terdapat 168 tumbuhan MAC yang dikumpulkan dari wawancara yang dilakukan pada penelitian rumah tangga. Sebanyak 117 tumbuhan (69.6%) digunakan untuk *curative*, *promotive* maupun *preventive*. 30.4% tumbuhan MAC yang lain, tidak digunakan dalam 12 bulan sebelumnya. Dari 117 tumbuhan yang digunakan, 105 (89.7%) digunakan dalam penyembuhan, 55 (47.0%) dalam promosi kesehatan dan 49 (41.9%) untuk pencegahan. Tidak satu pun dari tumbuhan MAC itu digunakan untuk pencegahan saja. Lima tumbuhan MAC hanya digunakan secara tunggal untuk promosi kesehatan dan 49 tumbuhan dilaporkan digunakan hanya untuk tujuan pengobatan. Tidak ada perbedaan yang signifikan dalam penggunaan sepuluh tumbuhan utama, yang mana mungkin menunjukkan penggunaan yang sudah biasa dilakukan pada beberapa tumbuhan dipakai dalam lebih dari satu aplikasi, daripada spesifikasi khusus untuk tujuan tertentu. Hasil analisis tidak menunjukkan perbedaan-perbedaan penting antara para pemakai dan mereka yang tidak memakai tumbuhan MAC dalam hubungannya dengan jenis kelamin responden, 65.1% laki-laki (N=877) dan 62.9% perempuan (N=847) dilaporkan menggunakan tumbuhan MAC, versus 34.9% laki-laki dan 37.1% perempuan tidak pernah menggunakan tumbuhan MAC selama 12 bulan terakhir. Dalam hubungan dengan kelompok umur, terdapat perbedaan antara para pemakai dan bukan pemakai. Di kelompok umur 0-14 tahun (kelompok pertama) dan 15-25 tahun (kelompok kedua) (N= 431): di kelompok pertama 46.9% tidak memakai, versus 53.1% memakai dan di kelompok kedua 58.4% tidak memakai versus 41.6% memakai. Di kelompok umur 25 sampai 64 tahun dan usia lanjut (65 tahun – ke atas) yang memakai adalah lebih besar: 26.6% tidak memakai versus 75.4% memakai di dalam usia pertengahan dan 24.7% tidak memakai versus 75.3% memakai di dalam lanjut usia.

Deskripsi yang lebih luas dari kesehatan masyarakat Bali, sistem medis yang beragam, difokuskan pada peran tumbuhan MAC segar dalam sistem medis modern dan tradisional dalam penggunaan promosi, penyembuhan atau pencegahan. Penggunaan tumbuhan MAC tersebut menunjukkan bahwa mereka telah mengunjungi pengobatan tradisional atau modern. Sekalipun seseorang sedang berobat pada suatu praktisi kesehatan, mereka akan mencari tindakan komplementer lain seperti pemakaian tumbuhan MAC untuk kesehatannya, yang dapat saja memberikan efek menguntungkan dari pengobatan pertamanya. Beberapa responden menyatakan bahwa ada perbedaan yang dapat dipercaya akan keandalan seorang *balian* dan keandalan praktisi kesehatan lainnya. Praktisi kesehatan modern dan tradisional kecuali *balian*, adalah subyek berbagai program pelatihan, prosedur dan peraturan untuk menghindari terjadinya malpraktek. Orang Bali percaya bahwa tidak ada malpraktek di antara *balian* walaupun mereka tidak berpendidikan khusus, sertifikasi atau sistem kontrol. Lokasi pelayanan kesehatan modern dan tradisional yang terdekat jaraknya memakan waktu perjalanan sekitar 30 menit dari lokasi anggota masyarakat di empat desa tersebut. Bagaimanapun, seperti di katakan Foster (1983: 24) bahwa: 'orang memilih para pengobat, bukan berdasarkan sistem pengobatannya'. Jarak yang dianggap dekat oleh responden bukan secara geografis, tetapi pada praktisi kesehatan yang dikenal lebih dekat.

Ada tiga tipe praktisi kesehatan tradisional yang berkaitan dengan pemakaian tumbuhan MAC: 1) *the herbalist*, seorang ahli tumbuhan yang menggunakan tumbuhan dalam berbagai praktek penyembuhannya; 2) *the divine healers*, yang melakukan penyembuhan melalui kemampuan supernaturalnya, dalam melakukan diagnosis adakalanya mereka menggunakan tumbuhan obat, tetapi pada dasarnya mereka memiliki kekuatan spiritual, termasuk *balian*; dan 3) '*witchdoctors*', praktisi yang dihargai karena memiliki kemampuan untuk mengusir

perbuatan makhluk halus dari penyihir dan mengusir roh jahat yang mengganggu seseorang. Di Indonesia, seperti negara berkembang lainnya, pengobatan modern adalah metoda pengobatan yang mendominasi semua rumah sakit besar, sedangkan diluar rumah sakit, sistem medis modern dan tradisional beroperasi secara mandiri tanpa hierarki yang jelas dan kadang mereka saling bersinergi. Sampai permulaan abad ke duapuluh, pengobatan modern menganggap pengobatan tradisional lebih rendah, skeptisisme menguasai ahli pengobatan modern. Oleh sebab itu pengobatan tradisional yang dalam aplikasinya menggunakan tumbuhan MAC, sering kali dianggap takhyul dan melakukan perdukunan. Saat ini, banyak praktisi kesehatan modern Bali tidak lagi menentang pemakaian tumbuhan MAC, walaupun hanya beberapa praktisi kesehatan yang aktif mempromosikan penggunaan tumbuhan MAC.

Peningkatan dan pencegahan perilaku kesehatan didukung oleh kosmovisi Bali dan hal ini dicerminkan dalam pengobatan tradisional dan pengobatan modern. Pengobatan modern mengintegrasikan pencegahan dan peningkatan kesehatan dalam kebijakan-kebijakannya dan organisasi pelayanan kesehatan lokal yang mengacu pada program-program kesehatan nasional yang menerapkan *Millennium Development Goals* didalamnya. Dalam kesehatan tradisional, konsep keseimbangan harmonis adalah kunci dalam hal kesehatan dan penyembuhan. Memulihkan keseimbangan dapat dilihat sebagai penyembuhan, sedangkan pemeliharaan keseimbangan merupakan pencegahan dan peningkatan kesehatan seseorang. Orang Bali melihat kesehatan secara holistik, termasuk fisik dan kesehatan mental, yang juga mencakup perspektif lingkungan sosial-budaya, sehingga merujuk pada baik poros horisontal maupun poros vertikal dari suatu keseimbangan dalam kosmovisi Bali. Dalam hubungan vertikal dan horisontal dari kosmovisi Bali. Poros horisontal merupakan hubungan dirinya dengan orang lain dan alam, sedangkan poros vertikal adalah untuk mempertahankan keseimbangan antara '*dunia bawah*' dan Tuhan ('*dunia atas*'). Suryani (2006: komunikasi antar personal) memperkenalkan pendekatan tersebut sebagai konsep *bio-psiko-spirit-sosiobudaya*. Ketiga elemen yang terintegrasi dalam konsep tersebut adalah *bio* (tubuh), *psiko* (pikiran) dan *spirit* (jiwa) dari seseorang. Ketiganya berinteraksi dengan konteks sosio-budaya seseorang, dan keseluruhannya harus ditempatkan dalam lingkungan hidupnya.

Konseptualisasi tentang kesehatan, rasa sakit dan penyakit pada orang Bali merupakan penggabungan konsep dari beberapa sistem medis, sehingga mengembangkan 'konsep baru' seolah-olah mengintegrasikan sistem *disease theory* yang menggunakan klasifikasi penyakit secara *emic*. Sistem *disease theory* ini seakan-akan telah terintegrasi; karena menempatkan berbagai perspektif yang mengambil manfaat dari sistem yang berbeda, di sebelah atau di atas yang lain, daripada mengembangkan suatu keseluruhan yang baru, yang benar-benar merupakan sistem integrasi, yang bebas dari konflik internal dengan berbagai alasan. Berdasarkan analisis '*pile-sort*' muncul solusi dalam sepuluh kelompok, disusun berdasarkan abjad sebagai berikut: 'Otak' ('*Brain*'), 'Batuk' ('*Coughing*'), 'Bagian luar tubuh' ('*External*'), 'Demam' ('*Fever*'), 'Kepala/tenggorokan' ('*Head/throat*'), 'Sistem bagian dalam tubuh' ('*Internal system*'), 'Usus besar/bagian dalam perut' ('*Intestines/ stomach*'), 'Organ tubuh' ('*Organs*'), 'Sulit digerakkan' ('*Restricted movement*') dan 'Kulit' ('*Skin*'). Penggolongan penyakit berdasarkan *emic* memiliki kesamaan dengan kategorisasi pada pelayanan di Departemen Kesehatan Indonesia. Hal ini menandakan adanya tumpang-tindih dalam praktek sistem kesehatan yang berbeda, hal ini menunjukkan adanya kesamaan antara penggolongan modern dan penggolongan penyakit berdasarkan *emic*. Ada beberapa penyakit yang dilaporkan dalam hubungan dengan penggunaan tumbuhan MAC dalam pengobatannya. Hasilnya adalah bahwa lebih dari separuh responden pada sepuluh kelompok penyakit menggunakan tumbuhan MAC untuk pengobatannya, kecuali kasus dari kelompok penyakit yang tak ditentukan, atau yang termasuk kategori 'Lain'. Untuk kelompok tersebut ternyata

hanya 40% responden memakai tumbuhan MAC. Hasil yang tinggi terlihat dalam penggunaan tumbuhan MAC untuk penyakit yang termasuk kategori organ tubuh (86.4%), sistem bagian dalam (85.2%) dan bagian luar (80%). Sedangkan penggunaan tumbuhan MAC yang paling rendah adalah pada kelompok 'Otak' dan 'Kulit'.

Konservasi keragaman biokultural yang dipusatkan pada penggunaan dan konservasi tumbuhan MAC serta pemeliharaan tumbuhan MAC dalam kebudayaan lokal, dan didasarkan pada perilaku yang di peroleh dari masyarakat Bali di empat desa sample, dibahas dalam Bab 6. Dalam studi ini konservasi keragaman hayati merujuk pada praktek multidisiplin untuk melindungi dan mengelola keragaman tumbuhan MAC dalam arti pemeliharaan gen-gen, spesies dan ekosistemnya untuk menghindari kepunahan dalam keragaman hayati. Keberlanjutan penggunaan sumber alam adalah suatu pendekatan lebih nyata dalam konservasi keragaman biokultural dibandingkan dengan pendekatan konservasi yang tidak melakukan apapun, yang tidak cocok dengan kosmovisi Bali di mana manusia merupakan satu bagian yang terintegrasi dengan alam. Pada tahun 1992, semua negara Asia Tenggara, termasuk Indonesia, menandatangani *Convention of Biological Diversity*, yang membenarkan pentingnya lingkungan dan memberi tanda bahwa mereka berniat untuk mengambil bagian dalam kancah internasional mengenai pembangunan berkelanjutan. Sering kali, kebijakan keragaman hayati dan konservasi berkaitan dengan nilai ekonomi dari tumbuhan tersebut.

Memiliki undang-undang, diterapkan ataupun tidak, bukan menjadi jaminan motivasi masyarakat umum untuk menerapkan penggunaan berkelanjutan akan tumbuhan MAC dengan rasa tanggung jawab bila tidak menyadari akan kepunahan yang dapat terjadi. Secara keseluruhan, dapat disimpulkan bahwa ada konsensus yang berlaku secara umum pada masyarakat Bali bahwa tidak tersedia lagi tumbuhan MAC dalam jumlah besar di lingkungan mereka. Hal ini menunjukkan adanya 90 responden (22.5%) yang tidak mengetahui berapa banyak tumbuhan MAC yang dapat ditemukan di hutan, dan 46 responden (10.5%) yang tidak tahu berapa banyak tumbuhan MAC dapat ditemukan di desa mereka sendiri. Itu berarti hilangnya pengetahuan dan menurunnya minat yang berkaitan dengan tidak menanam tumbuhan MAC, karena semua tempat dimana tumbuhan tersebut ditemukan, seperti ladang, sawah dan kebun telah ditanami. Perasaan 'membutuhkan' harus dibangkitkan pada anggota masyarakat, terutama sejak diterapkannya konservasi dan pengelolaan keragaman hayati di Indonesia, karena tanpa melibatkan atau mengikutsertakan masyarakat lokal hal itu tidak mungkin tercapai.

Konservasi kebudayaan terhadap tumbuhan MAC oleh orang Bali melingkupi konservasi penggunaan sumber daya dan pengelolaan, secara luas dalam sistem pengetahuan tradisional ekologi (TEK) dan secara khusus dalam sistem pengetahuan tentang etnobotani (EKS). Perubahan itu sendiri bukanlah suatu faktor penentu dari hilangnya keragaman budaya, karena kebudayaan adalah suatu sistem yang dinamis; tradisi yang ada diperbaharui dan dipersepsi oleh masing-masing generasi, selama transformasi warisan budaya masih ada. Meskipun demikian, sangat penting untuk diperhatikan bahwa perubahan yang terjadi dalam suatu kebudayaan diarahkan atau dikendalikan oleh masyarakat itu sendiri dan tidak oleh pihak luar, karena akan mengganti atau menghilangkan tradisi kebudayaan, praktek, moral dan nilai yang ada. Keberlanjutan warisan budaya melingkupi transfer pengetahuan dan kepercayaan yang diwujudkan dalam penggunaan. Konservasi kebudayaan terhadap tumbuhan MAC adalah suatu paradoks. Konservasi kebudayaan terhadap tumbuhan MAC, seperti penulisan pada *lontar*, tercerabut dari konteks pengetahuan aslinya. Tradisi-tradisi Bali memerlukan seseorang yang mampu secara spiritual untuk membaca *lontar*. Jika orang tersebut belum siap secara spiritual, seharusnya ia tidak terlibat dalam hal ini. Beberapa responden, sebagai contoh, menunjukkan bahwa saat ini tidak ada lagi *balian usada* di desa mereka yang masih

aktif, karena yang ada sudah terlalu tua. Tidak satu pun dari responden yang peduli bahwa tidak ada lagi orang yang diangkat untuk melakukan praktek tersebut. Hal itu dianggap sebagai sesuatu yang biasa dalam kehidupan mereka; ‘apapun yang akan jadi, terjadilah’. Bahkan sulit sekali mendapat orang yang memahami hubungan antara kosmologi Bali dan penggunaan tumbuhan MAC.

