International course on water and water management in the Philippines: 3 January - 5 February 2012

Weerd, M. van; Masipiqueña, M.D.; Taggueg, J.B.; Luning, S.W.J.; Persoon, G.A.

International course on water and water management in the Philippines

3 January – 5 February 2012

Merlijn van Weerd, Mercedes Masipiqueña, Jouel Taggueg, Sabine Luning and Gerard Persoon (editors)

Hoogheemraadschap van Rijnland

Universities of Leiden and Oxford
LOUWES FUND
research on water and food

MABUWAYA FOUNDATION, INC. 2003

ISABELA STATE UNIVERSITY 1978

Universiteit Leiden

International course on water and water management in the Philippines

Merlijn van Weerd, Mercedes Masipiqueña, Jouel Taggueg, Sabine Luning and Gerard Persoon (editors)

Cover: participants of the water course 2012

Please cite as follows: van Weerd, M., M. Masipiqueña, J. Taggueg, S. Luning and G. Persoon (Eds). 2012. International course on water and water management in the Philippines 2012. Report. Isabela State University, Cabagan, the Philippines and Leiden University, Leiden, the Netherlands.

International course on water and water management in the Philippines

Editors

Merlijn van Weerd

Mercedes Masipiqueña

Jouel Taggueg

Sabine Luning

Gerard Persoon

With contributions by:

Annelies van der Ploeg, Antje Steenhuizen, Dan Mark Ringor, Erik van Berchum, Eline Siebelink, Fred Pagulayan, Geraldine Palattao, Jasper Buikx, Joefrey Laggui, Jhema Dalupan, Joseph Balabbo, Josine Van Velzen, Leo Smit, Lisanne Dijkmeijer, Lone Maasland, Manouck Veenman, Maridel Galicia, Marilyn Prado, Mariolito Ortiz, Marlies Barendrecht, Maya Velis, Nicanor Yadan, Noortje Grijseels, Noriel Dulatre, Prudencio Magudang, Ronie Turaray, Rosalinda Buraga, Sarah Jane Pagallamman, Tanja Voogd, Vincent Vergeer

Isabela State University and Leiden University

Cabagan, the Philippines and Leiden, the Netherlands

2012

Hoogheemraadschap van
Rijnland

Message

Winter Course 2012

In January 2012, fifteen Dutch students went to the Philippines to meet their fifteen Filipino counterpart students, with whom they would participate in the Winter Course of 2012. Although the name Winter Course might one confuse in the Philippine context, something serious is going on with climate change.

The goals of the Winter Course might be described as:

Getting to know your counterpart student from a different country and a different discipline;

Getting to understand what 'integrated water management' and 'river basin management' looks like in practice.

The Rijnland District Water Control Board feels an obligation in sharing knowledge on the subject of integrated water management. With the millennium goals in mind, we understand that sharing knowledge does not limit itself tot the boundaries of your country. Our cooperation with Leiden University led us to the Philippines, and in this case specifically to the Isabela State University and the Centre for Cagayan Valley Programme on Environment and Development (CCVPED).

In this booklet you find the experiences of the group of students participating in the Winter Course 2012. We are proud of the results and the fact that we could contribute to this activity.

It might be a little too soon to speak of a tradition, but I am confident that this second Winter Course in a row will not be the last one.

I sincerely hope that many more Winter Courses may follow!

Timo van Tilburg

Head of the Policy Department

The Rijnland District Water Control Board

Leiden, The Netherlands

Acknowledgements

In 2006 and 2007 two summer courses of six weeks each were organized in the Philippines for 30 participants: 15 international and 15 Filipino students. The courses were organized under the umbrella of CVPED, the Cagayan Programme for Environment and Development. This cooperation programme between Leiden University and Isabela State University started in 1987 and lasted for more than 20 years until December 2009 when it unfortunately came to an end. This also implied the end of a range of joint educational activities, including the summer courses.

By a stroke of good fortune however, renewed contact at a personal level between staff members of the Water Board (Hoogheemraadschap) Rijnland and Leiden University resulted in the interest of Rijnland to partly fund a course in the Philippines on water use and water management. The first international water course was organized by the Faculty of Social Sciences of Leiden University, Isabela State University and the Mabuwaya Foundation in January 2011 with 24 students: 12 from the Philippines and 12 from the Netherlands. The course was a huge success, the interest of students in a full time interdisciplinary and intercultural course was as high as during the earlier summer courses. Based on the positive results of the first water course, Rijnland, Isabela State University, the Mabuwaya Foundation and Leiden University decided to continue this collaboration. In January 2012, another international water course was organized, this time with 30 students in total: 15 from the Philippines and 15 from the Netherlands.

The present booklet is the outcome of the work done by the students during their training and fieldwork in the Philippines from 3 January – 5 February 2012.

The 2012 Course would not have been possible without the funding by Hoogheemraadschap Rijnland, the Louwes Fund for research on Water and Food and the Faculty of Social Sciences of Leiden University.

The course was organized and coordinated by the Faculty of Social Sciences of Leiden University (Sabine Luning, Merlijn van Weerd and Gerard Persoon), Isabela State University (Mercy Masipiqueña and Jouel Taggueg) and the Mabuwaya Foundation (Merlijn van Weerd).

Participants from Isabela State University were screened from the different colleges and we thank Eileen Bernardo, Jouel Taggueg and Tomas Reyes of CFEM, Janet Quilang of PTIA, Marites Aggabao, Jane Cabauatan and Josie Balmaceda of CDCAS and Joel Alcaraz of the College of Engineering at Echague for their assistance in this.

The Centre for Cagayan Valley Program on Environment and Development (CCVPED) of Isabela State University (ISU), headed by Mercy Masipiqueña and with staff members Eso Tarun, Onia Gunayon and Lenlen Morillo provided support while the students stayed in Cabagan. Accommodation and meals were provided by ISU with the meal service coordinated by Rose Araño and Jun Zipagan while Snooky Macapallag coordinated accommodation. Randy Macapallag made sure the audio-visual equipment was working during lectures and presentations in Cabagan. Myrna Cureg, Maricon Perez, Bong Simon, Myrna Ramos and Eng'g Ausa kindly provided advice to students working on their reports. We thank Campus Executive Officer Edwin Macaballug of ISU Cabagan for all his support during the coordination and the implementation of the course.

We thank Dr. Bacani for the Echague bus used during this course, driven by Lino Baquiran and Edmundo Jastillana. Likewise, we thank the ATI-RTC for the use of their bus, driven by Nicky Ramirez and Samuel Binag Jr.

Essential support during the preparation and implementation of the course was provided by the Mabuwaya Foundation team: Tess Gatan-Balbas, Wilda Calapoto, Arnold Macadangdang, Dominic Rodriguez, Sam Telan, Jessie Guerrero, Edmund Jose, Ronald Addatu and Willem van de Ven.

Imee Reyes and May Caballero of the World Agroforestry Centre (ICRAF) and Emilia Lastica of the University of the Philippines helped organize the visits to organizations in Los Baños and accommodation there.

A large number of representatives of government, non-government and international organizations warmly welcomed the students at their offices or field sites and provided a unique insight in their work: Rodel Lasco of the World Agroforestry Centre (ICRAF). Beatrisa Martinez of the International Rice Research Institute (IRRI), Roy Padilla and colleagues of the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). Rizza Salinas of the Protected Area and Wildlife Bureau (PAWB). Dave de Vera and Samson Pedragosa of the Philippine Association For Intercultural Development (PAFID) and Giovani Reyes of the Koalisyon Ng Katutubong Samahan Ng Pilipinas. Roger Guzman of the Philippine Federation for Environmental Concern (PFEC). Sammy Balinhawang of the Kalahan Educational Foundation (KEF). Saturnino Tenedor and the Engineers of the Dam and Reservoir Division of the Magat River Integrated Irrigation System.

Lectures were given at the Environmental Information Centre (EIC) building in Cabagan. The following persons kindly shared their knowledge and expertise on a wide variety of subjects with the students: Romeo Quilang, Perla Visorro, Orly Balderama, Robert Araño and Dante Aquino.

Isabela State University President Romeo Quilang and Cabagan Campus Director Edwin Macaballug provided inspiring speeches during the opening program.

During fieldtrips, the group was very kindly received and informed by John Acay and colleagues of the Conservation International/Toyota reforestation project in Peñablanca and by Niña Lumauan and colleagues of the Metropolitan Tuguegarao Water District (MTWD).

Last but not least, the students experienced the famous Philippine hospitality while staying with host families in the field sites. The Mayors and Local Government Unit officials and employees, Barangay Captains and Council members, interview respondents, guides and host families in the field sites in Aparri, Peñablanca, Tuguegarao, San Pablo, Cabagan, San Mateo, Aurora and Cabatuan are warmly thanked for their generosity, hospitality and support.

The Editors

Table of Contents

Introduction

Water is one of the most critical resources currently under threat world-wide. Developing countries in particular face complex challenges as the demand for clean drinking water, irrigation water and water for the generation of hydroelectricity grows rapidly. Water becomes increasingly scarce while its quality declines. Climate change leads to greater risks associated with floods and droughts.

Water supports a great variety of resources, functions and services, and in order to safeguard these for the future, sustainable management is essential yet not adequately practiced. The formulation of policies for sustainable water resource management is a complex process. Water resource management is typically associated with multiple stakeholders and a wide range of social, environmental and economic needs. Moreover, effective management of water resources is achieved through the linkage of sustainable land and water uses across the whole of a river basin, crossing boundaries of different administrative units. Global institutions highly promote the participation of local communities, claiming that water resource management and development are central to sustainable growth and poverty reduction. Nevertheless, communities face numerous barriers in their efforts to establish sustainable water and land resources management systems, water sources and watersheds and adapt to weather-related disasters

The Faculty of Social Sciences (FSW) of Leiden University, in cooperation with Isabela State University and the Mabuwaya Foundation in the Philippines organised an international, interdisciplinary course on water issues and water management in the Cagayan River basin in Northeast Luzon in the Philippines from 3 January – 5 February 2012. Thirty students participated in this course, 15 through Leiden University and 15 through Isabela State University. The students were enrolled in different studies: Cultural Anthropology, Journalism, Biology, Forestry, Agricultural Engineering, Environmental Science, Sociology, Development Communication, Agriculture, Fiscal Law, Agri-business, Business Administration, Economical Law, Civil Engineering and Chinese Culture and Languages.

The focus of the course was on the utilization and importance of fresh water, water scarcity and super abundance, climate change and water, water and biodiversity conservation, conflicts over water and the role of communities and government in water management. The objective of the course was to gain experience with working in an international, interdisciplinary team on a problem-oriented research assignment. Apart from gaining knowledge on water issues and water management in a developing country, students learned practical fieldwork skills, the application of research methods and techniques and the complexities and opportunities of working in multi-disciplinary multi-cultural teams .

The course consisted of an introduction to water issues and water management in the Philippines by various government and non-government organizations in Manila and Los Baños.

In Los Baños, the group visited the International Rice Research Institute (IRRI) to learn more about rice cultivation and the importance of water management for rice farmers. The World Agroforestry Centre (ICRAF) provided a background on climate change, reforestation, forest protection and Payments for Environmental Services (PES). Students and staff also visited and hiked up Mt Makiling, a protected watershed area in Los Baños.

In Manila, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) of the Department of Science and Technology (DOST) presented the climate of the Philippines and climate change scenarios. The Protected Areas and Wildlife Bureau (PAWB) of the Department of Environment and Natural Resources (DENR) provided a background on their rescue centre for threatened wildlife in Quezon City. The Philippine Association for Intercultural Development (PAFID) lectured on the Indigenous People (IP) of the Philippines and their work with IP communities for land rights and conservation. The Philippine Federation for Environmental Concern (FPEC) presented their community-based reforestation and water shed protection programs. The students also visited the source of drinking water of Metro Manila: La Mesa Dam and the surrounding protected watershed area.

On the way to northern Luzon, the Kalahan Educational Foundation (KEF) and the Ikalahan Ancestral Domain in Nueva Vizcaya were visisted. Here the students learned, among others, about the role of Indigenous People in watershed protection. After a cold night high in the mountains Magat Dam was visited, downstream of the forest that the Ikalahan are protecting.

In Cabagan at Isabela State University, a series of lectures was given by external and academic presenters on water related subjects. A field site was visited for an in-depth introduction to water conservation issues: the Conservation International/Toyota watershed reforestation pilot project in Peñablanca.

The students worked in couples (interdisciplinary, multi-cultural) on the development of a small field study proposal on a water-related issue. Field work was conducted by these couples during five days in three research sites in Isabela and Cagayan Provinces. After field work, data were analysed during three days and presented during a concluding workshop on water issues.

The hard work done, the students visited the Philippine crocodile rearing station in the municipality of San Mariano to learn more about the conservation of the World's rarest crocodile. Then the group camped out at the Santa Victoria Caves Park in Ilagan and explored the forest, caves and natural swimming pools there. A visit to the famous Rice terraces of Banaue, a World wonder of indigenous engineering and water management, concluded the course.

This booklet contains an introduction of the participating students, the course program and a short description of the field studies by the participating students followed by the full student reports and concluded with the Blogs that students maintained on the course website (http://cabaganwintercourse.wordpress.com/). Student contributions have been slightly edited and formatted to improve readability.

The Editors

Students Water Course Philippines 2012, alphabetically by given name

Annelies van der Ploeg

Cultural Anthropology & journalism

Antje Steenhuizen

Chinese & Environmental Science

Dan Mark Ringor

Agricultural Engineering

Erik van Berchum

Civil Engineering

Eline Siebelink

Cultural Anthropology

Fred Pagulayan

Environmental Science

Geraldine Palattao

Biology

Jasper Buikx

Biology

Joeffrey Laggui

Development Communication

Jhema Dalupan

Sociology

Joseph Balabbo

Agriculture

Josine Van Velzen

Cultural Anthropology

Leo Smit

Biology

Lisanne Dijkmeijer

Cutural Anthropology

Lone Maasland

Cultural Anthropology

Manouck Veenman

Fiscal Law

Maridel Galicia

Agri-Business

Marilyn Prado

Forestry

Mariolito Ortiz

Environmental Science

Marlies Barendrecht

Civil Engineering

Maya Velis

Law (Economy)

Nicanor Yadan

Agricultural Engineering

Noortje Grijseels

Biology

Noriel Dulatre

Environmental Science

Prudencio Magudang

Forestry

Ronie Turaray

Agricultural Technology

Rosalinda Buraga

Sociology

Sarah Jane Pagallamman

Agri-Business

Tanja Voogd

Biology

Vincent Vergeer

Business Administration & Sociology

Coordinators and supporting staff water course Philippines 2012

Mercedes Masipiqueña

Isabela State University

Gerard Persoon

Leiden University

Jouel Taggueg

Isabela State University

Sabine Luning

Leiden Univerity

Wilda Calapoto

Mabuwaya Foundation

Marites Gatan-Balbas

Mabuwaya Foundation

Merlijn Van Weerd

Leiden University &
Mabuwaya Foundation

Arnold Macadangdang

Mabuwaya Foundation

Samuel Telan

Mabuwaya Foundation

Dominic Rodriguez

Mabuwaya Foundation

Jessie Guerrero

Mabuwaya Foundation

Willem van de Ven

Mabuwaya Foundation

Samuel Binag Jr

ATI-RTC- O2

Eduardo Jastillana

ISU Echague

Angelino Baquiran

ISU Echague

Nicanor Ramirez

ISU Cabagan

Program 3 January – 5 February 2012

Date	*Activity*	*Accommodation*
Tue 3	Departure Amsterdam/Cabagan	
Wed 4	Arrival Manila. Welcome Dinner	Manila: Natividad
Thu 5	Visit Intramuros, National Museum and Mall of Asia (ice skating!)	Manila : Natividad
Fri 6	Travel to Los Banos: visit World Agroforestry Centre (ICRAF) and International Rice Research Institute (IRRI)	Los Banos: SEARCA
Sat 7	Los Banos: am: hike up to Mt Makiling. pm: swimming	Los Banos: SEARCA
Sun 8	Travel to La Mesa dam in Quezon City	Quezon City: UP Diliman
Mon 9	Presentations by organizations in Manila: Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) Protected Areas and Wildlife Bureau (PAWB) Philippine Foundation for Environmental Concerns (PFEC) Philippine Association For Intercultural Development (PAFID)	Quezon City: UP Diliman
Tue 10	Travel to Santa Fe/Imugan. Visit the Kalahan Educational Foundation and community-based watershed protection project.	Imugan
Wed 11	am: visit IKalahan area pm: visit Magat Dam pm: travel to the Environmental Information Centre (EIC) in Cabagan	Cabagan: EIC
Thu 12	am: Opening Program introduction to Isabela State University and Cabagan by Calesa pm: lectures Introduction region II 1. Perla Visorro: introduction Cagayan Valley 2. Orlando Balderama: introduction hydrology, water use and water issues Cagayan Valley 3. Romeo Quilang: water harvesting techniques in Cagayan Valley	Cabagan: EIC
Fri 13	am: lectures Cagayan Valley 1. Merlijn van Weerd: Biodiversity/ecosystems Philippines and NE Luzon 2. Robert Arano: Biodiversity/watershed conservation Philippines and NE Luzon Lectures Research methods 1. Gerard Persoon: Environmental Science: action in context 2. Sabine Luning: social research methods 3. Dante Aquino: statistical methods for interview data analysis pm: introduction field work and workshop research design and research questions Evening: Dutch dinner at the Mabuwaya house and Videoke	Cabagan: EIC
Sat 14	Free, Fiesta San Pablo	Cabagan: EIC
Sun 15	Develop research proposal	Cabagan: EIC

Date	*Activity*	*Accommodation*
Mon 16	Develop research proposal	Cabagan: EIC
Tue 17	Visit Penablanca: CI/Toyota Project and Introduction to field conditions. Evening: dinner in Tugegarao and bowling	
Wed 18	am: develop research proposal pm: present research proposals	Cabagan:EIC
Thu 19	Field work, field day 1	Field
Fri 20	Field work, field day 2	Field
Sat 21	Field work, field day 3	Field
Sun 22	Field work, field day 4	Field
Mon 23	Field work, field day 5, return to Cabagan	Field
Tue 24	Cabagan Fiesta	Cabagan: EIC
Wed 25	Data analyses and report preparation	Cabagan: EIC
Thu 26	Data analyses and report preparation	Cabagan: EIC
Fri 27	Data analyses and report preparation	Cabagan: EIC
Sat 28	San Mariano Philippine crocodile rearing station and Santa Victoria Caves: field trip	Santa Victoria: tents
Sun 29	Santa Victoria: field trip	Cabagan: EIC
Mon 30	Preparation presentations	Cabagan: EIC
Tue 31	Presentation results field work. Evening: farewell party	Cabagan: EIC
Wed 1	am: Travel to Banaue, pm: visit rice terraces	Banaue Hotel
Thu 2	Hike to Batad, tour of the Batad rice terraces and waterfall	Banaue: Batad
Fri 3	Back to Banaue, travel to Manila and Isabela	Manila: Natividad
Sat 4	Departure Manila to Amsterdam	
Sun 5	Arrival Amsterdam	

Student teams and field work topics

Students: Fred Pagulayan, Josine van Velzen, Lisanne Dijkmeijer and Rosalinda Buraga

Title: Reduce, Reuse, Recycle

Location: Aparri

Students: Mariolito Ortiz and Lone Maasland

Title: Perception and Awareness of Climate Change in Different Barangays of Aparri

Location: Aparri

Students: Joseph Balabbo and Jasper Buikx

Title: Ludong (C*estraeus plicatilis*) fishing in the Cagayan River in the Municipality of Aparri, the Philippines

Location: Aparri

Students: Prudencio Magudang and Tanja Voogd

Title: The status of the mangrove forest in Aparri

Location: Aparri

Students: Eline Siebelink and Dan Mark Ringor

Title: Choosing for biodiversity: a conversation on conservation between the corporate, governmental and the community level in Peñablanca,Cagayan

Location: Peñablanca

Students: Noriel Dulatre and Vincent Vergeer

Title: Carbon trading within the borders of the PPSRP

Location: Peñablanca

Students: Leo Smit and Ronie Turaray

Title: PES and irrigation in Peñablanca (Malibabag)

Location: Peñablanca

Students: Marilyn Prado and Antje Steenhuizen

Title: Contributing Factors in the Success of Agro-forestry Farms in Peñablanca

Location: Peñablanca

Students: Annelies van der Ploeg and Geraldine Palattao

Title: Safe drinking water in Tuguegarao City and San Roque

Location: Peñablanca

Students: Manouck Veenman and Maridel Galicia

Title: Safe drinking water in Tuguegarao City and San Roque

Location: Peñablanca

Students: Marlies Barendrecht and Joeffrey Laggui

Title: The irrigation system in San Pablo

Location: San Pablo

Students: Sarah Jane Pagallamman and Maya Velis

Title: Difficulties with regard to Water Distribution in San Vicente and Dalena, San Pablo: Conflicts and conflict management in irrigation

Location: San Pablo

Students: Noortje Grijseels and Jhema Dalupan

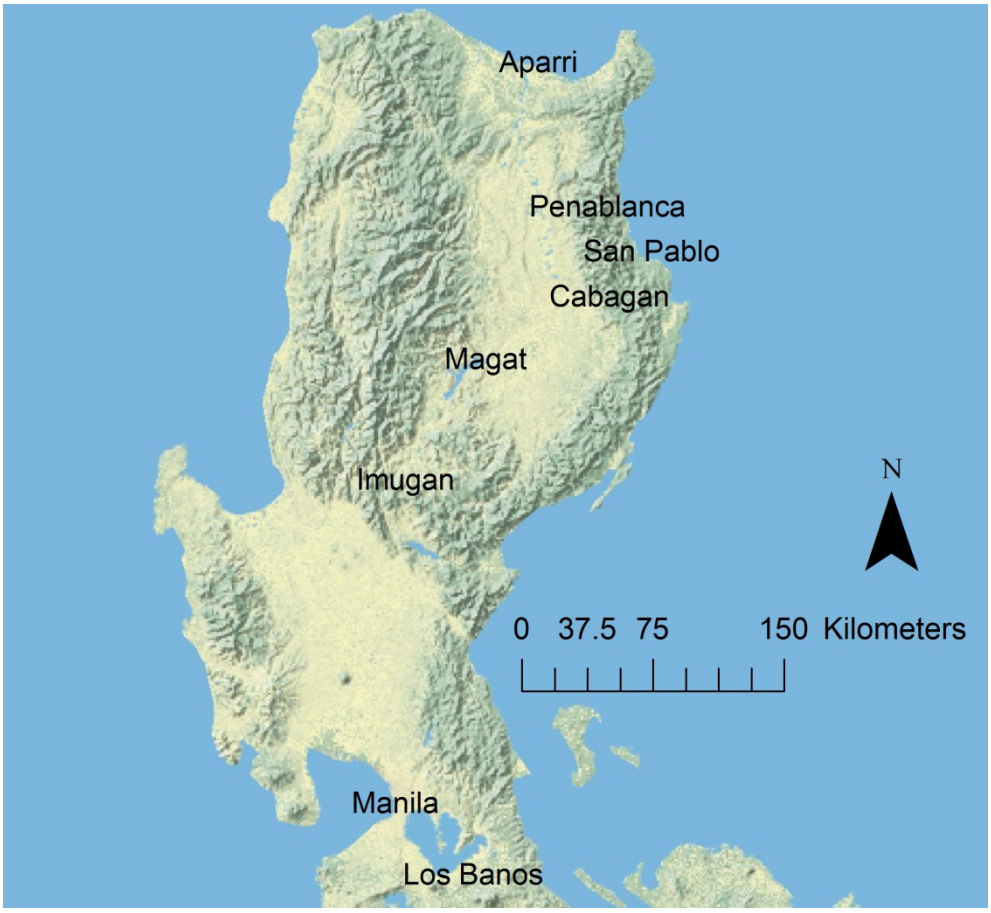
Title: A survey of the current status of the Philippine Duck *Anas luzonica* in the Malasi lake area, Cagayan Valley

Location: Cabagan

Students: Erik van Berchum and Nicanor Yadan

Title: An analysis on the consequences and possible improvements on the flood protection downstream of Magat Dam

Location: San Mateo, Aurora and Cabatuan



Map of North Luzon with visited localities and field work sites

Aparri

The Pier of Aparri at the mouth of Cagayan River (van Weerd 2012)

Reduce, Reuse, Recycle

Rosalinda Buraga, Lisanne Dijkmeijer, Josine van Velzen and Fred Pagulay

INTRODUCTION

Aparri is at the delta of the Cagayan River and we conducted this research in Punta, San Antonio and Maura, all barangays of Aparri. There is a lot of driftwood and garbage coming from the upstream. In this short research, we looked into the problems and opportunities that driftwood and garbage provide to the people of Aparri. We also looked into the rules at national, provincial and municipal level and if the rules are implemented.

Garbage comes from households, industries, farms, etc. Most garbage cannot be reused. There are some exceptions such as bottles which can be sold to the junkman, or farm garbage which can be used for cooking. Garbage pollutes the water of the river and the sea, it gets into the nets of fishermen and it is scattered everywhere on the beach. Since there is so much garbage in Aparri, coming as well from the people living in the upstream of the municipality, garbage is burned, buried, recycled or made into decorations and utensils like lamps.

Garbage burning at the beach in Aparri (Persoon 2010)

Driftwood comes from the sides of the river where (illegal) logging takes place even though illegal logging is forbidden since June 20, 1986 by the Ministry Administrative Order No. 8. The rule is there, but it is not fully implemented. The wood ends up in the river, either by flood, by strong wind or by mistake. It can ruin the nets of fishermen in downstream areas. But it can also be used for cooking, for furniture or for the construction of houses, depending on the size of the driftwood. With the various uses of driftwood, people can save a lot of money.

Garbage at the beach of Barangay Maura, Aparri (Dijkmeijer 2012)

During rainy season from September to December, there is an occurrence of flood in Cagayan Valley. Usually during floods, wastes - driftwood, agricultural and hazardous - are carried away, pass through the Cagayan River and finally into the Chinese Sea. But when the rainy season is over, there is still a lot of garbage because a lot of people use the Cagayan River to dispose their wastes as a ready sink without knowing the possible effects of these to human life and most especially to aquatic life (Bernardo et al 1998).

The theory we used for our research is Maslow's Pyramid theory (Appendix 1). His theory runs parallel to many other theories of human development psychology, all of which focus on describing the stages of growth in humans. Maslow's hierarchy of needs is often portrayed in the shape of a pyramid, with the largest and most fundamental level of needs at the bottom, and the need for self-actualization at the top. Based on the theory, there are needs that need to be fulfilled first before people are going to worry about the environment. If people have to worry about food, shelter, clothes, social security and peace and order, they will not think about the proper way of managing garbage. They have enough problems to think about, without the garbage problems (also according to respondent 5).

Collected driftwood on the street in Punta (van Velzen 2012)

RESEARCH QUESTION

What are the effects of driftwood and garbage on fishermen at the bank of the Cagayan River and the beach of Aparri?

Sub questions
Where, when, how and by whom is garbage and driftwood collected?
Who do our respondents think are responsible for cleaning the garbage and driftwood?
Will fishermen make, save or lose money out of garbage and driftwood?
Are garbage or driftwood considered a positive or negative factor on the livelihood of the fishermen?

METHODS

This study is a descriptive research, and actual field visits were conducted to gather and validate the information given by the respondents. In all cases, we used open interviews based on our sub-questions mentioned above. In our interviews, we referred to what we saw on the site where the interview took place and we also asked questions about what the respondent was doing at that time or what he or she was carrying. We also took pictures of what we saw in the area where we were at that moment so we would remember the interview areas better and could make better observations.

RESULTS

The laws on garbage

National Level
The national government's function on ecological solid waste management is declared by the policy of the State (Philippines) that ensures the protection of public health and the environment. Specifically, it utilizes environmentally sound methods and ensures proper segregation, collection, transport, storage, treatment, and disposal of solid wastes through the formulation and adoption of best environmental practice.

Municipal Level
The municipal government is responsible in the implementation of the solid waste management system. Open burning of solid wastes shall be prohibited. Illegal dumping of solid wastes along streets, alleys, riverbanks, and in any public place shall be strictly banned.

The Municipal Office organized a few contests about solid wastes. It conducted a contest for schools joined by every elementary school in Aparri. The elementary school that best implements the Solid Waste Program wins. The elementary school we visited adopted the Solid Waste Program which is implemented by the local government unit. It also participated in the competition of schools for best implementer of the Solid Waste Program. There are a lot of overlaps in the rules given from national, provincial, municipal and barangay level. They have a head of Solid Waste Management who makes sure the program works. They have a separate waste collection, recycle as possible, do not burn garbage but instead make compost which they use for the school garden. There are rules and tips for composting posted on some of the walls of the schools. The school also organizes days where the pupils/schoolchildren, their parents and teachers clean the beach.

The Municipal Office also held a contest about decorations made of recycled materials. The pieces of art are seen hanging in the Municipal Office and are displayed in front of the building as well.

Sign in the garden of the Elementary School of Punta (Dijkmeijer 2012)

Barangay Level

There shall be a network of barangay-based councils established as extension of the Integrated Solid Waste Management Council. There shall be a barangay and zone collection system of the recyclable and toxic/hazardous wastes by establishing a workforce of registered pushcart operators.

Overview of respondents

We made figures and tables to illustrate the background information of our respondents. The majority of the respondents are male (55%, compared to 45% female, Figure 1) and officials (37%, Figure 2). In addition, we interviewed a lot of fishermen (34%, Figure 2) and housewives (13%, Figure 2). We also asked the ages of our respondents and found out that most respondents are aged 40-49 and 50-59. Our youngest respondent is 31 years old and our eldest, 82 years old. Most of the respondents that we interviewed live in Barangay Punta (20 respondents, Figure 4). We also interviewed some officials in the Local Government Unit (LGU) (5 respondents, Figure 4).

Christmas art materials made of garbage in the Municipal Office (Dijkmeijer 2012)

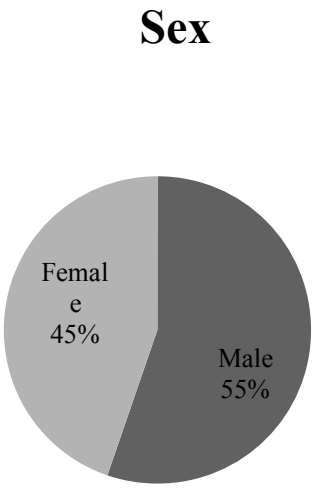


Figure 1: Division of the sex of the respondents

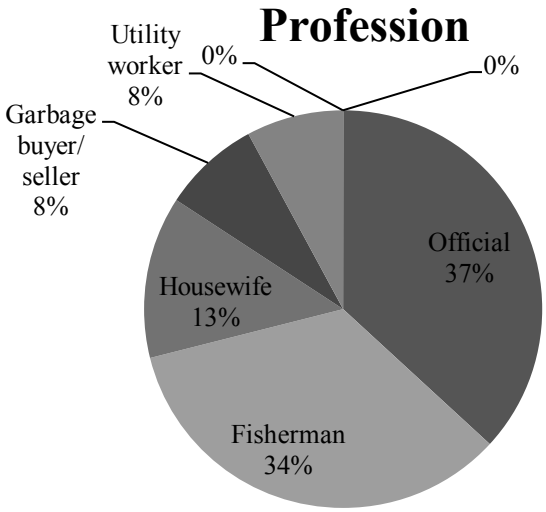


Figure 2: Division of the profession of the respondents

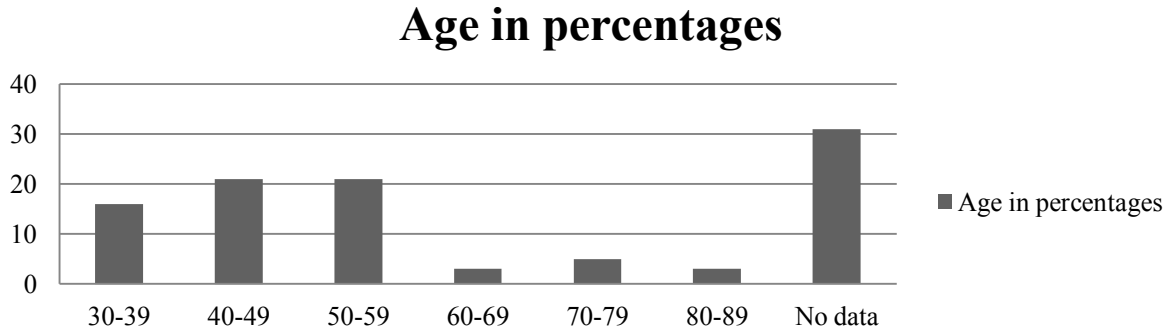


Figure 3: Division of the ages of the respondents, divided in categories

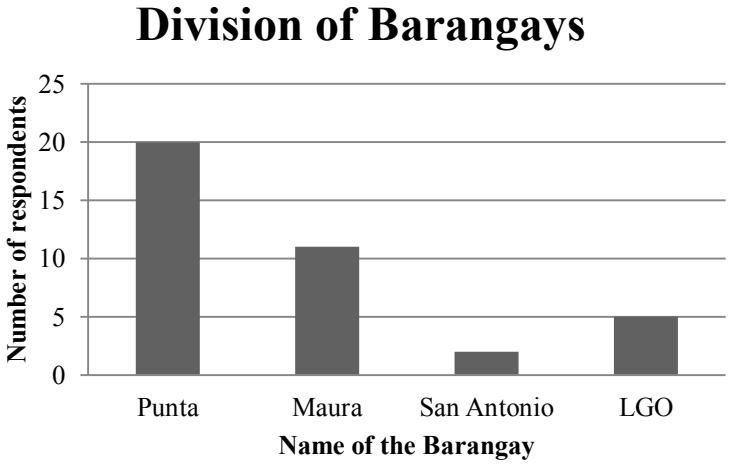


Figure 4: Divisions of the barangays where our respondents live

Quantitative data

Where, when, how and by whom is garbage and driftwood collected?

Most of the garbage is collected by the barangay officials and their utility workers (according to 26% of our respondents). They collect all kinds of garbage. Also, some respondents (5%) told us that mostly, children and elderly collect recyclable garbage to sell these to the junkshop for extra money, and sometimes, adults do this as their main income (8%). The driftwood however, is collected by everyone (40% of our respondents) who does not want to spend money on firewood for cooking because of lack of money for living.

Garbage is mainly collected at the beach. The officials who will clean the garbage will also do this at the beach. We did not hear anybody talking about cleaning the river.

For driftwood, the major part is collected in the river. But there is also driftwood collected on the beach (respondent 28), but these are much smaller than the driftwood collected in the river. Most of the things that are collected as fuel for cooking at the beach are actually garbage, not plastics, but corn tangles from the farmers (according to respondent 28).

Tricycle loaded with recyclable garbage (van Velzen 2012)

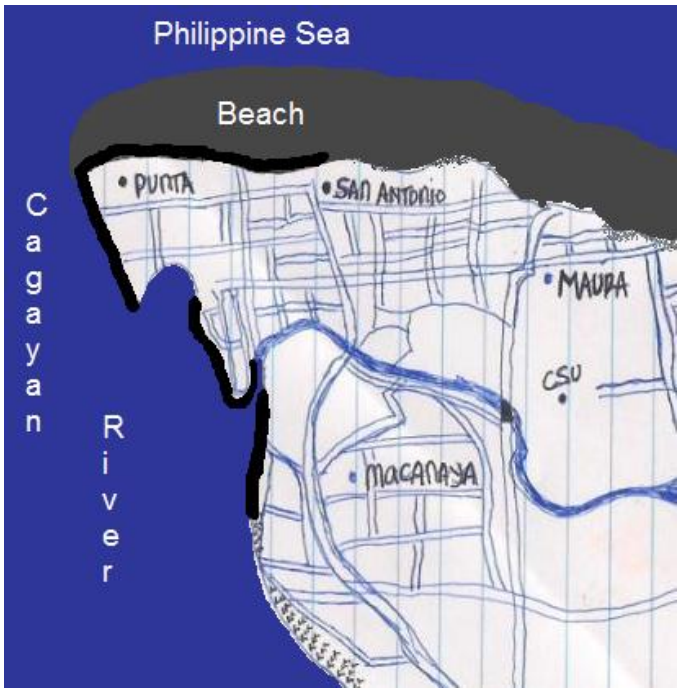
The highest quantities of garbage and driftwood are collected after a flood (according to 24% of our respondents). But next to that, some respondents (for example, 28) collect driftwood every day because otherwise they will not have fuel for cooking. Also, collecting garbage is done on a daily basis. In the whole Aparri, seven to eight tons of garbage is collected each day (according to respondent 1).

Most of the garbage is collected in bags, mostly, where people use to store rice. Then the people place their bags on the roadside and when the dump truck drives by, they will empty the bag in the dump truck (van Velzen 2012, Pers. Observ). And if the dump truck does not drive by, or the people do not want to bring the sack to the roadside, sometimes, they will bury or burn the garbage at the beachside (respondent 29).

The driftwood is just collected by hand and then carried on the shoulders or head of the collector or carried with a small cart (Dijkmeijer 2012, Pers. Observ).

Responsibility

When we asked about the responsibility of cleaning the garbage, most people answered that officials are responsible. They should do that either through implementing the law better or by cleaning themselves. Most of the people think this should be done at the municipal level (21% of the respondents) or at the barangay level (18% of the respondents). Also, some respondents (11%) think that the responsibility is with non-officials, like the citizens of Aparri, and one respondent (number 6) thinks that the responsibility is with the national government.



Map 1: Map of Aparri with the beach, the river and the sea. The black wall is the seawall

Making money or losing money?

It is hard to find out if fishermen are making or losing money because of garbage and driftwood. There is no exact datum about it. Most fishermen do not write down how much driftwood and garbage they collect and where they use them, thus, they are unable to determine how much money they save by using the found products. For example, the fishermen do not know how many days they use driftwood for cooking and how many days they use charcoal or other fuels. They do not also write down how much money they spend on fuels for cooking if there is no driftwood left. However, a lot of our respondents (40%) told us that they save money because of the driftwood.

Fishermen do not also keep charge of the times their nets break because of driftwood or garbage. Sometimes they do not know if it is because of driftwood, garbage or a big fish. Some of our respondents (11%) told us that sometimes their nets would break because of driftwood, but they do not know how often that happens. The nets just sometimes break and then they fix them again.

It is also hard to say if garbage has an influence on the income of fishermen because the effects of garbage are not extremely visible. Garbage can pollute the water, so there is less fish, but the fishermen do not really talk about that. There were officials who talked about the pollution of the water and the effect on fish population which is getting less. The fishermen need to go farther on the sea to get fish in an area without garbage (respondent 4 and 25). This costs more gasoline for their boats, so the fishermen lose money. Fishermen do not get money from garbage. But some of our respondents (16%) specifically the utility workers and the garbage buyers and sellers do make money out of the garbage. For fishermen, garbage is just a negative factor, but how negative is not completely clear.

Woman collecting driftwood (Photo by J.C. van Velzen 2012)

It is hard to say if the fishermen are losing or gaining money from the driftwood and garbage. But a lot of officials do believe that without the driftwood, the lives of fishermen will be a lot harder because they also have to buy fuels for cooking (40% of the respondents).

Garbage and driftwood, positive or negative?

The people at the river do not have a problem with garbage. If they get garbage in their fishing nets, they just throw them back into the river (according to 11% of the respondents). It does not really matter that other people will have the same problem if they do that. The people at the beach have more problems with garbage, because the waves will bring them right back if they throw them into the sea. There are a lot of garbage, but they do not mind them scattered at the beach. If these go to their houses, on the higher part of the beach, they gather them and either bury them, or burn them (for example respondent 28). For the respondents who can make money out of garbage, it is of course positive (37% of the respondents).

People near the river and sea need driftwood for cooking (according to 48% of the respondents). If there would be no more driftwood, a lot of people would not be able to provide for their livelihood. So, no one sees driftwood as a problem because they help in the livelihood of the people. However, driftwood sometimes breaks the fishing nets (this happened with 11% of our respondents). But the positive effects of the driftwood are much bigger than the negative effects. So, most of the respondents think that the effect of garbage on the livelihood of the fishermen is neutral or negative (both 13 respondents and 34%) and the greatest number of the respondents think that the effect of driftwood on the livelihood of the fishermen is positive (28 respondents or 74%).

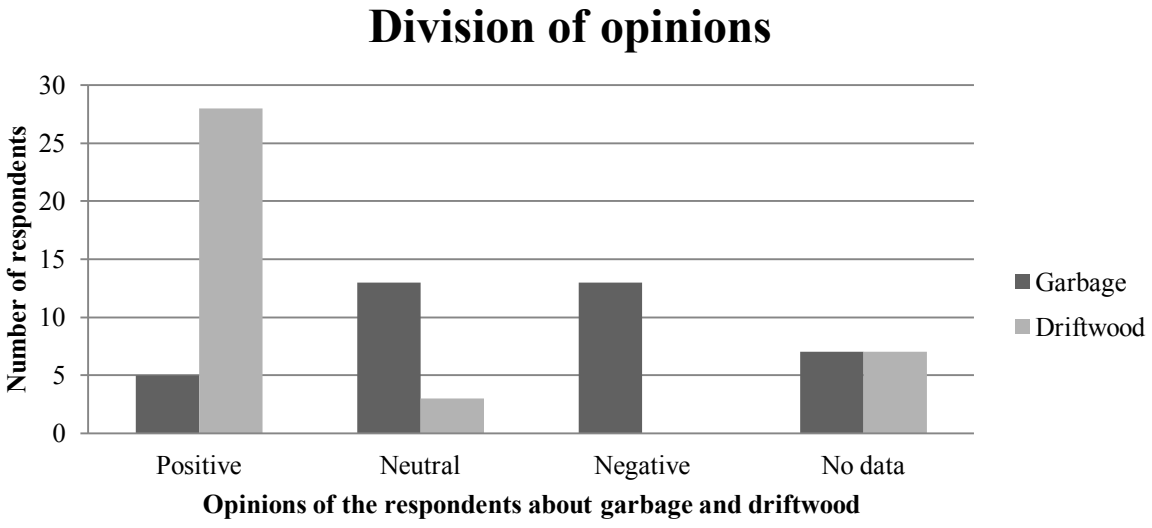


Figure 1: Division of the opinions of the respondents about garbage and driftwood

DISCUSSION

Municipal officials think that garbage is the biggest problem in Aparri. The local government unit considers improper waste disposal as the number one problem of the municipality of Aparri. The rules are very extensive but these are not always implemented. The barangays should make sure that the rules are implemented. That is not so easy especially because there are a lot of garbage and there are not enough resources and facilities to recycle or store all the garbage. That is why there are people who throw their garbage in the Cagayan River and even along the streets. Some of the people burn their garbage to reduce their household wastes. Some of them bury these wastes along the sea shore. These practices imply that some of the people in Aparri are not aware about the effects of burning and burying their waste materials especially the hazardous wastes.
The barangays had money to implement a program for solid waste management last year, but now there is not so much money anymore. However, they still have to do the same tasks. That is the reason why the implementation of the Solid Waste Program is not going as well as should be, according to the barangay officials. That there are only 26 police officers for the 60,000 people does not make the implementation easier.

Sign at the DENR's waste disposal place
(van Velzen 2012)

Since our research is not complete and poses a lot more questions, we would recommend further research. For future research, it is useful to look into the environmental effects of garbage. It will also be useful to know the health problems caused by pollution brought about by garbage and by burning these wastes and to know if people and how many of them know that burning of garbage is bad for their health. It would also be useful to look into the implementation of the rules and if there is a better way to make sure the rules are implemented.

Recommendations
We recommend a strict implementation of Republic Act No. 9003 and other related laws such as municipal ordinances and barangay ordinances. Maybe it would help if the law and the rules are in Tagalog or other local dialects. Relocation of a new dump site is also needed. People should stop burning garbage and throwing garbage in the river and along the seashore. This can be achieved by continuing information dissemination and education campaigns about the solid waste management programme in the barangay, schools, offices and other organizations. It would be very useful if every constituent would change his old habits and would start with reduce, reuse, and recycle.

ACKNOWLEDGEMENTS

We would like to express our profound thank and sincere appreciation to those who contributed to the accomplishment of our research: Assistant Regional Director Milagros Morales of the Bureau of Fisheries and Aquatic Resources (BFAR) Region II for providing us a room where we stayed for two days and two nights at the Regional Fisheries Training Center Staff House (RFTCSH) at the Cagayan State University in Aparri. Barangay Captain Aniceto Gatan of Punta and his family for being hospitable and kind where we stayed during the last few days of our fieldwork. Municipal Mayor Ismael V. Tumaru of Aparri for his sincere support and for providing lunch for us during the last day of our stay in Aparri. The Local Officials of Barangays Punta, Maura and San Antonio for their help in our research. The respondents from the different barangays and offices who gave us honest answers and accurate information. Arnold Macadangdang for his support in making appointments with all the officials we visited and for his encouragement in the field.

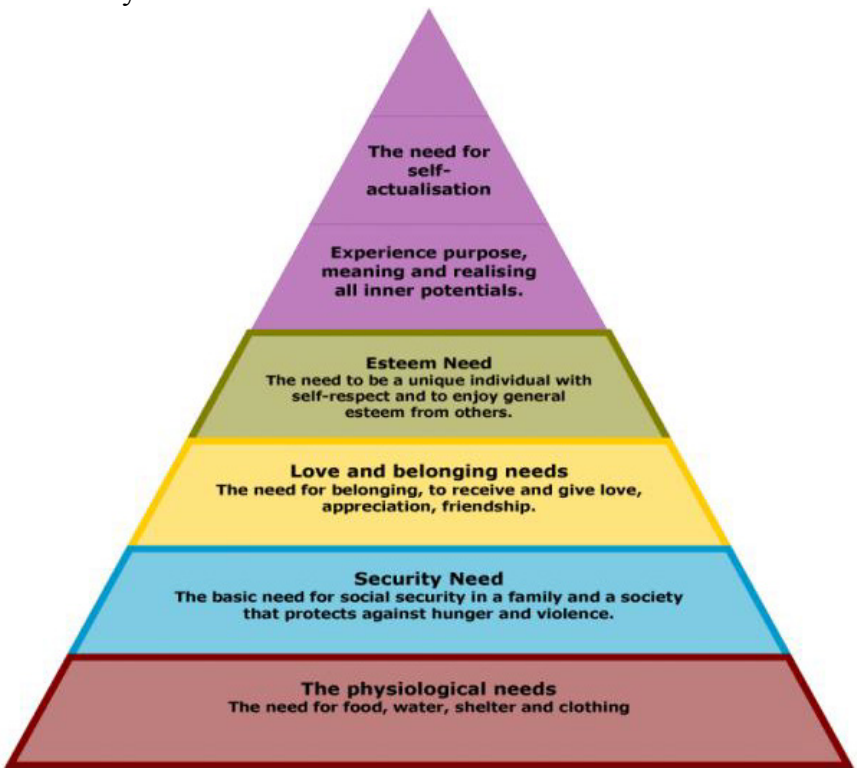
REFERENCES

Ministry Administrative Order No. 8, Series of 1986 was issued by the then Minister Maceda in order to effectively arrest the denudation of our forests and to stop illegal logging and log scale log smuggling. Pafid: Philipine association for intercultural development.
(powerpoint 9 jan. Pafid: History of forestry.)

Bernardo, et al, 1998 in: Baccay Impact of Solid Waste Disposal practices on Health in Selected Riverside Barangays of Naguilian and Reina Mercedes, Isabela pp1 ISU:Cabagan.

APPENDICES

Maslow Pyramid.



Interviews short version

Nr.	Name	M/F	Age	Profession	Where	Date
1	Rolando Liberato	M		Municipal Engineer	Municipal Office	19 jan
2	Norma Ragonjar	F		Municipal Planning and Development Coordination Officer	Municipal Office	19 jan
3	Orlando Raqueno	M	45	Fisherman	Pier, Punta	19 jan
4	Felipe Ramirez Jr.	M		Barangay Secretary	Barangay Hall Punta	19 jan
5	Aniceto Gatan	M	51	Barangay Captain	Barangay Hall Punta	19 jan
6	Domingo Rancho	M	70	Former Fisherman	Beach, San Antonio	19 jan
7	Lagrimas Raquino	F	44	Housewife	Beach, Maura	19 jan
8	Rolando Liberato	M		Municipal Engineer	Municipal Office	20 jan
9	Gertrude H. Banadero	F		Agricultural Technologist	Municipal Office	20 jan
10	Marites L. Robino	F		Agricultural Technologist Caretaker	Municipal Office	20 jan
11	Sabina Garma	F	44	Garbage buyer/seller	On the street, Punta	21 jan
12	Rema Rapila	F	44	Garbage buyer/seller	On the street, Punta	21 jan
13	Marcelo Alejandre	M	46	Garbage buyer/seller	On the street, Punta	21 jan
14	Cynthia Sariles	F	55	Principal Elementary School	Elementary School Punta	21 jan
15	Alfredo R. Ragasa	M	43	Teacher/ Solid Waste Management Coordinater	Elementary School Punta	21 jan
16	Reynel Bitawag	M	31	Farmer/ fisherman	On the street, Punta	21 jan
17	Felix Ritarita	M	60	Fisherman	On the street, Punta	21 jan
18	Jocel Ritarita	M	33	Fisherman	On the street, Punta	21 jan
19	Merlito Corbilla	M	51	Fisherman	On the street, Punta	21 jan
20	Lourdes Tolentino	F	82	Housewife	On the street, Punta	21 jan
21	Deliah Pamittan	F	55	President of the rural improvement club of Maura	Fisheries regional training center, Maura	21 jan
22	Joseph Villaluz	M		Fisherman	Pier, Punta	22 jan
23	Anibal Angel	M	33	Fisherman	House, Punta	22 jan
24	Domingo Ritarita	M	36	Fisherman	House, Punta	22 jan
25	Manuel Ritarita Jr.	M	47	President of Punta Fisherfolks Association	Barangay Captains House, Punta	22 jan
26	Manuel Calonogen	M	53	Fisherman	On the beach, Maura	22 jan
27	Ronald Alariao	M	31	Fisherman	On the beach, Maura	22 jan
28	Matilde Agustin	F	73	Housewife	On the beach, Maura	22 jan
29	Merlinda Macaraig	F	57	Housewife	On the beach, Maura	22 jan

Nr.	Name	M/F	Age	Profession	Where	Date
30	Alicia Sebastian	F		Retired Municipal Agrarian Officer		23 jan
31	Nilo de Rivera	M		Barangay Captain San Antonio	San Antonio	23 jan
32	Larry Chan	M		Barangay Captain Maura	Maura	23 jan
33	Teresita Gatan	F		Housewife	House of the barangay captain, Punta	23 jan
34	Mario Al Carion	M	38	Fisherman	House of the barangay captain, Punta	23 jan
35	Rowena Espino	F	48	Utility Worker	Maura	23 jan
36	Maryjane Pagallaran	F	50	Utility Worker	Maura	23 jan
37	Deliah Oniate	F	53	Utility Worker	Maura	23 jan
38	Rimedios Bermejo	F		Barangay Secretary of Maura	Maura	23 jan

Interviews long version

1	Rolando Liberato	M		Municipal Engineer	Municipal Office	19 jan

The final depository of all the garbage coming from upstream is in Aparri. There is a community service where in the LGU is involved. There is also a programme about the Republic Act 9003. It says that the citizens are responsible on garbage collection. The LGU collects only the hazardous waste. They collect 7-8 tons per day. There is no ideal site for waste disposal or landfill. The LGU encourages the constituents to segregate waste materials. More than 40% of the waste is biodegradable. The dumpsite of the garbage that is collected is very near the shoreline, so if there is a strong wind the garbage will be blown into the sea. The effect of garbage on the income of fisherman is not high. The number one problem in Aparri is the improper waste disposal.

2	Norma Ragonjar	F		Municipal Planning and Development Coordination Officer	Municipal Office	19 jan

Norma is a member of the Disaster Risk Management Group. She said that the 2 % of the internal revenue allotment was distributed to the following percentages. 70% used for rehabilitation, 5% used for reduction, 25% used for relieved goods.

3	Orlando Raqueno	M	45	Fisherman	Pier, Punta	19 jan

Orlando is a fisherman, and with fishing he also catches garbage from the Cagayan River. But he do not need that, so he throws it back in the river. Sometimes the driftwood will destroy his nets. But most of the time he uses the driftwood for making a cooking fire, for furniture and for building of houses. He does not lose money on driftwood, but he saves money on driftwood, because now he does not have to buy cooking wood or charcoal. So the driftwood is positive for him. He also said that there is no negative effect for him from the garbage. When it is the rainy season, from October till November, there is an increase of driftwood, so then he can collect more.

4	Felipe Ramirez Jr.	M		Barangay Secretary	Barangay Hall Punta	19 jan

Felipe told us that 60-70% of the people in Barangay Punta are fishermen. For Felipe, the main problem in Barangay Punta is the garbage and driftwood from upstream and from their own community. During flash floods you can see a lot of garbage in the Cagayan River. Some of the driftwoods are used for firewood and decorations. In the barangay they made a plan to avoid the problem on garbage, where discipline should be observed. The people in the upstream areas are the ones who contributed the garbage in Aparri. There is a negative effect from garbage on the fishermen because of water pollution. The fishermen now need to come more offshore because of the pollution near the shore. So now they need to spend more gasoline to catch the fish. According to Felipe, if there is a bigger population, there is also more garbage. In Punta there is a problem in implementing proper waste management. The LGU spends much time and money to educate the people about the proper waste management. There is no solution to reduce waste because people are not aware about the effects off garbage on their health. Some of the recyclable materials are sold to the junkshop. The LGU made a plan about 'no plastic bag' policy. The plan is there, but it should be implemented from now. The recommendation of Felipe is that the inhabitants of Barangay Punta should reduce, reuse and recycle.

5	Aniceto Gatan	M	51	Barangay Captain	Barangay Hall Punta	19 jan

According to Captain Gatan the garbage is a problem in Barangay Punta, garbage coming from the Cagayan delta river basin and also does garbage coming from the community, but the driftwood is not a problem because the people will use it for firewood. Garbage is even a bigger problem during flooding. Usually people in the Barangay are collecting garbage along the seashore, but after they collected it, they will put it into the sand, next to the shore, so it is a visual circle. Some people most especially the less economic constituents usually collect garbage from the seashore such as bottles, cans, and other materials to sell in the junk shop to earn something for living. The Captain suggested that the Barangay Official should construct a material recovery facility. Collection of hazardous waste is scheduled. The people do not care about what is happening around them, especially about the effects of garbage. The municipal office is forcing the Barangay Officials to implement the Waste Management Act. According to the Captain, the fishermen also do not have the time to care about their garbage because they are busy with surviving. (Maslows pyramid). The barangay captain added that collecting garbage is everybody's concern.

6	Domingo Rancho	M	70	Former Fisherman	Beach, San Antonio	19 jan

Domingo told us that children are collecting recyclable waste materials on the beach for selling in the junkshop. Driftwood is not a big problem for them because they use it as firewood for cooking. The garbage from the seashore is usually cleaned by the barangay officials and other government institutions, twice a week or during special days such as World Water Day, Environment Month Celebration and many more. Mr. Rancho said that it is very difficult for them to live if there's no garbage on the seashore. The people are well both benefited by garbage and driftwood.

7	Lagrimas Raquino	F	44	Housewife	Beach, Maura	19 jan

In Maura, Lagrimas told us that there is a plan for an extension of the seawall, to prevent erosion. Now the people of barangay Maura dig an hole for their garbage in the sand of the beach. Also peoples from other barangays throw their garbage on the beach of barangay Maura. Lagrimas thinks this is because there is no other place to put the garbage. For Lagrimas, garbage is not really a problem. Maybe only because of the smell. In her barangay

the garbage is cleaned by the Barangay Officials. We asked if it will be a problem for them if there will not be any more garbage on the beach, so that their job is not needed anymore. She told us that was not a problem because, then, they will clean the roads. Also driftwood is not a problem, it is more an opportunity, because she can use the driftwood for cooking. Therefore driftwood is really positive.

8	Rolando Liberato	M		Municipal Engineer	Municipal Office	20 jan

Engr. Liberato told us about the Republic Act (RA) 9003 and about the Provincial Environmental Law. But the implementation of the law needs still to be organized. The garbage in Aparri is collected daily with the help of one dump truck. The truck has a scheduled route so everybody knows when the truck is coming and then they can put their garbage on the way in bags. He said that in Aparri the garbage is for 40-45% biodegradable and that this is also collected. There are also several barangays which have an educating programme for their constituents. This contains regular meetings with the barangay captain and also an educating programme together with marriage and on schools. On the schools they will conduct an Information Education Campaign. The law was formulated in 2000. The Barangay officials usually do the cleaning because of the impact from garbage on climate change. According to Rolando there is no data about the volume of the garbage and driftwood coming from upstream. The Solid Waste Management Group is responsible for cleaning the area.

9	Gertrude H. Banadero	F		Agricultural Technologist	Municipal Office	20 jan
10	Marites L. Robino	F		Agricultural Technologist Caretaker	Municipal Office	20 jan

According to Gertrude and Marites is driftwood positive and garbage negative. They said that there is an increase in the catch of fish from the fisherman because of the garbage. Also, the fishermen will not go fishing when there is a lot of driftwood in the river or sea. Instead they will start collecting the driftwood. When the fishermen are fishing and they catch some garbage, they will take it out their nets and put it back in the river or sea. This is also because there is no place for a sanitary landfill. There is a plan for the landfill in the western part of Aparri, but this will cost a lot. Because of the population growth, in ten years there will be more and more plastics and garbage in Aparri. The Local Government Unit already found a solution for recycling and using the water hyacinth. They will also use other Indigenous materials.
A member of the Peace Course invented a programme for elementary schools on what to do with garbage, because he believed that if you will learn this at a young age, you will do this for the rest of your life. Now the programme also started on high schools and the programme really involves the whole neighbourhood. They also made a contest for the elementary schools on who has the best garbage reduction and solutions.

11	Sabina Garma	F	44	Garbage buyer/seller	On the street, Punta	21 jan
12	Rema Rapila	F	44	Garbage buyer/seller	On the street, Punta	21 jan
13	Marcelo Alejandre	M	46	Garbage buyer/seller	On the street, Punta	21 jan

On the street in barangay Punta we found a tricycle with these three persons in it and a lot of big plastic bags with garbage. Therefore we asked what they would do with all that garbage.

They had plastics, plastic bottles, cans and scrap metals. They were on their way to the junkshop to sell their collected garbage. They get 10 peso's for 1 kilo of garbage. So for them, the garbage is really positive, if there will not be any more garbage, they also do not have any more job.

14	Cynthia Sariles	F	55	Principal Elementary School	Elementary School Punta	21 jan

The principle discussed to us the program about solid waste management. Last year 2011, the school participated in a contest for the best school in Aparri sponsored by the LGU for the implementation of Solid Waste Management. Cynthia added that the teachers also put it into their lesson plan on the solid waste management. They also taught their students regarding the segregation, composting, and encouraging the students to apply their knowledge regarding solid waste management in their respective homes. The principal said that there is also a project about the selling of recyclable materials such as scratch paper. They will sell it to the junkshop for having additional income for the school.
The school also participated in community service, doing cleaning the seashore sponsored by the local officials and during special occasions mandated by law regarding the environment. To the principal, garbage is not a problem to their locality, and driftwood is economically important because the people save some amount of money because they do not have to buy firewood for cooking.

15	Alfredo R. Ragasa	M	43	Teacher/ Solid Waste Management Coordinater	Elementary School Punta	21 jan

After our interview with the principal of the elementary school of Punta, we talked to the waste management coordinator. In addition to Cynthia Mr. Ragasa said that there are still continuing activities of the implementation of the solid waste management program. He added that 100 % cannot be implemented well. He teaches his pupils in segregating the biodegradable from non-biodegradable. The school also have a compost pit and the composted biodegradable garbage that is coming from that compost pit is used for fertilizer for the school garden. The trucks used for collecting garbage from their school and from the community can't pick-up the garbage if the community will not segregate the garbage. And that is the policy on how to collect the garbage.

16	Reynel Bitawag	M	31	Farmer/ fisherman	On the street, Punta	21 jan

Mr. Bitawag is used to collect driftwood in the river delta, after doing the farm activities in the field. Especially when there is a flood, because then there is more driftwood. He gathers driftwood for firewood for cooking. According to him driftwood is very important, also because he belongs to a less fortunate family. Regarding the garbage on the effect on his life and even in fishing, there is no negative effect.

