Seasonality in the coastal lowlands of Kenya: Part 3: Socio-economic profile

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Food and Nutrition Studies Programme

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Part 3: Socio-economic profile

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Note on Authors

This study has been a genuine team effort in which several researchers participated in different phases of the research. Also, during the course of the study some of our colleagues left and were replaced by others. Since it is not possible to list all of them as authors to each report, we have chosen to list as authors the researchers who have taken a large hand in that particular report, be it in data collection, analysis, reporting or otherwise. The full team, however, has contributed to the end result and therefore needs to be mentioned. The respective names, disciplines and periods of participation in the study follow below:

Drs. Dick Foeken	human geography	1987-
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Summary

This is Part 3 of a series concerned with seasonality in the Coastal Lowlands of Kenya. Household surveys were carried out in six locations in Kwale and Kilifi Districts; two locations in each of the three major agro-ecological zones: CL3 (coconut-cassava), CL4 (cashewnut-cassava) and, more inland, CL5 (livestock-millet). In each location 50 households were visited six times over a period of two years, 1985-87. The data concern household and demographic characteristics, agriculture and off-farm employment, food consumption and nutritional status. Previous reports presented a description of research objectives and study design (Part 1) and a review of existing literature on seasonality and the two districts (Part 2). The present report offers a description of the socio-economic characteristics of the areas.

Households in Kilifi are generally larger than in Kwale, because of differences in household organization. To standardize household size, many data are expressed as ratios per consumer unit (= adult male equivalent). Households in Kwale have an average of 6.7 consumer units; in Kilifi of 11.1 consumer units (cu). This leads, among other things, to more crowded housing conditions in the latter district.

On average, households have 8.2 acres at their disposal but in the CL3 and CL4 zones, closer to the coast, 40% of the households have less than 3 acres. Agricultural productivity per household, per acre and per farm labour vary considerably not only between zones, but also between areas within the same zone. About half the land is used for food crop cultivation - predominantly maize but also cassava - except in the CL5 areas situated further inland.

On average, only 45% of the food energy requirements of the household was covered by own food crop production, leaving more than 50% to be purchased. The two areas with the lowest degree of food self-sufficiency are also areas that differ very much in

agro-ecological characteristics: a remote, inland area, dry and not suitable for agriculture; and a fertile area in the palm tree zone but densely populated

Off-farm employment is the major source of income. In most of the rural areas little employment is to be found and workers - the adult men - move to live near the place of work. Because of the living costs involved, this is only an option if the salary is sufficiently high, so that a balance remains to be taken home.

Total household income averages about sh10,000/household/year (sh2,000 /consumer unit), which is comparable to the results of a household budget survey in 1981/82. Wage income contributes 60% to the total, the value of food crops accounts for 25%, cash crops and livestock for the remaining 15%.

In all, about 40% of the households fall below the food poverty line; families that do not have sufficient income (cash & kind) to assure even the minimal energy requirements of the household members. Households that depend on farming are mostly low income households, and they are generally unable to meet household needs - with exceptions. Higher incomes are realized through wage employment, not farming.

Different household economies were distinguished according to income level: below sh1,000/cu (poor households; N=123); sh1,000-4,000/cu (middle income; N=141); sh4,000/cu and over (rich households; N=33). The middle income households were subsequently divided according to income composition; whether primarily farm income (N=31); wage income (N=58) or a mixture of both (N=52).

The two districts have a similar distribution of household economies with the exception that more poor households were recorded in the Kilifi research areas. One important finding of the survey is that the number of poor households in the three agro-ecological zones is virtually the same. The further distribution over different types of household economies also differs little. This can be explained by the fact that among households above the poverty line, wage income is the major component of the income, and employment opportunities are not location-bound - workers go where employment is offered. What is striking, is that so few households manage to secure a living from farming - and that this is so in all agro-ecological zones despite differences in agricultural potential.

1. Introduction

Coast Province is the third area of major population concentration in Kenya, after the Central and Western regions of the country. The climatic and economic conditions of the region are quite different from those of the highland areas. Inland, rainfall diminishes quickly while evapotranspiration increases. Most soils are chemically poor and the fertility of the land tends to be low (Boxem et al.,1987). The region has different agro-ecological zones that alternate over relatively short distances (Jaetzold & Schmidt,1983). The relatively humid coconut-cassava zone has a fair potential for food and cash crops, depending on local variations in soil fertility. In the somewhat drier cashewnut-cassava zone, possibilities for crop production are more restricted. The livestock-millet zone and the ranching zone cover more than two thirds of the agricultural land but offer only limited potential for rain-fed agriculture. Agriculture in the first two zones is dominated by food crops and perennial cash crops, while in the third zone livestock rearing is combined with cultivation of food crops. The seasonal character and the low reliability of rainfall, however, severely restrict the scope and productivity of agriculture. Maize production in the region is insufficient to feed the population and substantial imports are required from elsewhere in Kenya. The populations in the drier zones, in particular, have to deal with the disruptive effects of shorter and longer drought periods (MENR,1984a; 1984b).

Climatic seasonality, the succession of wet and dry seasons in tropical climates, results in profound variations in (rural) life: seasonal agricultural labour needs, seasonal differences in food supply and food availability, fluctuations in prices of crops and foodstuffs, variations in health and illness. In general these adverse factors tend to operate concurrently at certain times of the year, leading to situations of seasonal stress or hardship, depending on the agro-ecological characteristics of the physical environment and the social-economic characteristics of households. Regional and seasonal fluctuations in food supply and nutrition is one of the research subjects of the Food and Nutrition Studies Programme. The topic of seasonality has received increased international attention in recent years. Although many African societies traditionally had to cope with seasonal food shortages, the effects of seasonality appear to have worsened as a consequence of the introduction of commercial cropping and because of increasing population pressure. Certain groups, such as small farmers, appear to be particularly vulnerable to the vagaries of the seasons (Chambers et al.,1981; AMREF,1982; Longhurst,1986; IFPRI,1985).

Kenya has a tradition of intervention in and regulation of the food sector. Consumer prices of various food commodities, including maize meal, are set by the government, and the country has pursued a 'cheap food' policy over the last decade. Officially, the National Cereals and Produce Board (NCPB) is assigned the responsibility to distribute maize and to ensure stable supplies throughout the country. NCPB depots are located in all parts of the country, maize is purchased in regions and at times of surplus production; maize is stored and sold in regions and at times of market deficits. Official government policy, however, is not able to guarantee the food supply at low prices at all times, particularly not in the rural areas (Meilink,1987). Under these circumstances the food production for home consumption and the purchasing power of households becomes a critical factor.

An earlier FNSP study, a precursor to the present research, assessed the national food situation in Kenya together with its seasonal dynamics at the provincial and district level. It called particular attention to the growing populations in the drier zones against the

background of the factual instability of food production and as evinced by the regular food shortages in these marginal areas which regularly necessitate food relief (Kliest,1985).

The objective of the FNSP seasonality study is to record, describe and analyse the effects of climatic seasonality on food production and nutrition among the rural populations in the coastal lowlands, together with the coping mechanisms that are utilized by different population groups in order to deal with these seasonal variations. A second objective is to collect information on food practices and nutritional conditions among the rural populations in the districts concerned.[1]

The study was carried out in Kwale and Kilifi, the two districts that account for more than two thirds of the rural population in Coast Province.[2] Attention further concentrated on the three agro-ecological zones - CL3, coconut-cassava; CL4, cashewnut-cassava; CL5, livestock-millet zone [3] - which sustain the bulk of the population in the districts. According to estimates by Jaetzold & Schmidt (1983:309,350), more than 80% of the farm families in the two districts live in the three zones mentioned (28%, 40% and 14% respectively).

Six research locations were selected; one in each zone in each of the two districts. They are respectively Bongwe and Chilulu in L3, Mwatate en Kitsoeni in L4 and Kibandaongo and Bamba in L5 (See Map, inside back cover). Some miscellaneous information on the research areas is listed in Table 1. A total of 300 households - 50 in each area - were visited six times, in such a way that two agricultural years (1985 and 1986) were covered. Information was collected regarding housing circumstances and living conditions, demographic characteristics of household members, farm characteristics, off-farm employment, food consumption and nutritional status.

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[1] The study detailed here was only one of several which were carried out in Coast Province at the time. Subsidiary studies to the present study are concerned with the aetiology of childhood malnutrition in the region (Peters & Niemeyer,1987) and farming systems and food security in Kwale District (Oosten,1989). Other studies were concerned with another FNSP topic, namely nutrition in agricultural and rural development, and they concern the following: nutritional conditions at settlement schemes (FNSP,1985;1988c) and nutrition and dairy development (FNSP,1987;1988d).

[2] These two districts together with Mombasa, the main urban centre, and the sparsely populated Lamu district form the coastal region as such, with distinctive ecological and cultural characteristics. The two other districts in Coast Province, Taita and Tana River, are mainly situated inland and have their own characteristics.

[3] CL stands for coastal lowlands, referring to the special type of lowlands found in the coastal regions of the tropics. In the text reference is further made to L3, L4, and L5, without the precursor C.

Table 1
Research Areas

	Bongwe	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
Agro-ecol. zone [1]	L3	L3	L4	L4	L5	L5
District	Kwale	Kilifi	Kwale	Kilifi	Kwale	Kilifi
Location	Diani	Jibana	Mwavumbo	Chonyi N.	Kinango N.	Bamba
Sub-location	Bongwe	Chilulu/Tsagwa	Mwatate	Kitsoeni	Kibandaongo	Mikamini
Ethnic group	Digo	Chonyi	Duruma	Chonyi/Kauma	Duruma	Giriama
Pop. density [2]	133	312	203	109	40	35
Distance Mombasa (km)	25-30	45-50	15-20	55-60	35-40	95-100

1 L3 = coconut-cassava zone; L4 = cashewnut-cassava zone; L5 = livestock-millet zone (see Jaetzold & Schmidt, 1983)
2 The density figures are for 1979 and apply to the sub-locations concerned (CBS,1981).

A comprehensive description of research objectives, study design and data schedules has been given in Part 1 of the series of reports (Hoorweg, Kliest & Niemeyer,1988). The second report in the series contains a review of current knowledge on seasonality in Africa: - climatic seasonality; - its effects on the agrarian cycle, agrarian labour, food consumption, nutritional status, health; - the coping mechanisms used by households to deal with seasonal variations, i.e. mechanisms to prevent seasonal stress and mechanisms to solve acute situations of stress. The report also reviewed the existing conditions in Kwale and Kilifi Districts, together with the available information on social and economic conditions in the districts and the research areas (Foeken & Hoorweg,1988). Four factors were identified that are expected to play a prominent role in determining the adverse effects of climatic seasonality in this part of Kenya. These factors operate at different levels and are: climate, productive organization, household resources and age/gender characteristics. The dryness of the climate is a macro characteristic that is more or less shared by the different research areas. Sex and age are examples of individual characteristics that identify certain vulnerable groups; this will be one of the subjects of Report No. 4. Preliminary findings on socio-economic and anthropometric data were presented on the occasion of a district workshop (FNSP,1988a;1988b). An independent support study by Oosten (1989) provides detailed

material on the farming systems in Bongwe and Kibandaongo, two of the the Kwale survey areas.

The present report, part 3, is concerned with productive organization and household resources. Productive organization entails the mixture of food crop cultivation, tree crop production, livestock keeping and off-farm employment, which form the elements from which individual households make a living. In more traditional societies, production is mainly devoted to subsistence farming, with a strong emphasis on food crops and livestock. In societies with greater economic differentiation, there will be more opportunity to meet seasonal stress. None of the study areas can any longer be regarded as fully traditional, nevertheless they differ considerably in this respect. For instance, two Kwale locations - Kibandaongo and Bongwe - differ profoundly in the extent of food production and, conversely, the importance of off-farm employment.

Within rural societies, individual households also differ in respect of the size and composition of the resource base. The main opportunities to strengthen the resource base of households in the coastal region are through off-farm employment. Households that can be regarded as well-off by rural standards are households with a substantial off-farm income, as we shall see later. Having a regular income, it is likely that they are able to buy food regularly and thus will better able to deal with seasonal stress. Poor households may have to resort to hunting, gathering or they depend on occasional opportunities for casual labour on the farms of neighbours.

The present report has two objectives, one descriptive, one analytical. The first aim is to give a description of the productive organization in the respective areas by means of the presentation of the baseline socio-economic data, collected for the first and second survey rounds in 1985 (occasionally complemented by information from the third round). These data are presented in Sections 2-6, and the corresponding Appendices 1-28.[1] Appendix 1-9 present the demographic results, Appendix 10-13 cover living conditions, Appendix 14-

[1] Superseding the earlier preliminary findings (FNSP,1988b).

19 are concerned with food production, Appendix 20-23 with tree crops and livestock, Appendix 24-28 with off-farm employment.

The second aim of the report is to arrive at a characterization of the different research areas, in terms of magnitude and composition of the total resource base and a characterization and differentiation of individual households in socio-economic terms. The latter is the subject of an analysis presented in Section 7, and Appendices 29-37, and results in a household division that will be used in the next report.

2. Demographic Characteristics

The population of the two districts is largely of Mijikenda origin: in Kwale over 80% and in Kilifi over 90% (CBS,1979). The few non-Mijikenda are mostly living in the towns and the coastal strip, where, for instance, the settlement schemes are located. The rural areas inland are almost exclusively inhabited by members of the nine Mijikenda sub-tribes. Two groups, Digo and Duruma, are living in Kwale. In Kilifi seven more groups are found: Giriama, Chonyi, Rabai, Jibana, Kauma, Kambe and Ribe, in that order of importance. The Giriama are the largest sub-tribe estimated at 350,000 people in 1985, the Ribe the smallest with 4,000 (Foeken & Hoorweg,1988:32).

The data pertaining to demographic characteristics are listed in Appendix 1-9, where they are presented separately for each research area. The summary Tables 2-6 in the text are compiled by district to highlight the differences between Digo and Duruma on the one hand, and the Kilifi sub-tribes on the other. The total sample consists of 297 households.[1] There is considerable difference in household size, although the ratio adults/children remains the same (Table 2). There are also differences between the individual research

[1] See notes on calculations and miscellaneous information, p.143 (note 1)

areas. The largest households are in Bamba, the remote inland area in Kilifi District, almost twice the size of the average household in the other research areas. The largest single household with no fewer than 47 members was found here. Households are smallest in Bongwe, the area situated in the coastal strip near Diani Beach in Kwale District.

For purposes of this survey which is concerned with food production and food consumption, the best way of expressing household size is by calculating the number of consumer units in each household.[1] This recalculation does not affect the previously noted differences. The average household in Kilifi remains largest with 7.0 consumer units, against 4.6 in Kwale (Table 2).

Table 2
Household Size

	Total N=297	*Kwale* N=147	*Kilifi* N=150
household members (average number)	8.9	6.7	11.1
% child members (0-16years)	51%	51%	51%
% adult members (17yr and over)	49%	49%	49%
consumer units (average number.)	5.8	4.6	7.0

See Appendix 1,2,3,5

The difference in household size is caused by differences in household organization. In Kwale the majority of households are nuclear in kind where the adult members consist exclusively of man, wife and grown-up children. The Kilifi households are generally more complex in nature, due to polygamy and patrilocal residence. Among the Chonyi, Kauma and Giriama in Kilifi, polygamy is quite common with co-wives living together in the same compound. Here, in almost half the cases the head of the household had more than one wife (Table 3). There are also more extended households in Kilifi, where married sons remain members of the parents' household, so that households may include more than one married couple of the same or different generations (Table 4). The very large households, as in Bamba, usually show a combination of the above.

[1] For a definition of consumer units, see notes on calculations, p.143 (note 2).

Table 3
Marital Status of Head of Household
(%)

	Total N=297	*Kwale* N=147	*Kilifi* N=150
married, monogamously	51	52	51
married, polygamously	33	18	47
single/divorced/separated/widowed	16	30	2
	100	100	100

See Appendix 8

In Kwale, only 20% of the heads of households were married polygamously, and in all only 44% of the households were not nuclear in kind. There is a related phenomenon that contributes to the difference in household size. In Kwale more than a quarter of the heads of households are divorced, separated or widowed. This is particularly the case in Bongwe where more than 40% of the household heads fall in this category. The high figure is partly due to the fact that this is the only area with a substantial number of female-headed households (Appendix 8). Women here, and in Digo society in general, have a somewhat more independent position than in the inland areas. In Kilifi, heads of households are married, almost without exception.

Table 4
Household Type
(%)

	Total N=297	*Kwale* N=147	*Kilifi* N=150
nuclear households	41	56	26
other households	59	44	74
	100	100	100

See Appendix 9

A further difference between the districts concerns the presence and absence of household members. Of the total population, 9% was reported to be absentee or non-resident, i.e. "usually residing elsewhere". Another 4% was part-time resident, having been "absent for at least two weeks during the last three months". In total, 336 part-time and non-residents were counted, and by far the most were adult men, few were women or children (Appendix 3-4). In fact, in Kilifi, nearly half of the adult males are not living

permanently in the household. In Kwale the number is much lower, here it concerns only a quarter of the men (Table 5).

Table 5
Adults by Sex and Residency
(%)

		Total N=1302	*Kwale* N=481	*Kilifi* N=822
Men /	full-time resident	30	37	27
Men /	part-time & non-resident	20	13	24
Women /	full-time resident	47	49	46
Women /	part-time & non-resident	3	1	4
		100	100	100

See Appendix 4

The main reason for this absenteeism is that men have to migrate to find work. The lowest number of absentee males is found in Bongwe with only 18%, and this is due to the fact that employment opportunities are near at hand. The differences between the research areas in this respect are discussed in Section 6 on off-farm employment. In general, the number of absent males tends to be high in the areas where households are largest (Appendix 4). Two speculations can be made why this should be so: large households may have greater flexibility with respect to the division of labour and some members can migrate without consequences for agricultural production and, at the same time, households can be large because many members are living and working elsewhere, providing a more or less regular source of income.