Konservasi keragaman biokultural di pulau Bali dan penggunaan berkelanjutan dari sumber daya alam dan kebudayaan dalam hubungan dengan filsafat kuno Hindu-Bali *tri hita karana* saling berkaitan. *Tri hita karana* membentuk kompleks *Corpus-Cosmos-Praxis* (kompleks pengetahuan-kepercayaan-penggunaan). *Tri hita karana* menjadi paduan untuk memelihara hubungan yang harmonis di antara dan di dalam dunia manusia (*pawongan*), dunia alam (*palemahan*) dan dunia rohani (*parahyangan*). Secara tradisional, konsep ini melaksanakan dan mewujudkan prinsip biokultural di mana orang Bali dapat memelihara keragaman biokultural mereka. Untuk mencapai keberhasilan, setiap program atau prakarsa dalam mengelola sumber daya, masyarakat harus memfokuskan pada penguatan institusi-institusi lokal, termasuk *desa/banjar adat*, *subak*, *pura* dan *seka*. Dengan demikian, hal ini mengangkat pengetahuan dan filsafat yang mendasari hal yang dilakukan orang Bali masa kini, termasuk hasil seni dan pekerjaan seni mereka. Orang Bali percaya bahwa dengan melaksanakannya cara dan gaya kehidupan lokal mereka akan kembali, sehingga penggunaan potensi dan sumber daya lokal lebih optimal.

Seiring dengan dimulainya pariwisata di Bali, kedatangan orang asing sering menjadi alasan perubahan sosial di Bali. Memang ironis, karena dikhotomi yang dihasilkan antara tradisi Bali dengan pariwisata yang melahirkan modernisasi sama dengan yang dikhotomi yang menggambarkan ketakutan orang Barat terhadap ‘bahaya’ dari pariwisata. Pariwisata telah menjadi suatu kekuatan modernisasi dan juga kekuatan konservasi pada masa lampau yang sekaligus membekukan tradisi. Walaupun beberapa pengaruh negatif yang ternyata adalah dampak pariwisata pada sumber daya alam seperti di darat ataupun sumber daya air, ada juga pengaruh positif dari pariwisata. Hal yang paling jelas terlihat adalah peningkatan ekonomi dari pendapatan pariwisata. Lebih lanjut, pariwisata telah mendorong peningkatan penganekaragaman hasil pertanian. Responden di empat desa tidak mengakui ada suatu perbedaan yang besar sebagai dampak pariwisata dalam ketiga aspek: dalam tumbuhan MAC; dampak dalam keragaman kebudayaan terhadap tumbuhan MAC berdampak sedikit lebih banyak, membuat 26.8% ‘dampak rata-rata’ dan 4.8% ‘dampak yang tinggi’ sedangkan 18% ‘dampak rata-rata’ dan 2% ‘dampak yang tinggi’ terlihat dalam hubungan penggunaan dan keragaman hayati tumbuhan MAC. Hal ini dijelaskan berdasarkan fakta *herbalis* Bali dan *balian* yang menerima jumlah pasien asing yang tinggi untuk mendapatkan nasihat mereka. Hal ini memotivasi masyarakat untuk mengevaluasi ulang persepsi mereka tentang arti penting dari pemakaian tumbuhan MAC.

Penggunaan tumbuhan MAC memberikan kekayaan yang nyata pada kesehatan masyarakat, tetapi juga menjadi ancaman yang harus dipertimbangkan pada kesehatan individu. Argumentasi yang utama dari para praktisi medis modern yang memiliki sikap negatif ke arah pemakaian obat bahan tumbuhan adalah, apakah itu dibuat di rumah atau oleh industri, apakah itu segar atau dikeringkan, dan kesulitan pengendalian mutu ataupun kemanjuran dari ramuan-ramuan tersebut. Selain itu, mayoritas obat tradisional dari tumbuhan tidak memiliki pembuktian keberhasilan signifikan melalui uji klinis. Pemakaian obat tradisional dari tumbuhan sudah berlangsung lama, biasanya berdasarkan uji coba dari pemakaian sebelumnya (*trial and error*). Penggunaan tumbuhan-tumbuhan khusus berbeda antara kelompok etnis yang bertempat tinggal di ekosistem yang berbeda di Indonesia. Suatu spesies tumbuhan yang digunakan di Bali tidak digunakan untuk penyakit yang sama di pulau

Jawa atau sebaliknya. Ada perbedaan-perbedaan yang lebih besar dalam penerapan kelompok etnis lain di Indonesia sesuai dengan perbedaan *flora* dan *faunanya*. Beberapa nama lokal tumbuhan bisa menjadi sama dalam Bahasa Indonesia seperti di daerah Bali dan Jawa dengan contoh *kayu manis*, walaupun jenis tumbuhannya berbeda. Selain itu, bahan-bahan jamu ataupun *loloh*, *boreh* dan berbagai ramuan lain harus dalam keadaan higienis terutama campuran-campuran yang bersifat basah, jika tidak dijaga, akan menjadi media yang sempurna untuk berkembangnya bakteri. Kebun Raya Bali khusus memiliki bagian mengenai tumbuhan obat, untuk mengenali nilai dari tumbuhan ini bagi kesehatan dan penyembuhan. Pada pintu masuk, terdapat informasi peringatan terhadap pengunjung dalam memanfaatkan tumbuhan (MAC) yang tidak tepat karena kemungkinan hal itu dapat menjadi ancaman bagi yang menggunakannya.

Masih ada perdebatan dalam kemanjuran dan mutu dari ramuan-ramuan dan cara memprosesnya, selain itu, sering terjadi penggunaan yang tidak sesuai atau tidak diatur dalam sistem praktek pengobatan tradisional yang memiliki efek negatif atau berbahaya. Jika tidak dikendalikan, penggunaan tumbuhan MAC dapat juga menjurus pada pemanfaatan berlebihan, sehingga mempengaruhi dan menyebabkan hilangnya keragaman hayati disebabkan terjadinya gangguan pada ekosistem. Sebanyak 168 tumbuhan MAC, yang terdaftar melalui wawancara dengan responden diperiksa ulang dengan IUCN *Red List* di tahun 2008. Tujuh tumbuhan MAC ada dalam daftar IUCN *Red List*. Dua spesies diantaranya dapat dinyatakan 'berisiko' (VU) berdasarkan IUCN *Red List*, walaupun dua spesies itu tidak banyak dibutuhkan dalam aplikasi penggunaan tumbuhan MAC segar bagi pengobatan diri sendiri. Riset ini tidak dilakukan untuk pemanfaatan tumbuhan dalam dunia herbal industri. Penggunaan tumbuhan MAC berperan untuk perbaikan kesehatan masyarakat di Bali, jika digunakan secara benar dan berhati-hati. Oleh karena itu, pengetahuan tradisional, kepercayaan dan praktek-praktek mengenai tumbuhan MAC penting untuk ditransfer kepada generasi yang lebih muda untuk dikembangkan dan dipertahankan cara penggunaan tumbuhan MAC. Hanya dengan cara ini, tumbuhan MAC serta pengetahuan, kepercayaan dan penggunaannya akan tetap ada bagi generasi selanjutnya.

Di dalam Bab 7 akan dilakukan analisis hubungan timbal balik antara kategori dari faktor-faktor yang diteliti, dalam mengidentifikasi interaksi antara berbagai faktor dalam hubungan dengan penggunaan dan konservasi keragaman biokultural tumbuhan MAC oleh masyarakat Bali. Langkah pertama yang dilakukan adalah untuk menterjemahkan data yang terukur dengan yang didokumentasikan atau dikumpulkan oleh survei rumah tangga ke dalam kategori-kategori dari variabel-variabel. Sesudah itu, analisis statistik dilakukan. Analisis statistik dilakukan untuk memperoleh pengertian yang mendalam dari faktor-faktor utama yang saling berinteraksi dengan perilaku anggota masyarakat Bali. Analisis statistik *bivariate*, *multivariate* dan *multiple regresi* tentang variabel dan blok faktor-faktor dari *model multivariate* digunakan untuk menilai, memahami dan menjelaskan hubungan timbal balik dari berbagai blok faktor tersebut dari penggunaan dan konservasi keragaman biokultural tumbuhan MAC. Dari hasil analisis *bivariate* terlihat jelas beberapa hubungan signifikan yang menguatkan asumsi-asumsi tertentu, bahwa tidak ada hubungan satu-terhadap-satu antara satu variabel bebas atau variabel pengganggu dan salah satu dari ketiga variabel tergantung. Karena itu, dalam studi ini analisis *bivariate* tidak dapat menunjukkan interaksi yang kuat.

Selanjutnya, model *multivariate* memungkinkan untuk menilai konservasi keragaman biokultural yang agak rumit terhadap perilaku dari responden, sebagai satu kompleks yang terintegrasi hubungan interaksi antara lingkungan berkaitan dengan individual dalam tataran sistim. Analisis *multivariate OVERALS* mengidentifikasi tujuh variabel kuat pada dimensi pertama atau kedua, yaitu: 'Desa' ('*Village*'), 'Kasta' ('*Caste*'), 'Kepercayaan akan sistim

medis modern' (*BeliefMMS*), 'Pendapatan keluarga' (*IncomeHH*), 'Penyakit yang dilaporkan' (*RepDisease*), 'Pemerintah' (*Government*) dan 'Penggunaan yang berlebihan dari sumber daya' (*Overuse*). Variabel-variabel 'Pendapatan keluarga' (*IncomeHH*) dan 'Penyakit yang dilaporkan' (*RepDisease*), keduanya merupakan variabel kuat pada hasil *OVERALS*, diposisikan dalam suatu kwadrant yang berbeda kepada variabel tergantung yang menunjukkan bahwa, meski kedua variabel tersebut kuat pada *OVERALS* tetapi tidak ada hubungan langsung antara variabel tersebut dengan variabel tergantung. Variabel-variabel 'Kasta' (*Caste*) dan 'Kepercayaan akan sistim medis modern' (*BeliefMMS*) memiliki korelasi yang kuat dengan 'Konservasi keragaman budaya tumbuhan MAC' (*CultMAC*) pada hasil *OVERALS*. Semakin tinggi kasta seseorang, semakin tinggi pula tingkatan konservasi budayanya, hal ini menunjukkan adanya keterlibatan dari kasta tinggi dalam konservasi kebudayaannya. Sebagai contoh, konservasi pengetahuan tentang tumbuhan MAC yang tertulis pada *lontar* oleh *pedande* dan *balian*, menunjukkan keterlibatan mereka yang aktif dalam diskusi mengenai *kebalian* dalam mencapai tujuan konservasi kebudayaan Bali, termasuk sistem pengetahuan tradisional. Hasil dari *OVERALS* menunjukkan bahwa nilai yang tinggi dari kepercayaan dalam sistem medis modern berakibat perilaku konservasi keragaman budayanya pun tinggi. Mereka menyadari kekurangan dari sistim medis modern dan oleh karena itu mempunyai pendekatan yang positif ke konservasi pengetahuan, kepercayaan dan penggunaan mengenai tumbuhan MAC. Mereka berharap pengobatan modern dapat mengembangkan dan memperbaiki pengobatan atas dasar pengetahuan dan praktek tradisional Bali.

Tiga variabel lain yang kuat dihasilkan *OVERALS* dan *multiple regresi* adalah 'Penggunaan yang berlebihan dari sumber daya' (*Overuse*), 'Pemerintah' (*Government*) dan 'Desa' (*Village*). Hubungan yang dihasilkan *OVERALS* di antara 'Pemerintah' (*Government*) dan variabel tergantung 'Konservasi keragaman tumbuhan MAC' (*BioMAC*) dan 'Penggunaan tumbuhan MAC' (*UseMAC*) menunjukkan bahwa jika responden mempercayai ada dampak yang tinggi dari program-program pemerintah dalam penggunaan dan konservasi keragaman biokultural tumbuhan MAC, maka yang muncul adalah perilaku yang sebalik, yakni: penggunaan tumbuhan MAC yang rendah. Mayoritas dari responden merasa dampak dari program-program pemerintah tersebut adalah positif. Dampak positif ini dapat dipahami dalam ketelitian penggunaan tumbuhan MAC, untuk meningkatkan isu mengenai keselamatan dan kualitas yang berhubungan dengan program pemerintah. Hubungan negatif antara 'Pemerintah' (*Government*) dan 'Konservasi keragaman tumbuhan MAC' (*BioMAC*) menunjukkan bahwa orang Bali akan mengambil alih permasalahan dan menunjukkan perilaku konservasi keragaman hayati yang tinggi, jika mereka menilai dampak program pemerintah yang rendah.

Sesuai dugaan, 'Desa' muncul sebagai salah satu faktor kuat dalam semua analisis, yang mewakili keragaman lingkungan bio-kultural bagi seseorang. Setiap desa dipilih dalam suatu area geografis yang berbeda. Hal ini ditandai dengan perbedaan lingkungan biologis di antara desa-desa tersebut. Dalam kebudayaan Bali, prinsip *desa kala patra* berarti bahwa setiap desa mempunyai pola budayanya sendiri. Hasil *OVERALS* menunjukkan 'hubungan yang tak terhindarkan' antara keragaman hayati dengan perilaku konservasi akan keragaman budaya yang didokumentasikan oleh hubungan antara 'Kesadaran institusi-institusi lokal berhubungan dengan keragaman budaya tumbuhan MAC' (*AwareCult*) dan variabel tergantung 'Penggunaan tumbuhan MAC' (*UseMAC*) serta 'Konservasi keragaman tumbuhan MAC' (*BioMAC*). Analisis ini menyatakan pengetahuan dan kesadaran dari keragaman hayati konservasi tumbuhan MAC mempunyai efek yang positif dalam penggunaan dan konservasi keragaman hayati tumbuhan MAC. Korelasi yang tinggi antara variabel-variabel

‘Kepercayaan terhadap *tri hita karena*’ (*BeliefTHK*) dan ‘Konservasi keragaman budaya tumbuhan MAC’ (*CultMAC*), kembali menggambarkan peran yang penting dari prinsip *tri hita karena* dalam penggunaan dan konservasi keragaman hayati tumbuhan MAC.