17	Felix Ritarita	M	60	Fisherman	On the street, Punta	21 jan

Ritarita is used to fish in the sea and in the river delta. During the fishing activities in the sea, when they will throw their nets, the nets collect also garbage and during the collection of fish from their nets including garbage, they will usually pick up the garbage and throw it on the beach. He said that the garbage is not affecting his fishing activities. According to him the fisherman who have the most affects from the garbage are those who have fish cages from the river most especially in the barangay Macanaya. They also suffer from the driftwood because it will destroy their nets. But driftwood is also very useful for them to use for cooking, the big

drift wood are used for the construction of houses, fens, and other will be sold for and additional income.

18	Josel Ritarita	M	33	Fisherman	On the street, Punta	21 jan

Jocel Ritarita informed us about that garbage affects the fishing activities. During the floods they do not go the sea for fishing because driftwood and garbage are abundant and it will destroy the nets. According to him people do collect the driftwood for firewood for cooking, and other garbage they collect for selling in the junk shop, like the recyclable materials. Jocel does not like the garbage but he does like the driftwood.

19	Merlito Corbilla	M	51	Fisherman	On the street, Punta	21 jan

The collecting of driftwood in the river is usually done by the community, it helps them also in the providing of firewood for cooking, fencing and additional income because they can save money out of the driftwood.

20	Lourdes Tolentino	F	82	Housewife	On the street, Punta	21 jan

If there is no more driftwood then Lourdes buys firewood in the market, so there is a negative effect if there would not be any more driftwood to collect along the river/ seashore. Even the garbage has no effect whether there is garbage in the river or not.

21	Deliah Pamittan	F	55	President of the rural improvement club of Maura	Fisheries regional training center, Maura	21 jan

Most of the garbage that is on the beach is coming from upper stream, and the law is regarding that the solid waste must be applied. Because even the people in the community, most especially people along the beach, are throwing their garbage on the beach. And she added further that when there are continues activities of throwing garbage along the beach there will be water pollution and aquatic life will be affected. Collecting garbage is an individual responsibility, but helped by the government for promoting the reduce, reuse and recycle of the garbage.

22	Joseph Villaluz	M		Fisherman	Pier, Punta	22 jan

Joseph was interviewed, while he was removing the fish from the net including the garbage, he just threw the garbage on the beach. He said he usually does that. He does not mind the garbage because it does not affect our fishing activities. According to Joseph, the driftwood sometimes destroy the nets while fishing in the sea. But the driftwood is very important for him to use as firewood. The problem with garbage are the plastic bags because they will not be decomposed.

23	Anibal Angel	M	33	Fisherman	House, Punta	22 jan
24	Domingo Ritarita	M	36	Fisherman	House, Punta	22 jan

During fishing activities Anibal and Dominggo catch fish from the middle of the sea, but there they can still find garbage. Garbage is not a problem for them, most specially no the agricultural waste, because the fishes will stay under the waste and eat more food. According to them they catch more fishes when they find agricultural waste in the middle of the sea. Driftwood, most especially the big ones, are also very important for them because they benefit from it. They use it for fire wood ,fencing in the backyards and building houses. According to Anibal and Domingo the garbage usually is located on the side of the river and along the beach They think that the responsible people in cleaning the garbage are the local officials.

25	Manuel Ritarita Jr.	M	47	President of Punta Fisherfolks association	Barangay Captains House, Punta	22 jan

If there is garbage in the seawater, the fish will go further from the shore. So that is a problem for the fisherman. The fishermen are complaining about the garbage. If the garbage is plastic, the fisherman also can make money out of it, if they will sell it to the junkshop. Some fisherman build fish cages from the bamboo that is coming from upstream. Sometimes, if the fishermen collected to much driftwood, they will also sell it. Manuel said that 10 years ago, the fishermen could collect more fish, because there were less fishermen. Not because of that there is more garbage now. If there is a lot of driftwood on some place, the fishermen will not go fishing, because the driftwood will destroy their nets. Most of the time that is in the river. There will be a problem if there will not be any more driftwood, because the people need the driftwood. But it would be positive if there was no garbage anymore. 1 kilo of garbage is will make less than 10 pesos in the junkshop. Manuel thinks that there is a solution for the garbage, because every barangay has is own segregation station. He also thinks that he and the barangay should be the ones to clean the garbage from upstream. Burning the garbage is prohibited, because it is contributing to the climate change. The implementation of the laws is not strict. That has to change. It is everybody's concern to clean the garbage

The people who sell their driftwood will do that to their neighbours or relatives, there isn't a driftwood shop. It depends on the wind in which direction the driftwood will flow, so every morning the people will check what wind there is in order to go to the beach or not.

There is a story of a man, he was collecting driftwood in the river during the floods, and suddenly, his engine was broken. Then the boat capsized, and the man was drown.

26	Manuel Calonogen	M	53	Fisherman	On the beach, Maura	22 jan
27	Ronald Alariao	M	31	Fisherman	On the beach, Maura	22 jan

Mr. Alariao usually does the fishing from the month of January to March because there are more fishes on that period but from the month of June to July there is less fish in the sea. The occurrence of flood is from the month of October to December and than they do not go to the sea for catching fish. He does collect driftwood in that season. During January to March he can catch 30 kilos of fish a day amounting to P2,000.00. The fishermen added that they are also helping with cleaning the garbage from the beach during community service sponsored by the LGU. They recommended that the people from upper stream should stop throwing their garbage in the river, so that there is less garbage in the river delta and the sea.

28	Matilde Agustin	F	73	Housewife	On the beach, Maura	22 jan

We found Matilde collecting driftwood from the beach. She said that she uses the driftwood for firewood for cooking, and she collected tangles which usually comes from agricultural waste. If there is no more driftwood in the sea she usually buys firewood from the market, and without the driftwood her life would be more miserable. The garbage coming from the beach is also important because some children collect it. They will sell the recyclable waste in the junk shop for gaining some money. Matilda herself does not do this.

29	Merlinda Macaraig	F	57	Housewife	On the beach, Maura	22 jan

We found Merlinda on the beach digging a hole and with one sack of garbage. She said that she will dig a hole to put the sack of garbage in than she would cover it with sand. According to her she usually does that because the local officials can't collect all the garbage in the community. The solid waste management team does the collection but sometimes they will

not collect because there is only one dump truck doing the collection in the entire villages. If she has to much garbage, she told us, she will burn it. She was not aware of the fact that burning garbage is bad for your health. She also does the collection of driftwood for fire wood. According to her there is no negative effect of driftwood in the community. The barangay official is also educating them on how to segregate the waste and disposed it properly on the segregated cans in front of their houses.

30	Alicia Sebastian	F		Retired Municipal Agrarian Officer		23 jan

According to Alicia garbage is one of the major problems in their locality, because it will affect the life of the fishermen, for not catching more fishes in the sea. Driftwood also is not a problem because it gives a lot of benefits such as firewood for cooking, for building fences or houses and to repair a boat. She added that as a retired municipal agrarian officer. People should stop throwing garbage in the river and on the beach to minimize water pollution.

31	Nilo de Rivera	M		Barangay Captain San Antonio	San Antonio	23 jan

Captain Rivera proposed from his council that they will formulate a solid waste management framework in supporting the solid waste management program of the government. He also allotted Php78,000.00 from their Internal Revenue Allotment in support to the National greening project of the national government. Garbage is a problem in his community, because of the old habit of the people in his constituent just to throw the garbage anywhere.

32	Larry Chan	M		Barangay Captain Maura	Maura	23 jan

In implementing the solid waste management program as a barangay captain he funded from their Internal Revenue Allotment the creation of 3 utility workers responsible in cleaning their specific area in the beach from Zone 1 to Zone 2 (this are parts of a barangay), including the entire community. Usually in the beach (along the seashore) the barangay captain does not allow to collect the agricultural waste for the reason that there is a change of sand formation in the beach called mounting agricultural waste. This is used in protecting the sea shore and during summer season there are grasses growing in the area. During special holidays such as environment month, world water day and other occasion the entire people of Aparri is participating in the cleaning of the beach. Other than the creation of utility worker , he has also the clean and green programme amounting to Php30,000.00. This activities are responsible for tree planting along the seashore. Garbage is a problem in his constituent because, aside from the garbage coming from the upper stream people throw the garbage along the sea shore. But driftwood is not a problem, because it provides firewood for cooking, and also a source of income when they will sell the driftwood that is too much for them.

33	Teresita Gatan	F		Housewife	House of the barangay captain, Punta	23 jan
34	Mario Al Carion	M	38	Fisherman	House of the barangay captain, Punta	23 jan

At the middle of the sea, Mr. Al Carion observed some garbage and driftwood. While fishing he benefits from the garbage because there are more fishes under the garbage. So there is no negative effect of garbage and driftwood on him as a fisherman. Mrs. Gatan added also that

there is a greater income of fishermen if there are more garbage and driftwood on the beach and in the sea.

35	Rowena Espino	F	48	Utility Worker	Maura	23 jan
36	Maryjane Pagallaran	F	50	Utility Worker	Maura	23 jan
37	Deliah Oniate	F	53	Utility Worker	Maura	23 jan

The Utility workers usually clean the beach every morning. The solid waste management collector of the LGU, will collect the garbage twice or three times a week and then bring it to the dumpsite. According to them usually the greatest volume of garbage to be collected is during the floods from upper stream which brings the garbage to sea and then the wind brings it back on the beach.

38	Rimedios Bermejo	F		Barangay Secretary of Maura	Maura	23 jan

Garbage is a problem in barangay Maura because this is the place of dumping the waste coming from the entire community of Aparri. The dumpsite is located at the site Santo Thomas, in barangay Maura. This dumpsite is near to the seashore, so that is why the municipal office looked for another dumpsite located at barangay Paruddu in the western part of Aparri for not polluting the seashore. Rimedios also told us that the driftwood is not a problem in the community because the driftwood is used for firewood for cooking, and also for an additional income if the firewood will be sold to the market.

Overview of what respondents think about the garbage and driftwood.

Nr.	**M/F**	**Age**	**Profession**	**Garbage positive/ negative/ neutral**	**Driftwood positive/ negative/ neutral**
1	M		Official		
2	F		Official		
3	M	45	Fisherman	Neutral	Positive
4	M		Official	Negative	Positive
5	M	51	Official	Negative	Positive
6	M	70	Fisherman	Positive	Positive
7	F	44	Housewife	Neutral	Positive
8	M		Official	Negative	Neutral
9	F		Official	Negative	Positive
10	F		Official	Negative	Positive
11	F	44	Garbage buyer/seller	Positive	Positive
12	F	44	Garbage buyer/seller	Positive	Positive
13	M	46	Garbage buyer/seller	Positive	Positive
14	F	55	Official	Negative	Neutral
15	M	43	Official	Negative	Positive
16	M	31	Fisherman	Negative	Positive
17	M	60	Fisherman	Neutral	Positive
18	M	33	Fisherman	Neutral	Positive
19	M	51	Fisherman	Negative	Positive
20	F	82	Housewife	Neutral	Positive

Nr.	M/F	Age	Profession	Garbage positive/ negative/ neutral	Driftwood positive/ negative/ neutral
21	F	55	Official	Neutral	Neutral
22	M		Fisherman	Negative	Positive
23	M	33	Fisherman	Neutral	Positive
24	M	36	Fisherman	Neutral	Positive
25	M	47	Fisherman	Positive	Positive
26	M	53	Fisherman	Neutral	Positive
27	M	31	Fisherman	Neutral	Positive
28	F	73	Housewife	Neutral	Positive
29	F	57	Housewife	Negative	Positive
30	F		Official		
31	M		Official		
32	M		Official	Negative	Positive
33	F			Neutral	Positive
34	M	38	Fisherman	Neutral	Positive
35	F	48	Utility Worker		
36	F	50	Utility Worker		
37	F	53	Utility Worker		
38	F		Official	Negative	Positive

Perception and Awareness of Climate Change in Different Barangays of Aparri

Mariolito Ortiz and Lone Maasland

INTRODUCTION

Almost all the people living in the Philippines have experienced at least one extreme weather condition. This can be an extreme dry period, an extreme wet period, a typhoon or a tropical storm. One of the causes of these extreme weather conditions is the rise of temperature in the world which is more commonly known as global warming. But why does the earth get warmer? Researchers have found out that there is high confidence that global warming is caused by the emission of greenhouse gasses caused by humans (PAGASA 2011). Natural conditions also play a role in global warming. In as much as weather affects the lives of people living all over the world, we want to have a look at this subject.

Weather plays a major role in the lives of people especially in the Philippines because a lot of them rely on rainwater and are very vulnerable to the effects of rising water level. The Intergovernmental Panel on Climate Change (IPCC) observed widespread changes in extreme temperature (Dayrit 2009). Cold days, cold nights and frost become less frequent while hot days, hot nights and heat waves become more frequent (PAGASA 2011).

A researcher named Corona classified four (4) climate types based on monthly rainfall during the year in the Philippines (PAGASA 2011). Climate Type I has a distinct dry and wet season, Climate Type II has no dry period at all and a pronounced wet season, Climate Type III has a short dry period and Climate Type IV is characterized by rainfall almost equally distributed over the whole year.

Our research location is Aparri. It is a first class municipality in the north of Luzon, at the mouth of the Cagayan River. We can say that Aparri fits into Climate Type III. When we think about climate change, we should bear in mind that the increase of temperature causing this phenomenon depends on the greenhouse gas emissions all over the world. Even if the greenhouse gas emissions will be medium, the seasonal temperature will increase, the seasonal rainfall will increase and extreme weather events will occur more often (PAGASA 2011). PAGASA classifies the town of Aparri under the radii of the third type under the Corona climate types. Due to this information, it is very likely that the town's climate will keep on changing in the next 50 years. Knowing this, we also asked what the people in Aparri will do if climate change will get worse. Will they stay where they presently live? Or do they consider moving to another country if the weather will be more extreme? Next to the weather being more extreme will be the increase in temperature and rise of the sea level all over the world (Dayrit 2009). People living in Aparri live next to the sea and a rising sea level will have direct consequences to them. The rise of the sea level will also increase the level of the Cagayan River, which also affects the lives of villagers living in Aparri.

In 2009, the national government implemented a republic act about mainstreaming climate change: REPUBLIC ACT NO. 9729. In our research, we only looked into the projects of the local government. By doing the research, we can see if the concepts and strategies which are included in the republic act about climate change are being implemented.

In our research, we asked questions that elicit awareness and perception towards climate change. We wanted to know if the farmers and fishermen are aware of the changing climate. First, we asked them if they had experienced any change of weather conditions during their lives. Bernardo already found out that people experienced direct impacts of climate change, like decrease in crop production, food insecurity and abnormal conditions of weather (Bernardo 2010). We did not ask the people if they had experienced climate change because this is a topic which they do not hear often and we believed that they do not know its exact meaning. Most of the informants in Aparri had experienced changes of weather conditions during their lives. We wanted to know if they will relate these changes of weather conditions to climate change.

We interviewed two main groups who have to deal with climate change, namely; the local government of Aparri and the villagers living in that municipality. The local government is an important player in this subject. What does it do to prevent flooding of a village or loss of harvests because of drought that affects all the villagers in Aparri? The second group consists of farmers and fishermen. The interview was done in five different barangays: Punta, Maura, San Antonio, Macanaya and Gaddang (Map 1).

This research is important because people should be aware of a changing climate so that they can adapt to changes in their way of living to prevent any damage to their lives.

Map 1: Map of Aparri with the specific barangays where we did our research. Map drawn by the authors.

RESEARCH QUESTION

What do people in Aparri know about climate change and how does it affect their lives?

Sub-questions:
- Is the local government active in preventing the impacts of climate change?
- What do people think are the impacts of climate change in Aparri?
- What do people think will happen with the weather conditions in the future?
- What are the causes of climate change?

METHODS

For our research, we did a total of 41 interviews, 33 of which were with farmers or fishermen and eight were with local government officials. To gather information, we made two different sets of questionnaires: one for the government officials and the other for the local villagers. We did not make these questionnaires very structured. Aside from the structured questionnaires, we also used a topic list. By doing the interviews this way, we were able to let the interview go to the interesting topics of the respondents. This was done especially for the interviews with local government officials as a good way of eliciting more of their views. During our fieldwork, we observed different areas in Aparri. We did our interviews with farmers and fishermen in five different barangays. We selected more barangays to get a wider view of the different thoughts about climate change in Aparri.

RESULTS

Changing weather conditions

During our research, we interviewed 33 villagers, 10 of whom earn money by farming and 23 through fishing. We found out that they all have experienced changes in weather conditions during their lives. Most of our respondents mentioned more than one changes in the weather conditions. Table 1 shows the changes mentioned by the villagers. Based on Table 1, we can conclude that only two respondents did not experience more typhoons in the last 20 years of their lives; the 31 respondents did. This does not scientifically prove that this change is a consequence of climate change, but there is an observational evidence for the increase in intensity of tropical cyclone activity, correlated with the increase of tropical sea surface temperatures (PAGASA 2011). Our findings make this observational evidence stronger because the people experienced more typhoons and rise of the sea level. If we correlate our findings, the experience of more typhoons and the rise of the sea level, we can say that: 93.9% of our respondents experienced more extreme typhoons and 72.7% experienced a rise of the sea level, the mean is 83.3%. So 83.3% of our respondents are aware of the observational evidence made by Servando. This measurement makes his statement stronger.

Table 1. Changes in weather conditions mentioned by farmers and fishermen in different barangays in Aparri.

Changes in weather conditions[1]	Punta	Maura	San Antonio	Macanaya	Gaddang	Total
More extreme cyclones	5	3	4	9	10	31
More extreme rainy season	4	3	4	10	8	29
More extreme dry season	5	2	3	9	9	28
Rise of the sea level	2	2	4	9	7	24
Longer rainy and dry season	1	2	2	6	4	15
Higher temperature	1	2	3	5	4	15
Lower temperature	-	2	1	3	-	6
More wind during summer	1	-	1	1	-	3

[1]More than one answer possible per respondent

It can be deduced from Table 1 and Figure 1 that a lot of changes in weather conditions have been experienced by the farmers and fishermen. Since they said they experienced these changes, we also asked our respondents what they think is the cause of these changes. That question gave us information about the awareness of the farmers and fishermen on climate change. As can be seen in Figure 2, mining was mentioned as the biggest cause of climate change. Our interviews revealed that most of the respondents view mining as the leading cause of climate change because mining in the Cagayan River causes more extreme floods. This is what they think, not what is scientifically proven. Out of this information, we can conclude that most of the causes the farmers and fishermen mentioned are causes which are visible in the municipality. They see a lot of burning and dumping of garbage. They also see people engaged in mining and illegal cutting of trees. Only a few of them know the real reason of climate change which is the emission of gasses. A report of PAGASA states that climate change is caused by the emission of greenhouse gasses (PAGASA 2011). A report made by the World Bank presented the latest measurement of the Philippines' contribution to the greenhouse gas emissions. In 2000, the Philippines contributed 0.51% only of the world's total greenhouse gas emissions (World Bank 2008). The report concludes that the Philippines is a minor emitter but a country which is highly vulnerable to the impacts of climate change especially that of natural disasters. Figure 2 shows the vulnerability of the Philippines to typhoons. It can be seen in the map that Aparri is located in an area which is highly vulnerable to typhoons. This fact made Aparri a very good location for the research.

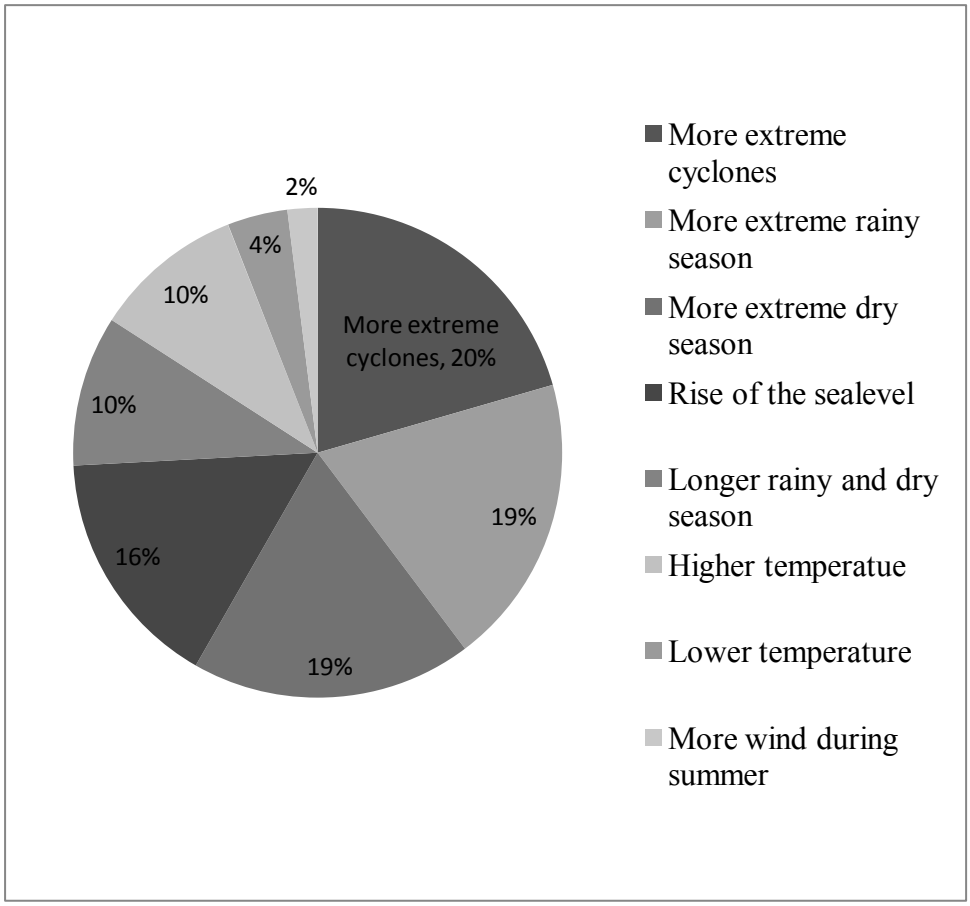


Figure 1: Proportion of weather changes mentioned of all answers. Information is shown clockwise

The area's high vulnerability to typhoons makes the change greater and supports the claim of the people we interviewed in Aparri that they had experienced a typhoon or a comparable extreme rainy season.

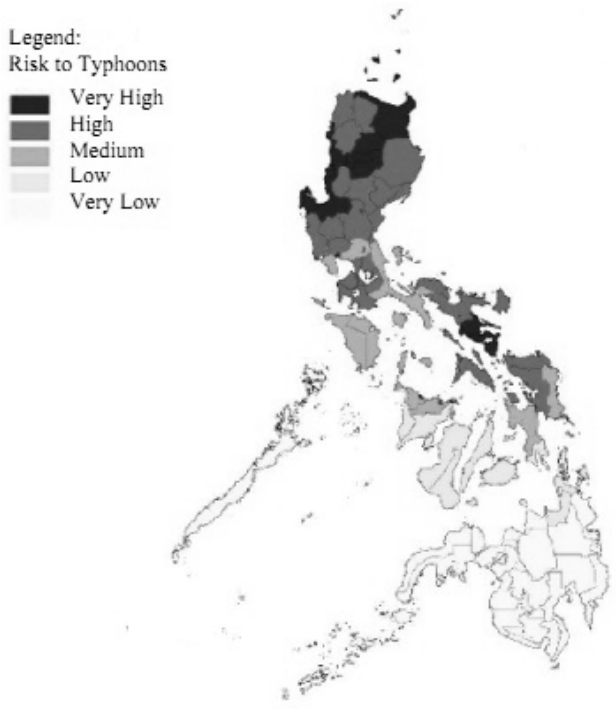


Figure 2: Risk areas for typhoons in the Philippines. Source: Manila Observatory and Department of Environment and Natural Resources (DENR) www.observatory.ph/vm/findings.html

Government officials

Table 2. Institution, name and position of the officials working for the local government interviewed in Aparri.

Institution	Name	Position
PAGASA	José Rico Mercado	Meteorological Specialist
Barangay Punta	Aniceto Gatan	Barangay Captain
Department of Environment and Natural Resources (DENR)	Ligaya Arce	Public Affairs Unit
Local Government Unit Aparri	Rolando Liberato	Municipal Engineer
Barangay Macanaya	Perlito Corpuz	Barangay Councilor
Barangay Macanaya	Romeo Putulan	Purok Leader (unit of the Barangay)
Barangay Gaddang	Mario Estrella	Barangay Captain
Barangay Gaddang	Mario Galanoge	Barangay Councilor

We interviewed eight different officials working in different local government offices and units in Aparri. During our fieldwork in the municipality, we experienced that climate change has effects on a lot of things in the place. We attended a congress about dredging of the Cagayan River. In the presentation about dredging, climate change was mentioned as one of the reasons why dredging the Cagayan River is necessary. If the river will not be dredged, the consequences of climate change for Aparri will be worse in the future (Dr. Siringan 2012, Pers. Comm.). The congress was participated in by a big group of different government officials. This gave us a positive impression of the awareness of government officials on the need for dredging the Cagayan River.

When we were welcomed in the municipality of Aparri, we saw a PowerPoint presentation about the town. In this presentation, climate change was mentioned more than once. We asked why it was included in the presentation and we learned that the municipal officials believe it is an important factor affecting the living conditions in Aparri. Norma Ragonjon presented the presentation to the whole group of Aparri researchers of our water course. She supposed that the extreme weather conditions of the last 25 years are caused by climate change (Ragonjon 2012, Pers. Comm.). In the municipality, there were enough places where we could see damages in buildings caused by extreme weather conditions. This strengthened the need for our research.

Government projects

The eight interviews gave us a good idea of what the local government is doing at present to avoid any damage of extreme weather conditions caused by climate change and what additional projects they think should be implemented. We asked them about the activities they do to help the farmers and fishermen in Aparri. They mentioned 10 different activities which they have implemented or want to implement in Aparri, namely; mangrove reforestation, reducing the use of fossil fuel, promoting alternative use of energy, planting vetiver grass, avoid burning and dumping of garbage, solid waste management, implementation of the seawall, different organizations working together, implementation of the National Greening Program and drainage control. Table 2 contains the schematic view of the solutions and

implementation. The seawall is the biggest project. There are different places in Aparri where the government had built a seawall. As reflected in Map 1, a long seawall had been built at the mouth of the Cagayan River. The seawall protects the villagers living in the corner of Aparri. But the seawall is not big enough to protect all the villagers of the municipality. We saw some places which are not protected if the level of the water will rise by one meter. A strong typhoon can let the water flow into the barangays even in the area where the seawall was built. The seawall in Barangay Macanaya is only a meter higher than the level of the river water. Since one of the impacts of climate change is rise of the sea level and Macanaya is very close to the mouth of the river, a big area of the barangay will be flooded if the sea level will increase and the level of river water will also go up.
Of the 10 projects the government mentioned, four are not implemented yet. But these four are also seen as solutions. These projects are not yet implemented because the local government does not have enough money to realize all the 10 projects. Table 2 shows a clear division between the projects which are implemented and those which are not yet put into operation.

Table 2. Solutions to prevent any negative impact of extreme weather conditions mentioned by the government officials.

Solutions mentioned by the government officials	**Projects implemented**	**Not implemented projects**
• Mangrove reforestation • Reducing the use of fossil fuel • Promote alternative use of energy • Avoid burning and dumping garbage • Planting vetiver grass (***Chrysopogon zizanioides***) • Solid waste management • Drainage control • Implementation of the seawall • National Greening Program • Different organizations working together	• Mangrove reforestation • Planting vetiver grass • Solid waste management • Drainage control • Implementation of the seawall • National Greening Program	• Reduce the use of fossil fuel • Promote alternative use of energy • Avoid burning and dumping garbage • Different organizations working together

Seven of the eight government officials believe that the projects of the local government mentioned in Table 2 are effective. We asked farmers and fishermen if they know the projects which the government is already implementing to prevent any damage brought about by climate change. Not all of the implemented projects were mentioned by the villagers. Two of them were mentioned a lot of times: implementation of the seawall and planting vetiver grass. The government projects mentioned by the farmers and fishermen in the five barangays are reflected in Figure 3.

Barangays Punta, Maura and San Antonio are located adjacent to the sea. Macanaya is located at the riverbank one kilometer away from the mouth of the Cagayan River. Gaddang is located a few kilometers inland. In Punta and San Antonio, the project of the government to prevent any damage due to climate change is a seawall. This is the only project in the neighborhood. In Map 1, the seawall is the black line in front of Punta and part of San Antonio. Few of the farmers and fishermen of Punta and San Antonio know about mangrove reforestation but they do not know where these mangrove species were planted. Macanaya is the only barangay where vetiver grass is planted to protect the riverbank. In Map 1, vetiver grass can be seen at the bottom of the seawall at the riverbank of Macanaya. These villagers can see the vetiver grass in their neighborhood and know it is planted to protect them. The fishermen living in Macanaya do not think the vetiver grass will protect them against a flood or a typhoon. We visited the vetiver grass plantation and saw ourselves that the vetiver grasses are not strong enough to keep the riverbank stable. If the riverbank erodes, the water of the Cagayan River can flood the barangay. But there is a chance that the vetiver grass will grow big enough to be stronger, thus, the soil can be more stable during a typhoon. However, this will take a longer time and there is a very big possibility that a typhoon will occur before the vetiver grass is strong enough to function as a protection for the villagers.

Gaddang is a barangay where people farm for their living. The respondents in this barangay are the only group who mentioned drainage control and see this project implemented in their neighborhood. The drainage control helps the farmers irrigate their rice fields during dry periods. There is a tributary of the Cagayan River flowing through Gaddang and the drainage control can give more water into the area to help farmers irrigate their lands. The big pump is seen as a black spot at the northwest of Gaddang in Map 1.

The projects mentioned by the farmers and fishermen are reflected in Figure 3. Comparing Map 1 and Figure 3, it can be concluded that most of the people know only the projects within their own barangay. We can further conclude that people in Aparri do not know what is happening in the municipality. We can also say that they live only within their own barangay and that they are not aware of the projects to prevent natural disasters in their own municipality.

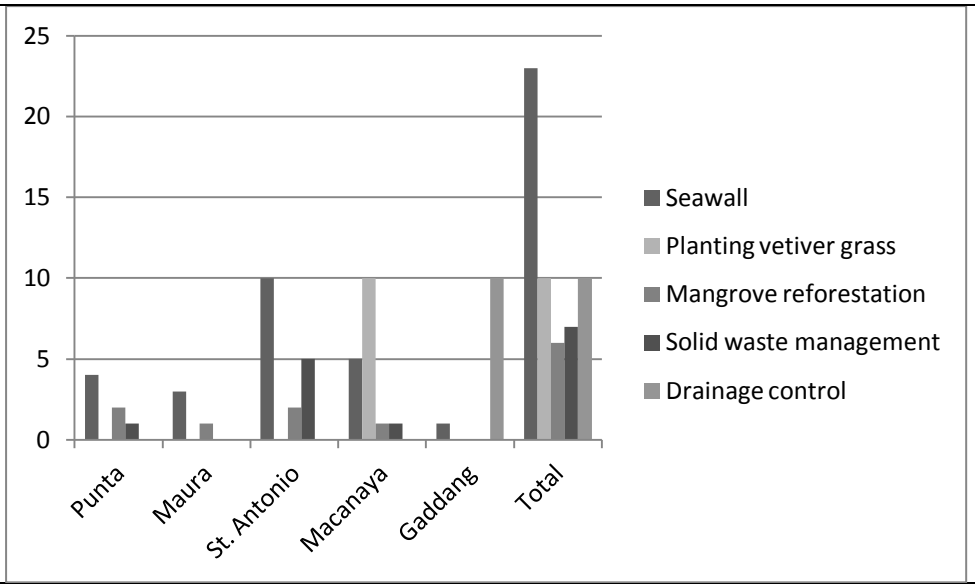


Figure 3: Government projects to prevent any damage caused by changes in weather patterns mentioned by farmers and fishermen in five different barangays.

Findings government officials

The different government officials working in Aparri agreed clearly on some subjects which they were asked about. They all said that there is enough information available about climate change for the local villagers. More interesting is that they also said there are clear solutions to the impact of climate change in Aparri. However, the solutions they mentioned were different. José Rico Mercado, Meteorological Specialist working for PAGASA in Aparri, told us that he thinks the solution lies on reducing the dependence on fossil fuels particularly the use of alternative energy sources like windmills and hydropower electricity (Mercado 2012, Pers. Comm.). The solution mentioned most of the time by the government officials is avoid dumping and burning of garbage. We observed in Aparri that huge number of people all over the municipality are dumping and burning their garbage. They consider this as a direct cause of climate change because it is visible in their town. The government officials know that climate change is not only a problem in Aparri and the Philippines but also believe that the way the villagers of Aparri manage their garbage is one of the causes of this phenomenon in the municipality.

From the eight government officials, only one does not think that the villagers in Aparri are aware of climate change. The others suppose that the villagers know enough about climate change to adopt strategies that would prevent any damage to their lives caused by extreme weather conditions. We found out that the people do not have the possibility to adopt any strategy. The only strategies farmers and fishermen mentioned are 'move all the stuff to the second floor' and 'tighten up our house'. They cannot afford to buy a stronger roof or a stronger wall. The official who thinks the people are not aware was also the only government official we interviewed who, himself, does not know a lot about climate change. The other government officials said that they know a lot or know enough about climate change. The government officials who are aware think that the farmers and fishermen are also aware. We can say, therefore, that most villagers we interviewed are not aware of climate change. If you look at Figure 4, the causes which are mentioned by the farmers and fishermen are not the causes mentioned by the government officials.

DISCUSSION

The main question we asked the respondents is their knowledge about climate change and how it affects their lives. To answer this question, we can look at the differences between the government officials and the farmers and fishermen we interviewed. We conclude our research with a comparison between these two groups. Both of the groups had experienced a lot of changes in weather conditions. When we asked them about it, the two groups told us that the changing weather conditions affected their lives. We found out that they have different perspectives as regard changes in the weather conditions. This is not very special. It is logical that they have different views towards climate change. But we think it is special that all government officials, except one, said that the villagers are aware of climate change. We do not think that this is the prevailing situation in Aparri.

The local government officials suppose the people are aware because they believe their projects to protect them are effective and have created awareness for local villagers. We found out that the farmers and fishermen we interviewed are not aware of the changes in weather patterns caused by climate change. They do not know the real cause of the changing climate and they only know the projects of the government which were set up in their own barangay.

The farmers and fishermen mentioned mining as the biggest cause of changes in weather conditions in Aparri. In Figure 4, all the causes which the informants cited with mining being mentioned a lot more than the other causes are reflected. Mining is not a direct cause of climate change. It may indirectly contribute to global warming but this is not mentioned by the farmers and fishermen. They think mining in the Cagayan River greatly influenced the strength of typhoons. Since they had experienced an increase in the number of more extreme typhoons during their lives, they link it to mining. As we already mentioned in our results, the Philippines contributed in 2000 only 0.51% of the world's greenhouse gas emissions. So mining in the Cagayan River is a very small amount of the Philippines' greenhouse gas emissions compared to the world's production.

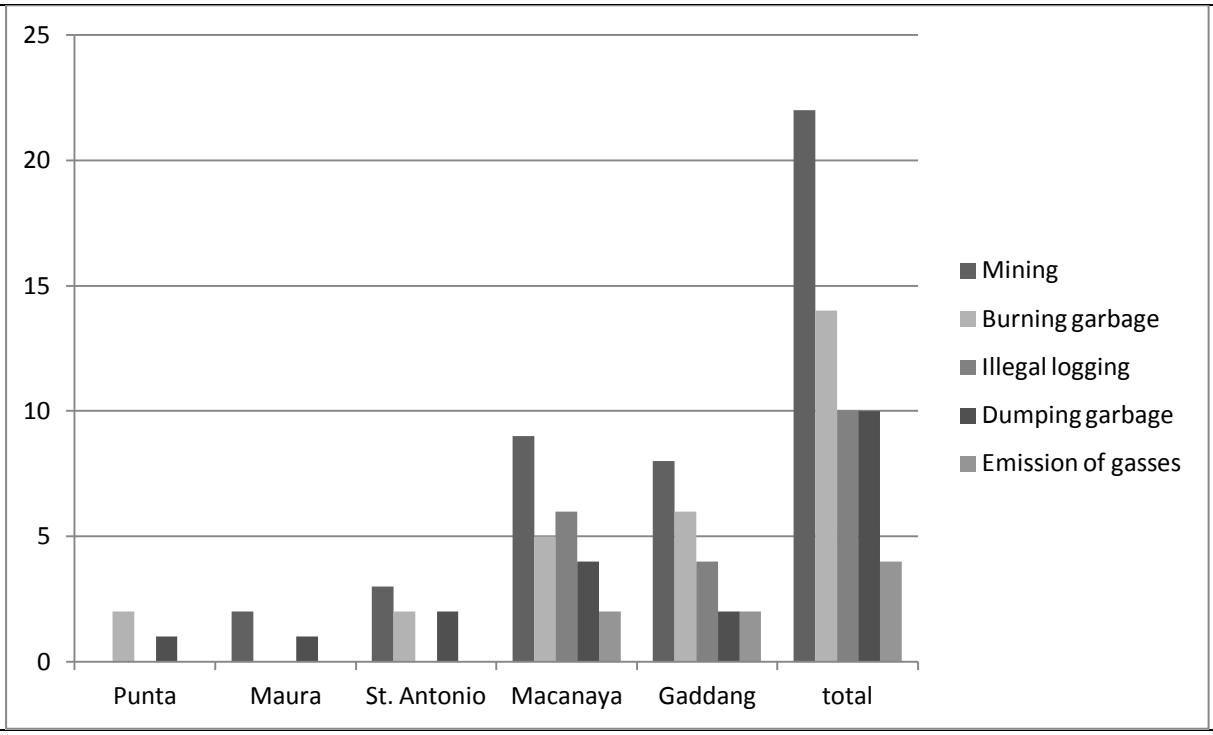


Figure 4: Causes of changing weather conditions mentioned by farmers and fishermen in five barangays of Aparri

We think that the local government itself is aware of climate change and its consequences for the villagers of Aparri. We also found out during our research that the local government tries to implement a lot of projects to protect Aparri from extreme weather conditions. But they do not have enough knowledge and money to do as much as they want. The national government plays a key role in what the local government of Aparri can do against the changes in weather conditions.

Most of the people in Aparri live a simple life due to poverty. A lot of the families we interviewed were living together with all family members staying in small houses. Some of the informants mentioned that they have a hard time earning enough money to live a normal life. If people have to work as hard as they can to achieve a secure life, they do not think of what causes the changing weather conditions and what is happening to them. They do not look a long way forward. They only think of today instead of tomorrow. The local government can pay more attention to the basic needs of their villagers. This is also included in the national act about climate change. The government should have a 'pro-poor' perspective policy. To say more about the solutions on the effects of changing weather conditions, a longer research is necessary.

We can conclude that as long as a lot of people in Aparri live in poverty, they will not be aware of climate change. The respondents from the local government are better-off compared to the farmers and fishermen we interviewed. They can be the key to help local villagers become aware about climate change and protect their lives against its impacts. The farmers and fishermen do experience the consequences of climate change but they do not have enough power and opportunities to change their lives and think of what will happen in the future. Doing a short research in Aparri made it clear for us that there is a lot more work to do in Aparri about the negative effects of climate change including its solutions and consequences.

ACKNOWLEDGEMENTS

First, we want to thank our host family, the Corpuz family, who allowed us to sleep in their house and treated us with a nice videoke evening. We also thank Pauline for diligently helping us interview a lot of farmers and fishermen for the whole day. We acknowledge the help of Dr. Ismael V. Tumaru, municipal mayor of Aparri, for the warm welcome accorded to us in all the barangays. We also thank the government officials whom we interviewed: José Rico Mercado, Aniceto Gatan, Ligaya Arce, Rolando Liberato, Romeo Putulan, Mario Estrella and Mario Galanoge. Our gratitude also goes to the farmers and fishermen for their information and time. We also thank Arnold Macadangdang, our coordinator in Aparri, who gave us a lot of confidence to start our fieldwork in an unknown area even if it was also his first time in the municipality.

REFERENCES

Bernardo, E. C. 2010. Local Adaption to Climate Change: Strategies of Farmers, Emplohyees and Local Businessmen, Philippines, Journal of Research Isabela State University 1-10.

Dayrit, M. (ed) 2009. Agenda for Hope. Ateneo de Manila University Press: Manila. 184 pages.

Mercado, J. 2012 Pers. Comm. Meteorological Specialist, PAGASA Aparri. Aparri, Cagayan, 20 January 2012.

Ragonjon. 2012. Pers. Comm. Municipal public director, Municipality of Aparri. Aparri, Cagayan, 19 January 2012.

REPUBLIC ACT NO. 9729. Climate Change Act of 2009. Republic of the Philippines, the Senate and House of Representatives of the Philippines in Congress.

Rincón M. and F. Virtucio. 2008. Climate Change in the Philippines: A contribution to the Country Environmental Analysis. World bank. Source: http://siteresources.worldbank.org/INTPHILIPPINES/Resources/PhilippineCEACC1July.pdf

Sebastian, R. 2005. Thesaurus on Philippine Environment. The Bookmark, Inc. 47 pages.

Servando, N. 2011 'Climate Change in the Philippines' PAGASA. Source: http://kidlat.pagasa.dost.gov.ph/cab/climate_change/main.html

Siringan. 2012. Pers. Comm. Professor University Philippines Diliman. Aparri, Cagayan, 20 January 2012.

APPENDICES

Questionnaire for government officials

1. Name
2. Position
3. Agency

4. Have you experienced changes in weather conditions during your life?

5. What do you think will be the impact of climate change in Aparri?

6. What should the government do with respect to climate change?

7. What has the government done already? Do you think this is enough?

8. Have you heard of the rise of the sea level?

9. What do you think of it?

10. The government does enough to prevent any negative effect of climate change for their villagers.

Scaling questions

I totally agree 1 2 3 4 5 I do not agree

11. I know a lot about climate change.

12. I think there is enough information available about climate change for villagers.

13. I think there are clear solutions to the impacts of climate change.

14. I think the projects of the government are effective.

15. I think the farmers and fishermen in Aparri are aware of climate change.

Questionnaire for farmers and fishermen

1. Name
2. Working in which sector
3. Barangay

4. Do you already live your whole life in Aparri?

5. Is the weather different now compared to the past? If yes, what are the differences?

6. What do you think is the best weather?

7. Did you experience any extreme dry period during your life?

8. Are there more/less/the same dry periods right now compared to when you were young?

9. Did you experience any flood during your life?

10. How did the extreme weather conditions affect your livelihood?

11. Do you know projects of the government to prevent you from damages caused by extreme weather conditions?

12. Did you mitigate or adapt to some strategies to prevent your own house against any damage caused by extreme weather conditions?

13. What do you think will happen in the future with the weather here in Aparri?

14. Have you ever heard of climate change?

15. Do you know PAGASA? And do you know what the institute is doing?

Scaling questions

I agree 1 2 3 4 5 I do not agree

16. Rainwater is very important for my living.

17. I think it rains too much in Aparri.

18. In a dry period, it is hard for me to survive.

19. I think there are too many dry periods in Aparri.

20. There is a chance that I will move to another area because of the changing weather conditions.

Ludong (C*estraeus plicatilis*) fishing in the Cagayan River in the Municipality of Aparri, the Philippines

Joseph Balabbo and Jasper Buikx

INTRODUCTION

The Lobed River Mullet (*Cestraeus plicatilis*, Valenciennes, 1836), locally known as Ludong or Banak, is a fresh water fish species that can be found in Cagayan River and its tributaries extending through the watersheds of Cagayan Valley and the Santa-Abra River Systems of Ilocos Sur and Abra. According to the Bureau of Fisheries and Aquatic Resources (BFAR), this fish is habituating the deep pools of Addalam River in Aglipay, Quirino, and rapids of Didimpit in Lacab, Jones, Isabela. Ludong is herbivorous, eating only the filamentous algae that live on rocks and boulders in and near river rapids (http://www.fishbase.org).

Ludong is a catadromous fish species since it lives in fresh water throughout the year but migrates to the ocean in order to spawn. Once a year, Ludong migrates from the Cagayan River Head (Sierra Madre, Nagtipunan, Quirino), during the floods between October and December, to the Cagayan River Delta (Babuyan Channel) in Aparri to reproduce, before returning upstream. It undergoes upstream migration during December, January and February, which coincides with the *ipon-run phenomenon* in which different species of fish fry, including Ludong, also undergo upstream migration.

Ludong fishing

During the migratory period, when rains swell the Cagayan River, the Ludong and its fry (called *Ifun*) are intensely fished by local fishermen. A mature fish weighs nowadays between 0.25 kg and 2 kg and costs between 4,000 or 5,000 pesos per kilo making it the most expensive fish in the Philippines (BFAR, 2011). Ludong is very expensive since it is rare and has a unique taste and peculiar aroma when cooked, thus, it is one of the most sought-after ingredients. This high price has given Ludong the name 'President's Fish' since only wealthy people can afford to buy and eat it. Ludong is also used often by government officials as a present for their peers.

The high value brought about the decennia of uncontrolled overfishing of adult Ludong and fry which has resulted in its near-extinction in North Luzon waters. According to a study from BFAR, Ludong catches have consistently declined over the years from around 1.3 million metric tons recorded in 1973. Additionally, the Ludong caught every year are getting smaller. Ludong caught by BFAR in 1998 had an average weight of 2.4 kg which decreased to 0.25 kg in 2001 (BFAR - http://www.bfar.da.gov.ph).

Protection

Ludong populations have officially been protected in the Philippines since the 1930's. Catching of Ludong was already prohibited on March 9, 1935, when the Fish *and Game Administrative Order No. 3, Regulations for the Conservation of Dalag, Kanduli and Ludong,* was signed to prohibit the catching of the mentioned fishes. On May 10, 1952, the *Fisheries Administrative Order No. 31* was adopted which prohibits the capture, purchase, sale, preparation, and serving of Ludong for private and public consumption during its seasonal migration. It also prohibits the use of *tabukol*, a cast net of large meshes, *tabak*, a small drag seine for river fishing and *pateng*, a cylindrical fish pot for catching mullet, in the Cagayan River and its tributaries and in the Santa-Abra River System. In 2001, *Republic Act 8550* was

accepted for the conservation of rare, threatened and endangered fish species, including Ludong, by declaring closed seasons, conservation, rehabilitation, and prohibition of the use of any illegal fishing paraphernalia in catching the endangered kind of fishes.

Not only the adult fishes are protected by law, Ludong fry fishing is also prohibited. Unfortunately, the laws protecting the fry were adopted in just a few municipalities and not nationwide. In Ilocandia, for instance, the *Municipal Ordinance No. 78* was signed in 2001, which prohibits the catching of fish fry of all endangered fish species, including Ludong, during the last part of the fry season every February. The Sangguniang Panlalawigan of Ilocos Norte approved *Ordinance 067* in 2004 which prohibits the catching of fry in the coastal area of the province. The *Fisheries Administrative Order No. 9* regulates the conservation of Ludong fry in Northern Luzon (BFAR – http://www.bfar.da.gov.ph/pages/Legislation/legislations.html).

According to these laws, anyone who violates them will be punished with jail time or a fine. Unfortunately, little or no enforcement of these laws takes place and despite the many laws enacted since 1935, Ludong populations are declining.

Endemic
Many Philippine sources consider the Ludong (*Cestraeus plicatilis*) to be endemic to the Cagayan River Basin in the Philippines. This species can however be found throughout the pacific region (Thomson, 1954; Harrison and Senou, 1997), i.e. in Celebes, New Caledonia, New Hebrides (http://www.fishbase.org), on the Fiji Islands (Boseto and Jenkins, 2006) and on the Solomon Islands (Boseto et al., 2007). This means that the fish, locally considered to be the endemic Ludong, might not be endemic at all, which opens up the possibility of importing the fish for conservation and/or consumption from other parts of the pacific region. Furthermore, the *Oplan Sagip Ludong*, a fish survey in Aparri launched by BFAR in 2010, resulted in the identification of at least two or three possible species considered to be Ludong. This means that, even though *Cestraeus plicatilis* is not endemic, up to three other (endemic) species might be in danger.

RESEARCH QUESTIONS

Since very little is known about Ludong, we would like first to gather more information about the status of Ludong and its protection.

Research question 1:
What is the status of Ludong (*Cestraeus plicatilis*)?

Sub questions:
- What species is Ludong (only *Cestraeus plicatilis* or multiple other species)?
- Is this/are these species endemic to the Philippines?
- Why is Ludong so rare in the Philippines?
- Is there a conservation program in place?
- Are the fishermen aware of the status of Ludong?
- Do the fishermen know of the BFAR conservation program?
- If Ludong is not endemic in the Philippines but common in the Pacific Region, why is it not imported for conservation and/or consumption purposes?

We would also like to know more about the past and current Ludong fishing.

Research question 2:
How is Ludong (illegally) fished nowadays?

Sub questions:
- During which period of the year is Ludong fished?
- How many days per year do fishermen fish for Ludong?
- What is the annual Ludong yield per fisherman and how has this changed over the years?
- What is the total annual Ludong yield in Luzon and how has this changed over the years?
- What is the weight of Ludong caught nowadays and how has this changed over the years?
- What is the current price per kilogram of Ludong and how has this changed over the years?

METHODOLOGY

Our data were gathered in two ways. The first was by taking 32 questionnaires (Simple Random Sampling) with local fishermen in Punta, a barangay along the Cagayan River delta in the municipality of Aparri, the Philippines (Appendix 1: Questionnaire fishermen). Fourteen of these fishermen still fish for Ludong and 18 have stopped. Estimates of annual Ludong yield and weight given by the fishermen were quantified by rounding these data to 0.5 kg so that group averages could be taken.
In order to get as much information out of the fisher folk questionnaires, we first obtained more background information through open interviews with different governmental and university sources (i.e. at the Bureau of Fisheries and Aquatic Resources (BFAR) Regional Office No.2 and the BFAR Regional Fisheries Training Center (RFTC), the Department of Agriculture of the municipality of Aparri and the Cagayan State University - Aparri campus) in the municipality of Aparri and the city of Tuguegarao, the Philippines (Appendix 3: Interview schedule).

RESULTS

The status of Ludong
Ludong population is declining steadily, despite many protective measures. Almost 97% of the interviewed fishermen are aware of the endangered status of Ludong but will continue fishing as long as they can still catch Ludong (Appendix 2: Results questionnaires fishermen). No official cause of Ludong decline has been found yet but BFAR officials suspect that the main reasons for the endangered status of Ludong are 1.) overfishing in both up- and downstream areas, 2.) catching of gravid females upstream before they can spawn at the river mouth in Aparri, 3.) more effective fishing methods, 4.) construction of dams without fish ladders that block the migratory route and 5.) climate change (Villariao, B.B., 2012, Pers. Comm.; Guzman, D., 2012, Pers. Comm.; Revilloza, R.N., 2012, Pers. Comm.; Sebastian, A., 2012, Pers. Comm.)

Dredging of the Cagayan River
A possible threat to Ludong in the future is the dredging of the Cagayan River. The Cagayan River has undergone many geomorphic changes over the past century (Siringan, F.P., 2012, Pers. Comm.). In some areas, the river has become shallower and sand banks have grown up to 400m since 1945, while in other areas, sandbars and riverbanks have been severely eroded. According to Siringan, flooding, riverbank erosion or accretion, thalweg shifts and sandbar formation or erosion are normal processes associated with rivers, especially those in coastal plains. However, deforestation, unwise farming practices and indiscriminate dredging operations in the past decennia have contributed greatly to the geomorphic changes in the

Cagayan River. This is especially true to the lower part of the river, including the delta,that have undergone severe changes. Due to siltation originating from the upstream, the river has become more shallow and has become more constricted due to sandbar growth (i.e. the spit along the west flank of the river mouth has grown up to 400m since 2007) (Siringan, F.P., 2012, Pers. Comm.). As a solution, the governments of Cagayan Province and the affected municipalities have decided to dredge large parts of the Cagayan River. This will decrease the annual flooding and enhance the flow to decrease riverbank erosion by deepening and straightening the channel and using the dredged silt for riverbank heightening.
According to the Bureau of Fisheries and Aquatic Resources (BFAR), the Department of Agriculture in Aparri and the mayor of the municipality of Aparri, Ismael V. Tumaru, M.D., the dredging of Babuyan Channel at the upper Cagayan River in Aparri will temporarily have a negative effect on the Ludong population (during the dredging itself) but will provide deeper waters where Ludong prefers to spawn in.
This is contested by Tony Liquigen, former Professor of Fisheries at the Cagayan State University (CSU), who explains that Ludong only spawn at the mouth of the river (almost in the Pacific Ocean itself) while the dredging will take place at the beginning of the Babuyan Channel. Secondly, there is also a permanent Ludong population residing at the Cagayan River delta in Aparri. These individuals do not migrate upstream after spawning and will therefore most certainly be affected in the long term by dredging.

Oplan Sagip Ludong
In 2010, the Bureau of Fisheries and Aquatic Resources (BFAR) Region 2 launched a conservation program to save the Ludong from extinction, called *Oplan Sagip Ludong*. In order to protect the Ludong from extinction, *Oplan Sagip Ludong* consists of four sections (Oplan Sagip Ludong Project Status Report, 3rd quarter of 2011; Revilloza, R.N., 2012, Pers. Comm.; Sebastian, A., 2012, Pers. Comm.; Villariao, B.B., 2012, Pers. Comm.).

The *Regulatory Section* is first of all meant for the amendment and implementation of Fisheries Administrative Order No. 31 (FAO 31, s. 1952), which was already adopted in 1952. Four Resolutions of Support were collected from the four provinces through which the Cagayan River runs, namely; Cagayan, Isabela, Quirino and Nueva Vizcaya, and submitted to the BFAR Regional Office No. 2 as reference for the amendment of FAO 31, s. 1952. The Regulatory Taskforce Team selected 38 local government units (LGUs) that are located along the migratory path of Ludong, to seek their support relative to the FAO 31 proposed amendment. Of these 38 LGUs, BFAR already received 95% of the municipal Resolutions of Support (Revilloza, R.N., 2012, Pers. Comm.).

The *Information, Education and Communication (IEC) Section* is a collaboration between BFAR and the Philippine Information Agency (PIA) Regional Office No. 2. Through surveys and seminars with local fishermen and a leaflet explaining *Oplan Sagip Ludong*, they try to create more awareness about the threatened status of Ludong among the inhabitants of Luzon.

The main sections of *Oplan Sagip Ludong* focus on research since there is still a lot of unknown information about Ludong. One section is specially created for *Spawning of Ludong in Captivity*. This required the installation of support facilities (RFTC Fish Farm, Aparri) and the capture of live Ludong adults and fry. These individuals are very important for the last section of the program which is *Research and Development*. In November 2011, one female, two males and (possible) Ludong fry were caught and transferred to the RFTC Fish Farm in Aparri.

The adult specimens will be used for morphological studies and captive reproduction. Since previously captured Ludong died within a short period of time after capture, the RFTC Fish Farm is presently focusing only on keeping the captive individuals alive. At present, the Ludong are only observed for behavioural characteristics and acclimatization to their new environment (Sebastian, A., 2012, Pers. Comm.). The RFTC Fish Farm therefore, only has artificial reproduction plans for the future. If the RFTC Fish Farm will actually commence with the artificial reproduction, the eggs of the gravid female will manually be removed and mixed with the sperm of the males in small tanks. This will possibly be combined with hormonal treatment. But before this is tested on Ludong, it will first be tested on Flathead Grey Mullet (*Mugil cephalus*, or Porong), a common mullet species in Luzon (Revilloza, R.N., 2012, Pers. Comm.; Sebastian, A., 2012, Pers. Comm.).

The fry and juveniles that are kept in RFTC Fish Farm, are not just Ludong fry but consist of different mullet species. These fish will be reared to adulthood to determine the ontogenetic development and characterization of the larval mugilids and mainly to determine the species, since the morphology of Ludong fry and juveniles is still unknown.
Other part of *Research and Development* is a fishing expedition in the Cagayan River and its tributaries to gather more information about the distribution and seasonality of Ludong. Interviews with fisher folk that fish in (possible) Ludong habitat, will result in an assessment of the fishing technologies employed by the fisher folk during the spawning season of Ludong in the Cagayan River and its tributaries.

Even though the Resolutions of Support of the provinces of Cagayan, Isabela, Quirino and Nueva Vizcaya and 95% of the municipalities were received by BFAR, *Oplan Sagip Ludong* is not yet adopted by the senate. The main reason is that this conservation program might result in a total ban of fry fishing of all fish species since Ludong fry mix with the fry of other common mullet species and cannot be distinguished from them. According to BFAR, *Oplan Sagip Ludong* has resulted in many complaints from fishermen that rely on fry fishing for a living. But when the fishermen were polled about their awareness of *Oplan Sagip Ludong*, only 43.75% know of the existence of the conservation program. The reason is that Manuel Ritarita, Jr., the president of the Fisher Folk Association in Punta, did attend the BFAR *Oplan Sagip Ludong* seminar but will not inform his fishermen until the Program's regulatory section is adopted by the senate.

Ludong speciation
The most important part of the *Oplan Sagip Ludong* is to determine what species of Ludong that inhabits the Cagayan River Basin, actually is. A study from the University of Queensland, Australia, by Professor J. M. Thomson on Ludong specimens provided by BFAR, resulted in the identification of Ludong as *Cestraeus plicatilis*. However, *Oplan Sagip Ludong* revealed that the Ludong (caught throughout the Cagayan River and its tributaries by BFAR) are not *Cestraeus plicatilis*, but *Cestraeus oxyrhynchus* and *Cestraeus goldiei* (Revilloza, R.N., 2012, Pers. Comm.). This does not mean however, that the University of Queensland is wrong or that *C. plicatilis* is extinct in the Cagayan River and its tributaries. BFAR only fingerprinted a few Ludong specimens for their DNA which means there might be three species that are known and fished as Ludong in Luzon and that not one, but three species, are endangered in the Philippines.

None of these species are endemic to the Philippines though. *Cestraeus goldiei* can be found in Papua New Guinea, Timor, Sulawesi (Blaber, 2000; Jennings, 1998), Australia (Thomson, 1954), the Philippines (Pan et al., 2008) and New Caledonia (fishbase.org). *Cestraeus*

oxyrhynchus can be found from Indonesia east to Fiji, north to the Philippines and south to New Caledonia (fishbase.org). And none of these species is globally threatened (IUCN Red List, 2011). BFAR does not want to import these species from other regions in the Pacific for consumption, however. The main reason is that there is still no artificial reproduction program for these species. Importing specimens for conservation measures is also out of the question since BFAR is not sure whether the species inhabiting Northern Luzon waters are possibly unique sub-species (Revilloza, R.N., 2012, Pers. Comm.; Villariao, B.B., 2012, Pers. Comm.; Sebastian, A., 2012, Pers. Comm.).

Ludong fishing

According to the fishermen interviewed, adult Ludong can only be fished with gill nets (or *lambat*) for approximately two days per year (2.218 days) in October or November (the peak of the rainy season), depending on the weather ("often during a typhoon and floods when the waves and currents are strong"). Even though it is just a short period of time, Ludong fishing is a very dangerous occupation. All of the 18 former Ludong fishermen (56.3%) had stopped fishing for Ludong due to the increased rarity of Ludong resulting in smaller yields or no catch at all. However, seven of the 18 former fishermen (38.9%) also stopped Ludong fishing due to the high dangers. The age of the former Ludong fishermen is about 10 years higher (on average 48.5 years old) than that of the fishermen (on average 38.2 years old), who still dare to face the dangers for a relatively small or no yield.

Annual Ludong yield

According to a study from BFAR, Ludong catches in the Philippines have steadily declined from around 1.3 million metric tons recorded in 1973. The results from the fishermen questionnaires seem to confirm these findings. The average annual yield per fisherman decreased from 16 pieces in the 1990's, to five in 2005 and just two in 2011 (Fig.1). The official Ludong catch data from the Cagayan Valley from 2003 until 2010 are quite variable but also show a decreasing trend (Bureau of Agricultural Statistics (BAS), 2011) (Table 1, Fig.2). The official total number of Ludong caught in Aparri in 2011 was 11 pieces (Ritarita, Jr., M., 2012, Pers. Comm.). Only 10 out of the 32 fishermen could give us an estimation of this total but the average was a lot higher i.e. 27.5 individuals.