Table 6
Educational Level of Adults
(%)

	Total N=1303	*Kwale* N=481	*Kilifi* N=822
no formal education	61	66	57
standard 1-4	10	9	11
standard 5-8	21	18	22
secondary	8	6	10
	100	100	100

See Appendix 6,7

The level of education among the adult population is rather low, it is less than that of Kenya as a whole (Table 6). More than half the adults have not received any formal education; this is particular so among the women, of whom three quarters have no formal education. The men are generally better educated: 60% have partly followed or have completed primary education. Men in the less remote areas are generally better educated than in the coastal hinterland. People with more than primary school are few: only 10% of the men and 3% of the women (Appendix 6). Generally, the better educated men are the ones who leave home to find off-farm jobs: 24% of the part-time/non-residents had followed more than primary education (Appendix 7).

3. Living Conditions

Houses in the rural areas of Kwale and Kilifi are mainly of two local types, the Mijikenda and the Swahili house. The traditional Mijikenda house consists of a frame of poles and branches, from top to bottom covered with grass. Gradually low mud and wattle walls have been introduced to support the upper structure while palm leaves may be used to replace grass as roofing material. The house is generally divided in two parts, one area being used for cooking and social activities, the other for sleeping and private activities (Andersen, 1977). The Swahili house also consists of a wooden frame, but the walls are filled with mud in which small coral stones are mixed, while the roof is thatched with dried coconut palm leaves (*makuti*). Generally, it has several rooms with a common verandah. Although houses with grass or makuti roofs are cooler, they tend to accumulate more dust and insects. More 'modern' houses tend to have have roofs of corrugated iron sheets (*mabati*). People who can afford it will also build walls from coral stone and paved floors, but these are few (Beinum et al.,1985).

Households usually occupy several structures, a mixture of living houses, kitchen place and sheds of various kinds. The head and/or the first wife live in the "main house". Where necessary, there are houses for second wives, for adult children or kin of the head of the households, and their dependents. Boys, once they become sexually mature, are no longer allowed to sleep under the same roof as their mothers, and they build smallish structures, so-

called boys' houses, which they usually share with other boys. Where houses are more spacious, grown-up boys may be given a separate room. Girls of that age do not build their own houses but often sleep in the house of an older female family member.

Table 7
Houses, Rooms and Occupants

	Total	*Kwale*	*Kilifi*
living houses / household	2.1	1.4	2.8
rooms / house	1.9	2.4	1.5
rooms / household	3.5	3.2	3.9
occupants / room	2.8	2.4	3.1

See Appendix 10

The Kilifi compounds have twice the number of living houses as the Kwale compounds, but in Kilifi the smaller Mijikenda house is more common and the number of rooms per house is smaller than in Kwale, where the Swahili type house dominates (Table 7). In all, the total number of rooms per household is still larger in Kilifi than in Kwale, 3.9 vs. 3.1, although this is not sufficient to compensate for the much larger population. Consequently, densities per room are higher than in Kwale. There are further differences between individual research areas. For instance in Bongwe, with nearly 90% Swahili houses and small households, only 1.9 persons share a room, while in Bamba with 60% Mijikenda houses and very large households, this amounts to 3.5 persons per room (Appendix 10).

Table 8
Main House: Construction Materials
(% of households)

		Total N=297	*L3* N=100	*L4* N=98	*L5* N=99
Roof,	makuti	66	94	59	45
	grass	22	-	22	45
	metal	12	6	18	11
		100	100	100	100
Walls,	mud/coral	79	88	72	78
	grass	12	2	16	19
	cement blocks	8	10	11	3
		100	100	100	100

See Appendix 11

The quality of the materials used in the construction of houses is decided by three factors: tradition, the wealth of the household and the presence of local building materials, and therefore differ strongly among agro-ecological zones (Table 8). In the L3 zone with many coconut palms nearly all the roofs are made of palm leaves, in the L5 zone half of the roofs are made of grass. Mud, mixed with crushed coral is generally used for walls in the L3 and L4 zones. Grass or makuti walls are still found in the L5 zone, in Kibandaongo and Bamba. Floors usually consist of earth (Appendix 11). Overall, the best houses in terms of construction materials are found in two of the Kwale areas: Mwatate and Bongwe. As we shall see, in these areas there are more households with a relatively large resource base.

Table 9
Sanitary Conditions

(% of households)	*Total* N=297		*L3* N=100		*L4* N=98		*L5* N=97	
Water source by season	wet	dry	wet	dry	wet	dry	wet	dry
well	30	27	88	81	-	-	-	-
pipeline/borehole	41	58	12	19	98	98	14	57
surface water	29	15	-	-	2	2	86	43
Latrine present	33		59		33		6	

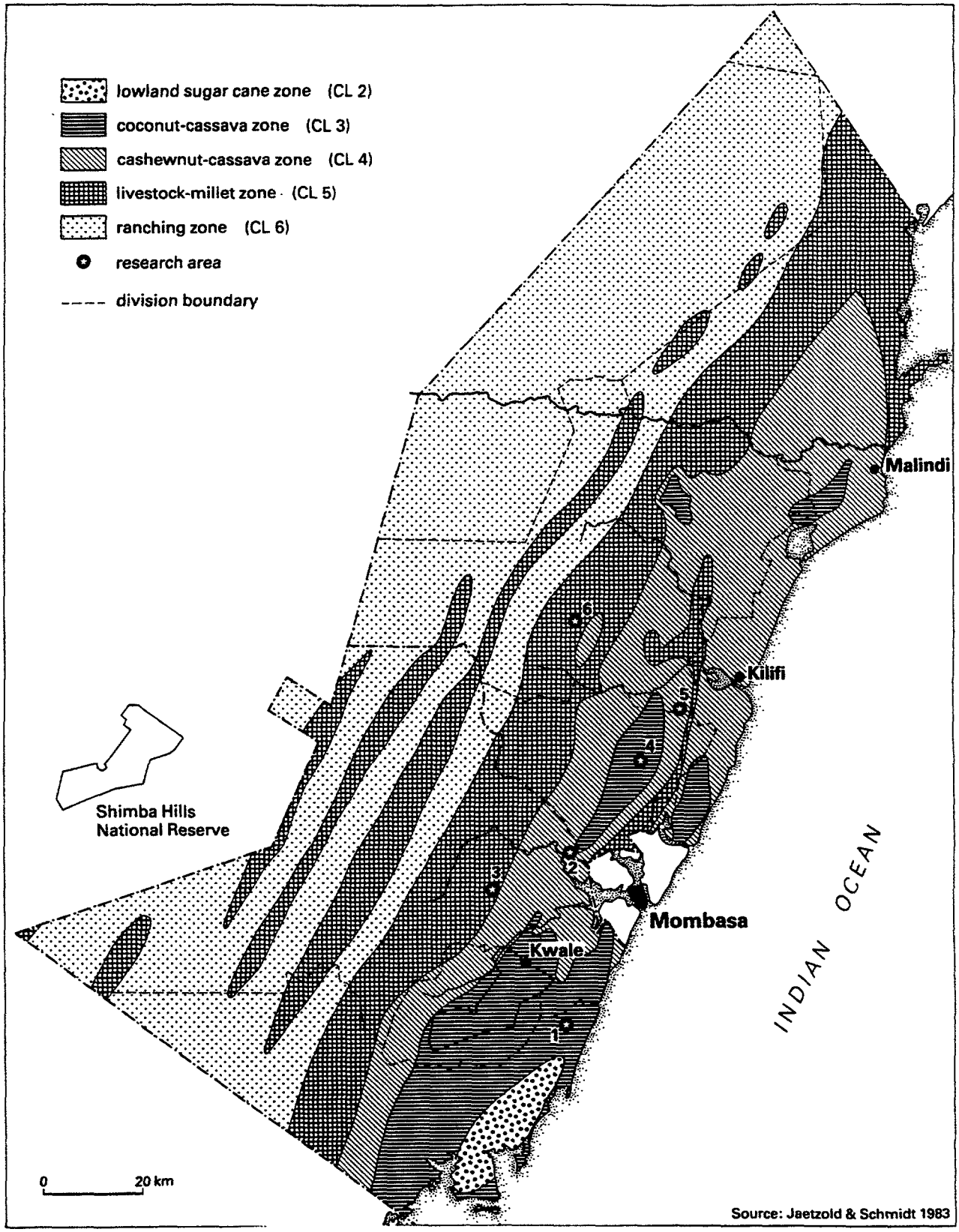
See Appendix 10, 12

Sanitation is another important element of living conditions. Clean drinking water and adequate waste disposal are particularly important for health conditions and also differ strongly among agro-ecological zones (Table 9). In the L3 areas, water is usually available from local wells, the areas in L4 draw water from a pipeline/borehole. In these areas there is little seasonal difference in water access, although problems may occur when there is a breakdown. In the L5 area, however, the situation is different. People depend on surface water, but these sources usually dry up during the dry season. In these periods, many households have to rely on improved water sources at great distances from the compounds (Appendix 13). This is dramatically shown for Bamba in Kilifi: during the wet season, about three quarters of the households are within ten minutes walking of some pond, but during really dry periods nearly all households are more than 25 km from a water source, namely the pipeline in Ganze, from where the water has to be transported by various

means. The quality of the water is presumably better at these times than the surface water in the wet season. However, the amount of water available is likely to be too small to guarantee good household hygiene.

Overall, only a third of the households had a latrine, which is a low percentage compared with other parts of Kenya.[1] Latrines are particularly few in the drier areas (Table 9). The difference between zones may be explained by the lower population density in the drier areas, and possibly by a greater distance from and lesser influence of government health and sanitation services.

[1] In Kwale there were particularly few latrines (18%), in Kilifi in about 50% of the households.



Map 1. Agro-Ecological Zones

4. Agriculture: Farms and Food Crops

4.1 Introduction

The six research areas are distributed over the three main agro-ecological zones in the two districts (Map 1): the coconut-cassava zone (L3), the cashewnut-cassava zone (L4), and the livestock-millet zone (L5).[1] The zonation roughly corresponds with rainfall gradients and indicates the possibilities of growing certain crops and for rearing livestock. In the relatively wet L3 zone more types of crops can be cultivated than in the drier L4 and L5 areas, and with better results (Foeken & Hoorweg,1988:51). How this agro-ecological potential is exploited by the resident population is another matter, as will be shown in this chapter: there are considerable differences between locations within the same zone. The relevant data on land, food crops, trees and livestock are discussed in this and the next section, together with reviews of the degree of food-self sufficiency and the total agricultural resource base. Appendices 14-23 contain the detailed listings, such as distributions and cropwise specifications. The tables included in the text generally give information of an aggregated nature.

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[1] See Hoorweg, Kliest & Niemeyer, 1988:12-14. Because the cotton and simsim areas of Kilifi District (mainly in Malindi Division) and the L2 zone of Kwale District (with sugar cane plantations) are not included, the sample is not representative for the farming population in these areas.

Agriculture in the six areas is still traditional in many respects and little developed: land registration has only been completed in some parts, the degree of agricultural modernization is low, and the cultivation of food crops for home consumption predominates.

The registration of land is still in progress. In the hinterland, the land is administered in group ranches with established grazing rights for the communities living there. In the more densely populated areas of the narrow coastal strip and the hills of the Coastal Range, most of the land has been adjudicated. But registration is a complex matter, and modern laws on land rights often do not fit in with the traditional land use and usufruct in Coast Province. Farmers are in the habit of mortgaging and renting out not only land, but also the trees on the land, and the fruits on the trees, so that often different owners have quite legitimate claims.[1]

In their choice of crops farmers traditionally take into account the topography of the land and soil fertility. Recently, because of growing population and increasing pressure on land, there is a tendency towards over-exploitation: repeated cultivation of the same crop(s), prolonged exploitation and short fallow periods. Farming practices are generally labour-intensive. The large majority of farmers use the machete (*panga*) and hoe (*jembe*) for land clearance and preparation. Planting is done by hand. The seeds are planted over the field in an irregular manner. Plant densities are low. Mixed cropping is common and involves almost every possible combination of crops. Parts of the maize fields are often interplanted with cassava or pulses. Weeding is labour-intensive and done by hand, once or twice a season. Inputs for which money is required - tractors, fertilizers, insecticides, etc. - are little used. Yields per acre are low, and due to the unreliable rainfall vary from year to year (Schreurs,1982; Waaijenberg,1987).

The cropping pattern is dominated by food crops. Maize and cassava are by far the most important crops, followed by pulses and, in some wet parts, rice. Sorghum and

[1] Lending and mortgaging is one of the traditional coping mechanisms to see farmers through periods of seasonal stress. According to Ciekawy (1988:178) land tenure reform and commoditization has discouraged the separate ownership of land and trees.

millet, both indigenous and drought-resistant cereals, are hardly grown anymore as people prefer maize. Compared to sorghum and millet, maize has a higher production potential and is less vulnerable to diseases and pests, especially bird attacks. On the other hand, it is more vulnerable to drought and flooding and requires well-drained and fertile soils. Cassava is a much less demanding crop in terms of water needs, soil fertility and labour. It can remain in the field throughout the season, so that for most farmers it can serve as a reserve crop to be used in times of food shortages. However, the cassava in Coast Province is infected with the mosaic virus, causing considerable yield reductions. Pulses like beans, cowpeas, pigeon peas, green grams and groundnuts are commonly grown but only in small quantities. Vegetables are grown incidentally, and also in small quantities.

4.2 Farm Size, Land Use and Farm Labour

On average, farmers have 8.2 acres (3.3 ha) at their disposal (Table 10). There are large variations concerning farm size, not only between but also within the research areas (Appendix 14). For instance, the smallest farm consisted of 0.4 acres, the largest of 91 acres. In general, farms in the L5 zone are larger than in the two other zones; in the L5 area in Kilifi the average farm size is 21 acres. The exception to the trend is Bongwe where the average farm size is relatively large. In fact, the smallest farms are in Chilulu, near Kaloleni, the study area with the highest population density, where a situation of land shortage can be said to exist.

Table 10
Farm Size & Farm Labour

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
Acreage, total (average)	8.2	6.8	2.8	4.0	5.0	9.4	21.0
Farm labour (adult equivalent) [1]	3.0	1.9	3.5	2.0	2.9	3.0	4.7
Acres / farm labour equivalent [2]	2.7	3.6	0.8	2.1	1.7	3.2	4.5

See Appendix 14
1. See notes on calculations and miscellaneous information, p.143 (note 3)
2. Area ratio; see notes on calculations, p.144 (note 4)

The figures above concern households, but household size differs considerably in the different research areas. Consequently, the available household labour also differs. After correction for age, off-farm employment and residency, it was calculated that households have an average of 3.0 adult equivalents potentially available for farm labour (Table 10). In accordance with what we know about household size, on average, the households in Bamba and Chilulu have the most farm labour available, the households in Kitsoeni and Kibandaongo are in-between, in Mwatate and Bongwe the figure is lowest, only 2 adult equivalents (mainly consisting of women). When the ratio of available farm land and potential farm labour is calculated, there is an average of 2.6 acres per farm worker. The areas with the largest tracts of land per labour unit, i.e. the most extensive type of agriculture, are found in the L5 areas. The rate is less in the L4 areas, and again less in the L3 zone, reflecting increasing population and agricultural intensification. There is, however, one exception, Bongwe, where the acres/labour ratio much higher than in the other L3/L4 areas, suggesting that land is underexploited in Bongwe.

Most households have more than one plot; on average, 2.7 pieces of agricultural land (Appendix 15). Farms are most fragmented in Chilulu, with the result that the average distance to the plots is also the largest there (about 50 minutes walking, versus, for instance, only 12 minutes in Kibandaongo). One of the possible coping mechanisms against the adverse effects of seasonality is the cultivation of plots in different agro-ecological zones (Foeken & Hoorweg,1988:23). Evidently this hardly occurs as a mechanism at household level, although the possibility remains that it is used as an inter-household strategy, i.e. by polygamous and extended households that may split up at certain times of the year and temporarily move elsewhere.[1]

Not all land is used for food crops. Where trees are planted, shade inhibits the growing of annual crops, while in the drier areas land lies fallow. One third of the farm land, in one way or another, is used for the cultivation of food crops (Table 11). There are important

[1] See notes on calculations and miscellaneous information, p.144 (note 5).

differences between the districts. In the areas situated in Kwale, the acreage reserved for food crops amounts to about 35% of the available land, leaving the remainder for other purposes. In Kilifi, however, in the L3 and L4 zone, more than 70% of the land was reserved for food crops, a fairly high figure. In Chilulu this must be related to the small farms. Farmers here sometimes even plant food crops amidst their trees. The Kitsoeni households have access to deeper fertile soils which are particularly suitable for maize cultivation. In Bamba, the remaining L5 area in Kilifi, farms are generally large, but only a fifth of the land is in use for food crop cultivation.

Table 11
Food Crop Cultivation

	Total	*Bongwe*	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
Food crop acreage / h.hold	2.8	2.4	2.0	1.4	3.8	2.9	4.4
Farm acres under food crops (%) [1]	34	35	69	35	77	30	21
Acres food crops/farm labour eq.[1]	0.9	1.3	0.6	0.7	1.3	1.0	0.9

1. Area ratio
See Appendix 14

The ratio of land in use for food crop production averages at 0.9 acres per farm labour equivalent. Again, there are considerable differences between the respective areas. In Bongwe the ratio is high and more acres are cultivated per labour unit because mostly cassava is grown here, a labour-extensive crop. In Chilulu the rate is low due to various factors: the existing land shortage, the dispersion of plots often at long distances from the homestead (Appendix 15), and the cultivation of some fields during the long and short rainy seasons. The latter also plays a role in Mwatate and Kibandaongo, where 1.0 acre of food crops is cultivated per farm labour equivalent. In Kitsoeni the local conditions do not permit cultivation of cereals in both seasons (Table 12) but here large tracks of open land are available for maize cultivation. In Bamba, despite the low potential for food crop cultivation and low returns, the acreage per worker is not less than in the other areas.