Kesimpulan dari analisis *multiple regresi* adalah faktor-faktor kelembagaan yang muncul sebagai blok yang paling kuat dari pada faktor-faktor yang saling berinteraksi dengan variabel tergantung. Oleh karena itu, blok dari variabel tergantung mempunyai hubungan yang paling kuat dengan variabel-variabel ‘Kesadaran institusi-institusi lokal berhubungan dengan penggunaan tumbuhan MAC’ (*AwareMAC*), ‘Kesadaran institusi-institusi lokal berhubungan dengan konservasi keragaman hayati tumbuhan MAC’ (*AwareBio*) dan ‘Kesadaran institusi-institusi lokal berhubungan dengan keragaman budaya tumbuhan MAC’ (*AwareCult*). Variabel tersebut jika berdiri sendiri menjadi tidak kuat di dalam analisis. Dalam analisis *bivariat*, *Pearsons Chi-square* tidak dapat digunakan dan hasil *Spearman’s Rho* di antara variabel-variabel kelembagaan dan variabel tergantung memperlihatkan suatu hubungan yang lemah. Dalam hasil *OVERALS* variabel-variabel kelembagaan menonjol sebagai variabel biasa. Bagaimanapun, karena variabel kelembagaan memiliki interaksi yang paling kuat dengan semua variabel dan blok faktor yang mempengaruhi perilaku masyarakat Bali, variabel tersebut adalah indikator yang paling kuat bagi variabel tergantung. Setelah faktor-faktor tersebut, faktor-faktor psikososial menjadi blok kedua yang kuat dalam analisis *multiple regresi*. Karena itu, faktor tersebut dikatakan sebagai faktor ‘tak terlihat’ seperti juga sistem kepercayaan dan filsafat-filsafat lokal tentang alam dan lingkungan, yang menjadi faktor kuat dalam mempengaruhi masyarakat Bali dalam penggunaan dan konservasi tumbuhan MAC.

Kesimpulan dari studi ini tentang pengetahuan, kepercayaan dan penggunaan tumbuhan MAC untuk kesehatan masyarakat pada masyarakat Bali, penggunaan dan konservasi sumber daya tumbuhan MAC serta pemeliharaan kebudayaan lokal tentang tumbuhan MAC disampaikan dalam Bab 8. Penelitian antropologi medis dan etno-botani ini mempelajari dokumen, menguraikan dan melakukan analisis antar hubungan dalam kesehatan masyarakat lokal, keragaman hayati dan keragaman budaya, pada tingkat masyarakat dari satu segi pandangan *emic*, yang mengutamakan hubungan dan interaksi antara manusia dan tumbuhan. Saat ini, komunitas global mulai menyadari kemunduran yang cukup mengkhawatirkan dari keragaman hayati dunia serta konsekuensi serius mengenai kesehatan dan kesejahteraan manusia. Pemerintah Indonesia mengakui bahwa memelihara keragaman hayati merupakan asas integritas terhadap lingkungannya, dan kepunahannya akan berdampak negatif dalam perencanaan pembangunan ekonomi negara, seperti juga dalam bidang kesehatan. Indonesia masuk dalam urutan kedua sebagai sepuluh negara dari ‘pusat dari mega keanekaragaman’ (*‘centres of megadiversity’*) di dunia. Dalam keragaman jenis tumbuhannya, Indonesia masuk dalam urutan kelima di dunia. Walaupun, data baru menunjukkan bahwa status keragaman hayati di Indonesia dan Bali mengalami krisis keragaman hayati yang serius, juga program-program dan kebijakan terhadap perlindungan keragaman hayati mengalami kegagalan dalam tingkat nasional dan regional. Implementasi kebijakan dan peraturan tentang pembangunan berkelanjutan dan pengelolaan keragaman biokultural di Indonesia terbukti sangat sulit tanpa melibatkan dan mengikutsertakan masyarakat lokal, karena mereka harus mengubah cara hidupnya serta beradaptasi dengan perilaku mereka. Observasi tersebut mendukung pernyataan Pitana (1999) tentang globalisasi, yakni: bahwa jika struktur global dapat mempengaruhi struktur lokal, globalisasi sekurang-kurangnya dapat membantu agar struktur lokal juga dapat mempengaruhi struktur global. Dalam observasinya pada saat ini di Bali, globalisasi dan lokalisasi terjadi secara serempak.

Orientasi teoritis mendukung aplikasi dari kompleks pengetahuan-kepercayaan-penggunaan sebagai suatu pendekatan dasar dari studi perilaku manusia yang memungkinkan untuk menilai konservasi keragaman biokultural yang kompleks dari para responden, seperti umpamanya dalam satu kompleks integrasi dari hubungan dan interaksi antara lingkungan dan manusia. Perhatian diberikan pada kosmovisi masyarakat Bali, khususnya *tri hita karana* yang disebut sebagai faktor 'yang tidak kasat mata' dalam sistem kepercayaan dan filsafat lokal mengenai alam dan lingkungan - yang menjadi faktor kuat dalam penggunaan dan konservasi tumbuhan MAC oleh masyarakat Bali. Pendekatan Etnosistem dan model multivariat menjadi kerangka yang tepat untuk memformulasikan dan mengidentifikasi data yang harus dikumpulkan juga sebagai dasar analisis kuantitatif yang mengukur sistem pengetahuan, kepercayaan dan penggunaan pada masyarakat Bali dalam konteks yang lebih dinamis dari suatu proses pengembangan dan perubahan. Ada tujuh sasaran khusus dari studi ini yang telah dicapai atas dasar implementasi dari metodologi penelitian pokok serta pelaksanaan dari metoda dan teknik penelitian yang telah ditentukan dalam pengumpulan data dan analisis. Temuan pokok yang telah digambarkan pada bab sebelumnya dijabarkan secara spesifik dalam Bab 8.

Akhirnya, implikasi-implikasi teoritis, metodologis, dan praktis telah dijelaskan. Studi ini bertujuan untuk lebih jauh turut berperan dalam mengembangkan teori dalam pendekatan multidisiplin ilmu antropologi medis, etnobotani medis, konservasi keragaman bio-cultural serta pembangunan berkelanjutan. Studi ini juga menyumbangkan secara lebih detil dokumentasi dan argumentasi pemahaman tentang pemecahan masalah secara praktis melalui pendekatan pengetahuan lokal, yang merupakan bagian dari Pengetahuan Ekologis Tradisional (TEK), bukan sekedar 'pengetahuan umum' namun dengan caranya sendiri yang bersifat ilmiah. Tentu saja, karena empirik, eksperimental dan sistematis dapat digabungkan dengan ilmu pengetahuan modern, yang menjembatani antara pengetahuan 'ilmiah' dan pengetahuan 'tradisional'. Penggunaan tumbuhan MAC ditempatkan pada konfigurasi medis yang beragam secara realistis, yang menunjukkan bahwa penggunaan tumbuhan MAC segar untuk kesehatan dan pengobatan melampaui batas sistem pengetahuan dan kepercayaan yang menjadi bagian suatu sistem medis. Kompleks *Corpus-Cosmos-Praxis* atau kompleks pengetahuan-kepercayaan-penggunaan dari masyarakat lokal merupakan kombinasi teori dan pendekatan dari beberapa sistem medis ke dalam satu kesatuan yang utuh dan terintegrasi. Hal tersebut mensyahkan penggunaan tumbuhan MAC dalam situasi sistem medis yang beragam serta diperkuat oleh klasifikasi *emic* tumbuhan MAC dan klasifikasi *emic* berbagai penyakit.

Sebagai pendekatan umum, studi ini menggunakan analisis *etno-scientific* tentang persepsi dan penggunaan sumberdaya tumbuhan obat dalam konteks keputusan-keputusan yang berkaitan dengan tindakan oleh masyarakat Bali dalam situasi kehidupan nyata. Pendekatan ini menghasilkan informasi baru tentang berbagai faktor yang berkaitan dengan etno-botani atau berbagai proses antropologi medis yang dilaksanakan dalam lingkungan sosio-medis pada komunitas Bali, yang sudah jelas mengkaitkan hubungan timbal balik secara biokultural antara perilaku manusia dan sistem biologi disekeliling mereka. Aplikasi Pendekatan Etnosistem dan model multivariat dalam studi ini membantu memperkuat konsep konservasi bio-kultural berdasarkan kenyataan (*'Bio-Cultural Evidence-Based Conservation'*), yang meningkatkan pemilihan, analisis, pemahaman, evaluasi dan pengintegrasian kemampuan dalam penerapan dalam pengelolaan dan konservasi biokultural bagi pengembangan komunitas. Analisis statistik menunjukan penggunaan dan konservasi tumbuhan MAC oleh masyarakat harus didukung oleh analisis multivariat agar dapat mendokumentasikan hubungan timbal balik pada blok faktor-faktor dalam model multivariat tersebut.

Implikasi praktis dari studi ini dalam mengidentifikasi faktor-faktor yang mendukung penggunaan dan konservasi tumbuhan MAC melalui perspektif masyarakat telah dijelaskan dalam Bab 7 dan pada kesimpulan di Bab 8. Secara keseluruhan, orang Bali melaporkan berbagai aplikasi tumbuhan MAC untuk pengobatan, promosi dan pencegahan. Bagaimanapun, studi ini tidak mungkin menjelaskan penggunaan tumbuhan MAC untuk penyakit-penyakit yang disebutkan, apakah tumbuhan MAC digunakan sendiri atau secara komplementer atau dipakai untuk gejala sekunder atau untuk perasaan gelisah selama berada dalam episode sakit.

Hasil yang dicapai program TOGA adalah, bahwa tumbuhan obat menjadi bagian dari masyarakat Bali. Variasi jenis tumbuhannya masih rendah, walaupun dalam jangka panjang akan dapat dipengaruhi kelestarian gen, spesies dan ekosistem kelestarian, karena pengetahuan dan pengelolaan beragam tumbuhan MAC oleh anggota masyarakat. Program TOGA menjadi keharusan untuk dilakukan di setiap puskesmas dan Pemberdayaan Kesejahteraan Keluarga (PKK). Tetapi efek program tersebut tergantung pada mereka sendiri dalam melaksanakannya, umpamanya berapa banyak biaya yang akan mereka keluarkan dan waktu yang akan mereka gunakan. Karena pemakaian bahasa yang beragam di Bali, transfer informasi secara langsung mengenai penggunaan tumbuhan MAC menjadi berkurang, walaupun penggunaan tumbuhan MAC meningkat karena trend '*back to nature*'. Hal ini mengakibatkan diperlukannya pendidikan (pemberdayaan?) untuk mewujudkan kemanjuran, mutu dan keamanan dalam pemakaian tumbuhan untuk kesehatan dan pengobatan. Berikutnya, kita juga harus menghargai dengan mengaplikasikan keberagaman kegunaan tumbuhan MAC, karena biasanya satu tumbuhan MAC digunakan untuk lebih daripada satu gejala yang tunggal. Hal yang lebih penting lagi adalah bahwa masyarakat seharusnya menyadari efek samping yang mungkin timbul dari tumbuhan MAC, selain itu mereka harus bisa mengenali spesies yang benar. Oleh karena itu, disarankan untuk mengenali nama lokal atau nama daerah dari tumbuhan-tumbuhan tersebut dan juga acuan nama ilmiah yang tercakup di dalam semua penerbitan tentang tumbuhan MAC. Lebih baik jika tumbuhan MAC diidentifikasi dengan foto yang jelas, karena banyak orang menggunakan buku-buku tersebut tanpa bimbingan ahli herbal. Sebagai kesimpulan, terlihat jelas dan nyata bahwa aplikasi tumbuhan MAC merupakan suatu peningkatan kesehatan masyarakat, jika ada peraturan dan kebijakan penggunaan tumbuhan MAC, sehingga penggunaan tersebut tidak menjadi hal yang berbahaya bagi kesehatan masyarakat dan juga keragaman hayati di Bali.

Filsafat *tri hita karana* memiliki peran utama dalam mengelola sumber daya masyarakat kini dan yang akan datang, termasuk aspek-aspek sosial, budaya dan ekonomi dari masyarakatnya. Hal ini disebabkan karena isi *tri hita karana* sangat dikenal oleh orang Bali. Agar dapat mencapai keberhasilan, program dan inisiatif diarahkan pada pengelolaan sumber daya masyarakat yang dikonsentrasikan pada penguatan institusi lokal, termasuk desa atau banjar adat, subak, pura dan seka. Orang Bali yakin bahwa realisasi bentuk pengalangan sumber daya masyarakat ini akan meningkatkan gaya dan cara hidup lokal dan mengoptimalkan penggunaan potensi dan sumberdaya lokal. Sehubungan dengan perilaku konservasi keragaman biokultural anggota masyarakat terhadap tumbuhan MAC di seluruh pulau Bali, ternyata bahwa anggota masyarakat merasa bertanggung jawab untuk melindungi masa depan bagi generasi berikutnya. Beberapa inisiatif-inisiatif yang baik diantara anggota masyarakat, seperti perundang-undangan baru dan pengembangan kebijakan, termasuk penyediaan dana, sebaiknya diarahkan menuju ruang untuk berkreasi supaya inisiatif masyarakat tersebut berkembang dan masyarakat Bali dengan semangat *tri hita karana* dan *desa kala patera* dapat berperan dalam konservasi keragaman biokultural di Bali.