Table 1: Annual volume of production of Ludong in Region 2 by province in metric tons (MT) from 2003 to 2010.

Year	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Cagayan Valley	1.00	1.00	1.32	0.75	0.52	1.23	0.79	0.57
Cagayan	1.00	1.00	0.32	0.25	0.23	0.40	0.10	0.03
Isabela	..	..	1.00	0.50	0.29	0.83	0.69	0.54
Nueva Vizcaya	..	..	..	..	..	..	..	..
Quirino	..	..	..	..	..	..	..	..

Ludong weight

According to BFAR, not only the annual Ludong catch but also the weight of the Ludong caught over the years has reduced (average weight of 2.4 kg in 1998 and 0.25 kg in 2001). The same was observed by almost 97% of the fishermen (31 of the 32 fishermen) in Barangay Punta, Aparri. The weight of Ludong they caught over the last two decades reduced from 3.07 kg in the 1990's to 1.50 kg in 2005 and to 0.82 kg in 2011 (Fig.3).

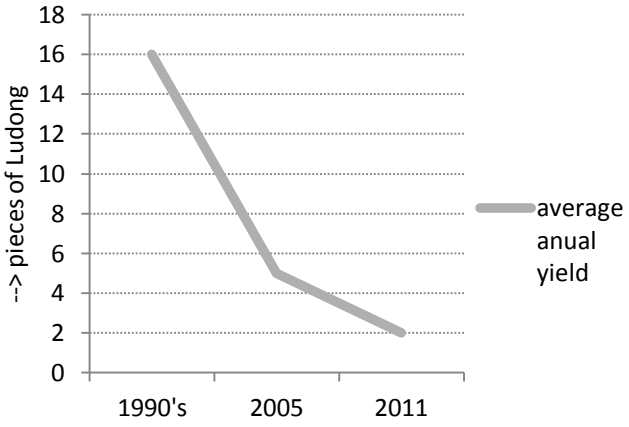


Figure 1: Average annual Ludong yield (in pieces) per fisherman in Barangay Punta, municipality of Aparri, in the 1990's, 2005 and 2011.

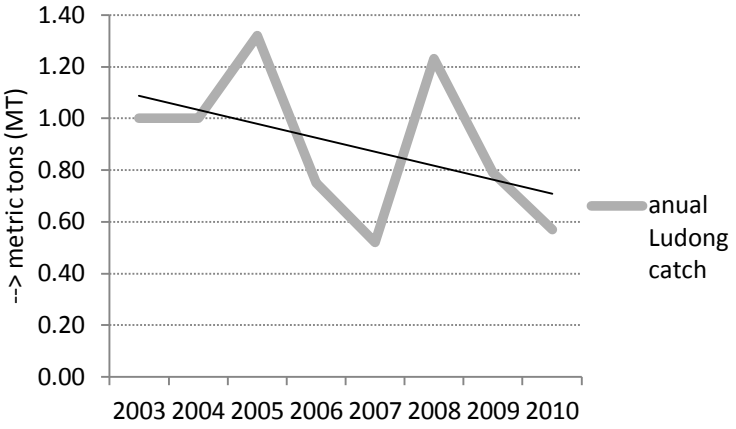


Figure 2: Total annual Ludong catch (in metric tons) in Cagayan province, the Philippines, between 2003 and 2010.

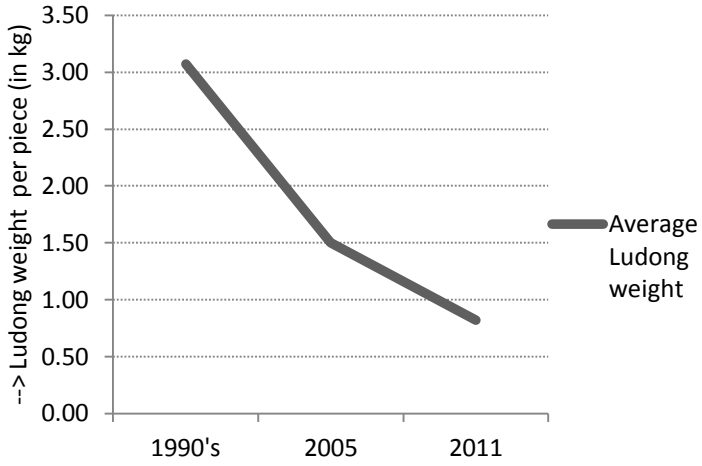


Figure 3: Average Ludong weight per piece in kilograms from 1990's to 2011 according to Punta fishermen.

Ludong price

The price of Ludong (per kilogram) differs throughout the area in which it is caught. It is for example more expensive in Aparri since it is considered more tasteful at the river delta. This is possibly due to hormones since the fish are about to spawn or have already spawned, or because of the other food items the Ludong ate during its downstream migration (Liquigen, T., 2012, Pers. Comm.; Villariao, B.B., 2012, Pers. Comm.)

According to the older fishermen and some of the officials, Ludong was so common decades ago, that the market stands were filled with Ludong, resulting in very low prices. Nowadays, so few Ludong are caught that according to BFAR, the official price for one kilogram of Ludong in 2011 was between 4,000 and 5,000 Phil. pesos. The (average) estimates of the Punta fishermen and president of the Fisher Folk Association of Punta, correspond with these numbers and give a clear description of the price changes (Table 2, Fig 4).

Table 2: (Average) estimate of Ludong price (in Phil. pesos) per kilogram from 1970's to 2011.

	1970's	**1980's**	**1990's**	**2000**	**2005**	**2011**
Punta fishermen (average)	-	-	1,300.00	-	2,687.50	4,620.69
Manuel Ritarita, Jr.	100.00	300.00	500.00	1,000.00	3,500.00	5,000.00

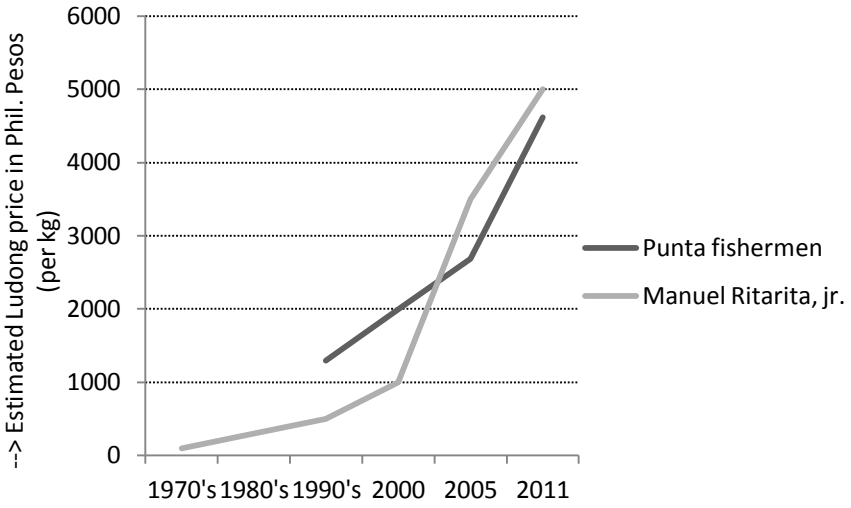


Figure 4: (Average) price for one kilogram of Ludong (in Phil. pesos) estimated by Punta fishermen and Manuel Ritarita, Jr., president of the Fisher Folk Association of Punta, between the 1970's and 2011.

DISCUSSION

According to the Bureau of Fisheries and Aquatic Resources (BFAR) and the Bureau of Agricultural Statistics (BAS), Ludong has become rarer, weighs less and has become much more expensive over the years in the Philippines. The same results were obtained from the questionnaires answered by the fishermen. A strong decline in annual Ludong yield and weight was also observed by the (former) Ludong fishermen. All former Ludong fishermen stopped fishing for Ludong due to its increased rarity but many also stopped due to the dangers that are associated with the Ludong season.

The total annual Ludong yield in the Cagayan Valley determined by BAS of 0.57 MT in 2010 might be different from the actual total annual yield, though. Many fishermen sell the caught Ludong directly from their boat without registering their catches, meaning, the actual total yield might be much higher. This might also be why the total catch in Aparri in 2011 estimated by the fishermen is much higher (27.5 pieces) than the official number (11 pieces). BAS determined the Cagayan Valley total yield according to the data from Isabela and Cagayan provinces only. We were however, unable to obtain data from Quirino and Nueva Vizcaya or discover why these data were absent from the BAS table.

Because *Oplan Sagip Ludong* was launched just in 2010, a lot of morphological, behavioural, reproductive and genetic research studies still have to be conducted on (live) Ludong specimens. *Oplan Sagip Ludong* did reveal however, that the fish considered to be Ludong, possibly consists of three species, namely; *C. plicatilis*, *C. oxyrhynchus* and *C. goldiei*. These species are not endemic to the Philippines and not in direct danger of global extinction. They are however, severely threatened within the Philippines, so action has to be undertaken before it is too late.
The exact causes of the decline of Ludong population in Northern Luzon have not also been scientifically proven although the existing scientific data and the observations and expectations of the officials from BFAR and the Department of Agriculture seem to coincide with the observations of the Punta fishermen. The main reasons for the decline are overfishing along the entire range of Ludong with more effective fishing methods and the capture of gravid females. Despite the efforts to create awareness among the inhabitants of Cagayan Valley about the threatened status of Ludong, only 43% of the fishermen have heard of the conservation program, but none of them knows the actual content. Many fishermen therefore, continue fishing for Ludong (despite the dangers) since the price per kilo is so extremely high nowadays.

ACKNOWLEDGEMENTS

First of all, we would like to thank the Local Government Unit of Aparri for its warm welcome and aid in the successful completion of our short research, specifically Mayor Ismael V. Tumaru M.D. Our special thanks go to Mr. Rowel and his family for accommodating us in their home during our stay and Mr. Gatan, the barangay captain of Punta, for aiding us in our research. We would also like to give our sincere gratitude to the engineers at the Department of Agriculture (DA) in Aparri, the researchers at the Bureau of Fisheries and Aquatic Resources (BFAR) Regional Office No. 2 in Tuguegarao City and the Regional Fisheries Training Center in (RFTC) - Aparri and the researchers at the Bureau of Agricultural Statistics (BAS) in Tuguegarao City for their vital information on the status and conservation of Ludong in the Cagayan River Basin. We would specifically like to thank Ma'am Morales who provided us with a place to sleep during our first two nights at the RFTC, Cagayan State University campus. We would like to thank the Punta fishermen for their honest information, cooperation and time that were essential to our research. And finally, we would like to thank Arnold Macadangdang for perfectly arranging our stay and providing vital solutions.

REFERENCES

Blaber, J.M., 2000. Tropical estuarine fishes: ecology, exploitation and conservation. Fish and Aquatic Resources Series 7. Blackwell Science Ltd.: Oxford. 372 pages.

Boseto, D. and Jenkins, A. P., 2006. A checklist of freshwater and brackish water fishes of the Fiji Islands. Wetlands International-Oceania

Boseto, D., Morrison, C., Pikacha, P. and Pitakia, T., 2007. Biodiversity and conservation of freshwater fishes in selected rivers on Choiseul Island, Solomon Islands The South Pacific Journal of Natural Science, 2007, 3: 16-21.

Bureau of Fisheries and Aquatic Resources (BFAR) – http://www.bfar.da.gov.ph
Downloaded on 13th of January 2012

Laws and legislation:
http://www.bfar.da.gov.ph/pages/Legislation/legislations.html
Fisheries Administrative Order No. 31:
http://www.bfar.da.gov.ph/pages/Legislation/FAO/fao31.html
Publications:
http://www.bfar.da.gov.ph/pages/AboutUs/maintabs/publications/publications.html

Catching of 'Ludong' fry banned in Cagayan. Manila Bulletin Publishing Cooperation.
http://www.mb.com.ph/node/237208/catching-ludong-fry-banned-cagayan

Fishbase.org
http://fishbase.org/summary/Cestraeus-plicatilis.html
http://fishbase.org/summary/Cestraeus-oxyrhynchus.html
http://fishbase.org/summary/Cestraeus-goldiei.html

Harrison, I.J. and Senou, H., 1997. Order Mugiliformes. Mugilidae. Mullets. p. 2069-2108. In K.E. Carpenter and V.H. Niem (eds.) FAO species identification guide for fishery purposes. The living marine resources of the Western Central Pacific. Volume 4. Bony fishes part 2 (Mugilidae to Carangidae).

Interview: Westly Rosario - Interim Executive Director and Research Center Chief of the Bureau of Fishing and Aquatic Resources (BFAR).
http://myworld.prepys.com/archives/2006/04/22/ludong/

Is it the end for Ludong. Agriculture Business Week
http://www.agribusinessweek.com/is-it-the-end-for-ludong/

Jennings, G.H., 1998. The sea and freshwater fishes of Australia and New Guinea. Part 2: North-East, North, North-West Australia and New Guinea. Calypso Publications Ltd.: Henlow. 247 pages.

Pan, M., Bailly, N., Conejar, J., Dar, C., Froese, R., Garilao, C., Guerzon, L.I., Laxamana, E., Paglinawan, L., Pauly, D., Sorongon, P., Tabaranza, G.K., and Palomares, M.L.D., 2008. Philippine marine biodiversity as assessed by SeaLifeBase: Status and Gaps. Published on: Sealifebase.org

Save Ludong, the most delicious and expensive fish in RP. Agriculture Business Week. http://www.agribusinessweek.com/save-ludong-the-most-delicious-and-expensive-fish-in-rp/

Thomson, J. M., 1954. The Mugilidae of Australia and Adjacent Seas. Australian Journal of Marine and Freshwater Research 5(1): 70-131

Interviews:

Engr. Rolende Liberato, Pers. Comm., Department of Agriculture, Aparri (presentation), January 19th 2012.

Delia Guzman, Pers. Comm., Administrative Officer of the Bureau of Fisheries and Aquatic Resources (BFAR) - Regional Fisheries Training Center (RFTC), Aparri, January 19th 2012.

Dr. Benchito B. Villariao, Pers. Comm., Executive Officer Ludong team of the Bureau of Fisheries and Aquatic Resources (BFAR) – Regional Fisheries Training Center (RFTC), Aparri, January 19th 2012.

Dr. Alice Sebastian, Pers. Comm., former Municipal Agricultural Officer (MAO) in Aparri, Consultant for BFAR at the RFTC Fish Farm, Aparri, January 20th 2012.

Dr. Fernando P. Siringan, Pers. Comm., Professor in Marine/Coastal Geology, Sedimentology and Seismic Stratigraphy at the University of the Philippines Diliman-campus. Speaker at the conference *Channel Restoration of the lower Cagayan River*, Aparri, January 20th 2012.

Engr. George T. Quines, jr., Pers. Comm., Department of Agriculture, Aparri, January 20th 2012.

Engr. Gertrude Banadero, Pers. Comm., Fisheries Expert of the Department of Agriculture, Aparri, January 20th 2012.

Dr. Tony Liquigen, Pers. Comm., former Professor of Fisheries at the Cagayan State University (CSU) Aparri-campus, President of the Aparrianos Movement for the Conservation and Protection of the Environment (AMCPE) and board member of the Federation of Anti-Mining Advocates Cagayan (FAMAC). January 20th 2012.

Manuel Ritarita, jr., Pers. Comm., president of the Fisher Folk Association of Punta, Aparri, January 22nd 2012.

Roderick N. Revilloza, Pers. Comm., research staff of the BFAR Ludong-project, BFAR Regional Office No.2, Tuguegarao, January 24th 2012.

Dr. Angel B. Encarnacion, Pers. Comm., OIC – Planning, Monitoring & Evaluation Division of the Bureau of Agricultural Statistics (BAS), Tuguegrarao, January 24th 2012.

APPENDICES

Appendix 1: Questionnaire fishermen from barangay Punta, Aparri

Questions:

1. Name
2. Age
3. Profession
4. Ethnic Group
5. Do you know Ludong/Banak?
6. Do you fish for Ludong?
7. When did you start fishing?
8. Do you still fish for Ludong?
    a. If not, when did you stop?
    b. Why did you stop fishing for Ludong?
9. Do/did you fish for Ludong adults, fry or both?
10. How do/did you fish for Ludong?
11. How many days per year you fish for Ludong?
12. How many Ludong did you catch last season?
13. What was the total Ludong catch in Aparri last season?
14. Did the Ludong you caught reduce in weight?
    a. If so, what did they weigh on average in the 1990's?
    b. If so, what did they weigh on average in 2005?
    c. If so, what did they weigh on average in 2011?
15. Does your annual yield today differ from before?
    a. If so, what was your annual yield in the 1990's?
    b. If so, what was your annual yield in 2005?
    c. If so, what was your annual yield in 2011?
16. Have the prices per kilogram of Ludong changed?
    a. If so, what was the price in the 1990's?
    b. If so, what was the price in 2005?
    c. If so, what was the price in 2011?
17. Do you know Ludong is endangered?
18. Do you know the conservation program Oplan Sagip Ludong?
19. Did you ever eat Ludong?
20. How did it taste?

Appendix 2: Results questionnaires fishermen

No.	1	2	3	4	5	6	7	8	8a	8b	9	10
1	*Terry Andaya*	38	F	I	Y	Y	16	N	2000	Rarity	Adults	Nets
2	*Edwin Basilio*	43	F	I	Y	Y	14	Y	-	-	Adults	Nets
3	*Hill Culcul*	42	F	I	Y	Y	11	Y	-	-	Adults	Nets
4	*Georgie Labbou*	38	F	I	Y	Y	13	N	1999	Rarity	Adults	Nets
5	*Jerry Corbilia*	30	F	I	Y	Y	14	N	2010	Rarity/Dangerous	Adults	Nets
6	*Claudio Senteno*	72	F	V	Y	Y	20	N	2002	Rarity	Adults	Nets
7	*Efren Lagmay*	53	F	I	Y	Y	15	N	2001	Rarity/Dangerous	Adults	Nets
8	*Wilson Malassab*	47	F	I	Y	Y	14	N	2000	Dangerous	Both	Nets
9	*Antonio Quailbiopo*	62	F	I	Y	Y	30	N	2002	Rarity	Adults	Nets
10	*Danilio Ante*	62	F	I	Y	Y	15	N	2000	Rarity	Adults	Nets
11	*Joeffrey Raquino*	35	F	I	Y	Y	29	Y	-	-	Adults	Nets
12	*Eduarde Leste*	38	F	I	Y	Y	13	Y	-	-	Adults	Nets
13	*Marvin Bergorio*	35	F	I	Y	Y	12	Y	-	-	Adults	Nets
14	*Jay Cagasa*	26	F	I	Y	Y	16	Y	-	-	Adults	Nets
15	*Virgilio Quilliopo*	45	F	I	Y	Y	15	Y	-	-	Adults	Nets
16	*Arcenio Ravena*	48	F	I	Y	Y	19	Y	-	-	Both	Nets
17	*Melchor Calcalan*	31	F	I	Y	Y	15	Y	-	-	Adults	Nets
18	*Jerry Taja*	35	F	I	Y	Y	20	Y	-	-	Adults	Nets
19	*Rosendo Renauld*	46	F	I	Y	Y	15	Y	-	-	Both	Nets
20	*Hayde Culcul*	33	F	I	Y	Y	25	Y	-	-	Both	Nets
21	*Romulo Benadero*	57	F	I	Y	Y	30	N	2001	Rarity/Dangerous	Adults	Nets
22	*Dante Corvilla*	43	F	I	Y	Y	14	N	2007	Rarity	Adults	Nets
23	*Martin Lubbui*	56	F	Ib	Y	Y	20	N	2000	Rarity	Both	Nets
24	*Jimmy Rebola*	39	F	I	Y	Y	16	Y	-	-	Adults	Nets
25	*Edison Palattao, jr.*	39	F	Ib	Y	Y	17	Y	-	-	Both	Nets
26	*Jovan Casho*	53	F	V	Y	Y	35	N	2003	Rarity/Dangerous	Adults	Nets
27	*Juan Raming*	55	F	I	Y	Y	20	N	1999	Rarity/Dangerous	Adults	Nets
28	*Alex Quitug*	33	F	I	Y	Y	18	N	2005	Rarity	Adults	Nets
29	*Loyda Quitug*	33	F	I	Y	Y	15	N	2005	Rarity	Adults	Nets
30	*Eddie Lagbao*	43	F	I	Y	Y	14	N	1998	Rarity	Adults	Nets
31	*Robledo Babbao*	41	F	I	Y	Y	11	N	2000	Rarity/Dangerous	Adults	Nets
32	*Ernesto de la Cruz*	57	F	I	Y	Y	14	N	2009	Rarity/Dangerous	Adults	Nets

I = Ilocano, V= Visaya, Ib= Ibanag. Y = Yes, N = No

No.	11	12	13	14	14a	14b	14c	15	15a	15b	15c	16	16a	16b	16c	17	18	19	20
1	3	-	-	Y	2.5	-	1.3	Y	10	5	0	Y	500	2500	4500	Y	N	Y	1
2	3	1	-	Y	3.5	-	1.0	Y	13	-	-	Y	250	2500	5000	Y	N	Y	1
3	1		3	Y	-	0.5	-	Y	8	-	-	Y	1000	2000	5500	Y	N	Y	1
4	2	-	-	Y	3.5	-	1.0	Y	20	3	0	Y	1750	3500	3500	Y	Y	Y	1
5	3	-	-	Y	3.5	1.0	-	Y	20	5	0	Y	1000	4000	5000	Y	Y	Y	1
6	3	-	-	Y	2.5	-	0.5	Y	25	5	0	Y	500	2000	-	Y	N	Y	1
7	2	-	-	Y	3.0	-	-	Y	30	-	-	Y	500	2000	4000	Y	N	Y	1
8	3	-	-	Y	3.5	-	0.5	Y	30	-	-	Y	2500	-	3500	Y	N	Y	1

9	2	-	-	Y	2.5	-	0.5	Y	-	-	-	Y	250	1000	5500	Y	N	Y	1
10	2	-	-	Y	2.5	-	0.5	Y	-	-	-	Y	1500	-	5000	Y	N	Y	1
11	3	0	-	Y	3.5	-	0.5	Y	-	-	-	Y	1000	3000	5000	Y	N	Y	1
12	2	1	20	Y	3.5	1.5	0.5	Y	20	4	1	Y	1000	2500	5500	Y	N	Y	1
13	3	1	5	Y	2.5	2.0	1.5	Y	8	4	1	Y	1500	4000	4000	Y	Y	N	-
14	5	3	20	Y	3.5	2.0	1.5	Y	7	3	3	Y	1750	4000	5500	Y	Y	Y	1
15	2	0	1	N	-	-	0.8	Y	10	4	0	Y	2000	3000	5500	Y	Y	Y	1
16	2	0	-	Y	-	-	-	Y	-	-	-	Y	-	2750	4750	Y	N	Y	1
17	1	0	-	Y	-	-	-	Y	5	3	0	Y	3500	3500	3500	Y	Y	Y	1
18	1	0	-	Y	-	-	-	Y	8	3	0	Y	3500	3500	3500	Y	Y	Y	1
19	2	6	85	Y	3.5	-	1.0	Y	-	-	6	Y	850	3000	5000	Y	Y	Y	1
20	2	7	70	Y	3.5	-	0.5	Y	-	-	7	Y	850	3000	5000	Y	Y	Y	1
21	2	-	-	Y	-	-	-	Y	-	-	-	Y	2000	3000	5000	N	N	Y	1
22	2	-	40	Y	-	-	-	Y	-	-	-	Y	-	1500	4750	Y	N	Y	1
23	2	-	-	Y	-	-	-	Y	-	-	-	Y	2000	3000	-	Y	Y	Y	1
24	2	3	-	Y	-	-	-	Y	25	-	-	Y	1500	-	3000	Y	Y	Y	1
25	1	5	-	Y	2.0	-	1.0	Y	20	15	5	Y	2500	-	4000	Y	Y	Y	1
26	2	-	25	Y	3.5	1.5	1.0	Y	20	4	0	Y	500	3500	5500	Y	Y	N	-
27	2	-	6	Y	2.5	-	-	Y	-	-	-	Y	100	1500	3500	Y	N	Y	1
28	2	-	-	Y	2.5	-	1.0	Y	9	0	-	Y	1000	2000	5500	Y	N	Y	1
29	2	-	-	Y	2.5	-	1.0	Y	10	-	-	Y	500	2000	5000	Y	N	Y	1
30	2	-	-	Y	3.5	-	0.7	Y	4	-	-	Y	500	2000	3500	Y	N	Y	1
31	2	-	-	Y	3.5	1.5	0.5	Y	25	-	-	Y	2200	2500	-	Y	N	Y	1
32	3	-	-	Y	3.5	2.0	0.5	Y	25	15	0	Y	500	2500	5500	Y	Y	Y	1

Y = Yes, N = No. Question 20: answer 1 = Best Fish in the Philippines!

Appendix 3: Interview schedule

Thursday, 19th January 2012

Presentation from Engr. Rolende Liberato, Department of Agriculture, Aparri.

Interview with Delia Guzman, Administrative Officer of the Bureau of Fisheries and Aquatic Resources (BFAR) – Regional Fisheries Training Center (RFTC), Aparri.

Interview with Dr. Benchito B. Villariao, Executive Officer Ludong team of the Bureau of Fisheries and Aquatic Resources (BFAR) – Regional Fisheries Training Center (RFTC), Aparri.

Friday, 20th January 2012

Interview with Dr. Alice Sebastian, former Municipal Agricultural Officer (MAO) in Aparri, Consultant for BFAR at the RFTC Fish Farm, Aparri.

Conference; *Channel Restoration of the lower Cagayan River*, 20th January 2012, Aparri. Speaker: Fernando P. Siringan, Professor in Marine/Coastal Geology,

	Sedimentology and Seismic Stratigraphy at the University of the Philippines Diliman-campus.
	Interview with Engr. George T. Quines, jr. of the Department of Agriculture, municipality of Aparri.
	Interview with Engr. Gertrude Banadero, Fisheries Expert of the Department of Agriculture, municipality of Aparri.
	Interview with Dr. Tony Liquigen, former Professor of Fisheries at the Cagayan State University (CSU) Aparri-campus, President of the Aparrianos Movement for the Conservation and Protection of the Environment (AMCPE) and board member of the Federation of Anti-Mining Advocates Cagayan (FAMAC).
Saturday, 21st January 2012	Questionnaires with fishermen from Barangay Punta, Aparri.
Sunday, 22nd January 2012	Interview with Manuel Ritarita, jr., President of the Fisher Folk Association of Punta. Questionnaires with fishermen from Barangay Punta, Aparri.
Tuesday, 24th January 2012	Interview with Roderick N. Revillozaa, research staff of the BFAR Ludong-project, BFAR Regional Office No.2, Tuguegarao.
	Interview with Dr. Angel B. Encarnacion, OIC – Planning, Monitoring & Evaluation Division of the +Bureau of Agricultural Statistics (BAS), Tuguegrarao.

The status of the mangrove forest in Aparri

Prudencio Magudang and Tanja Voogd

INTRODUCTION

Mangrove forest, also called Mangal, is a distinct saline woodland or shrub land habitat characterized by a depositional coastal environment. Mangrove forests are found in tropical and subtropical tidal areas. Areas where mangroves occur include estuaries and marine shorelines. They include diversified habitats such as core forests, litter forest floors, mudflats, and adjacent coral reefs and sea grass ecosystems. The contiguous water bodies consist of the rivers, bays, intertidal creeks, channels and backwaters. The mangroves can exist under wide ranges of salinities, tidal amplitudes, winds, and temperatures, even in muddy and anaerobic soil conditions (Kathiresan 3). Living along the interface between land and sea, the mangrove ecosystems support genetically diverse groups of aquatic and terrestrial organisms.

The mangrove forest has many different functions; it provides, for example, vital nurseries for the life histories of many species of commercial importance. Mangroves also protect coastal areas from damage due to storm surges and tsunamis (Danielsen et al. 2005). Mangroves also enhance fisheries (Mumby et al. 2004; cited in Danielsen et al. 2005) and forestry production. Functions like water quality improvement, prevention of soil erosion, sediment and nutrient retention are also important functions of the mangrove forest (Baan, 1997; Hemeleers 2009).

Mangrove forest near Aparri (Voogd 2012)

In recent years the pressures of increasing population, food production, industrial and urban development, and wood chipping have caused a reduction in the world's mangrove resource (Field 1998). Some of the threats to mangrove forests are detailed briefly as follows:
Aquaculture practices: A large scale destruction of mangroves to facilitate aquaculture practices which can be found in several countries. To cite an example, in the Philippines, between 1968 and 1983, 237,000 ha of mangroves were lost for pond construction. This is almost half of the total national mangrove area (Fernandez, 1978). One major issue associated with the farms located in mangrove habitats is acidification of pond waters that kills aquatic organisms (Kathiresan 5).
Cutting of mangrove trees for timber, fuel and charcoal: Mangroves are cleared for timber, charcoal and firewood. Because of higher calorific value, the mangrove twigs are used as firewood. The mangrove wood is rich in phenols, and hence is highly resistant to deterioration, and it is widely used as timber for construction purpose. The mangrove wood is highly suitable for chipboard industry and quality paper (Kathiresan).

Spalding et al. (1997) estimated the global extent of mangrove areas to be between 18.1 million ha and 19.9 million ha. The current estimate of mangrove forests of the world is less than half of what it once was (Spalding *et al*., 1997; Spiers, 1999; cited in Giri et al. 2011) and much of what remains is in a degraded condition. More recent estimates indicate that the figure may now be 15 million ha (www.fao.org/forestry/mangroves) or even less (Giri et al. 2011; Fig 1).

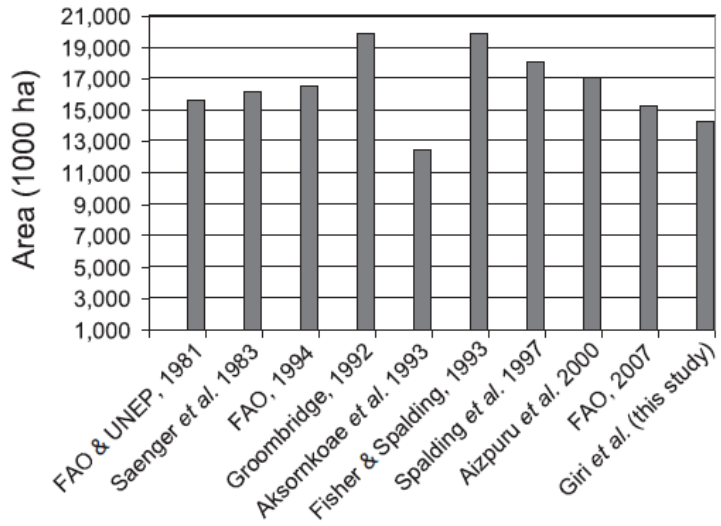


Figure 1: Comparison of aerial estimates of global mangrove area (Giri et al. 2011)

The degradation of mangrove ecosystems has prompted a world-wide movement to plant new areas of mangroves (Farnsworth and Ellison 1997; cited in Field 1998). There are many mangrove rehabilitation projects with various aims that have been undertaken in the last few years or that are currently underway (JAM 1994, Field 1996; cited in Field 1998).

Mangrove forest cover in the Philippines has declined substantially during the last century. From an estimated 450,000 hectares of mangroves in 1918, less than 140,000 ha exist (White and De Leon 2004). At present, 95% of the remaining mangroves are secondary growth and only 5% are old primary mangroves that are mostly in Palawan (Brown and Fischer 1918, DENR 1988, White and De Leon 2004). Thus, mangrove forests remaining along Philippine coasts today are of much lower quality than 50 years ago and cover less than one-third of their

original area (White and De Leon 2004) (cited in Haribon Foundation 2005). Although it is illegal to log mangrove forest in the Philippines (Oposa 2002), it is still happening throughout the country.

Reforestation project in the Philippines mainly focuses on replanting Nipa (*Nypa fruticans*). Nipa is a palm species that grows well in mangrove areas. It is also the most versatile and useful plant in the mangrove forest. Practically, all parts of the plants can be used to provide a supply of basic goods, ranging from construction and fuel materials for food, drugs and various materials used in rural industries (Wetfriends 1999, in litt). Nipa palms have high potential for both ecological and economic importance.

In our research, we looked into mangrove destruction and rehabilitation of mangrove forest in Aparri on the Northern coast of Luzon in the Philippines. Mangrove forest is occurring naturally in Aparri. This well serves as a protection against tsunami, storm surge and as a nursery for fingerlings. But the problem is that some people in Aparri are cutting and destroying the mangrove forest for profit and consumption. We decided to conduct a study to determine the impact of the destruction of mangrove forest on the people in Aparri. Furthermore, we want to determine the possible threats to the coastal communities if the mangrove forests disappear and how they feel about mangrove conservation.

RESEARCH QUESTIONS

Main question
What is the status of the mangrove forest in Aparri?

Sub-questions

1. What is the difference in mangrove forest cover in Aparri from the past to the present?
2. What are the consequences to the people and to the environment in Aparri if the mangrove forests disappear?
3. What do the governments do to preserve the mangrove forest?
4. Who are the actors that are cutting the forest?
5. For what purposes are the actors using the mangrove forest?
6. How much are the actors dependent on the mangrove forest?
7. How do the people feel about forest conservation?

METHODS

We conducted a six-day research in four different barangays of Aparri, namely; Punta and Macanaya on the eastern side, and Linao and Nabagan on the western part. We conducted several interviews with different government agencies to obtain theoretical background, i.e. at the Bureau of Fisheries and Aquatic Resources (BFAR) Regional Office No.2, the BFAR Regional Fisheries Training Center (RFTC), local and regional Department of Environment and Natural Resources (DENR), and the Department of Agriculture (DA) in Aparri. To get an overview of the local problems, we interviewed a total of 24 villagers from the four barangays along the coastal area in Aparri. We interviewed four villagers in Punta, one in Macanaya, eleven in Nabagan and eight in Linao.

Time schedule

Table 1: Time schedule (Wednesday 18 January – Tuesday 24 January)

Wednesday	Visit to BFAR Tuguegarao City Travel to Aparri (4-5 hours)
Thursday	Visit to LGU-Aparri to introduce our study Interview with CENRO (local DENR) Interview with BFAR
Friday	Visit to a conference on river dredging in the Cagayan river delta Interview with George Quines, engineer of the Department of Agriculture Talk to Mayor Tumaru to introduce the study Interview with 4 fishermen
Saturday	Travel to Barangay Linao (west part of Aparri) by boat Interview with Barangay Captain and 7 other villagers
Sunday	Travel to Nabagan by boat Interview with Barangay Captain, 3 barangay officials and 7 villagers Visit to the mangrove forest in Aparri West
Monday	Travel to Aparri East Interview with the barangay secretary of Macanaya Lunch in St. Patrick hotel provided by the mayor Travel to Cabagan
Tuesday	Travel to Tuguegarao City to gather data and interview BFAR and DENR

RESULTS

Status of mangrove forest

Figure 2 shows the decline in mangrove forest in the last 100 years in the Philippines (Philippine Aquasilviculture Project, 2011). The forest cover has clearly declined from 500,000 hectares in 1918 to just 117,000 hectares in 1995. There is, however, no available datum from BFAR or DENR on the decline of the mangrove forest in the last 100 years specifically for Aparri. But according to BFAR and DENR officials, the mangrove forest in Aparri also underwent a decline, even in the last 20 years (Adap 2012, Pers. Comm.; Villariao 2012, Pers. Comm). But there are some data on the present status of the mangrove forest in Aparri. Based on the latest data of the DENR, the mangrove forest in Aparri has a total area of 1,093.53 hectares. The mangrove forest in Aparri is mainly located in nine barangays, namely; Linao, Bisagu, Sanja, Bulala Sur, Navagan, Binalan and Caagaman on the western river bank and Gaddang and Maura in the eastern side. The dominant species in these forests is Nipa (98%) while the remaining 2% is mainly consisting of Bakauan (*Rhizophora Stylosa*) and Pototan (*Brugeria sexangula*) (source: DENR 2012; local inhabitants 2012, Pers. Comm.).

The inhabitants of Aparri were also asked whether they had observed an increase or decrease of the mangrove forest surface in the last 10 years and before that (more than 10 years ago) (Fig. 3 and 4). The observations of the inhabitants about the status of the mangrove forest more than 10 years ago seem to consolidate with the actual figures since 50% of the interviewees observed a decrease in forest cover.

In the last 10 years however, the observations of the interviewees do not coincide with what was expected because 42% of the inhabitants actually observed an increase in mangrove forest cover while officials of BFAR and DENR said there was a decrease. This is mainly due to the response of the inhabitants of Barangay Linao. In the last decade, Nipa reforestation programs (e.g. Philippine Aquasilviculture Project) replanted Nipa in this area for human use.

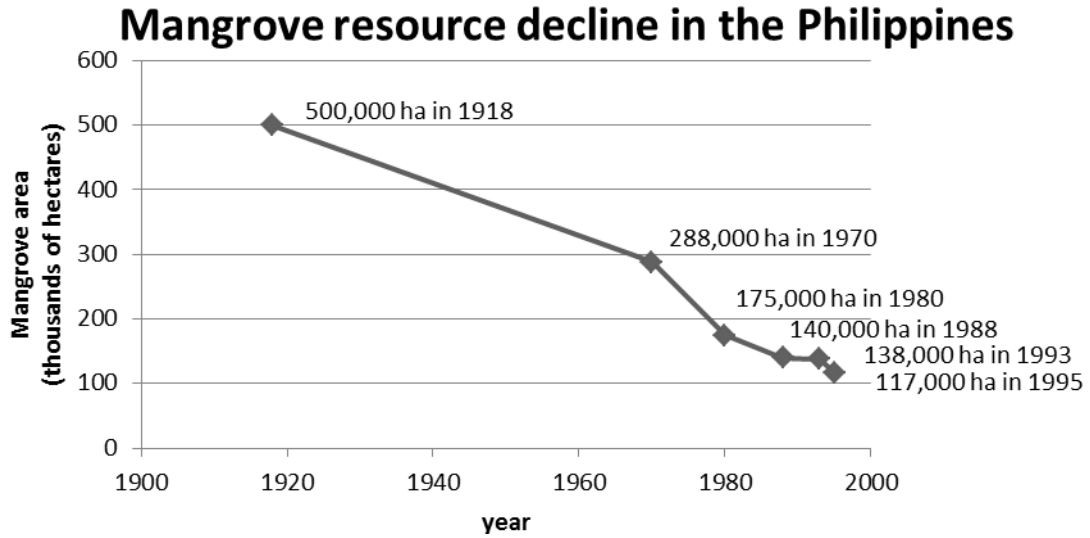
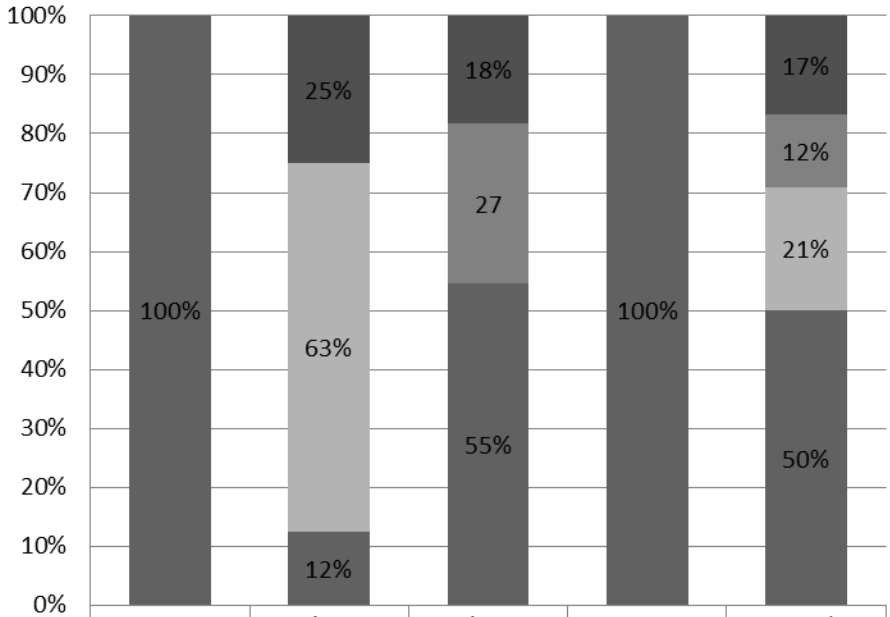


Figure 2: Mangrove resource decline in the Philippines (Philippine Aquasilviculture Project, 2011)



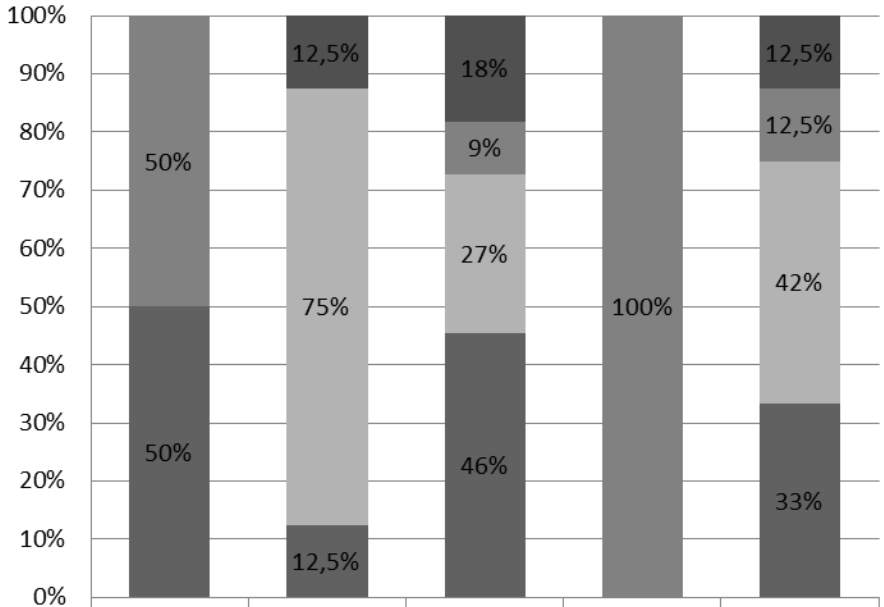
	Punta	Linao	Nabagan	Macanaya	Total
unknown	0	2	2	0	4
No change	0	0	3	0	3
Increase	0	5	0	0	5
Decrease	4	1	6	1	12

Figure 3: Change in mangrove cover before 2002 according to the inhabitants given per barangay and for all barangays.

Consequences of mangrove deforestation

If the mangrove forest disappears, many different consequences for the community and environment might occur: lower fish production due to the disappearance of rearing grounds and nurseries for fish and crustaceans (Villariao 2012, Adap 2012, Quines 2012, Pers. Comm.); increase of water salinity (Tarun 2012, Pers. Comm.) and intrusion of salt water into agricultural areas (Villariao 2012, Pers. Comm.); due to the deforestation, there will be more

erosion and heavy siltation (Villariao 2012, Pers. Comm.); and the horizontal flow for flooding will disappear with the disappearance of the mangroves which increases the threat of flooding, furthermore, the effect of tsunamis will worsen (Villariao 2012, Pers. Comm.). Most of the inhabitants of the mangrove area have different concerns about mangrove disappearance; 12 out of 24 interviewees think they will lose their livelihood, three interviewees expect more soil erosion and four interviewees expect more or severe flooding.



	Punta	Linao	Nabagan	Macanaya	Total
unknown	0	1	2	0	3
no change in mangrove cover	2	0	1	1	3
Increase in mangrove cover	0	6	3	0	10
Decrease in mangrove cover	2	1	5	0	8

Figure 4: Change in mangrove cover in the past 10 years according to the inhabitants given per barangay and for all barangays.

Mangrove conservation

The national government is implementing a project in collaboration with BFAR, DENR and the local government units (LGUs) of different municipalities, including Aparri, called the Philippine Aquasilviculture Project. This project aims to restore the destroyed mangrove forests and aquatic resources by restoring unproductive, underutilized and abandoned fishpond areas. The aim in 2011 was to plant 300,000 propagules of which most of them were Nipa. In 2012, the project is planning to plant 1 million propagules. It is however, very difficult to find suitable areas to replant since most mangrove areas are privately owned. By having local fishermen plant the propagules, the project provides jobs to the local people living in the coastal areas and reduces (often destructive) fishing activities. The fishermen are taught how to sustainably manage the plantation and how to protect the area. These groups of fishermen are so-called 'self-reliant groups'. After the end of the project, they will own the plantation and are supposed to sustainably harvest Nipa and sell the Nipa products as an alternative source of income. This reforestation program lessens the pressure on the marine areas by diverting the fishermen from fishing to farming of Nipa (BFAR 2012, Pers. Comm.).

In Barangay Nabagan, the Ipil-ipil project was implemented in 2011 to conserve the mangrove forest. Ipil-ipil is a woody tree that can be used as firewood and as an alternative for mangrove trees. The plantation project has an area of one hectare and should become a

source of firewood for the entire barangay. In Barangay Macanaya, a replantation project of vetiver grass took place in the second week of January. A strip of four rows of grass was planted along the riverbank. Since this project started only recently, very little information could be obtained. As Table 2 shows, almost all of the inhabitants (96%) would support these reforestation projects and would be willing to help in the reforestation. The awareness on these conservation projects among the local people is quite high since 67% of the inhabitants know of the protection and reforestation programs.

Table 2. Support of mangrove conservation by local communities (n=24)

Supportive	Non-supportive	Unknown
96% (23)	0%	4% (1)

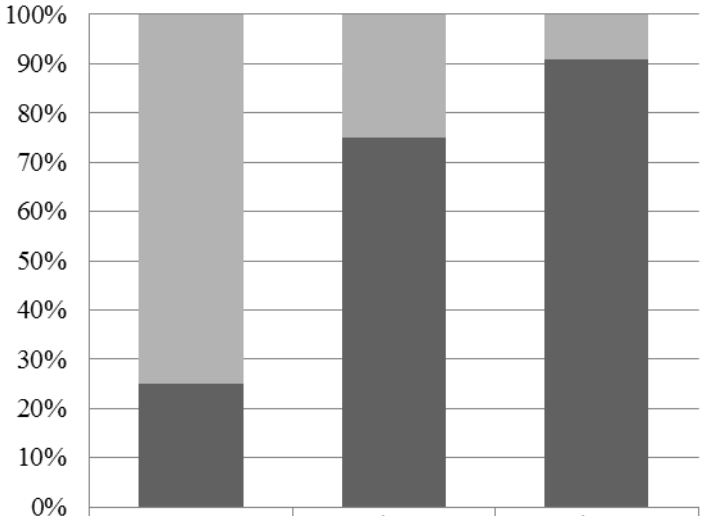
Mangrove use by local community

In the 1970's, there was still commercial logging of mangrove forest in Aparri but today, there is no commercial mangrove logger left in Aparri (Quines, G., 2012, Pers. Comm.). The mangrove is only used by the community that inhabits the mangrove area. The removal of mangrove trees is therefore, not called logging, which has a commercial purpose, but cutting. The cutting of mangrove forest has been prohibited since 1982 (P.P. 2146) and since 1991 there is a ban on cutting of all mangrove species (R.A. 7161). Harvesting of Nipa is still allowed though because it does not involve the complete removal of the plant. The main actors who are still cutting in the mangrove forest are the private owners of mangrove areas. Most of these private owners are villagers living in barangays on the western part of Aparri. The villagers buy the Nipa from the private owners and produce Nipa products and sell them in the market or use these themselves. The people mainly living in the western parts of Aparri, specifically Barangays Linao and Nabagan, are strongly dependent on Nipa as a main source of their income; 91% in Nabagan (n=11), 75% in Linao (n=8) and only 25% in Punta (n=4) (see Figure 5). In order to produce Nipa wine, firewood is needed. When the villagers were directly asked if they cut the forest, 50% admitted they use wood from the mangrove forest as firewood. On the question if they know anyone cutting in the mangrove forest, the interviewees often do not know (54%) or say no (21%). Only 25% of the participants seem to know mangrove wood cutters. However, when the villagers were asked how they were using the mangroves, 71% included firewood in their answer. All interviewed people were aware that it is illegal to cut mangrove tree species.

DISCUSSION

Status of mangrove forest

In the past decades, mangrove forest in the Philippines has decreased (source: Aquasiliculture project DENR 2012; BFAR 2012). It is still unclear how much of the forest has disappeared in Aparri. None of the organizations was able to give the data on the decrease of mangrove forest in Aparri or the entire Region 2 of the Philippines. This is either because no research has been conducted yet or because the data are not available to the public. This decrease was also observed by the interviewees since 50% observed a decrease in mangrove forest before 2002. In the last 10 years, only 33% observed a decrease in mangrove forest while 42% observed an increase. In Linao, this number was even higher and 75% of the interviewees observed an increase, most likely due to reforestation projects in this barangay.



	Punta	Linao	Nabagan
Not dependent on nipa	3	2	1
Dependent on nipa	1	6	10

Figure 5: Dependency on Nipa as a source of income for the inhabitants of Barangays Punta, Linao and Nabagan (in percentages)

Because Nipa products are an important part of the income of the local communities, many villagers are supportive of such projects and are willing to help in the replantation of the mangrove area. However, we noticed that most of the replantation projects focus on the replantation of Nipa. Already 98% of the mangrove area in Aparri is made up of Nipa. We therefore, think that it is likely that in the future the mangrove area will become a monoculture consisting only of Nipa. We strongly advise that replantation should also focus on other mangrove species such as Bakauan, Pototan and other species native to the mangrove area in Aparri.

In the interviews we conducted, it became clear that most of the people in the coastal area are dependent on either fishing or mangrove forest for Nipa, or both. The people make and use Nipa products such as wine, vinegar and Nipa shingle for roofing, and this forms a large part of their income. The people collect wood from the mangrove forest which they use in cooking the sap of the Nipa fruit to make wine. When we asked for what purposes they use the mangroves, 71% said they use these for firewood. However, when directly asked if people collect or cut wood from the mangrove forest, only 50% admitted to do so. This difference might be because the question of whether they cut wood from the forest is too direct and because all respondents know cutting wood from the forest is illegal thus, they were afraid to answer the question truthfully.

The mangroves serve many different functions. In Aparri, the mangrove forest is one of the main sources of livelihood. With the disappearance of the mangrove forest, most of the inhabitants (especially in the western barangays of Aparri) will lose a large part of their income. But the disappearance of the mangrove forest has other consequences as well. When it disappears, the production of fish will decrease which affects the livelihood of the fishermen. Mangrove forests also serve as a protection against storm surges and floods. If the mangrove forest disappears, Aparri will be prone to flooding. The soil along the coast line and river sides easily erodes.
Both nature and people are dependent on the mangrove forest. It is therefore very important to conserve and replant the mangrove forest.

AKNOWLEDGEMENTS

We would like to thank all the people who contributed to our research: Sir Arnold for accompanying us in Aparri; The officials of the Local Government of Aparri for welcoming us to their municipality; The barangay captains of Linao, Nabagan, Punta and Macanaya for allowing us to do research in their barangays; The villagers for their information; and Nancy Adap for the acceptance in her house and helping us conduct interviews. We are also grateful for the information BFAR, DENR and LGU-DA provided to us.

REFERENCES

F. Danielsen, M.K. Sørensen, M. F. Olwig,V. Selvam, F. Parish,4 N. D. Burgess, T. Hiraishi, V. M. Karunagaran, M. S. Rasmussen, L. B. Hansen, A. Quarto, N. Suryadiputra, 2005. The Asian Tsunami: A Protective Role for Coastal Vegetation. Science, 310, pp. 643.

Field, C. D. 1998. Rehabilitation of mangrove ecosystems: an overview. Marine Pollution Bulletin, 37, 383-392.

Giri, C., Ochieng, E., Tieszen, L. L., Zhu, Z., Singh, A., Loveland, T., Masek, J., Duke, N., 2011. Status and distribution of mangrove forests of the world using earth observation satellite data. Global Ecology and Biogeography, 20, pp. 154-159.

Hemeleers, 2009. Global ecology of mangroves: a macroecological survey analysis of diversity functionality and degradation of mangrove ecosystems. Master thesis. Université Libre de Bruxelles

Haribon Foundation . 2005. Atlas of community- based marine protected areas in the Philippines. Haribon Foundation for the conservation of natural resources. Quezon City, and Pamana Ka Sa Pilipinas, Cebu City, Philippines. 533p.

Kathiresan, K., 5.Threats to mangrove: Degradation and destruction of mangroves. Centre of Advanced Study in Marine Biology. Annamalai University

Mangrove. Wikipedia (english)

Mangal (Mangrove). *World Vegetation*. Mildred E. Mathias Botanical Garden, University of California at Los Angeles

Oposa, A., 2002. A legal arsenal for the Philippine environment. The Philippine Islands. Batas Kalikasan.

www.fao.org/forestry/mangroves

http://www.researchsea.com/html/article.php/aid/2142/cid/1

Interviews:

Dr. Benchito B. Villariao, Pers. Comm., Executive Officer Ludong team of the Bureau of Fisheries and Aquatic Resources (BFAR) – Regional Fisheries Training Center (RFTC), Aparri, January 19th 2012.

Engr. George T. Quines, jr., Pers. Comm., Department of Agriculture, Aparri, January 20th 2012.

Adap, N. Pers. Comm. Center of Environment and Natural Resources. Aparri, January 19th 2012

Tarun, T. Pers. Comm. Department of Environment and Natural Resources Region II.Tuguegarao. January 24th 2012

APPENDICES

Appendix 1: Questionnaire villagers

1) What is your name?
2) How old are you?
3) Gender? Male/female
4) What is your ethnic group? Ilocano / Ibanag / Other
5) What is your educational attainment?
   primary level / elementary level / elementary graduate / high school level / high school graduate/ vocational graduate / college graduate
6) What is your job? Farmer / fishermen / businessman / other
7) How much is your monthly income?
8) a. Have you noticed a change in the amount of mangrove forest in the last 10 years?
      Decrease of mangrove forest / Increase in mangrove forest / No change
   b. And what about more than 10 years ago?
      Decrease of mangrove forest / Increase in mangrove forest / No change
9) Have some mangrove forest species disappeared? Yes/no
10) Did some species before were more common? Yes/no
11) Do you know that mangrove forests are disappearing? Yes/no
12) Are you dependent on the mangrove forest? Yes/no
13) For what are you dependent on the mangrove forest?
    i. Fire woods
    ii. Fruits/plants
    iii. Timber for construction or furniture
    iv. Farming
    v. Shrimp farming
    vi. Nipa
    vii. others
14) Do you collect wood from the mangrove forest? Yes/no
    a) If yes, how much trees do you collect from the mangrove forest (per week/month)?
    b) If yes, have the trees you collect from the forest become smaller in the past 10 years?
    c) And for what purpose have you cut the mangrove trees?
    d) Which species you collect from the forest and why those?
15) Do you know anyone who is involved in cutting wood from the mangrove forest? Yes/no
    a. If yes, what profession does this person have?
    b. For what purposes are these persons cutting the wood?
        i. Fire woods
        ii. Fruits/plants
        iii. Timber for construction or furniture
        iv. Farming

v. Shrimp farming
vi. Nipa
vii. Other

c. How many people do you know that are cutting wood from the mangrove forest?

16) What do you think will happen if the mangrove forest is gone?
17) Are you aware that logging mangrove forest is illegal? Yes/no
18) Do you know of reforestation programs for the mangroves? Yes/no
19) Why do you think those programs exist?
20) How would you feel about reforestation/restoration of the mangrove forests (supportive/ against)?
21) What should be done to protect the mangroves?
22) Who is responsible for protection/ reforestation of the mangroves?

Appendix 2: Interview BFAR/DENR/LGU-DA.

1) What is your name?
2) Gender? Male/female
3) Company?
4) What is your function/job within this organisation?
5) Do you perform research on Mangroves? Yes/no
6) Has mangrove forest declined in the last 20 years? Yes/no
   a. If yes, how much mangrove forest has disappeared in the last 20 years? (show it on a map)
7) Has there been a change in mangrove species composition in the past decades?
8) What do you think are the consequences of the disappearance of the mangrove forest?
9) What are the impacts/changes on nature due to the mangrove forest destruction?
10) Does the mangrove forest decline affect the coastal communities?
11) Does logging of the mangrove forest takes place?
    a. and where?
12) How much wood is being logged?
13) Who are logging the mangroves? (which actors)
    a. Is there commercial logging of the mangroves?
14) What are the reasons that people are cutting mangrove species?
15) Is it illegal to cut down mangrove forest? Yes/no
    a. If so, what is the penalty for logging?
16) Are the mangrove forests in Aparri protected?
17) Is there a project going on to restore or rehabilitate the mangrove forests in Aparri? (can you give us some information on this project)
18) What is the public opinion on mangrove forest restoration?

Appendix 3: Interview results

No.	Barangay	name	age	gender	ethnic gr	job	Q8a	Q8b	Q9	Q10a	Q11	Q12
1	Punta	Jophrey Kiton	-	m	I	Fisherman	no changes	decrease	-	-	-	-
2	Punta	Haydee Culcul	-	F	I	Fisherman	decrease	decrease	Y	-	Y	partly
3	Punta	Lany Sambudero	-	F	I	-	no changes	decrease	Y	N	Y	Y
4	Punta	Anacleto Culcul	71	M	I	Fisherman	decrease	decrease	-	-	Y	Y
5	Linao	Vicente Micador	-	M	-	Brng Captain	increase	increase	-	-	-	N
6	Linao	Sally Napoles	68	F	Ib	Nipa selling	increase	increase	N	-	-	Y
7	Linao	violeta taguba	71	F	Ib	Nipa selling	increase	increase	N	-	N	Y
8	Linao	Elvira Taguba	-	F	Ib	-	-	-	-	-	Y	Y
9	Linao	Rolando	-	M	I	Fisherman	decrease	decrease	Y	Y	Y	-
10	Linao	Nancy Adap	-	F	I	Nipa selling	increase	increase	Y	Y	Y	Y
11	Linao	Aida Micador	-	F	Ib	-	increase	-	Y	-	-	Y
12	Linao	Jimmy Albano	56	M	Ib	Fisherman	increase	increase	N	Y	-	Y
13	Nabagan	Capt. Ceasar Saboya	64	M	Ib	Farmer	decrease	decrease	-	-	Y	-
14	Nabagan	Laurence Gumarang	-	M	Ib	Fisherman	No changes	no changes	N	Y	-	Y
15	Nabagan	Ben Manglo	-	M	Ib	Fisherman	decrease	decrease	-	-	Y	Y
16	Nabagan	Jane Mercado	-	F	Ib	-	increase	no changes	-	-	-	Y
17	Nabagan	Thelma Gumarang	48	F	Ib	-	-	-	Y	Y	-	Y
18	Nabagan	Imelda Macatuggal	50	F	Ib	-	decrease	decrease	N	Y	Y	Y
19	Nabagan	Andy Castro	-	M	Ib	Fisherman, nipa	increase	-	Y	-	Y	Y
20	Nabagan	Remedios Urias	48	F	Ib	-	increase	decrease	N	Y	Y	Y
21	Nabagan	Lea Saboya	-	F	Ib	-	decrease	decrease	-	-	-	N
22	Nabagan	Sally	-	F	-	-	decrease	decrease	-	-	Y	Y
23	Nabagan	-	-	F	-	-	unknown	no changes	-	-	N	Y
24	Macanaya	Janeth Abella	-	F	Ib	-	increase	decrease	N	-	Y	N

M= Male, F = Female, I = Ilocano, Ib = Ibanag, Y = Yes, N = No

Interview results cont.