4.3 Food Production

The long rains of 1985 and the short rains of 1985/86 were generally not favourable. The total rainfall almost equalled the 'normal' amount, but the distribution over the year was irregular, although this in itself is not an uncommon occurrence. At the beginning of the long rains the maize crop germinated satisfactorily but was partly destructed by heavy rainfall in May, while outbreaks of pests (root beetles, rodents) caused damage in parts of Kilifi District. The short rains came late, resulting in late planting. The rains were untimely, in some parts it lasted for only two weeks followed by prolonged dry periods so that there was no crop to be harvested.[1]

Table 12
Cereal Harvest from Long Rains and Short Rains (1985/86)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
% Households harvesting after:							
- long rains 1985	72	62	78	89	92	94	15
- short rains 1985/86	29	-	36	49	2	36	52
Contribution to annual household production (%)							
- long rains harvest	87	100	89	84	100	95	19
- short rains harvest	13	-	11	16	-	5	81

Information on the cereal harvest from the long and short rainy seasons 1985/86 are presented in Table 12. Although 28% of the farmers had some cereal harvest from the second growing season, only 13% of the total harvest of that year was realized during the second period. This indicates relatively poor harvests, except in Bamba. In the latter area, the bulk of the maize harvest was, in fact, realized during the second growing season, something which seems not to be exceptional according to local information. Moreover, the long rains of 1985 had been poor in Bamba, making the harvest of the short rains relatively more important. The table also confirms that farmers in Bongwe and Kitsoeni tend not to cultivate cereals in the short rainy season.

[1] See notes on calculations and miscellaneous information, p.144 (note 6).

Table 13
Annual Food Crop Production (1985/86)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
% h.holds growing cereals	80	62	80	90	92	94	62
cereal production (kg/h.hold)	352	37	225	279	784	554	234
cereal production (kg/cu)	61	09	34	62	146	111	26
% h.holds growing cassava	74	92	88	85	80	73	24
cassava plants (number/h.hold)	363	675	410	276	436	320	56
cassava plants (number/cu)	63	160	62	62	81	64	6

See Appendix 16,17,18

Further data on annual food production are summarized in Table 13 and listed in detail in Appendix 16-18, with figures on food crop acreage per consumer unit, percentage of households cultivating certain crops and average production of individual crops. Maize is the main staple crop, followed by cassava and, to a lesser extent, beans, rice and bananas. Sorghum and millet are hardly grown; not even in the livestock-millet zone where only five of the 100 farmers cultivate these drought-resistant crops. One-tenth of all households (i.e., 30 farmers) cultivate rice, mostly in Bongwe where farmers either grow maize or rice in seasonal swamps (Oosten,1989).

An average of 350 kg of cereals was harvested per household in 1985, of which 340 kg consisted of maize. This amounts to 60 kg per consumer unit. There are considerable production differences, ranging from 780 kg cereals per household in Kitsoeni, to a meagre 40 kg per household in Bongwe. When calculated per consumer unit, the areas with the highest agricultural potential - the two CL3 areas - show the lowest production of cereals, together with Bamba, the low potential area in Kilifi (Table 13). In Chilulu, this is due to the relatively small farmsize, since the production per acre in this area is relatively high (see Table 19, p.43). In all, one fifth of the farming population does not grow any cereals. In Bongwe and Bamba this even amounts to one third of the households. In both areas, off-farm activities form the major part of the total resource base as we shall see in Section 7.

The low cereals production in Bongwe is somewhat compensated by cassava cultivation. A large number of households cultivates cassava while the average number of cassava plants in this area is by far the highest, especially if household size is taken into account (Table 13). Locally, the Digo are regarded 'cassava growers' but it must be noted that in the other areas many households also cultivate cassava (with the exception of Bamba as the soils in this area are generally too heavy), while many households in Bongwe rely on the purchase of maize flour for their food requirements.

Beans are not as commonly grown as one might expect. This crop is cultivated in only one third of all households and only in very small quantities (Appendix 16-17). It is noteworthy that the leaves, which are consumed as vegetable, are locally considered more important than the pulses. Over half of the households have one or more banana trees, almost solely for home consumption. In Bongwe, a few farmers have a large number of banana trees for commercial purposes.

4.4 Food Self-Sufficiency

Food production from the household's own farm is an important factor in food availability. An estimate was made of the degree to which each household was able to fulfill its food requirements with staple foods (cereals, cassava, beans, bananas) from own cultivation.[1] On average, only 45% of the energy requirements per consumer unit was covered (Table 14), thus leaving a "deficit" of 55%. In other words, in 1985/86 more than half of the staple foods had to be obtained from other sources, i.e. food purchases in particular. Two areas - Kitsoeni and Kibandaongo - stand out positively, they are about 75% self-sufficient. We have already seen that cereal production was by far the highest in these areas.

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[1] See notes on calculations and miscellaneous information, p.144 (note 7)

Table 14
Food Self-Sufficiency of Households (1985/86)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
Average degree of food self-sufficiency (%)	46	36	32	43	77	72	14
Percentage h.holds with food self-sufficiency below 50%	69	76	80	62	56	36	96

See Appendix 19

Appendix 19 shows the distribution of households, as regards the degree to which they are able to meet their respective (staple) energy requirements. Remarkably, only 10% of the households are producing sufficient staple foods to feed the members throughout the year. No less than 70% of the households produce insufficient food crops to meet even half of the energy requirements. This is remarkable because all households in the survey availed of smallholdings, as a rule more than one acre. Regarding the differences between the research areas, the same observations can be made as above. Kitsoeni and Kibandaongo are the areas with the highest food production; still only one in three households produces more than 75% of staple food requirements. In Mwatate and Bongwe more than half of the households are unable to produce half of their requirements. In Chilulu and Bamba conditions are even worse: half or more of the households are unable to produce even a quarter of their requirements. The low degree of food self-sufficiency makes households to a large extent dependent for their living on cash crops - which also face severe ecological constraints - livestock and off-farm employment.

Table 15
Composition of Total Staple Energy Produced by Households (1985/86)
(%)

	Total	*Bongwe*	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
cereals	63	10	41	59	80	77	85
cassava	24	69	29	24	15	13	5
other	13	21	30	17	5	10	9
	100	100	100	100	100	100	100

See Appendix 19

In food energy terms, cereals contribute 63% to household food production, cassava 24%, and bananas a further 11% (Table 15). Beans contribute only marginally. Cereals account for more than half the food energy in four research areas; only in Bongwe does the principal contribution come from another crop, cassava.[1]

[1] For details on the calculations regarding cassava, see notes on calculations and miscellaneous information, p.145 (note 8). Data on the actual contribution of cassave to daily food consumption will be presented in the next report.

5. Agriculture: Cash Crops and Livestock

5.1 Cash Crops

The main form of cash crop cultivation in the coastal areas consists of tree crops which play an important role in the rural economy of the region. In suitable areas, coconut palms may truly dominate, providing the tropical landscape so characteristic of the Kenyan Coast. Not without reason, the coconut palm is called the "tree of life". The nuts can be used for home consumption or sold for copra production. The husks of the nuts may be used as fuel if firewood is scarce. The leaves are used as roofing material. And last but not least, the trees (i.e. the still unopened spathes) can be tapped for the production of palm wine (toddy). One tree can produce one or two bottles (of 0.5 to 1 litre) a day (Floor,1981:21). Until the selling of palm wine became illegal, this was an important means to tide farmers in the coconut belt over periods of food shortages (Herlehy,1983). In short, a coconut palm always yields something. Nevertheless, Waaijenberg (1987:226) estimated the total annual income per palm at no more than sh30 during the first half of the 1980s (tapping excluded), leading him to the conclusion that "one needs more than the average number of palms to cover [...] household needs".

The relevant data are summarized in Table 16, and presented in detail in Appendix 16 and 20, with figures on the percentage of households with trees and the average number of trees. Of all households, 60% have coconut palms. There is an average of 33 producing trees per household. Another 54% of the households own cashewnut trees, but, in comparison with coconut palms, the average number of producing trees is much lower: 16 per household.

Table 16
Cash Crop Cultivation
(average number of producing trees per household)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
coconuts	33	37	84	4	39	20	10
cashewnuts	16	27	15	8	34	5	9
citrus/mango	5	4	20	2	4	1	-

See Appendix 20,21

Beside coconut palms and cashewnut trees, there is a range of other (potential) cash crops: citrus, mango (improved and local varieties), sweet soursop, guava, pawpaw, passion fruit, pineapple, sugar cane, pepper, bixa, tobacco, etc. (Appendix 20-21). In general, these crops are of minor or no commercial importance, i.e. in terms of the number of households cultivating these crops as well as the average number of plants per household. Nevertheless, in a few households, substantial numbers were recorded.

The value of trees as a cash crop depends to a large extent on the possibilities of marketing, i.e. either when a market place is nearby (Bongwe) or when connections with a market are favourable (Chilulu, Mwatate). Elsewhere, traders or buyers of raw materials occasionally pass through, perhaps on a more or less regular basis. Places like Kibandaongo are located unfavourably. Perhaps, that is one of the reasons that local varieties of mango, pawpaw, guava and custard apple are often not even harvested (Oosten,1989: 54).

5.2 Livestock

Information about the cattle population in the districts is limited [1], but most of the local breed - the small East African Zebu type - are found in the hinterland under traditional rangeland husbandry. The improved breeds are mainly found in the coastal strip on medium and large-scale farms.[2] In the L3 and L4 zones there are few cattle; the occasional herd usually numbers less than 25 head, while further inland herd size increases with an average of 60 head or more (Bartman,1984).

The ethnic groups living in the hinterland of Coast Province - the Giriama in Kilifi District and the Duruma in Kwale District - are the main cattle holders (Spear,1978). Cattle is traditionally kept for different purposes but the impression is that the role of cattle in these societies is diminishing. The dowry is still expressed in number of cattle although it is more and more often paid in cash. Historically, cattle also was an important reserve for periods of food shortage (Herlehy,1983).

The main characteristics of traditional cattle farming are communal grazing, looking after cattle of others, pooling and dividing cattle over several herds. Bartman (1984) estimated that in Kilifi, over three quarters of the herds are composed of cattle from different owners (2 to 9 owners per herd), while nearly one third of the herd keepers have lent out cattle to other caretakers.

Milk has always been an important product. It is collected by the households who are looking after the animals and usually forms the payment for their services. Calving and milk production are seasonally related. Most of the calves are born in the long rainy season at the time when also the natural conditions for milk production are favourable. During the dry season water can be found only at long distances and the quality and quantity of roughage is restricted, both factors limiting the milk production of cows in lactation. These seasonality effects are more pronounced in the local herd than in the improved breeds,

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[1] The total cattle population in Kilifi District was recently estimated at about 213,000 head, of which 13,000 of improved breeds (MALD, 1986).

[2] One of the main constraints for improved cattle breeds are the presence of tick-borne diseases and trypanosomiasis transmitted by tse-tse flies.

because the first are more exposed to changes in natural conditions. In the hinterland, there is usually a surplus of milk production over local consumption during the long rains, because of the high milk production during this period and because of the low purchasing power of the population in that area. As a result, farmers revert to the making of ghee from the milk for sale at markets in coastal towns. The large dairy farms situated in the coastal strip process the milk before selling at distribution centres or delivering to individual shopkeepers. The other dairy farmers deliver directly to consumers or sell at the farm gate.

Goats and sheep are common and nearly all households have some poultry. Goats and sheep are usually tethered or herded with animals from other owners, especially in the drier, less densely populated areas. Poultry range freely around the compound. The animals are generally kept for their meat and also serve as a financial reserve to be sold when necessary. The animals are also slaughtered on ceremonial and religious occasions.

Figures on livestock in the six research areas are presented in Table 17 and Appendix 22: the percentage of households with certain types of stocks, the average number of animals per household, together with the pertaining distribution figures. On average, 18% of the sampled households have one or more head of cattle, 41% own goats/sheep, while almost all households have some poultry. In general, livestock is more prevalent as the areas become drier, at least as far as cows and goats/sheep are concerned. However, there are important variations within the zones. In Chilulu, for example, many households keep goats/sheep, nearly as many as in the drier zones, although generally in smaller numbers.

Because of the risks connected with annual cropping in zone L5 and the few trees grown there, one would expect an economy mainly based on livestock. This, however, is only partly the case. Half the households in the two areas keep goats/sheep, and even fewer households keep cattle. In fact, the percentage of households that do not keep any livestock amounts to 55%, while another 27% keep fewer than two livestock equivalents as shown by the figures on distribution of all cattle, sheep and goats, pooled together (Table 17).

Table 17
Livestock Ownership
(LE, livestock equivalents) [1]

		Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
average / household		4.7	0.8	0.7	2.8	0.9	7.2	15.6
% h.holds	without livestock	55	78	44	65	64	47	30
	with 0.1-1.9 LE	27	16	42	25	28	22	26
	with 2 or more LE	18	6	14	10	8	30	44
		100	100	100	100	100	100	100

1. For purposes of this table, 1 LE = 1 head of cattle = 7 goats/sheep (poultry not included).
See Appendix 22

5.3 Agricultural Resources

The three main farming activities - food crop cultivation, cash crop production and livestock rearing - have been discussed separately until now. To allow further comparison and aggregate analysis the annual value of each type of production was calculated per household and per consumer unit.[1] The results are presented in Table 18.

The total value of farming activities is highest in Kitsoeni and Kibandaongo, and lowest in Bamba. The contribution of food crops to the total value is in the range of 60-80%, with one exception: Bamba, where livestock contributes about 60%. Cash crops contribute substantially to farm income only in the two areas in the L3 zone. The two L4 areas derive most of their agrarian income from food crops, with relatively low contributions from other activities. Kibandaongo, one of the L5 areas, has a similar high income from food crops. Households in the two L5 areas also realize contributions from livestock, but with the difference that in Bamba this constitutes the major part of the agricultural production, while in Kibandaongo there is also considerable food production. It appears that in respect of food crop production the Kibandaongo area has more in common with the L4 locations, but

[1] See notes on calculations and miscellaneous information, p.145 (note 9).

that in respect of cash crops and livestock it resembles a L5 location. The primary agricultural income in this area, however, is from food crops (cereals in particular) and the degree of food self-sufficiency is relatively high compared with the other study areas, as noted earlier (Table 14). [1]

Table 18
Agricultural Production (1985/86)
(sh)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
Total agric.prod. per h.hold	3465	2125	3449	2295	4635	4385	3875
- food crops	2207	1294	2144	1762	3815	2980	1244
- cash crops	466	666	1175	47	644	115	126
- livestock	792	164	130	486	176	1289	2505
Total agric.prod. per cu	730	643	561	569	983	1139	488
- food crops	486	388	352	462	788	768	160
- cash crops	100	218	188	16	136	26	14
- livestock	144	37	21	91	59	344	314

See Appendix 23

In Table 19, the value of agricultural production per household and per consumer unit are summarized, together with the estimated returns per acre and per labour unit. The resulting figures reveal somewhat different patterns from the overall household figures. The households in Bamba have the lowest agricultural income; in terms of sustenance of household members, averaging only sh500/cu. The returns per acre and per farm-worker are also low here, generally confirming the low agricultural potential of the area. At the other end, there are Kitsoeni and Kibandaongo, with sh1,000/cu or more from agriculture. In these areas the productivity per worker is also high but the productivity per acre differs, it is low in Kibandaongo, situated in L5, but much higher in Kitsoeni, situated in L4. Nevertheless, dependence on off-farm income is likely to be less in these areas, something which will be confirmed in the next section.

[1] The reason for this is that Kibandaongo and Bamba are situated in different sub-zones of L5. Kibandaongo lies not far from Kinango, in the transition area with L4, with an average annual rainfall of about 850 mm, while in Bamba annual rainfall is less than 700 mm. Also, the first growing period in Kibandaongo is longer than in Bamba (Foeken & Hoorweg,1988:49).

Table 19
Value of Agricultural Production
(sh)

	Total	*Bongwe*	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
Per household	3465	2125	3449	2295	4635	4385	3875
Per consumer unit	730	643	561	569	983	1139	488
Return / acre [1,2]	326	287	1171	447	895	328	65
Return/farm labour equivalent[2]	1153	1121	978	1167	1583	1466	829

1. Excludes livestock production
2. Area ratio
Source: Table 10,18; Appendix 23

The remaining areas - Bongwe, Chilulu and Mwatate - present a mixed picture. The figures for production per consumer unit fall in the same range, as do the figures for production per farm worker. However, the returns per acre differ considerably, being low in Bongwe and Mwatate, and being very high in Chilulu. In Chilulu, returns per acre are high, but returns per worker have dropped below those of the other areas (except Bamba), as a result of the serious land scarcity in the area. In Bongwe and Mwatate the reverse situation exists, with somewhat higher returns per labour but low returns per acre, indicating extensive agriculture in zones that allow for more intensive cultivation, particularly in Bongwe.

The six locations included in the survey were selected from the three main agro-ecological zones in the districts and it is evident that we face a complex situation with:

- agro-ecological variations between zones, in line with the classification and descriptions offered by Jaetzold & Schmidt (1983);
- agro-ecological variations within zones, which are many and substantial; in fact, this has led to the introduction of a further sub-zonation by the same authors.

Moreover, as with any categorization of physical reality, there are borderline areas, areas that have characteristics of more than one zone. This is the case for Kibandaongo which shows characteristics of L4 and L5: having substantial food production but also considerable livestock income. At closer examination, this area probably belongs more to the former zone than to the latter, in which it is classified.