Bibliography

- Adams, W. M., & L. J. Slikkerveer (eds.) (1996) *Indigenous Knowledge and Change in African Agriculture*. Studies in Technology and Social Change No. 26. TSC Programme, Iowa: Iowa State University.
- Adimihardja, K. (1999) *Indigenous Agricultural Knowledge in Mount Halimun Area. Indaks Project Report*. Bandung: INRIK.
- Aditjondro, G. J. (1995) *Bali, Jakarta's Colony: Social and Ecological Impacts of Jakarta-Based Conglomerates in Bali's Tourism Industry. Working Paper 58*. Perth: Asia Research Centre on Social, Political, and Economic Change, Murdoch University.
- Agung, A. A. G. (2005) *Bali Endangered Paradise? Tri Hita Karana and the Conservation of the Island's Biocultural Diversity*, PhD Thesis, Universiteit Leiden.
- Ajzen, I., & M. Fishbein (2005) The Influence of Attitudes on Behaviour, in: Albarracin, D., B. T. Johnson, & M. P. Zanna (eds.) *Handbook of Attitudes and Attitude Change: Basic Principles*, pp. 173-221, Mahwah, N.J.: Lawrence Erlbaum Associates.
- Akerele, O., V. H. Heywood, & H. Synge (1991) *The Conservation of Medicinal Plants*. Cambridge: Cambridge University Press.
- Albrecht, G. L., R. Fitzpatrick, & S. Scrimshaw (2000) Introduction, in: Albrecht, G. L., R. Fitzpatrick, & S. Scrimshaw (eds.) *Handbook of Social Studies in Health and Medicine*, pp. xxvii, 545 p., London: Sage Publications.
- Alcorn, J. B. (1999) Indigenous Resource Management Systems, in: Posey, D. A. (ed.) *Cultural and Spiritual Values of Biodiversity: A Complementary Contribution to the Global Biodiversity Assessment*, pp. 203-206, London: Intermediate Technology Publications.
- Alcorn, J. B. (2000) Factors Influencing Botanical Resource Perception among the Huastec: Suggestions for Future Botanical Inquiry, in: Minnis, P. E. (ed.) *Ethnobotany; a Reader*, pp. 17-28, Norman, USA: University of Oklahoma Press.
- Altwaijri, A. O. (1997) "Identity and Globalization in the Perspective of the Right to Cultural Diversity," in *Spring Session of the Academy of the Kingdom of Morocco*. Rabat: Islamic Educational, Scientific and Cultural Organization – ISESCO.
- Andersen, R. (1968) *A Behavioral Model of Families' Use of Health Services*. University of Chicago: Center for Health Administration Studies, Research Series 25.
- Anderson, D. O., T. W. Bice, E. Kalimo, R. Kohn, & T. Purola (1976) Theoretical Orientation, in: Kohn, R. & K. L. White (eds.) *Health Care: An International Study: Report of the World Health Organization/International Collaborative Study of Medical Care Utilization*, pp. 1-10, London: Oxford University Press.
- Anderson, E. N. (1996) *Ecologies of the Heart: Emotion, Belief, and the Environment*. New York: Oxford University Press.
- APA (1984) *The American Psychiatric Association's Psychiatric Glossary*, Trade ed. / edited by a subcommittee of the Joint Commission on Public Affairs. edition. Washington, D.C.: Distributed by the American Psychiatric Press.
- Arnold, J. E. M. (1992) *Community Forestry: Ten Years in Review Fao*. Rome.
- Ayensu, E. S. (1983) Endangered Plants Used in Traditional Medicine, in: Bannerman, R. H. O., W.-C. Ch'en, & J. Burton (eds.) *Traditional Medicine and Health Care Coverage: A Reader for Health Administrators and Practitioners*, pp. 175-183, Geneva: World Health Organization.
- Baer, H. A., M. Singer, & I. Susser (2003) *Medical Anthropology and the World System*, 2nd edition. Westport, Conn.: Praeger.
- Bagus, I. G. N. (1996) The Play "Woman's Fidelity": Literature and Caste Conflict in Bali, in: Vickers, A. (ed.) *Being Modern in Bali: Image and Change*, pp. 92-115, New Haven, Connecticut: Yale University Southeast Asia Studies.
- Bailey, B. J., & J. T. Grunehoff (1997) A Proposal for a National Council on Biodiversity and Human Health, in: Grifo, F. & J. Rosenthal (eds.) *Biodiversity and Human Health*, pp. 353-356, Washington, D.C.: Island Press.

- Balick, M. J. (1994) Ethnobotany, Drug Development and Biodiversity Conservation - Exploring Linkages, in: Chadwick, J. & J. Marsh (eds.) *Ethnobotany and the Search for New Drugs*, pp. 4-18, Chichester: John Wiley & Sons.
- Balick, M. J., & P. A. Cox (1997) Ethnobotanical Research and Traditional Health Care in Developing Countries, in: Bodeker, G., K. K. S. Bhat, J. Burley, & P. Vantomme (eds.) *Medicinal Plants for Forest Conservation and Health Care*, Non-Wood Forest Products, vol. 11, pp. 12-23, Rome: Food and Agriculture Organization of the United Nations.
- Bannerman, R. H. O., W.-C. Ch'en, & J. Burton (1983) *Traditional Medicine and Health Care Coverage: A Reader for Health Administrators and Practitioners*. Geneva: World Health Organization.
- BAPPENAS (1993) *Biodiversity Action Plan for Indonesia*. Jakarta: Ministry of National Development Planning: National Development Planning Agency.
- Barsh, R. L. (1999) Indigenous Knowledge and Biodiversity, in: Posey, D. A. (ed.) *Cultural and Spiritual Values of Biodiversity: A Complementary Contribution to the Global Biodiversity Assessment*, pp. 73-76, London: Intermediate Technology Publications.
- Beers, S.-J. (2001) *Jamu: The Ancient Indonesian Art of Herbal Healing*. Hong Kong: Periplus.
- Belo, J. (1960) *Trance in Bali*. New York: Columbia U.P; Oxford U.P.
- Berkes, F. (1993) Traditional Ecological Knowledge in Perspective, in: Inglis, J. T. (ed.) *Traditional Ecological Knowledge: Concepts and Cases*, Ottawa: International Program on Traditional Ecological Knowledge and International Development Research Centre.
- Berkes, F. (1999) *Sacred Ecology: Traditional Ecological Knowledge and Resource Management*. Philadelphia, PA: Taylor & Francis.
- Berkes, F. (2001) Religious Traditions and Biodiversity, *Encyclopaedia of Biodiversity* 5:109-120.
- Berlin, B. (1992) *Ethnobiological Classification: Principles of Categorization of Plants and Animals in Traditional Societies*. Princeton, N.J.: Princeton University Press.
- Berlin, B., D. E. Breedlove, & P. H. Raven (1974) *Principles of Tzeltal Plant Classification; an Introduction to the Botanical Ethnography of a Mayan-Speaking People of Highland Chiapas. Language, Thought, and Culture*. New York: Academic Press.
- Bernet Kempers, A. J. (1991) *Monumental Bali: Introduction to Balinese Archaeology & Guide to the Monuments*. Singapore: Periplus Editions.
- Bernstein, J. H. (1997) *Spirits Captured in Stone; Shamanism and Traditional Medicine among the Taman of Borneo*. London: Lynne Rienner Publishers.
- Bodeker, G. (1997) Introduction, in: Bodeker, G., K. K. S. Bhat, J. Burley, & P. Vantomme (eds.) *Medicinal Plants for Forest Conservation and Health Care*, Non-Wood Forest Products, vol. 11, pp. 1-4, Rome: Food and Agriculture Organization of the United Nations.
- Bodeker, G., K. K. S. Bhat, J. Burley, & P. Vantomme (eds.) (1997) *Medicinal Plants for Forest Conservation and Health Care*. Non-Wood Forest Products Vol. 11. Rome.
- Bogers, R., L. E. Craker, & D. Lange (eds.) (2006) *Medicinal and Aromatic Plants*. Proceedings of the Frontis Workshop on Medical and Aromatic Plant. Wageningen: 17-20 April 2005.
- Bontekoe, C. (1689) *Al Zijn Philosophische, Medicinale En Chymische Geschriften*. Amsterdam.
- BPS (2006) *National Labour Force Survey 2001, 2002, 2003, 2004 and 2005*, [Http://www.bps.go.id/sektor/employ/table2.shtml](http://www.bps.go.id/sektor/employ/table2.shtml), Access date: 10-01-2007, Jakarta: Badan Pusat Statistik.
- BPS (2007a) *Beberapa Indikator Utama Sosial-Ekonomi Indonesia*, March 2007 edition. Jakarta: Badan Pusat Statistik.
- BPS (2007b) *Concepts and Definitions*, [Http://www.bps.go.id/sektor/employ/index.html#concepts_1](http://www.bps.go.id/sektor/employ/index.html#concepts_1), Access date: 10 January 2007, Jakarta: Badan Pusat Statistik.
- BPS (2008) *Ulasan Singkat Nasional; Hasil Sensus Penduduk Tahun 2000*, http://www.bps.go.id/sektor/population/Pop_indo.htm, Access date: 27 January 2008.
- Brokensha, D., D. M. Warren, & O. Werner (1980) *Indigenous Knowledge Systems and Development*. Washington, D.C.: University Press of America.
- Bulmer, R. N. H. (1982) Traditional Conservation Practices in Papua New Guinea, in: Morauta, L., J. Pernetta, & W. Heaney (eds.) *Traditional Conservation in Papua New Guinea: Implications*

- for Today, pp. xii, 392 p., [20] p. of plates, Boroko, Papua New Guinea: Institute of Applied Social and Economic Research.
- Buschkens, W. F. L. (1990) *Community Health in the Developing World: The Case of Somalia*. Assen/Maastricht, The Netherlands: Van Gorcum.
- Buschkens, W. F. L., & L. J. Slikkerveer (1982) *Health Care in East Africa. Illness Behaviour of the Eastern Oromo in Hararghe (Ethiopia)*. Assen: Van Gorcum.
- Canary, J. J. (1983) Modern Allopathic Medicine and Public Health, in: World Health Organization; [Albany, N. Y. W. P. C. U., distributor] (ed.) *Traditional Medicine and Health Care Coverage: A Reader for Health Administrators and Practitioners*, pp. 90-109, Geneva: World Health Organization.
- Carlson, T. J. S., & L. Maffi (2004) Introduction: Ethnobotany and Conservation of Biocultural Diversity, in: Carlson, T. J. S. & L. Maffi (eds.) *Ethnobotany and Conservation of Biocultural Diversity*, pp. 1-6, Bronx: New York Botanical Garden Press.
- Chambers, R., A. Pacey, & L. A. Thrupp (1989) *Farmer First: Farmer Innovation and Agricultural Research*. London: Intermediate Technology Publications.
- Chivian, E. (1997) Global Environmental Degradation and Biodiversity Loss: Implications for Human Health, in: Grifo, F. & J. Rosenthal (eds.) *Biodiversity and Human Health*, pp. 7-38, Washington, D.C.: Island Press.
- CIA (2009) *The World Fact Book: Indonesia*, <https://www.cia.gov/library/publications/the-world-factbook/geos/id.html>, Access date: 19 March 2009, Washington: Central Intelligence Agency.
- Cicourel, A. V. (1967) *Measure and Measurement in Sociology*. New York: McGraw Hill.
- Cohen, J. (1988) *Statistical Power Analysis for the Behavioral Sciences*, Second edition. Hillsdale, N.J.: L. Erlbaum Associates.
- Colorado, P. (1988) Bridging Native and Western Science, *Convergence* 21(2/3):49-59.
- Conklin, H. C. (1957) Hanunoo Agriculture: A Report on an Integral System of Shifting Cultivation in the Philippines, *Forestry Development Paper* 12.
- Connor, L. H. (1982) Ships of Fools and Vessels of the Divine: Mental Hospitals and Madness, a Case Study, *Social science and medicine* 16(7):783-794.
- Connor, L. H. (1984) The Unbounded Self: Balinese Therapy and Theory and Practice, in: Marsella, A. J. & G. M. White (eds.) *Cultural Conceptions of Mental Health and Therapy*, vol. Culture, illness and healing; v.4, pp. 251-256, Dordrecht; Lancaster: Reidel Publishing Company.
- Connor, L. H. (1986) Balinese Healing, in: Connor, L. H., P. Asch, & T. Asch (eds.) *Jero Tapakan: Balinese Healer: An Ethnographic Film Monograph*, pp. 59-80, Cambridge: Cambridge University Press.
- Connor, L. H. (2001) Healing Powers in Contemporary Asia, in: Connor, L. H. & G. Samuel (eds.) *Healing Powers and Modernity; Traditional Medicine, Shamanism, and Science in Asian Societies*, pp. 3-21, Westport: Bergin&Garvin.
- Connor, L. H., & R. Rubenstein (1999) Introduction, in: Rubenstein, R. & L. H. Connor (eds.) *Staying Local in the Global Village; Bali in the Twentieth Century*, pp. 1-14, Honolulu: University of Hawai'i Press.
- Connor, L. H., & G. Samuel (eds.) (2001) *Healing Powers and Modernity; Traditional Medicine, Shamanism, and Science in Asian Societies*. Westport: Bergin & Garvin.
- Cook, F. E. M. (1995) *Economic - Botany Data Collection Standard - Prepared for the International Working Group on Taxonomic Databases for Plant Sciences*. Kew: Royal Botanic Gardens.
- Corsiglia, J., & G. Snively (1995) Global Lessons from the Traditional Science of Long-Resident Peoples, in: Snively, G. & A. MacKinnon (eds.) *Thinking Globally About Mathematics and Science Education*, pp. 25-51, Vancouver: University of British Columbia.
- Cotton, C. M. (1996) *Ethnobotany: Principles and Applications. Society for Experimental Biology Seminar Series; 58*. Chichester: Wiley.
- Covarrubias, M., & R. Covarrubias (1937) *Island of Bali*. New York: Alfred A. Knopf.
- Cox, P. A. (1994) The Ethnobotanical Approach to Drug Discovery, in: Chadwick, J. & J. Marsh (eds.) *Ethnobotany and the Search for New Drugs*, pp. 25-36, Chichester: John Wiley & Sons.