No.	13		14	14b	15	16			17	18	20	.22
1	-	firewood	-		-	-	-	-	-	-	-	-
2	-	firewood	-	-	N	-	-	-	-	N	S	DENR
3	nipa	firewood	Y	N	-	-	-	flooding	-	Y	S	Maritime soldiers
4	-	firewood	-	-	-	-	-	-	-	Y	S	government
5	-	-	-	-	N	lose livelihood	-	-	Y	Y	S	-
6	nipa	firewood	N	-	N	lose livelihood	soil erosion	-	Y	Y	S	government, Brgy officials, villagers
7	nipa	-	Y	-	Y	lose livelihood	-	-	Y	Y	S	DENR, barangay officials
8	nipa	firewood	-	-	-	lose livelihood	-	-	Y	Y	S	DENR, counsil and villagers
9	-	-	N	-	Y	-	-	-	-	N	S	officials
10	nipa	-	N	-	-	lose livelihood	-	-	-	Y	S	governments
11	nipa	firewood	Y	-	Y	lose livelihood	-	-	Y	Y	S	villagers
12	nipa	firewood	Y	-	-	lose livelihood	-	-	Y	Y	S	villagers
13	nipa	firewood	Y	-	-	-	-	-	Y	Y	S	Brgy officials, villagers
14	nipa	firewood	Y	-	Y	lose livelihood	-	-	Y	-	S	Brgy officials
15	nipa	firewood	Y	-	-	-	-	-	-	N	S	government, villagers
16	nipa	firewood	-	-	Y	lose livelihood	-	-	Y	N	S	government,villagers
17	nipa	firewood	N	-	N	lose livelihood	-	-	Y	Y	S	DENR, BFAR, DA
18	nipa	firewood	Y	-	N	lose livelihood	soil erosion	flooding	Y	N	S	Brgy captain, villagers
19	nipa	firewood	Y	-	Y	lose livelihood	-	-	Y	Y	S	villagers, DENR, government
20	nipa	firewood	Y	-	-	-	-	-	Y	N	S	villagers
21	-	firewood	N	-	-	-	-	flooding	Y	Y	S	BFAR, Brgy councils
22	nipa	-	Y	Y	-	-	-	flooding	-	Y	S	BFAR, villagers
23	nipa	-	Y	-	-	-	-	-	Y	Y	S	government, villagers
24	-	-	N	-	-	-	soil erosion	-	-	Y	S	villagers

Y = Yes, N = No, S = Supportive

Peñablanca

Women washing clothes in a dammed creek in Peñablanca (van Weerd 2012)

Choosing for biodiversity: a conversation on conservation between the corporate, governmental and the community level in Peñablanca, Cagayan

Eline Siebelink and Dan Mark A. Ringor

INTRODUCTION

Northeast Luzon is characterized by a diversity of natural forest habitats as a result of the complex geological history of the island. Habitat diversity in the Sierra Madre Mountains and adjacent foothills is directly associated with both altitudinal differences and the wide range of rock formations of varying age and composition on which distinct species have established themselves over time (van der Ploeg et al. 2003: 176). But the population of protected animal species in the mountain is continuously decreasing because of forest degradation. Species are moving from one place to another in their search for food and a peaceful living. Looking forward, if forest cover will continue to diminish, the animals will not only compete for food but human beings will also get to deal with different environmental effects that could provide difficulties in their ways of living in this area.

Conservation International (CI) Philippines, an agency whose main concern is the conservation of natural resources, has initiated the Philippine Peñablanca Sustainable Reforestation Project (PPSRP) within the Peñablanca Protected Landscape and Seascape (PPLS), a protected area located at the heart of Sierra Madre Mountains, in partnership with local NGOs, the Department of Environment and Natural Resources (DENR) and the Local Government Unit of Peñablanca (LGU) (Toyota Motor Corporation & Conservation International 2009: 2). The project's goal is to uplift the living standard of the communities and promote human well-being while reducing their dependence on the unsustainable use of their natural resources. It is a 6-year project funded by Toyota Motor Corporation Japan. Laaunched in September 2007, the project will ring in its last official and funded year in 2013.

The PPSRP combines the different goals, on one hand, of 'sustainable' reforestation in which sustainability must flow naturally from the use of incentives to give the project a long term character. On the other hand, the project aims to set numeric targets for improving the lives of residents while addressing the issue of deforestation.

As reported by Toyota, the PPSRP is claimed to have been quite a successful design so far. Two years after the start of the project, the design has been awarded a gold rating under the Climate, Community and Biodiversity Standards (CCBS). Our research has as its main purpose to look at the final effects of this project on the residents' local lives. Have their daily lives changed as intended? Have their lives indeed improved, and in what ways? Is the project working as they initially expected? How has the project raised awareness of, or changed perceptions on biodiversity, and in what way is this linked to the broadening of possible activities alternative to environmentally harmful activities?

RESEARCH QUESTION

What is the impact of the Philippine Peñablanca Sustainable Reforestation Project (PPSRP) on selected communities in Peñablanca, Cagayan in terms of economic activities, perceptions on biodiversity conservation and community-corporate conversation?

METHODS

For our research, we developped two different lists of questions. The first consisted of practical and factual questions focusing on the 'what' and 'how' of the reforestation activities of the PPSRP. This list was prepared for people who are in some way participating in the organisation of the PPSRP and contains questions such as what seedlings were picked out for the tree planting, who decided on the species and other inquiry on the implementation of the project. This list was shortly answered first before analyzing the results of our interviews among participants of the reforestation project. The other list of questions was presented as a questionnaire to the farmers who are or who have been participating in the reforestation activities conducted by PPSRP. This list originally consisted of 15 questions on, again, the factual activities that the farmers get to deal with, personal perceptions on the process and on communication between the organisational level on one side, and the practitioner level on the other. As time passed, however, about eight more questions were added. This means that for some respondents, certain data were missing. The questionnaire was at all times used as a guide for open interviews, resulting in personal conversations that took around 45 minutes for each respondent.

Data gathering

The data were gathered from the five different barangays within Peñablanca selected for the implementation of the PPSRP. The selection of respondents differed for each of these barangays. Originally, we planned to see a representative of the People's Organization (PO) in each of the barangays to inquire the list of participants of the reforestation project but not every barangay could provide this list. In some barangays, we could not use names or references as a starting point. In this case, we mostly just went around to ask people randomly whether they were involved in the reforestation project. Otherwise, we would ask whether they know about anyone who did participate in the project. The names that we gathered in this way were the start of a chain of people resulting from the snowball method instead of the fully random way of sampling.

Timetable

The period of interviewing was done between the 18th and 24th of January 2012. Put shortly, our scheduled activities were as follows:

Jan. 18 – travel to Mangga, Peñablanca. Arrival at around 5 p.m.; rest of the day: getting to know the area and arranging guides for next days
Jan. 19 – Mangga, conducting interviews among PO's Chairman and farmers
Jan. 20 – Mangga, conducting interviews among farmers and barangay representatives
Jan. 21 – Leaving for Sisim, conducting interviews among farmers, PO's Chairman and CI-staffmember and literature research
Jan. 22 – San Roque, conducting interviews with the Cooperative's leader and farmers
Jan. 23 – Cabasan & Bugatay, conducting interviews among farmers
Jan. 24 – Tuguegarao, CI Office and travel back to Isabela State University Campus, Cabagan

Data Analysis

Beforehand, we found some academic articles on different reforestation projects and the strengths, pitfalls and challenges that were found in these, as well as lessons learned from the projects. We originally intended to compare these to the data we gathered on the PPSRP but because of time constraints, we instead decided to take some expectations or challenges expressed in the official level and see how they compared to statements and opinions from the local level.

RESULTS

The main objective of the Philippine Peñablanca Sustainable Reforestation Project (PPSRP) is to restore the forest for the community and at the same time train the residents in each barangay as a catalyst community. A combination of reforestation, enhancement planting using an appropriate mix of indigenous plant species and agro-forestry activities is undertaken to achieve the goals of promoting forest conservation and demonstrate the compatibility among multiple uses of forests (Conservation International 2010: 7). Part of its implementation activities is to assess project impact on biodiversity conservation and watershed rehabilitation as well as the project's contribution to socio-economic benefits accruing to local communities (Toyota Motor Corporation and Conservation International Dec. 2009: 7).

The PPSRP helps the people of the five barangays by giving them temporary jobs. The CI gave free seedlings to the kaingin owners, prioritizing the charcoal-makers for them to have an additional income in a legal way and plant the seedlings within the protected area (Molina 2012, Pers. Comm). For the first phase of the project, the farmers received P150 per day. On the second phase, the CI gave an income of P220 per day to the farmers participating in the reforestation project. Moreover, almost all of the respondents we asked were given a superkalan and ricehull kalan. Superkalans were mostly distributed in barangay Mangga because there is no rice mill near the place. Ricehull kalan uses ricehulls produced at nearby rice mills as fuel. This alternative cooking scheme reduces, if not eliminates, the need for purchased firewood and/or cutting of trees from the native forest for fuelwood and/or charcoal for cooking (TMC and CI, Aug. 2009: 71). The species of seedlings planted in the protected area were selected by the farmers but in the second phase of the project, the CI chose seedlings for the farmers because they considered the first phase as an experiment as well. The seedlings planted in the area are indigenous trees; Narrra, Molave, Kalumpit, Tindalo, Tuay/Tuag and Bignay. The indigenous trees were chosen because the population of these trees in the country is rapidly decreasing (Dalin 2012, Pers. Comm). The CI also trains the farmers to produce their own quality exotic seedlings, which the CI will buy for P4 per seedling if they are a member of the cooperative and for P2.75 if bought from a non-member. Family Participants (FPs) are community residents within the project site that are involved in the reforestation activities. These participants receive direct compensation for planting activities and if they can maintain the seedlings, they will earn P1.50 per tree every quarter during the first year of planting to ensure that at least 80% of planted seedlings will mature.

The protection of the forest was furthermore ensured by the CI; it organized groups that monitors the growing seedlings, maintenance of the trees and illegal logging. The Community Reforestation Group (CRG) aims to check the fireline in the protected area. The 11 gentlemen who are deputized by the DENR were finally given the right to confiscate charcoals.

Partnership

In this research, part of our goal was to find out more about the ways of communication between the different levels of participating actors. Not only the questions addressed before, on who gets to decide about certain tree species or the amount of seedlings received by the participants are, therefore, important. We also wanted to know how decision-makers communicate with their counterparts in the project. How is the relationship between Toyota and CI as initiators and funder of the project and the participating farmers or tree planters being valued by the latter? Are the overall feelings about this project ones being granted with opportunities that otherwise would not have been available for the participants? And do participants value their partaking in the project only in terms of their benefits, derived from being an executive, or do they feel threatened as a partner in the project?

To get this relationship clearer, we asked our respondents, among other things, about the seminars they have been attending and the topics discussed in these occasions. As can be seen in Appendix 2, nine (out of 22) respondents first thought of the trainings they attended where they were trained on skills on, for example, ways of planting, the space that is needed for trees to have the best possible process of growth, and how to maintain the planted seedlings. We asked the respondents whether this information is indeed new to them, a question which was mostly confirmed by them. Others (12 out of 22) first thought of the Focus Group Discussion-type of conversations they have had, often on a monthly basis, where they got the chance to speak about their experiences and make suggestions if desired. Only one respondent answered he did not attend any of these kinds of discussion because of lack of communication or invitation.

Before answering this question, we had already asked what the people, in general, think about the PPSRP. Do the participants consider the project successful? What is the part they like best in the project? More importantly, could they think of any difficulty, complication or thing that could be improved in the project? As soon as we found out that most of our respondents (18 out of 22, see Figure #) could indeed think of improvements, we proceeded to ask whether they did ever suggest these things, and whether their suggestions or requests were granted.

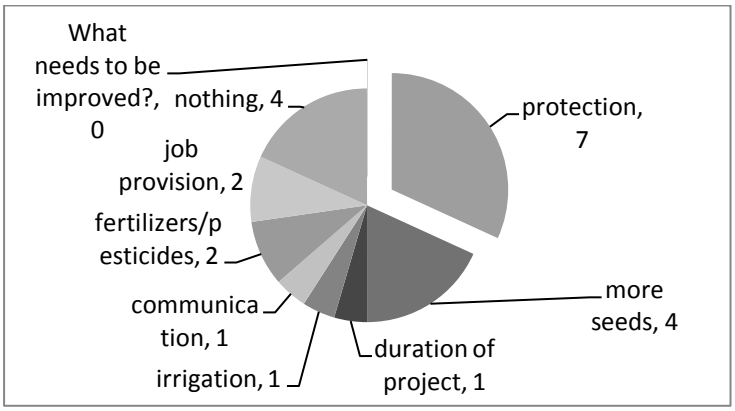


Figure 1. What could be improved in the PPSRP?

Figure 1 shows the different thoughts that the respondents shared on possible improvements of the project. Most cited was the answer that the PPSRP needs to do more about protection, either protection and maintenance of the seedlings or protection from bigger disastrous events such as forest fires, which, according to several respondents, had occured repeatedly. Other complaints, though only three of them, were on the temporary aspect of both the project and

the activities that are offered within it. For only two of the respondents, tree planting is not enough for additional income due to its rotational character thereby creating temporary income earning activities.

Overall, people seemed to be quite satisfied with the PPSRP. Another question that had to do with partnership was the one that asked if promises made by CI/Toyota have been realised so far. Based on the gathered data, we can see that 17 out of the 22 respondents so far have always received the amount of seedlings or cash payment that was promised to them. Only four of the five remaining respondents answered that the payment or the provision of materials was delayed or not the same as initially promised. The last respondent missed giving out these data. However, it must be said that among the members of the People's Organization that we talked to, the complaint of delay in payment was recognized. Since these people, as members of the Cooperative, are aware of more of the general complaints and speak to more people than we had the chance to, we do not know whether our number of respondents is representative. In our experience nevertheless, people did not have to think for a long time to answer this question, and most seemed pretty content.

When we had a presentation by the CI Staff a day before our research, one of the questions asked was how CI gets local residents interested in joining the project. Forester Acay replied that this was exactly one of the hardest challenges for the initiators of the project, elaborating on the nature of the 'typical' Filipino: "to see is to believe" (Acay 2012, Pers. Comm). In line with this, reforestation areas and agroforestry farms have been developed, as to make participants see in which way they could derive benefits (Toyota Motor Corporation and Conservation International 2009: 51).

This fact was our reason to ask the participants whether they have joined the project from the start on or have only joined in later years, and if they know of people who were invited to join the project but did not want to. Looking at the fact that this 'to join or not to join' question had been called a challenge before by the CI, it is worth mentioning that only two of the respondents said they know people who did not want to join. When asked for the reasons of their decline, one respondent answered that some people are still too busy while the other mentioned some kind of suspiciousness towards Toyota Motor Corporation. Both are interesting: the first one, being too busy, because we asked all our respondents whether there is any activity that they cannot do anymore since the start of the project, and in all their answers, there was a strong focus on activities that are less possible now because they are illegal and more strictly controlled nowaydays, rather than on legal activities that can no longer be done due to time management, the way we originally meant our question to aim at. Suspiciousness, on the other hand, was recalled only once, but was recognized as a crucial point by the CI member that we met in our last day of fieldwork. Some residents, as he said, would likely refuse to join the reforestation project funded by the Toyota Japan because they were afraid that the Toyota group could be using the project as a strategy to 'steal' the place, because way back in history, the last batalion of the Japanese soldiers was killed in the protected area and they believe that there might still be hidden treasures in the area that 'the Japanese' or Toyota, could possibly be after.

Perceptions on biodiversity

In our introduction, one of the questions we asked ourselves, was: how has the project raised awareness of, or changed perceptions on biodiversity, and in what way is this linked to the broadening of possible activities alternative to environmentally harmful activities? To find possible answers, we included a few things in our questionnaire. Literally, we asked if

people's opinions on biodiversity have changed since the start of the PPSRP, and in what way. In addition, we included a couple of questions in the interviews that could possibly show whether the opinions had indeed changed or not. We inquired about the type of economic activities people had been in before, and if they are still doing so; we asked if they ever got in trouble because of these activities, and why they stopped doing so. We also asked each respondent what he or she thinks would be the case if nothing is done for the prevention of forest degradation. What are the first effects they think about, and who will suffer most from these effects? First, did the respondents think their opinions on biodiversity had changed? A short table can illustrate:

Table 1. Has your opinion on biodiversity changed since the PPSRP?

Yes	**No**	**Slightly**	**Inspired**	Total:
15 (68.2%)	1 (4.5%)	5 (22.7%)	1 (4.5%)	22 (100%)

A clear majority answered a straight 'yes', while the answers 'slightly' and 'I got more inspired' could be considered confirmative as well, be it to a lesser extent. What happened most in our interviews was that the respondent would say something like "yes, before, I didn't care about biodiversity and would just extract from the forest whatever I could get". 'Caring' here, however, has a slightly different definition than the usual one, because when we would ask why is it that they did not care about the forest they were living in and of, they would add that they had just not been aware before.

And that they were not aware – or did not have the opportunity to care much – was shown in the answers to our questions what economic activities they had been in before. As shown in Figure 3, within the five barangays and among the 22 respondents, activities such as charcoal making, bird- or wildlife hunting, kaingin (slash-and-burn land conversion), firewood gathering and carabao logging were mentioned with a total of 33 executives (several respondents partaking in more than one of the above-mentioned activities).

Figure 2. Barangay Sisim; awareness

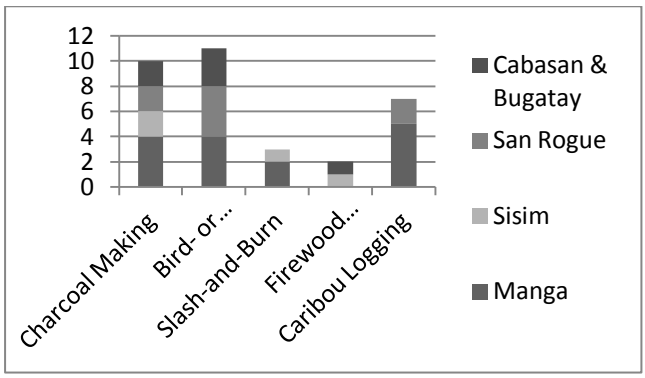


Figure 3. Former activities of reforestation participants

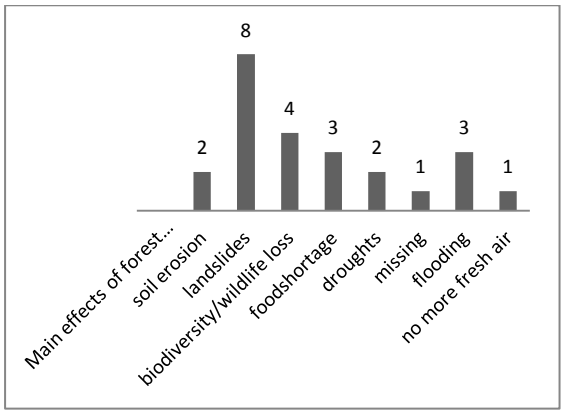


Figure 4. Biggest effects of forest degradation?

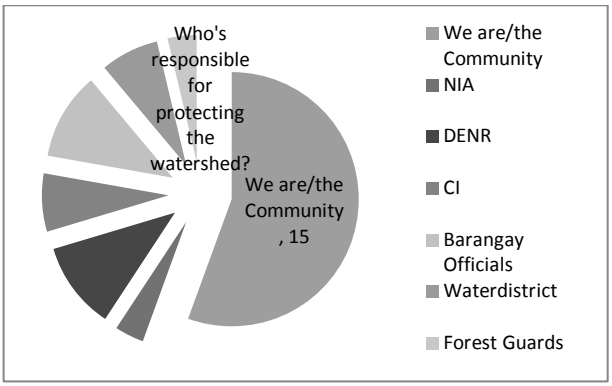


Figure 5. Who is responsible for protecting the watershed?

Thus, although not remembered as activities that brought them many difficulties in accomplishing, these illegal undertakings are apparently not attractive (enough) anymore as a way to continue earning extra income. This is interesting because in their Project Design Document for Climate, Community and Biodiversity Standards of 2009, TMC and CI address the off-site stakeholder impacts, stating that 'the expected result is that some of these activities like firewood gathering or charcoal making and cattle/carabao grazing will be displaced and transferred somewhere else outside of the project side (TMC & CI 2009: 74). As far as the information we gathered is concerned, however, people did not report the continuation of the activities mentioned above, which could mean a step in the right direction and confirms the possible success of actions taken by TMC/CI to keep residents from going outside.

At the upper right corner of this page, there is another graph that deals with the question of awareness and responsibility. We asked all of our respondents first what they think would be the biggest impacts (Figure 4) if the forest would continue to degrade. Surprisingly, when we asked if these events had ever been experienced by the respondents themselves in their current area, their answer was 'no' most of the times for the answers of landslides, floods, typhoons, etc. Only some cases of shortage of food, mostly to feed their carabao, and temporary droughts, were in fact experienced personally. Nevertheless, the question on who would suffer most from deforestation impacts, was for the 14 answers that we got (as we added this question only later) taken to a personal level as it was all answered by 'the community', or 'all people'. This personal level was taken a step further when we asked who the respondents thought would be responsible for deforestation prevention and thereby indirectly for the protection of the watershed and more important, themselves as persons at risk. As shown in Figure 5, the respondents answered more than 50% of the times that they themselves were responsible, only adding official institutions as a help in achieving this protection.

DISCUSSION

In the conversation with CI, foregoing our actual research, the CI staff addressed the continuation of the project and the kind of feeling that needs to be grown– in the words of Forester Acay; some 'sense of ownership' felt by the community. To us, this seems to be happening already, as we look at the answers of how many people, for example, plan to continue planting, and also when we look at the remarkable amount of people who, though not having witnessed many disastrous events themselves, are quite aware of the dangers that

can strike them. Resulting from this, people realise that while it is themselves who will get to endure the most, they are at the same time the ones who are most responsible and can most effectively do something in the prevention of forest degradation. Our respondents have learned about the environmental impacts of forest degradation through the PPSRP, but heard about it in other ways as well: through television and radio, many have noticed how other people (in other areas) have already suffered and do not want the same to happen to them. However, their answers make clear that the respondents do not distinguish between a "them" and "us": meaning, that what can happen to other people can also happen to them, but also that the respondents do not shove away the tasks of protection to higher authorities or bigger institutions, but commit to act to reforest themselves too. This, we think, implies something for how the cooperation between the different levels involved in the reforestation project is felt and experienced.

Another coincidence happened to add to these feelings of some sort of bureaucracy in the implementation felt by most of the respondents as they told us that they got many chances to make suggestions and actually speak up, as well as the experienced fairness of the rotational schemes. This was the time when we rode a jeepney from Barangay Mangga to Barangay Sisim, and the jeepney was stopped for a charcoal check. The charcoal found was confiscated by one of the so-called '11 gentlemen', a forest guard, who happened to be in some kind of brotherhood too. The jeepney driver, who came from the same brotherhood, showed him the tattoo that they both had in their hand, as to try to get away with it, but the forest guard's reply then was "no brotherhood this time". Furthermore, in the usual process that follows on the confiscation of charcoal, the "catch" is being burnt right away, to make sure people know there is no unequal profit making on the part of higher authorities. A remarkable thing however, is that most of the time, only a part of the total sacks of charcoal is confiscated, to 'humanize the law'; 'keep it human' (Soriano 2012; Pers. Comm.). In the discussion on opportunity costs and the 'attractiveness' of activities alternative to illegal or environmentally harmful activities, this process and factual numbers of what is still being tolerated would be interesting. Implementation of laws is a critical aspect within the part of the PPSRP, where deforestation is prevented, that we did not spend too much attention on. This is important though for the expectation expressed by the CI in its report of August 2009 that illegal activities might be displaced because of the PPSRP, for there may be a linkage between the way illegal activities are being monitored and penalized in one place and their displacement elsewhere. Other than that, it is a point for discussion whether higher charges and stricter enforcement of the law would also have that "to see is to believe" function.

Finally, on biodiversity perceptions, we noticed that many of our respondents, when asked whether biodiversity is important for their work, answered in a confirmative way. When we asked why exactly it is though, it is sometimes hard for them to explain. Some of the respondents who were involved in groups that particularly emphasized the protection of wildlife could assign some spiritual or aesthetic value to wildlife and would in the end, after repeatedly saying "of course it's important", say that they consider it important because it actually feels good or makes them happy to hear birds singing and breathe fresh air. This type of valuation is, however, not fully explored in our short research. In the end, the perceptions that we asked for mainly dealt with practical importance but not with some kind of 'beauty' of wildlife per sé. And even though utility may come first, appreciation of wildlife as such could be a focus for attention.

Recommendations

Within the five days of interviewing the residents of the five barangays, we noticed that some (though very few) of the farmers still encounter problems in the project. Some of these are matters of unawareness of the precise implementation of the project or communication, as well as the impossibility of the PPSRP to provide fully (self)sufficient jobs for them. Next to the cited problems, we also heard some complaints about the criteria in selecting forest guards and attitude of favoritism of higher officials.
Therefore, we would like to suggest that the next researcher of this project will:

-look at how concerned organizations educate the residents;
-learn what is the impact of wildlife conservation to the farmer's life, also in terms of appreciation instead of practical utility

ACKNOWLEDGEMENTS

This study would not have been possible without the presence of some people, who offered their time for helping us. Therefore, we would like to express our deep gratitude to: Mr. Samuel Telan and Mr. Jessie Guerrero for giving us pieces of advice on how to deal with the respondents and helping us in arranging places to sleep; Mr. and Mrs. Martin Telan for being our host family in Barangay Mangga; and Maricris Pasicolan and Maylin Tanguilan for serving as our tour guides in Barangay Mangga, where, though it is a lovely place, one could easily get lost when he or she is not familiair with the area. Furthermore, we would like to thank Anno Taguna, the leader of the 11 gentlemen; the barangay captains of the five barangays and especially Brgy. Capt. Plaridel Danguilan for letting us stay at their barangay hall; the PO's Chairmen of the five barangays who were a big help; and of course, all of the participating farmers who were as hospitable and kind to answer our questions.

REFERENCES

Boerwinkel, A.C.J., and D. Snelder. 2003. From natural biodiversity to agrobiodiversity: rainforests and natural systems as models in the design of sustainable species-rich agrosystems. In: Van der Ploeg et al (ed). The Sierra Madre Mountain Range: Global Relevance, Local Realities. Pp 176-193. CVPED 2003, Cabagan.

Toyota Motor Corporation. 2012. Rainforest Restoration Project in the Philippines: Definite Achievement and Efficient Implementation of a "Sustainable Reforestation" System. http://www.toyota.co.jp/en/social_contribution/environment/index.html, downloaded on January 15, 2012.

Toyota Motor Corporation and Conservation International. Aug. 2009. Project Design Document for Climate, Community & Biodiversity Standards. http://climate-standards.org/projects/files/cagayan/ccbs2_pdd_ppsrp_ver_aug30rev.pdf

Toyota Motor Corporation and Conservation International. Dec. 2009. Project Design Document for Climate, Community & Biodiversity Standards. http://climate-standards.org/projects/files/cagayan/ccbs2_pdd_ppsrp_ver_dec08rev.pdf

Snelder, D.J., M. Klein and S.H.G. Schuren. 2007. Farmers preferences, uncertainties and opportunities in fruit-tree cultivation in North-East Luzon. Agroforest Syst 71:1-17.

APPENDIX 1.

Questionnaire

Name:_____ Sex:_____
Location:_____
Age:_____ Civil Status:_____
Ethnic Group:_____
Are you born here?:_____
If no, where?:_____

1. Do you know Philippine Peñablanca Sustainable Reforestation Programme?
   Alam mo ba ang ibig sabihin sa Philippine Peñablanca Sustaianable Reforestation Programme?

2. Are you a participant of the Philippine Peñablanca Sustaianable Reforestation programme? why?
   Isa ka ba sa mga kalahok sa Programang ito? Bakit?

3. Do you own land that is being used for planting trees, or do you pay voluntary taxes for the land you use?
   Pagmamay-ari mo ba ang lupang ginamit sa pagtatanim ng puno, o ikaw ba ay kusang nagbabayad ng buwis?

4. Are you planning to be in tree planting, 5-10 years from now?
   May plano ka bang ituloy ang pagtatanim ng puno, 5 hanggang 10 taon mula ngaun?

5. What are the incentives you receive as a farming participant on the PPRSP?
   Ano ang mga bagay na iyong natatanggap bilang isang Kalahok sa pagtatanim ng mga puno?

6. What was promised to you and is this the same as what you have received so far?
   Ano ba ang pinangako ng mga awtoridad sa iyo at pareho ba ito sa mga natatanggap mo?

7. If you are a participant of the PPSRP, what is it that you like best in the program?
   Kung ikaw ay kalahok sa PPSRP, Ano ang pinakagusto mo sa programa ng pagtatanim?

8. What needs improvement according to you?
   Ano pa ang kailangang bigyang pansin?

9. Have you tried to join a seminar talking about the PPSRP?
   Nasubukan mo na bang sumali sa mga seminar at aktibidades patungkol sa PPSRP?

10. What are your different products as the outcome of the reforestation program?
    Ano ang ibat ibang produkto na nakukuha sa programa?

11. Can you make money by selling products gained from the reforestation program? Which products are these?
Nagkakapera ba kayo sa patitinda ng mga produktong to? Ano ang mga product na to?

12. Is biodiversity important for your work? Why?
Importante ba ang biodiversity sa trabaho mo? Bakit at paano?

13. Has your opinion on biodiversity changed since the start of the program?
Sa iyong opinion ang pagbabago bas a biodiversity mula ng nag umpisa ang programa?

14. Who is responsible for the protection of the Watershed?
Sino ang responsable sa pangangalaga ng pinagkukunan ng malinis na tubig?

15. Are there any activities that you can do no longer since the program started?
Meron ba kayong ga Gawain na isinakripisyo para lamang sa programang to?

Carbon trading within the borders of the PPSRP

Noriel M. Dulatre and Vincent Vergeer

INTRODUCTION

Problem statement

There is an overwhelming scientific consensus that the earth's atmosphere is warming up rapidly due to the greenhouse effect, mostly because of human activities, and that will lead to significant climate change during this century. Carbon dioxide (CO_2) emissions are the biggest contributor of the greenhouse gasses to this change (Miller and Spoolman, 2011). The projected rapid change in the atmosphere's temperature during this century is very likely to increase drought and flooding, shift areas where food can be grown, raise sea levels, result in intense heat waves, and causes the premature extinction of many species (Miller and Spoolman, 2011). To slow the rate of global warming and climate change, we can increase energy efficiency, sharply reduce greenhouse gas emissions, rely more on renewable energy resources, and slow population growth (Miller and Spoolman, 2011). Governments can subsidize energy efficiency and renewable energy used, tax greenhouse gas emissions, set up cap-and-trade emissions reduction systems, and help to slow population growth (Miller and Spoolman, 2011).

What will not be helping is act in a laissez faire way. If we want to stop climate change due to human activity we need to act, but that is easier to say than to do in a field of actors with often opposite interests. When we only take in mind what are the technological possibilities than are land based carbon capture and removal techniques, such as reforestation the easiest way to reduce CO_2 concentrations in the atmosphere (The Royal Society, 2009:9-21). Unfortunately, reforestation brings also social controversial and possible negative side effects with it, because of linkages between different developments going with a possible solution (Voet and Graedel, 2007). The Philippine Peñablanca Sustainable Reforestation Project (PPSRP) is an initiative of Toyota Motor Corporation to battle these challenges. In the case of the PPSRP, the negative linkages are the loss of income coming with the ban on charcoal making or loss of agricultural land because of the prohibition of slash-and-burn farming. That's why a lot of environmental policies are not effectuated in practices. Policies will be only successful if three distinguishable streams are coming together, the policy window will be open (Kingdon, 2010), and a breakthrough in policy is possible. Kingdon distinguishes three streams:

1. Recognizing and acknowledging problems (flow problems)
2. The formulation of policy alternatives (policy alternative power)
3. Political developments (political and administrative power).

When we look at the situation within the boundaries of the PPSRP, we can say that carbon trading can be a good contribution in the battle against climate change so the policy alternatives are ready (stream two of Kingdon) but the local community (government included) also recognizes that the problem (stream 1) of climate change is unknown, the same can be said about political developments, because it is not clear if national and local authorities are willing to act on climate change with respect to local conditions and maybe with some controversial policies (stream 3). The ultimate question coming with the introduction of carbon trading is: who will benefit from the carbon credits?

A carbon credit can be defined as a tradable certificate which stands for one ton of carbon dioxide (or an equivalent from another greenhouse gas). Communities and countries which

emit more greenhouse gasses than they are allowed can buy credits from countries who have lower emissions than allowed, so they can generate income with projects which intend to stop climate change due to human activity. The market (regulated and privatized) of carbon credits is called the carbon market, and carbon trading is the actual effort in trading the carbon credits.

Regarding the situation in Peñablanca, it is unknown if the local community is informed well about climate change, reforestation and carbon trading. With the theories of Kingdon in mind, we can conclude that policies can only be implemented successfully when people are well informed. At the same time, we need to bear in mind that policies are needed to handle the commons (Hardin, 1968) but that it is necessary along with the local people are the ones who will take the final decisions about their common property and they are not governed by an authority without any respect for local traditions, feelings and needs (Ostrom, 1990).

We wanted to know how stakeholders think about the PPSRP and the ownership of the carbon credits: conform official law and policy, but also what is fair in the opinion of the local community and authorities.

Area description

The area where we conducted our research is the Peñablanca Protected Landscape and Seascape (PPLS). The PPLS is a protected area located at the heart of the Sierra Madre Mountains in the Cagayan Province in the northern part of the Philippines. In our research, we stayed in Barangay Cabasan and we got most of our information from local barangay officials and other citizens. We also collected data in Barangays Bugatay and Sisim and in the municipality of Peñablanca and the city of Tuguegarao.

We particularly focused on the municipality of Peñablanca. In Peñablanca, we conducted research about the opinion of stakeholders about the Philippine Peñablanca Sustainable Reforestation Project (PPSRP) which takes place within the borders of the PPLS and what role carbon trading can play within this project, especially if it is an opportunity to continue the PPSRP without funding from Toyota.

The region was known as a top producer of rice and corn in the country, and unfortunately the marginalized community has been forced to use the forest lands in an unsustainable way. This resulted in the fragmentation of the forest (Toyota Motor Corporation & Conservation International, 2009). In 2007, Conservation International (CI) under supervision of Toyota decided to try to reverse the negative trends and started a reforestation project. The project aims to uplift the community's human well-being and reduce their dependence on the unsustainable use of the natural resources (Toyota Motor Corporation & Conservation International, 2009).

Coming together with reforestation is the economic opportunity to sell the carbon capture and storage (CCS) capacity or the so-called carbon credits. At this moment authorities say that this is not an option within the project site, but probably in the future. Therefore, it is important that it is clear on forehand who is the righteous owner of the carbon credits and what is the opinion from the local community and authorities on the ownership. Because one of the main principles of good governance is to be prepared on everything that is possible and a little bit more than that. In that way you will never be surprised, and will be vulnerable for corruption or pressure.

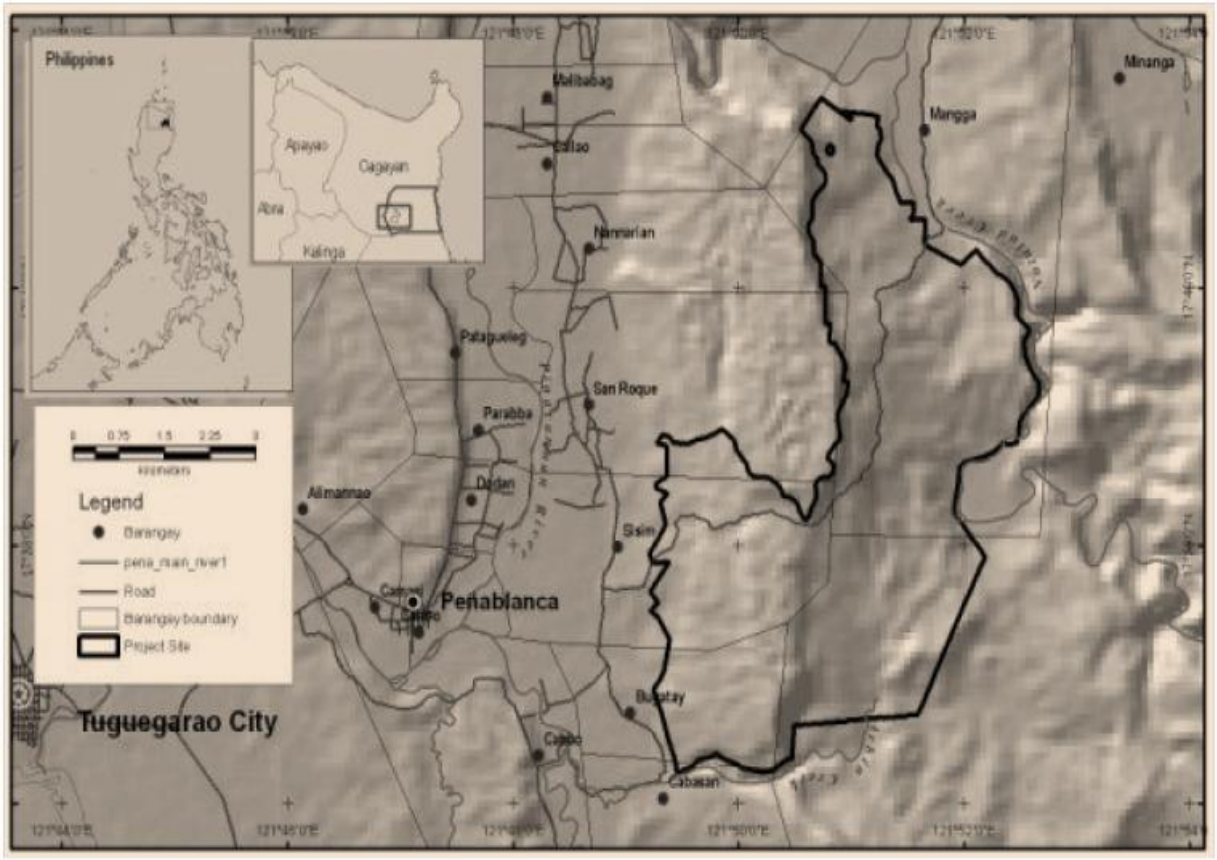


Figure 1: Location of the Philippine Peñablanca Sustainable Reforestation Project Site (within the bold lines). In the most southern point of the site is where the barangay of Cabasan is situated.

RESEARCH QUESTION

Main-question
What role can carbon trading play within reforestation projects?

Sub-questions

1. What is the opinion of stakeholders about the PPSRP?
2. What is the knowledge of the local community about the reasons behind the PPSRP?
3. What are the consequences coming with the ending of the funding of Toyota Motor Corporation in 2013 for the objectives which are formulated within the PPSRP?
4. Who is the owner of the carbon credits in the opinion of stakeholders?

Purpose
The research would like to find out what role can carbon trading play within reforestation projects. In this study, the PPSRP acts as a case study for other projects. We wanted to find out what is the opinion of local people and authorities on the PPSRP and what are their future expectations about the continuation of objectives formulated by Conservation International, and what role can carbon trading play to fore when the area will go back to the traditional way of environmental usage.

METHODS

The first step in this research was a literature study about the PPSRP, carbon trading and carbon rights. Besides, we had some conversations with people who already know the area and gave us useful tips about the local circumstances and how to act with respect to local habitats and culture. For this research, we stayed for six days and five nights in the barangay of Cabasan. In this way, we had the opportunity to interview a great variety of people and see the actual situation by ourselves. During the week, we visited a couple of barangays to interview as many people as possible. With the key actors, we conducted in-depth open interviews, and we asked other community members to answer a few short questions like in an open question survey. The short questionnaire took 15 to 20 minutes to answer and the longest open interview took an hour. During the question-and-answer portion of the interview, we asked about the ownership of the trees instead of carbon credit rights because most of our respondents as well as some of the barangay officials we encountered never heard of carbon trading before. But to the more technical people and concerned citizens, we directly asked question about carbon trading and carbon rights. During the fieldwork week, a couple of unstructured spontaneous focus group meetings were held with local farmers to discuss our questions and findings so far. We interviewed a total of 57 people in 42 sessions.

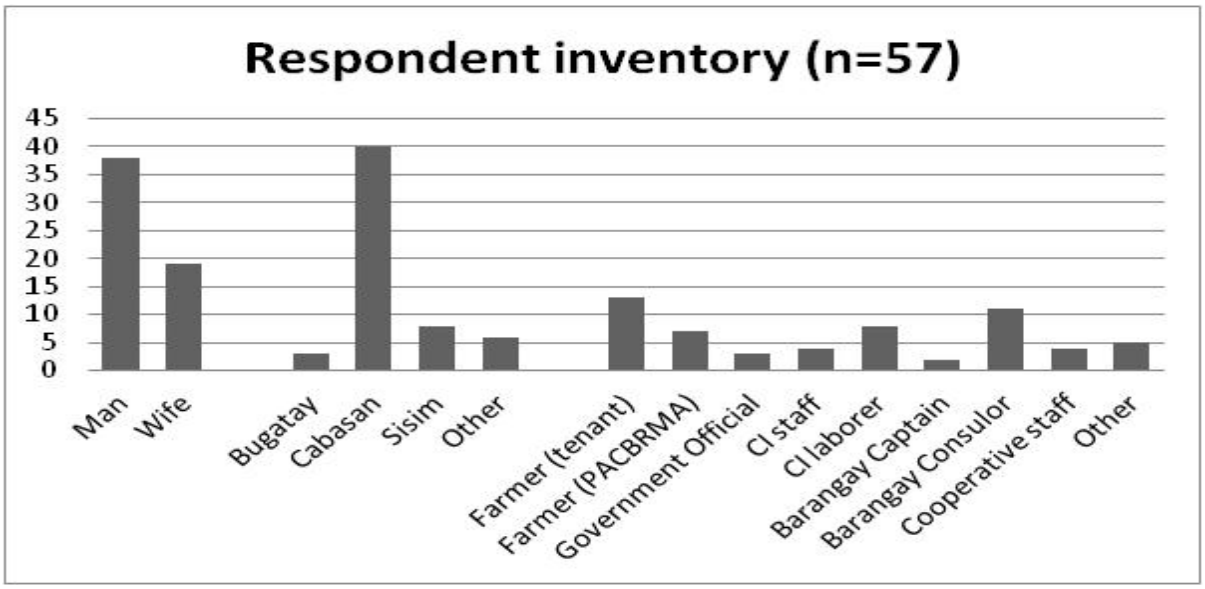


Figure 2: Inventory of interviewed people into gender, barangay and occupation in total numbers.

The data gathering took place primarily in the barangay of Cabasan. But to verify if the data are comparable with other barangays, we also gathered data in the barangays of Bugatay and Sisim. In the barangays, we interviewed barangay captains, barangay councilors, (vice)-chairmen of the cooperatives, local farmers and housewives.

Because we are interested if there is a difference between the opinions of local community members and municipal and provincial government officials, we also visited the Municipal Environment and Natural Resources Officer (MENRO) of Peñablanca, the Community Environment and Natural Resources Officer (CENRO) of Tuguegarao City and the office of Conservation International (CI).

RESULTS

1. What is the opinion of stakeholders about the PPSRP and why?

Almost all the stakeholders are positive about the PPSRP, mostly because it generates extra income for themselves (direct beneficiaries) or for the community as a whole. Farmers with a plot in the project zone receive free seedlings to use in their land, besides they receive a salary for their labor contribution to the project. A notable third of the people mentioned the local negative effects of climate change as a reason why they are in favor of PPSRP.

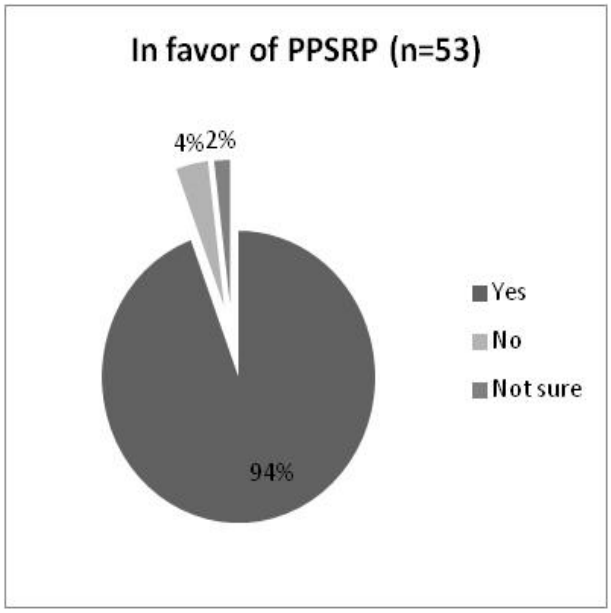


Figure 3: The opinion of people about the PPSRP in percentages.

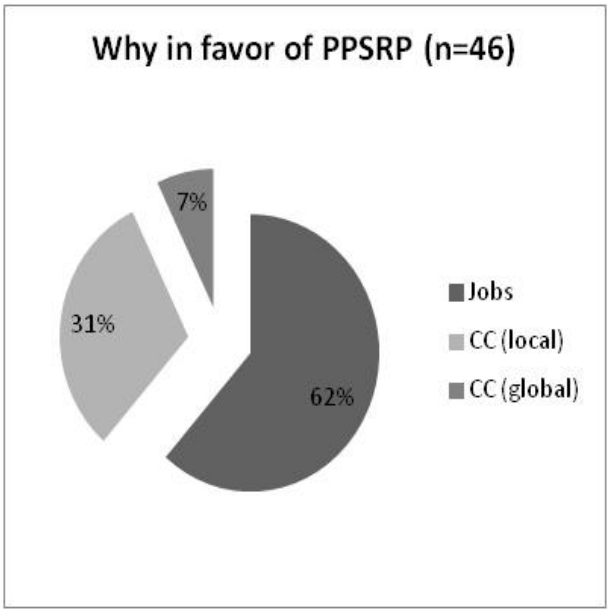


Figure 4: The reasons why people are in favor of the PPSRP in percentages.

2. What is the knowledge of the local community about the reasons behind the PPSRP?

The most important reason why our respondents support the PPSRP is because of the money and the jobs coming with it. Some locals know that reforestation is necessary because of soil erosion, but they were few and were, in most cases, only supportive because of the incentive of money or work. Most of the respondents are not much knowledgeable about climate change in general (Figure 5), and the direct consequences for themselves. As mentioned before, a third of the people are capable to say that climate change will have an effect on their lives, but most of them cannot mention in what way. From all local respondents, only one is aware of the worldwide challenges coming with climate change. Local officials (not the barangay officials) showed more knowledge about the bigger picture.

Sir Eduardo Angadol from CI said that one component of the project is Information, Education and Communication (IEC). He told that they are very busy with education and to inform people about the importance of continuing with the objectives of the project even when funding will end. He made clear that they give especially a lot of attention to practical issues which are instantly usable for the local farmers. But awareness building by education and information is minimized to some general lectures and there is no big awareness building program for people to learn about the long-term consequences of tree cutting, slash-and- burn and charcoal making.

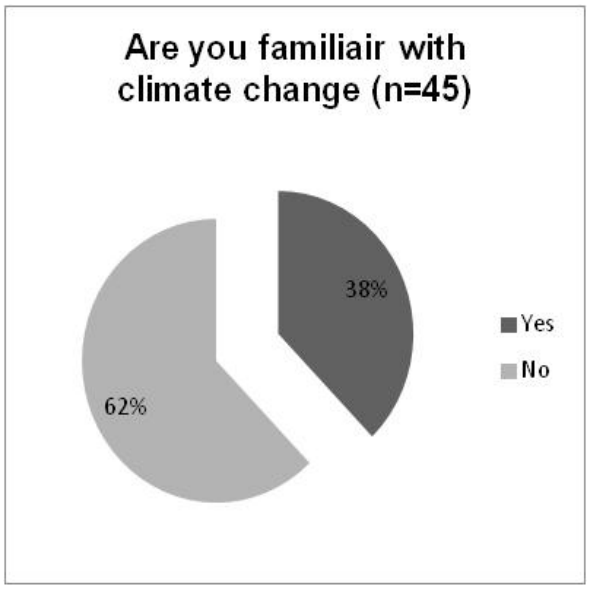


Figure 5: The number of local people who are familiar with climate change in percentages.

3. What are the consequences of the ending of the funding of Toyota Motor Corporation in 2013 for the objectives which are formulated within the PPSRP?
The local government unit (LGU) and the Department of Environment and Natural Resources (DENR) are positive about the future but the local community is very skeptic about the continuation of the objectives of the PPSRP after July 2013.

One of the objectives of Conservation International (CI) was that Mango production by free disposal of seedlings will rise and that the income coming with this activity can catch up the loss of income to be brought about by the termination of the PPSRP. At this time, with 18 months left, the reality is that the Mango trees could not produce harvestable fruits yet and that this will not happen in the next five years.

A great part of local community said they will fall back in traditional ways (e.g. charcoal making) of earning money when the funding by Toyota will stop, especially because they think that LGU or DENR will not be capable to take over the place of Toyota as donor and do not expect that government has the knowledge that CI will continue the effectuation of the project's objectives. Government officials are afraid this will be the case but they do not know how to solve this problem. Actually, at the short time the project stopped temporarily in the barangay of Sisim, some people directly started with charcoal making again as an alternative source of income making up for the lost income. The barangay officials also admitted this situation because of poverty and the community people also need to meet their everyday satisfaction for survival.

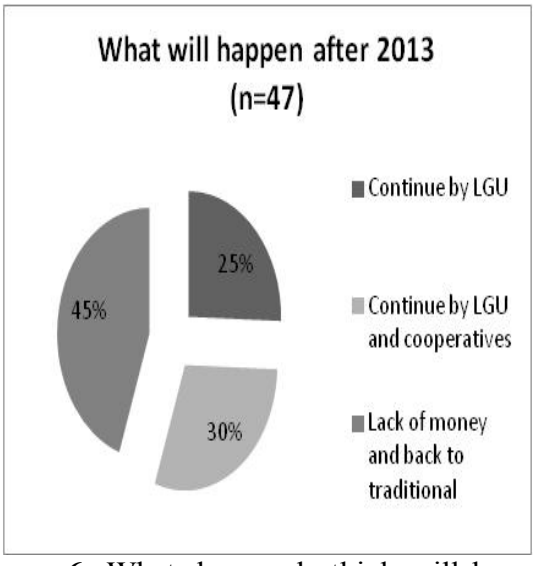


Figure 6: What do people think will happen with the objectives of the PPSRP when the funding of Toyota will stop in 2013 in percentages.

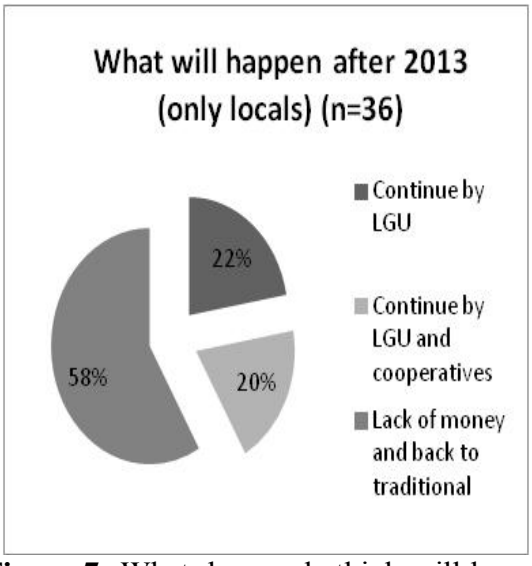


Figure 7: What do people think will happen with the objectives of the PPSRP when the funding of Toyota will stop in 2013 in percentages.

The staff members of Conservation International (CI) are skeptical about the sustainability of the project after 2013, and they say that there is, at this moment, already lack of money to run the project in a smooth way.

4. Who is the owner of the carbon credits in the opinion of stakeholders?

Local people do not know exactly what carbon credits are, but they know that there is something relatively big amount of money to the community because of reforestation. Therefore, most local community members share the opinion that they have to benefit from everything coming with trees. "Millions and millions of money will come with carbon trading" was the main interest of Barangay Captain Allam of Cabasan when talking about carbon credits and the question on to whom the carbon credits should belong (Allam, 2012, Pers. Comm.).

The role of Toyota

The idea of Toyota, as donor of the PPSRP, about the carbon credits and that from Conservation International is stated as follows in their own official documents about the PPSRP in the second project design document:

"*As to carbon rights ownership, the Philippine government has no specific policy yet in existence. However, to anticipate conflicts that may arise as to who owns the carbon, the DENR agreed, in consensus with other stakeholders, that the Certificate of Stewardship Contract (CSC) holders shall own the carbon*." (PPSRP Project Design Document, December 2009:75)

"Toyota Motor Corporation, as the donor and a project partner, maintains a clear position that it does not claim carbon rights generated from the project activities, and that such rights should belong to local entity or entities." (PPSRP Project Design Document, December 2009:75)

Compare these statements with the next statements from the initial project design document which was prepared three months earlier.

"*As to carbon rights ownership, the Philippine government has no specific policy yet in existence. Provisionally, the government through DENR – for being the land owner of the untenured project areas where the reforestation and enhancement planting are targeted, including the natural forest areas which will be protected for emission avoidance – can be considered as the carbon rights owner. Where the targeted government-owned lands are covered by tenure such as CBFM Agreement, the peoples' organization as tenure holder owns the carbon rights."* (PPSRP Project Design Document, August 2009:57)

"This project is concerned about helping to reduce carbon emissions through carbon sequestration (A/R) and emission avoidance (REDD). As project fund donor-investor, Toyota Motor Corporation of Japan will have the priority to claim for the carbon credits." (PPSRP Project Design Document, August 2009:57)

This is like a 180-degrees turn in just three months, so this explains why the local community officials are a little bit afraid and skeptical about the real intentions of Toyota.

Carbon trading is not an option

The Conservation International and the Local Government Unit of Penablanca do not want to participate in carbon trading, because that is not the objective of the PPSRP. Carbon trading is not an option and therefore, CI and the LGU are not preparing policies or programs about the righteous beneficiary of the carbon credits if carbon trading will be an issue in the future.

Land Classification Maps

The land classification maps of Bugatay, Cabasan and Sisim show that only the project site within the borders of these barangays is government property and that the rest of the land is privately owned. Regarding the privately owned land, there cannot be a discussion on the ownership of the carbon credits because it is clear that the private owner decides over his property and take all the benefits from it. The only source of income for the government from trading of carbon credits from privately owned land is the tax.

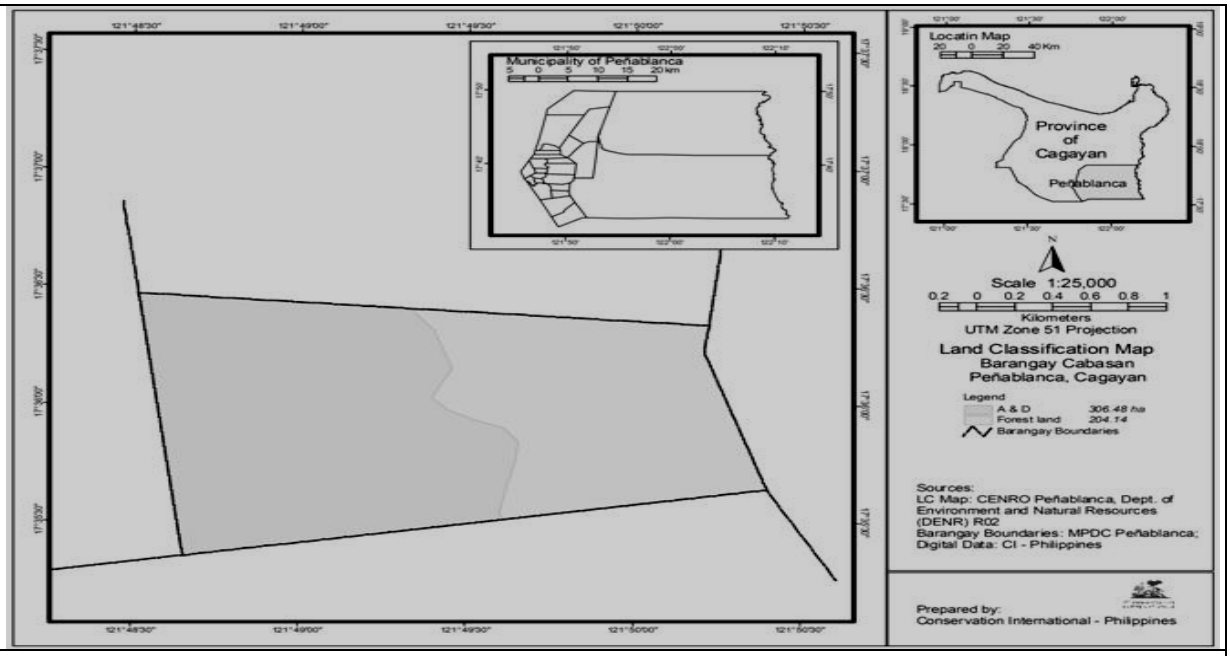


Figure 8: Land Classification Map of Barangay Cabasan

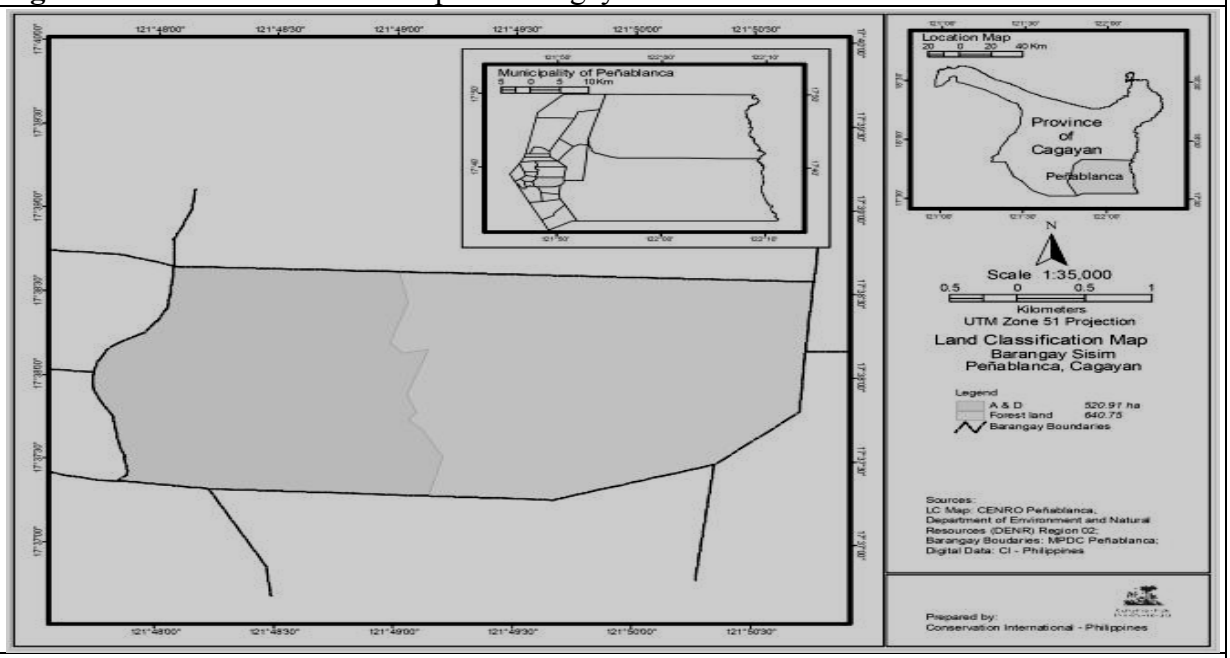


Figure 9: Land Classification Map of Barangay Sisim

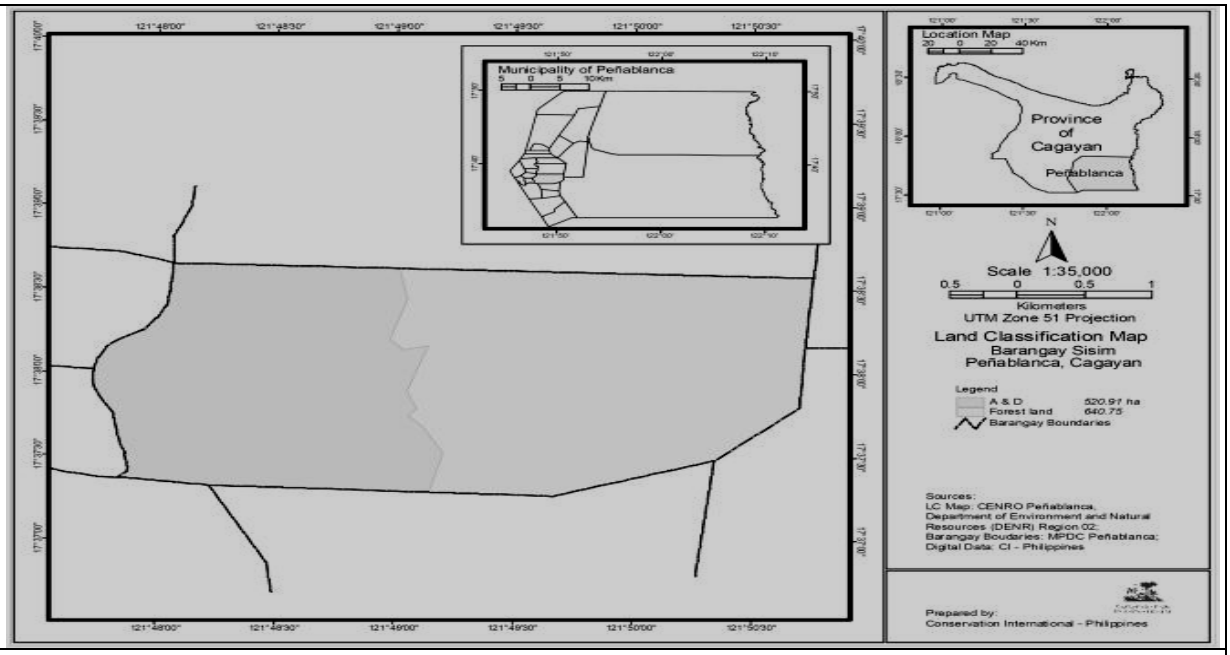


Figure 10: Land Classification Map of Barangay Sisim

The stewardship agreement (PACBRMA)

Now it is clear that a large part of Peñablanca is privately owned land and we need to focus on the carbon credit rights in the government-owned areas. In the case of Peñablanca, this is only the PPLS area.