All in all, agriculture in the two L3 locations, Bongwe and Chilulu, is characterized by a low to medium level of food crop production, a relatively high cash crop production (all in comparison to the rest of the coast) and little livestock. The two L4 locations - Mwatate and Kitsoeni - are characterized by a medium to high level of food crop production, low to medium production of cash crops and a low level of livestock production. Kibandaongo has a substantial income from livestock but also a substantial food production, much more than Bamba, a location in the heart of L5. The latter area is characterized by low food crop and low cash crop production with livestock as the main agricultural activity.

The agronomic situation in the various areas is further complicated by the fact that agro-ecological potential is one thing, but that the use of the land, the crops people actually choose to cultivate, is often quite another. An example is the prevailing cultivation of maize, a crop that is generally considered less suitable for the area by agricultural experts. Last, but not least, how and to what extent people wish to exploit their environment is highly dependent on alternative means of existence that are available, notably the opportunities for off-farm employment. This results in varying combinations of farm activities and wage labour in different areas and in individual households. The extent and nature of off-farm employment are discussed in the next section.

6. Off-Farm Employment

For the population in Kwale and Kilifi, off-farm employment forms an essential element in making a living. Opportunities for off-farm work are largely found in Mombasa, the principal town in the region. According to estimates for the formal sector by CBS (1986:229), more than three quarters of all wage employment in the districts Kwale, Kilifi and Mombasa Town is concentrated in the provincial capital. A further 14% of employment opportunities is found in Kilifi District, in Kwale another 9%. As a consequence, migration to Mombasa is often necessary to find work, and this is particularly so for the people in the hinterland, as we shall see.

Data on off-farm employment and its characteristics in the six research areas are presented in appendices 24-28, with figures on the frequency of employment, the employment characteristics and the annual incomes from off-farm employment. The data concern the formal as well as the informal sector, including figures on self-employment and casual labour, with the exception of farm labour with neighbours, which tends to be highly irregular.

Table 20
Frequency Off-Farm Employment (o.f.e)

	Total	*Bongwe*	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
number of people in o.f.e	326	66	50	40	40	31	99
number o.f.workers / h.hold	1.1	1.3	1.0	0.8	0.8	0.6	2.0
% of adult population engaged in o.f.e.	25	43	20	26	19	17	27
% of adult males engaged in o.f.e.	42	60	33	47	37	35	47

See Appendix 24

Overall, 25% of the adult population is in some way engaged in off-farm employment. The average number of people engaged in off-farm employment is 1.1 per household, which after correction for periods of unemployment amounts to 0.9 adult worker per household (Table 20).[1] Off-farm employment is particularly common in Bongwe and Bamba. These areas have a low agricultural production as mentioned in Section 5. Off-farm employment is largely a male activity: 42% of the adult men are employed, of the women only 7%. Indeed, in Bongwe, 60% of the men have some kind of employment; elsewhere this is less, but still reaches about 40%. Most of the women who are employed come from Bongwe: they make and sell craft products like mats and makutis, and prepare small food dishes for sale. Digo women generally tend to be less involved in agriculture than women from other groups and the local market offers more opportunities than elsewhere. In the other areas, opportunities for women to earn income are mainly restricted to farm labour (Oosten,1989:61; 78).

The employment opportunities in the rural locations are limited, and many workers have to travel to Mombasa or elsewhere to find employment (Table 21). This is the case for more than three quarters of the workers, except in Bongwe. In the latter area, the large majority of workers manage to acquire work in the administrative location in which the

[1] Other sources confirm this high figure. The Agricultural Production Survey of 1986/87 reported that in Kwale and Kilifi only 60-65% of farm-holders were resident on their holdings; the lowest figures for all districts in Kenya and comparing with a national average of nearly 90% resident farm-holders (CBS,1989:30)

esearch area is situated; this is largely because of the many tourist hotels in nearby Diani Beach and the spin-off employment this generates.

Table 21
Off-Farm Workers: Place of Work and Residency

	Total N=(323)	*Bongwe* L3 (65)	*Chilulu* L3 (50)	*Mwatate* L4 (38)	*Kitsoeni* L4 (40)	*Kib'ngo* L5 (31)	*Bamba* L5 (97)
workplace: in location (%)	37	82	16	28	15	26	33
resid: full-time in h.hold (%)	39	83	22	53	15	19	29

See Appendix 25

Consequently, most of the workers in the latter area live full-time at home. Workers in the other research areas usually live near the place of work, part-time or full-time. The percentage of workers with employment within the location corresponds closely with the number who are full-time resident, with one exception. In Mwatate, half the workers manage to live full-time at home but only a quarter is employed in the location. This means that the other quarter commutes daily to and from their work (mainly in Mombasa), which is possible because of the tarmac road connection and available transport facilities. The other areas (with the exception of Bongwe) have longer and often difficult connections with Mombasa, so that workers have to migrate to find employment. About half the workers are non-resident which means that they usually stay elsewhere, incur costs of living and can presumably send only a small portion of their salary home. This is different in the case of the part-time residents who come home regularly, still have their home base here, and consequently contribute relatively more.

Table 22
Type Off-Farm Employment
(%)

	Total N=(323)	*Bongwe* L3 (65)	*Chilulu* L3 (50)	*Mwatate* L4 (38)	*Kitsoeni* L4 (40)	*Kib'ngo* L5 (31)	*Bamba* L5 (97)
regularly employed	52	27	76	50	68	35	55
self-employed	31	47	18	18	15	29	38
temporarily employed & casual labour (non-rural)	18	26	6	33	18	35	7
	100	100	100	100	100	100	100

See Appendix 25

About half of the off-farm workers are regularly employed (Table 22). These are people with a regular salary, which gives them a more secure basis of existence. The high percentages of regularly employed people in the two Kilifi areas - Chilulu and Kitsoeni - are noteworthy. Although relatively few people in these areas are engaged in off-farm employment, the ones that are, have apparently found regular jobs. The reverse is the case in Bongwe where relatively many people are employed, but most are self-employed or do casual labour.

About 30% of the workers are self-employed. These are shopkeepers, artisans, small traders, etc. Although this type of employment offers a more or less regular income, most of these people have only modest businesses. For instance, only 15% of the self-employed persons employ other people in turn. The highest percentages of self-employed are found in Bongwe, Bamba and Kibandaongo.

Temporary employment and casual labour form comparable employment categories. Temporary employment concerns people who may have work for a few months, but not permanently. Casual labourers are employed on a daily basis, technically they are hired anew each day and paid at the end of the same day. These kinds of employment have a lower remuneration than regular and self employment and offer less security and less of a resource to assure food purchases when food stocks are finished (Appendix 27).[1]

The opportunities for regular employment are better with a higher level of eduation. For instance, three quarters of the regularly employed had received some formal education, while this was the case for only half the group of self-employed/casual labourers. There is also a relation with place of work (Appendix 26). Regular employment is usually found outside the location, in 80% of the cases. The self-employed on the other hand usually have their place of work in the location. Casual labour and temporary employment also tend to be found more often outside the location.

Table 23 presents the salaries earned by workers from the respective areas, which averages at about sh11,000. Appendix 27 gives a further specification of the salary levels

[1] See notes on calculations and miscellaneous information, p.145 (note 10)

of the respective employment categories. The estimated annual salary earned by casual labourers and temporarily employed is about sh5,000, that of self-employed people was estimated at sh9,500, and that of regular employed workers at sh14,000.

Table 23
Wages/Salaries from Off-Farm Employment
(sh)

	Total N=(324)	*Bongwe* L3 (64)	*Chilulu* L3 (50)	*Mwatate* L4 (40)	*Kitsoeni* L4 (40)	*Kib'ngo* L5 (31)	*Bamba* L5 (99)
annual salary / worker	10,808	7,202	10,002	12,000	11,953	8,787	13,234
h.hold contribution / worker [1]	5,974	6,152	4,175	8,064	4,321	4,319	7,116

1. Corrected for residency
See Appendix 27,28

However, since many of the workers have to move and stay more or less permanently near their place of work, there are costs involved and only a part of the salary remains to be taken home. The table further specifies the estimated contribution of off-farm workers to the household income, taking into account residency.[1] The returns for wage labour, thus calculated, average about sh6,000/worker.[2] There is also a strong difference between areas in this respect. The returns per worker are low in Chilulu, Kitsoeni and Kibandaongo. In the two latter areas this fits in with the higher returns for farm labour in these areas, but this is not the case in Chilulu (Table 19).[3] The workers from the three remaining areas - Bongwe, Mwatate and Bamba - succeed in realizing much higher wage returns, which has to do with a combination of higher job groups and full-time residency.

Table 24 gives further information on the income from off-farm employment in the household, corrected for residency, as explained earlier on. In all, 60% of the households

[1] In the case of full-time residents the total wage salary was included in the household income; in the case of part-time residents 75% of the salaries was included; and for non-residents 25% of the salary.

[2] This is higher than the returns for agriculture by as much as a factor 4 (Table 19). Such a comparison, however, is deceptive for the reasons explained in the notes on calculations (note 3, p.143), nevertheless differences remain.

[3] In Chilulu it is as if people continue to concentrate on agriculture, despite low incomes because of small plots, instead of switching their efforts to wage employment. The relatively high returns per acre may be a cause of this, but also the fact that the agricultural potential of the area is higher than actually realized. The sales of palm wine was formerly an important source of income but is illegal since 1980. It must be admitted that we do not know to what extent (illegal) toddy sales still offer a source of income.

have income from off-farm employment. Almost half the off-farm income in these households is contributed by part-time and non-resident members of the household (Appendix 28). The highest income figures are for Bamba and Bongwe, the two areas that are furthest apart geographically but also in terms of agro-ecology. Kitsoeni and Kibandaongo, on the other hand, are areas where only half of the households have income from off-farm employment. For the total sample, the average income from off-farm employment is sh6,500 per household which equals sh1,157 per consumer unit. The differences between the areas are substantial. The highest incomes are found in the areas with a high percentage of people engaged in off-farm employment: Bongwe, Mwatate and Bamba. This is not only because the averages include fewer zero-incomes, but also because the percentage of workers living full-time at home is higher (Table 21) and there are no costs attached to workers living elsewhere. Those employed can make larger contributions to household income. The areas with the lowest income figures are Kitsoeni, Kibandaongo and Chilulu. As already mentioned, these areas have low employment rates while most of the workers from these areas have to live elsewhere, with the associated costs, and consequently contribute smaller portions of their salaries to household income.

Table 24
Household Income from Off-Farm Employment

	Total	*Bongwe*	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
households with income from off-farm employment (%)	61	74	60	54	50	45	84
annual income / hhold (sh)	6560	8120	4175	6717	3457	2734	14089
annual income / cu (sh)	1180	1911	792	1554	642	641	1544

See Appendix 28

The relations between place of work, type of work, salary level and household income are as follows. In most areas there is little employment to be found, daily commuting is usually not possible, and people have to move to live near the place of work. Because of the living costs involved, this is only an interesting option if the salary is sufficiently high, so that a sizeable balance remains to take home. Otherwise people will prefer to occupy

themselves at home, particularly if there are possibilities at the farm to do so. In combination with the figures for agricultural returns per acre (Table 19; p.43) it is clear that in Bamba the low agricultural returns more or less force people into wage employment. In Bongwe and Mwatate, however, returns per acre are higher and here it seems that the existing employment opportunities pull people away from agriculture. Oosten (1989) has also pointed at the relative neglect of agriculture in Bongwe.

In sum, the different research areas can be characterized as follows. Bongwe is the location with the highest incidence of off-farm employment per consumer unit, but this is because of the many self-employed people. The next areas with high employment figures are Bamba, followed by Mwatate with about 50% regularly employed workers. These three areas are also the areas with the highest incomes from employment; per households, per consumer unit as well as per worker and they are also areas with relatively low figures for agricultural production as we have seen. The three remaining areas - Chilulu, Kitsoeni and Kibandaongo - have fewer off-farm workers and only half the income from off-farm employment but, at least in the two latter areas, agricultural production is much higher.

7. Resource Base

7.1 Area-wise

The resource base of the rural households in the two districts consists of the three elements detailed in the previous sections: food crop production which is used for own consumption; tree crops and livestock products; and off-farm employment. Table 25 presents the contributions of these means of existence, estimated in terms of annual income, to the livelihood of the households in the different research areas (Appendix 30 presents the aggregated figures by district and by agro-ecological zone).

Table 25
Household Income by Area
(sh/consumer unit/year)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
value of food crops	486	388	352	462	788	768	160
cash crops and livestock +	244	255	209	107	195	371	328
farm income	730	643	561	569	983	1139	488
wage income +	1180	1911	791	1553	642	641	1544
income, total	1910	2554	1352	2123	1626	1780	2032

See Appendix 29

The average income level is slightly below sh1,900 per consumer unit (or sh10,000 per household[1]) which is close to an earlier estimate by CBS (1988).[2] The largest part (i.e. 60%) of the income comes from wage income, despite the fact that it was corrected for residency, and counted only partly in the case of partial and non-residents. Cash crops and livestock contribute only 13% to the annual income and the remaining 25% consists of the value of food crop production. There are great variations in income between households (Appendix 29). The lowest quartile has incomes below sh500/cu, while the upper quartile earns more than five times as much, namely sh2,500 and more.

Areas differ in economic activities and, consequently, the size of the resource base and its composition similarly vary. In the L3 areas (coconut-cassava zone) the two components of farm production (food crops and cash crops) are quite similar. The differences between the two areas are caused by wage incomes. In Bongwe this is about 2.5 times higher than in Chilulu, making the average household in Bongwe the 'wealthiest' and in Chilulu the 'poorest' of the six study areas. In the L4 zone (cashewnut-cassava) farm income is mainly derived from food crops, but in Kitsoeni it is more than 1.5 times that in Mwatate. The value of cash crops and livestock is low, although twice as high as in Kitsoeni. Regarding wage income the situation is reverse. In Mwatate wage income is more than two times that in Kitsoeni, resulting in a higher total income. In the L5 areas - Kibandaongo and Bamba - the aggregaded value of cash crops and livestock is comparable and higher than in the other areas, mainly due to livestock production. However, it still forms no more than 20% of household income. The two areas differ considerably, however, regarding food crop production and wage income. In Bamba there is almost no agricultural production, but there are high wage incomes, ranking only behind wage income in Bongwe. In Kibandaongo the opposite is the case: wage income is low but the value of food crops is relatively high and, as mentioned before, in this respect the area is more like an L4 zone.

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[1] Exchange rate for the Kenya shilling in 1985 was 1US$=16sh

[2] See notes on calculations and miscellaneous information, p.146 (note 11)

Table 26 gives the percentage of households with incomes below sh1,000, the income level that can be considered as the food poverty line below which families do not have sufficient income to assure the very minimal energy requirements of the household members.[1] The results indicate that 40% of the households are living in dire poverty; this figure is very similar to an earlier estimate by Greer & Thorbecke (1986) that 41% of the households fall below the food poverty line.

Table 26
Households below Food Poverty Line and below Minimum Existence Level (%)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
below food poverty line (< sh1000/cu)	41	24	58	39	44	47	36
below min. existence level (< sh1450/cu)	53	34	70	54	56	61	44

See Appendix 29

However, even when households have such low income levels they will not be able to spend all income on food; other household expenses are also necessary. Available data indicate that poor rural households spend 32% of their income on non-food expenses (CBS,1988:29). If allowance is made for this, an income level of sh1,450/cu would be needed to assure at least 75% of staple energy requirements. In that case, the 12% households with an income between sh1,000-1,450/cu can also be regarded as falling below this minimum existence level; these households can also be expected to have regular difficulties in coping with daily food provision. Thus, 40-50% of the households in the six areas can be considered as living in poverty, depending on the cut-off level chosen.

Areas with - on average - lower resource levels also have a greater number of poor households. This is particularly the case in Chilulu, where almost 60% of the sampled households remain below the food poverty line of sh1,000/cu, followed by Kibandaongo

[1] See notes on calculations and miscellaneous information, p.146 (note 12)

and Kitsoeni, with about 45% of the households. In Bamba, Mwatate and Bongwe the situation is better because of the wage incomes realized by the population, although a quarter to a third of the households still fall below the food poverty level.

7.2 Income Composition

Figure 1 shows the income composition for successive income levels and confirms the importance of wage income in deciding household means of existence. Already at fairly low income levels, at least half of the income is drawn from off-farm activities. The higher the income group the greater the contribution from wage income, i.e. higher incomes are realized through wage employment.

The low income groups consist of households that have to depend mostly on farm activities, food crop cultivation in particular, and that appear to be unable to meet household needs in this way. The middle income groups are better able to meet household needs, but farm incomes, on average, remain below sh1000/cu It is evidently very difficult, if not impossible, to rely fully on farming to meet household needs under the prevailing conditions in the districts.

Figure 1 further reveals that there is no relation between farm income and wage income, neither positive, nor inverse. There are no compensatory mechanisms in the sense that households with a low farm income have a high wage income. Agricultural income is low throughout.