- Daes, E.-I. (1993) *Study on the Protection of the Cultural and Intellectual Property of Indigenous Peoples*, United Nations Sub-commission on Prevention of Discrimination and Protection of Minorities, Forty-Fifth Session, E/CN.4/Sub.2/1993/28.
- De Heus, P., R. Van der Leeden, & B. Gazendam (1995) *Toegepaste Data-Analyse; Technieken Voor Niet-Experimenteel Onderzoek in De Sociale Wetenschappen*. Utrecht: Lemma bv.
- De Josselin de Jong, P. E. (1984) *Unity in Diversity: Indonesia as a Field of Anthropological Study*. *Verhandelingen Van Het Koninklijk Instituut Voor Taal-, Land- En Volkenkunde*; 103. Dordrecht, Holland; Cinnaminson, U.S.A.: Foris Publications.
- De Leeuw, J. (1984) *Canonical Analysis of Categorical Data*, 2nd edition. Leiden: DSWO Press.
- De Padua, L. S., B. Å. Nanthawan, R. H. M. J. Lemmens, & J. L. C. H. Van Valkenburg (1999) *Medicinal and Poisonous Plants. Plant Resources of South-East Asia; No. 12*. Leiden: Backhuys.
- De Silva, T. (1997) Industrial Utilisation of Medicinal Plants in Developing Countries, in: Bodeker, G., K. K. S. Bhat, J. Burley, & P. Vantomme (eds.) *Medicinal Plants for Forest Conservation and Health Care*, Non-Wood Forest Products, vol. 11, pp. 45-59, Rome: Food and Agriculture Organization of the United Nations.
- De Vos, J. (1995) "The Migration of Homo Erectus and Homo Sapiens in South-East Asia and the Indonesian Archipelago," *Pithecanthropus Centennial 1893-1993 Congress*, Leiden 239-260. Pithecanthropus Centennial Foundation, Leiden University.
- Dechering, W. H. J. C. (1995) "Methoden En Technieken I," Universiteit Leiden.
- DepKes (2007) *Profil Kesehatan Indonesia 2006*. Jakarta: Departemen Kesehatan Republik Indonesia.
- DKPDT (1985) *Tanaman Obat Dalam Lontar Usada I*. Denpasar: Dinas Kesehatan Propinsi Daerah Tingkat I Bali.
- DKPDT (1986) *Tanaman Obat Dalam Lontar Usada Ii*. Denpasar: Dinas Kesehatan Propinsi Daerah Tingkat I Bali.
- Dobson, A., M. S. Campbell, & J. Bell (1997) Fatal Synergisms: Interaction between Infectious Diseases, Human Population Growth and Loss of Biodiversity, in: Grifo, F. & J. Rosenthal (eds.) *Biodiversity and Human Health*, pp. 87-110, Washington, D.C.: Island Press.
- Doubleday, N. C. (1993) Finding Common Ground: Natural Law and Collective Wisdom, in: Inglis, J. T. (ed.) *Traditional Ecological Knowledge: Concepts and Cases*, Ottawa: International Program on Traditional Ecological Knowledge and International Development Research Centre.
- DPPD (2008) *Statistik Pariwisata*, http://www.baliprov.go.id/informasi/stat_par/index.php?op=stat_1&th=07, Access date: 9 March 2008, Denpasar: Dinas Pariwisata Provinsi Bali, BITD Provinsi Bali.
- Dunn, F. L. (1976) Traditional Asian Medicine and Cosmopolitan Medicine as Adaptive Systems, in: Leslie, C. (ed.) *Asian Medical Systems: A Comparative Study*, pp. 133-158, Berkely: University of California Press.
- Durning, A. T. (1992) *Guardians of the Land: Indigenous Peoples and the Health of the Earth*. Vol. Worldwatch Paper 112. Washington, D.C.: Worldwatch Institute.
- Eisenberg, L., & A. Kleinman (1981a) Clinical Social Science, in: Eisenberg, L. & A. Kleinman (eds.) *The Relevance of Social Science for Medicine, Volume 1*, pp. 422, Dordrecht: D. Reidel Publishing Company.
- Eisenberg, L., & A. Kleinman (eds.) (1981b) *The Relevance of Social Science for Medicine*. Dordrecht: D. Reidel Publishing Company.
- Ellen, R. F. (1986) What Black Elk Left Unsaid: On the Illusory Images of Green Primitivism, *Anthropology Today* 2(6):8-12.
- Ensink, J. (1978) Siva-Buddhism in Java and Bali, in: Bechert, H. (ed.) *Buddhism in Ceylon and Studies on Religious Syncretism in Buddhist Countries: Report on a Symposium in Göttingen*, vol. Symposien zur Buddhismusforschung; 1, pp. 178-199, Göttingen: Vandenhoeck & Ruprecht.

- Epstein, P. R., A. Dobson, & J. Vandermeer (1997) Biodiversity and Emerging Infectious Diseases: Integrating Health and Ecosystem Monitoring, in: Grifo, F. & J. Rosenthal (eds.) *Biodiversity and Human Health*, pp. 60-86, Washington, D.C.: Island Press.
- Erdelen, W. R., K. Adimihardja, H. Moesdarsono, & Sidik (1998) *Biodiversity, Biogeography and Conservation of Indigenous Medicinal Plants in Indonesia*. Bandung: Unit Pelaksana Teknis, Indonesian Resource Centre for Indigenous Knowledge, Universitas Padjadjaran (UPT Inrik Unpad).
- Fairhead, J. (1992) *Indigenous Technical Knowledge and Natural Resource Management in Sub-Saharan Africa*. Chatham: Natural Resources Institute.
- Field, A. P. (2005) *Discovering Statistics Using Spss: (and Sex, Drugs and Rock'n'roll)*, 2nd edition. London; Thousand Oaks: SAGE.
- Fleming, J. (1820) *Naamlijst Van Indische Geneeskundige Planten En Droogerijen, Met Hunne Namen, in De Hindostansche En Sanscritische Talen: Benevens Een Aanhangsel over De Genezing Van Den Lintworm (Tæniæ) / J. Fleming; Uit Het Engelsch Vert., En Met De Maleidsche Namen Verm.; Als Ook Eene Korte Beschrijving Van Eenige Planten, Die Op Het Eiland Java Gevonden Worden; Geschikt Voor Genees- En Heelmeesters, Welke Zich Naar De Indieⁿ Begeven, Door J.R. Vos*. Rotterdam: Jan Hendriksen.
- Food and Agriculture Organization of the United Nations. (1996) *Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture and, the Leipzig Declaration, Adopted by the International Technical Conference on Plant Genetic Resources, Leipzig, Germany, 17-23 June 1996*. Rome: Food and Agriculture Organization of the United Nations.
- Foster, G. M. (1983) An Introduction to Ethnomedicine, in: Bannerman, R. H. O., W.-C. Ch'en, & J. Burton (eds.) *Traditional Medicine and Health Care Coverage: A Reader for Health Administrators and Practitioners*, pp. 17-24, Geneva: World Health Organization.
- Foster, G. M., & B. G. Anderson (1978) *Medical Anthropology*. New York: Wiley.
- Freeman, M. M. R., & L. N. Carbyn (1988) *Traditional Knowledge and Renewable Resource Management in Northern Regions*. Edmonton, Alberta: Commission on Ecology and Boreal Institute for Northern Studies.
- Garfinkel, H. (1964) *Netherlands India*. Cambridge: Cambridge University Press.
- Garson, G. D. (2008) *Canonical Correlation*, <http://www2.chass.ncsu.edu/garson/pa765/canonic.htm>, Access date: 8 August 2008.
- Geertz, C. (1959) Form and Variation in Balinese Village Structure, *American Anthropologist* 61(6):991-1012.
- Geertz, C. (1966) *Person, Time, and Conduct in Bali: An Essay in Cultural Analysis*. Cultural Report Series, No. 14: Southeast Asia Studies, Yale University.
- Geertz, C. (1973) *Interpretation of Cultures: Selected Essays*. New York: Basic Books.
- Geertz, C. (1977) Curing, Sorcery and Magic in a Javanese Town, in: Landy, D. (ed.) *Culture, Disease, and Healing: Studies in Medical Anthropology*, pp. 146-154, New York: Macmillan.
- Geertz, H., & C. Geertz (1975) *Kinship in Bali*. Chicago: University of Chicago Press.
- Giddens, A. (1990) *The Consequences of Modernity*. Cambridge: Polity Press.
- Gifi, A. (1990) *Nonlinear Multivariate Analysis*. Chichester; New York: Wiley.
- Glanz, K., B. K. Rimer, & F. M. Lewis (2002) *Health Behavior and Health Education: Theory, Research, and Practice*, 3rd edition. San Francisco: Jossey-Bass.
- Good, B. J., & M.-J. Delvecchio (1981) The Meaning of Symptoms: A Cultural Hermeneutic Model for Clinical Practice, in: Eisenberg, L. & A. Kleinman (eds.) *The Relevance of Social Science for Medicine, Volume 1*, pp. 165-196, Dordrecht: D. Reidel Publishing Company.
- Goodenough, W. H. (1956) Componential Analysis and the Study of Meaning, *Language* 32:195-216.
- Google Earth (2009), Access date: 26 April 2009.
- Gordon, R. G., Jr. (ed.) (2005) *Ethnologue: Languages of the World*, Fifteenth edition, Online version: http://www.ethnologue.com/show_country.asp?name=Indonesia. Dallas, Texas: SIL International.

- Gray, A. (1999) Indigenous Peoples, Their Environments and Territories, in: Posey, D. A. (ed.) *Cultural and Spiritual Values of Biodiversity: A Complementary Contribution to the Global Biodiversity Assessment*, pp. 59-118, London: Intermediate Technology Publications.
- Greenlick, M. R., D. K. Freeborn, G. L. Gambill, & C. R. Pope (1973) Determinants of Medical Care Utilization: The Role of the Telephone in Total Medical Care, *Medical Care* II (March):121-134.
- Grifo, F., & J. Rosenthal (eds.) (1997) *Biodiversity and Human Health*. Washington, D.C.: Island Press.
- Grimes, B. F., R. S. Pittman, & J. E. Grimes (1996) "Ethnologue: Languages of the World.," 13th edition, vol. 13th edition Available on the World Wide Web, pp. xi, 966 p. Dallas, Tex.: Summer Institute of Linguistics, Dallas.
- Groombridge, B. (1992) *Global Biodiversity: Status of the Earth's Living Resources*, 1st edition. London: Chapman & Hall.
- Hames, R. B., & W. T. Vickers (eds.) (1983) *Adaptive Responses of Native Amazonians*. New York: Academic Press.
- Hanna, W. A. (1976) *Bali Profile: People, Events, Circumstances (1001-1976)*. New York: American Universities Field Staff.
- Hardesty, D. L. (1977) *Ecological Anthropology*. New York: Wiley & Sons.
- Hardon, A., P. Boonmongkon, P. Streefland, M. Lim Tan, T. Hongvivatan, S. Van der Geest, A. Van Staa, & C. Varkevisser (1995) *Applied Health Research: Anthropology of Health and Health Care*. Amsterdam: Spinhuis.
- Harmon, D. (1995) The Status of the World's Languages as Reported in Ethnologue, *Southwest Journal of Linguistics* 14:1-33.
- Harmon, D. (1998) The Other Extinction Crisis: Declining Cultural Diversity and Its Implications for Protected Area Management, in: Munro, N. W. P. & J. H. M. Willison (eds.) *Linking Protected Areas with Working Landscapes, Conserving Biodiversity*, pp. 352-359, Wolfville: Science and management of protected areas.
- Hauck, G. (2006) *Kultur Zur Karriere Eines Sozialwissenschaftlichen Begriffs. Einstiege 16/17 Grundbegriffe Der Sozialphilosophie Und Gesellschaftstheorie*. Munchen: Westfälisches Dampfboot.
- Hays, T. E. (1981) *Utilitarian/Adaptationist Explanations of Folk Biological Classification: Some Cautionary Notes*, Paper presented at Fourth Ethnobiology Conference.
- Heywood, V. H. (1999) Note from the Executive Editor of the Gba, in: Posey, D. A. (ed.) *Cultural and Spiritual Values of Biodiversity: A Complementary Contribution to the Global Biodiversity Assessment*, pp. xiii-xiv, London: Intermediate Technology Publications.
- Heywood, V. H., & M. E. Skoula (1999) The Medusa Network: Conservation and Sustainable Use of Wild Plants of the Mediterranean Region, in: Janick, J. (ed.) *Perspectives on New Crops and New Uses*, pp. 148-151, Alexandria: ASHS Press.
- Heywood, V. H., R. T. Watson, & United Nations Environment Programme (eds.) (1995) *Global Biodiversity Assessment*. Cambridge: Cambridge University Press.
- Hill, A. F. (1937) *Economic Botany; a Textbook of Useful Plants and Plant Products*, 1st edition. McGraw-Hill Publications in the Agricultural and Botanical Sciences. New York: McGraw-Hill Book Company, inc.
- Hobart, A. (2002) *Healing Performances of Bali: Between Darkness and Light*. New York: Berghahn Books.
- Hobart, A., U. Ramseyer, & A. Leemann (1996) *The People of Bali. The People of South-East Asia and the Pacific*. Oxford: Blackwell Publishers.
- Hobsbawm, E. J. (1983) Introduction: Invented Traditions, in: Hobsbawm, E. J. & T. O. Ranger (eds.) *The Invention of Tradition*, pp. 1-14, Cambridge [Cambridgeshire]; New York: Cambridge University Press.
- Hunn, E. N. (1993) What Is Traditional Ecological Knowledge? in: Williams, N. M. & G. Baines (eds.) *Traditional Ecological Knowledge: Wisdom for Sustainable Development. Based on*