The next section will give answers to the opinion of the local people and authorities about the righteous owner of the carbon credits. But in this section, we will give answers stated in official documents and maybe by a sort of jurisprudence case in Quirino Province in the north of the Philippines where carbon trading is already effectuated.

The Protected Area Community-Based Resource Management Agreement (PACBRMA) of the cooperatives of the barangays of Bugatay, Cabasan and Sisim are clear about the party who has to benefit from the income coming from the land. The agreement says: "*The PACBRMA Holder shall have the following privileges under this Agreement: receive all portion of income and proceeds from the sustainable utilization of resources within the area.*" Within the Quirino project, it is decided that the local community thru the cooperatives will be the primary beneficiaries of carbon trading.

Opinion of local people about ownership of the carbon credits

About half of the people interviewed think that the formal owner of the carbon rights are the people from the local community, and a quarter think that government is the owner. Conservation International is mentioned also sometimes but it is a non-governmental organization without any objective to earn money out of its projects.

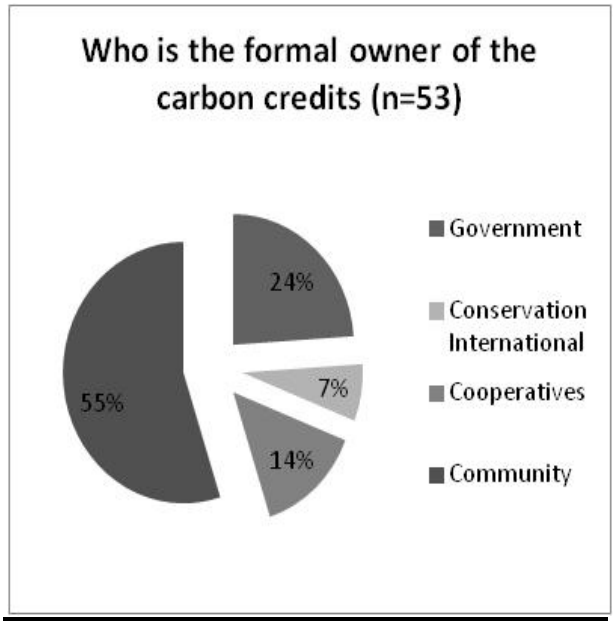


Figure 11: Who is the formal owner of the carbon credits in the opinion of the respondents in percentages.

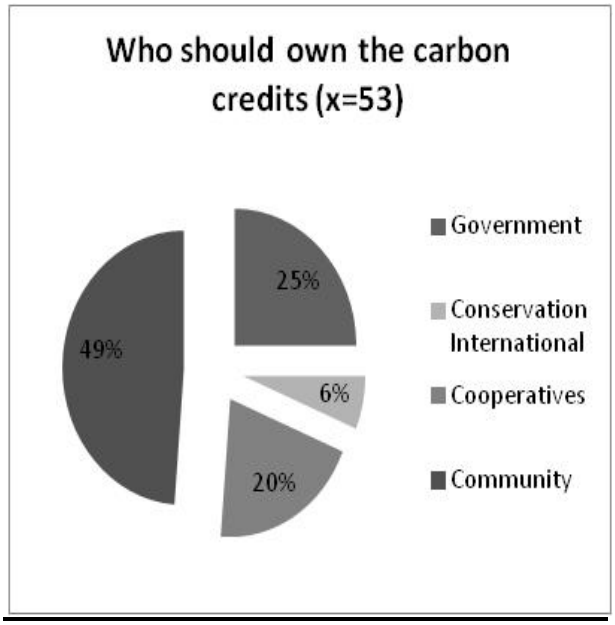


Figure 12: Who should own the carbon credits in the opinion of the respondents in percentages.

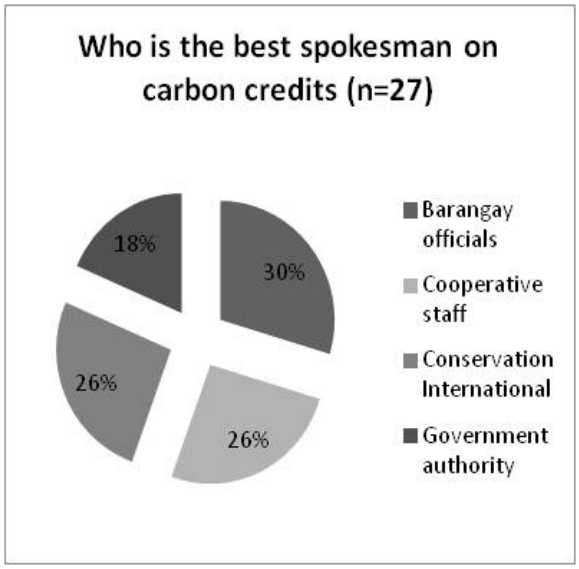


Figure 13: Who is the best spokesman on carbon owenership in the opinion of the respondents, in percentages.

Decision-maker about carbon trading

Who is authorized to make the final decision over entering the carbon trading market is not clear among the local community. Governmental organizations do not also know surely who has to decide about this matter. The respondents do not see the problem that, in fact, CI is not a governmental organization which by law is prohibited to decide about common property issues because 26% think that CI has the authority to decide about this issue. Thus, this question gives the biggest variety of answers because the barangay officials (especially the barangay captain), government authorities and the cooperatives staff were often called also.

DISCUSSION

1. A great majority of the people in Peñablanca is in favor of the PPSRP because of the job/income they get from the project activities

The PPSRP has great support among the local communities of Bugatay, Cabasan and Sisim. The most important reason is they get some extra money out of the project. In Cabasan, more jobs are created than in Sisim and this was clear during the interview with the people in the two barangays because they were much more enthusiastic in Cabasan than in Sisim.

2. *Local people do not know much about the bigger reason behind PPSRP*

As mentioned before, most local people are in favor of the PPSRP not because of the bigger picture of global warming, but simply because of the money coming with it. There is no intrinsic motivation to participate in the battle against global warming in the area. We can conclude that the information, education and communication program which is part of the PPSRP has not yet resulted in an increased awareness of the challenges regarding climate change for the people in Peñablanca. The IEC program focused especially on practical knowledge of farming and how the local farmers can practice agro-forestry on a sustainable way, but not why this is necessary for local and global climate problems.

3. *Effective implementation of the written laws and continuous monitoring, maintenance and protection of the PPLS are difficult due to lack of funds and local and political knowledge*

The streams from Kingdon are not coming together yet because the knowledge of local people is not sufficient to recognize the size of the coming climate problem. When authorities want that local people voluntarily participate in the struggle against climate change, it is necessary to invest in education about the bigger picture of climate change and the challenges coming with it for the Philippines.

4. *Alternative source of income is needed in the eyes of local community*

To continue the objectives of the PPSRP, there needs to be an alternative source of income for the people which now benefit from the labor coming out of the project. Half of the people said they will go back to the traditional way of surviving and getting income when they do not get paid out of the funds of the PPSRP anymore. Charcoal making, slash-and-burn farming and woodcutting are the fastest and most lucrative ways of getting money for the people in the Peñablanca area. So without alternative sources of income, time will come that people fall back to unsustainable ways of living.

5. *There is a lot of variety in the opinions as to who has to decide about carbon trading*

Who has to benefit from carbon credits is clear: the local community, but who has to decide about entering to the market is not clear. Four groups are named often and all of them equally: (1) official government authorities, (2) local barangay officials, (3) Conservation International, and (4) the cooperatives. To make clear decisions regarding carbon trading, a board which has the authority to decide in the name of the whole community about carbon trading is needed.

6. *Authorities are not prepared for the introduction of carbon trading and are ambiguous about the property rights*

A good public manager is always prepared for possible future developments but it seems that the authorities are not so regarding carbon trading and carbon rights, because they do not see carbon trading as a serious possibility. We cannot state the reason behind, because our research was too short, but it is strange that all over the world and also in the Philippines, carbon trading is a hot issue, but in this area, they are not aware of it. Policies need to be written down on forehand.

Conservation International says that carbon trading is an option for the PPSRP area, but we think authorities need to be prepared on every possible development. The June CI realized the first area in the Philippines, Quirino, has gotten Verified Carbon Standards (VCS)

(Conservation.org, 2012). So when it is possible in Quirino, it is also possible within the PPLS area in Peñablanca.

7. The official documents are clear about the ownership of the carbon credits

In the Climate Change Act, there is an Implementing Rules and Regulations but nothing is mentioned about carbon trading within it, so on the national level and lawmaking, there is no official policy over carbon trading and the righteous owner of carbon credits.

On a local level, there are more documents which are clear on the rights of the credits. In the eyes of the local community, the cooperatives will give benefits to the whole community, but the stewardship contract is divided into small parts with individual farmers benefitting from the contract. So in reality, the people who will benefit from carbon trading when this will occur under the wings of the cooperatives, are the individual land lessee from the cooperatives.

So now, we can formulate an answer to our main question: *What role can carbon trading play within reforestation projects?*

Carbon trading can be an opportunity to give an alternative source of income when the funding of Toyota Motor Corporation will stop in 2013. At this time, government units want to continue with the project in one way or another to secure the objectives of the PPSRP but many are very skeptical about the funding. It seems that LGU and DENR do not have enough money to take serious responsibility for the PPLS. When local people lose their source of income coming from the PPSRP, they will go back to unsustainable ways of surviving, simply because they need money to provide food to their family. When carbon trading will be introduced in the PPLS area and when the benefits from the carbon credits go to the local community, then it is possible to get real commitment from the people to develop a sustainable way of living with respect for people, planet and profit. Carbon trading can be a good solution for the time that awareness needs to be engaged and people want to survive. The case of Quirino can be used as a pilot and when it will be successful there, carbon trading can be introduced in the PPLS area.

We can conclude that carbon trading can play a role in reforestation projects worldwide because the loss of income for local people as they have to stop with their traditional ways of agro-forestry can be compensated and used as an incentive to participate in reforestation.

Recommendations

In our opinion, LGU and DENR need to investigate the possibility to generate a source of income which will prevent people in the barangays of Peñablanca from being forced into traditional and unsustainable ways of agriculture. Entering the carbon market can be a possibility which brings some negative sides with it, but it is a far better solution than the way back to the traditional approach of agro-forestry. There is only one important condition: the local community needs to have the rights on the benefits coming with carbon trading because the cooperatives have a stewardship agreement: the Protected Area Community-Based Resource Management Agreement (PACBRMA). This agreement contains that owners of this contract have all the rights over the benefits coming with the leased land. All the income coming with carbon trading will go to the cooperatives. They need to use it for sustainable development of their community. This is not only for the reforestation, but will focus on the three holy P's of sustainable development: People, Planet & Profit. LGU and DENR are only there to provide the necessary knowledge and funds to start with carbon trading. Local community can possibly pay back the initial costs by a tax system.

A large percentage of the respondents mentioned CI as owner and decision-maker of the carbon credits. According to law, private companies cannot make decisions about common property. We were also surprised by the number of people that called CI as the righteous owner of the carbon credits, because a non-governmental organization can never be the righteous decision-maker about big question like the entering to the carbon market. A consensus-making board with membership consisting of LGU, DENR, barangay captains and staff of cooperatives is in our eyes the only possibility to serve all the people in a way that decisions about entering the carbon market can be made democratic. The role of CI needs to be advisory and it cannot have a decision-making vote.

ACKNOWLEDGEMENTS

At the end of this writing, we would like to give our appreciation to all the people who helped us during the week in the field. We would like to thank all the respondents without whom this research should not have been made possible: all the local farmers, barangay captains, CI-personnel, staff of cooperatives and government officials who made time for us to share their knowledge and opinion and of course some of their coffee.

We would like to give a special word of appreciation to Sir Kabug and his family for giving us a place which felt like home for five nights and where we got excellent and overflowing food.

Last but not least, we would like to thank Sir Sam and Sir Jessie for their assistance in the field. They were always there when we needed them and gave us some nice motor rides over the dusty and bumpy roads of Peñablanca.

REFERENCES

Allam, J. (2012). Pers. Comm. Barangay Captain Cabasan. Cabasan, 19 January 2012.

Conservation.org (2012). *Philippine Forest Project gets Global recognition For Greenhouse Gas Emissions Reduction, Other Benefits*. http://www.conservation.org. Downloaded on 26 January 2012.

Hardin, G. (1968). *Tragedy of the commons.* Science, 162(1968):1243-1248.

Kingdon, J.W. (2010). *Agendas, alternatives and public policies*. London.

Miller,G. & Spoolman, S. (2011). *Living in the Environment*. Hampshire. Cengage Learning.

Ostrom, E. (1990). *Governing the commons.* Indiana. Indiana University.

The Royal Society (2009). *Geoengineering the climate*. London.

Toyota Motor Corporation & Conservation International (2009). Philippine Peñablanca Sustainable Reforestation Project (PPSRP) - *Project Design Document for Climate, Community & Biodiversity Standards, first edition August 2009.* PPSRP.

Toyota Motor Corporation & Conservation International (2009). Philippine Peñablanca Sustainable Reforestation Project (PPSRP) - *Project Design Document for Climate, Community & Biodiversity Standards, second edition December 2009.* PPSRP.

Voet, E. van der & Graedel, T.E. (2007). *The Emerging Importance of Linkages.* Leiden.

APPENDICES

List of respondents						
Nr	**Name**	**M/W**	**Function**	**Type of interview**	**Location**	**Date**
1	Juan Acay	M	Director CI	Presentation	Cabasan	18-01-12
2	Jackelyn Vergara	W	Barangay Secretary Cabasan	Short general	Cabasan	19-01-12
3	Monalisa D. Dichoson	W	Rural health midwife at local health center	Short general and get the population figures	Cabasan	19-01-12
4	Rito Baligod	M	Tenant farmer	General	Cabasan	19-01-12
5	Grace Baligod	W	Barangay health worker	General	Cabasan	19-01-12
6	Jouito Allam	M	Barangay captain and chairman waterboard	Long – like focus group	Cabasan	19-01-12
	Alden Tamayo	M	Barangay consular and vice chairman waterboard			
	Meleccio Baggay	M				
	Man with no name from other barangay	M				
10	Bernardo Agudo	M	Vice-chairman P.O. BUFAR MPC	Long - with wife and 3 daughters	Bugatay	19-01-12
11	Rachel Dul-du-law	W	Farmers housewife / former laborer CI	Short general	Cabasan	19-01-12
12	Meleccio Baggay	M	Former Cabasan barangay captain 1974-1977	Long	Cabasan	19-01-12
13	Alex M. Sibbalucca	M	MENRO	Long	Peñablanca	20-01-12
14	Marlon C. Agnar	M	CENRO	Short general	Tuguegarao	20-01-12
15	Nestor Balaqui	M	PAWCZM	General	Tuguegarao	20-01-12
16	Eduardo Angodu	M	CI - Forester	Long	Tuguegarao	20-01-12
17	Raymon …	M	CI –In charge over reforestation	General	Tuguegarao	20-01-12
18	Iereneo Talosig	M	CI- Development Coordinator (forester)	Long	Tuguegarao	20-01-12
19	Louis Taguna	M	PACBRMA beneficiary paid by CI	Long double interview	Cabasan	20-01-12
	Sherwin Allam	M	PACBRMA beneficiary paid by CI			
21	Guest family and visitor	M/W	Local inhabitants	Simple focus group	Cabasan	20-01-12
22	Unknown	M	Chief barangay police Cabasan	Short general	Cabasan	21-01-12
23	Unknown	W	Farmer housewife	Short general	Cabasan	21-01-12
24	Unknown	W	Farmer housewife			
25	Unknown	M	Tenant farmer	Short general	Cabasan	21-01-12
26	Ricky James Allam	M	Tenant from Manilla originated Cabasan	General	Cabasan	21-01-12
	Unknown	M	Local young farmer			
28	Unknown	M	Local young farmer	General	Cabasan	21-01-12
	Unknown	M	Local older man			
30	Silverio Camaro	M	Cabasan consular	General	Cabasan	21-01-12
	Gabriela Danao	M	Cabasan consular			
32	Tito Magantulao	M	Protected Area Supervisor	Telephone interview	Cabasan	21-01-12
33	Norman Calatcat	M	Beneficiary of PPSRP farmer	General	Cabasan	21-01-12
34	Unknown	M	Young lady	Short general	Cabasan	21-01-12
35	Oscar Taguna	M	Beneficiary of PPSRP farmer	Short general	Cabasan	21-01-12
36	Mariano Casaway	M	Older local man	Long/general	Cabasan	21-01-12

List of respondents						
Nr	**Name**	**M/W**	**Function**	**Type of interview**	**Location**	**Date**
37	Unknown	M	Beneficiary of PPSRP farmer	General	Cabasan	21-01-12
38	Kabug	M	CI and head of our host family	Long and couple of times	Cabasan	21-01-12
39	Raymundo Daquioag	M	Owner model farm outside protected a.	General & hike	Cabasan	21-01-12
40	Eduardo Danguilan	W	Sisim barangay consular	General	Sisism	22-01-12
41	Julieta Allam	W	BHW	General	Sisism	22-01-12
42	Linda Ferrer	W		General	Sisism	22-01-12
43		M				
44	Plaridel J. Danguilan	M	Sisim barangay captain	Long	Sisism	22-01-12
45	Salvita Gallibo	W	Chairman coop Sisim (SUFAR)	Long	Sisism	22-01-12
46	Unknown	M	Farmer and husband of Salvita Gallibo			
47	Anthony Balaw	M	Construction worker	Short general	Sisism	22-01-12
48	Jovie Ultu	M	Former chairman coop Sisim	General	Sisism	22-01-12
49	Ernesto Bugatay	M	Charcoal make & sometimes laborer CI	General	Sisism	22-01-12
50	Jocelyn Tamayao	W	Charcoal make & sometimes laborer CI			
51	Rosie Allam	W	Laborers for CI project	Short general	Cabasan	23-01-12
52	Aureta Allam	W	Laborers for CI project			
53	Nacie Daquioag	W	Laborers for CI project			
54	Caridad Mallongo	W		General	Cabasan	23-01-12
55	Lira Nadal	W	Treasury Cabasan	General	Cabasan	23-01-12
56	Amando Arugay	M	Former barangay chairman 1988-1994	General	Cabasan	23-01-12
57	Carmilita Iglesias	W	Cabasan barangay consular	General	Cabasan	23-01-12

Topics for longer open interviews

- PPSRP opinion
- The future of the project site and the objectives
- Ownership carbon rights (trees)
- Decision maker
- Spokesperson

Short questionnaire for general interviews

1. Are you in favor of the PPSRP?
2. If yes, why?
3. What will happen after 2013 with the project objectives?
4. What is your occupation?
5. What is in your opinion the formal owner of the trees/carbon credits?
6. Who should be the owner (beneficiary) of the trees?
7. Who should be your spokesman on the topic of tree ownership/carbon credits?

PES and irrigation in Peñablanca (Malibabag)

Leo Smit and Ronie Turaray

INTRODUCTION

Among the scientific community, it is widely accepted that forests capture rainfall and replenish and cleanse our water supply. "…every hectare of forests makes a huge contribution to regulating water cycles, around 330 million hectares of the world's forests are designated for soil and water conservation…" (Utkina, GEF 2011). But, oftentimes, government institutes and land users are unaware of the importance of forests to water conservation (Center for Watershed Protection, 2008). The combination of looming water scarcity in the world and active deforestation emphasizes the importance of minimizing deforestation and protecting the world's forest watersheds.

The Peñablanca watershed contributes the irrigation water for farmers in the municipality of Peñablanca, Cagayan Province, Philippines. The watershed's main source of water is known to be the forests on the Sierra Madre Mountain range, feeding the Pinacanauan River sub-watershed which flows into the Cagayan River (Figure 1). The Cagayan River also supplies most of the irrigation and domestic water needs of local farmers in Cagayan Valley (as well as supplying a potable water supply for the nearby city of Tuguegarao). The forest, whilst officially protected and owned by the government (Peñablanca Protected Landscape and Seascape covering 103,000 ha.) (Amponin et al. 2007) and being the site of the Philippine Peñablanca Sustainable Reforestation Project (PPSRP) (Toyota 2009), is still victim to active deforestation by farmers living in the mountains of the protected area (upland farmers/watershed area farmers (WAF)) converting forest into farmland. This threatens the income and food production of the farmers in the 24 barangays in Peñablanca, at the foot of the Sierra Madre (irrigated farmers/affected area farmers (AAF)). Malibabag is one such barangay and has been selected as model for this research project. According to the barangay captain, the population is about 1,438 people, consisting primarily of farmers (Cpt. Tuppil).

Main river irrigation system from the Pinacanauan River to the Peñablanca barangays

The National Irrigation Administration (NIA) is responsible for water distribution to the farmers that are engaged in rice production. It supplies 500 ha of land in Peñablanca owned by the farmers. The NIA establishment in this area also supplies water mainly to one municipality and one city in the vicinity; Peñablanca and Tuguegarao. Here, there are 380 ha that are being irrigated making for a total of 850 ha of irrigated land dependent on the Peñablanca watershed (Engr. Yu 2012. Pers. Comm.).

The implementation of laws protecting the watershed is not strictly reinforced by the higher authorities of the government such as the MENRO and DENR. Despite the area being government-owned, legally protected, and the logging ban, deforestation is still taking place. If downstream farmers are not willing to invest in watershed protection (by monetary means), and the upland farmers are not willing to halt their slash-and-burn/logging tactics (in return for compensation), the water available to the Peñablanca area will drastically decrease (to below the level of sustainability for the amount of users). The CI project alone is not sufficient to actively preserve the forest watershed, once this is completed and the CI leaves, it would be efficient to have a self-sustaining project in place that does not require an NGO 3rd party (Sibbaluca 2012. Pers. Comm.).

Farmers' major irrigation source is at risk. Upland farmers are unaware of their actions or unwilling to change their ways. The government is not actively reinforcing its policies against logging or enforcing regulations in protected areas. The captains of the upland farmers have more experiences and insights to the actions and their consequences but cannot persuade their farmers to halt their procedures. The upland farmers say that the activities (like carabao logging and slash-and-burn farming) they perform are their only source of income and an important source of food.

The theory is that if the higher authorities of the government perform their responsibilities for sustaining the forest area through implementing the laws strictly, rice farmers are willing to donate to the Environmental Service (ES) of the forest, and upland farmers are willing to accept this Payment for Environmental Service (PES) and switch to agroforestry and reforestation for their source of income, then the income, production, biodiversity, and livelihood of most beneficiaries should increase due to the increased availability of irrigation water.

PES is an increasingly popular system for generating funds to protect vulnerable environmental sites. There are four categories of environmental services; watershed protection, carbon sequestration, biodiversity conservation, and landscape/seascape beauty (Padilla et al. 2005). Those who provide these environmental services, usually marginalized groups such as upland farmers, indigenous people, and fisher folk, are compensated by the people who gain from the service. Those benefitting from the ES are usually water users, tourists, and pharmaceutical companies (REECS 2008).

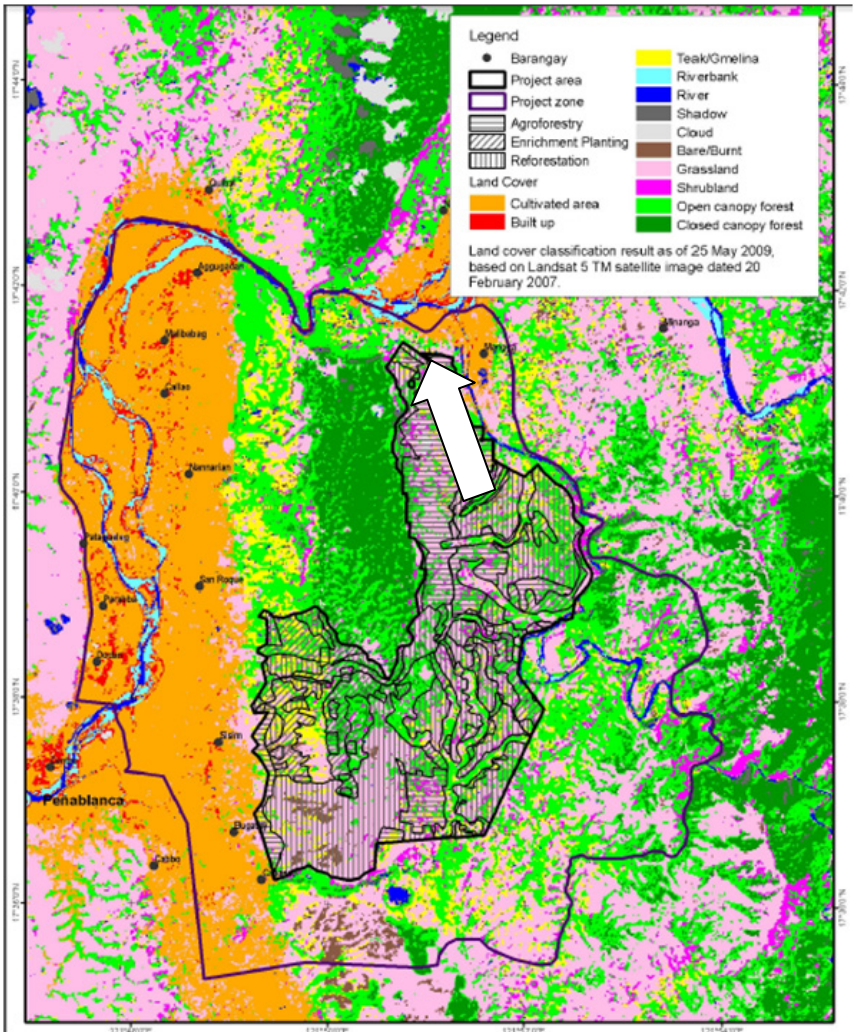


Figure 1: Map of water flow from watershed area to Pinacanauan River in Peñablanca (Toyota 2009)

RESEARCH QUESTIONS

Is a self-sustaining PES program between irrigated farmers and upland farmers possible?

- Is there enough irrigation water during the harvesting/cropping season?
- Are farmers already paying PES? Would they be willing to invest to secure their source of irrigation water if presented with sufficient knowledge? If not, why?
- Are upland farmers already receiving PES (Rewarding the Upland Poor for Environmental Services (RUPES))? Have they been offered? Would they be willing to accept PES to change their forest-degrading ways? If not, why?
- Can lack of knowledge and understanding be blamed for the decisions of farmers?
- Are all inhabitants and local actors involved (farmers, local government unit, barangay captains) aware of the current situation and its potential negative consequences? Are they aware of the benefits of agroforestry and participating in PES projects?
- What is halting the reinforcement of government laws, regulations, and policies (such as the logging ban)?
- Why is the Department of Environment and Natural Resources (DENR) and/or Municipal Environment and Natural Resource Office (MENRO) not tackling the deforestation in the protected area?

METHODS

Before we went to the field, six different questionnaires were prepared; one for irrigated farmers/AAF (Appendix A), one for upland farmers/WAF (Appendix B), affected area captain (Appendix C), upland captain (omitted), NIA (Appendix D), and one for MENRO (under LGU) (Appendix E). The questionnaires for the farmers were closed and we stuck to the questions whilst the ones for NIA and MENRO were more or less guidelines for our interview; important questions arose as these interviews proceeded. As circumstances would have it, we did not manage to interview the upland barangay captain in Mangga due to her absence.

We conducted interviews and observation analyses in Malibabag for three days, one day in Mangga, and during the last day of our fieldwork, we visited the National Irrigation Administration (NIA) and the Municipal Environment and Natural Resource Office (MENRO) for individual interviews.

During our interview with the farmers in the two barangays, we altered our questionnaires a little after the first interview as to obtain clearer answers to our research questions. The barangay captain (Emerson Tuppil) and one of his kagawad members helped construct a list of farmers for us to interview. In some situations, we were not able to find the farmers in their residences, so the officer in charge (kagawad member) helped us find the farmers we were looking for. We chose the respondents at random in every purok (zone) of the barangay.
Oftentimes, we encountered farmers who did not speak or understand English, but through teamwork and personal experience, Mr. Turaray was able to translate the dialogue very effectively so results could be noted by both interviewers. The data were processed according to importance for analysis in preparation for the final presentation.

RESULTS

Summary Affected Area Farmers (AAFs), Malibabag

The key question here was question no. 10 (Appendix A): "(Theoretical Question) If upland farmers were cutting trees, would you be willing to pay extra for them to halt their activities? If not, why?" The other questions helped in obtaining background information. Some farmers mentioned alternative payment amount requirements to NIA during the dry and wet season whilst other farmers claimed they would pay the same amount in both seasons. The nine farmers who are unwilling to donate PES stated that this is because it is the responsibility of the DENR/government to enforce protection in the protected area. Those who want to pay would do so because they are aware of the importance of the forest. Table 1 and Figure 2A show the representation of farmers who are willing and not willing to contribute PES.

All farmers are aware of, and attended the NIA and DA educational seminars and informed us they took place once per cropping season and contained information about environmental awareness as well as farming techniques. None is aware of the long-term possibility of drought if deforestation continues; most prominent among the answers to environmental consequences of deforestation is that of erosion and mudslides.

Interestingly enough, only approximately 55% (16) of the respondents are not aware of the illegal activities (carabao logging and slash-and-burn) taking place in the uplands while 45% (13) are aware of these activities but also know this is mainly for personal use and livelihood.

When asked about problems with the NIA, 100% of the farmers responded with complaints about reparations of the irrigation system after strong rains. None mentioned complications regarding bill payments nor did anyone mention the 10% discount provided to those who pay their bills on time (see NIA interview below).

Table 1: Number of interviewed farmers who are willing to donate PES in Malibabag

Location (Barangay)	No of interviewed farmers	Willing to donate PES	Not willing to donate PES
Malibabag	29	20	9

Summary Watershed Area Farmers (WAFs), Mangga

The key question in this questionnaire was no. 8b (Appendix B) regarding the farmers' will to accept PES and change their farming techniques to reforestation and agroforestry: "Would you be willing to receive payment to switch your farming techniques to agroforestry?" The majority of the respondents are willing to accept this payment and change their techniques (Table 2 and Figure 2B) only if some strict conditions are met that entitle them to the land they live on like stewardship contracts, and a way to provide themselves with enough food or money during the time of fruit-tree growth (when no fruit can be harvested yet).

None of the respondents is aware of any negative consequence of slash-and-burn or logging techniques on affected area farmers (AAFs) (question 6a Appendix B).When asked about the DENR's presence, all farmers mentioned that they just come to visit, look around, and observe. One farmer had complications (question 11 Appendix B) with the DENR as she had been warned about her practices being illegal but the issue did not surpass verbal warning (Agabin 2012, Pers. Comm.).
Personal observations revealed a less serious perception on environmental consequences of deforestation; farmers sometimes even chuckled when they mentioned the mud- and landslides.

Table 2: Number of interviewed farmers who are willing to receive PES in Mangga

Location (Barangay)	No of interviewed farmers	Willing to receive PES	Not willing to receive PES
Mangga	9	8	1

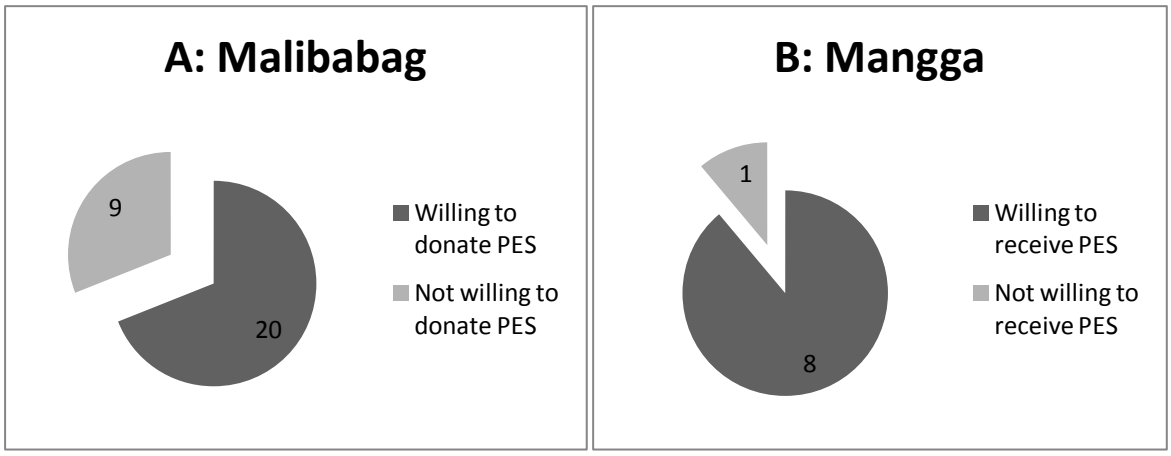


Figure 2: Number of interviewed farmers willing to participate in PES in Barangays Malibabag (A) and Mangga (B) in Peñablanca

Malibabag Barangay Captain interview summary

As mentioned in the methods, we interviewed the barangay captain of Malibabag, Emerson Tuppil. The following is a summary of the highlights of the interview:

Mr. Tuppil has been the barangay captain of Malibabag for four years and had many years of experience as a kagawad, thus establishing his high level of experience and knowledge. The barangay captain is very aware of the logging ban of 2011, but also admitted to his awareness of upland farmers using carabao logging and slash-and-burn techniques, and that these are mainly used for livelihood. The barangay captain is not aware of any future threat of decreasing irrigation water supply (question 8a).

The barangay captain himself is not willing to donate PES because he feels strongly that it is the DENR's responsibility to protect the protected area. He is also under the impression that the people of his barangay would not be willing to pay either, the research provided above proves contrary. When asked about question # 10 of the questionnaire, the barangay captain responded that he is aware of a number of complications with the NIA regarding the lack of payment for irrigation services by some of the farmers in Malibabag. This also became apparent in the NIA interview.

NIA interview summary

At the NIA, we interviewed Francis S. Yu, Civil Engineer and the Officer-In-Charge. He has been working at the NIA since 1976. Out of 880 ha supplied by the NIA with irrigation water, 500 are within the Peñablanca area; the remaining 380 ha are officially part of Tuguegarao City. When interviewing farmers, we noticed that some paid a different amount in the wet cropping season as opposed to the dry, whilst others claimed to pay the same amount in both seasons. The NIA confirmed that there was indeed a difference in price between the dry and wet cropping season:

- 2 cavans (sack of produce) at 50 kilos each at 15 pesos per kilo per ha in the wet season = 1,500 pesos per hectare
- 3 cavans at 50 kilos each at 15 pesos per kilo per ha in the dry season = 2,250 pesos per hectare

Mr. Yu stated that the NIA is not involved with the protected area or PES program and is only aware of the CI/Toyota projects (questions #4 and 8), mainly because the irrigation land covered is not within the protected area of Peñablanca. Hence, he stated that the NIA is unaware of any logging and/or slash-and-burn activity taking place within the protected area.

The NIA did, however, pose an interesting point in its cooperation with Irrigation Associations (IAs). Mr. Yu said the NIA and IA have a partner relationship that attempts to flow into a full or partial management and maintenance transfer of the irrigation systems.

Question 10 was answered by stating there are mostly problems involving late bill payments which sometimes resulted in judicial involvement. Though, to stimulate timely payments the NIA offers a 10% due date discount; we had insufficient time to return to the farmers to confirm if they were aware of this information.

Mr. Yu did state that the NIA would be willing to participate in a potential PES program, only if the government passes a policy regarding obligatory participation by farmers in the PES program.

MENRO interview summary

At the MENRO, we interviewed Mr. Alex M. Sibbaluca, the MENR Officer. We got a lot of information, some of which were not on the questionnaire as well. We received a print-out of the MENRO's Duties and Functions; #3 of this list reads, "Establish, maintain, protect and preserve communal forest, watersheds, tree parks, mangrove, greenbelts, commercial forest and similar forest projects, like industrial tree farms and agro-forestry projects." Thus, it is clear that the MENRO is responsible for the protection of the protected area.

The MENR Officer stated that he is in favor of PES and actively supported the CI project but there should be proper mechanisms and governmental input if there is to be a self-sustaining PES project that does not involve a 3rd (NGO) party (like CI). Currently, 18 out of 24 barangays fall within the protected area.

When asked about the long-term effects of deforestation, the MENR Officer mentioned some environmental impacts, though it seemed he is unaware of the potential drought resulting from watershed degradation and deforestation.

The MENR Officer mentioned something like the farmers are currently residing in the protected area; they retain *stewardship contracts*. These contracts entitle them to the land they live on as long as they do not expand into the forest or cut more trees (Toyota 2007).

DISCUSSION

Through the research method described above and the results that were attained, a number of valid and valuable conclusions could be drawn and some of the answers to the research questions became clear. Ultimately, the main research question could be answered:

Is a self-sustaining PES program between irrigated farmers and upland farmers possible?

As it turns out, affected area farmers (AAF)/inhabitants state that there is no current lack of water, nor do they express awareness of any threat to the irrigation water supply. Also, some (older) farmers justly mentioned that it is the responsibility of the DENR to enforce protection of the watershed and that no additional effort or payment should be required on their part; why pay when it is the law? These points, of course, provide less incentive to donate a part of their (AAFs) incomes to preserving the watershed for the purpose of securing the water supply; no threat = no worries. Yet, as the results state (Table 1 and Figure 2A), the majority of farmers *are* willing to donate some of their income to protect the forest; through NIA and DA seminars they attend once per cropping season, the farmers have been made aware of the importance of nature and the forest watershed. This, in turn, is a great positive step towards a possible, future, self-sustaining PES program (albeit for a reason other than securing the water supply).

Watershed area farmers (WAFs) are a definite and important factor, seeing as their refusal to participate would cause the entire PES program to fail. One farmer mentioned that he already received PES in exchange for agroforestry and reforestation actions (Bangayan 2012, Pers. Comm.); most farmers are aware of the reforestation activities in the area, but the majority did not participate or receive payment, nor were they offered such. Residents of the area mentioned that the DENR came around, but mostly just visited. Most WAFs said they are willing to accept PES to include agroforestry in their land but under certain strict conditions: they want full control over the land they are on (so the government could not claim their land,

profits, or evict them); government enforces policy so participation is compulsory for all; and stewardship contracts, and money and food so they can feed their families (due to the fact that the first number of years, fruit-bearing trees do not produce fruits, thus immediately reducing income and food supply). Hence, if these conditions are met, a self-sustaining PES program is possible.

To be able to establish a self-sufficient PES program for securing the irrigation water supply, strong government involvement is required according to both the MENRO and NIA officials that were interviewed. The MENRO also stated that most of the responsibility would lie with the national government, local government, barangay captains, and the people. The NIA's will to participate would help greatly to implement a PES program, seeing it as the only one already receiving payment from farmers for irrigation, though the tardiness of bill payments may put such a project at risk. The NIA's involvement with IAs also points towards self-sufficient progress; giving the barangays partial management and maintenance of their own irrigation systems would be a great experience and a big step towards self-sufficiency; hence pointing to their capacity for a possible self-sustaining PES program. In addition, seeing as the current watershed protection is not sufficiently enforced by the government (and deforestation is still taking place), it may be hard to rely on strict government involvement. All in all, the answers from the two officials were positive towards a self-sustaining PES program.

Despite some farmers' and the barangay captain's opinions that the protected area simply needs to be enforced by the government, all seem to be adamant to follow government policy if such is posed on them and they are instructed on their importance by seminars (not to mention stricter enforcement of laws). If the contributions of the AAFs are enough to meet the conditions and demands of the WAFs' needs, if seminars are conducted to instruct farmers on the importance of the small additional payment, and if the national government, local government, barangay captains, IAs, and farmers all work together, a self-sustaining PES program to secure irrigation water of the Peñablanca watershed is indeed feasible.

ACKNOWLEDGEMENTS

We would like to express our thanks to the people who helped us and gave us their full support and the great determination to finish the research:
Mr. Sammy Telan and Mr. Jessie Guerero, the research and conservation officers of Mabuwaya Foundation, who accompanied us in the host family where we stayed and monitored us for safety and security on a daily basis;

The hospitable and loving host family, Captain Emerson Tuppil and his wife, who accommodated us, introduced us to the barangay kagawad; (Thanks also for the delicious food and coffee every day)

The Officers-of-the-Day who accompanied us to find the farmers' houses; The respondents of Barangay Malibabag; The other hospitable host family, Mr. and Mrs. Martin Telan, who accommodated us and gave us companion; Mrs. Myline Tanguilan who helped us find the houses of upland farmers in Mangga; The upland farmers for giving us the information we sought for our research; and To the Officer-In-charge of NIA, Engineer Francis S. Yu, and the MENR Officer, Mr. Alex Sibbaluca, for giving us the time to interview them and provide us with information.

REFERENCES

Toyota Motor Corporation and Conservation International, 2009; Philippine Peñablanca Sustainable Reforestation Project (PPSRP)

Tuppil. 2012. Pers. Comm. Captain Barangay Malibabag. Malibabag, 20 January 2012.

Sibbaluca 2012. Pers. Comm. Municipality Environmental and Natural Resource Officer (MENRO). Centro, Peñablanca, 24 January 2012

Engr. Yu 2012. Pers. Comm. Officer in Charge of National Irrigation Association (NIA) office Peñablanca. Camasi, Peñablanca, 24 January 2012

Agabin 2012. Pers. Comm. Watershed Area Farmer (WAF) in Mangga. Mangga, 21 January 2012.

Bangayan 2012, Pers. Comm. Watershed Area Farmer (WAF) in Mangga. Mangga, 21 January 2012.

Amponin et al. 2007. Willingness to pay for watershed protection by domestic water users in Tuguegarao City, Philippines

REECS, 2008; Marketing the Environment through PES. http://reecs.org/node/143

Padilla et al. 2005. PES: Sustainable Financing for Conservation and Development

Center for Watershed Protection, 2008. http://www.forestsforwatersheds.org/forests-and-drinking-water/

Utkina Irina, 2011. Forests are key for high water quality supply. Global Environment Facility (GEF). http://www.thegef.org/gef/press_release/2011_IYF_forest_for_water

APPENDICES

Appendix A: AAF Questionnaire:

1. What is your name?
2. How old are you?
3. What is your level of education?
4. How long have you been a farmer?
5. How many children do you have?
6. How much land do you cultivate? How much of this is irrigated?
7. What do you grow, primarily?
8. About how much do you pay per ha per month for irrigation water?
9. Do you receive enough irrigation water all year?

a. If not, why do you think there is not enough water?

10. (Theoretical Question) If upland farmers were cutting trees, would you be willing to pay extra for them to halt their activities?

a. If not, why?

11. Do you receive any information from DENR/NIA/LGU/DA that you may be able to use on your farm?
12. Is the area upstream of your house being logged?
a. What is your opinion about that?
b. Do you think this has consequences for you?
13. Are there any conflicts between you and upland farmers, the NIA, or government officials?

Appendix B: WAF Questionnaire:

1. What is your name?
2. How old are you?
3. What is your level of education?
4. How long have you been a farmer?
5. How many children do you have?
6. How much land do you cultivate?
a. What farming techniques do you use?
i. Do you think this has an effect on the people or farms downstream (like Malibabag)?
7. Is this a protected area?
8. Does the DENR/NIA ever come to this area?
a. Do you know what this would be about?
b. Would you be willing to receive payment to switch your farming techniques to agroforestry?
c. Do you think that this could improve your income?
9. Do you receive any information from DENR/NIA/LGU/DA that you may be able to use on your farm?
10. Are you aware of the environmental effects of cutting the forest with regards to irrigation water?
11. Have you experienced conflicts between yourself and NIA, CI, DENR, affected area farmers, and government officials?

Appendix C: Affected Area Captain

1. What is your name?
2. How old are you?
3. How many people live in this Barangay?
4. How long have you been captain of this Barangay?
5. Do you receive any information from institutions about land use and development?
6. Do you know about any logging taking place at the watershed area?
7. Do you know about any slash-and-burn taking place at the watershed area?
8. Is there any problem with water?
a. Do you think there ever might be a problem with water?
9. (Theoretical Question) If upland farmers <u>were</u> cutting trees, would you be willing to pay extra for them to halt their activities?
a. Do you think the people of this Barangay would be willing? Why or why not?
10. Do you negotiate with NIA, IA, or government officials about payment for sustainable irrigation plans?

Appendix D: NIA Interview Guide Questions

1. What is your function/position within NIA?
2. How long have you been working for NIA?
3. How much do farmers pay every cropping season to NIA for irrigation?
a. How many ha of irrigation does NIA supply?
4. Is there a problem in the protected area of Peñablanca?
5. Is there logging in Peñablanca?
a. Why/Why not?
b. What are the consequences?
6. Is there slash and burn in Peñablanca?
a. Why/why not?
b. What are the consequences?
7. How is the water distributed amongst farmers and Barangay in the affected area?
8. Do you offer PES to watershed farmers so they will protect the forest?
9. Is there any program that offers upland farmers money for protection of the watershed? Does NIA think this is feasible?
10. What is the relationship between NIA and IAs?
11. Have you encountered any conflicts or complaints from the irrigated farmers or the watershed farmers?
12. Would NIA be willing to help facilitate a PES program in the Peñablanca area?

Appendix E: MENRO Interview Guide Questions:

1. What is your function/position within MENRO?
2. How long have you been working for MENRO?
3. What is the purpose of the MENRO?
4. Who's responsibility is it to enforce the protection in the protected area of Peñablanca?
a. What are the consequences of illegal practices in the protected area?
5. Is there any protected area in Peñablanca? What projects are executed here?
6. Is there a problem in the protected area of Peñablanca?
7. Is there logging in Peñablanca?
8. Is there slash-and-burn in Peñablanca?
9. What are the long-term effects of deforestation?
10. Are you in favor of PES?
11. Would you aid in the facilitating of a potential PES program between affected area farmers and watershed area farmers?
a. Do you believe this will aid the effort to stop deforestation and degradation of the watershed?
12. What are some active relations you have with the farmers, IAs, and NIA?

Contributing Factors in the Success of Agro-forestry Farms in Peñablanca

Marilyn Prado and Antje Steenhuizen

INTRODUCTION

The Peñablanca Protected Landscape and Seascape (PPLS) is a protected area in the Sierra Madre Mountains in Cagayan Province, the Philippines. This area has an important ecosystem service function for the watershed. However, this area is faced with severe deforestation and threatened biodiversity. Deforestation in the uplands, caused by conventional upland agriculture, contributes to the deterioration of water quality in the watershed of Peñablanca.

In this area, Conservation International (CI) has initiated several projects aimed at reducing the dependence on unsustainable use of natural resources by communities living in it. The Toyota Motor Corporation (TMC) made a donation that enabled the CI and local stakeholders to launch the Philippine Peñablanca Sustainable Reforestation Project (PPSRP) in September 2007.

The goal of the project is to promote forest restoration, forest and biodiversity conservation, and alternative livelihood through reforestation, enhancement planting and agroforestry (CI 2009). The project encompasses 2,500 hectares, of which 700 ha are designated for agroforestry. Four hundred upland farms are included in the agroforestry component of the project.

Some farms that were converted into agroforestry farms, fell back to conventional farming (M van Weerd, Perss. comm.). The topic of this research is looking into the factors that contribute to the successful implementation of enterprises that are involved. An essential element of successful agroforestry is the economic viability of the various enterprises that are involved. As Salafsky(2001) acknowledged that if local people can benefit financially from enterprises that depend on the biodiversity of the forest within which they live, then they might reasonably be expected to support the conservation and sustainable use of the forest ecosystem

RESEARCH QUESTIONS

Main question:
- How can agroforestry farms in Peñablanca be successful?

Steenhuizen 2012

Sub-questions:
- How are the agroforestry farms funded?
- How do farms have access to water?
    - Are these water resources sufficient, also in dry months?
- What are the incentives for setting up an agroforestry farm?
- What are the farmers' other sources of income next to agriculture?
- What is the knowledge of the farmers about agroforestry?
    - local norms
    - indigenous knowledge
    - technical knowledge
- What is the location of the farm?
    - What is the distance to the market?

METHODS

To answer the research questions, the two researchers conducted fieldwork in five barangays of Peñablanca that are situated inside the PPLS: Mangga, Sisim, San Roque, Bugatay and Cabasan. The research method involved was interview using a prepared questionnaire. The main target respondents were farmers that engage in agroforestry. A total of 29 respondents were interviewed, made up of farmers, People's Organization's chairmen, barangay captain, and CI staff (see Table 1). Additional information was gathered through literature review.

Table 1: Respondents per barangay and classification

	PO Chairmen	Farmers	Barangay Official	CI Staff	total
Mangga	1	9	0	( )	10
Sisim	1	5	1	( )	7
San Roque	1	4	0	( )	5
Bugatay	1 (vice)	2	0	( )	3
Cabasan	0	3	0	1	4
total:	4	23	1	1	29

(Note: PO chairmen are farmers themselves, but are counted only once as PO chairmen)

Small mango tree. (Steenhuizen)

Cuttings of kakauate (Steenhuizen)

RESULTS AND DISCUSSION

A total of 29 respondents participated in this study: 10 are from Mangga, 7 from Sisim, 5 from San Roque, 4 from Cabasan, and 3 from Bugatay as shown in Table 1.

Table 2. Distribution of respondents in five (5) barangays and membership of AF

Barangay	Mangga	Sisim	San Roque	Bugatay	Cabasan
Number of AF members	140	138	106	89	27
Number of respondents	10	7	5	4	3
Non members	0	0	2	1	1

Agroforestry Development and Practices

Most of the respondents in the study area practice agroforestry (AF) farming. Most of them participated in trainings conducted by CI to protect, manage and maintain AF farms.

For site preparation, clearing the area is one of the hardest things encountered by the farmers. The common tools used by the farmers are crowbar, bolo, and sometimes sharp and pointed wood for hole digging. In the following discussion, agroforestry will be referred to as AF for simplicity.

Cropping

The main crops of farmers which may occupy 50% - 60% of their area are Mango (Mangifera indica), Cacao (Theobroma cacao) and Maize (Zea mays). These crops are usually intercropped with Mangoes, usually within the succeeding days after planting major trees. The secondary crops are Mung beans, String beans, Kidney beans, Peanut/ground peanuts. Likewise, Soybeans are raised for household consumption. Some other farmers also plant different kinds of fruit trees surrounding their area serving as fence to protect their crops or as windbreaker.

Table 3. Crops raised in AF

Respondents	Crops
21	Mango
11	Cacao
11	Corn
5	Banana
4	Calamansi, Peanut
3	Jackfruit, Pomelo
2	Coconut, Rambutan, Lanzones, Coffee,
ALL	Different kinds of vegetables

Impacts of AF

The members of AF are obliged to abide by the rules and policies of the CI project. This means that it is prohibited for members to engage in slash-and-burn farming (kaingin), cutting trees and charcoal making (Bugatay vice PO chairman 23 January 2012). A CI staff mentioned that before the PPSRP started, charcoal making was widely undertaken, especially in Bugatay. Previously in this barangay alone, 90% of the residents were involved in charcoal making. This percentage has decreased to a current 5% (Malanos , Perss. comm.).

Image 4: Cacao fruit (Steenhuizen)

Role of Conservation International and Coop's

Conservation International (CI) provides trainings and seminars to teach the farmers how to plant tree seedlings, flower induction and fertilizer application. Most of the farmers responded that the most important knowledge for practicing agroforestry was provided by CI in these trainings. The trainings were conducted approximately once a year. Before the project, farming knowledge was mostly limited to the growing of vegetables. According to the CI staff, farmers were not able to apply diversified farming or to use the farm sustainably. In addition, it is mostly the farmers that have no knowledge on using other methods of farming that were engaged in charcoal making (24-01-2012). From the above, it is clear that education and training is of major importance for sustainable farming in Peñablanca.

CI provides the five barangay Farmers Multipurpose Cooperatives (FMCs) with seedlings, vegetable seeds and fertilizer. The People's Organization (PO) chairmen are in turn responsible to monitor the FMC and to distribute the seedlings, seeds and fertilizers to the member farmers of the cooperative. CI staff members help in planting the seedlings. Most of the respondents received a superkalan or a ricehull stove. These cooking implements are aimed at replacing conventional wood- fired stove to save firewood.

FMCs have a provision for farmers' microcredit with an interest rate of 2% per month instead of the "5/6" rate which actually is 20% interest. The FMC's funds are sustained by a member's fee paid by all members, and by the provision that 10% of the farmers' income from mangoes is put into the fund. In addition, CI provides trainings to the FMC's beneficiaries on how to apply for funding at official actors, to make sure that the FMCs will be able to access adequate funding for sustainability after the PPSRP has been terminated.

Benefits and Advantages of AF

The land in the protected area of PPLS is obviously of government property but in the project, farmers can receive land stewardship certificate for 25 years under the Protected Area Community-Based Resource Management Agreement (PACBRMA). Conditions for receiving this stewardship certificate include obligation of the farmer to improve and maintain his area.

Superkalan (Steenhuizen)

All of the respondents had official stewardship of the land in PACBRMA. PACBRMA is closely related to cooperation with the PPSRP. The land with stewardship is the same land that was already in use by the farmers before the project started. The most common advantage mentioned by farmers are getting higher income where trees provide fruits, windbreaks, shades, fuelwood and wood for domestic consumption. Another frequent answer is that trees prevent soil erosion and the number of animals increases due to available forage and vegetables for consumption.

Table 4: Advantages of AF as stated by the respondents

Advantage	No. of respondents
higher income/source of food	27
protect the environment	3
shade, windbreak	4
wood consumption	3
animal increase	2

Market and Transportation

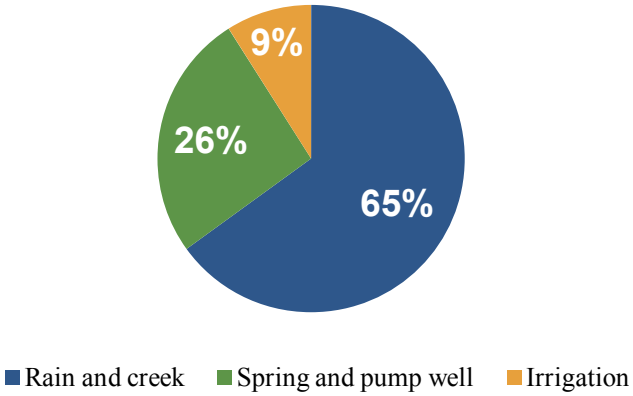
Majority of all farmers bring their harvested products for sale to Tuguegarao. There are differences however in what products are brought to Tuguegarao and what are sold locally. For example, corn is mostly brought to Tuguegarao while vegetables, in most cases, are sold locally or for own consumption (P.K.R. Nair, et al.2004). Inputs such as corn seeds, rice seeds, fertilizers and pesticides are, in all cases, bought in Tuguegarao.

The major mode of transportation is by jeep, sometimes tricycles and carabaos are used mostly in combination. Per barangay, there is a difference in the transportation fare, supposedly because of a difference in distance. Fares range from 30 pesos per sack of corn to 50 pesos per sack from farm to Tuguegarao.

Cart for crops' transportation (Steenhuizen)

It is not yet clear where the fruits will be marketed once the farmers are able to harvest fruits from the AF farms. Many of the respondents say they will sell the fruits only when they harvest many fruits otherwise, they will use these for their own consumption. The PO chairman of Sisim, Savita Villar Gallibu, said that education on fruit packaging prior to transportation is needed before harvesting of Mangos would start. CI plans to set up a system for buying the harvested Mangoes by one central buyer for all the five barangays to facilitate the trade.

Diagram 1: Water Access for crops



Water Access and Shortage

Asked how they access water for their crops, 65% of the 23 respondents are dependent on rain water and creek. They use pail and dipper for watering their crops while 26% rely from spring and pump well (using pail and dipper also) and 9% depend on communal irrigation.

Twenty-one (91%) out of the 23 of farmers have experienced drought especially during the months from March to May. Some farmers have a technique to prevent the dying of their plants (trees). They reuse PET bottles of 1.5 liter which they fill with water and hang upside down near the trees for continued watering.

Model farm of Sisim (Steenhuizen)

Awareness of Beneficial Functions of AF and Reforestation for Farm, Environment and Watershed

PO chairmen and vice-chairmen that cooperated in this research were able to describe the significance of AF for the environment in terms of prevention of soil erosion and flood relief. In addition, all of the PO chairmen said that the planting of trees in the agricultural field was beneficial to the farm in terms of risk reduction, crop protection and fencing.

Overall, farmer members who are not active in an FMC, for example chairman, stated no significant awareness of the importance of AF for the environment or watershed. CI stated that it emphasizes the role of AF for the watershed and the environment during meetings. However, it seems that their message does not get across the farmers. Therefore, more education for farmers on the contribution of AF for the watershed and the environment should be considered.

Income and Risk Perceptions

In AF, the major activities that provide income are the sale of fruits harvested from AF farms, paid labour in reforestation and the sale of seedlings to CI. Farmers are given the chance to raise tree seedlings (after training by CI) and in turn sell these seedlings to CI.

Table 5. Main and secondary sources of income and number of respondents.

	Main source	secondary livelihood
Agroforestry	14	6
Corn and/or rice culture outside AF	6	2
Livestock	2	7
Labour in Reforestation	1	1
Others	4	9

A significant part of the respondents mentioned that they have not yet harvested fruits from the trees in AF, because they only planted the seedlings in 2007 or later, and it takes, in general, five years before some tree species produce fruits. As a result, it was hard for farmers to estimate any increase in income by AF. On the other hand, none of the respondents stated any decrease in income. Majority of the farmers are convinced that AF would provide them with higher incomes once the trees produce fruits in the future. See also Table 5. If the main source of income is agroforestry, this income mainly comes from the corn culture inside the agroforestry farm.

In case of a crop failure due to, for example, drought, farmers would still be able to harvest fruits from trees and gain an income. However, it is not fully clear how farmers perceive this benefit because a large part of the respondents did not fully understand the issue that was inquired.

The threats in AF as stated by CI include the loss of farmers' investments due to grass fires and the burning of planted seedlings. From the respondents in this research, one farmer in Sisim said that a large share of her planted fruit trees were lost by burning.

Switching back or not?

The CI staff told us that convincing farmers to engage in AF is hard, mainly because of cultural reasons. Philippine farmers tend to have an attitude of 'first see and only then believe', and are reluctant to become a member. According to the PO chairman of Mangga, Eleonor Soriano, none of the AF farmers had stepped out of the PPSRP to switch back into the previous livelihood. The PO chairman of San Roque said that some farmers who were members of the FMC before, stopped maintaining their farm 'for some reasons' which he does not know. According to him, some farmers might be too busy or lazy (Mario Soriano 21-01-2012). Indeed, maintenance of the AF farm takes time and effort. One of the respondents in San Roque who was a member of the FMC before said she did not participate anymore because she is too busy in her other farm. She is a tenant of a rice field in the valley outside of the PPLS and concurrently holds a PACBRMA certificate for an upland farm for AF. Both fields are approximately one hour of walking apart.