The reverse scenario, in which households with wage incomes invest in commercial farming in order to realize higher farm sales is also not the case. The value of cash crops and livestock does not increase consistently with income, with the exception of the highest income category. Nor does food crop production show a consistent increase with income. In fact, groups with similar income levels show quite different farm incomes, which indicates the presence of households with quite different household economies at similar income levels.[1]

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[1] See notes on calculations and miscellaneous information, p.147 (note 13)

Figure 1 Income Composition by Income Class

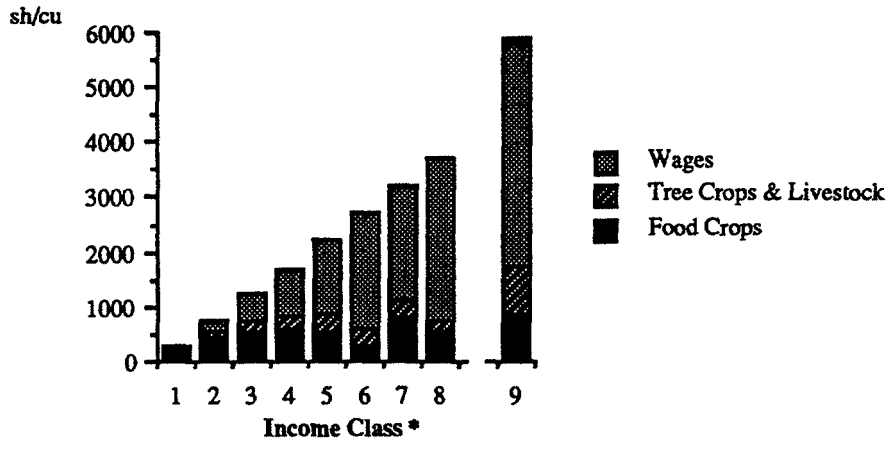


Figure 2 Housing & Education By Income Class

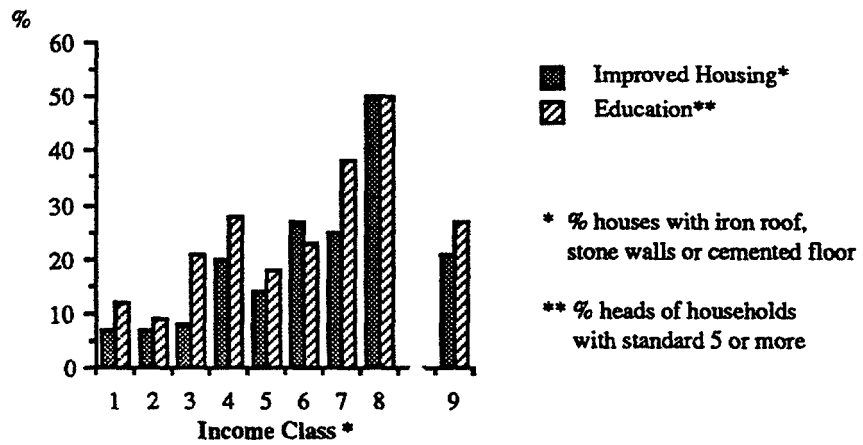
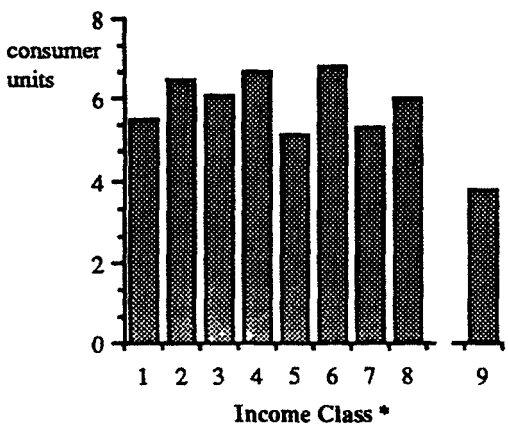


Figure 3 Household Size by Income Class



* Income Class:
1= -sh499/cu
2= sh500-999/cu
3= sh1000-1499/cu
4= sh1500-1999/cu
5= sh2000-2499/cu
6= sh2500-2999/cu
7= sh3000-3499/cu
8= sh3500-3999/cu
9= sh4000/cu and more
(See Appendix 31)

Appendix 31 lists household characteristics at different income levels. It is evident that the heads of households with higher incomes generally have a higher level of education and that these households generally have better living conditions, with more improved houses (Figure 2). These indicators differ not only for income extremes, but also show an increase among the middle income levels. Households in higher income groups also tend to be smaller in size; in this respect there is a more abrupt change in the case of the top income group (Figure 3) but this is partly the result of the calculation methods used.[1]

Household organization (nuclear/extended; child/adult ratio) shows little relation with income, with one exception. A third of the female-headed households fall in the very lowest income group (below sh500/cu), which is a higher proportion than among the male-headed households.

7.3 Household Economies

The economies of individual households can be characterized according to income level and income composition, whether primarily farm income, wage income or both. For purposes of the present studies, income composition becomes of lesser or no importance above and below certain income extremes, in this case defined as above sh4,000/cu and below sh1,000/cu respectively. The upper cut-off level was chosen arbitrarily, at slightly more than twice the average household income. The latter is the food poverty line below which households are unable to meet even the most basic food energy requirements - not even including other necessary household expenses.[2] There are good arguments to consider these groups, as distinct household economies. The rich households (N=33) have sufficient resources to meet many unforeseen circumstances, and they also include some atypical cases, as explained earlier on (p. 57). There are 125 households below the foodpoverty line: households living in chronic poverty that will have few or no reserves to cope with seasonal hardship - 40% of the sample, as noted earlier.

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[1] See notes on calculations and miscellaneous information, p.147 (note 14)
[2] See notes on calculations and miscellaneous information, p.146 (note 12).

Figure 4 Household Economy Classification

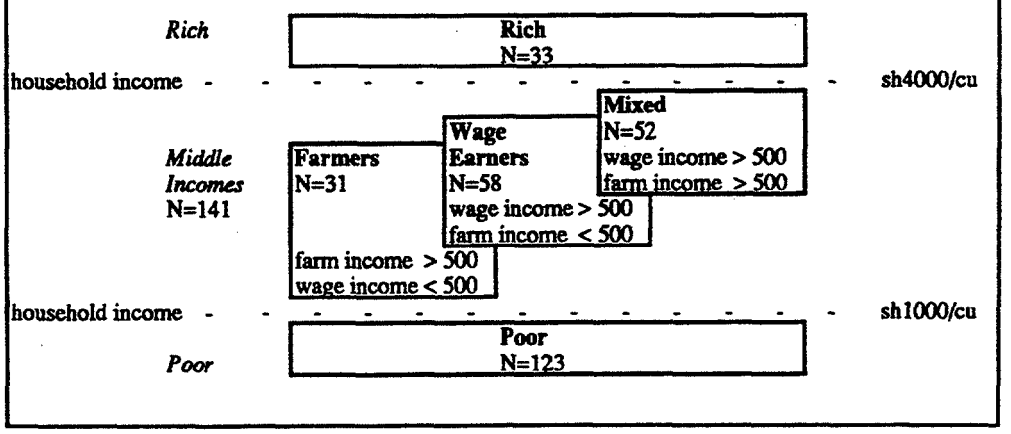
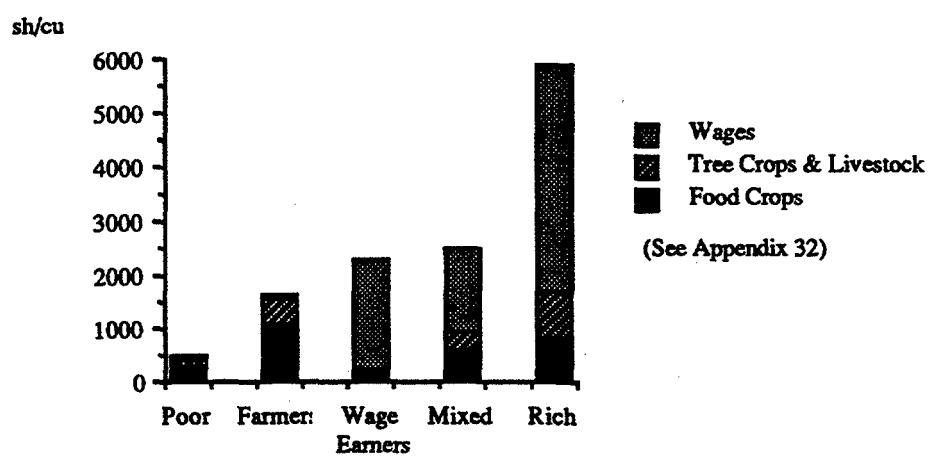


Figure 5 Income Composition by Household Economy



The remaining 141 households belong to the middle income bracket, sh1,000 - 4,000/cu, and are people who, though not living in dire poverty, still have to manage with scarce resources. It is among this group that the composition of the income becomes important: whether primarily consisting of farm income, primarily of wages or a mix of both. Certain households rely mostly on food production for home consumption but have little wage income. Other households have wage incomes but little food production for home consumption. Households with mixed economies have both kinds of resources and presumably have greater adaptability; elsewhere in Kenya such households have been shown to be able to maintain better nutritional conditions (Niemeijer & Hoorweg, 1989). The middle income households were subsequently divided into three sub-groups, depending on whether they managed to make sh500/cu from farming, from wages or both (Figure 4). Households that draw more than sh500/cu from farming, but less than that amount from wage income, are termed 'farmers' (N=31). Households that realize more than sh500/cu from wages but less than that from farming are termed 'wage earners' (N=59). Households that draw more than sh500/cu from farming and also more than sh500/cu from wage income have 'mixed economies' (N=52).

Appendix 32-33 list the income composition of the respective groups, together with selected household characteristics. The poor and rich are extreme groups, the first almost fully dependent on farming, especially on food crop production, the latter with mostly wage income. Among the three medium groups the 'farmers' realize the lowest incomes with about sh1,600/cu, the 'wage earners' follow with sh2300 and the mixed households are slightly higher again (Figure 5). The detailed figures with standard deviations in Appendix 32 confirm the distinct income composition of the respective groups.

Among the 'farmers', 67% of the income comes from the value of food production, another 30% from trees and livestock and, by definition, very little from wage income. Among the 'wage earners' the opposite is the case: 90% comes from wages, with the remaining 10% from food production. The 'mixed' group draws 70% from wage income, and an equal 14% from food production and agricultural sales respectively.

Table 27
Agriculture by Household Economy

	Poor Hholds	*Farmers* --	*Wage Earners*	*Mixed* --	*Rich Hholds*
acres / household	7.3	10.9	8.4	8.4	8.4
farm acreage under food crops (%) [1]	34	38	29	35	37
return / acre [1,2]	259	583	152	438	356
value food crops / acre [1,3]	673	1288	461	946	689
food self-sufficiency (%)	30	103	18	56	85

1. Group ratio; see notes on calculations and miscellaneous information (note 3)
2. Excluding livestock production
3. Calculated per acre used for food crop cultivation
See Appendix 32,34

The differences in agricultural production are related to differences in farm size between the groups, but also to differences in utilization of the land (Table 27). The 'farmers' have the largest holdings, with an average of more than ten acres. The 'poor' on the other hand, have only two thirds of this amount of land available, with the other groups in between. Households generally use less than half of the available land for food crop cultivation. The 'poor' and 'wage earners' use even less of their land to that purpose, about 30%. There are further important differences in agricultural production between the groups, notably in yields per acre. The 'rich' and 'mixed' groups realize about sh600/acre, while the 'wage earners' and 'poor' realize half these yields, indicating less intensive farming. The sub-figures for food crops show that the 'wage earners' are least concerned with food production while the group of farmers clearly place high emphasis on food production. The degree of food self-sufficiency differs accordingly, varying from 18% to 100%, being very low among the wage earners and poor groups.

There are three groups with sizeable wage incomes: 'wage earners', 'mixed' and 'rich households'. These households have an average of 1.5-2.0 persons employed (Table 28). On average, there is usually one person with regular employment. In addition, there are casual and self-employed persons in many households: the number of the latter is higher among the wage earners and rich households. In the households of the 'poor' and the 'farmers' there are few employed persons, by definition.

Table 28
Wage Employment by Household Economy

	Poor Hholds (N=123)	*Farmers* -- (N=31)	*Wage Earners* (N=58)	*Mixed* -- (N=52)	*Rich Hholds* (N=33)
av. no. persons employed	0.4	0.3	1.9	1.7	1.9
av. wage income contr. (sh/cu)	106	56	2035	1534	4176
income contribution (%)					
regularly employed	-	-	55	63	44
self-employed	-	-	37	24	42
temporarily & casual employed	-	-	8	13	13

See Appendix 35, 36

Appendix 35 and 36 present detailed data on the number of workers and their wage contribution to the household, with a breakdown by type of employment and residency. Among the 'wage earners' and the 'mixed', about 60% of the wage income comes from regularly employed workers. Among the rich households this is 44%, and a further 41% comes from self-employed persons, not because there are so many more in this group but because they are nearly all full-time residents. In all, about 60% of the wage income is contributed by full-time residents, 15% by part-time residents and 25% by absentees. An important aspect in the seasonality context is income that can be tapped in times of need, i.e. the remaining income from part-time and non-residents, and this potential reservoir seems largest in the 'mixed' and 'rich' households.

There is one income source that has been left out of the calculations until now, namely the income from local casual labour in agriculture.[1] Table 29 gives the reported income from this labour source, which is largely confined to the groups that have none or little wage income. The 'poor' and the 'farmers' report averages of sh100/cu and sh200/cu respectively, while among the other groups this kind of income is virtually nil.

Apparently, the 'poor' and the farmers' have some - albeit modest - means to improve their low income, although, because of its unreliable nature, local casual labour will serve

[1] See notes on calculations and miscellaneous information, p.145 (note 10).

Table 29
Extra Household Income from Local Casual Labour

	Poor Hholds (N=123)	*Farmers* -- (N=31)	*Wage Earners* (N=58)	*Mixed* -- (N=52)	*Rich Hholds* (N=33)
local casual labour (sh/cu)	111	204	20	20	61
total wage income (sh/cu) [1]	217	260	2,055	1,554	4,237

1. Wage income + local casual labour
See Appendix 32

more as a mechanism to solve acute seasonal stress than as a mechanism to prevent it.[1] Thus, the income of the 'poor' and the 'farmers' has been somewhat underestimated, although not to the extent that this has distorted the classification of household economies. The total wage income of the respective household economies remains very much in line with the earlier findings (Table 29), i.e. with a much lower level among the groups of 'poor' and 'farmers'.

7.4 Conclusion

The present survey concerns six areas in Kwale and Kilifi Districts. On average, households have 8 acres at their disposal, but in the L3 and L4 zones, closer to the coast, 40% of the households have less than 3 acres. About half the land is used for food crop cultivation. In most of the rural areas little employment is to be found and workers - adult men - move to live near the place of work. In areas with low agricultural returns people are more or less forced into wage employment; in other areas where agricultural returns are higher but employment opportunities exist nearby, it appears that many people are drawn away from agriculture.

Household income averages about sh10,000/household/year (sh2,000/consumer unit). Wage income contributes 60% to the total, the value of food crops accounts for 25%, cash

[1] For a discussion on the distinction between mechanisms to prevent and mechanisms to solve seasonal stress, see Foeken & Hoorweg, 1988, 22-28

crops and livestock for the remaining 15%. Compared with the results of the Household Budget Survey of 1981/82, there is no increase in income; more than 40% of the rural population live in dire poverty. The low returns from agriculture mean that households dependent on agriculture are at risk. In fact, only 20% of the rural population manages to realize an income from agriculture that is above the food poverty line. Off-farm employment is the major source of income.

The present survey covers three agro-ecological zones. There are not only differences between zones, but also differences between areas within zones, as well as between households within areas. Although there are evident differences in agro-ecological potential between the zones, the material presented in this report also shows that there are large differences in the way people choose to realize their available resources. Within the same agro-ecological zone the selected areas differ considerably from each other. Bongwe in L3 is very different from Chilulu; Mwatate and Kitsoeni in L4 differ; as is the case with Kibandaongo and Bamba in L5.

The household economy classification typifies households according to their main income characteristics, whether 'poor', 'farmers', 'wage earners', 'mixed economy' or 'rich'; and there is considerable difference among the areas in this respect. Chilulu has the highest percentage of poor households, more than twice the number in Bongwe (Appendix 37). The latter area has a large percentage of wage earners, together with Bamba. Mwatate, Kitsoeni and Kibandaongo also have a large contingent of 'poor' households. Otherwise, Kitsoeni has the largest percentage of 'farmers'; and Kibandaongo the highest percentage of 'mixed' households.

When aggregated by district, the distribution of households according to economy type is largely the same, with the exception that there are more poor households among the sampled cases in Kilifi (Table 30). The difference is not large and results mainly from the many poor households in one area: Chilulu. This does not confirm the generally existing perception that Kwale is the poorer of the two districts, and this undoubtedly has to do with

the employment opportunities in two of the Kwale areas studied.[1] The Rural Household Budget Survey of 1981/1982 also reported that household incomes in Kwale were higher than in Kilifi, because of higher incomes from salary and wages (CBS, 1988:34).

When grouped according to ecological zone there is little or no difference in the prevailing household economies despite the differences in agricultural potential (Table 30). The number of poor households in the three zones studied is virtually the same (40%), as is the number of affluent households (about 10%). The number of households classified as 'farmers', 'wage earners' and 'mixed' are also very similar, with the exception that there are slightly more farming households in the L4 zone.

Table 30
Household Economy by District and Agro-Ecological Zone
(%)

	TOTAL	*DISTRICT*		*AGRO-ECOLOGICAL ZONE*		
	--	*Kwale*	*Kilifi*	*L3*	*L4*	*L5*
	(N=297)	(N=147)	(N=150)	(N=100)	(N=98)	(N=99)
Poor households (<sh1000/cu)	41	37	46	41	42	41
Farmers }	10	10	11	9	14	8
Wage Earners] (sh1000-4000/cu)	20	21	18	21	18	19
Mixed Econ. }	18	18	17	20	13	19
Rich households (>sh4000/cu)	11	14	9	9	12	12
	100	100	100	100	100	100

See Appendix 37

The similar distribution does not mean that the agricultural and economic activities in the zones are the same; obviously they are not. Rather, it means that in each of the zones a similar number of households fail to rise above the poverty line. Among the households that manage to do so, wage income is the major component, and since employment opportunities are not location-bound the similarity in prevalent household economy is not surprising. What is surprising is that in each zone so few households manage to make an existence from farming only.

[1] See notes on calculations and miscellaneous information, p.147 (note 15).