- Traditional Ecological Knowledge Workshop, April 1988*, pp. 13-15, Canberra: Centre for Resource and Environmental Studies, Australian National University.
- Hunn, E. S. (1976) *Tzeltal Folk Zoology: The Classification of Discontinuities in Nature*. New York: Academic Press.
- Hydrick, J. L. (1942) *Intensive Rural Hygiene Work in the Netherlands East Indies. Booklets of the Netherlands Information Bureau No. 7*. New York: The Netherlands information bureau.
- IBSAP (2003) *Indonesian Biodiversity Strategy and Action Plan 2003-2020*. Jakarta: Badan Perencanaan Pembangunan Nasional (BAPPENAS).
- Ibui, A. K. (2007) *Indigenous Knowledge, Belief and Practices of Wild Plants among the Meru of Kenya: Past and Present Human-Plant Relations in East Africa*, A PhD Thesis, Leiden University: The Netherlands.
- Indonesian Embassy (2007) *Indonesia's Profile, the Land*, http://www.indonesia.nl/index.php?option=mod_idb_listing&task=view&id=13&sectid=1&catid=26&Itemid=28, Access date: 26 January 2008, The Hague: Indonesian Embassy.
- Ismail, G. (1998) Introduction, in: Ismail, G. & M. Murtedza (eds.) *Biodiversity Conservation in Asean; Emerging Issues & Regional Needs*, pp. vii-ix, London: ASEAN Academic Press.
- Ismail, G., & M. Murtedza (eds.) (1998) *Biodiversity Conservation in Asean; Emerging Issues & Regional Needs*. London: ASEAN Academic Press.
- IUCN (1996) "Resolution 1.4. Species Survival Commision, Resolutions and Recommendations," *World Conservation Congress*, Montreal, Canada, 13-23 October 1996, pp. 7-8. Gland: IUCN.
- IUCN (2001) *Iucn Red List Categories and Criteria: Version 3.1*. Gland: IUCN.
- IUCN/UNEP/WWF (1991) *Caring for the Earth: A Strategy for Sustainable Living*. Gland: IUCN/UNEP/WWF.
- Janzen, J. M., & W. Arkinstall (1978) *The Quest for Therapy in Lower Zaire*. Berkeley: University of California Press.
- Jensen, G. D., & L. K. Suryani (1992) *The Balinese People: A Reinvestigation of Character*. Singapore; Oxford: Oxford University Press.
- Johnson, M. (ed.) (1992) *Lore: Capturing Traditional Environmental Knowledge*. Ottawa: Dene Cultural Institute: International Development Research Centre.
- Jordaan, R. E. (1985) *Folk Medicine in Madura (Indonesia)*, Thesis doctoral --Rijksuniversiteit te Leiden 1985., Universiteit Leiden.
- Kalland, A. (1994) *Aboriginal Subsistence Whaling: A Concept in the Service of Imperialism*, 2nd edition edition. *High North Alliance 11 Essays on Whales and Man*. Reine Lofoten: High North Alliance.
- Kasahara, Y. S., & S. Mangunkawatja (eds.) (1986) *Medicinal Herb Index in Indonesia*. Jakarta: P.T. Eisai Indonesia.
- Kissick, W. L. (1978) Community Health and Medical Care: A Perspective, in: Kovner, A. R. & S. P. Martin (eds.) *Community Health and Medical Care*, pp. 1-27, New York: Grune & Stratton.
- Kleinman, A. (1978) Concept of a Model for the Comparison of Medical Systems as Cultural Systems, *Social science and medicine* 12(2B):85-93.
- Kleinman, A. (1980) *Patients and Healers in the Context of Culture: An Exploration of the Borderland between Anthropology, Medicine, and Psychiatry. Comparative Studies of Health Systems and Medical Care; No. 3*. Berkeley: University of California Press.
- Kleinman, A. (1986) *Social Origins of Distress and Disease: Depression, Neurasthenia and Pain in Modern China*. New Haven: Yale University Press.
- Kleinman, A. (1988) *Rethinking Psychiatry: From Cultural Category to Personal Experience*. New York: Free Press.
- Kloppenburgh-Versteegh, J. (1907) *Indische Planten En Haar Geneeskracht*. Semarang: Masman & Stroink.
- Kohn, R., & K. L. White (eds.) (1976a) *Health Care: An International Study: Report of the World Health Organization/International Collaborative Study of Medical Care Utilization*. London: Oxford University Press.

- Kohn, R., & K. L. White (1976b) Introduction, in: Kohn, R. & K. L. White (eds.) *Health Care: An International Study: Report of the World Health Organization/International Collaborative Study of Medical Care Utilization*, pp. 1-, London: Oxford University Press.
- Koos, E. L. (1954) *The Health of Regionville, What the People Thought and Did About It*. New York: Colombia University Press.
- Kosen, S., & S. Gunawan (1996) Health Care in Indonesia, *Medical journal of Australia* 165(11-12):641-644.
- Krauss, M. (1992) The World's Languages in Crises, *Language* 68(1):4-10.
- Kurup, P. N. V. (1983) Ayurveda, in: Bannerman, R. H. O., W.-C. Ch'en, & J. Burton (eds.) *Traditional Medicine and Health Care Coverage: A Reader for Health Administrators and Practitioners*, pp. 50-60, Geneva: World Health Organization.
- Laderman, C. (2001) Tradition and Change in Malay Healing, in: Connor, L. H. & G. Samuel (eds.) *Healing Powers and Modernity; Traditional Medicine, Shamanism, and Science in Asian Societies*, pp. 42-63, Westport: Bergin & Garvin.
- Lansing, J. S. (1995) *The Balinese. Case Studies in Cultural Anthropology*. New York: Harcourt Brace College Publishers.
- Leakey, R. E., & L. J. Slikkerveer (eds.) (1991a) *Origins and Development of Agriculture in East Africa: The Ethnosystems Approach to the Study of Early Food Production in Kenya*. Origins and Development of Agriculture in East Africa. Ames: Iowa State University.
- Leakey, R. E., & L. J. Slikkerveer (eds.) (1991b) *Origins and Development of Indigenous Agriculture Knowledge Systems in Kenya, East Africa*. Studies in Technology and Social Change, No. 19. Ames: Iowa State University.
- Leslie, C. (1976) *Asian Medical Systems; a Comparative Study*. Berkeley: University of California Press.
- Leslie, C. M., & A. Young (eds.) (1992) *Paths to Asian Medical Knowledge*. Comparative Studies of Health Systems and Medical Care. Berkeley: University of California Press.
- Lewis, W. H., & M. P. F. Elvin-Lewis (2003) *Medical Botany: Plants Affecting Human Health*, 2nd edition. New Jersey: John Wiley & Sons Inc.
- Liburd, L. C., & J. E. Snizek (2007) Changing Times: New Possibilities for Community Health and Well-Being, *Preventing Chronic Disease (serial online)* (4) 3:1-5
http://www.cdc.gov/pcd/issues/2007/jul/07_0048.htm, Access date: 15 March 2009, Centers for Disease Control and Prevention.
- Lieban, R. (1977) The Field of Medical Anthropology, in: Landy, D. (ed.) *Culture, Disease, and Healing: Studies in Medical Anthropology*, pp. 13-31, New York: Macmillan.
- Liem, M. H. T. (2003) *The Turning Wheel of Time, Roda Jaman Berputar: Modernity and Writing Identity in Bali 1900-1970*, Thesis (Ph.D.)_Universiteit Leiden, 2003., Leiden University.
- Lumbantobing, S. (1997) *The Standarization and Internationalization of the Universal Statistical Code Sets*, <http://www.cicc.or.jp/english/hyoujyunka/af07/7-05.html>, Access date: 10-01-2007, Tokyo: AFSIT.
- Lyon, M. L. (2003) Jamu for the Ills of Modernity? Jamu Is Evolving to Meet Modern Needs, *Inside Indonesia* 75:14-15.
- Maffi, L. (1999) Linguistic Diversity, in: Posey, D. A. (ed.) *Cultural and Spiritual Values of Biodiversity: A Complementary Contribution to the Global Biodiversity Assessment*, pp. 21-58, London: Intermediate Technology Publications.
- Maffi, L. (2004) Maintaining and Restoring Biocultural Diversity: The Evolution of a Role for Ethnobiology, in: Carlson, T. J. S. & L. Maffi (eds.) *Ethnobotany and Conservation of Biocultural Diversity*, pp. 9-35, Bronx: New York Botanical Garden Press.
- Maffi, L., & G. Oviedo (2000) *Indigenous and Traditional Peoples of the World and Ecoregion Conservation*. Gland: WWF / Terralingua.
- Martin, G. J. (1994) Conservation and Ethnobotanical Exploration, in: Chadwick, J. & J. Marsh (eds.) *Ethnobotany and the Search for New Drugs*, pp. 229-239, Chichester: John Wiley & Sons.
- Martin, G. J. (1995) *Ethnobotany: A 'Peoples and Plants' Conservation Manual*. London: Chapman & Hall.

- Martin, G. J., & R. Idrus (1998) Conservation of Forest Resources and Indigenous Knowledge through Community Participation: The Wwf People and Plants Programme in Southeast Asia, 1996-2000, in: Ismail, G. & M. Murtedza (eds.) *Biodiversity Conservation in Asean; Emerging Issues & Regional Needs*, pp. 263-278, London: Academic Press.
- Mathias-Mundy, E. (ed.) (1992) *Indigenous Knowledge and Sustainable Development*. Proceedings of the International Symposium of the Regional Program for the Promotion of Indigenous Knowledge in Asia. Silang, Cavite, The Philippines: IIRR.
- Mazur, R. E., & S. O. Titilola (1992) Social and Economic Dimensions of Local Knowledge Systems in African Sustainable Agriculture, *Sociologia Ruralis* 32 (2-3):264-286.
- McCauley, A. P. (1984) *The Cultural Construction of Illness in Bali*, Dissertation, University of Michigan.
- McKinlay, J. B. (1972) Some Approaches and Problems in the Study of the Use of Services - an Overview, *Journal of Health and Social Behaviour* 13(2):115-152.
- McNeely, J. A., International Union for Conservation of Nature and Natural Resources., World Resources Institute., Conservation International., World Wildlife Fund (U.S.), & World Bank. (1990) *Conserving the World's Biological Diversity*. Gland: IUCN; WRI; CI; WWF-US; The World Bank.
- Miller, R. L., C. Acton, D. A. Fullerton, & J. Maltby (2002) *Spss for Social Scientists*. New York: Palgrave Macmillan.
- Mrazek, P. B., & R. J. Haggerty (eds.) (1994) *Reducing Risks for Mental Disorders: Frontiers for Preventive Intervention Research*. Washington, D.C.: National Academy Press.
- Mühlhäusler, P. (1996) *Linguistic Ecology: Language Change and Linguistic Imperialism in the Pacific Region. The Politics of Language*. London; New York: Routledge.
- Nichter, M. (2001) The Political Ecology of Health in India: Indigestion as Sign and Symptom of Defective Modernization, in: Connor, L. H. & G. Samuel (eds.) *Healing Powers and Modernity; Traditional Medicine, Shamanism, and Science in Asian Societies*, pp. 85-106, Westport: Bergin & Garvin.
- Oldfield, M. L., & J. B. Alcorn (1991) *Biodiversity: Culture, Conservation, and Ecodevelopment*. Boulder: Westview Press.
- Ortiz, F. (1970) *Cuban Counterpoint; Tobacco and Sugar*. New York: Random House.
- Panji Tisna, I. G. R. (2001a) Between Traditional Medicine and Antibiotics, in: Ramseyer, U. & I. G. R. Panji Tisna (eds.) *Bali: Living in Two Worlds: A Critical Self-Portrait*, pp. 105-115, Basel: Museum der Kulturen Basel; Schwabe.
- Panji Tisna, I. G. R. (2001b) The Loss of the Last Paradise? Nature-Culture and Economic Temptations, in: Ramseyer, U. & I. G. R. Panji Tisna (eds.) *Bali: Living in Two Worlds: A Critical Self-Portrait*, pp. 15-26, Basel: Museum der Kulturen Basel; Schwabe.
- Pearce, D. G. (1992) Alternative Tourism: Concepts, Classifications and Questions, in: Smith, V. L. & W. R. Eadington (eds.) *Tourism Alternatives: Potentials and Problems in the Development of Tourism*, pp. 15-31, Philadelphia, PA: University of Pennsylvania Press.
- Pearce, D. W., & D. Moran (1994) *The Economic Value of Biodiversity*. London: Earthscan Publications.
- Pei, W. (1983) Traditional Chinese Medicine, in: Bannerman, R. H. O., W.-C. Ch'en, & J. Burton (eds.) *Traditional Medicine and Health Care Coverage: A Reader for Health Administrators and Practitioners*, pp. 68-75, Geneva: World Health Organization.
- Pellegrino, E. D., & D. C. Thomasma (1981) *A Philosophical Basis of Medical Practice: Toward a Philosophy and Ethic of the Healing Professions*. New York: Oxford University Press.
- Pfifferling, J.-H. (1981) Cultural Prescription for Medicocentrism, in: Eisenberg, L. & A. Kleinman (eds.) *The Relevance of Social Science for Medicine, Volume 1*, pp. 197-222, Dordrecht: D. Reidel Publishing Company.
- Picard, M. (1996) *Bali; Cultural Tourism and Touristic Culture*. Singapore: Archipelago Press / Didier Millet.