In Mangga as well, the distance from home to the field is long for respondents living near the barangay hall in the valley, and live approximately one hour walking distance from the AF field. Some farmers hold more than one house, to have a house near the upland AF farm.

According to sir Malanos, barangay captains have much power to make farmers refrain from charcoal making.

What will happen when the project ends in June 2013? The FMCs have to be financially and organizationally sustainable by that time. It is not yet clear whether the farmer members of the FMCs will still receive trainings and free seeds from the FMCs after the end of the PPSRP. Currently, it is not yet clear whether agroforestry will be continued or abandoned by farmers, partly because it is not yet clear to farmers themselves how they can sustain their agroforestry practices. In addition, it is not yet clear how much additional time farmers have to spend in maintaining, harvesting, packaging and selling their fruits once they are able to harvest fruits.

A notable challenge in farming in Peñablanca and selling products might be transportation. A limited number of jeeps run from the five barangays to Tuguegarao City, and are often too full to gather more passengers. The roads are mostly rocky and the speed of transportation is slow.

ACKNOWLEDGEMENTS

We like to thank the following persons: The PO chairman of every barangay for their information regarding the number of members in agroforestry; Mr. Martin Telan for letting us stay at their house for two days; Ms. Maricris Pasicolan for guiding us during the interview in their place; The barangay chairman of Sisim for letting us stay and allowing us to use their kitchen utensils during our interview in their place and neighboring barangay; Sir Samuel Telan and Sir Jessie Guererro for their assistance during the fieldwork; and all the interviewed farmers for their cooperation and time and for sharing their information with us.

REFERENCES:

Conservation International and Toyota Motor Corporation, August 2009, Philippine Peñablanca Sustainable Reforestation Project (PPSRP).

P.K.R. Nair, M.R. Rao and L.E. Buck. 2004. New Vistas in Agroforestry , 'A compendium for the 1st word congress AF.

Saliling WJB et al., 2009, 'Responses of upland farmers in Northern Sierra Madre to rising fuel and fertiliser cost under climatic uncertainties' in: Masipequeña AB et al (eds) 2009, Changing Landscapes. Quezon City: CVPED pp 51-72.

APPENDICES

Questionnaire for the farms

Basic questions:
1. Position (employment, job)
2. Age
3. Education
4. Hectares of farm
5. Yield per season
6. Since when is the farm in operation?
7. What is the number of employees/people working in the AF farm?

Motivations:
8. What is the most important reason for changing the farming into agro-forestry?
    a. What are the other reasons for changing the farm into AF?
9. What are the main difficulties you face in AF?

Support and funding:
10. What is the main source of income?
11. Do you have any additional source of income except from the AF farm?
12. Is the farm being supported by an organisation? which organisation?
13. How is it funded?
    a. by whom/which organisation?
    b. by what construction?
    c. what is the amount of investment/funds?
    d. Do you think the funding is sufficient?
    e. do you think you should receive additional subsidies because of doing AF instead of conventional agriculture

Knowledge:
14. How do you know about the way of doing agro-forestry?
15. What was your prior knowledge on farming?
    a. Is there any indigenous knowledge that you apply?
    b. What are the local norms that you apply in your AF?
16. Does the farm receive any education by the supporting organisation? what training?
17. Do you think AF runs counter to your prior knowledge on farming?
18. What kind of technology(/machines) do you use in AF?
19. What kind of information do you need for AF?
20. Do you think you have access to the needed information for AF?
21. Where do you look for information?
22. Did you participate in any training for AF?
    a. If yes, do you think the training was helpful?
    b. Why? / Why not?
23. Do you work together with other farmers to gather information?
24. Do you work together with foresters in the area?

Location:

25. How is the location decided?
26. what is the framework for land use and ownership/rent?
27. How do you access water for the crops?
    a. do you ever experience drought/water shortage?
28. Where do you sell your products?
29. What is the distance from farm to market?
30. Do you think the price for selling your products is high enough to make profit?
31. Are your products in adequate demand to make a living?
32. Where do you buy the needed
    a. seeds and/or seedlings?
    b. fertilisers and/or pesticides/herbicides?
33. what is the price for buying these products?
34. How do you transport your farm products to the market?
    a. and what are the costs?

Note:
During the fieldwork, a number of questions have been deleted from the research, mainly on education and training. In addition

Table : Time Table

Day 1	**Travel to Peñablanca**
Day 2	-interviewing PO chairman and farmers in Manga
Day 3	-interviewing PO chairman and farmers in Manga - visit AF farm
Day 4	-Travel to Sisim,visit Barangay hall -interviewing PO chairman and farmers
Day 5	-interviewing PO chairman and farmers in San Roque -visit model farm in Sisim
Day 6	-interviewing farmers in Cabasan -interviewing vice PO chairman and farmers in Bugatay
Day 7	-travel to Tuguegarao -interviewing CI staff -return to the Cabagan

Safe drinking water in Tuguegarao City and San Roque

Maridel Galicia, Geraldine Palattao, Annelies van der Ploeg, Manouck Veenman

INTRODUCTION

Groundwater plays a significant role in providing freshwater needs and in promoting progress and development. Groundwater supplies drinking water for crop irrigation, industrial cooling, commercial and domestic uses. All in all, groundwater contributes about 14% of the total water resource potential of the Philippines (Espiritu 2009).

San Roque is a barangay, a village, in the municipality of Peñablanca, Cagayan Province. For this study, we focused on the use of the watershed of this area. The watershed of San Roque is not just used by this barangay itself, it is also important for the nearby city of Tuguegarao. Up the hills of San Roque are the three springs, Mangga, Dabba and Vunnung, which are connected by pipelines with Tuguegarao City.

In the uplands of Peñablanca, farming activities take place that potentially harm the forest. Slash-and-burn farming threatens the integrity of the watershed. When trees are being cut, they cannot store groundwater anymore with their roots. There is a risk that this will lead to a loss of groundwater, which will lead to scarcity of water in San Roque and Tuguegarao. With the growing population of Tuguegarao in mind, this could become a serious problem. To find a possibility to preserve the groundwater, something has to be done. If the conversion of forest into agricultural areas continues, there probably won't be enough drinking water in the future for all the residents (Dayrit 2009).

Sustainable development is important. Everyone needs drinking water every day. Springs and groundwater need to be preserved to provide drinking water for all residents presently and in the future.

RESEARCH QUESTION

How can the water supply of Tuguegarao City and San Roque be secured?

To answer this question, we focus on the following sub-questions:

- What do the residents of San Roque know about slash-and-burn farming and its consequences?
- What do the residents of Tuguegarao City know about their water supply?
- How satisfied are the residents of San Roque and Tuguegarao City with the quality and the supply of their water?
- What is being done currently to protect the watershed?
- What is the role of the Metropolitan Tuguegarao Water District (MTWD)?
- What is the role of the government in water and watershed protection and conservation?

METHODS

Interviews

We dealt with different respondents who supplemented the information and data that we needed to complete the study. Included in these interviews were some of the officers of the

MTWD, the previous and incumbent barangay captains of San Roque and several residents of San Roque and Tuguegarao City.

Observation/Fieldtrips

To be able to see the actual operations related to the supply of water for both San Roque and Tuguegarao City, we conducted several site visits. These trips included visiting the three springs found in San Roque that provide a 5% share of the total water supplied and managed by the MTWD. A fourth spring in San Roque is being developed to supply water to the residents of the barangay. We also visited the MTWD office to gather information on their activities.

Documentations

We took pictures during our fieldtrips for presentation purposes. Other documentation materials include copies of several documents that could be important for our research.

Table 1: Time schedule during the field research.

Day	Date	Activity	Location
Wednesday	January 18, 2012	Travel from Cabagan to San Roque, Peñablanca	
Thursday	January 19, 2012	am: Interview with Ms. Ninia Lumauan, AGM of MTWD pm: Interview with the randomly selected residents	San Gabriel, Tuguegarao City, Cagayan San Gabriel, Tuguegarao City,Cagayan
Friday	January 20, 2012	am: Visit to the three springs pm: Interview with San Roque Brgy. Capt. Isidro Pagalilauan	San Roque,Penablanca San Roque, Penablanca
Saturday	January 21, 2012	am: Visit to the Rabbel Spring; interview with some residents at the nearby area pm: Interview with some of the residents	San Roque, Penablanca; Zone 3 Zones 1 and 2
Sunday	January 22, 2012	am and pm: Conduct more interviews with the residents of the barangay	Zones 4, 5, 6 and 7
Monday	January 23, 2012	am: Interview with some of the Tuguegarao City residents pm: Return to Cabagan, Isabela	Barangays Tanza and Balzain of Tuguegarao City
Tuesday	January 24, 2012	Get some documents from the MTWD	San Gabriel Tuguegarao City

Figure 1: Springbox covering the Rabbel Spring, San Roque (van der Ploeg 2012)

RESULTS

San Roque Slash-and-burn San Roque is a barangay (village) of 320 households. There are irrigated ricefields in the valley and up the mountain. Farmers engage in non-irrigated upland farming.

Motivations for DENR reforestation

- *Promote forest conservation*
- *Increase public awareness of the values of forest resources*
- *Foster growth of dynamic public sector participation in the reforestation industry (Masipiqueña et al. 2009)*

The barangay captain of San Roque, Mr. Isidro Pagalilauan, started a program together with the Department of Environment and Natural Resources (DENR) to preserve the forest in the uplands. Since slash-and-burn farming is a way of providing an income for several farmers, he does not want a total ban of this. The solution is: for every tree cut, there should be three trees planted in the area. DENR provides the seedlings for this. Besides, the location of the farmland should be changed every five years, so that it can recover. Of all the trees planted, around 10% die. The 90% survival is a good result, so thinks Rey Villon, employee of the MTWD. He monitors the planted trees every two years, to know if they grow well.

Figure 2: Slash-and-burn farming in the uplands of San Roque. In the background, recovering slash-and-burn land (van der Ploeg 2012)

There seems to be a difference between the opinions of the barangay captain about agreements regarding slash-and-burn farming and what happens in reality. Two of our respondents told us that they have no time to plant trees and that they do not participate in the program. This is contrary to the information the barangay captain gave us that every upland-farmer in San Roque participates.

Although only a few of them do it themselves, all residents of San Roque we talked to are aware of slash-and-burn activities and their consequences. People know about the importance of trees to avoid soil erosion, mainly during floods. Also, fear of grassland fires that will destroy their houses is common. The fact that trees are also important for securing water supply is less mentioned. Given the fact that almost all respondents indicated that they seldom experience, if ever, scarcity of water, it seems logical that this 'natural water storage' is no hot topic for them.

Springs

In the mountains of San Roque, there lie the three springs of the MTWD: Mangga, Dabba and Vunnung. One of the residents of San Roque, a forester, who is an employee of the said office, looks after these springs. The springs were donated by the DENR to the MTWD. An outcrop of the Mangga Spring, also supervised by the forester, is used by just few residents of San Roque. In 2007, another spring was discovered. This so-called Rabbel

Tree-Planting Program in San Roque

- *Cooperation with the Department of Environment and Natural Resources (DENR)*
- *Preserving forest in the uplands*
- *Three trees planted for every tree cut*
- *Farmers move every five years*
- *DENR provides seedlings*

spring is currently developed to supply water to San Roque. At the moment, there are only six households connected to it. These residents generally mentioned poverty as the reason for not having more connections, but according to the barangay captain, it is due to lack of funds. These two reasons seem to be similar, but they mentioned these as two different causes.

When there will be enough money to go on with the construction of pipelines, the first priority is to connect all households of San Roque. If there is enough money left in the end, the barangay captain would also like to construct a purification system. With this system, the water of the spring would be cleaner than the groundwater most residents pump up from their pump well at present, according to the barangay captain. This is due to the fact that the spring water is not polluted by farm residues like pesticides while the groundwater may be.

Water use now and in the future

Almost all our respondents use a shallow well to pump up water with only few connected to the spring. Eight of the 33 respondents sometimes buy mineral water for their babies or during floods. But in general, the water from the well is used for every purpose like washing clothes, bathing, cooking and drinking. Their opinion is that the water is clean and safe, which they base on the fact that they do not get sick. Just a few respondents mentioned the metal taste of the water.

Table 2: Comparison between consumers' water sources for drinking water and their perceptions of its safety/cleanliness, San Roque

Water Sources	No. of Consumers	Perceptions	
		Safe to drink	Not safe to drink
Pumpwell	31	25	6
Spring water	7	6	1

As stated, the residents of San Roque did not mention water shortage as a problem. Actually, they did not mention so much problems regarding water at all. If there are some, these have to do with cleanliness. It is striking to note that every respondent wants to be connected to the spring if the connection will be finished but not because of its apparent cleanliness. Most of them want to be connected because it would be easier to water the plants. A 62-year old housekeeper mentioned: "I want to be connected, because it is easier, especially for my plants. But I am not sure about the funds." All respondents are willing to pay a small amount for the connection to maintain the spring, the spring boxes and the pipelines.

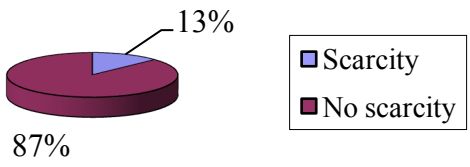


Figure 2: Percentage of respondents who had experienced scarcity of water in the last three years, San Roque

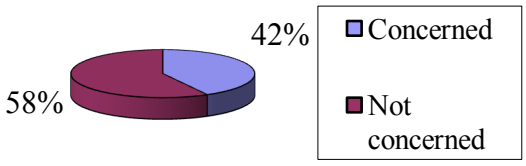


Figure 3: Percentage of respondents who are (not) concerned about water supply in the future, San Roque

As shown above, most respondents have not experienced scarcity of water in the last three years. This may be linked to the fact that most respondents do not worry about water supply in the future. Several residents said that there will be no problem once they are connected to the spring and they still have their pump well. They have a lot of confidence in the tree-planting program. As long as there will be enough tree-planting activities, there will be no problem, seems the general opinion. There was just one woman who is not that positive about the role of the DENR in this whole process: "Of course, there will be problems in the future if deforestation won't stop, for sure! No water, no life! It will stop if the attitude of people change, DENR should act in accordance with its role, but it's not happening, they're the leaders of illegal logging. It has no end, the government must have a total log ban or a strict monitoring".

Tuguegarao City

Water supply

The MTWD is the main water supplier in Tuguegarao City. Of the 33 respondents, 25 are connected.

The Metropolitan Tuguegarao Water District (MTWD)

- *Main water supplier in Tuguegarao City*
- *Owned and controlled by government*
- *Financed by sales of water*
- *Sources: 95% groundwater, 5% springs*

The MTWD uses two different water sources for its consumers: groundwater and springs. It prefers the water from the springs because it is cheaper to gather: they do not have to pump it up because of the 'natural pumping system' of the spring itself. The water flows to a purification station, where it is cleaned and directly distributed. The MTWD stated that the distributed water is safe for drinking because it checks its quality three times a day.

The consumers have a different opinion. Only ten out of 25 respondents (40%) drink the water they receive from the MTWD. Most of them do not drink it during floods because they think it is not safe. The other 60% always buy mineral water to drink. People base their opinion about the cleanliness and the safety of the water on what they see and smell and the color their clothes get after washing.

Table 3: Comparison between consumers' water sources for drinking water and their perceptions of its safety/cleanliness, Tuguegarao City

Water Sources	No. of Consumers	Perceptions	
		Safe to drink	Not Safe to drink
Pumpwell	8	4	4
MTWD	25	10	15

Awareness of problems

Although more respondents in Tuguegarao City have experienced scarcity of water during the last three years than in San Roque, they are less concerned about water supply in the future (see Figures 4 and 5). Most of our respondents are not aware of possible problems with water supply. A typical answer to the question about this came from a 29-year old cashier: "You just have to pay the Water District, then they won't cut your supply and then there will be no problem". The respondents do not know about the source of their water and about environmental problems that can harm their water supply like slash-and-burn farming. Only

one of the respondents mentioned deforestation, but he does not really know about the problem with it: “I have heard about deforestation, but I don’t think it will give problems in the future. There’s enough water”.

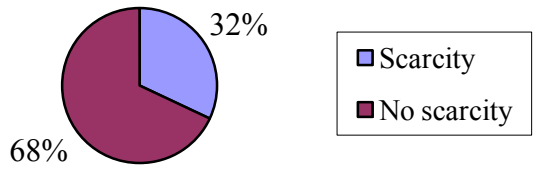


Figure 4: Percentage of respondents who had experienced scarcity of water in the last three years, Tuguegarao City

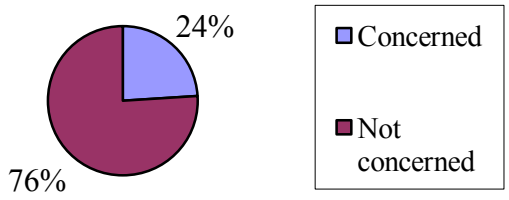


Figure 5: Percentage of respondents who are (not) concerned about water supply in the future, Tuguegarao City

As a kind of Payment for Environmental Services (PES), the MTWD started up a program in which schools and organizations can join to save the natural environment of their water sources. Students or members of organizations have to plant 10 trees each in a certain area, pointed by the MTWD. This water district also provides vehicles for transportation and seedlings. The program serves two goals because besides the planting of trees, it also raises awareness of people who join as well as the public since the participants are educational institutions.

Besides this program, the MTWD also tries to cooperate with the upland farmers in Peñablanca especially in San Roque. They give lectures to them to raise their awareness and provide seedlings for reforestation.

Figure 4: Reforestation project area in the uplands of San Roque (van der Ploeg 2012)

DISCUSSION

Slash-and-burn activities of upland farmers in San Roque harm the watershed of Peñablanca. Less trees means less roots to store groundwater. This could lead to scarcity of water that is very important for both San Roque and Tuguegarao City.

The MTWD as well as Barangay San Roque have the topic 'securing the watershed' on their agenda. They started several programs like the tree-planting program for schools and organizations. This program serves two goals: by planting of trees, the watershed will be protected which implies the security of water and at the same time, problems concerning erosions and floods will be reduced. It increases a sense of responsibility among the people who live nearby the project and use the watershed (Masipiqueña et al. 2009).

To answer our main question 'How can the water supply of Tuguegarao City and San Roque be secured?', we conducted 66 interviews. In all these interviews, we mentioned this main question in the end. Most respondents have the opinion that there would be no problem in the future. Especially the residents of Tuguegarao City do not seem to be really concerned about the watershed. The most heard answer to our main question was: "There will be no problem in the future, there will always be enough water for everybody". A reason for this can be that those respondents have no idea about the source of their water at all and, thus, are not aware of the watershed-harming activities in the watershed. Besides this, the fact that most respondents mentioned that they (almost) never experienced scarcity of water, can also be a reason for them not worry about the future. It is not a topic.

> *"We should work together, hand-in-hand. It's not just up to our employees, but we should work with the consumers, to protect the watershed" - MTWD*

In San Roque, there is a lot to do about raising awareness. A lot of people already joined the tree-planting program, but not everyone. The barangay captain thinks everybody joins, but in reality there are farmers who do not. These farmers are aware of the consequences of their slash-and-burn activities but do not have time for planting trees. In an informal conversation with an employee of the MTWD, he revealed that when the program started, there were 40 farmers in the upland, who all joined the program. Right now, there are 100 farmers in the area, a lot of them are illegally housed. This could explain the difference in the information obtained from the barangay captain and based on official records and interviews.

In San Roque, most respondents do not worry about the cleanliness of their water. The use of water they pump up from their pump well is for everything, specifically for drinking. In Tuguegarao City, there are more who are concerned about this. Although the MTWD mentioned its water is safe for drinking, almost all its consumers we spoke to do not drink it, but buy mineral water instead.

The government plays an important role in the two mentioned programs. The MTWD is a government-owned organization. In its tree-planting program, it provides joining schools and organizations with seedlings and transportation. DENR is also a governmental organization. In their companionship with San Roque, they provide the seedlings. The government thus, plays an important role in the two mentioned programs for securing the watershed.

In both programs, the focus is on raising awareness and working together with local people. Farmers and youth are important targets. They can make the difference.

Reflection

The main topic in our research proposal was about PES though in the very beginning of our research, we mentioned that there are few residents of Tuguegarao City and San Roque who know about this, or could say something about their opinion about it when we explained. For this reason, we focused more on opinions about residents' own (future) water supply and contemporary programs to protect the watershed.

Possible caveats in our study are answers at sensitive questions, for example, about practicing slash-and-burn activities and at the same time joining the tree-planting program. It could be that farmers who practice slash-and-burn but do not join the program are afraid of being completely honest.

The information we got about illegally housed farmers in the uplands was given to us on the last day of our fieldwork. Unfortunately, we did not have time to explore this topic further.

ACKNOWLEDGEMENTS

We want to thank a few people who helped us make this research possible. At first, our host, Lola Lily Adarme, who gave us a place to live and sleep and is the perfect example of hospitality. We also want to thank Barangay Captain Isidro Pagalilauan and his secretary for welcoming us in their village and for giving us useful information. We are thankful to all the respondents who were willing to be interviewed. We also express our gratitude to the employees of the Metropolitan Tuguegarao Water District for providing us with really helpful information and making time to join us in the field especially Ninia P. Lumauan, Rey Villon, Cris Decena and Vincent Soriano. Last but not least, we want to thank Sam Telan and Jessie Guerrero for their assistance when we were in the field.

REFERENCES

Dayrit, M. 2009. Agenda for Hope. Ateneo de Manila University Loyola Schools: Quezon City.

Espiritu, E.Q. 2009. Water Resources and Water Quality. In: Dayrit (Ed.). Agenda for Hope. Pp 33-63. Ateneo de Manila University Loyola Schools: Quezon City.

Masipiqueña, A.B., J. van der Ploeg and G.A. Persoon. 2009. Reforestation for a Better Future. In: Persoon, G.A., A.B Masipiqueña, J. van der Ploeg, M.A. Masipiqueña, M. van Weerd (Eds.). Crossing Boundaries. Pp 97-105. Cagayan Valley Programme on Environment and Development: Cabagan.

San Pablo

Planting rice in irrigated paddies (van Weerd 2012)

The irrigation system in San Pablo

Joeffrey Laggui and Marlies Barendrecht

INTRODUCTION

An irrigation system is a system that delivers water to an area where water is needed, but not normally present in the required amounts. Generally, it is used for agriculture and landscaping purposes (Black 2003). In the Philippines, irrigation is primarily used to increase the rice production of the farmers (David 1995). The irrigation system supplies the required amount of water, to be able to produce rice during the whole year.

Like most of the irrigation systems in the Philippines, the system in San Pablo is used to supply water for the production of rice. It is a gravity based system, which means that the water flows due to gravity and no pumps or other devices are needed. The source of its water is the Pinacanauan River. The number of farmers making use of the system is 1,447 and the total service area is 1,365 hectares. (NIA 2012, In litt.)

Location

The study was conducted in San Vicente, San Pablo, in the northern part of the province of Isabela, where the irrigation system is located.

Figure 1 : Research area

RESEARCH QUESTION

The question we are trying to answer is as follows:

What is the state of the irrigation system in San Pablo?

In order to answer this question, we tried to find the answers to the following sub-questions:

How is the irrigation system organized and what is its layout?
Are the farmers satisfied with the irrigation system?
What are the problems that the farmers encounter?
What is the impression we get, ourselves, when observing the system?

METHODS

Before we went to the field, we first asked the permission of the mayor of the municipality of San Pablo, as a standard operating procedure in doing research. For the technical aspects on how the irrigation system works, we interviewed Engr. Martinez, the president of the National Irrigation Administration's (NIA) Office of the San Pablo-Cabagan Irrigation System. In the field, we interviewed the farmers with the aid of a questionnaire (see Appendices). We conducted several interviews in two barangays of San Pablo (San Vicente and Dalena) and one barangay of Cabagan (Angancasilian). A total of 50 farmers participated in the study. The data gathering went smoothly because we used the natural setting, meaning, we approached the farmers individually in their homes and used the questionnaire in interviewing them. We did not visit places of all laterals because of the limited time. We spent six days in the field. On the first day, we were guided by the barangays officials, who led us and introduced us to the farmers and guided us to the correct house. We also did some observation of our own to elicit the desired information.

RESULTS

Layout and organization of the irrigation system

The intake of the irrigation system lies in San Vicente, in the Pinacanauan River. The water is led into the main canal that runs from San Vicente south towards Balasig. The irrigated area is divided into 11 laterals, each lateral has its own sub-canal splitting off to the main canal that can be shut off with gates. Table 1 shows an overview of the Irrigators Associations (IAs) with laterals, size of the service area and number of farmers belonging to each IA.

Table 1: Irrigators Associations and their characteristics (NIA 2012, In litt.)

Irrigators Association	Laterals	Service area (Hectares)	Number of farmers
San Vicente – Dalena (San Pablo)	A0 A1 Aextra	277.5125	288
Minanga – Bungad – Dalena (San Pablo)	B	99.9247	133
Acuanab (Cabagan)	C	330.2549	198
Sta. Cruz Lamesa Batu	D0 D1 D2	174.5435	139
Garita	E	196.9449	122
Cansan – Balasig	F	128.8189	148
Adda – Latta – Namnama	G	156.6072	61

For this research, we focused on laterals A0, A1, Aextra, B and C.

Management and maintenance

The NIA is responsible for the maintenance and management of the main canal and intake. The maintenance and management of the sub-canals is the responsibility of the IA where the lateral belongs.

Maintaining the irrigation system costs a lot of money. This money comes from the irrigation fees the farmers pay. The IAs are responsible for the collection of the fee and then hand the collected money to the NIA. From every 100 pesos collected, the NIA will keep 65 pesos and return 35 pesos to the IA. However, not all farmers are paying their fees and when the collected money is less than 100 pesos, the NIA still gets 65 pesos and the IA gets only what is left.

Layout

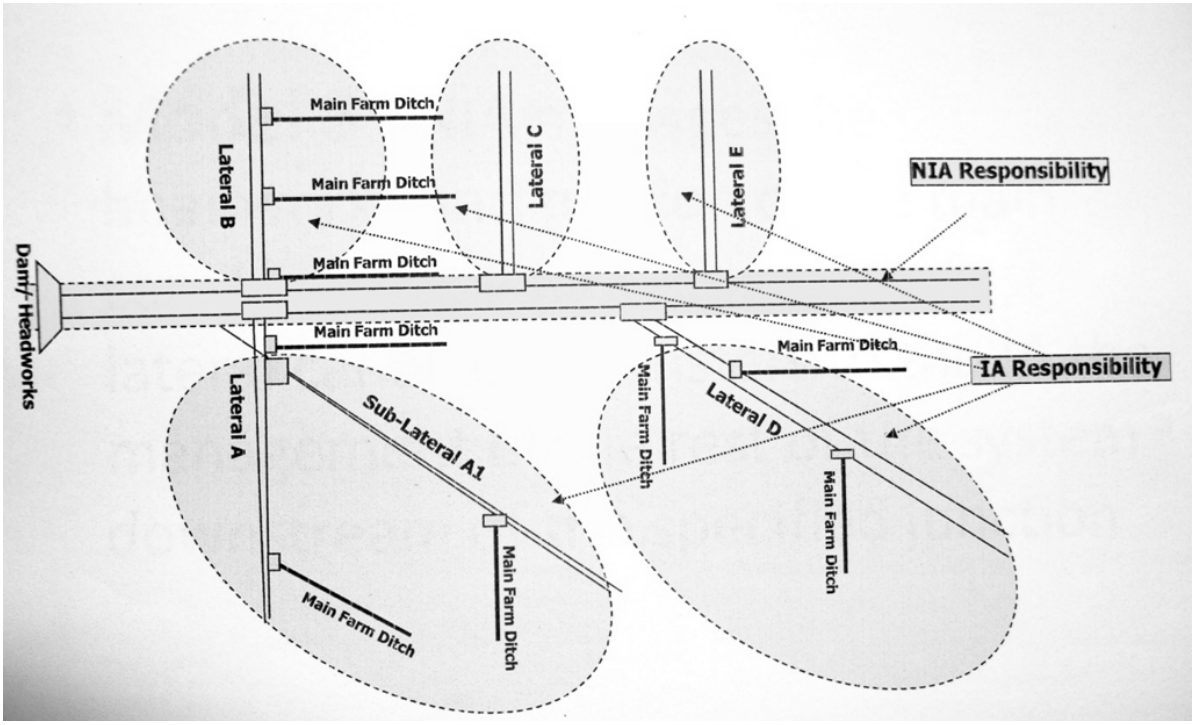


Figure 2 : Layout of the irrigation system (NIA 2012, In litt.)

Satisfaction of the farmers

The biggest problem the farmers encounter is scarcity of water because of drought. Since this problem is not influenced by the state of the irrigation system, we did not acknowledge it as a problem in this research report. All farmers that complained solely about drought are taken into account as satisfied with the irrigation system.

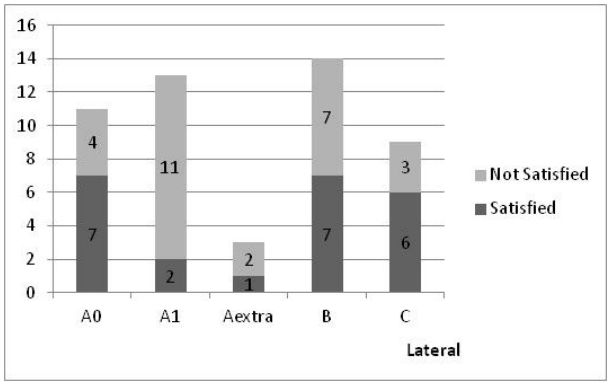


Figure 3: Number of satisfied and unsatisfied farmers per lateral.

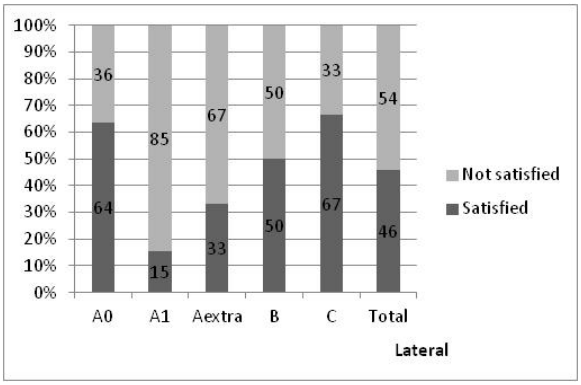


Figure 4: Percentages of satisfied and unsatisfied farmers per lateral.

Figure 4 shows that taking all laterals into account, the satisfaction is not very high. Only 46% of the farmers we interviewed are satisfied with the irrigation system. Furthermore, as said before, the fact that a farmer is satisfied does not automatically mean that he does not have any problem. All farmers have encountered problems because of drought.

Looking at the satisfaction per lateral, we can see that the differences between laterals are very big. The satisfaction in lateral A1 is very low, whereas the farmers in laterals A0 and C, are quite satisfied with the system.

Problems of the farmers

Most farmers did not hesitate in telling us their problems. Some of them even brought us to the place where the canal was broken or where landslides had occurred. From the interviews we conducted, we were able to obtain the following list of problems:

1 – The canal (lining) is broken
2 – The fields are too far away from the canal
3 – Problems with erosion/landslide besides/in the canal
4 – The water is not equally distributed among the farmers
5 – The NIA is not following the rotation schedule
6 – The NIA should not use a rotation system
7 – The road beside the canal is broken
8 – Farmers near the source of the water should be prioritized
9 – Too much water on field/no drainage system
10 – Sedimentation in the canal
11 – Other people are stealing water
12 – The repairing of the canal takes too long
13 – The intake of the irrigation system should be cleaned more often

Not all problems are caused by a bad state of the system, some problems arise because of the way the NIA manages the water supply and irrigation system.

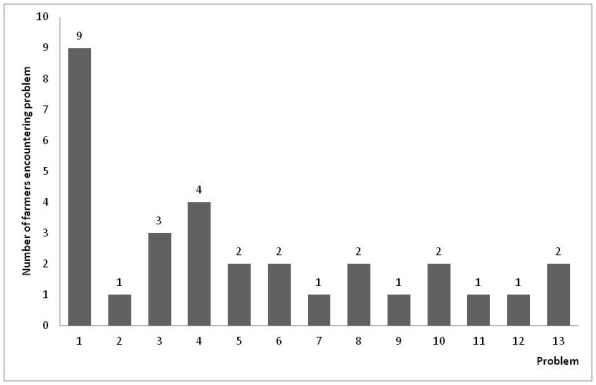


Figure 5: The total number of times each problem is encountered

Table 2: Occurrence of problems in each lateral

	Lateral					
	A0	A1	Aextra	B	C	Total
The canal (lining) is broken	3	2		2	2	9
The fields are too far away from the canal	1					1
Problems with erosion/landslide beside/in the canal		2		1		3
The water is not equally distributed among the farmers		4				4
The NIA is not following the rotation schedule		2				2
The NIA should not use a rotation system				2		2
The road beside the canal is broken		1				1
Farmers near the source of the water should be prioritized		2				2
Too much water on field/no drainage system		1				1
Sedimentation in the canal		1	1			2
Other people are stealing water			1			1
The repairing of the canal takes too long					1	1
The intake of the irrigation system should be cleaned more often				2		2
No problem	7	2	1	8	6	24

From Table 2, we can conclude that problems with the lining of the canal occur in each lateral. This can have several causes: it could be that the maintenance is really bad, but another possible explanation is that the material might not be that fit for this purpose. Lateral A1 where the farmers are the least satisfied, not only has the most problems in number but also has the most variation in the occurring problems. Laterals A0 and C where the farmers are quite satisfied have the least variation in their problems.

Our own impression

The irrigation system does not look very well-maintained. We were able to see most of the technical problems the farmers told us about, for ourselves. Besides that, there is a lot of

rubbish floating around the canal, some structures are broken and on the brink of collapsing and there are a lot of carabaos taking a bath in the canals.

Problems the farmers told us about

Figure 6: Broken canal lining

Figure 7: Broken canal

Figure 8: Landslides beside/in the canal

Figure 9: Landslides beside/in the canal

Figure 10: Rubbish in front of the intake

Figure 11: Sedimentation in the canal

It is clear that the farmers are not exaggerating about their problems. The canal is indeed broken in many places, there is a lot of sedimentation, landslides are obstructing the canals and the intake has a lot of rubbish in front of it.

Problems we observed ourselves

Figure 12: Rubbish in the canal

Figure 13: Rubbish in the canal

Figure 14: Broken structure

Figure 15: Broken structure

Rehabilitation of the inlet structure

The day we arrived in the field, only one of the gates of the intake was open. There was a lot of rubbish floating in front of the gate and the height of the water in front of the intake was very low, due to sedimentation. The second day, the NIA dredged the river, put up a small dam and cleaned away the rubbish. After that, they opened both gates and the water level in the canal became higher. Farmers who had been complaining about not getting enough water the day before, were supplied with sufficient water.

Before the rehabilitation of the intake

Figure 16: Intake

After the rehabilitation of the intake

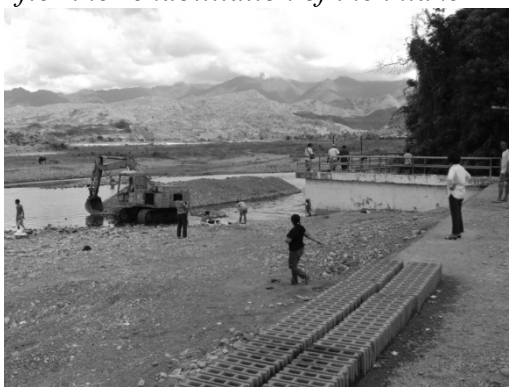


Figure 17: Intake with small dam

Figure 18: Intake, one gate open

Figure 19: Intake, two gates open

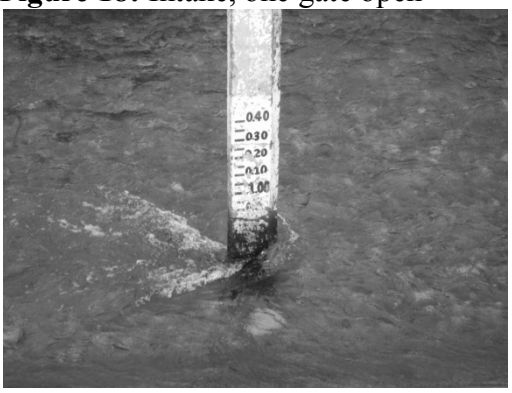


Figure 20: Water level 40 cm

Figure 21: Water level 90 cm

The meeting of the NIA with the farmers

We were present at a meeting of the NIA and the farmers in Dalena. In this meeting, the NIA and IAs presented to the farmers the amount of money they had collected the past year as fees, and what was done with the money. They told the farmers nothing about the rehabilitation and repair of the canals and structures that they are planning to do. After the presentations, they asked the farmers if they have any question or problem. The farmers did not ask the NIA any question nor did they complain about their problems. It seems as if the NIA is not informing the farmers properly, and the other way around, that the farmers are not telling the NIA their problems.

DISCUSSION

Generally speaking, the farmers are not that satisfied with the system. More than half of the farmers are having problems, other than those caused by drought. A lot of these problems are caused by the bad state of the irrigation system. Our own observations, too, show that there is a lot amiss with the state of the irrigation system.

We can conclude that the irrigation system is not in a very good state. The state of the main canal is better than that of the side canals, but overall, the state of the system is quite bad.

Some rehabilitation is done in the main canal, but no maintenance work is being done at all in the side canals. The explanation for the differences in maintenance between the main canal and the side canals, could be the way the money is divided between the NIA and the IA. If farmers do not pay their fees, the NIA still gets enough money and therefore, is able to pay for the rehabilitation of the inlet and main canal whereas the IAs do not get enough money to repair the side canals.

It is remarkable that there is a difference in the satisfaction of the farmers between laterals. Laterals A0 and B are having far less problems than lateral A1. This difference cannot be ascribed to the fact that there are different IAs who are responsible for these laterals because laterals A0 and A1 belong to one and the same IA. There seems to be no clear explanation for this difference in satisfaction and so it would be interesting to conduct further research to find out what the reason could be.

Another point that stands out is the fact that the farmers do not know anything about the plans of the NIA. They complained about problems that were solved the next day because the NIA rehabilitated the inlet structure. Apparently, the NIA does not tell the farmers about its plans. The other way around, the farmers, do not tell the NIA about their problems. Perhaps a better communication could solve a lot of the problems. We think this should be looked into, as well.

ACKNOWLEDGEMENTS

We would like to give our thanks to everybody for helping us during the conduct of our research: Mayor Antonio Miro of San Pablo for giving us full support, protection and treating us like very special visitors during the conduct of the study; Aunty Aphie for accommodating us in her house and treat us as members of the family; Bro. Edwin for washing all of Jeff's clothes during the conduct of the study; Engr. Martinez of San Pablo-Cabagan Irrigation System for the technical support during the conduct of the study; Barangay Captain Soriano of San Vicente for the hospitality and support; Sir Andy Macapallag for the courage and support; and Lastly, to all the farmers who were willing to give some of their time and answer our questions.

REFERENCES

Wisegeek. 2012. Black, K. and B. Harries. What is an irrigation system? www.wisegeek.com. Downloaded on January 15 2012.

David, C.C. October 1995. Philippine Irrigation Development: Overview, Determinants and Policy Issues

Martinez. 2012. In litt. Engineer of National Irrigation Administration, January 24 2012

APPENDICES

Questionnaire farmers

General information
Name
Age
Education
Position

Questions regarding the irrigation system
What is the size of your fields?
What lateral are your fields in?
Are you satisfied with the irrigation system? Why (not)?
Do you encounter any problems? What are these problems?
Do you have any recommendations to improve the irrigation system?

Difficulties with regard to Water Distribution in San Vicente and Dalena, San Pablo: Conflicts and conflict management in irrigation

Sarah Jane Pagallamman and Maya Velis

INTRODUCTION

San Pablo is an agricultural area with most of the inhabitants engaged mainly in farming. Rice and corn are the main crops grown by the farmers. Farmers artificially applicate water to their land by means of irrigation.

General problem – Irrigation in relation to water scarcity

Irrigation should be studied in relation to drainage - which is the natural or artificial removal of surface and sub-surface water from a given area. As long as water is sufficiently available, the demand of the total so-called service area can be accommodated. Even during the rainy months when lowland crops are grown, however, water supply from either the reservoir or rainfall might become scarce. In fact, irrigation is globally confronted more and more with competition for water resources.

A water distribution plan for irrigation is a key consideration in efficient operation of small water system responds to the irrigation water-needs in relation to the available water supply - either from rainfall or impounded water. The development of a water distribution plan depends on the cropping calendar and the cropping pattern in the service area (Irrigation Water Management Manual for Smallholders Irrigation System 2005, p. 17).

Specific problem – Water distribution and conflict management in San Pablo

A conflict is a disagreement between two or more individuals or groups, arising from the fact that they must share scarce resources or work activities and/or from the fact that they have different statuses, goals, values, or perceptions (Schmidt and Kochan 1972). Farming in San Pablo is a conflict-prone practice, especially during dry season, because water is a scarce resource then.

Structure of the report

First, we will set forth how national irrigation systems are managed in the Philippines. Then we will describe how water is distributed by means of a rotation system. Consequently, the term irrigation service fee will be introduced. Finally, all of this will be integrated in an analysis of conflicts and conflict management in San Pablo. The results will be interpreted within the theoretical framework of both the political concept of decentralization and Ostrom's "Governing the Commons".

The concept of decentralization, and more in particular devolution, can help to historically explain the *status quo* of the irrigation system in San Pablo. Decentralization is the process in which governance is dispersed closer to the people.

Ostrom has argued that communal ownership is possible, under certain conditions. The irrigation system in San Pablo is, similar to Ostrom's examples, dependent on uncertain and complex factors (*i.e.* erratic rainfall). The population, on the other hand, is quite stable. Individuals try to maintain their reputations as reliable members of the community, because there is strong interdependence on many fronts (Ostrom 1990, p. 88). Therefore, it would be interesting to assess the irrigation system in San Pablo, following Ostrom's speculative design principles.

RESEARCH QUESTION

What are the difficulties with regard to water distribution in San Vicente and Dalena, San Pablo - particularly concerning conflicts and conflict management in irrigation?

METHODS

Prior to the field days, various questionnaires (Appendix 4) were designed for the actors involved in the information gathering. To obtain an overview of the whole irrigation system, a visit to the National Irrigation Administration (NIA) at Tumauini was conducted, to request for relevant documents. There were also a visit on the fields irrigated by NIA, as well as the intake and canals. Furthermore the researchers attended the general assembly of the farmers whose farms are irrigated by NIA. To gain the insights of the costumers of NIA, farmers from two barangays namely San Vicente and Dalena were interviewed, and also some officers of Irrigators Association. Interviewing was limited to farmers who were connected to the irrigation system. There were changes in the questionnaires for the farmers because of the reluctance of some farmers to answer some of the questions, and also because of the rise of more interesting topics as the interviewing progressed. Pictures were also taken for the documentation. The gathered data were analysed by scrutinizing the answers of the respondents and information given by NIA. In Appendix 1, a scheme can be found of the activities that were done during the field days.

Table 1: Breakdown of Respondents

Respondents	San Vicente	Dalena
Farmers	19	9
IA Official	1	1
Total	20	10

RESULTS

Management of irrigation systems in the Philippines

The National Irrigation Administration (*NIA*) is a government owned and operated corporation, which is concerned with irrigation systems in the Philippines. The regional NIA office of the irrigation system of San Pablo is located at Cauayan City, Isabela and has a sub-office at Garita, Cabagan. National Irrigation Systems (*NIS's*) in the Philippines was used to be exclusively operated by the National Irrigation Administration Nowadays, NIS's are operated and maintained jointly with Irrigators Associations (*IA's*).

The Irrigation Management Transfer (*IMT*) refers to the processes involved in the takeover by the IA's of the management, operation and maintenance of the national irrigation systems (Art. A. Irrigation Management Transfer Contract jo. Attachment 2-1 Definition of Terms). It is the policy of the NIA '*to pursue improved performance and attain financial sustainability in the operation and maintenance of the National Irrigation Systems through the transfer of NIS management, partially or fully, to duly organized irrigators associations*' (NIA's IMT Policy Statement).

The IMT model applied in San Pablo is Model 2 – in which the NIA manages the main system, from the headwork to the main canal up to the head gates of lateral canals and transfers to the IA the management of the laterals, sub-laterals, and terminal facilities (Art. B. Irrigation Management Transfer Contract).

Rotation system in San Pablo

The San Pablo-Cabagan Irrigation System (SPCIS) is located at the town of San Pablo in the Province of Isabela. It has a designed service area of 1365 hectares but has only 810 hectares actual irrigated area on wet season and 997 hectares on dry season. The system serves a total of 1089 farmers. Moreover, the cover of this study is limited only to Brgys. San Vicente and Dalena, which have a total service area of 277.51 has with 288 farmers being served.
The water is derived from the Pinacanauan River. The intake (run-of-the-river type) has two gates and is located at Brgy. San Vicente, San Pablo, Isabela which is four kilometres away from the town of San Pablo and six kilometres away from the town of Cabagan. The intake has two gates in order to determine the amount of water flowing into the main canal. Seven lateral canals are connected to the main canal. The lateral canals lead to supplementary ditches. These ditches are connected to all farms through turn-outs. The IAs are authorized to manage the water distribution by opening respectively closing the turn-outs.

The cropping calendar and pattern can be found in Appendix 2. During the periods of December-April and July-December for dry season and wet season respectively, a water schedule is in force. Based on this, farmers are entitled to use as much water as they need during periods of five days of which the dates depend on the lateral in which they operate.

Even though this 'rotation system' was designed for the year-round cropping system, farmers state that it is used in dry season only.

The Irrigation Service Fee

As payment for the services rendered in the delivery of water, an irrigation service fee (*ISF*) is charged by NIA from the beneficiaries. The NIA prepares the bill of the IA based on the submitted List of Irrigated and Planted Area (*LIPA*), and the IA prepares bills for individual farmers (Attachment 2-2 IMT Contract, Technical and Financial Arrangement for Model 2). An IA officer will then collect the fees. For instance, Rodolfo Galicia (president of the board of the IA of cluster A) collects the payment from lateral A.

The ISF is computed by multiplying the surface area of the agricultural land with the Gross Selling Price (*GSP*). Most of the interviewed farmers do not know how to compute the ISF, even though the computation is explicitly depicted on the receipt. Farmers who are in some way or another related to the management of the irrigation system, however, do know how the fee is determined, for example former collectors.

According to the transfer strategy for the compensation or sharing, the NIA and IA sharing computation of 65%-35% is based on the actual benefited area. The IA share shall be limited to the collections over and above the NIA share (Attachment 2-3, IMT contract), which is an incentive to the IAs to maximize the ISF collection efficiency rate.

All of the respondents claim that they actually pay the fee. Some of them even mentioned that they are willing to borrow money in order to enable themselves to pay. Many farmers express their fear of the ''back account''. Other reasons for paying the fee are the recognition of the importance of paying and the fear that the NIA might close the gate. It is, however, highly unlikely that the NIA will cut off the water due to reluctance to pay, as long as the other farmers in de service area do still pay the fee (Simon 2012, Pers. Comm.)

According to some of the farmers, here are discounts in case of low harvest due to typhoon (if the harvest is less than 50% of the average harvest). Most farmers claim that there are no discounts, even if they harvested below 50% of the average harvest. But according to NIA, there is a 40-sack policy on discount or exemption in paying, which states that if the harvest of a farmer is less than 40 sacks per hectare, then he is entitled to the exemption in paying.

Conflicts with regard to water distribution (frequency and conflict management)

Problems usually occur during dry season. Most frequently, conflicts arise among members within an IA and sometimes among members of two different IAs.

An exhaustive enumeration was used in order to define 'conflicts' in this survey: unauthorized checking of water on a lateral which results to lessening of the downstream flow; closing someone else's outlet without authorization; taking water out of turn (as when farmers in an upstream sector continue to take water when they are supposed to let it pass on for the use of downstream sectors); refusing to participate in the maintenance of the main and lateral channel, reluctance to pay ISF, and verbal or physical violence between individuals or threatening with physical violence.

When farmers are speaking of “stealing”, they refer to unauthorized opening and closing of water entry points, which is done by closing one’s outlet (affecting farmers of the same lateral) and opening of gate of the lateral not in the schedule and closing the gate of the lateral in the schedule (affecting farmers of different laterals). One of the farmers who were interviewed, appeared to be a stealer himself. He declared that he used to stay awake at night, guard the gate that he opened so that he would receive water, and he would not return home before the sun was about to rise. Farmers declare that they are aware of the stealing and sometimes they also know the identity of the stealers, but they are usually not willing to address the issue of stealing because they are afraid to be involved in conflicts which might arise if they would do so. Farmers claim that IAs and the NIA are well aware of the so-called stealers, but that they do not take any action against them, for similar reasons. In fact, a ISF collector stated that the NIA had warned the IA not to quarrel with the stealers, otherwise someone might be killed by the farmers.

One of the questions in the questionnaire concerned the notion of change with regard to certain events since the introduction of the rotation system. Many farmers mention a rise in ISF. Some regret the abolishment of the possibility to pay the fee in kind, because in case of disappointing harvest, they have difficulties with paying the fee in cash. With regard to the frequency of conflicts, some farmers mention that the number of violent conflicts has decreased in the past few years. They attribute this to the appointment of a new NIA officer in 2007, the change in Barangay Captain or the gradual recognition of the importance of sharing water. Sir Martinezs, the head of the local NIA office, had declared that the rotation system was introduced when he took office in 2007. However, none of the interviewed farmers remembers exactly when the rotation system was introduced. This might be an indication that the legal basis of the rotation system possibly already existed, whereas the implementation of the rotation system has gradually been strengthened in the past few years.

Farmers in San Vicente claim that there had been no violent conflicts in their barangay for many years, but only verbal conflicts. According to some of them, these only occur in Dalena (a nearby barangay) and Flaviano. According to farmers from Dalena, however, there were no violent conflicts happening in their place, but only in San Vicente.According to the farmers, violent conflicts are resolved by the Barangay Captain. Other conflicts, especially verbal ones, are resolved by the farmers themselves. NIA or IA had never been involved.

DISCUSSION

Some elements of the management of the irrigation system in San Pablo could probably be understood best in the context of decentralization. The purpose of decentralization is to increase participation of the citizens in government affairs and to give the local governments and the communities a more active role in the economic, social and political development.
The objectives of the IMT, for example, are to organize functional and self-reliant IAs, to improve performance of the NISs in terms of a profitable agricultural production and sustainability and financial viability of the IAs and the O&M of NISs. Performance indicators are: a) more equitable water distribution, b) better timely and reliable water deliveries, c) higher irrigated/service area ratio, and d) higher ISF collection efficiency (NIA's IMT Policy Statement). The IMT, for that matter, is a manifestation of devolution.

Devolution is a form of decentralization in which powers are statutory granted from the central government of a sovereign state to government at a subnational level. Devolved powers of the subnational authority may temporary and ultimately reside in central

government, thus the state remains, formally, unitary. At the subnational level in the Philippines, local government units (*LGUs*) have certain distinctive characteristics. Firstly, they are autonomous, independent and clearly perceived as a separate level of government over which central authorities exercise little or no direct control. Secondly, LGUs have clear and legally recognized geographical boundaries within which they exercise authority and perform public functions. Finally, LGUs have corporate status and possess the power to secure resources to perform the function. (Martinez 2012, Pers. Comm.) Devolution could be understood as a reverse reaction to more than twenty years of dictatorship, which came to an end in 1986. There are some downsides to devolution, such as the dependency of the efficiency of local governance on the capacities of, for example, Barangay Captains (Van Weerd 2012, Pers. Comm.). Therefore, governance on a local level probably is not always equally effective.

On the other hand, Ostrom has described some cases in which governance of common goods on a community level has been successful. In the cases which her research was based on, restrictive rules had been established by the appropriators to constrain appropriation activities and mandate provisioning activities. Ostrom has noted how remarkably high the levels of conformance to the rules are - even though thousands of opportunities have arisen in which large benefits could have been reaped by breaking the rules, while the expected sanctions were comparatively low. In the following paragraph, a selection of the problems that we determined will be highlighted, in connection to certain (supposedly) essential elements or conditions that contribute to sustaining communal property and gaining the compliance of generation after generation of appropriators to the rules in use (Ostrom 1990, p. 90).

With regard to *collective-choice arrangements* (Ostrom 1990, p. 93), one ought to note that participation of farmers is very low. At the General Assembly which the researchers attended, 80 heads were counted, whereas 288 to the particular IA affiliated farmers should be operating in San Pablo (Table 3 Appendix). At the end of the meeting, farmers would have the possibility to ask questions. None of the farmers actually asked any questions. We also noted that farmers generally do not have the tendency to start petitions or to take legal action against each other. In relation to participation, this could be a problem of *commitment*. Most of the farmers do not know what their rights are, especially when it comes to exemptions. Consequently, they do not enforce their rights. In practise, this could mean that a farmer pays his fee even when the legal basis is non-existent. The same applies to knowledge of their obligations and punishment in case of non-conform behavior. Farmers often are illiterate, so perhaps they deserve to be informed better about their rights and obligations. Ostrom argues that commitment and monitoring are strategically linked, because one should not talk about a rule unless most people whose strategies are affected by it know of its existence and expect others to monitor behavior and to sanction nonconformance.

With regard to *monitoring* (Ostrom 1990, p. 94), we noticed a lack of appointed monitors who actively audit the system's conditions. Guards do not necessarily have to be 'external' agents – appropriators themselves may play a major role in monitoring each other's activities, thereby producing private benefits for themselves as well as joint benefits for others. The farmers themselves, however, are not able to fulfil the task of monitoring, because of their fear to be involved in conflicts which might harm themselves or their family. In other words, under current circumstances, farmers will not undertake mutual monitoring and enforcement because such actions involve relatively high personal costs.

Another aspect of systems in which common resources are successfully governed, consists of *graduated sanctions* (Ostrom 1990, p. 94). One of the obligations of the IA's is to formulate and enforce policies, rules and regulations on operations including appropriate sanctions for violators (Irrigation Management Transfer Contract). Unfortunately, we have not been provided with penalty policies. There probably is a well-designed policy, but we assume that this policy is not well-implemented, since the farmers couldn't tell us anything about it.
However, our research results do not allow for general conclusions. In this report, main issues and concerns have been identified in an inductive and somewhat intuitive manner within a theoretical framework, but it would be interesting to quantify these issues as well. Further research is therefore required in order to make a quantitative analysis of the occurrence of the various types of conflicts. Since we only interviewed farmers in upstream barangays, we would recommend that future research would incorporate the effect of upstream farmers' taking water out of turn on the water supply for downstream farmers.

ACKNOWLEDGEMENTS

This research would not have been possible without the contribution and participation of many people and institutions, who in one way or another, supported us to fulfil this study. Therefore, we would like to express our heartfelt gratitude for the following people: Mr. Samuel R. Simon, a graduate student in Agricultural Engineering, for helping us during the preparation of the proposal of this research. Hon. Antonio Miro, Municipal Mayor of San Pablo for the assistance and hospitality to the group. Mrs. Lenlen and her husband, executive secretary of the Mayor for showing us their concern for our safety in the locality. To SPO4 Soriano, SPO4 Gumaru, and SPO1 Mallillin, for escorting and securing our safety in the village where we stayed. To the officials of the Barangay San Vicente for the warm welcome and accommodation in their place. To Mr and Mrs Policarpia Padron and Family, for accepting and hosting us in their home. To the NIA, for granting our request for the several relevant documents needed for this study. To Sir Dominic G. Rodriguez, for the encouragement and advice. To the farmers of San Vicente and Dalena for cooperating with us as we did the interviewing.

REFERENCES

Irrigation Water Management Manual for Smallholders Irrigation System. 2005.

Ostrom, E. 1990. Governing the Commons. Cambridge University Press.

Schmidt, S. M., and T. A. Kochan. 1972. Conflict: Toward conceptual clarity. Administrative Science Quarterly 17.

NIA documents: Irrigation Management Transfer Contract by and between the National Irrigation Administration and the San Vicente-Dalena Narang-ay Irrigator's Associaiton, Inc.
Overview of the Irrigation System, pp.1
PIDP IMT status, pp.3

Martinezs, G. C. 2012, Pers. Comm. Head Isabela Clustered NISOs. Garita, Cabagan, Isabela, 18 Januari 2012.

Van Weerd, M. 2012. Director Mabuwaya Foundation. Cabagan, Isabela, 25 Januari 2012.

APPENDICES

Appendix 1: Scheme of activities

Date	Day	Activities taken	Location
January 18	Wednesday	AM: Preparation for the field PM: Visit to NIA Courtesy call at Local Government Unit of San Pablo and Brgy. Officials of the research site	EIC Tumauini Office of the Municipal Mayor Brgy. San Vicente
19	Thursday	AM: Visit irrigated farms, intake, and canals PM: Interview respondents	San Vicente
20	Friday	Interview respondents	San Vicente
21	Saturday	AM: Attend farmers' general assembly with IA's and NIA PM: Witness backhoeing at the intake	Dalena San Vicente
22	Sunday	Interview respondents	Dalena
23	Monday	AM: Interview respondents PM: Travel back to Cabagan	San Vicente
24	Tuesday	Return visit to NIA	Tumauini

Appendix 2: Cropping calendar and pattern

Wet Crop	August			September			October			November			December		
Dry Crop	December			January			February			March			April		
	10	20	30	10	20	30	10	20	30	10	20	30	10	20	30
	Land soaking Land preparation Transplantation			Normal irrigation period					Terminal drainage				Harvesting and ISF Collection		

(Based on NIA documents.)

Appendix 3: List of Irrigators Associations/Federation San Pablo-Cabagan Irrigation System (SPCIS)

No.	Name of Federation of Irrigators Associations, Irrigators Association	FIA/IA President Name	IA Service Area in Hectares	Total Farmers
	San Pablo-Cabagan Irrigation System´ Federation of Irrigators´ Associations	Gina Gammaru	1,364.6100	1089
1	San Vicente-Dalena Narang-ay IA	Rodolfo Galicia	277.5125	288
2	Minanga-Bungad-Dalena IA	Gina Gammaru	99.9247	133
3	ACUANAB IA	Arnel Manangan	330.2549	198
4	Sta. Cruz Lamesa Batu IA	Dennis Ralph Binag	174.5435	139
5	Garita IA	Domingo Paddanan	196.9449	122
6	Cansan-Balasig IA	Panchito Gumaru	128.8189	148
7	Adda-Latta-Namnama IA	Manolo Magundayao	156.6072	61
	Total W/O Contract			
Total			1,365	1,089

Appendix 4: Questionnaires

Farmers questionnaire: 1st set

Name:
Crops grown:
Lateral:
Membership in an organization:

I. Irrigation Service Fee (ISF)
Determination - Do you know how to compute it? How much do you pay? Has the charged amount changed over time?
Collection - Who collects it? How often is it collected?
Payment - Are there farmers who are reluctant to pay? - Do you yourself pay? - Do you always have to pay? What about in case of typhoons? Do you know where do your payments go / how is it managed?
Modality of Payment - In cash or in kind? Where do you think do the fees go?

II. Type of Irrigation System
Introduction of the rotation system - When was it introduced?
Assessing the introduction - Have you observed any changes since the introduction [in terms of (violent) conflicts, stealing, payment]?

III. Conflict Management in case of Water Scarcity
Occurrence of conflicts – have there been conflicts (in the past) related to water scarcity?Among farmers? Farmers – NIA? Farmers – IA?

Frequency of violence - Have there been any violent conflicts? If so, how many/how often?
Resolvement - How have these conflicts been resolved over time? Was Irrigators Association (IA) / National Irrigators Administration (NIA) involved in resolving?

Farmers questionnaire: 2nd set

How often do conflicts ccur? Unauthorized checking of water? Closing someone else's outlet without authorization? Taking water out of turn? Verbal or physical violence between individuals/threatening with physical violence?
Who resolves conflicts?
How do you participate in the management of the system?

Malasi Lakes and Magat Dam

Malasi Lake in Cabagan (van Weerd 2012)

A survey of the current status of the Philippine Duck *Anas luzonica* in the Malasi lake area, Cagayan Valley

Jhema Dalupan and Noortje Grijseels

INTRODUCTION

Wetlands in the Philippines are important ecosystems that attribute to the wealth that sustains life and means of livelihood of a large part of the Philippine population. Yet, wetlands are among the most threatened ecosystems in the Philippines (DENR and UNEP 1997). Many water bird species are harboured by these important ecosystems. As a result of the negative impacts on wetlands populations of several water bird species are declining.