APPENDICES

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Appendix 1
Number of Household Members by Residency

	Total –	*Bongwe* L3	*Chilulu* L3	*Mwatate* L4	*Kitsoeni* L4	*Kib'ngo* L5	*Bamba* L5
Number of households	297	50	50	48	50	49	50
Household members							
- residents, full-time	2314	279	458	289	375	331	582
- residents, part-time	107	9	8	11	2	10	67
- non-residents	229	11	71	21	54	23	49
total	2650	299	537	321	431	364	698

Definition of terms
A household was defined as a group of people who reside together under one roof or under several roofs within a single compound, who are answerable to the same head and share a common source of food. Household members can be either resident, part-time resident or non-resident:
- full-time residents are persons taking one or more meals from the household kitchen on a daily basis;
- part-time residents are persons who normally live in the compound but who are or have been absent for an uninterrupted period of two weeks or more during the last three months;
- non-resident members are members of the household who are staying elsewhere for reasons of employment, education or otherwise, but who return regularly, and keep economic ties with the household.

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Appendix 2
Household Size

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
2A.							
Household members							
average	8.9	6.0	10.7	6.7	8.6	7.4	14.0
standard deviation	6.2	3.3	5.1	3.4	4.5	5.1	9.6
distribution (%)							
1-3	12	24	-	19	10	16	2
4-5	15	20	10	13	22	16	6
6-7	23	28	20	33	12	33	12
8-9	19	16	26	17	18	16	20
10-14	18	8	20	19	26	6	26
15-19	9	4	18	-	10	8	16
20 and over	5	-	6	-	2	4	18
	100	100	100	100	100	100	100
2B.							
Consumer units [1]							
average	5.8	4.2	6.6	4.5	5.4	5.0	9.0
standard deviation	3.9	2.2	3.0	2.3	2.8	3.5	5.9
distribution (%)							
0-1.9	9	14	-	13	6	20	-
2.0-3.9	25	38	18	27	36	18	12
4.0-5.9	29	32	26	35	18	41	22
6.0-7.9	16	8	24	15	22	8	20
8.0-9.9	11	6	18	10	10	2	18
10.0-11.9	5	2	6	-	6	6	8
12 and over	6	-	8	-	2	4	20
	100	100	100	100	100	100	100

1. For description and definition of consumer units, see notes on calculations and miscellaneous information, p.143 (note 2)

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Appendix 3
Household Members by Residency and Age
(N)

		Total –	*Bongwe* L3	*Chilulu* L3	*Mwatate* L4	*Kitsoeni* L4	*Kib'ngo* L5	*Bamba* L5
3A. *Children-Adults*								
Full-time residents	children (0-16yr)	1305	141	275	164	220	182	323
	adults (17yr +)	1009	138	183	125	155	149	259
	subtotal	2314	279	458	289	375	331	582
Part-time & non-residents	children (0-16yr)	42	6	7	8	3	2	16
	adults (17yr +)	294	14	72	24	53	31	100
	subtotal	336	20	79	32	56	33	116
	total	2650	299	537	321	431	364	698
3B. *10-year age groups*								
Full-time residents	00-09yr	871	92	181	110	146	134	208
	10-19yr	565	64	116	65	93	65	162
	20-29yr	306	46	48	38	45	53	76
	30-39yr	241	33	45	37	27	41	58
	40-59yr	237	38	47	24	46	29	53
	60yr+	94	6	21	15	18	9	25
	subtotal	2314	279	458	289	375	331	582
Part-time & non-residents	00-09yr	24	3	2	6	-	2	11
	10-19yr	52	3	21	4	12	2	10
	20-29yr	123	3	27	9	21	17	46
	30-39yr	72	4	18	8	14	5	23
	40-59yr	59	7	11	3	7	6	25
	60yr+	6	-	-	2	2	1	1
	subtotal	336	20	79	32	56	33	116
	total	2650	299	537	321	431	364	698

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Appendix 4
Household Members by Residency and Sex
(N; Adults, 17 years and older)

		Total –	*Bongwe* L3	*Chilulu* L3	*Mwatate* L4	*Kitsoeni* L4	*Kib'ngo* L5	*Bamba* L5
Full-time residents	men	394	63	70	54	54	59	94
	women	615	75	113	71	101	90	165
Part-time residents	men	60	6	5	4	1	7	37
	women	19	-	-	2	-	1	16
Non-residents	men	198	8	60	17	45	22	46
	women	17	-	7	1	7	1	1
	total	1303	152	255	149	208	180	359

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Appendix 5
Children under Ten by Age Group
(N; Full-time residents)

	Total –	*Bongwe* L3	*Chilulu* L3	*Mwatate* L4	*Kitsoeni* L4	*Kib'ngo* L5	*Bamba* L5
00-11 months	99	12	18	11	18	20	20
12-23 months	86	9	20	8	18	5	26
24-35 months	116	14	25	19	16	10	32
36-47 months	88	8	12	9	19	20	20
48-59 months	56	6	9	6	8	11	16
60-71 months	101	10	26	12	21	10	22
72-83 months	91	6	17	10	13	15	30
84-95 months	79	5	21	13	14	16	10
96-107 months	90	14	17	13	14	12	20
108-119 months	55	5	13	8	5	12	12
exact age unknown	10	3	3	1	-	3	-
total	871	92	181	110	146	134	208

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Appendix 6
Household Members by Sex and Education (%)
(Adults, 17 years and older)

		Total –	*Bongwe* L3	*Chilulu* L3	*Mwatate* L4	*Kitsoeni* L4	*Kib'ngo* L5	*Bamba* L5
Men		(N=652)	(N=77)	(N=135)	(N=75)	(N=100)	(N=88)	(N=177)
	no formal education	35	34	25	35	23	55	40
	adult class only	3	10	-	3	-	7	3
	primary school, standards 1-4	16	10	19	17	15	14	17
	primary school, standards 5-8	32	43	41	31	33	13	29
	more than primary school	14	3	15	15	29	13	10
		100	100	100	100	100	100	100
Women		(N=651)	(N=75)	(N=120)	(N=74)	(N=108)	(N=92)	(N=182)
	no formal education	79	72	80	73	77	79	84
	adult class only	4	4	3	8	-	14	1
	primary school, standards 1-4	5	9	3	1	3	4	7
	primary school, standards 5-8	10	15	11	9	16	2	7
	more than primary school	3	-	3	8	5	-	1
		100	100	100	100	100	100	100

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Appendix 7

Household Members by Residency and Education (%)

(Adults, 17 yrs and older)

		Total --	*Bongwe* L3	*Chilulu* L3	*Mwatate* L4	*Kitsoeni* L4	*Kib'ngo* L5	*Bamba* L5
Full-time		(N=1009)	(N=138)	(N=183)	(N=125)	(N=155)	(N=149)	(N=259)
resident	no formal education	64	54	63	58	65	71	69
	adult class only	4	7	2	5	-	11	2
	primary school, standards 1-4	10	7	12	8	10	9	12
	primary school, standards 5-8	18	30	22	20	21	6	14
	more than primary school	4	1	1	9	5	3	4
		100	100	100	100	100	100	100
Part-time &		(N=294)	(N=14)	(N=72)	(N=24)	(N=53)	(N=31)	(N=100)
non-resident	no formal education	32	43	19	29	11	48	46
	adult class only	3	7	0	8	-	10	3
	primary school, standards 1-4	11	36	10	17	6	6	12
	primary school, standards 5-8	30	14	40	21	34	13	29
	more than primary school	24	-	31	25	49	23	10
		100	100	100	100	100	100	100

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Appendix 8
Sex and Marital Status of Heads of Households
(%)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
8A.							
Sex							
male	91	70	100	87	100	86	100
female	9	30	-	13	-	14	-
	100	100	100	100	100	100	100
8B.							
Marital status							
married, monogamously	51	48	54	54	50	53	48
married, polygamously	33	6	44	25	48	24	50
divorced/separated	7	32	-	2	-	6	-
widowed	8	12	2	17	-	14	2
single	1	2	-	2	2	2	-
	100	100	100	100	100	100	100

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Appendix 9
Household Type
(%)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
nuclear [1]	41	58	30	54	28	55	20
other [2]	59	42	70	46	72	45	80
	100	100	100	100	100	100	100

1. Includes households where adults are either head of the household, spouse to the head or grown-up child of the head. The definition also includes female-headed households and households without young children, otherwise meeting the definition.
2. Includes households with adults otherwise related to head and households with head married to more than one wife.

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Appendix 10

Housing Conditions: Structures, Rooms and Occupants

	Total	*Bongwe*	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
Living houses / household							
- main house	1.0	1.0	1.0	1.0	1.0	1.0	1.0
- other houses [1]	0.8	0.1	1.4	0.2	0.6	0.6	1.7
- boys' houses	0.3	0.0	0.4	0.1	0.6	0.2	0.6
Rooms / household	3.5	3.5	4.7	3.2	2.9	2.7	4.2
Rooms / house	1.9	3.0	1.8	2.6	1.3	1.5	1.3
Occupants / room	2.8	1.9	2.5	2.4	3.3	3.0	3.5
Latrine - present (%)	33	30	88	21	44	-	12
- not present (%)	67	70	12	79	56	100	88
	100	100	100	100	100	100	100

1. Houses of second wives; married or unmarried children of the head of household; brothers/sisters of the head and others.

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Appendix 11

Construction Materials [1]

(% households)

		Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
11A.								
Roof	- grass	22	-	-	8	36	47	42
	- makuti [2]	66	94	94	58	60	47	42
	- mabati (iron)	12	6	6	33	4	6	16
		100	100	100	100	100	100	100
11B.								
Walls	- grass/makuti [2]	12	2	2	2	30	8	30
	- mud + coral	79	80	96	79	66	90	66
	- cemented	8	18	2	19	4	2	4
		100	100	100	100	100	100	100
11C.								
Floor	- sand/mud	91	86	92	83	92	98	92
	- cemented	8	14	8	17	6	2	4
	- other	1	-	-	-	2	-	4
		100	100	100	100	100	100	100

1. The materials used in the construction of the best quality house - nearly always the main house - were recorded
2. Leaves of the coconut palm.

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Appendix 12

Source of Drinking Water by Season.

(% households)

		Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (47)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (48)	*Bamba* L5 (50)
12A.								
Wet season	- river	8	-	-	-	-	48	-
	- well	30	98	78	-	-	-	-
	- pond/dam	21	-	-	4	-	52	72
	- pipeline, borehole, protected well, tank	41	2	22	96	100	-	28
		100	100	100	100	100	100	100
12B.								
Dry season [1]	- river	3	-	-	-	-	19	2
	- well	27	98	64	-	-	-	-
	- pond/dam	12	-	-	4	-	38	28
	- pipeline, borehole, protected well, tank	58	2	36	96	100	44	70
		100	100	100	100	100	100	100

1. The answers of respondents concerning the dry season probably reflect the situation during fairly dry years.

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Appendix 13

Distance to Source of Drinking Water by Season
(% households)

		Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (47)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (48)	*Bamba* L5 (50)
13A.								
Wet season	0-10 min.	46	24	50	70	20	38	78
	11-30 min.	49	72	42	30	80	54	16
	31-60 min.	4	4	8	-	-	6	4
	> 60 min.	1	-	-	-	-	2	2
		100	100	100	100	100	100	100
13B.								
Dry season	0-10 min	26	24	30	70	18	13	2
	11-30 min.	42	72	32	30	82	35	-
	31-60 min.	9	4	32	-	-	15	4
	> 60 min.	23	-	6	-	-	38	94
		100	100	100	100	100	100	100

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Appendix 14
Farm Size Characteristics

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
14A.							
Total acreage							
- average	8.2	6.8	2.8	4.0	5.0	9.4	21.0
standard deviation	9.8	7.1	2.0	3.0	5.6	13.2	9.5
- distribution (%)							
0.0 - 0.9acres	3	6	4	6	-	2	-
1.0 - 1.9acres	10	8	30	10	14	-	-
2.0 - 2.9acres	14	14	26	21	20	4	-
3.0 - 4.9acres	24	32	24	31	36	18	-
5.0 - 9.9acres	25	20	14	29	22	55	8
10.0 - 19.9acres	13	10	2	2	6	14	42
20.0acres and over	11	10	-	-	2	6	50
	100	100	100	100	100	100	100
14B.							
Acreage under food crops [1]							
- average	2.8	2.4	2.0	1.4	3.8	2.9	4.4
standard deviation	2.5	2.3	1.2	0.9	3.3	2.5	2.6
- distribution (%)							
0.0 - 0.4acres	5	8	4	15	2	2	-
0.5 - 0.9acres	9	14	10	19	4	6	2
1.0 - 1.4acres	11	4	26	19	8	8	-
1.5 - 1.9acres	17	24	12	29	8	22	8
2.0 - 2.9acres	21	28	28	6	20	29	14
3.0 - 3.9acres	18	12	14	13	26	14	30
4.0acres and over	19	10	6	-	32	18	46
	100	100	100	100	100	100	100

1. The number of acres cultivated with food crops in long rainy season 1985 and short rainy season 1985/86, corrected for existing tree coverage.

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Appendix 15
Fragmentation of Farms

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
Number of plots (average/household)	2.7	2.0	3.4	2.3	3.2	2.7	2.9
Walking distance to plots (average number of minutes)	29	25	50	18	35	12	21
Plots within respective agro-ecological zones (%)	97	100	91	98	100	99	97

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Appendix 16

Percentage of Households Cultivating Different Crops [1]

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
Food crops							
- maize	74	32	78	90	92	94	62
- sorgum/millet	2	2	-	-	-	-	10
- rice	10	38	14	-	8	-	-
- beans/cowpeas/green grams	37	42	44	38	24	27	46
- cassava	74	92	88	85	80	73	24
- bananas	52	70	80	69	34	59	2
- pigeon peas	7	10	-	8	-	20	4
Cash crops							
- coconuts	60	82	92	56	58	61	12
- cashew nuts	54	82	56	73	50	49	14
- citrus/improved mango	46	72	62	71	26	43	4
- sw.soursop/guava/mango var.	30	26	20	75	16	47	-
- pawpaw/passion fruit	28	40	32	50	12	35	-
- pineapple	6	20	4	4	-	2	6
- sugar cane/pepper/bixa	7	12	-	21	-	10	-

1. Long rainy season 1985 and short rainy season 1985/86

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Appendix 17

Food Production by Crop (1985) [1]

	Total	*Bongwe*	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
17A.							
Average per household							
- maize (kg)	343	14	204	279	783	554	228
- sorghum/millet (kg)	1	-	-	-	-	-	6
- rice (kg)	7	23	20	-	1	-	-
- beans/cowpeas/green grams (kg)	14	6	17	3	20	7	29
- cassava (number of plants) [2]	363	675	410	276	436	320	56
- bananas (number of plants) [2]	17	51	24	11	2	13	-
17B							
Average per consumer unit							
- maize (kg)	59	3	31	62	146	111	25
- sorgum/millet (kg)	-	-	-	-	-	-	1
- rice (kg)	1	5	3	-	-	-	-
- beans/cowpeas/green grams (kg)	2	1	3	1	4	1	3
- cassava (number of plants) [2]	63	160	62	62	81	64	6
- bananas (number of plants) [2]	3	12	4	2	-	3	-

1. Long rainy season 1985 and short rainy season 1985/86
2. As recorded at the end of long rainy season 1985

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Appendix 18
Cereals and Cassava Production

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
18A.							
Cereals production per household [1]							
- average (kg)	352	37	225	279	784	554	234
- distribution (%)							
kg 0	20	38	20	10	8	6	38
kg 0-99	19	52	20	23	6	4	10
kg 100-224	14	8	22	23	14	4	12
kg 225-349	13	2	20	10	10	25	8
kg 350-499	13	-	14	13	20	20	14
kg 500-999	15	-	2	21	20	29	18
kg 1,000 and over	6	-	2	-	22	12	-
	100	100	100	100	100	100	100
18B.							
Cassava cultivation per household [2]							
- average (number of plants)	363	675	410	276	436	320	56
- distribution (%)							
0 plants	26	8	12	15	20	27	76
0-99 plants	4	2	-	6	2	6	6
100-249 plants	18	10	16	29	20	29	6
250-499 plants	20	20	22	35	12	20	8
500-749 plants	21	32	40	10	26	10	4
750-999 plants	5	6	10	-	14	-	-
1000plants and more	7	22	-	4	6	8	-
	100	100	100	100	100	100	100

1. Long rainy season 1985 and short rainy season 1985/86
2. As recorded at the end of long rainy season 1985

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Appendix 19
Household Food Energy Production [1]
(1985/86)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
19A.							
Food self-sufficiency (%)							
- average	46	36	32	43	77	72	14
- distribution							
0 %	8	-	2	2	4	-	38
0.1-24.9 %	31	42	46	29	16	16	34
25-49.9 %	30	34	32	31	36	20	24
50-74.9 %	17	14	14	23	12	33	4
75-99.9 %	5	4	-	8	8	12	-
=>100%	10	6	6	6	24	18	-
	100	100	100	100	100	100	100
19B.							
Composition staple food energy (%)							
cereals	63	10	41	59	80	77	85
cassava	24	69	29	24	15	13	7
bananas	11	19	26	16	1	9	-
beans	2	2	4	1	4	1	9
	100	100	100	100	100	100	100

1. For the definition of food self-sufficiency, see notes on calculations and miscellaneous information, p.144 (note 7)

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Appendix 20

Cash Crop Cultivation by Crop Type [1]
(Average number of producing plants per household)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
- coconuts	33	37	84	4	39	20	10
- cashew nuts	16	27	15	8	34	5	9
- citrus/improved mango varieties	5	4	20	2	4	1	-
- sw.soursop/guava/local mango var.	1	2	1	2	-	3	-
- pawpaw/passion fruit	2	4	3	2	-	3	-
- pineapple	2	2	-	1	-	1	4
- sugar cane/pepper/bixa	1	-	-	1	-	7	-