- Picard, M. (1999) The Discourse of Kebalian: Transcultural Constructions of Balinese Identity, in: Rubenstein, R. & L. H. Connor (eds.) *Staying Local in the Global Village; Bali in the Twentieth Century*, pp. 15-49, Honolulu: University of Hawai'i Press.
- Pike, K. L. (1967) Etic and Emic Standpoints for the Description of Behavior, in: Hildum, D. C. (ed.) *Language and Thought; an Enduring Problem in Psychology*, pp. 32-39, Princeton, NJ: D. Van Nostrand Company.
- Pinchuk, M. (ed.) (2007) *World Health Statistics 2007*, Electronic Version. Geneva: World Health Organisation.
- Pitana, I. G. (1999) Status Struggles and the Priesthood in Contemporary Bali, in: Rubenstein, R. & L. H. Connor (eds.) *Staying Local in the Global Village; Bali in the Twentieth Century*, pp. 181-201, Honolulu: University of Hawai'i Press.
- Pitana, I. G. (2000) *Cultural Tourism in Bali: A Critical Appreciation*. Denpasar: Research Centre for Culture and Tourism.
- Plotkin, M. J. (1988) The Outlook for New Agricultural and Industrial Products From the Tropics, in: Wilson, E. O., F. M. Peter, National Academy of Sciences (U.S.), & Smithsonian Institution. (eds.) *Biodiversity*, pp. 108-116, Washington, D.C.: National Academy Press.
- Posey, D. A. (1985) Indigenous Management of Tropical Forest Ecosystems: The Case of the Kayapó Indians of the Brazilian Amazon, *Agroforestry Systems* 3:139-154.
- Posey, D. A. (1990) The Science of the Mebêngôkre, *Orion* 9(3):16-21.
- Posey, D. A. (ed.) (1999a) *Cultural and Spiritual Values of Biodiversity: A Complementary Contribution to the Global Biodiversity Assessment*. London: Intermediate Technology Publications.
- Posey, D. A. (1999b) Introduction: Culture and Nature - the Inextricable Link, in: Posey, D. A. (ed.) *Cultural and Spiritual Values of Biodiversity: A Complementary Contribution to the Global Biodiversity Assessment*, pp. 3-18, London: Intermediate Technology Publications.
- Posey, D. A., & G. Dutfield (1996) *Beyond Intellectual Property Rights: Toward International Resource Rights for Indigenous Peoples and Local Communities*. Ottawa: IDRC.
- Posey, D. A., & G. Dutfield (1997) *Indigenous Peoples and Sustainability: Cases and Actions*. Utrecht: IUCN and International Books.
- PPB (2007) *Profil Daerah Bali*, <http://www.baliprov.go.id/informasi/profil/>, Access date: 8 March 2008, Denpasar: Pemerintah Provinsi Bali.
- Praeger, L. F. (1863) *Indische Studiën: Bijdragen Tot De Kennis Der Levensvatbaarheid, Levens- En Gezondheidsleer Van De Vreemde En Eigene Bewoners Van Nederlandsch Indie: Met Eene Bevatelijke Voorstelling Van De Werking Van Het Klimaat, En De Leefwijzen in Verschillende Bewoonde Plaatsen Van Nederlandsch Indie Op Den Vreemdeling, Van De Wijs Van Ontstaan Der Meest Voorkomende Tropische Ziekten, En Van De Middelen Om Ze Te Voorkomen, Van De Betrekkelijke Gezondheid Der Verschillende Standen En Rassen, Gesteund Door Eenige Statistische Proeven Uit Goede Bronnen*. Nieuwediep: J.C. de Buissonje.
- Prance, G. T. (1995) Foreword, in: Martin, G. J. (ed.) *Ethnobotany: A 'Peoples and Plants' Conservation Manual*, London: Chapman & Hall.
- Prance, G. T., D. Chadwick, & J. Marsh (1994) *Ethnobotany and the Search for New Drugs*. Ciba Foundation Symposium; 185. Chichester; New York: John Wiley.
- Ramseyer, U. (1986) *The Art and Culture of Bali*. Singapore: Oxford University Press.
- Ramseyer, U. (2001) Prologue: Tears in Paradise? in: Ramseyer, U. & I. G. R. Panji Tisna (eds.) *Bali: Living in Two Worlds: A Critical Self-Portrait*, pp. 9-14, Basel: Museum der Kulturen Basel; Schwabe.
- Randall, R. A. (1976) How Tall Is a Taxonomic Tree? Some Evidence for Dwarfism., *American Ethnologist* 3:543-553.
- Redfield, R., R. Linton, & M. J. Herskovits (1936) Memorandum on the Study of Acculturation, *American Anthropologist* 38:149-152.
- Redford, K. H. (1991) The Ecologically Noble Savage, *Cultural Survival Quarterly* 15:46-48.

- Richards, P. (1992) Saving the Rainforest? Contested Futures in Conservation, in: Wallman, S. (ed.) *Contemporary Futures: Perspectives from Social Anthropology*, pp. 138-158, London: Routledge.
- Robinson, G. (1995) *The Dark Side of Paradise: Political Violence in Bali. Asia, East by South*. Ithaca, London: Cornell University Press.
- Rosnow, R. L., & R. Rosenthal (2002) *Beginning Behavioral Research, a Conceptual Primer*, Fourth edition. New Jersey: Prentice Hall.
- Rubenstein, R. (1996) Allegiance and Alliance: The Banjar War of 1868, in: Vickers, A. (ed.) *Being Modern in Bali: Image and Change*, pp. 38-70, New Haven, Connecticut: Yale University Southeast Asia Studies.
- Rumphius, G. E. (1741) *Het Amboinsch Kruid-Boek, Dat Is, Beschryving Van De Meest Bekende Boomen, Heesters, Kruiden, Land- En Water-Planten, Die Men in Amboina, En De Omleggende Eylanden Vind, Na Haare Gedaante, Verscheide Benamingen, Aanqueking, En Gebruik: Mitsgaders Van Eenige Insecten En Gediertens, Voor 'T Meeste Deel Met De Figuren Daar Toe Behoorende*. Amsterdam: Meinard Uytwerf.
- Russell Bernard, H. (2002) *Research Methods in Anthropology: Qualitative and Quantitative Methods*, 3rd ed. edition. Walnut Creek; Oxford: AltaMira Press.
- Sacchette, E. (2002) *Traditional Healing in Bali, Indonesia*, <http://www.webspawner.com/users/sinarsakti/>, Access date: 27 October 2005.
- Said, H. M. (1983) The Unani System of Health and Medicare, in: Bannerman, R. H. O., W.-C. Ch'en, & J. Burton (eds.) *Traditional Medicine and Health Care Coverage: A Reader for Health Administrators and Practitioners*, pp. 61-67, Geneva: World Health Organization.
- Salan, R., & T. Maretzki (1983) Mental Health Services and Traditional Healing in Indonesia: Are the Roles Compatible? *Culture, medicine and psychiatry* 7(4):377-412.
- Sarin, M. (1995) Joint Forest Management in India: Achievements and Unaddressed Challenges, *Unasylva* 4(180).
- Sastroamidjojo, S. (2001) *Obat Asli Indonesia*, 6th edition. Jakarta: Dian Rakyat.
- SCBD (2006) *Global Biodiversity Outlook 2*. Montreal: Secretariat of the Convention on Biological Diversity.
- Schambra, P. E. (1997) Preface, in: Grifo, F. & J. Rosenthal (eds.) *Biodiversity and Human Health*, pp. xv-xviii, Washington, D.C.: Island Press.
- Schefold, R. (1988) *Lia: Das Grosse Ritual Auf Den Mentawai-Inseln (Indonesien)*. Berlin: D. Reimer.
- Schefold, R. (1990) Introduction, in: Homan, P. & N. De Jonge (eds.) *Indonesia in Focus: Ancient Traditions, Modern Times*, pp. 3-11, London: Kegan Paul International Ltd.
- Schulte, A. (2002) Rainforestation Farming: Option for Rural Development and Biodiversity Conservation in the Humid Tropics of Southeast Asia; a Review of Major Issues on Community-Based Rehabilitation Silviculture and Guide to Recommended Native Tree Species for the Visayas / Philippines, in: Aachen: Shaker Verlag.
- Schulte Nordholt, H. (1990) Status and Ancestors, in: Homan, P. & N. De Jonge (eds.) *Indonesia in Focus: Ancient Traditions, Modern Times*, pp. 3-11, London: Kegan Paul International Ltd.
- Schulte Nordholt, H. (2007) *Bali, an Open Fortress 1995-2005: Regional Autonomy, Electoral Democracy and Entrenched Identities*. Leiden: KITLV Press.
- Schultes, R. E. (1988) *Primitive Plant Lore and Modern Conservation*, Summer 1988 edition. Vol. 7. *Orion Nature Quarterly*. New York: Myrin Institute.
- Schumacher, T. (1996) Plants Used in Medicine, in: Whitten, T. & J. Whitten (eds.) *Indonesia Heritage Plants*, Jakarta: Buku Antar Bangsa.
- Shiva, V., H. Schücking, P. Anderson, A. Gray, L. Lohmann, & D. Cooper (1991) *Biodiversity: Social & Ecological Perspectives*. London: Zed Book.
- Slikkerveer, L. J. (1990) *Plural Medical Systems in the Horn of Africa: The Legacy of 'Sheikh' Hippocrates*. London: Kegan Paul International.
- Slikkerveer, L. J. (1996) Indigenous Agricultural Knowledge Systems in Kenya: Towards Conservation of Biocultural Diversity in East Africa, in: Adams, W. M. & L. J. Slikkerveer (eds.)

- Indigenous Knowledge and Change in African Agriculture*, vol. Studies in Technology and Social Change No. 26, pp. 17-37, TSC Programme, Iowa: Iowa State University.
- Slikkerveer, L. J. (1999) Ethnoscience, 'Tek' and Its Application to Conservation, in: Posey, D. A. (ed.) *Cultural and Spiritual Values of Biodiversity: A Complementary Contribution to the Global Biodiversity Assessment*, pp. 169-177, London: Intermediate Technology Publications.
- Slikkerveer, L. J. (2000a) Ethnobotanical Knowledge Systems and Their Potential for Sustainable Use of Wild Food and Non-Food Plants, in, pp. 37-44.
- Slikkerveer, L. J. (2000b) *Etnobotanische Kennissystemen Van Medicinale Planten in Ontwikkelingslanden: Een Brug Met Vele Pijlers En Bogen*, Oratie, Universiteit Leiden.
- Slikkerveer, L. J. (2002) "The Rise of Jamu in Indonesia: The Contribution of Medical Ethnobotanical Knowledge Systems to a Model of Evidence-Based Biocultural Conservation," *Innovative wisdom: The contribution of local knowledge to science*, Proceedings of the White Oak Seminar, Fla. USA1-30 Reprint.
- Slikkerveer, L. J. (2005) *The Rise of Ethnomedicine in Indonesia: Innovative Wisdom for the Advancement of the Medical Social Sciences*. Bandung: Universitas Padjadjaran.
- Slikkerveer, L. J. (2006a) The Challenge of Non-Experimental Validation of Mac Plants: Towards a Multivariate Model of Transcultural Utilization of Medicinal, Aromatic and Cosmetic Plants, in: Bogers, R. J., L. E. Craker, & D. Lange (eds.) *Medicinal and Aromatic Plants. Agricultural, Commercial, Ecological, Legal, Pharmacological and Social Aspects*, Dordrecht: Springer.
- Slikkerveer, L. J. (2006b) "Medicinal and Aromatic Plants," *Proceedings of the Frontis Workshop on medical and aromatic plant*, Wageningen, 17-20 April 2005, pp. 6.
- Slikkerveer, L. J., & W. H. J. C. Dechering (1995) Lead: The Leiden Ethnosystems and Development Programme, in: Warren, D. M., L. J. Slikkerveer, & D. Brokensha (eds.) *The Cultural Dimension of Development: Indigenous Knowledge Systems*, London: Intermediate Technology Publications.
- Slikkerveer, L. J., & C. Lionis (1996) *Traditional Medical Beliefs and Practices in Rural Crete: The Persistence of Philosophical and Cosmological Views on the Universe in the Hippocratic-Galenic Humoral System*. Heraklion: Department of Social Medicine, University of Crete.
- Slikkerveer, L. J., & S. R. Quah (eds.) (2003) *Traditional Healing Systems: Negotiating Science and Technology Challenges*. Leiden: LEAD, Leiden University.
- Slikkerveer, L. J., & M. K. L. Slikkerveer (1995) Taman Obat Keluarga (Toga): Indigenous Indonesian Medicine for Self-Reliance., in: Warren, D. M., L. J. Slikkerveer, & D. Brokensha (eds.) *The Cultural Dimension of Development: Indigenous Knowledge Systems*, pp. 13-34, London: Intermediate Technology Publication.
- Smith, B. K. (1989) *Reflections on Resemblance, Ritual, and Religion*. New York: Oxford University Press.
- Smith, J. M. B. (1986) Biogeography of Australian Flora and Fauna, in: Recher, H. F. (ed.) *A Natural Legacy - Ecology in Australia*, Australia: A.S. Wilson, Inc.
- Sofoluwe, G. O. (1985) The African Concept of Community Health, in: Sofoluwe, G. O. & F. J. Bennett (eds.) *Principles and Practice of Community Health in Africa*, pp. 3-5, Ibadan: University Press.
- Solahuddin, S., & R. Dahuri (1998) Sustainable Use of Natural Resources and Biodiversity Conservation in Indonesia, in: Ismail, G. & M. Murtedza (eds.) *Biodiversity Conservation in Asean; Emerging Issues & Regional Needs*, pp. 96-127, London: Academic Press.
- Spellerberg, I. E. (1998) Biological Diversity, Conservation and Resource Management, in: Ismail, G. & M. Murtedza (eds.) *Biodiversity Conservation in Asean; Emerging Issues & Regional Needs*, pp. 1-13, London: Academic Press.
- Stephen, M., & L. K. Suryani (2000) Shamanism, Psychosis and Autonomous Imagination, *Culture, medicine and psychiatry* 24:5-40.
- Sterling, S. (1990) Towards and Ecological World View, in: Engel, J. R. & J. G. Engel (eds.) *Ethics of Environment and Development: Global Challenge, International Response*, pp. 77-86, London: Belhaven Press.