Among those bird species is the Philippine duck *Anas luzonica*, an endemic species of which the total population size is estimated at only 2,5 – 10 thousand individuals. Since additionally the population trend is decreasing, the species has been listed as 'vulnerable' in the IUCN Red List. At least 13 percent of the total population was harboured by Malasi lakes in 2001 (Van Weerd and Van der Ploeg 2004), which qualifies the Malasi lakes as Ramsar (Convention on Wetland conservation) site.

Since 1994 the Philippines has been a contracting party of the Ramsar convention and is thereby obligated to conserve its wetland areas of international importance. The Malasi lakes and its water birds have been protected by the local governance for a few years now. Hunting and collecting of eggs is banned in and around the lake and agriculture is limited around the lakes (Van Weerd and Van der Ploeg 2004). Van Weerd and Van der Ploeg (2004) also stated that the local government of Cabagan indicates that locals will contribute significantly to the conservation of threatened species.

However, to identify this local contribution to conservation and to know whether the laws on hunting are enforced, a continuous survey of the Malasi lakes is needed. Over the past few years (from 2002 to 2006) a series of surveys has been published by different authors. We compared these data to our own findings, for which we counted the ducks in Malasi lakes several times. In addition, we interviewed several officials and the local residents of the barangay San Antonio, where the lakes are situated. These were used to get an idea of the actual state of protection in the lakes.

RESEARCH QUESTION

What is the current status on the conservation of the Philippine Duck *Anas luzonica* in the Malasi lake area, Cagayan Valley?

- How many duck species and how many individual ducks per species currently reside in the Malasi lake area?
- What are the habitat characteristics in the Malasi lake area? What is the land use around Malasi lakes and what vegetation types are found there?
- What are the threats to the Philippine Duck in this area?
- What are the rules and regulations in the Malasi lake sanctuary and how effective are these policies?
- What are the perspectives of the different actors on the conservation of the Philippine Duck?

METHODS

We conducted our research in the barangay of San Antonio, Isabela, where the Malasi lake sanctuary is situated.

To answer the first three sub-questions we used four days to make observations around the Malasi lakes (for a map of the area, see figure 3). We systematically counted all duck species and population sizes using a telescope with tripod. Ducks swimming in the lake could be counted without trouble; counting the ducks hiding in the vegetation was more difficult. Since the detectibility strongly varied, we used the maximum count as population size for each species. To determine different species we used Kennedy 2000.

To answer the last two sub-questions we conducted semi-structured interviews with different actors. To get an idea of the rules and regulations of the Malasi lake sanctuary, the view and knowledge of the government on the effectiveness of these regulations and the future plans with this sanctuary, we interviewed several governmental organizations. We gained information at the Department of Environment and Natural Resources (DENR): we interviewed both the Provincial Environment and Natural Resources Officer (PENRO) and the Community Environment and Natural Resources Officer (CENRO). We also interviewed a respondent of the Local Government Unit (LGU). To find out whether the local residents were aware of the conservation program and rules and regulations in the Malasi lake sanctuary, we interviewed both the barangay captain and one of his councillors and 25 local residents.

Additionally, we tried to interview someone at the Department of Tourism (DOT), but this interview was not completed, since they did not know the Malasi lake area yet. Given that the DOT has a general program on water birds (Van Weerd 2012, Pers. Comm.) it could be useful for them to explore the possibilities of this area.

RESULTS

Habitat characteristics of the Malasi lake area

The Malasi lakes are two natural lakes situated in open grasslands at San Antonio, Cabagan, Isabela and about 3 km west to the Cagayan River (figure 3). Additional to grasslands, some agricultural patches (of rice and corn) and a patch of early stage reforested area surround the lakes. In between the lakes there is a road, next to which a cottage, rest house and watchtower are placed. The lakes comprise of a shallow and deep lake. The shallow lake (figure 4a) is covered mainly with vegetative plants which serve as hiding place for water birds. The deep lake (figure 4b) is an open lake with less vegetative plants, where water birds can easily be observed swimming and congregating to it. The lakes hold water throughout the year, which is also used for irrigation purposes.

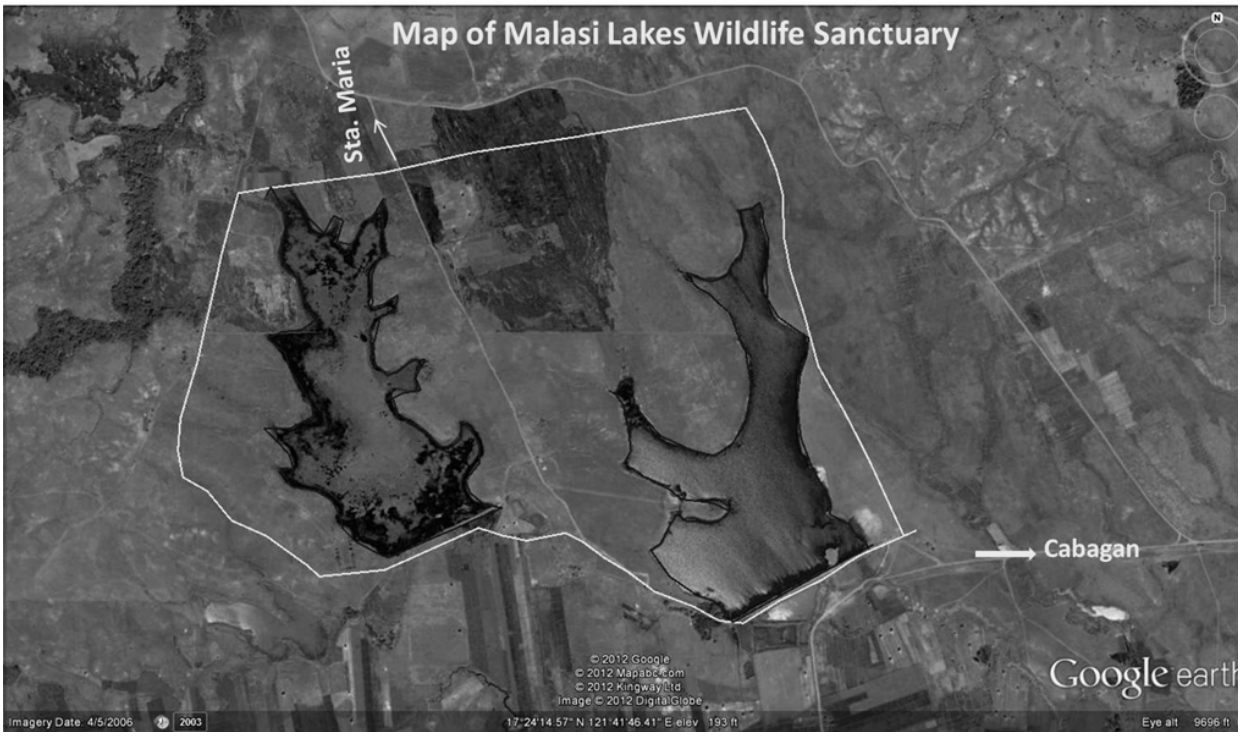


Figure 1: Map of the Malasi Lakes Wildlife Sanctuary, Google earth.

Figure 2a: Malasi lake 1 (shallow lake).

Figure 2b: Malasi lake 2 (deep lake) and guest house.

Counting duck species

Table 1 shows the population size of each duck species in the Malasi lakes. The Philippine Duck (figure 1a) is the most abundant duck in the Malasi lakes; especially in the shallow lake they were abundant. This population size is at least 20% of the total population size throughout the Philippines, which is estimated at 2,500 – 10,000 individuals (Asian Water bird census). In the deep lake the Northern Shoveler (figure 1b) is the most abundant species, this species is the second most abundant species in the whole Malasi sanctuary. The Northern Pintail and Wandering Whistling-Duck are also notably represented in the lakes. We also found a few Eurasian Wigeon, Common Pochard and one Tufted Duck. The Common Pochard has never been found in the Malasi area before; all other species have been found there before (table 2 shows all species and population sizes in Malasi lakes observed before).

Figure 3a: Philippine Duck. Photograph taken by Merlijn van Weerd

Table 1: Species and number of ducks found in Malasi lakes, January 2012.

Species	***Scientific name***	***Jan 21 lake 1***	***Jan 22 lake 1***	***Jan 23 lake 1***	***Jan 24 lake 2***	***Jan 24 lake 2***	***Max. count***
Philippine Duck	*Anas luzonica*	1,020 (1500*)	2,090	1,130	410	61	**2,090**
Northern Shoveler	*Anas clypeata*	538	274	390	0	1,230	**1,230**
Northern Pintail	*Anas acuta*	131	336	81	0	17	**336**
Wandering Whistling-Duck	*Dendrocygna arcuata*	3	34	273	450	0	**273**
Eurasian Wigeon	*Anas penelope*	0	0	0	0	8	**8**
Common Pochard	*Aythya ferina*	0	0	0	0	5	**5**
Tufted Duck	*Aythya fuligula*	0	0	0	0	1	**1**

Dates indicate the day on which the counting took place. Lake 1 is the shallow lake; lake 2 is the deep lake. Strong variation can be explained by detectibility and difference in lake depth, therefore the maximum count is used as an estimate of the population size. *=Estimated number of ducks including flying ducks.

Several surveys have been performed on the water bird species in Malasi Lakes from 2002 to 2006. The population sizes from the ducks in these surveys are listed in table 2. The population size of the Philippine Duck and the Northern Shoveler increased from 2002 to 2006. Since 2002 these two species and the Wandering Whistling-Duck have been the most abundant species.

Table 2: Species and number of ducks found in the Malasi lake area from 2002 to 2007. Maximum count numbers are shown.

Species	***Scientific name***	***January 2002***	***March 2003***	***March 2004***	***March 2005***	***March 2006***
Philippine Duck	*Anas luzonica*	1,320	1,490	1,560	4,288	3,633
Northern Shoveler	*Anas clypeata*	1,920	930	1,214	942	3,517
Northern Pintail	*Anas acuta*	30	340	500	9	7
Wandering Whistling-Duck	*Dendrocygna arcuata*	3,050	1,036	1,750	3,345	2,088
Eurasian Wigeon	*Anas penelope*	46	95	21	12	132
Common Pochard	*Aythya ferina*	*	*	*	*	*
Tufted Duck	*Aythya fuligula*	71	220	126	1	1
Garganey	*Anas querquedula*	260	556	1,013	831	803

*the Common Pochard was not found in these surveys
Sources used: Van Weerd and Van der Ploeg 2004, Ngolluan Canceran 2004, Salazar 2005, Bagunu 2006, Paguigan 2007

In figure 3 we show an overview of the population sizes over years. We compare the surveys that were done annually from 2002 to 2006 and in our own observations (2011). No clear trend can be found in this graph, although we might say there has been an increase, followed by a decrease in population sizes of the Philippine Duck, Northern Shoveler and Wandering Whistling-Duck. Personal communication with Merlijn van Weerd (Cabagan, 2012) tells us that no Philippine Ducks were found at all in 2010 (counted once). This means there has been a decrease in population size after 2006 and an increase again between 2010 and 2012. Van Weerd also told us there was a lot of disturbance in the lakes in 2010, especially because of fishermen. We did not observe any fishing in 2012, although we did observe some collecting of wood and pasturing of cows and carabaos.

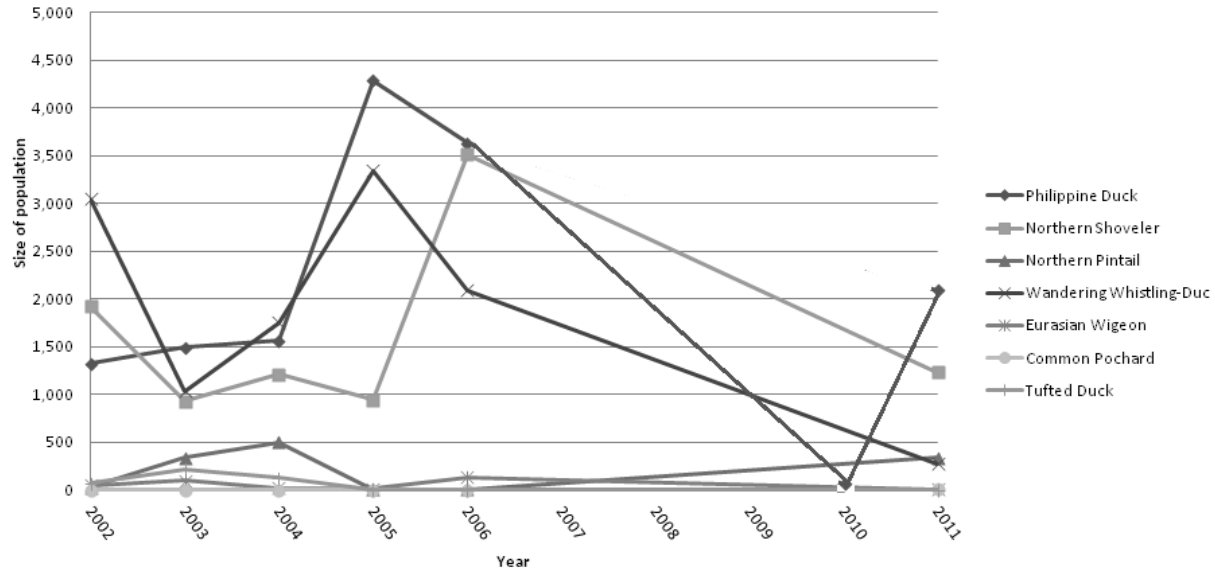


Figure 4: Number of ducks per species found in the Malasi lakes over years.

Possible threats to the Philippine Duck

We observed no striking threats in the Malasi lake sanctuary. No hunting or evidence of hunting (like carcasses, skeletons or traps) were observed or found. Pasturing of cows and carabaos around the shallow lake did take place. Also, we observed collecting of wood (figure 5c and d). Next to the watch tower, a small tree nursery is placed (figure 5b), for the reforestation projects taking place in the sanctuary. The planting of seedlings can be a disturbance for the ducks, especially if the planting is done in the breeding season.

Figure 5a: Cows grazing nearby the shallow lake

Figure 5b: Tree nursery next to the watch tower.

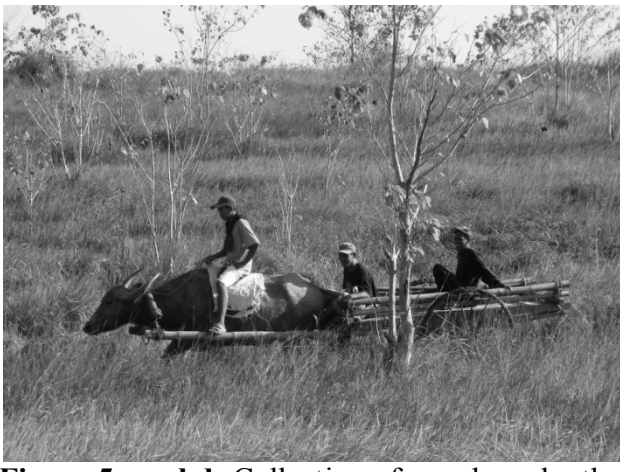


Figure 5c and d: Collecting of wood nearby the shallow lake.

View on Malasi Lake Wildlife Sanctuary by governmental organizations and local residents of San Antonio

We interviewed 3 governmental organizations and 26 local residents (mostly farmers and housewives) of San Antonio. The gathered data are summarized schematically in table 1 and 2 of the appendix.

Awareness of the Malasi lake sanctuary and water birds:
All respondents know the Malasi lakes and have been there, usually even come there often. Also, every respondent observed water bird species in the area. More than one third of the people know the Philippine Duck resides in the area (figure 6a). As reasons for the water birds

to stay in the Malasi area, most people named 'fresh/natural water' or 'the environment' (figure 6b).

Most of the respondents said they do not observe any hunting or other man-made activities in the area. Fifteen percent named replanting of trees as a disturbing factor for water birds (figure 6c).

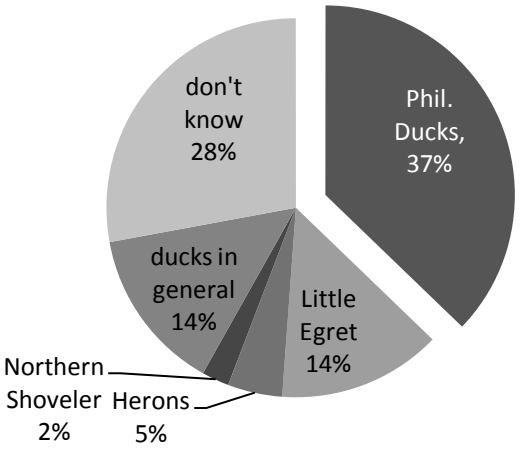


Figure 6a: Answers to the question "What species of water birds stay in the Malasi lakes?"

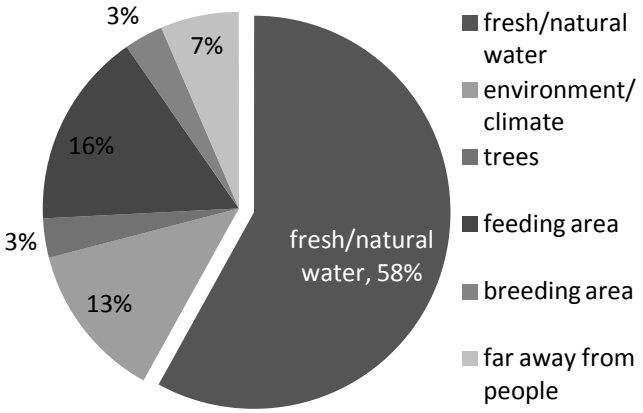


Figure 6b: Answers to the question "Do you know the reasons why the water birds prefer to stay in the Malasi lakes?"

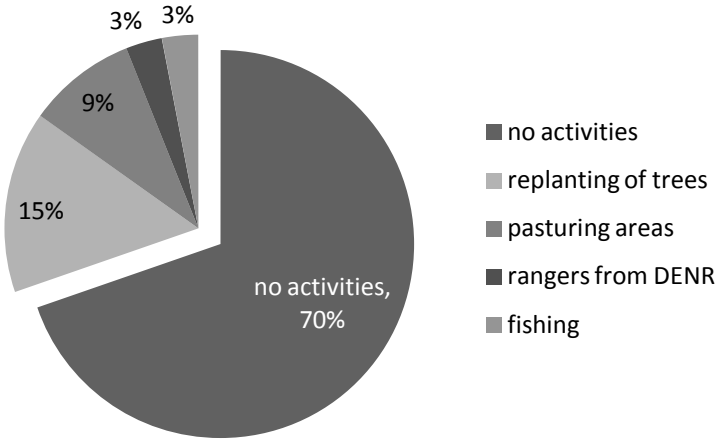


Figure 6c: Answers to the question "Are there any related man-made activities taking place in the Malasi lakes that affect water birds species at present?"

Attitude towards the protection and conservation of the Malasi lakes:
Most people know it is a protected area (figure 7a). All respondents are in favour of the protection and conservation of the lakes and many people (77%) say that they want to participate for the protection. All respondents say the Malasi area and its water birds should be protected.

Significance of the lakes to the residents of San Antonio and to the water birds:
Only one third of the people say the sanctuary was established because of the water birds, another one third does not know and some say it is for the people living in the neighbourhood

(figure 7b). Only about half of the respondents know there are policies in the lakes (figure 7c) and is aware that hunting birds and fishing is prohibited. A small part also knows burning of grasslands is prohibited (figure 7d). Only a little more than half of the people says the policies are effective and 14% even says the policies are not effective (figure 7e).

To the question if the residents have any benefits from the lakes almost two third of the respondents said they collect fish, snails or wood there (figure 7f). This is remarkable, since 80% present of the people say that no hunting or other man-made activities take place in the sanctuary.

The awareness of ecological importance is high, almost every respondent says the Malasi lakes sanctuary is an ecologically important area and all respondents agree the area is a good habitat for birds and serves as breeding ground, wintering and feeding area. More than one third sees the Malasi lake area as a tourist spot in the future.

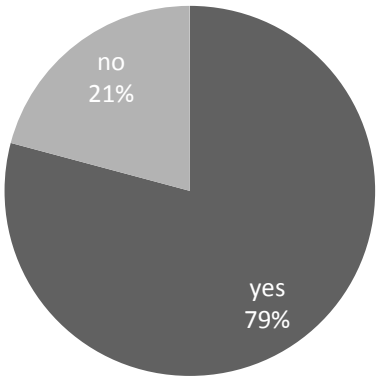


Figure 7a: Answers to the question "Do you know if it is a protected area?"

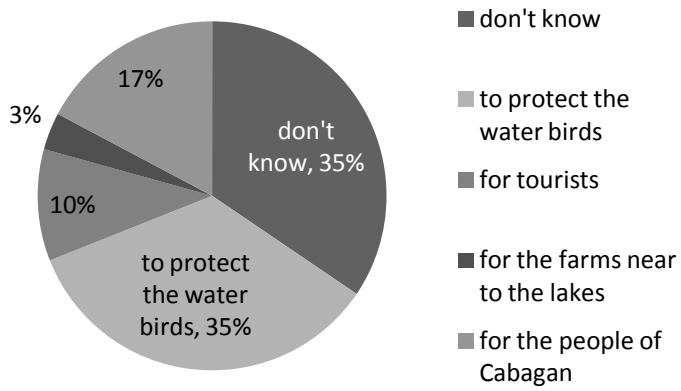


Figure 7b: Answers to the question "Do you know the reasons why the sanctuary established?"

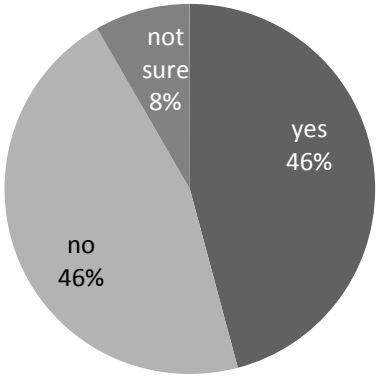


Figure 7c: Answers to the question "Are there any existing policies in the lakes?"

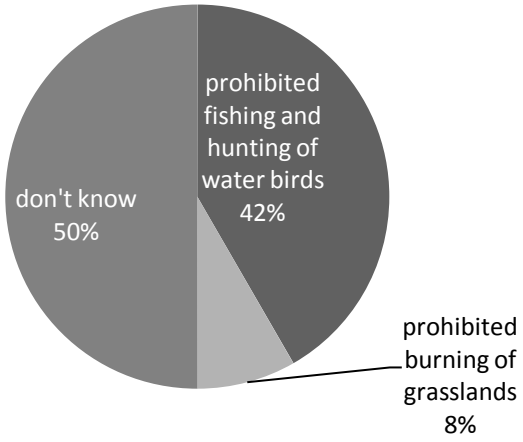


Figure 7d: Answers to the question "What do you know about the policies in the Malasi Lakes?"

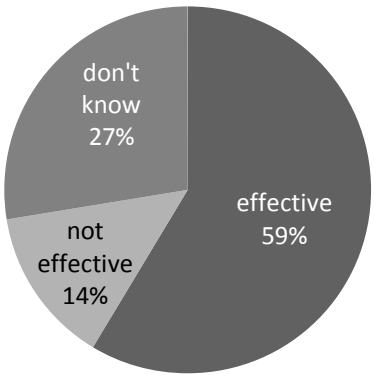


Figure 7e: Answers to the question "What can you say about these policies: are they effective or not?"

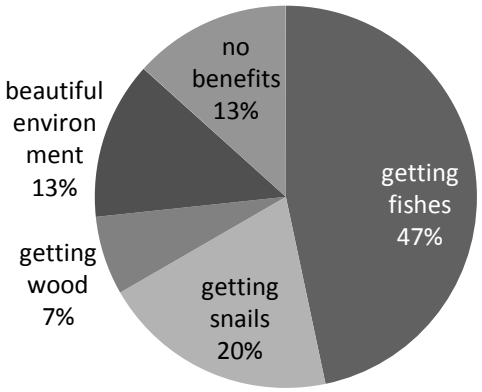


Figure 7f: Answers to the question "Do you get any benefits from the Malasi lake area? If yes, what are they?"

DISCUSSION

The two lakes in the Malasi lake sanctuary form an important habitat for endemic as well as migratory duck species. Almost every duck species found in the Philippines can be found in the Malasi lakes and the lakes harbour a large population of the Philippine Duck, an endemic species. At least 20% of the total population of 2,500 – 10,000 Philippine Ducks resides in the Malasi lakes during wintertime. This high number of this endemic species makes the Malasi lake sanctuary a wetland of global importance, as recorded in the Ramsar Convention on Wetlands.

Both the Local Governmental Unit (LGU) and the Department of Environment and Natural Resources (DENR) stressed the global and national importance of the Malasi Lakes Wildlife Sanctuary. Policies are made and measures have been taken to protect and conserve the area. Two rangers of the LGU and DENR guard the sanctuary on a regular basis. Hunting, fishing and burning grasslands are prohibited in the area since 1994 (copy of proclamation gained from the DENR, Cabagan).

Also among the local residents, people seem aware of the importance of the sanctuary. The barangay captain and councillor of San Antonio have their own ordinances to protect the Malasi area. Most of the local residents are aware of the protection program, although most of them are not aware of the specific rules or fines for violations. All residents agreed on the ecological importance of the area and call the area an important habitat for water birds. Noticeable is, however, that still 20% of the people in San Antonio say they observe hunting in the area. On the other hand, considering the counts of the last decade, the regulation of hunting activities could be enough to maintain the population.

Considering both our observations in the Malasi Lakes Wildlife Sanctuary and the information we got from the different actors in the conservation program, the conservation and protection of the Philippine Duck and other water bird species seems to be going in the right direction. Still some disturbances are observed in the area, such as grazing cows and carabaos, but these seem to be less severe than a few years ago. Cows and carabaos used to stand not only in the grasslands, but also trample the vegetation directly next to the lake (Bagunu 2006). Also, no fishing was observed, while from 2002 to 2007 and also in 2010 this

was greatly observed (Van Weerd, Pers.Comm.; Van Weerd and Van der Ploeg 2004; Ngolluan Canceran 2004; Salazar 2005; Bagunu 2006; Paguigan 2007).

Concluding, the current status of the Philippine Duck in the Malasi Lake Wildlife Sanctuary seems to have improved over the last decade. However, what needs to be taken into account is the fact that for an effective protection of the Philippine Duck not only the Malasi Lakes should be protected. The Philippine Duck is known to stay in more wetland areas, such as Lake Magat, Buguey Wetlands, Linao Swamp (Van Weerd and Van der Ploeg 2004). Moreover, during the cold months the Philippine Duck congregates in the Malasi Lakes. After these cold months, when the migratory birds fly back, the Philippine Duck will also disperse over grasslands to breed (Dalupan, Pers.Obs.). During this time, there is no control to protect the duck. This is why, to extend the protection and conservation, egg collecting and of course hunting should be more restricted throughout the year and throughout the Philippines. One way of achieving this would be by extending the knowledge and awareness of the value of the Philippine Duck among people in the Philippines. We are happy to say The Department of Tourism (DOT) might be able to play a role in this, since they already showed us to be interested in the sanctuary as an ecotourism spot.

Recommendations

This research was conducted in only 4 days. We realize that more time is needed to fully monitor the water birds and observe the Malasi lakes and the farmers land use. Therefore we would like to include some recommendations about further research in order to protect the water bird species as well as the Malasi lakes Wildlife Sanctuary of San Antonio. The following should be implemented for this protection and conservation:

- Posting of billboards with information materials that promote the conservation and protection of water birds;
- Regulate pasturing of cows and carabaos, burning of grasslands, collection of snails and fishing in the lakes that might disturb the water birds
- Strengthening the regulation on the use of the lakes through the formulation of ordinances by the Local Government Unit and Barangay Ordinances of San Antinio, as well as the Department of Environment and Natural Resources are admirable steps to protect the lakes.
- The farmers should take care on the use of the water source of the lakes for irrigation because that might possibly cause the drainage of the wetland ecosystem.
- Keep continuous survey and monitoring of the water bird species.

ACKNOWLEDGEMENTS

We would like to give our sincerest gratitude to those who helped us conduct this research: to Mr. Dominic Rodriguez for his assistance and support during our fieldwork. To every person who participated in our research: the officials of the CENRO, PENRO and LGU, the Barangay officials and of course all residents of San Antonio.

We would also like to thank the rangers of the DENR for assisting us in the Malasi lake sanctuary.

To the Baccay family: the Barangay Captain and his wife, Ma'am Concepcion Baccay, for their hospitality, kind assistance during our interviews with the residents of San Antonio and during our fieldwork.

REFERENCES

Bagunu, VC (2006). Survey and monitoring of water birds in Malasi lakes wild life sanctuary San Antonio, Cabagan, Isabela. Undergraduate thesis. 20.

Birdlife International. Species fact sheet Philippine Duck. www.birdlife.org. downloaded on 16 January 2012.

Dalupan, J. 2012. Pers. Obs. Student of Isabela State University; resident of Naganacan (near San Antonio). 29 January 2012.

DENR and UNEP (1997) *Philippine biodiversity: an assessment and action plan.* Makati City: Bookmark Inc.

Kennedy et al (2000). A guide to the birds in the Philippines.

Ngolluan Canceran, TA (2004). Survey and monitoring of water birds in Malasi lakes wild life sanctuary San Antonio, Cabagan, Isabela. Undergraduate thesis. 20.

Paguigan, JS (2007). Survey and monitoring of water birds in Malasi lakes wild life sanctuary San Antonio, Cabagan, Isabela. Undergraduate thesis. 20.

Salazar, RB (2005). Survey and monitoring of water birds in Malasi lakes wild life sanctuary San Antonio, Cabagan, Isabela. Undergraduate thesis. 20.

Van Weerd. 2012. Pers. Comm. Director Mabuwaya Foundation. Cabagan, Isabela, 28 January 2012.

Van Weerd, M and Van der Ploeg, J (2004). *Surveys of wetlands and water birds in Cagayan valley, Luzon, Philippines.* Forktail 20: 33-39.

APPENDICES

Data gathered from interviews:

Table 1: Demographic profile of the respondents**.**

Respondent	***Gender***	***Address***	***Age***	***Education***	***Occupation***
1	*F*	Purok Sigirang	32	College Graduate	Housewife
2	*M*	Purok Sigirang	37	Elementary level/ Grade II	Farmer
3	*F*	Purok Sigirang	39	Elementary Level/ Grade I	Farmer and Housewife
4	*M*	Purok Sigirang	47	Elementary Graduate	Farmer
5	*F*	Purok Sigirang	44	College Graduate	Day Care Worker
6	*F*	Purok Dukul	39	High School Level/ Second Year	Barangay Health Worker
7	*M*	Purok Sigirang	40	High School Graduate	Farmer
8	*M*	Purok Dukul	56	Elementary Level/ Grade II	Farmer
9	*M*	Purok Dukul	41	Elementary Level/ Grade II	Farmer
10	*M*	Purok Fugong	64	Elementary Level/ Grade I	Farmer
11	*M*	Purok Fugong	25	Elementary Level/ Grade V	Farmer

12	*F*	Purok Fugong	42	High School Lev el/ Third Year	Housewife
13	*M*	Purok Fugong	42	Elementary Level/ Grade I	Labourer for Planting Rice and Corn
14	*F*	Purok Fugong	31	High School Graduate	Housewife
15	*F*	Purok Fugong	43	Elementary Graduate	Housewife
16	*M*	Purok Fugong	44	Elementary Level/ Grade III	Farmer
17	*F*	Purok Fugong	24	Elementary Graduate	Car Wash
18	*F*	Purok Fugong	34	Elementary Graduate	Housewife
19	*F*	Purok Fugong	49	Elementary Graduate	Housewife
20	*F*	Purok Fugong	37	Elementary Graduate	Housewife
21	*F*	Purok Fugong	45	Elementary Graduate	Housewife
22	*M*	Purok Fugong	33	Elementary Graduate	Farmer
23	*M*	Purok Fugong	33	Elementary Level/ Grade I	Farmer
24	*M*	Purok Fugong	38	Elementary Level/ Grade II	Farmer
25	*M*	Cubag, Cabagan	39	Post Graduate	Government Employee
26	*M*	DENR PENRO, Ilagan, Isa.	58	MBA/ BS Forestry	Government Employee
27	*M*	DENR CENRO, Cabagan, Isa.	64	BSE, BSF, MPA, DPA	Government Employee
28	*M*	Purok Dukul	31	Elementary Graduate	Barangay Captain
29	*M*	Purok Dukul	26	College Graduate	Barangay Councillor

Table 2: interview results		
Question	**Yes**	**No**
I. Awareness about Water Birds and the Sanctuary.		
1. Do you know the Malasi lakes?	29 (100%)	
2. Do you know if it protected area?	24 (83%)	5 (17%)
3. Have you been to the lakes?	29 (100%)	
4. Have you seen/observed water birds species in the lakes?	29 (100%)	
	Answer	# of respondents
5. What species of water birds are they?	Phil. Ducks	16
	Little Egrets	6
	Wild ducks	5
	Migratory birds	3
	Birds	2
	Different species/birds	4
	Herons	2
	White birds	1
	Many ducks	1
	Northern Shoveler	1
	Don't know	2
	Reasons	Reasons
6. Do you know the reasons why the water birds prefer to stay in the Malasi lakes? Yes ( ) No ( ). If yes, what are they?	Fresh/natural water	18
	Environment/climate	4
	Trees	1
	Feeding area	5
	Breeding area	1
	Far away from people	2
	Yes	No
7. Do you observe hunting in the Malasi lakes?	6 (21%)	23 (79%)
8. Are there any related man-made activities taking place in the Malasi lakes that affect water birds species at present?	6 (21%)	23 (79%)
If yes, what activities?: CENRO, PENRO and LGU have the same answer: there is seasonal replanting of trees, but this is done by silent regulated movement so there is no disturbance for the water birds. 6 respondents said that there are related man-made activities like planting trees, pasturing animals near the lakes, the rangers from the DENR and catching fishes.		
9. Do you know the reasons why the sanctuary established? For whom? And by whom?	19 (66%)	10 (34%)
Reasons for establishing the sanctuary are: because of the water birds, because of the tourists and for the farm of rice and corn near the lakes. These 19 respondents also said that the sanctuary established for the people of Cabagan, for the two rangers and for the people of San Antonio. The LGU said it established because of the presence of the water birds; PENRO said because it is frequently visited by the migratory birds and it is because of the government, to promote (migratory) bird spotting by tourists.		
	Yes	No
II Attitude towards the protection and conservation of the Malasi lakes.		
1a. Are you in favour for the protection and conservation of water birds in the Malasi lakes? (does not include LGU, PENRO, CENRO)	26 (100%)	
	Answer	
1b. (PENRO, CENRO) Do you have your own policies to protect the water birds in the Malasi lakes?	CENRO: Yes, municipal resolution of 1994/1995 PENRO: Yes, NIPAS laws	
	Yes	No
2a (local residents). Do you want to participate for the protection and conservation of water birds in the Malasi lakes?	20 (77%)	6 (23%)
	Answer	
2c. (LGU, brgy captain, brgy councillor). Do you have your own policies to protect the water birds in the Malasi lakes? If yes, what are these policies?	LGU: yes, Municipal ordinances; rules and regulations for hunting water birds Brgy captain, brgy councillor: yes, Municipal	

	ordinances; brgy ordinances: fines for illegal fishing and hunting are P5,000 for first offence, second offense P10,000, third offense P15,000		
2d. (PENRO, CENRO, LGU). What do you do to enforce these policies to meet these agreements?	LGU: Municipal ordinances should be finalized and established the rules and regulations so that nobody can harm the water birds. PENRO: Coordinate with the LGU, DENR, and PNP to implement these policies. CENRO: LGU and DENR have 2 forest guards to protect the water birds species and the Malasi area for illegal fishing and hunting.		
	Yes	No	Not sure
3. (Local Residence). Are there any existing policies in the lakes?	11 (46%)	11 (46%)	2 (8%)
	Prohibit fishing and hunting (%)	Prohibit burning of grasslands (%)	Don't know (%)
4. (Local Residence). What do you know about the policies in the Malasi Lakes?	10 (42%)	2 (8%)	12 (50%)
	Effective (%)	Not effective (%)	Don't know (%)
5. Local Residence, Barangay Captain and Councillor, LGU, PENRO, and CENRO). What can you say about the implemented policy in the Malasi lakes, is it effective or not?	17 (59%)	4 (14%)	8 (28%)
III. Significance of the lakes to the people and to the species of water birds.			
	Benefits from the Malasi Lakes		
1. Do you have benefits from the Malasi Lakes in the past and at present? If yes, what are they?	PENRO, CENRO: Promoting Malasi lakes as tourist area and providing funds to the protection to promote ecotourism purposes. LGU: Recognition as International Protected Area. Local residents: (14) getting fishes; (6) getting snails; (1) planting fruit trees and getting fruits; (2) clean environment; (2) grasslands for houses, (2) wood for cooking; (4) no benefits		
	Answer		
V. How do you see the Malasi area in the future?	(1) with better equipment for monitoring the water birds; (1) many people going there; (7) as a tourist spot; (4) as a developed place with good facilities to serve as ecotourism spot; (3) more improved; (1) established school; (2) as a city; (1) still the birds are there; (1) good and beautiful place; (2) as a fishing area; (1) many houses and store; (1) no improvement		

An analysis of the consequences and possible improvements of the flood protection downstream of Magat Dam

Nicanor Yadan and Erik van Berchum

INTRODUCTION

The Magat River area

In the north of Luzon, the largest island of the Philippines, lies the Cagayan River Basin. This 27,000 square kilometer mountainous area is the watershed of the largest river in the Philippines, the Cagayan River. The long Cagayan River ends as a very wide river in the north of Luzon in Aparri and starts as a small stream in the southern part of the river basin. On its way up north, the Cagayan River picks up several tributaries. The largest tributary is the Magat River, an impressive river by itself. This Magat River is known for being controlled by the Magat Dam, a huge dam, and a large reservoir. But this huge dam is incapable of storing the water coming from its massive watershed.

Even though a lot of land and nature have been lost with the construction of the dam and reservoir, the construction went on and today, the project found its place in the area at the heart of the surrounding villages. Not only does it provide more control on the river, but also a steady flow of electricity, made by the hydro-power plant inside the dam.

The construction and appurtenant structures was authorized by Presidential Decree No. 693 signed on May 7, 1975 by the late President Ferdinand E. Marcos. The Magat Dam was constructed in 1978 and inaugurated by the late Pres. Marcos on October 27, 1982 and started operations in 1983.

Subsequent detailed and extensive dam site investigation and engineering studies further confirmed the feasibility of what is now known as the National Irrigation Administration's most daring infrastructure project and one of Asia's biggest dams today.

It was the Southeast Asia's first large multipurpose dam. The dam is part of the Magat River Multipurpose Project (MRMP) which was financed by the World Bank and whose purpose is to improve on the existing Magat River Irrigation System (MARIS) and to triple the production of rice in the Cagayan River basin (Wikipedia.org. 2012).

Many people live along the Magat River, using the water for irrigation and other necessary purposes. Different towns like Ramon, San Mateo, Cabatuan, Aurora and Luna are very close to the water with farmers using the fertile lands next to the river banks for planting crops (Ausa 2012, Pers. Comm.).

The problem of the Magat River area

The main problem of the Magat River area is not specific for that area, but a huge problem also for other parts of the Philippines and the world. Typhoons rage through South-East Asia during rainy season, destroying almost everything on its path. Approximately 20 typhoons enter the Philippine area of responsibility every year, with varying results (Tuppil 2012, Pers. Comm.). While most typhoons pass through above the sea or uninhabited areas, some do find the cities/municipalities and rivers, where people live.

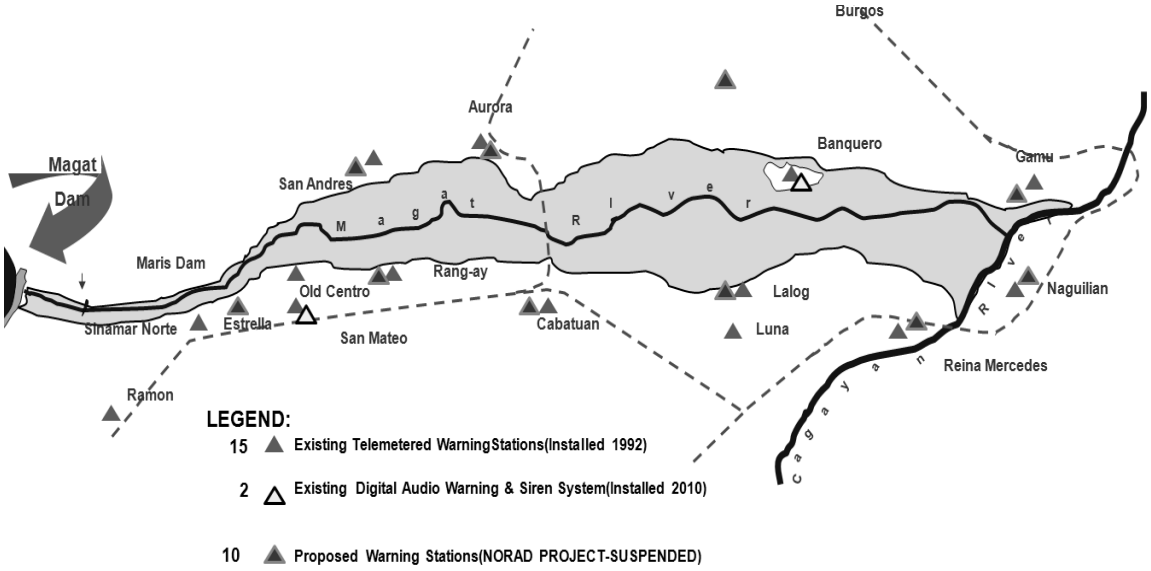


Figure 1: Map of the Magat River area, with municipalities and warning stations by NIA-Magat Dam Authority

Although typhoons rarely hit the Magat River directly, a typhoon hitting the watershed will cause overcapacity of the Magat Dam, due to heavy rains. This will result in floods along the Magat River. Because of the difficulty of determining the probable path of the typhoons, the agency controlling the Magat Dam can only react a few hours before the storm water reaches the reservoir. The only option left is spilling water by opening big spill gates in the Magat Dam, which will unavoidably flood the downstream lands.

To prevent casualties, the government has installed warning devices along the river to warn the people of a flood and ensuring enough time for the people to get to higher grounds. Although some areas are not reached by the warning system, the people warn each other and the number of casualties can be held to a minimum. For damage, on the other hand, fewer measures are being taken. Because the main focus of the government is to prevent casualties, the flood can freely destroy the crops, houses, cattle and riverbeds (Allamanga 2012, Pers. Comm.).

People and agencies involved in flood response

Since flood is a huge problem, a lot of people and organizations are involved. Therefore, it is good to divide the involved people and agencies into groups:

Residents

Farmers

Fishermen

Quarriers

Non-Governmental Organizations

Hydro-electric power company (SN Aboitiz Power - Magat, Inc.)

Stone-Quarry companies

Governmental Organizations

National, Provincial, Municipal and Barangay Government

National Irrigation Administration (NIA)

Provincial Disaster Coordinating Council (PDCC)

Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)

Department of Agriculture – Cagayan Valley Institute for Agriculture Research Center (DA-CVIARC)

As can be made clear from the list of involved organizations, not only a big group of people (inhabitants) feel the effects of flood. There is also a large group of governmental and non-governmental organizations that have responsibilities and tasks in the Magat Dam area, which makes the situation very complicated and the solution hard to realize.

RESEARCH QUESTION

In our research concerning the Magat Dam area, we came up with the following research question and sub-questions:

Main Question

How can the flood protection measures downstream of the Magat Dam be improved?

Our main concern is to find out if there is a way to defend the crops and houses against the floodwater. There are many ways to do so, but before we can answer that question we need to know what the current situation is and what options are actually wanted and possible. Therefore, it is important to analyze this first, and later connect the possible options to the needs of the farmers, within the budget of the government, without forgetting the companies involved.

To make this possible, the following set of sub-questions has been made:

Sub-Questions

What are the effects of a flood downstream of the Magat Dam?

How does the current flood protection work?

Is there a need to improve the current flood protection?

What improvements can be made to the flood protection downstream of the Magat Dam?

These sub-questions have been chosen to separately enlighten a part of the situation or solution. The first two questions are focused on analyzing the current situation. This is important to know before necessary flood protection measures are being placed. By answering these questions, we hope to have a sufficient view on the area and the situation concerning floods and flood protection at the downstream of the Magat Dam.

The third question hopes to show the opinions of the farmers and (non-)governmental organizations on this matter. Changes will only be made when enough people or organizations support them. If possible, we also hope to find out what opinions and choices have resulted in

the current situation and priorities. The problems the area faces today are partly a result of these choices, and interesting to investigate is to see if the people who made these choices are being blamed for these and if the same vision will still count as much in the future.

The last question will hopefully give some options to avoid damages as a result of the floods in the Magat River. In order to answer this question, the analysis in the first two questions has to be done good enough to distinguish the different problems and places.

METHODS

Our method was a combination of technical analyses and semi-open interviews. The first thing we did was we tried to meet up with the experts in water resources management to get insights about floods and flood protection around the Magat Dam. From there, they guided us to our next step, that is, to make an appointment with authorities on the Magat Dam Administration and the agencies concerned with the Magat Dam and flooding of the Magat River. We interviewed them using our questionnaire but most were open interviews to get more information from them.

We then went to the most flood-prone towns along the Magat River area as indicated in the map given to us by the National Irrigation Administration (NIA) and verified by Engr. Ausa and some of his students who live along the Magat River. They are San Mateo, Aurora and Cabatuan. We interviewed the villagers using our questionnaire. We also took pictures of the flood-damaged areas and the flood protection structures installed in some localities.

We combined the comments and statements of the authorities with the observations and perspectives of the villagers to get a better picture of the importance and possible improvements on flood protection along the Magat River.

Table 1: Timetable of N. Yadan and E. van Berchum during field-trip at Magat River.

Date	Location	Activity
Wednesday 18-01-12	Cabagan, Echague	Trip to Echague, interview PAGASA
Thursday 19-01-12	Echague, Ramon	Interview Engr. Ausa and entire class, interview Magat Dam Authorities
Friday 20-01-12	San Mateo	Visit Old Centro Proper, interview farmers
Saturday 21-01-12	San Mateo	Interview Mun. Engr. of San Mateo, visit bridge and flood protection
Sunday 22-01-12	Aurora	Visit Apiat and Villa Fugu, interview farmers
Monday 23-01-12	Echague, Cabagan	Return to ISU Cabagan
Tuesday 24-01-12	Ilagan	Visit Provincial Capitol, interview PDCC Director, interview DA-CVIARC Engr.

RESULTS

During our field trip, we found interesting and surprising information. To give a good view on our findings, we split our results into an overall view on the situation and answers to our sub- and main questions.

Overall view

To give a clear view on the situation, we will first describe the people involved and some of the major problems concerning floods in the Magat River. First of all, it is clear that the government concentrates on saving people during floods. This means that most actions taken are a reaction rather than prevention. There is a warning system in place, which works most of the time according to plan, but it does not warn early enough for the farmers to save cattle or harvest. According to the government, there is a shift towards flood control. The plan is to use dikes, small retention basins and bamboo-planted riversides to control the flow of the flood and the destruction that it brings about.

There are a lot of organizations involved in response to floods along the Magat River. They all have their separate roles which overlap in some cases, meaning, data should be monitored by different organizations. This results in a situation where nobody has a clear overall view of all data and information in the area and some measurements being done by nobody, because the involved organizations think the others do. To make it more complicated, there are also commercial companies involved that are more concerned with making profit, like the hydro-power company.

This hydro-power company and the Magat Dam authorities need a high water level at the reservoir. The hydro-power company needs this to keep the power supply running and the Magat Dam authorities to keep irrigating the farms during dry season.

This causes many problems because it is very hard to predict the rainfall. This means that when the Magat Dam authorities make the water level too high at the reservoir, flood may come during wet season.

The degrading of San Mateo

To give an example of the current problems along the river, there is the case of the municipality of San Mateo. During our research, we talked to farmers in the most affected barangay, as well as the Municipal Engineer and checked their story by our own observations.

San Mateo is one of the severely affected municipalities along the river with every barangay stated as high risk area. The hardest hit of these are the farmers in Old Centro Proper, as can be seen in Figure 1. According to the Municipal Engineer, there is a dike protecting the municipalities on the southern side. This dike also has spur dikes, making the river smaller and deeper and providing some sort of control towards a bridge near San Roque, also a severely affected barangay of San Mateo (Taqueban 2012, Pers. Comm.).The farmers, however, do not know of the existence of this dike, and during the observation, we could see why. The dike was there, but it was poorly maintained and heavily damaged. The spur dikes were made of stones covered in steel wire, known as gabion. The wire was broken by stones hitting the spur dike, making the spur dikes slowly disappear and obsolete. The bridge had to be extended numerous times. \

This results in a degradation of the land. The town has become cornfields, the cornfields have become rice fields and the rice fields have become riverbeds, covered by stones ready to be quarried (Acoba 2012, Pers. Comm.)

Figure 2: Broken spur dikes and badly repaired dike in San Mateo (Photo by E van Berchum 2012)

The wasteland of Apiat

The second and most dramatic example of the river's impact on the life of riverbank residents is Apiat, a barangay that has entirely disappeared in the Magat River area. By quarrying and flooding, the lands lowered until the river found a new route during a flood, closing a part of the Aurora Municipality off from the mainland. This new island consists of numerous barangays, some of which are Panicien, Villa Fugu and Apiat, which has been hardest hit due to its frontline position (Fig. 3).

Figure 3: Erosion and start of stone riverbeds where Apiat used to be. Farm used to begin where the other side of the riverbed is now (Photo by E van Berchum 2012)

Now, the whole of Apiat is eroded into the Magat River. Where houses used to be, now lies a stone wasteland where the only structure is a tent where people can wait for the boat to cross the river. Farther up the island, there are still farms where farmers see their land slowly decrease. The government has not offered relocation and because of lack of money, the people cannot move by themselves. Their crops are flooded every time the Magat Dam spills and the government only supplies relief goods to get through the flood. This means that the farmers have to buy new seeds themselves, making expensive seeds for vegetables impossible to buy and planting tobacco or rice the only option (Baysa 2012, Pers. Comm.).

Sub-questions

What are the effects of a flood downstream of the Magat Dam?

The three towns which suffer most heavily from the floods caused by spillage of water from the dam are San Mateo, Aurora and Cabatuan (SOURCE).These municipalities lie along the riverbanks of the Magat River, and most residents rely solely on agriculture for living.

In case of a flood downstream of the Magat Dam, the most apparent damage is agricultural loss. These municipalities lie along the Magat River, and they have fertile soil to use. When floods come, there is no protection for the crops so they get washed away. Nothing is salvaged, especially when the floods come during the growth stage of the crops. When spillage has been scheduled at nighttime, farmers do not receive the warning. They usually pasture their cattle along the river and some livestock die of drowning from the flood water.

The second devastating effect is soil erosion. The flood scrapes away the edge of the riverbank slowly and siltation deposits along the bottom, decreasing the capacity of the river. Parcels of land completely disappear; leaving a trace of what was once a fertile land.

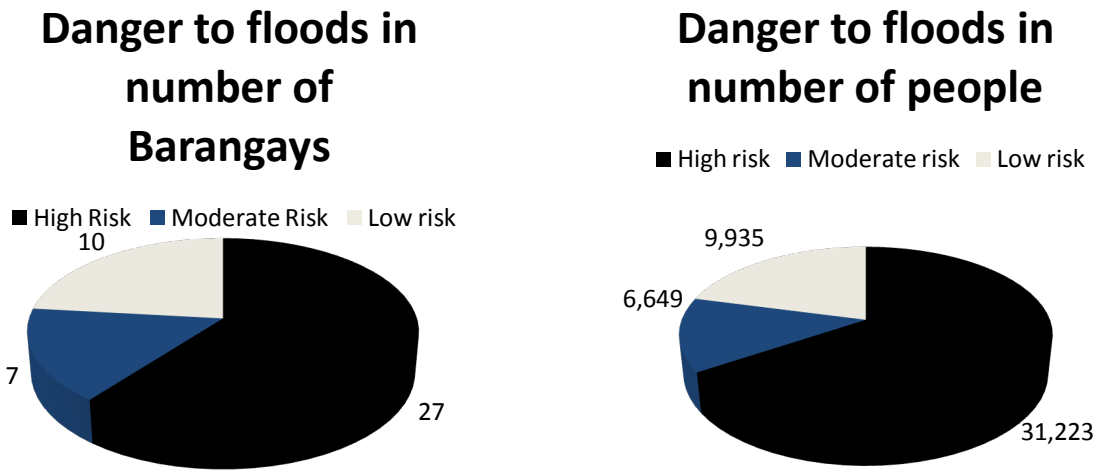


Figure 4: Number of barangays (left) and number of people classified in danger to floods for municipalities near the Magat River as classified by the PDCC, 2012.

How does the current flood protection work?

A Flood Protection System is defined as a system for reducing the risks of flooding to people and property (Ogunyoye and Van Heereveld, 2002). In the Philippines, flood protection structures are funded by the national government. Construction is done by the Department of Public Works and Highways (DPWH) and supervised by the local government units where they are built.

The basis of the local government in installing flood protection is the number of residents living within the locality. A larger population needs more protection. According to the list of flood prone areas of the Provincial Disaster Coordinating Council (PDCC), the municipalities near Magat River on the high risk category are San Mateo, Aurora, Cabatuan and Luna. But because these towns are not that populous, only a couple of dikes have been installed since the construction of the Dam.

They also take into consideration the structures that need protection, i.e. bridges and roads. The San Roque Bridge in San Mateo, a structure that traverses Magat Dam, constricts the river so much that flood pressure scours its bottom and sides, known as bridge scour. Riprap is the most common countermeasure against such scouring. Riprap is also known as rip rap, rubble, shot rock or rock armor. Rip-rap is rock or other material used to armor shorelines, streambeds, bridge abutments, pilings and other shoreline structures against scour, water or ice erosion. It is made from a variety of rock types, commonly granite or limestone, and occasionally concrete rubble from building and paving demolition. It is used to protect coastlines and structures from erosion by the sea, rivers, or streams. It can be used on any waterway or water containment where there is potential for water erosion.

The local government of San Mateo installed four gabion-type dikes along its sides. But even these structures were damaged during the last flood that occurred last 2011. (Wikipedia.org. 2012).

Is there a need to improve the flood protection?

Much of the flood protection structures along the river are gabion-type dikes. These are made of stones enclosed in a wire mesh and made into blocks. They are intended to resist the resistive forces of the flood, and protect the banks of the stream against erosion (Freeman and Fischenich 2000).

But within the budget limits of the government, everyone involved agrees that proposals should be made in improving the flood protection scheme along the Magat River. The inhabitants are very enthusiastic and are willing to participate in the construction and maintenance of the flood protection structures as labor force because it is for the welfare of the people. It is interesting to note that there was a project called the "Intervention Program" by the national government, with plans to restore the damaged portions of the Magat River, but it was discontinued due to lack of support and funding. (Taqueban 2012, Pers. Comm.).

What improvements can be made to the flood protection downstream of the Magat Dam?

People want better flood protection rather than a good warning system. At present, very few dikes exist along the river. Though not many are left standing, these dikes greatly contribute to the welfare and safety of the residents along the Magat River. The local government unit takes advantage of the stones that were carried downstream that have heavily silted the Magat River and make them as gabion-type dikes but these structures are not that resilient. The wire mesh that holds them will corrode eventually. If they can be improved, they will greatly reduce the risk of flooding whenever Magat Dam needs to spill excess stored water.

Before discussing the structures, methods for reducing the risks of flooding should be considered. First, holding back some water and letting it out at a controlled rate, thereby lessening its force (Flood storage). This is one of the reasons why Magat Dam was built in the first place. Without the dam, uncontrolled floods would have ravaged the valley. Second, increase conveyance to get high flows through (Channel improvements/control structures). This may mean lining the river canal, riprap, or dredging the river. Third, which is highly unlikely in the Magat area, is diverting water around the area. Many people depend on the river for their food and irrigation. And finally, which is the most probable technique along the river is building flood defenses to prevent water getting into protected area (flood walls/banks). (Ogunyoye and Van Heereveld, 2002)

To find the best flood control measure to be taken, we have to take into consideration the impact and cost of the building/maintenance. The best option for the Magat River area is a combination of the previously mentioned measures. There are three important points for the area to manage the flood the best way:

The current control structures need to be rebuilt, improved and maintained properly, although they cover a small part of the river, it could be a huge help and a cheaper option to control the river. Another factor to be taken into consideration is the effect and durability of the gabion-type spur dikes.

Along the Magat River, more flood defenses need to be built, ideally in combination with spur dikes, which deepen the main river. Also important is to maintain these defenses, partly with funding or help from the farmers. Erosion control needs to be built along the entire river area. The river is rapidly destroying farmland making the river wider and shallower and more prone to floods in the future. This erosion control can be done in different ways:

Bamboo planted along the river banks, a natural resource, no loss to the beauty of the river or biodiversity along the river banks. When the roots hold the soil, erosion will most likely be minimized. The bamboo can also be used for other uses. The downside is time; it will take a lot of time before the bamboo can hold the river banks.

Rip-raps, by placing big rocks along the river beds, the soil is protected. These rocks have to be heavier and bigger than the rocks taken by the river and therefore, have to be quarried somewhere else. It will do damage to the biodiversity and the sight of the river, but is immediately implementable. (Alcaraz 2012. Pers. Comm.)

Main question

How can the flood protection measures downstream of the Magat Dam be improved?

As our results point out, there are many problems with devastating consequences because of the floods in the Magat River area. All respondents, being inhabitants, non-governmental- or governmental organizations say flood protection measures are both necessary and possible. There are many efficient ways for the flood protection measures to be improved and some of them are even cheap or easy. First of all, the involved organizations need to divide the tasks more clearly and provide regular feedback to other organizations based on their data. Also the information provided to the farmers need to be improved. They are a large group of people with a lot at stake, possibly making them a big help. Thirdly, the human destruction of the river banks by quarrying needs to be stopped entirely. The quarry sites should concentrate on sites immediately next to the water, making it a profitable form of dredging, or much farther inland.

For the actual flood control measures, building is as important as maintenance. The current structures need to be rethought and repaired, making them more effective in deepening and controlling the river. The best thing to do would be to build more structures and erosion control along the river, but the costs could make this hard to do. The most logical answer would be to concentrate on the densely-populated or hard-hit sites. One way or the other, the flood prevention and response needs drastic improvement in order to maintain the beautiful lands and to keep the people safe. The current measures are costly and insufficient. The only answer is information and prevention.

After all, “an ounce of prevention is better than a pound of cure.”

DISCUSSION

In our week of research, we talked to various kinds of people, all of them having their own interests, goals and backgrounds. The government made a better view than reality and the farmers mainly thought of their own lands. As our own knowledge on the topic increased, we can ask better and more confronting questions. Therefore, it would have been better to either analyze longer in advance or go back to the respondents to discuss and confront them with our findings or opinions of other respondents. Sadly, this was not possible due to time limit. Because of the gathering of knowledge along the way, we only used the questionnaire strictly when talking to farmers. The interviews with authorities were more open and are therefore worthy to repeat with new information. Also because of time limit, we have chosen to interview key informants rather than a large number of respondents. Therefore, interesting to investigate is if more farmers or barangays share the vision of the interviewed farmers and if different people within an organization share the view of the current respondents.

ACKNOWLEDGEMENTS

Many thanks and much praise to the following: Dr. and Mrs. Joel M. Alcaraz, for giving us a wonderful place to sleep; Engr. Nelia S. Alvarez, for her hospitality and heartfelt care; Engr. Bonifacio T. Ausa, for his enthusiastic lectures and advices; Dr. and Mrs. William R. Eustaquio, for their generosity and friendliness; Mr. and Mrs. Ermel Delima and Dr. Dolores Catabian, for the kindness and wonderful lunch; the students of the College of Engineering, ISUE, for the exchange of ideas and enduring the entire lecture; and all the people we interviewed, for providing us valuable information. Thanks also to NIA-Magat Dam Authority, municipality of San Mateo, PDCC, and the PSAE- PPG ISUE Chapter.