1. As recorded at the end of long rainy season 1985

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Appendix 21

Tree Crop Cultivation per Household [1]

(Total number of producing trees: coconut /cashew /citrus/mango)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
- Average	54	68	119	14	77	26	19
- Distribution (%)							
0 trees	39	18	14	27	46	41	86
1-9 trees	13	4	8	29	12	22	2
10-24 trees	9	14	8	17	10	6	-
25-49 trees	14	24	18	25	10	6	-
50-99 trees	12	24	18	2	12	12	6
100-249 trees	7	10	16	-	2	12	4
250trees and more	6	6	18	-	8	-	2
	100	100	100	100	100	100	100

1. As recorded at the end of long rainy season 1985

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Appendix 22
Livestock [1]

	Total	*Bongwe*	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
22A.							
Percent households with							
- cows	18	6	12	13	4	29	42
- goats/sheep	41	20	48	35	34	49	58
- poultry	90	76	90	90	90	96	96
22B.							
Number of animals / household							
- cows	4.3	0.7	0.4	2.6	0.6	6.5	14.8
- goats/sheep	2.9	1.0	2.3	1.9	2.4	4.6	5.3
- poultry	6.9	3.0	4.6	7.7	6.4	9.8	10.0
22C							
Livestock equivalents / household [2]							
- average	4.7	0.8	0.7	2.8	0.9	7.2	15.6
- distribution (%)							
none	55	78	44	65	64	47	30
0.0-0.9 LE	19	14	34	17	18	14	16
1.0-1.9 LE	8	2	8	8	10	8	10
2.0-4.9 LE	6	4	14	2	4	2	8
5.0-19.9 LE	6	-	-	6	2	16	10
20.0-49.9 LE	4	2	-	-	2	8	12
50LE and more	3	-	-	2	-	4	14
	100	100	100	100	100	100	100

1. As recorded at the end of long rainy season 1985
2. For purposes of this sub-table, livestock was expressed in livestock equivalents (LE = 1 head of cattle = 7 goats/sheep (poultry not included))

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Appendix 23

Value of Agricultural Production [1]
(sh)

	Total	*Bongwe*	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
23A.							
Per household							
- average	3465	2125	3449	2295	4635	4385	3875
standard deviation	3988	1998	3139	2724	5259	4160	4994
- distribution (%)							
sh 0-499	11	8	6	13	6	8	24
sh 500-999	14	20	8	23	16	2	14
sh 1000-1499	10	20	10	8	6	6	8
sh 1500-2499	21	28	14	25	22	27	10
sh 2500-4999	26	16	50	23	20	35	14
sh 5000-9999	11	8	4	6	22	10	16
sh 10,000 and over	7	0	8	2	8	12	14
	100	100	100	100	100	100	100
23B.							
Per consumer unit							
- average	730	643	561	569	983	1139	488
standard deviation	903	644	436	499	1294	1248	723
- distribution (%)							
sh 00-099	13	6	10	13	6	4	38
sh 100-249	12	22	12	15	10	8	8
sh 250-499	27	32	32	27	34	12	24
sh 500-749	18	14	22	19	14	27	10
sh 750-999	11	10	12	10	6	18	8
sh 1000-1499	9	4	6	15	14	10	6
sh 1500 and over	10	12	6	2	16	20	6
	100	100	100	100	100	100	100
23C.							
Per acre [2]							
total agr. production [3] / total acreage	326	287	1169	447	895	328	65
value food prod. / acreage food crops	785	541	1088	1259	999	1038	284

1. See also notes on calculations and miscellaneous information, p.145 (note 9)
2. Area ratios
3. Excluding livestock production

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Appendix 24
Frequency of Off-Farm Employment (o.f.e.)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
24A.							
Off-farm workers							
- number of people engaged in o.f.e.	326	66	50	40	40	31	99
- average number/household	1.1	1.3	1.0	0.8	0.8	0.6	2.0
24B.							
Adult population, total (N=1303) [1]							
- engaged in o.f.e (%)	25	43	20	26	19	17	27
- not engaged in o.f.e (%)	75	57	80	74	81	83	73
	100	100	100	100	100	100	100
24C.							
Adult population, men (N=652) [1]							
- engaged in o.f.e. (%)	42	60	33	47	37	35	47
- not engaged in o.f.e. (%)	58	40	67	53	63	65	53
	100	100	100	100	100	100	100
Adult population, women (N=651) [1]							
- engaged in o.f.e. (%)	7	25	5	5	3	-	7
- not engaged in o.f.e. (%)	93	75	95	95	97	100	93
	100	100	100	100	100	100	100

1. The corresponding Ns for the respective areas are listed in Appendix 6.

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Appendix 25
Characteristics Off-Farm Employment and Off-Farm Workers
(%)

	Total N=(326)	*Bongwe* L3 (66)	*Chilulu* L3 (50)	*Mwatate* L4 (40)	*Kitsoeni* L4 (40)	*Kib'ngo* L5 (31)	*Bamba* L5 (99)
25A.							
Type of employment [1,2]							
- regularly employed	52	27	76	50	68	35	55
- self-employed	31	47	18	18	15	29	38
- temporarily employed	8	12	2	15	3	6	7
- casual labour	10	14	4	18	15	29	-
	100	100	100	100	100	100	100
25B.							
Place of work [2]							
- in location *	37	82	16	28	15	26	33
- in district	10	5	20	10	20	10	6
- in Mombasa	45	14	52	48	48	58	57
- elsewhere	8	-	12	15	18	6	4
	100	100	100	100	100	100	100
25C.							
Place of residence off-farm worker							
- household	39	83	22	53	15	19	29
- elsewhere (part-time resident)	13	8	4	8	-	23	26
- elsewhere (non-resident)	48	9	74	40	85	58	44
	100	100	100	100	100	100	100

* administrative location

1. For a description of types of employment, see notes on calculations and miscellaneous information, p.145 (note 10).
2. Cross-tabulation of type of employment and place of work is presented in Appendix 26

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Appendix 26

Off-Farm Workers by Type Employment and Place of Work
(N)

		Total N=(326)	*Bongwe* L3 (66)	*Chilulu* L3 (50)	*Mwatate* L4 (40)	*Kitsoeni* L4 (40)	*Kib'ngo* L5 (31)	*Bamba* L5 (99)
Regular empl.	in location	34	11	6	3	2	4	8
	elsewhere	134	7	32	17	25	7	46
Self-employed	in location	66	30	2	4	3	3	24
	elsewhere	34	1	7	3	3	6	14
Temporarily & Casual empl.	in location	20	13	-	4	1	1	1
	elsewhere	38	4	3	9	6	10	6

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Appendix 27
Average Wages by Type of Employment
(sh/year)

	Total N=(324)	*Bongwe* L3 (64)	*Chilulu* L3 (50)	*Mwatate* L4 (40)	*Kitsoeni* L4 (40)	*Kib'ngo* L5 (31)	*Bamba* L5 (99)
regularly employed	13,627	10,306	10,803	15,245	14,167	13,445	15,828
self-employed	9,276	7,230	7,667	13,543	10,800	7,422	10,684
temporarily employed	4,904 }						
	}	4,047	6,867*	6,177	4,400	5,245	7,071
casual labour	5,609 }						
average (all wages)	10,808	7,202	10,002	12,000	11,953	8,787	13,234
casual labour (local) [1]	1,771	1,452*	1,603	1,726	1,829*	1,644	2,039

1. N=79; information presented for completeness; this information is not included in other data on off-farm employment (see also note 10 on calculations, p.145)
* fewer than 5 observations

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Appendix 28
Income from Off-Farm Employment
(sh/year)

	Total	*Bongwe*	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
28A.							
Per household							
- average	6,560	8,120	4,175	6,717	3,457	2,734	14,089
- distribution (%)							
none	38	24	40	44	50	55	16
up to sh 2,499	9	12	12	8	4	8	8
sh 2,500-4,999	18	12	26	8	28	18	14
sh 5,000-9,999	11	12	8	13	8	10	16
sh 10,000-14,999	9	26	6	8	2	4	10
sh 15,000-19,999	5	6	4	8	4	2	8
sh 20,000 and more	9	8	4	10	4	2	28
	100	100	100	100	100	100	100
28B.							
Per consumer unit							
- average	1,180	1,911	791	1,554	642	641	1,544
- distribution (%)							
none	38	24	40	44	50	55	16
up to sh 499	12	06	24	06	08	08	18
sh 500-999	11	06	16	06	14	14	08
sh 1000-1999	14	18	06	10	18	08	24
sh 2000-2999	12	26	06	13	04	06	16
sh 3000-4999	10	12	06	13	06	08	16
sh 5000 and more	03	08	02	08	-	-	02
	100	100	100	100	100	100	100
28C.							
Contribution to annual off-farm income (%)							
- full-time residents	58	84	51	75	41	43	45
- part-time residents [1]	17	13	3	10	-	26	29
- non-residents [1]	25	3	46	15	59	32	25
	100	100	100	100	100	100	100

1. The contribution to household income of part-time residents and non-residents was calculated at 75% and 25% of the respective salaries.

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Appendix 29
Total Income
(sh/year)

	Total	*Bongwe*	*Chilulu*	*Mwatate*	*Kitsoeni*	*Kib'ngo*	*Bamba*
29A.							
Per household							
- average	10,025	10,245	7,624	9,013	8,092	7119	17,963
standard deviation	11060	8714	7880	9824	8848	7243	17180
- distribution (%)							
up to sh 1,000	10	8	10	15	10	8	8
sh 1,000-2,499	14	14	8	17	20	18	8
sh 2,500-4,999	19	10	30	15	16	33	8
sh 5,000-9,999	24	22	30	23	30	18	20
sh 10,000-14,999	12	28	8	10	8	4	12
sh 15,000-24,999	13	10	10	13	14	16	18
sh 25,000 and more	8	8	4	8	02	2	26
	100	100	100	100	100	100	100
29B.							
Per consumer unit							
- average	1,910	2,554	1,352	2,123	1,626	1,780	2,032
standard deviation	1796	1864	1597	2023	1744	1756	1605
- distribution (%)							
up to sh 249	9	6	10	12	8	10	8
sh 250-499	13	8	22	12	18	8	12
sh 500-999	19	10	26	15	18	29	16
sh 1000-1999	21	16	22	17	34	22	16
sh 2000-2999	16	28	8	19	8	10	24
sh 3000-3999	10	20	6	6	8	10	10
sh 4000 and over	11	12	6	19	6	10	14
	100	100	100	100	100	100	100

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Appendix 30

Household Income by District and Agro-Ecological Zone
(sh/cu/year)

	TOTAL	*DISTRICT*		*AGRO ECOLOGICAL ZONE*		
		Kwale	*Kilifi*	*CL3*	*CL4*	*CL5*
	(N=297)	(N=147)	(N=150)	(N=100)	(N=98)	(N=99)
cash crop production	100	88	113	203	77	20
livestock production +	144	157	131	29	75	329
cash crops & livestock	245	245	244	232	152	349
value of food crops +	486	539	433	370	629	461
farm income	730	784	677	602	781	810
wage income +	1180	1371	993	1351	1089	1097
income, total	1910	2155	1670	1953	1869	1907

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Appendix 31
Social & Economic Characteristics by Income Class

Income bracket:	sh/cu	*Total* --	*1* -500	*2* -1000	*3* -1500	*4* -2000	*5* -2500	*6* -3000	*7* -3500	*8* -4000	*9* 4000+
	N	297	67	56	38	25	22	26	16	14	33
Income composition											
value food crops	sh/cu	486	205	457	562	614	567	276	817	522	853
cash crops and livestock +	sh/cu	244	41	88	181	238	347	327	299	206	859
farm income	sh/cu	730	246	545	743	852	914	603	1116	728	1712
wage income +	sh/cu	1180	37	189	479	847	1336	2121	2097	3009	4176
income, total	sh/cu	1910	283	733	1223	1699	2250	2724	3214	3738	5888
consumer units / household	average	5.8	5.5	6.5	6.1	6.7	5.1	6.8	5.3	6.0	3.8
children / adults	ratio	1.03	1.09	1.13	1.07	1.12	1.07	1.03	0.84	1.17	0.58
nuclear households	N	121	32	20	16	8	11	9	3	7	15
other households	N	176	35	36	22	17	11	17	13	7	18
sex head: male	N	269	56	53	32	24	20	25	15	13	31
sex head: female	N	28	11	3	6	1	2	1	1	1	2
education head: >= standard 5	N	60	8	5	8	7	4	6	6	7	9
education head: < standard 5	N	237	59	51	30	18	18	20	10	7	24
house quality: improved*	N	45	5	4	3	5	3	7	4	7	7
house quality: not improved	N	252	62	52	35	20	19	19	12	7	26

* houses with iron roof and/or stone walls and/or cemented floor

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Appendix 32

Income Composition by Household Economy [1]

(sh/cu/year with standard deviations in brackets)

	Poor Households (N=123)	*Farmers* -- (N=31)	*Wage Earners* (N=58)	*Mixed* -- (N=52)	*Rich Households* (N=33)
cash crop production	38	248	22	180	205
livestock production +	24	247	24	178	654
cash crops and livestock	62	495	47	358	859
value of food crops +	320	1109	194	599	853
farm income	382 (260)	1604 (657)	241 (149)	956 (518)	1712 (1922)
wage income +	106 (200)	56 (129)	2035 (932)	1534 (789)	4176 (1935)
income, total	488 (263)	1660 (618)	2276 (904)	2491 (771)	5888 (1370)
casual labour (local)	111	204	20	20	61

1. The household economy classification is described on p.59 (figure 4) and was defined on the basis of income level and income composition as follows:

poor households	income: < sh1000/cu	
farmers	income: sh1000/cu - sh4000/cu;	farm income > sh500/cu, wage income < sh500/cu
wage earners	income: sh1000/cu - sh4000/cu;	farm income < sh500/cu, wage income > sh500/cu
mixed economy	income: sh1000/cu - sh4000/cu;	farm income > sh500/cu, wage income > sh500/cu
rich households	income: > sh4000/cu	

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Appendix 33
Household Characteristics by Household Economy

	Poor Households	*Farmers* --	*Wage Earners*	*Mixed* --	*Rich Households*
Members / household	9.1	8.3	10.4	9.0	6.0
Child / adult ratio	1.11	1.03	1.15	0.97	0.58
Consumer units / household	6.0	5.5	6.8	5.6	3.8
Education head household: standard 5 or more (%)	11	16	31	29	27
Improved house quality (%)	7	3	31	19	21
Occupants / room	3.1	2.8	2.8	2.5	1.8

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Appendix 34
Farm Size by Household Economy

	Poor Households (N=123)	*Farmers* -- (N=31)	*Wage Earners* (N=58)	*Mixed* -- (N=52)	*Rich Households* (N=33)
Total acreage / household	7.3	10.9	8.4	8.4	8.4
Acreage under food crops / household	2.5	4.2	2.5	3.0	3.1

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Appendix 35
Off-Farm Workers by Household Economy

	Total --	*Poor Households*	*Farmers* --	*Wage Earners*	*Mixed* --	*Rich Households*
35A. Number of persons with off-farm employment (o.f.e.)						
total	324	53	10	112	86	63
35B. Breakdown by type employment and residency						
- regular employment						
full-time resident	36	1	-	16	10	9
part-time resident	19	2	-	11	4	2
non-resident	112	26	4	29	34	19
subtotal	*167*	*29*	*4*	*56*	*48*	*30*
- self-employment						
full-time resident	64	3	-	33	12	16
part-time resident	12	6	-	4	1	1
non-resident	23	8	4	2	5	4
subtotal	*99*	*17*	*4*	*39*	*18*	*21*
- temporarily & casual employment						
full-time resident	26	3	1	8	6	8
part-time resident	12	1	-	5	5	1
non-resident	20	3	1	4	9	3
subtotal	*58*	*7*	*2*	*17*	*20*	*12*
total	*324*	*53*	*10*	*112*	*86*	*63*
35C. Average number of off-farm workers / household						
total	1.09	0.43	0.32	1.93	1.65	1.91
- regular employment	0.56	0.24	0.13	0.97	0.92	0.91
- self-employment	0.33	0.14	0.13	0.67	0.35	0.64
- temporarily & casual employment	0.20	0.06	0.07	0.29	0.39	0.36

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Appendix 36
Income from Off-Farm Employment by Household Economy

	Poor Households (N=123)	*Farmers* -- (N=31)	*Wage Earners* (N=58)	*Mixed* -- (N=52)	*Rich Households* (N=33)
36A.					
Average / household (sh/cu)	106	56	2035	1534	4176
36B.					
Household income from off-farm employment by type employment and residency (%) [1]					
regular employment					
full-time resident	-	-	27	29	24
part-time resident	3	-	15	6	6
non-resident	65	41	13	28	14
subtotal	*68*	*41*	*55*	*63*	*44*
self-employment					
full-time resident	3	-	31	19	37
part-time resident	8	-	5	3	2
non-resident	21	53	1	2	3
subtotal	*32*	*53*	*37*	*24*	*42*
temporarily & casual employment					
full-time resident	-	5	3	6	10
part-time resident	-	-	4	4	1
non-resident	1	1	1	3	2
subtotal	*1*	*6*	*8*	*13*	*13*
	100	100	100	100	100

1. The contribution to household income of part-time residents and non-residents was calculated at 75% and 25% of the respective salaries.

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Appendix 37
Household Economy by Research Area
(%)

	Total N=(297)	*Bongwe* L3 (50)	*Chilulu* L3 (50)	*Mwatate* L4 (48)	*Kitsoeni* L4 (50)	*Kib'ngo* L5 (49)	*Bamba* L5 (50)
poor households	41	24	58	40	44	47	36
farmers	10	8	10	10	18	12	4
wage earners	20	38	4	19	18	6	32
mixed economy	18	18	22	13	14	24	14
rich households	11	12	6	19	6	10	14
	100	100	100	100	100	100	100

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NOTES & REFERENCES

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Notes on Calculations & Miscellaneous Information

1. *Sample Size (with page 17)*
Three households were excluded since there did not appear to be at least one full-time resident member at the time of the survey. This brings the total sample to 297 households.