- Stevens, S. (ed.) (1997) *Conservation through Cultural Survival: Indigenous Peoples and Protected Areas*. Washington, DC: Island Press.
- Stuart-Fox, D. J. (1979) *Eka Dasa Rudra: 100-Year Ceremony at Pura Besakih, Bali*. Denpasar: Panitia Karya Agung Eka Dasa Rudra, Seksi Penerangan dan Dokumentasi.
- Suchman, E. A. (1965) Stages of Illness and Medical Care, *Journal of health and human behavior* 6:114-128.
- Sudman, S. (1983) Applied Sampling, in: Rossi, P. H., J. D. Wright, & A. B. Andersen (eds.) *Handbook of Survey Research*, New York: Academic Press.
- Suradisastira, K., W. K. Sejati, Y. Supriatna, & D. Hidayat (2002) Institutional Description of the Balinese Subak, *Jurnal Litban Pertanian* 21(1):11-18.
- Suryani, L. K. (1984) Culture and Mental Disorder: The Case of Bebainan in Bali, *Culture, Medicine and Psychiatry* 8(1):95-113.
- Suryani, L. K. (1988) *Psikosis Akut Pada Orang Bali Yang Beragama Hindu Di Bali: Suatu Studi Pendekatan Kliniko-Sosiobudaya*, Ph.D dissertation, Erlangga University.
- Suryani, L. K. (1995) Penanagang Gangguan Jiwa Dengan Pendekatan Bio-Psiko-Sosiobudaya-Spiritual, *Jiwa Majalah Psikiatri (Indonesian Psychiatric quarterly)* 2:1-8.
- Suryani, L. K. (2003) *Perempuan Bali Kini*. Denpasar: Penerbit BP.
- Suryani, L. K., & G. D. Jensen (1992) Psychiatrist, Traditional Healer and Culture: Integrated in Clinical Practice in Bali, *Medical anthropology* 13:301-314.
- Suryani, L. K., & G. D. Jensen (1993) *Trance and Possession in Bali: A Window on Western Multiple Personality, Possession Disorder, and Suicide*. Kuala Lumpur: Oxford University Press.
- Tabachnick, B. G., & L. S. Fidell (1989) *Using Multivariate Statistics*, 2nd edition. New York: Harper & Row.
- Tarbut, E. J., & F. K. Lutgens (1993) *The Earth - an Introduction of Physical Geology*, 4th edition. New York: Macmillan.
- Toledo, V. M. (1992) What Is Ethnoecology? Origins, Scope and Implications of a Rising Discipline, *ethnoecológica* 1(1):5-21.
- Toledo, V. M. (1994) Biodiversity and Cultural Diversity in Mexico., *Different drummer* 1(3):16-19.
- Toledo, V. M. (2000) "Ethnoecology: A Conceptual Framework for the Study of Indigenous Knowledge on Nature, Plenary Lecture," *Seventh International Congress of Ethnobiology*, Athens, Greece.
- Tomascik, T. (1997) *The Ecology of the Indonesian Sea, Part I. The Ecology of Indonesia Series; V. 7-8*. Singapore: Periplus Editions.
- Tomlinson, J. (1999) *Globalization and Culture*. Cambridge: Polity Press.
- Töpfer, K. (1999) Foreword, in: Posey, D. A. (ed.) *Cultural and Spiritual Values of Biodiversity: A Complementary Contribution to the Global Biodiversity Assessment*, pp. xi-xii, London: Intermediate Technology Publications.
- Turner, N. J., M. B. Ignace, & R. Ignace (2000) Traditional Ecological Knowledge and Wisdom of Aboriginal Peoples in British Columbia, *Ecological applications* 10(5):1275 -1287.
- Twaddle, A. C. (1981) Sickness and the Sickness Career: Some Implications., in: Eisenberg, L. & A. Kleinman (eds.) *The Relevance of Social Science for Medicine, Volume 1*, pp. 422, Dordrecht: D. Reidel Publishing Company.
- UNESCO (1993) "Amendment to the Draft Programme and Budget for 1994-1995 (27 C/5), Item 5 of the Provisional Agenda," 27 C/DR.312 edition. Paris: UNESCO.
- United Nations (2007) *The Millennium Development Goals Report 2007*. New York: United Nations.
- Urbaniak, G. C., & S. Plous (1997) *Research Randomizer*, <http://www.randomizer.org/>, Access date: 01/06/2006, Social Psychology Network.
- Van de Geer, J. P. (1987) *Algebra and Geometry of Overals: Internal Report Rr-87-13*. Leiden: Department of Data Theory, University of Leiden.
- Van de Geer, J. P. (1993) *Multivariate Analysis of Categorical Data: Theory. Advanced Quantitative Techniques in the Social Sciences; 2-3*. Newbury Park, CA: Sage.
- Van den Breemer, P. J. M. (1989) Yam Cultivation and Socio-Ecological Ideas in Aouan Society, Ivory Coast, *Sociologia Ruralis* 29(3/4):265-279.

- Van den Breemer, P. J. M., H. T. Van der Pas, & H. J. Tieleman (eds.) (1991) *The Social Dynamics of Economic Innovation: Studies in Economic Anthropology*. Leiden: D.S.W.O. Press.
- Van der Burg, E. (1983) *Nonlinear Canonical Correlation and Some Related Techniques*. Leiden: DSWO Press.
- Van der Burg, E., & J. De Leeuw (1988) Use of the Multinomial Jackknife and Bootstrap in Generalized Nonlinear Canonical Correlation Analysis, *Applied Stochastic Models and Data Analysis* 4:159-172.
- Van der Burg, E., J. De Leeuw, & R. Verdergaal (1984) *Non-Linear Canonical Correlation Analysis: Internal Report Rr-84-12*. Leiden: Department of Data Theory, University of Leiden.
- Van der Burg, E., J. De Leeuw, & R. Verdergaal (1988) Homogeneity Analysis with K Sets of Variables: An Alternating Least Squares Method with Optimal Scaling Features, *Psychometrika* 53(177-197).
- Van der Burg, E., I. Noordermeer, & J. C. J. M. De Haes (2000) "Quality of Life of Cancer Patients: A Multi-Set Analysis," *Classification and information processing at the turn of the millennium: proceedings of the 23rd annual conference of the Gesellschaft für Klassifikation e.V., University of Bielefeld, March 10-12, 1999*, Berlin 421-429. Springer.
- Van Gent, E. (1880) *Boekoe Obat-Obat Voor Orang Toewa Dan Anak-Anak*. Djodja: Buning.
- Van Kol, H. H. (1903) *Uit Onze Koloniën*. Leiden: A. W. Sijthoff.
- Van Leeuwen, L. (1997) *Airconditioned Lifestyles: De Nieuwe Rijken in Jakarta*. Amsterdam: Het Spinhuis.
- Van Seters, A. P. (1997) Forest Based Medicines in Traditional and Cosmopolitan Health Care, in: Bodeker, G., K. K. S. Bhat, J. Burley, & P. Vantomme (eds.) *Medicinal Plants for Forest Conservation and Health Care, Non-Wood Forest Products*, vol. 11, pp. 5-11, Rome: Food and agriculture organization of the United Nations.
- Van Wijk-Fransz, M. C. (1939) *Martha's Indische Kruiden Recepten Boek*. Bandoeng: Nix.
- Van Wouden, F. A. E. (1935) *Sociale Structuurtypen in De Groote Oost*. Leiden: J. Ginsberg.
- Veilleux, C., & S. R. King (2008) *An Introduction to Ethnobotany*, <http://www.accessexcellence.org/RC/Ethnobotany/page2.php>, Access date: 21 June 2008: Access Excellence @ the National Health Museum.
- Verdergaal, R. (1986) *Overals: Internal Report Ug-86-01*. Leiden: Department of Data Theory, University of Leiden.
- Vergara, N. T. (1998) "The Role of Communities in Promoting Sustainable Forestry and Social Equity," *Community forestry as strategy for sustforest management. DENR / ITTO. Proceedings of the International Conference on Community Forestry*, Manila.
- Vickers, A. (1996a) *Being Modern in Bali: Image and Change*. New Haven, Conneticut: Yale University Southeast Asia Studies.
- Vickers, A. (1996b) Modernity and Being "Modern": An Introduction, in: Vickers, A. (ed.) *Being Modern in Bali: Image and Change*, pp. 1-37, New Haven, Conneticut: Yale University Southeast Asia Studies.
- Warren, C. (1993) *Adat and Dinas: Balinese Communities in the Indonesian State*. Kuala Lumpur: Oxford University Press.
- Warren, C. (1994) *Centre and Periphery in Indonesia: Environment, Politics and Human Rights in the Regional Press (Bali)*. Working Paper 42. Perth: Murdoch University Asia Research Centre.
- Warren, D. M. (1974) *Disease, Medicine, and Religion among the Techniman Bono of Ghana*, Doctoral Dissertation, Indiana University.
- Warren, D. M., L. J. Slikkerveer, & D. Brokensha (eds.) (1995) *The Cultural Dimension of Development: Indigenous Knowledge Systems*. London: Intermediate Technology Publications.
- Waxler, N. E. (1981) The Social Labelling Perspective on Illness and Medical Practice, in: Eisenberg, L. & A. Kleinman (eds.) *The Relevance of Social Science for Medicine, Volume 1*, pp. 283-306, Dordrecht: D. Reidel Publishing Company.
- Weck, W. (1937) *Heilkunde Und Volkstum Auf Bali*. Stuttgart: F. Enke.

- Weinberg, S. L., & S. K. Abramowitz (2002) *Data Analysis for the Behavioral Sciences Using Spss*. Cambridge: Cambridge University Press.
- WHO (1993) *Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines*. Manila: World Health Organization, Regional Office for the Western Pacific.
- WHO (1998) *Health Promotion Glossary*, http://www.who.int/hpr/NPH/docs/hp_glossary_en.pdf, Access date: 8 November 2008, Geneva: World Health Organisation.
- WHO (2000) *General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine*, http://whqlibdoc.who.int/hq/2000/WHO_EDM_TRM_2000.1.pdf, Access date: 22 July 2008, Geneva: World Health Organisation.
- WHO (2002) *Integrating Prevention into Health Care; Factsheet No 172*, <http://www.who.int/mediacentre/factsheets/fs172/en/>, Access date: 2 november 2008, Geneva: World Health Organisation.
- WHO (2003) *Traditional Medicine; Factsheet No 134*, <http://www.who.int/mediacentre/factsheets/fs134/en/>, Access date: 6 August 2008, Geneva: World Health Organisation.
- WHO (2005) *Action on the Social Determinants of Health: Learning from Previous Experiences*, www.who.int/social_determinants/strategy/en/CSDH_socialdet_backgrounder.pdf, Access date: 15 March 2009, Geneva: World Health Organisation.
- WHO (2006a) *Engaging for Health, 11th General Programme of Work, 2006-2015. A Global Health Agenda*. Geneva: World Health Organisation.
- WHO (2006b) *Who Constitution, Basic Documents, Forty-Fifth Edition, Supplement, October 2006*, http://www.who.int/governance/eb/who_constitution_en.pdf, Access date: 18 July 2008: World Health Organisation.
- WHO (2007a) *Country Health Profile: Indonesia*, http://www.searo.who.int/LinkFiles/Indonesia_indonesia.pdf, Access date: 11 May 2008: World Health Organization.
- WHO (2007b) *Indonesia National Health System Profile*, http://www.searo.who.int/LinkFiles/Indonesia_CHP-Indonesia.pdf, Access date: 11 May 2008: World Health Organization.
- WHO (2008a) *Who Statistical Information System (Whosis). Indicator Definitions and Metadata, 2008*, <http://www.who.int/whosis/indicators/compendium/2008/en/>, Access date: 20 July 2008, Geneva: World Health Organization.
- WHO (2008b) *The World Health Report 2008: Primary Health Care Now More Than Ever*. Geneva: World Health Organization.
- Williams, N. M., & G. Baines (1993) *Traditional Ecological Knowledge: Wisdom for Sustainable Development. Based on Traditional Ecological Knowledge Workshop, April 1988*. Canberra: Centre for Resource and Environmental Studies, Australian National University.
- Williams, N. M., & E. S. Hunn (eds.) (1981) *Resource Managers: North American and Australian Hunter-Gatherers*. Aas Selected Symposium; 67. Boulder, Colo.: Westview Press for the American Association for the Advancement of Science.
- Williamson, E. (2006) Systems of Traditional Medicine from South and South East Asia, *the Pharmaceutical Journal* 276(May):539-540.
- Wilpert, C. B. (2001) Preface: Paradise Bali? in: Ramseyer, U. & I. G. R. Panji Tisna (eds.) *Bali: Living in Two Worlds: A Critical Self-Portrait*, Basel: Museum der Kulturen Basel; Schwabe.
- Wilson, E. O. (ed.) (1988) *Biodiversity*. Washington, D.C.: National Academy Press.
- World Bank (2008a) *Key Development Data & Statistics*, <http://go.worldbank.org/1SF48T40L0>, Access date: 12 July 2008: The World Bank Group.
- World Bank (2008b) *World Bank List of Economies*, <http://siteresources.worldbank.org/DATASTATISTICS/Resources/CLASS.XLS>, Access date: 12 July 2008: The World Bank Group.
- Yoder, P. S. (1982a) Biomedical and Ethnomedical Practice in Rural Zaire. Contrasts and Complements, *Social science and medicine* 16(21):1851-1857.

Yoder, P. S. (1982b) Issues in the Study of Ethnomedical Systems in Africa, in: Yoder, P. S. (ed.) *African Health and Healing Systems: Proceedings of a Symposium*, pp. 1-20, Los Angeles: Crossroads Press.

Curriculum Vitae

Liesbeth Nathalie Leurs was born on the 16th of February 1977 in Diest, Belgium. After completion of her high school education in Belgium, she joined Leiden University in The Netherlands and completed the propadeuse program in *Cultural Anthropology and Sociology of Non-Western Societies* in August 1995. In August 2000, she received her Master of Arts Degree from Leiden University in *Cultural Anthropology* with Indonesia as a regional specialization. Her programme included an intensive two months' language training in *Bahasa* Indonesia in Yogyakarta, Java and a four months' fieldwork training in the area of Payakumbuh, West-Sumatra, Indonesia. Following her Master of Arts Degree, she worked as a research assistant for the *Netherlands Institute for Advanced Study in the Humanities and Social Sciences* (NIAS). In 2001, she joined the TWINMAP Program, as part of the Bilateral Cooperation Agreement between Leiden University and Universitas Padjadjaran (UNPAD) in Bandung, Indonesia. After completion in November 2002, she received a Master of Science Degree in *Medical Anthropology and Ethnobotany*, which included a three months' fieldwork training in Ciamis, West-Java, Indonesia.

Mrs. Leurs has been employed since 2002 by *ActiVite*, known before as *Stichting Thuiszorg Groot Rijnland*. Currently, she coordinates, as *Projectleider Zorgbeleid* ('Project Leader Health Care Policies') projects and programmes. In addition, she advises the Board on current and future impacts of national policies related to health care, particularly the quality of care and cure. During her association with *ActiVite*, she also contributed to various conferences and workshops related to both general developments and specific health care topics in The Netherlands. She is also involved in current debates and developments on both regional and national levels specifically as in the preventive and promotive health care, *ketenzorg* ('integrated care'), and reorientation towards the role of nurses in home care. She contributed to the *De Landelijke Eerstelijns Samenwerkings Afspraak Actueel Medicatie-overzicht* ('National First-Line Directives for Cooperation Current Medications Overview').

In 2003, she joined the *Leiden Ethnosystems and Development Programme* (LEAD) of the Faculty of Science of Leiden University, and in 2005 she started her PhD research in Bali. She has been working with Prof. Dr. L.J. Slikkerveer, Director of the LEAD Programme, and advised various graduate as well as post-graduate students on their research. She also participated and lectured in the MSc Course on 'Ethnobotanical Knowledge Systems' (EKS) at the Leiden University Branch of the National Herbarium of The Netherlands.