2. *Consumer Units (with page 18, 69)*
For the analysis of survey findings at household level, it is important to standardize household size. The most common way is a straight count of the number of household members, which means that each member receives an equal weight. For certain (e.g., demographic) purposes, this is quite appropriate.

For other purposes, however, a weighted summation is often needed because the requirements of household members differ from each other. For example, the food consumption of a child is less than that of an adult, but this is also true for other needs: shelter, clothing, transport, etc.

An approximation of the relative needs is offered by a physiological weighting, namely according to the nutritional requirements of individual household members. This incorporates various biological characteristics: age, sex, physiological status and physical activity level and it offers a fair approximation of overall requirements, also because food consumption forms a large part of overall consumption.

Weighting in this way is known by the term "consumer units". One consumer unit (cu) is equal to a reference adult male. The reference adult male of 20-29 years of age is estimated to need 2960 kcal per day. All other individuals are expressed as a ratio of this unit (adult male equivalents) on the basis of their estimated nutritional requirements. For the calculation of these requirements, the most recent international recommendations were used (WHO,1985). Further assumptions that were made in order to fit the reference standards to the circumstances in Coast Province concerned body size, pregnancy and lactation, activity patterns and disease. The energy requirements of the various age and sex groups, expressed in terms of consumer units, are as follows:

age	*male*	*female*	*age*	*male*	*female*	*age*	*male*	*female*
0yr	0.3cu	0.3cu	8-10yr	0.7cu	0.7cu	30-39yr	1.0cu	0.8cu
1yr	0.4cu	0.4cu	11-16yr	0.8cu	0.7cu	40-59yr	0.9cu	0.7cu
2-4yr	0.5cu	0.5cu	17-19yr	0.9cu	0.7cu	60yr+	0.7cu	0.6cu
5-7yr	0.6cu	0.6cu	20-29yr	1.0cu	0.8cu			

3. *Farm Labour (with page 29)*
For purposes of calculating the available farm labour, each adult, aged 17-60 years and full-time resident, was counted as one farm labour equivalent. Children, aged 11-16 years and not schooling, were counted as 0.5 equivalent; elderly people over 60 years also counted as 0.5 equivalent. Persons with off-farm employment were not counted, unless not employed full-time, in which case they were counted partly as farm labour. The period concerned was mid-1985 to mid-1986.

Since this calculation also includes people and time ordinarily devoted to domestic and social activities, the figures necessarily give overestimates of actual labour input in agriculture and as such underestimates of the returns for agricultural labour. This makes comparison with the returns for off-farm employment in section 6 difficult.

4. *Ratios (with page 29)*
Certain tables in this report present ratios, such as the number of rooms / house, the child/adult ratio and various indicators per consumer unit. There are two possible ways of calculating these ratios.
A. By calculating the ratio for each household (e.g. rooms/house) and subsequently calculating the average of the ratio over all households.
B. By separately summing the two individual factors in the ratio over all households, subsequently dividing the totals on each other.
The two methods can give quite different results for the same data. The discrepancy between the two methods tends to be larger when the factor used as the divisor in the ratio has a large standard deviation.

In this report the first method has mostly been used since we are primarily concerned with characteristics of the average household. The second method was used, however, in the case of certain agro-ecological factors. The latter is indicated in the tables as area ratio (in the case of geographical areas) or group ratio (in the case of socio-economic groups).

5. *Distant Holdings (with page 30)*
Under the definitions used in this survey households or part-households cultivating and living elsewhere were not considered part of the sample. On the other hand, a few households reported ownership of holdings elsewhere, notably in the settlement schemes in the coastal strip, which explains some slight anomalies in the data later on (For example, the recorded presence of certain types of trees in unsuitable areas such as Bamba).

6. *Meteorological Information (with page 32)*
Data were available for Kilifi District only (Meteorological Department, Nairobi, and MOA, 1986: 27). According to Oosten (1989:49,72), the situation in Kwale was about the same. In Kibandaongo (L5), "both the long rains and the short rains of 1985 were below average", while in Bongwe (L3), "both the long rains and the short rains of 1985 have been regarded by seven households as enough and by eight households as too little for a reasonable harvest". This might indicate that in 1985 the rainfall situation in the coastal belt was better than in the hinterland, if compared with 'normal' years.

7. *Food Self-Sufficiency (with page 34)*
The level of food self-sufficiency was calculated for households on the basis of the following foodstuffs: cereals, beans, cassava and bananas (In the case of Bongwe, bananas were counted partly because in that area they are also sold as a cash crop).

For each of these crops, the total yield of the harvests of the long rains of 1985 and the short rains of 1985/86 (in kg) was estimated and multiplied by a certain percentage in order to obtain the net yield, i.e. the edible portion (90%, 100%, 85% and 67% for cereals, beans, cassava and bananas, respectively).

These figures were multiplied with the respective caloric values per kilogram (3400 for cereals and beans, 1530 for cassava and 1100 for bananas) and added. For each household, this figure was divided by the average number of consumer units, thus obtaining the annual staple food production (in kcal) per consumer unit.

Energy requirements per cu were estimated to be 2960 kcal per day, and it was assumed that 75% of this amount is generally provided by staple foods, resulting in a staple food requirement of 810,300 kcal per consumer unit per year.

The degree of food self-sufficiency is calculated by expressing the annual food production/cu as a percentage of the staple energy requirements.

8. *Cassava (with page 36)*
As regards cassava, the food-selfsufficiency calculations are not based on the number of plants harvested but on the number of plants reportedly cultivated. It was assumed that cassava plants have a growth period of 15.3 months and that, on average, they produce a harvested weight of 1 kg. This weight is much lower than the potential weight of an individual plant cultivated and harvested under optimal conditions. Usually, however, only a fraction of the cassava planted will be used for own consumption, thus reducing the average (harvested) weight per plant as counted in the field. It has already been mentioned that crop yields further suffer as a result of infections by the mosaic virus. Cassava is often used as a reserve food, and when food shortages do occur, the crop will often be harvested before being fully mature. Usually this is not the case and the remainder of the crop may be left in the fields or sold for factory processing. The latter is done at a later stage and at a much lower price than the cereal equivalent prices used in this report.

When alternative calculations are made in which the estimated weight per cassava plant is doubled - 2 kg - the degree of food self-sufficiency still remains below 60% (see figures below):

	Total	Bongwe	Chilulu	Mw'tate	Kits'ni	Kib'ngo	Bamba
food self-suff.	57%	61%	42%	54%	89%	81%	15%
h.holds < 50%	58%	52%	70%	52%	46%	31%	96%

More than half the households remain unable to provide half of the household energy requirement. The overall trends for the areas also remain the same, except for Bongwe where farmers have large numbers of cassava plants in the fields.

9. *Agricultural Production (with page 41)*
The value of the food crop production was estimated by using sh4 for one kg of harvested cereals (consumer price), cassava and bananas for home consumption (converted into cereal equivalents according to caloric values), and sh8 for one kg of harvested beans.

The value of the cash crop production was determined by estimating the monetary income from the sales of the produce of trees with a commercial value (Appendix 21; in the case of Bongwe commercial bananas were also included).

The value of livestock rearing consists of two elements:
a) the income from the sale of poultry and milk (the latter was corrected for "caretaker", in the sense that it concerned only milk from cattle that was taken care of by one of the household members or by hired labour);
b) the increase of the value of cattle and goats/sheep through reproduction.

In the case of three variables a maximum value was determined to prevent serious distortions in the mean values: sh3,200/cu for the value of annual food crops (cereals and beans); sh2,000/cu for tree crops; and sh1,500/cu for local casual labour (This concerns 7 households).

10. *Employment (with page 48)*
Information was collected on three types of casual labour: casual labour in town, casual labour at estates/plantations and local casual labour in the rural areas. The latter consists almost exclusively of agricultural work on the farms of neighbours during peak labour periods, the details of which are usually more difficult to recall than, for example, of regular jobs. This type of labour also proved difficult to record because it has a very low status and people tend not to report it. It was indeed mentioned infrequently by the respondents, 79 cases alltogether. This kind of work is also the most irregular in nature and the incomes from it tend to be low and difficult to estimate (The 79 cases reportedly earned an average of sh1,800 per annum, which is less than a third of that reported for other casual labour. See Appendix 27). For these reasons, this type of employment and the possible income from it was not included in the calculations, they are separately

presented in section 7, p.62. The data on casual labour therefore concern casual labour in town and at estates/plantations only.

11. *Rural Household Budget Survey 1 (with page 53)*
CBS (1988) carried out the Rural Household Budget Survey in 1981/82 and reported average monthly incomes (cash and kind) of sh937/household in Kwale and sh663/household in Kilifi/Tana River/Lamu. Aggregated, this amounts to a household income of sh800/month or sh9,600/year. This compares with our estimate of sh10,025/year. The two figures are conveniently close but leave the rate of inflation unaccounted for and also overlook differences in research methodology.

The average rate of inflation for the 4 years between 1981/82 and 1985/86 can be estimated at 14% annually, on the basis of the Nairobi consumer prices index. The CBS reported income for 1981/82 recalculated at 1985/86 prices therefore amounts to sh16,128/year (1.68*9,600).

A second correction is necessary because in the present survey the incomes of wage earners were corrected for residency (as explained, p.49), something which was not done for the CBS survey. Furthermore, the income from local casual labour was not included in the calculations for reasons mentioned above (note 10). If the total wages of all off-farm employment, recorded during the present survey, are included unweighted in the household incomes, the average household income increases to sh15,727/year. This is within 2% of the above CBS figure, corrected for inflation.

12. *Food Poverty Line (with page 54)*
The food poverty line was defined as the annual household income needed to purchase the amount of calories required to meet the minimum nutritional needs of household members and was calculated at sh990/cu (rounded at sh1000/cu). The calculation method used is derived from that of the Fifth World Food Survey (FAO, 1987).

The minumum nutritional needs are defined as the need at minimal bodily function at minimum body weight. Minimum body weight was pegged at 54.3kg (=90% of average weight). The basic metabolic rate corresponding with this weight is 1510 calories, multiplied by a factor 1.4 to allow for mimimal activities (not including exercise or work), results in an estimate of 2115 kcal/cu/day or 772,000 kcal/cu/year.

Assuming a food package that consists for 75% of cereals (at sh4/kg) and for 25% of other foods (at sh6/kg) and a caloric value of 3,500 kcal/kg results in an estimated cost of sh990/cu (772,000/3,500 * 4.5).

In an analysis of data from the Integrated Rural Survey of 1974-75, using slightly higher caloric requirements (2250kcal/adult-equivalent) but based on data from only 64 households, the food poverty line in Coast Province was calculated at sh331/adult-equivalent (Greer & Thorbecke,1986:39). The average inflation rate for the decade 1976-85 can be estimated at 12.5% annually, on the basis of the Nairobi consumer price index. Recalculated at 1985/86 prices this results in a figure of sh1070/adult-equivalent for the earlier CBS-survey, which compares with a figure of sh990/cu used in the present FNSP-survey.

The food poverty line is a quite different concept from that of food self-sufficiency explained in note 7, p.144. Food self-sufficiency refers to the food production of a household in terms of staple foods (which are assumed to account for 75% of the recommended daily intake needed for a normal healthy and active existence, 2960 kcal). The food poverty line refers to the 'purchasing power' of a household necessary to assure a minimum energy supply for daily survival with minimum activity (calculated at 2115 kcal/day).

13. *Wage Classes (with page 57)*
This is further confirmed when households are arranged according to wage income: there is no relation with the figures for food crop production and the figures for cash crops and livestock:

Wage Class	*N*	*Wage Income*	*Food Crops*	*Cash Crops & Livestock*
-499	148	64	531	193
500-999	32	712	427	183
1000-1499	27	1194	554	471
1500-2499	35	2023	339	357
2500-3499	30	2998	459	217
3500-	25	5008	456	258

(All figures, except N, in sh/cu)

14. *Top Income Group (with page 57)*
The smaller household size among the top income group is caused by statistical inevitability as well as by the presence of some atypical households in this group.

In the upper income groups, wage incomes are the deciding factor and they tend to reach a certain maximum level; further differentiation among households will then depend on household size, so that smaller households will realize a higher income/cu from a similar gross salary.

Furthermore, the top income group is not homogeneous. There are a number of atypical households in this group where wage earners are living elsewhere with wife and children, but still retain a rural homestead for some family members, often one of the elder parents, usually under fairly traditional living circumstances. In these cases the wage contribution was estimated relatively high, and since the household size is small, this results in a relatively high income per consumer unit. These cases are quite different in nature from rich households where the wage earner is resident, and this could explain why in the top income group housing conditions and educational level tend to drop below that of other high income groups.

15. *Rural Household Budget Survey 2 (with page 63)*
However, it also has to do with the manner of calculation in this report, namely the practice of expressing incomes per consumer unit. If, on the other hand, household incomes are compared, the trend is reversed, and the average income in Kwale is lower than that in Kilifi. However, this is caused solely by higher household incomes in Bamba, which in turn are high because of the large household size in this area (see p.18). Otherwise, household incomes in the L3 and L4 areas in Kilifi were below those in the corresponding Kwale areas (Appendix 29)

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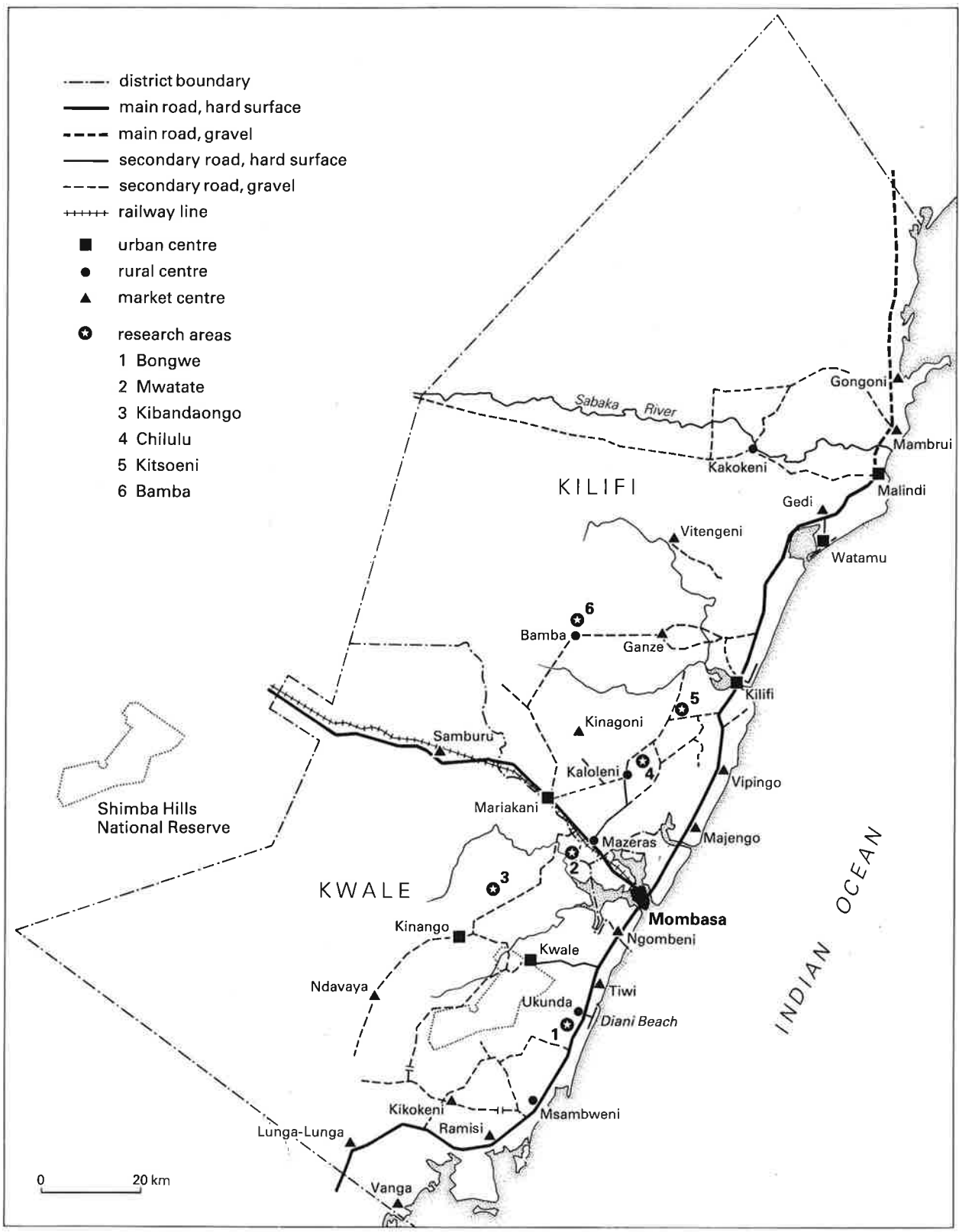
district boundary
main road, hard surface
main road, gravel
secondary road, hard surface
secondary road, gravel
railway line
urban centre
rural centre
market centre
research areas
1 Bongwe
2 Mwatate
3 Kibandaongo
4 Chilulu
5 Kitsoeni
6 Bamba
Sabaka River
Gongoni
Mambrui
Kakokeni
KILIFI
Malindi
Gedi
Vitengeni
Watamu
Bamba
Ganze
Kilifi
Kinagoni
Samburu
Kaloleni
Vipingo
Mariakani
Majengo
Mazeras
Shimba Hills
National Reserve
KWALE
Mombasa
Kinango
Ngombeni
Kwale
Ndavaya
Tiwi
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