REFERENCES

Ogunyoye, F. and Heereveld, M. van. 2012. Temporary and Demountable Flood Protection, Interim Guidance on Use. Publishing Organization, Posford Haskoning Ltd.

Freeman, G.E. and Fischenich, J.C. 2012. Gabions for Streambank Erosion Control. U.S. Army Engineer and Research Development Centre (ERDC).

Wikipedia. 2012. Page on Ripraps. http://en.wikipedia.org/wiki/Riprap. Downloaded on 26 January 2012

Tuppil 2012. Pers. Comm. Meteorologist PAGASA. Echague, Isabela, 18 January 2012.

Ausa 2012. Pers. Comm. Professor Isabela State University, College of Engineering (COE). Echague, Isabela, 19 January 2012.

3rd & 4th year class 2012. Pers. Comm. Class of Bachelor of Science in Agricultural Engineering, Isabela State University (ISU). Echague, Isabela, 19 January 2012

Allamanga 2012. Pers. Comm. Head Flood Forecasting Department NIA-Magat Dam Authority. Ramon, Isabela, 19 January 2012

Acoba 2012. Pers. Comm. Farmer. Old Centro Proper, San Mateo, Isabela 20 January 2012

Taqueban 2012. Pers. Comm. Municipal Engineer of San Mateo. San Mateo, Isabela, 21 January 2012

Alcaraz 2012. Pers. Comm. Dean College of Engineering, ISU. Echague, Isabela, 21 January 2012

Baysa 2012. Pers. Comm. Farmer. Villa Fugu, Aurora, Isabela, 22 January 2012

Guzman 2012. Pers. Comm. Director of PDCC. Ilagan, Isabela, 24 January 2012

Wikipedia. 2012. Page on Magat Dam. http://en.wikipedia.org/wiki/Magat_Dam. Downloaded on 30 January 2012

APPENDICES

Questionnaire for authorities

Most of the conversations with the authorities will be informal and semi-open, not following a questionnaire.

However, there is some data we need from them. This includes:

Flood protection measures being done

Maximum flood levels in the Magat River

Area of flooding

Average number of flood per year

Damage per flood

Investments on flood protection

Rainfall

Maps

Also we need information used for the sub-questions. So:

What is your view on floods and flood protection?

Ano ang pananaw nyo tungkol sa baha at proteksyon sa baha?

What is the effect of a flood in your area and how does the authority react to this?

Ano ang epekto ng baha sa inyong lugar at pano tumutugon and awtoridad tungkol dito?

Are you aware of the existing flood protection measures in your area?

May mga nalalaman ba kayong umiiral na tugon tungkol proteksyon sa baha sa inyong lugar?

Are there any new projects concerning flood protection?

May mga bago bang proyekto tungkol sa proteksyon sa baha sa inyong lugar?

What are the villages that urgently need flood protection measures?

Anung mga barangay ang kinakailangan na ng proteksyon sa baha?

What villages are interested for flood protection measures?

Anung mga barangay ang interesado sa mga tugon sa proteksyon sa baha?

Questionnaire barangay captains/ villagers

Do you experience floods? How often?

Binabaha ba ang inyong lugar? Gaano kadalas?

What do you do in case of a flood?

Ano ang ginagawa nyo kapag may baha?

Have you had much damage due to floods?

Nagkaroon na ba kayo ng grabeng pinsala dahil sa baha?

Do you have anything to protect you against floods?

May mga pananggalang ba kayo laban sa baha?

Are there any flood protection projects in your area?

May mga proyekto ba tungkol sa proteksyon sa baha sa inyong lugar?

Did the government offer you relocation sites?

Inalukan na ba kayo ng gobyerno ng malilipatan?

Do you notice any efforts the government is making to protect you against floods?

May mga napapansin ba kayong mga hakbang ng gobyerno upang maproteksyon kayo laban sa baha?

Would you prefer better flood protection above better flood communication?

Mas pipiliin nyo ba ang proteksyon sa baha kaysa sa babala sa baha?

Based on your experience, how can the flood protection measures be improved?

Base sa inyong karanasan, paano mas mapapaganda ang proteksyon sa baha?

Do you think it is possible to protect you against floods?

Sa tingin nyo, possible kayang maproteksyonan kayo laban sa baha?

BLOGS

The following blogs were written by the students during the course and posted on the website: http://cabaganwintercourse.wordpress.com

Wednesday the 4th of January
How ***Jasper Buikx*** experienced ***Wednesday the 4th of January***

After arrival on Manila International Airport, the hot and humid air that greeted us, was a sharp contrast with the winter we left behind in the Netherlands. The heavy traffic was a clear indication of the densely populated city of Manila, with over 12 million inhabitants. The 'short' drive from the airport to Natividad, our hostel, took over an hour but gave us a glimpse into the organized Philippine chaos, called swirling. Busses, trucks, taxi's, (motor)bikes, mopeds and Jeepneys, al ignoring the (often invisible) road markings, honking their way to their destination. The same chaos could be found in the electricity and phone lines, hanging over the busy roads in the form of enormous bird's nests.
Upon arrival at the hostel, we were introduced to our Philippine counterparts; 15 Philippine students from the Isabela State University. Due to the amount of names (and often quite difficult ones) we played a Name Game. In this game, a Philippine student had to throw a ball to a Dutch student while asking his name in Dutch (and vice versa). Unfortunately, we had so much trouble remembering the Philippine sentence for "What is your name?", that the names of our Philippine friends were soon forgotten.

That evening, fortunately, we were able to get to know each other a little bit better during a delicious dinner at Zamboanga. At the end of the evening, this famous restaurant had surprise in stall for us; an hour of native music, dance and costumes. An impressive performance which showed a part of the Philippine culture we will never forget.

Wednesday the 4th of January
How ***Sarah Jane Pagallamman*** experienced ***Wednesday the 4th of January.***

Hallo! hello! This is it, the first day of the International Winter Course! The 11-hour trip all the way from Isabela to Manila is very tiring and exhausting, but still I was very excited to start the course and to see, meet, and be friends with the Dutch students, moreso, that they came from other race and culture. I am excited for the new discoveries and learnings.

And when they came, I said " This is it! The course has really started and I have to revive the English words I have in my 'baul'..hehe..For the Dutch students, baul is a box made of wood where native and old Filipinos put their clothes. But it is very rare nowadays cause we're already living in a modern world and the one we're using now is the cabinet or durabox.. It is good that Dutch students are nice and very friendly. At first, Filipino students were quite quiet and shy but hours later, we started to talk, mingle, and be friends with the Dutch, and thanks to the administrators for letting us play the "Name Game". It helped me a lot to know and remember the names of the Dutch. And also thank to that game for the new words – Dutch words to be added in my imaginary dictionary just like dankjewell (thank you) and graag gedaan (welcome). hehe

After the game came the shopping which was supposedly just a "window shopping" but already became a real shopping..ehe..Then we had the dinner party where we ate original Filipino dishes. After which we watched the show still inside the restaurant named " Zamboanga" if i am not mistaken, where the performers showcased the dances of the different ethnic groups here in the Philippines.
And that's it!!!It's the end of the first day of the course..A TIRING YET A HAPPY DAY..! Till next time…Dag! Bye!

Thursday the 5th of January
How ***Rosalinda Buraga*** experienced ***Thursday the 5th of January.***

At 8.30 in the morning, we went to Intramuros – a place where we considered as one of the historical site in the Philippines because that was the place where Dr. Jose P. Rizal died. At the Intramuros, our tour guide discussed to us the events that were happened during the Spanish Regime. We enjoyed picture taking everywhere. We visited also the Church of Intramuros ut unfortunately we were not allowed to go inside because there was a wedding ceremony that time.

After the visit in Intramuros, we proceed at the National Museum. Our tour guide gave us some information about the Ancient Period in the Philippines. We were able to see the antique collections from the Ancient Period, even the different Filipino cultures and traditions.
The most awaited and exciting part, the ice skating at the Mall of Asia (MOA). We were very excited to do the skating. It is our first time ever! The Dutch students assisted us and teach us how to do the skating. We were very happy and thankful because they are willing to teach us. We enjoyed the skating with the Dutch students.

We spent our dinner at the Viking Restaurant. At that moment, we do have our time to mingle with the Dutch students. We learned from them the Dutch term of head, schoulder, knee, eyes, ears and nose. They teach us also the Dutch term of I love you, good morning, good afternoon, good evening and sleep well. In return, we teach them also the Tagalog or Filipino term of these words.
It is such a great pleasure for us to be with the Dutch students and we enjoyed the day!

Thursday the 5th of January
How ***Annelies van der Ploeg*** experienced ***Thursday the 5th of January.***

Today has been a 'touristic day' for us in Manila. First we had a guided tour through the old centre 'intramuros'. We saw several memorial places about the national hero Rizal and had a overview of the city from the top of a former watchtower. In a museum we have seen a typical Philippine manor house: really big and very beautiful. The guide told us that she has a small altar at home (like in the museum) with on one side Jesus and on the other side Buddha: 'In case Jesus fell asleep'. I was really surprised by this! She told it as a kind of a joke, but it's true and I think it's a wonderful and special way of thinking.

After the guided tour, we had lunch at Jollibee's, a sort of McDonald's. Really nice, but I still have to get used to eating rice three times a day … After lunch we went to the national museum, where we saw several artifacts from Philippine cultural traditions.

But the greatest thing of the day… We went ice-skating! There's an enormous shopping mall in Manila and in the middle of it there's a skating rink. The Dutch helped the Filipinos and tried to show them how to skate. Great fun! For me at least, I can't speak for the Filipinos …

After the ice skating we had diner at Viking's, a buffet restaurant. Sara Jane created a typical Philippine desert for each of the Dutch students: halo halo (means: mix mix). A bit strange for us, but I thought it was really nice! So thanks, Sara !

So, that was the second day. And it was an exciting one!

Ice skating in the Mall of Asia

Friday the 6th of January
How ***Jhema Dalupan*** experienced ***Friday the 6th of January***.

At 8.00 A.M. we left to Los Banos Laguna to visit the IRRI (International Rice Research Institute) and the ICRAF (International Center for Research in Agroforestry) but we visit first the ICRAF and to meet Dr. Rodel D. Lasco and other staff in ICRAF. After this, Dr. D. Lasco prepared a presentation to the Dutch and Philippine students about the ICRAF in the Philippines. He explained the introduction to ICRAF , he presented also the forest area in the different past years, the key transition , niche of ICRAF-Philippines, come strengths, key research questions, methodology, environmental services, etc. We received a lot of knowledge about these presentation to start mitigate our lands, protect trees from illegal loggers, and prevent bad actions to destroy our environment.

At 1 P.M., after a delicious lunch, we went to the studio of IRRI and there is a video that presented to us to be watched We watched how the people in the Philippines experienced what poverty is because of the overpopulation and continuing of population growth. As Filipino I am sad of what I watched because many children affected by the poverty and my parents are also farmers. I know it's very hard to have a good harvest because of the different typhoons that come to the Philippines. If I'm not mistaken every month there is a typhoon that destroys many plants and life. As I observed Dutch students are amazed of what they watched because of the Filipino farmer practices in harvesting and how they plant rice.

After watching we spent some times for taking pictures in the IRRI farm. And we arrived to Searca Residence Hotel to take a rest because we are all tired in the trip from Malate to Los Banos Laguna, so we need a rest. At 5.30 P.M. we back to IRRI because some of us will played soccer and at 6.00 P.M. the game started between the IRRI play and the Dutch and Philippine team. But the International Water Course team lost.

At 7 P.M. we arrived at Isdaan Floating Restaurant to have diner there. We are all impressed of the place that we saw, especially the Dutch students, and the delicious foods that they served to us.
As a Filipino we are happy to interact with the Dutch students because they are very generous, kind and respectful. We learned a lot of them about their life style. We hope that we will be enjoying their company until the last day of this watercourse and also the same them that they will be enjoying staying here in the Philippines.

Friday the 6th of January
How ***Lisanne Dijkmeijer*** experienced ***Friday the 6th of January.***

Today we went from Manila to Los Banos, a two hour drive to the south. We went to two organizations, the first was ICRAF. It's an organization that does research, gives information and tries to convince people that it is really good and in their own best interest to plant more trees in the fields. Because trees keep water and soil were is should be, so the land will be longer profitable. It's their goal to work together with farmers, scientist and local government to make shore there are more trees planted. And work on solutions for problems farmers have.

After the presentation we had lunch in the cafeteria, were they also had the favorite food of the north and de Philippines students let me taste some. It was a dish with beans.After lunch we had a presentation from IRRI. The international rice research institute. www.irri.org Because the presentation of the IRRI didn't took as long as they thought, we went back to the hotel. I went to my room with Annelies and Sarah Jane and we looked at pictures of our families and of snow, skiing and ice-skating.

In the afternoon there was a soccer match, a team of our group and a team of the university we visited. After a while is was really dark and the only thing you could see were some white socks and some bats flying above our heads. The match ended at 3-7, so we lost again. But we did our best.
At night we ate at a restaurant which was owned by a famous Filipino and it was a mix of all sorts of things. There were traditional houses, Mickey mouse and Minny mouse, Barack and Michelle Obama on a couch so you can sit next to it to make a picture and traditional music and dance. The food was real nice, and we had a great time. It was a really nice day!

The International Water Course Football Team (IWCFT) prior to the, heroically, lost match against the international team of the World Agroforestry Centre (ICRAF) and the International Rice Research Institute (IRRI)

Saturday the 7th of January
How ***Dhan Mark Ringor*** experienced ***Saturday the 7th of January***

"Yes, Go! Go! Go! I am excited to climb Mount Makiling". These are the first sentence formulated in my mind as I open my eyes and step out on my bed.Our journey for this day was started at 7:30 in the morning; we went at the bus with a smile in our face and ride going through the pass foods to have our breakfast. But suddenly, as we arrived, some of our companions were not able to join our meals because they are busy watching television on the second floor but still we bought some for them.

It is about 8:15 in the morning when everybody was fully prepared to walk and explore the beauty of the mountain. Dr. Emilia Lastica, a veterinary medicine professor in UPLB, and her student were joined the group and serves as our guide. Just about 15 minutes walking in a steep road when we reached the gate and the personnel gave some safety tips and discuss some regulations to be follow for the Mud spring. First station was the flat rocks, just about a kilometer from the gate. We walked on the slippery soil, we almost roll on the very steep hills, and some of us were even slipped on the trail. We went at the flatrocks, a place where can you fill relaxing and where you can see a beautiful formation of big rocks. Since the view was very pleasing to the eyes, some of us were took a picture on it.

As we plan to continue the journey, rain was fell on the ground and some of us were even want to quit but fortunately when the rain was gone we continue walking through the mud spring. As we walk going on to it, we saw a lot of beautiful flowers, heard some songs of birds and touched some species of snails. When we were walking, some of the Filipino students were on the side of Dutch students and share some story about everything that they can see on the way. After almost 2 hours of walking, we finally reached the mud spring, and eventually I was amazed on what I have seen, it's a great place actually.

Time for us to live the Mud Spring, all of us wanted to hug their beds and have some rest, especially me because I even ran for me to be at the hotel, as fast as I can to hug my bed and have some rest.
They gave us time to take a rest. Upon saying that I ran on our room to grab that opportunity to sleep and eventually I was slept for just 30 minutes. They called as to have our lunched at the famous grills and videoke, just a few minutes travel from the school premises. While waiting for the foods to serve, Jeff, Fred, Den den and the lady in yellow sing their music for us.

Yipppppppppiehh, foods are done, time to go at the pool and swim. It is obviously that the Dutch students know how to swim and the Filipinos are not, well it is just my observation. Some of the Filipino ladies were afraid to go at the middle because they don't know how to swim. It's good we have a good and kind companion which is ready to teach us in swimming.
Generally, it is a very tiring day but still there's a smile nest on our face and a tune hears in our lips.

Saturday the 7th of January
How ***Erik van Berchum*** experienced ***Saturday the 7th of January.***

Merlijn warned us for this: Filipino's wake up early and without any consideration for someones sleep. So I wasn't surprised when at 5.45 my day had a rough start. Lights on, noise on and apparently it was time to get up. We learn a lot about cultural differences  !
Today was going to be a special kind of day. No institutes or assignments today, just a very long hike up Mount Makiling and some time off at a hot spring. After a breakfast at Jolibee's (which is the McDonalds of the Philippines), with surprisingly good pancakes, we met a local professor and began the voyage up Mount Makiling, starting at our hostel.

The special thing about this site was how close it was to the city. After walking for an hour on decreasingly comfort roads, with increasingly pleasant view, we reached the first interesting spot, The Flat Rocks. A small, beautiful site with a waterfall, where apparently beautiful birds come by. These weren't here now because of the noise. So we took the time to climb up the waterfall, which was very fun and exciting.

After a lot of climbing and a bit of falling, it was time to continue the journey, just when it started raining a bit. After a long walk uphill, about 1,5 hours, we reached an extremely muddy and small road leading to the Mud Spring. A small muddy lake, with steaming boiling water, a very beautiful sight.

Luckily the road down went faster, although we were still a few hours later than expected. Our program for the afternoon consisted of swimming at a hot spring, but first we had to get some lunch. This turned out to be at a place with a Vireoki -set(sort of karaoke), which meant that our food was accompanied with singing from our Filipino companions.

We had little time left for the hot spring, but it was worth it. The water had a perfect temperature and it was the right place to rest from our long hike. Some Dutch started giving swimming-lessons and everybody had fun. On the way back we stopped at Los Baños for some diner.
After all it was a nice day full of nature, water, mud and eating.

Sunday the 8th of January
How ***Lone Maasland*** experienced ***Sunday the 8th of January.***

It's already Sunday, we aren't here a week but it feels a much longer. Today we had a relaxed day. We could sleep a little bit longer than normal. We had breakfast at 8 a.m. at the hotel. But all our stuff had to be packed again. I was this morning very happy that I already packed a lot of my stuff yesterday evening, so this morning I had it easy with doing the last things in my backpack. The breakfast was good. Everybody could choose what he or she wanted to eat. There was rice, egg, bread, sausages and fresh fruit. After breakfast we left Los Banos and we started the bus ride to UP Diliman in Quezon City. This is a part of Metro Manilla. Right now I think I almost understand how big Metro Manilla is. It's really a huge city with about 12 million inhabitants. For me it's not imaginable that more than two third of the Dutch can live in one city together. Even Metro Manilla is very big.

The bus ride was ok, and after 2 hours we arrived at our hotel at the campus. We couldn't go to our rooms so we waited a little time and started to drive to the Eco Park next to La Mesa dam. But first we went then to a place where we had lunch. You could choose where to go. I went together with Josine to an Hawaian restaurant. We ate a hamburger and a salad, it both tasted good!

After lunch we drove further to the Eco Park. A guide walked with us through the park and told a lot about all the endemic trees inside the park. Most of the trees had a special story, some are used as a medicine and some can produce beautiful flowers. She also told about the dam. The plan of the dam started when the Americans were still in the Philippines. Now the dam provides water for the inhabitants of Metro Manila. The Eco Park is a side where Philippines enjoy their free time, they give parties and enjoy their weekend at the park. You can also swim in a pool or play a paintball game. But what I liked the most was the view. Before we could enjoy the view we had to walk 117 steps on the stair. At one side you could see the Eco Park, and at the other side you could see the basin created by the dam. I thought it was weird that we were not allowed to take pictures of the dam or the area. Why it isn't allowed isn't clear for me, but I enjoyed the view at both sides of the dam.

One thing that was very annoying today was the rain. It wasn't cold, so wearing a raincoat was too hot, but becoming totally wet wasn't a good plan either! Because it was still raining after our visit at the Eco Park the staff decided that we would go to a shopping mall. After a short trip in the bus we arrived at a big shopping mall. Inside we had more than 2 hours to shop and have dinner. I went with two Dutch girls inside, first shopping, then eating and on our way back to the bus also a little bit shopping. We had a lot of fun about the sizes of clothes in the Philippines. We need to buy everything one, two or even three sizes bigger than we usually do in the Netherlands!

This was our first Sunday in the Philippines, and I enjoyed it very much. Tomorrow we have breakfast at 7 a.m. and there will be four lectures during the day. I'm looking forward to all the things we will experience the rest of the trip!

Sunday the 8th of January
How ***Mariolito C. Ortiz*** experienced ***Sunday the 8th of January***

"Hi……" Have a nice day to everyone of us, I wish you are in a good condition and I hope that everyone of us enjoyed doing thing that help other not to harm them.

I'm so excite today because our route is going to UP, Diliman so I expect a lot of thing to seen there because it is my first time to went here and a past few year,I already heared what the UP is, but I keep it secret…. ***HmMmMmMffFFfFf***.. This a College when some bright and intelligent student exists so I glad to say that many of our professor in my College are graduated here and even in UP Los Banos. We arrive here not exactly 12:00 o'clock at the afternoon so We left again the University Hotel because the time to check-in is 2:00 P.M and They decided also We are going know to visit La Mesa Dam and Eco-Village.

"How wounder and beautiful it is", this is the first words came out from my mouth when I already seern the entrance of it. This is a places you can see a different species of tree, orchids and ornamental plant, some are endemic to the philippines and other are exotic. I knew from our tour guide that some movies are made here like "LOBO", and seen also the Dam which supplement or a source of water in UP not only here but in the other places near the Dam site.
We gone at Trinoma mall after visiting the La Mesa to take our Dinner but they said that we spent our own money and repund it tomorow but I and my companion plan dont take our dinner because we forgot to bring our own money so we walk all around for window shopping but suddenly we meet some friend, and suprise he can treat us in Tokyo Tokyo Restaurant….. *"yes". We* save our money even though We dont have a money that time. HmMmMmFfFf I thank for that…

That's all for today…….. Good bye…. ai sorry dont say Good Bye instead Say ***"Good Journey"*** *and* ***GBU…****means* ***"God Bless You"***

Monday the 9th of January
How ***Noriel Dulatre*** experienced ***Monday the 9th of January***

Hello…Good morning.,…..That`s the first word came out on my mouth as wake up.
Today, the International Water Course of 2012-our group was scheduled to visit the different organizations such as: the Philippine Association for Intercultural Development (PAFID); the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA); the Protected Areas and Wildlife Bureau (PAWB); and the Philippine Foundation for Environmental Concerns (PFEC).

We take our breakfast first at the restaurant of the University hotel at University of the Philippines, Diliman, Quezon city where we checked-in. Before we go to scheduled tour, Merlijn van Weerd from Leiden University and one of the staff of the Mabuwaya foundations, gave us a short lecture about " Climate and Climate Change in the Philippines." Climate change is one of the environmental problems facing the world today, which is in need of immediate solutions and actions from the national and local government most especially the actions and respond of the individual persons. Merlijn cited mitigation and adaptation as one of the major solutions toward this problem.

Annelies van der Ploeg,a dutch student from leiden university taking Cultural Anthropology and Journalism, gave a short lecture and knowledge about "How to deal with the Website," by the way she was the known as the "Web Buster" of the group.

Sabine Luning, an Anthropologist from Leiden university also presented some of her research about Mining at West Africa entitled "Resource Extraction, Stakeholders and Collective Identities." She talk more about racial discrimination between the indigenous people and autochtones. Unfortunately, she did not finish the whole content of her lecture because we have only very limited time and we need to visit the DOST-PAGASA office.

At the DOST-PAGASA, they warmly welcome us. Rey Lerious and Dr. Ezperanza Cayaman, one of the meteorologist gave us some lecture on how they work, monitor, record information and updating the public of the daily weather thru mass media. After the lecture, we traveled to visit the Protected Areas and Wildlife Bureau (PAWB). Before we entered the Ninoy Aquino Park and Wildlife Center, we take first our lunch at the nearby small restaurant just front of the park-locally known as "Turo-turo."

Inside the PAWB park, we have seen a different species of birds which are in highly endanger of extinction from the face of the earth. Some of this birds species are the Philippine eagle also known as the Monkey-eating eagle, we also found out one of its distinct behavior why it have a very small numbers thats: once its mating partner was died it will never be mate again with the other ,in short they are very honest to their partner. Unfortunately, we did not permitted to enter the so-called Mini-Zoo because we are wrong in timing, its Monday and yet, the feeding day of the animals inside the park. this was one of the rules and regulations to ensure the safety of the wild animals. After the tour time, we go back again at the lecture room at the university hotel of U.P. Diliman.

Forester Roger Guzman, one of the staff of the Philippine Federation for Environmental Concern (PFEC),gave us a lecture about the " Empowering and Uplifting Socio-Economic Development of Communities through Renewable Natural Resources Management and Social Enterprises. He tackled more about the upland development and how the local communities will improve their income as one of the program objectives.

There is also a lecturer representative from the Philippine Association for Intercultural Development (PAFID). He is Sam. He gave us the short introduction about the "History of Forestry in the Philippines"- from the Spanish regime upto the present. He also presented to us "The State of our Forest"-as in its critical stage. It is in need to take one of the major focus of our government not just by writing a law in protection and preservation of it, but more on implementing those written laws which he criticized. I also favored on what he shared to us, because it will sustained the life of the next generations of mankind as well as its long term survival of life on earth.

Then lastly, the Secretary General of the "`Koalisyon ng Katutubong Samahan ng Pilipinas or the Alliance Group of the Indigenous People of the Philippines" Mr. Giovanni B. Reyes was our last presenter. He is also an IP of Mt. Province. His lecture is all about "The State of Indigenous Peoples of the Philippines," he talked more about IPs rights in owning an ancestral domain land which it took about 7 years to process.

Every lecturer and organization we visited was given a certificate of appreciation, a t-shirt souvenir from the course, some calendars from the Mabuwaya foundation, and a Souvenir from Netherlands.
Today was full of Academic Lectures and views that we need in order to understand deeply what this `International Water Course ' is all about., it is also very fruitful day for us, both Filipino and Dutch students, because we experienced opportunities like this and listen lectures of conducted research from the well known researchers of our country, but on the other side of it, we need to sacrifice time, efforts and even the cost in order for us to understand the complicated problems about water management. That is what happened today….I`m Noriel saying "**Think like a Man of Thought and Act like a Man of Action…,"**

good night and good morning…God Bless Us All…INGAT…

College day!
How ***Josine van Velzen*** experienced ***Monday the 9th of January.***

This morning we had to eat breakfast at 7am. So I woke up at 6.15 and jumped under the shower. Unfortunately, it wouldn't get warm. So it was a cold start of the day.
The breakfast was nice; 2 slices of (white) bread with an egg, ham and pineapple. But for the most Dutch students it was not enough, luckily Merlijn left a slice of bread for me.

After breakfast we started the lectures session of today. The first one to speak was Merlijn, about Climate and Climate Change in the Philippines. After a nice refresher course (because I already took part in the Minor Sustainable Development) Sabine followed with her lecture about differences between "indigenous people" in the Philippines and "autochthonous people" in the Netherlands.
For the next lecture we went by bus to Pagasa (Philippine Atmosperic, Geopsycical and Astronomical Services Administration). It is an institute like the KNMI in the Netherlands. After a nice song in which we learned about the different types of clouds, we also learned and how a thunderstorm is created in the air and how to get safe during a thunderstorm.

Then we were all hungry so we went for lunch in a typical Philippine restaurant. It was a very small place but they made place for all of us and they served nice food with cold drinks. Also I bought some green mandarins, I didn't know there would be green mandarins that would taste like orange mandarins.

After we risked our lives by crossing the street, we arrived at the Department of Environment and Natural Resources, where the Protected Areas & Wildlife Bureau and the Ninoy Aquino Parks & Wildlife Center are established. There we got a small speech about the Wildlife Center and we saw some animals, like 200 turtles in one enclosure, the Philippine brown dear, the Philippine Eagle and some other beautiful birds.

At 3pm we were back at the Hotel for three more lectures. The first one was from the NGO: Philippine Federation of Environmental Concern. The second one was about the history of forestry in the Philippines and about the big question: Who owns the land? The third one was from an "indigenous" man himself, he talked about the indigenous peoples rights act and about the same question as posed above. Unfortunately, due to this very busy day, I didn't remember all the interesting information.

Then it was time for Dinner and we ate at the Hotel. The dinner was soup, rice with beef stew and some unrecognizable vegetable and fruit for dessert.
So, this was another busy day in the Philippines! Good night!

Tuesday the 10th of January
How **Nicanor Yadan** experienced **Tuesday the 10th of January**

Today was a day of traveling. We left the university hotel at 8:33am and headed for Imugan Falls in Sta. Fe, Nueva Vizcaya. Along the way, Anelies brought out a Sea Life Puzzle where everyone got busy solving it. They gave me some stroopwaffles and somiak We stopped by a gas station and went to buy some snacks.

When lunchtime came, we stopped by a restaurant and had a hearty meal. I ordered caldereta (meat with a sweet sauce), menudo (minced meat with peas and carrots),and two cups of rice.whew! that's a lot!:)

We've reached Sta. Fe at 3:24pm. Most of us experienced riding on the top of the jeepneys (traditional Filipino public transport), and it was great. The trip was exhilarating because we were going towards the top of the mountain. We also had to cross a creek by way of a hanging bridge which not everyone does every day.

The director general of the Kalahan Foundation welcomed us warmly and he made a presentation of their organization. He showed us how the Ikalahan make a sustainable living and the efforts made by the community to protect the watershed.

We had a nice dinner after the lecture consisting of chicken adobo and sayote tops. It was very delicious. After dinner, Dr. Persoon instructed us on the topics and locations of what and where our research should be. The locations were scattered throughout the Cagayan Valley. I'm particularly interested in the Magat Dam deforestation and the fishing enterprise in that area. I can still remember

the beautiful words written on the jeepney where he took a picture of it and included it in his slides," "THE ART OF LIVING IS TO KEEP A GOOD HEART. ALWAYS BE A CHILD"
That night, everyone was suddenly jumpy when the women saw a big spider in the room. Vincent tried to catch it but it jumped on his face. Joseph I quickly took a plastic bag and caught the critter. It was a great day!

"To ensure good health, eat lightly, breathe deeply, live moderately, cultivate cheerfulness, and maintain an interest in life" –William Londen

Arnold Macadangdang explaining how to survive a ride on top of a Jeepney

Up the mountains!
How ***Manouck Veenman*** experienced ***Wednesday the 10th of January***

Today we travelled for six hours from the big city Manila to the provinces. At the end of the day we entered the Kalahan mountain. From the dirty crowded big city to a small house up the mountain where the temperature was lower and the air was clean. It is really a different world in the same country. At the smaller province roads people still have there little markets shops along the road. In the Netherlands, such a way will be closed for traffic but in the Philippines they just drive at a high speed through this way. When we were half way up the mountain, our busses couldn't go further because it was too rough for the busses. The last part of the trip we went up the mountain by Jeepneys. We put our luggage's on top of it and some students were sitting on top while we drove up the mountain. When we arrived at our next place we came to a small primitive house where we had a kind of rice-pie with sugar. It was really nice! For the Dutch students, we are very surprised of all the things the Filipino's can make out of rice. At the end of the day, we had a presentation from Sir Sam from the Kalahan Community. This community lives at the Kalahan mountain. Sir Sam told us about the government and the inside rules of the community. This community lives totally self-sufficient. From six o'clock it was all dark outside. It was really quiet out there. After a good local diner, we had a presentation about the proposals of our research project and we discussed the subjects. After this, finally everybody wanted to go to bed. But then Antje found out that there was a very big hairy spider above her bed. This was very interesting for the students who are studying biology. Unfortunately

some of the girls couldn't sleep for the rest of the night. But finally WE GOT HIM! The spider stayed the rest of the night outside. Let see what kind of animals we will see during the rest of our journey…..

Merlijn trying to explain, in vain, why there is so much wind on top of the dividing ridge in Imugan

Road trip to the North of Luzon
How ***Vincent Vergeer*** experienced ***Wednesday 11th of January 2012.***

Today we finally will reach our main destination of this course. The province of Isabela, but first I want to share our first 'real' jungle experience with you, which included much of loud screaming. This was because one of the biggest nightmares from a lot Dutch people became reality. It all started when

The big big spider in Imugan

Antje wanted to install her mosquito net around 11pm. Next to her bed she found a big spider. She thought it was cool, and asked everybody to come and watch. From that moment on the spider was like a movie star because everybody wanted to take a glimpse of it. Directly a lot of Dutch and Pilipinos act like paparazzi and take a lot of pictures from the spider. After the photo session we wanted to get rid of the spider and together with Merlijn we did actually catch the spider, but it escaped and jumped right into my face. So from that moment the only sound in the hostel was screaming all over the place. Fortunately we were able to catch it again and release it into the woods. So everybody can sleep happily ever after.

Next morning we got up early for a nice morning hike up to a waterfall. It was extremely beautiful and Leo, Erik and I decide to take a nice bath in the mountain lake. Directly a lot of other guys joined us

and also the staff can't resist the temptation to swim anymore. So Gerard, Merlijn and Sabine joined us for a refreshing swim.

Swimming in the pool at Imugan Falls

Back in the nice hostel we consumed a generous breakfast and after that we had a sightseeing tour of the self supporting community of Ikalahan. We visited a juice and jelly factory and afterwards we got into, or to be more specific, climbed on the roof of a jeepney to take a ride uphill. On top of the jeepney everybody was shooting with every bump on the road in a way you do when you are in a roller coaster in Disneyworld. Meanwhile it was getting colder and windier, but the views were remarkable. When we arrived at the viewpoint where two climate types meet each other I was astonished with the beautiful panorama.

View over Pangasinan from the dividing ridge in the Cordillera mountains

With a delay of an hour we got in our normal busses and set off for Isabela province. Finally we are going to the place where it all has to happen. On the road we visited one of the greatest dams in the world: Magat Dam. This will be one of the sites for the fieldwork. After a very long and ride we arrived at 9pm at the campus of Isabella State University. This very nice and cosy place will be our home for the next week. At this place lectures will be given and preparations will be done for the research in the field.

At night we build a little party. It was nice to get to know each other better in this way. Most of the Dutch people experienced their first experience with the nice taste of a specific Filipino specialty.

One last remark to keep in mind: "The art of living is to keep a good heart"

A warm welcome and Philippine transportation
How ***Antje Steenhuizen*** experienced ***Thursday the 12th January***

When I woke up this morning in the room of Isabela State University hostel, I felt the joy of the night before still whirling in my head. Today we would be welcomed by the ISU, and we had to appear in a representative manner. A cold shower brought a welcome refreshment.
The ISU welcome was very nice, with all Filipino's singing the national anthem, the university hymn, and the hymn of Isabela. It was great to see (hear) the Filipino way of showing the people are proud of

their country and university. We ate a miryenda of noodles (pancit) as a 'snack'. It is fascinating that Filipino's can eat so many times a day and remain slim.

After the miryenda, we made a tour around the campus by a horse drafted chart and went to a local market. I enjoyed the ride a lot, but I was also concerned whether the small and light horse would be able to draft the chart. We spent some time in the market and returned to the ISU hostel by tricycle. This was an exciting ride as well. The capacity of one tricycle is 6 passengers. Together with Lisanne and Maridel, I squeezed myself in the small sidecar. The combination was colourfully decorated.
In the afternoon, we attended lectures on biodiversity conservation and environmental management. The ISU is taking good care of us by providing food five times a day, and the food is very delicious. However I have to say, some afternoon miryenda are too sweet for me, for example the sticky rice with coconut/sugar sauce.

In the evening I tried to do some work behind my computer for my studies in the Netherlands. I find it quite hard to concentrate on things back in the Netherlands, because I do not want to miss anything here. There is so much to enjoy here!


Inside the Calesa (Horse-drawn Carriage) for a tour of Cabagan

Wednesday the 11th of January
How ***Ronie Turaray*** experienced ***Wednesday 11th of January***

When I woke up in the morning the first thing I do is pray. I thank God for giving me another life that is full of enjoyment and blessings.

After that, I go out to my bed and I saw my two professors playing chess. I make my coffee while watching them play. At six am, I walked going to the Imugan Falls. While I was walking, I appreciate the way they conserve the environment and their culture in planting vegetable and crops for daily consumption. We also visited the other barangays of Imugan riding on the top of a jeepney. While the jeep is running, I feel cold because of the rain until we reached the top dividing the Pangasinan and Cagayan Valley. After hiking, I packed my things and we traveled almost five hours going to Magat

Dam. Before going to Magat Dam, they conducted a brief seminar to us in their office. Then we visited the Magat Dam. After visiting the Magat Dam we again traveled going to Isabela State University, Garita Heights Cabagan Campus. We arrived around nine o'clock in the evening in the EIC building of ISU. When we arrived, there were already prepared food then we ate. I'm tired in our travel but before I slept I thank God for the guidance and protection in our travel.

Welcome water course participants 2012
How ***Jeofrey Laggui*** experienced ***Thursday the 12th of January***

The family of isabela State University Cabagan Campus family including the president and Dean of the different of the college of the university welcome the Dutch participants in International Water course in the Philippines for this school year 2012. The president gave his inspirational message to inspire the participants as well as the Executive director of the campus.

After the, we had experienced the riding of kalesa(Filipino) together with the Dutch student, we rode all the way to Cabagan proper park up to the supermarket, it was interesting activities because I was also served as their tourist guide for my group, every place that we passed by I gave them short story about the place. For it was also consider as one of my unforgettable moment because it was my first time to ride kalesa with foreign people, when we went back the management hired tricycle going back to the hostel.

Dr Orlanda Balderama lecturing about water management in Cagayan Valley

In the afternoon, we participated in the discussion being presented by the different speakers. The topics all about the overview of water resources of the Cagayan valley river basin its challenge and opportunity integrated water management and development, plan for the Cagayan river basin lastly the water harvesting technology.

A Dutch meal, a Filippino 'dessert'
How ***Maya*** experienced ***Friday the 13th of January***

This morning, we gathered in the auditorium in order to attend the final lectures on water and water management in Cagayan Valley, followed by an introduction to field work and an workshop in research design and quantitative data analysis. But – even though the lectures were quite interesting as well as helpful – the evening programme was the most interesting part of today. The Dutch students would prepare dinner, consisting of typical Dutch dishes – hutspot (a mishmash of potatoes, carrots and onions served with sausage), appelmoes (crushed apples and cinnamon), pancakes and many more. Quite unexpectedly, the plate with peanutbutter-chocolatesprinkle-sandwiches soon was empty. As darkness fell, we were preparing for a popular Filipino social activity: videoke. Soon the warm and humid air would be buzzing with the sweet tones of Filipino love songs and (western) sing-alongs – accommodated by loud voices which sounded ever more hoarse as the evening progressed. To my own surprise, I ended up singing Billy Joel's Piano Man…

One lazy day
How ***Leo Smit*** experienced ***Saturday 14th of January***

After 10 days of traveling, lectures, sight-seeing, shopping, and character building, our free day had arrived; no schedule and no plans. We kept asking each other, what are your plans? What are you going to do? I replied with one definite answer: "my plan is to sleep till 12 for once, like I do when I'm home! I'll see what I do with my afternoon." Even though we had all been teamed up with our partners and received our research topics and locations yesterday, I was determined to rest on my free day.

After not being able to get back to sleep for a while I decided it was time to check the time… 8:30?!! What in the world has this country done to me? I had the whole rest of the day left and absolutely no plans! I was lucky the morning "snack" was ready, seeing as breakfast ends at 7 and lunch starts at 12… I had something to eat! Most of the Filipinos and Filipinas were nowhere to be found, most of them decided to go home to visit their families, I believe.

One certain benefit of the early-morning routine is that I get to enjoy the entirety of the day instead of just the afternoon, something I might consider taking with me back to Holland.
The highlight of the day was a walk I had with Annelies down to where Jeofrey's auntie washed my clothes the other day for 100 pesos. We walked past some of the boarding houses there; naturally people called their children out to come stare and wave at us.

I had a rice lunch when I returned, then slept till what I thought was dinner time. At around 6 it wasn't ready yet, but the afternoon "snack" of spaghetti Bolognese was there! It had gotten cold long ago, but I was glad to have something other than rice for once so I chowed it down with delight. I was booked for the evening though, as I had a skype-date planned with my girlfriend in Wales (the 8-hour time difference is quite a tough pickle to work around, I was happy with my day off). We had a wonderful chat, I had a very relaxing day, and I went to bed feeling happy.

Saturday the 14th of January
How ***Sarah Pagallamman*** experienced ***Saturday the 14th of January***

It's our free day! At last I had my 10-hour sleep again after 2 weeks. I supposed everyone was relaxed because of the program-free day. We just had our laundry matters and some preparations for the research proposal. I had the chance to go home and join the practice of the choir. I was very happy to see my family again. JJJ

In the afternoon, an unexpected thing happened! I was on my way back to the hostel when I received a call from Joseph saying that some of the Dutch (Maya, Lissane, Antje, Tanja, Jasper, and Eline)are in our village and are going to visit our home. It's just good that my father and I were still on the market buying green mangoes. It realized it was actually a blessing in disguise (if that is the right term) that they are going to our home so that they could also taste the green mangoes with the bagoong (salted fingerlings/shrimps) which the Filipinos really love to eat.

When I reached home, I immediately prepared the mangoes and the bagoong so that they can taste it because it is a very typical Filipino pastime foodstuff. And I am happy that they liked it.
It was so cute when Jasper carried my 7-month old nephew who was crying and looking at him wondering who is that white man carrying him. Hehe..

At night, everybody was busy making the proposal. Maya and I even overtimed just to finish something. The internet was not even cooperating with us. Tsk tsk ..It took us until past 12 midnight making some parts of the proposal. When I laid in my bed, as if I do not want to stand anymore and just lay there till forever because of my tired body and mind..hehe
And that was all for Saturday. A light and restful day supposedly, but became a quite tiring day.hehe..But anyway it was also good because we finished something for our proposal.

Sunday the 15th of January
How ***Eline Siebelink*** experienced ***Sunday the 15th of January***

So, recently we received a couple of emails in which we were reminded of some peoples short(er) attention spans. Now, it is true that all of us here have a lot to talk about and tend to describe every single detail in our blog, but today I hope to please at least part of our audience by keeping it "kort maar krachtig" so to say.
For me, that means it won't be long before i can try the 'balut' (a ducks egg in which you can find a 18-20 day old chicks embryo, considered a Philippine delicacy) and the barbecued chicken intestines we bought in a streetshop in Cabagan. Definitely, today was and will still be a fruitful day in terms of new foods.

This 15th of January was spent in a small town called San Pablo, in which the traditional 'Baka fiesta' took place. As 'baka' means cow, this whole day evolved around the different ways in which one can think of cows. So, we started the day by a dancing contest in which the baka was honoured, to continue with a branding ceremony and finish the day with a lunch in which we ate some freshly roasted lechon baka (roasted cow). One of our pilipina friends got her dad to arrange this lunch in the mayors office, after we had already been seated in what seemed to be the VIP's balcony. From there, we were able to take some quite nice pictures, and also, the mayor, governers, minister of agriculture and of course the president of Isabela State University were able to take some nice pictures of us in return. Too bad for us, we are now in many pictures wearing westerner hats that made us look even less pinoy. On the other hand, the sun was shining all day, so we tanned a little and after all, celebrated this for the Dutch very random date in a very pilipino way

The last day before fieldwork…
How Noortje Grijseels experiencedTuesday the 17th of January

This morning we stepped into the jeepney again (the one I was riding was called 'Amsterdam'), to arrive in Tuguegarao about an hour later. A noisy city, full of smog. Tricycles, motorcycles, jeepneys and people everywhere. We went to the Tuguegarao Water District, where we got a warm official welcome, with – of course- the national anthem. After we listened to a presentation about the water distribution in Cagayan Valley, we continued our trip to Peñablanca, one of our research spots.
In Peñablanca we learned about an innovative reforestation project and continued our way to the Callao caves. A beautiful trip on a boat over a clear river, with a view on tropical rainforest. We first climbed 187 steps to visit the chapel in the caves and after that we went to a beautiful spot in the river, where most of us jumped into the cool water. We climbed a rock in the water to wait for the bats to fly out of the cave for hunting. This was a spectacular event: it took about 10 minutes for all bats to fly out! About 100.000 bats?

In the evening I had my first ube icecream – a sort of yam, that is mostly used for making 'meryenda' (snacks). It is a dark purple vegetable, so this dessert resulted in a purple tongue…
Tomorrow is the first day of our week of fieldwork. All duo's will go to their own research location. From upstream to downstream these are: Magat Dam, Malasi lakes near Cabagan (Jhema and I will be going there), San Pablo, Peñablanca, Aparri.

Most of us probably won't have connection to the internet and maybe we will have no electricity or signal to call or text. So I guess you will have to wait for a while to read the next blog…BUT no doubt the coming week will bring some interesting stories with new experiences and beautiful pictures!

Monday the 16th of January
How ***Maridel Galicia*** experienced ***Monday the 16th of January***

So how's the whole day? …busy and tiring for sure. Almost everybody slept so late last night because of the proposal that we had to come up with for today so we woke up a bit late too.

We spent the whole morning working out with the research proposal. Reviews and discussions within each team took place as part of the preparation. At around 4 o'clock in the afternoon, as what was written in the itinerary, we had a short presentation of the target topic that every pair intends to study about. And well, those sleepless nights of preparation were worth it. There were good feedbacks and suggestions were given as well for the improvement of the topic.

Presenting research proposals to the course coordinators and other students

In our case, we're all four in the team (Maridel, Manouck, Annelies, and Geraldine). Our field supervisor also made mention about the things that we have to bring on Wednesday for our host family at Penablanca where we'll be conducting our research study. Right now, everybody is looking forward to it. Everyone is excited actually…

And tonight, everybody is gonna be dreaming about the Callao Cave for sure!!! 🙂

1st Day of fieldwork – Aparri How ***Tanja Voogd*** experienced ***Wednesday the 18th of January***

Today the fieldwork officially starts. We all wake up early in the morning still tired from the previous day. Almost everybody is pact but some still need to change their questionnaires, so it takes a while before actually leaving. In total there are 15 groups departing to 5 different location; Aparri, Peñablanca, San Pablo, Magat dam and Cabagan. I am going to Aparri together with my Philippine counterpart Prudencio and four other teams. Aparri is a coastal municipality. Before we left Cabagan we didn't have a place to sleep. But at our first stop at the BFAR office in Tuguegarao a sleeping place was quickly arranged for us, we were able to sleep at the guesthouse of BFAR at the campus of Cagayan State University. At arrival we went straight to the guesthouse. Because the beach is very near we decide to take a look. But instead of the brownish sand we are used to in the Netherlands the sand is actually black. It looked quite beautiful the ocean and the black sand. Unfortunately, however,

Interviewing Government Officials

the beach was covered with garbage. This is due to the dumping of garbage into Cagayan River by the upland municipalities. After this we went to the centre to eat at a typical Philippine place where we had a complete meal with drinks included for only 55 pesos (= 1 euro). And after a quiet evening we went to bed.

Purple soup
How ***Jasper Buikx*** experienced ***Thursday the 19th of January***

Together with Joseph Balabbo, we choose the subject of Ludong fishing for our fieldwork period. The Ludong is an endangered fish species that is considered to be the most delicious fish in the Philippines. Despite many protective laws, its immense price (4000-5000 Pesos per kilo, about 70-80 euro's) has many fishermen fishing for Ludong illegally. For this subject we were send to Aparri, a municipality at the mouth of the Cagayan River in Northern-Luzon. Since this was the first time that students of this International Watercourse visit Aparri, the organization didn't have any contacts to provide the students with a place to sleep. The entire group therefore spend their first night at the campus of the Cagayan State University.

Today we first went to the mayor's office to meet the Local Government Unit (LGU) and inform them of the purpose of our stay. In contrast with the Netherlands, no appointment has to be made before meeting Philippine government officials. After half an hour of arriving, the mayor's office had arranged several officials to give us a complete presentation about our subjects and even provided us with a lunch.

After our pleasant stay at the LGU, we went to the Bureau of Fisheries and Aquatic Resources (or, since Philippine people love abbreviations, BFAR in short) for an interview about the Ludong fishing and the protection program, called *Oplan Sagip Ludong*. Again, we were welcomed very enthusiastically and immediately got coffee (Philippine style, so very sweet) and a bowl of purple soup. Since we don't have any Dutch food that even looks remotely purple, this was quite a shock. But even though it had the color of a toilet cleaner, it tasted great (again, very sweet)!

That night we went out to get diner with the entire group. We arrived at a small alley filled with Philippine eateries. During our dinner we immediately noticed that this alley was also used as a playground although very few of the children actually played that night. They all found the white students very interesting and watched us as if they saw water burning.

With this relaxed start of the fieldwork period, I got a good impression of the Philippine culture and look very much forward to the rest of the course.

2nd Day in the host family – Aparri
How ***Lisanne Dijkmeijer*** experienced ***Saturday the 21th of January***

We woke up for the first time in our host family. At 7 all of the groups of Aparri met at the Jollybee's. First we ate there and then we went to the market to buy a lot of food for our host families. Then we went back to our host family. The women of the host family was doing laundry and we asked if we could join her. We could, so we did. We used water out of the well and a block of soap. After the washing we had lunch at the host family. After lunch we played an easy version of Jungle Speed (a game I took with me from the Netherlands) with the daughter Dea of the host family, of 7 years old. She was very quick with grabbing the holy totem and she even won from Joseph, the Filipino who is really fanatic with this game! During the game there came a lot of children around us and they all tried to touch my hair, secretly, but I miss a few hairs… When Dea was walking back to school she had to tell everybody who we were. We went to the school as well to do some interviews with the principal about the Solid Waste Management program. They told us a lot and also showed us a lot about garbage. In the afternoon we did a lot of interviews with fisherman. We had a snack in the afternoon, it was chicken ingestions and pigs skin from the barbeque. After the snack we began preparing for dinner. Our host family (of Josine, Rosalinda, Fred, Arnold and me) and the host family of Jasper and Joseph had dinner together. Our host family cooked Filipino and I helped Jasper cooking a 'Dutch' dinner. We made fried potatoes, cooked cauliflower (definitely not my own choice) and some salad with tomatoes. The fried potatoes were very salt, because the salt is much stronger here. The Filipino dinner consisted out off million fish (very small fish) made in two different ways, a lot of rice and noodles. It was a very nice dinner. It was a very busy but very good day. We learned a lot and it was really fun!!!

Up to San Roque!
How ***Eline Siebelink*** experienced ***Sunday the 22th of January***

It's the 22nd of January, and we have all been busy for 5 days already conducting research individually in the different sites of Cabagan, San Pablo, Appari, the Magat Dam, Tuguegarao and Peñablanca.. But today, there is a disproportionate amount of students gathering in Penablanca's barangay San Rogue, where Annelies (the upperhead of this weblog!) is having her 23rd birthday! In the tricycle, still on our way to San Rogue, we were wondering how big of a chance we had to actually find someone of whom we did not know her place of residence, but as we entered San Rogue, it was shown to us that this chance was about 100%. So, after visiting the barangay captains house to introduce ourselves and explain the reason of our visit to this barangay (we've been told that if we did not do so ourselves, a villager will bring the news that some strangers have been 'spotted'), we headed to the place where Annelies, Geraldine, Maridel and Manouck were hosted by a quite intriguing lady. This lady, aged 87, seemed happy to welcome even more guests to her house, and since she was dressed in her best clothes to go to church later on, she grabbed this opportunity to start a photoshoot starring her and all of her visitors. She told us about the awards she has won twice already as "most outstanding Mom" in the region, while sending text messages in her pink trendy cellphone. This slightly absurd but very positive way of astonishing us, reminded me much of my own 'lola'/oma, except for that my own grandmother would not enter my bedroom at 5 a.m. to watch the Christian Channel on tv, as I was told this old lady did this last night.

Though it was really nice staying with them, we did need to continue our research after eating some sugarcane, freshly slaughtered coconut and speculaasmolens (annelies' birthdaytreat), so we left to find out about the other people of San Rogue and in our case, their partaking in reforestation programs organized in the area. Luckily, this day passed without any trouble. My partner did not fall in any creeks this time, like he did only 10 minutes before we were about to have our first real interview on the very first day of our research project. Whereas we had tried riding a caribou only 2 days before, we now had a calesa (paard en wagen) as means of transportation, which made things easier too. After finishing some interesting interviews with again some very talkative elderly, we hiked back to Sisim, where we were offered to stay in the barangay office. Having no host family for this time, we needed to cook ourselves and my task for this evening was to remove the Tilapia's scales. Lucky me, because

I could also have had the task of removing the innerparts, which was now done by our Philipina expert Marilyn. I'm about to sleep now under the mosquito nets that we connected to the airconditioning system and some random chairs. One more day of doing research still awaits us tomorrow, so I need to take my well deserved rest under the barangay captain's desk now.. Goodnight everyone!

Another day in the field – Cabasan
How **Noriel M. Dulatre** experienced **Sunday the 22nd of January**

Gooood morning Philippines!!!!! welcome again to the silent paradise of the CI bunk house at barangay cabasan.

Today this is our 5th day in the fieldwork, but we are not so early to go in the field interview because we are very confuse on the answers of our respondents- they have the same opinion on the future of the project. Instead of proceeding to the field, were just take some rest while my Dutch counterpart Vincent is reading a book under the sun because it is quite cold in the place, I decided to read some documents left in the bang house and I accidentally discovered a document related to our topics. This are we do mostly in the whole morning.
In the afternoon, we decided to go in the nearby barangay of Penablanca- the Bugatay and Sisim-thru motor riding of our field supervisor Sir Jessie and Sir Sam. They took us in the Brgy. Hall of Sisim and coincidence that they have barangay general cleaning and it was a big advantage to us to get their opinion in general, as well as the opinion of the local people and leaders of the community.

After a lot of respondents, we decided to look around the place and it have a very large difference in terms of infrastructural improvements, the landscape of the surroundings and the opinion of the people which are very opened to us-the place are more beautiful and clean than the other nearby barangay. We think that they (Sisim) have a good and responsible leader and cooperation among community members.

After we interview the Coop chair of Sisim, we decided to walk from Sisim to Cabasan to take some interview in the street and to enjoy the sense of being in the field.

Dominic Rodriquez and a DENR Ranger introduce Jhema Dalupan and Noortje Grijseels to Malasi Lakes and to the noble skills of Duck counting

Monday the 23th of January
How ***Mariolito Ortiz*** experienced ***Monday the 23th of January***

Hi…… Have a nice day to everyone I wish you are all in the good condition today….
I woke up early today to prepare my lodge because this is the last day we are going to stay here in Aparri and I glad to say that we do a lot regarding to our study and we got a lot of data that we are need in our final out put of our research. This day, we are going back to Cabagan for the analyzing of the data and start making some final out put for this study.

But before we leave the town of Aparri, the Municipal mayor are make some appointment that we are going to take our lunch together w/ him at St. Patrick Hotel and how lucky we are because he treat of of us for lunch but unfortunately he is not arrive because of some important matter to do so, He went to Manila but His staff do that lunch treat together w/ some other officials of the different Brgy.
We arrive here in Cabagan at 4:00 not exactly and i went to dormitory to wash my clothes and take a rest also.. and I sleep early…… That for today…. See you again…

Lone's last day of fieldwork – Aparri
How ***Lone Maasland*** experienced ***Monday the 23th of January***

The last day at the host family! I really had a good time at my host family. They are a very warm family. I am amazed by the way they treated me as a part of their family. Because Mario and I already interviewed enough people we went to the market to buy some souvenirs. I bought 2 chickens made of Jollibee garbage! In a place as Aparri, (with a lot of garbage everywhere) it is nice to see that some people try to do something good with the garbage. After shopping we went to a woman who helped us Saturday to find the right people to interview, she already showed us our house and we came to her house to say goodbye. Then we had to hurry to get our luggage because we had lunch with the major in St. Patricks Hotel. When we arrived we heard that the major of Aparri couldn't make it, because he had to leave for a trip to Manila. But we still enjoyed the lunch with other officials like the Barangay captain of Punta. Then the bus trip back to Cabagan started, luckily we had this time a big touring bus which brought us all the way back to the entrance of ISU. There we arranged some tricycles and dropped our luggage in the CCVPED. Most of the students were also back at Cabagan, we went with most of the students to a nice place to have dinner. The rest of the evening was filled with a lot of stories of other students, nice to hear how everybody experienced their fieldwork.

CABAGAN 1: 1-5
How ***Josine van Velzen*** experienced ***Tuesday the 24th of January***

When we woke up today there was nothing. There was no water for showering, there was no water for drinking, there was no breakfast to eat and there was no internet to surf on. Then Wilda came and she said, "Let there be water!" – and water appeared! And she saw that it was good. In this way, the problem with the internet was also solved.
Unfortunately, she couldn't give us food, so I went with Lone to the market in Cabagan and bought breakfast. Thereafter we ate our breakfast in the Bamboo lounge and Vincent brought us coffee with it!

Then Rosalinda, one of my research partners, invited us for lunch. So I went with Lisanne and Jhema to Rosalinda's house, in the next Barangay. She prepared rice with traditional chicken, and it was really nice! Also we finally met her 2.5 years old son! He is really cute and already knows how to dribble with a basketball!

After the lunch I washed some clothes and then we went for swimming in the river! Well, that was the plan. But there was so little water in the river that only when you sat down, the water reaches your middle. So we laid down in the river and started sunbathing. But the river was not so clean as we thought it was, therefore, after we came back I went for a shower and I was fresh and clean again.

In the evening we sat outside, talked, played a game and we were just relaxing. Because tomorrow, we have to start with the writing of our research report! Evening passed and morning came – that was the 24th of January.

Good and Bad Luck, In And Out of Our Room
How **Dan Mark A. Ringor** experienced **Tuesday the 24th of January**

Bye!!! Bye!!! This is our last day here in our room (in our own hotel). After 6 days of gathering data, hiking into slanting roads and walking into a miles distances, finally we almost answered all the questions that we formulate in our report.

I don't know if this is evidence of Lucky and Unlucky Day's existence. It was started by my headache early in the morning, and then secondly my partner Eline was bitten by Cockroach in the eyes.
Going back to Tuguegarao City to have more interviews to the CI personnel, we wait for the Jeepneys for more than an hour but all of the Jeepneys passing by were full. I and my team agreed to rent a tricycle goes to the town proper, a little bit boring actually. Bad thing was happened to us once again, the sky start to cry and wetted our bags. On the tricycle, Antje suddenly lost her phone but for us to relax even it's not time to relax; I brought my team in JOLIBEE, jolibee, jolibee. After our lunch we went back at CI to ask some question and they were very kind in answering our question.
What a small world, when we are at the terminal going to Cabagan, we saw our companion Tanya, Jasper and Den Den. Therefore we went back in EIC together.

Last decision made by myself for this day is to go home to visit my family and my friend. And the night of that day, my partner Eline lost her wallet with her ATM card and cash.
It's up to you on how you look on our day, "Lucky or Not?

Week at the field – San Roque
How ***Manouck Veenman*** experienced her fieldwork from ***Thursday the 18th till Tuesday the 24th of January***

From January 18 till January 24 Annelies, Maridel, Geraldine and I (two Dutch students and two Filipino's) went together by tricycle to the barangay San Roque (a small village of Region II) of Penablanca to do our fieldwork for the research about payment on environmental services. When we arrived, we first had to talk with the barangay captain about what we were going to do. The barangay captain is the head of the barangay, but also like the normal people of the barangay a farmer.

When we were talking to the barangay captain more people came to the house at the barangay captain to have a look at us. Especially Annelies and I, because we are white and most of the residents never see white people. During our talking with the barangay captain, Annelies and I found out there was still no host family arranged for us. In the Netherlands this could be a problem, but in the Filipines the residents are very hospital so in five minutes we had a host family. It was Lola Lily (grandmother Lily), who is 87. She was the first teacher of the barangay. She had a house with four rooms and a bamboo floor (where she was really proud of). About ten chickens and some dogs and cats from here neighbours where around her house and in the kitchen. We had to cook on a small fire made by some wood out of the garden. All the water we used we had to pump up from a well. If you wanted to take a shower in the evening, you had to let the door open because of the darkness from 6 p.m. Because of this darkness (except from three lights in the house) and all the mosquito's mostly in the evening we went to bed around 9 p.m. So my birthday on the 19th of January wasn't just a party as I used to, but walking in a dress between the rice fields, banana and mango-trees was nice.

For the research, we went to the water district. They were really helpful and they took us up to three water springs the next morning. When we hiked up the mountains, they made some coffee for us for during our break. When I was drinking my coffee, I saw a man walking with two chicken which he just killed. Later on, for lunch we had those really fresh chicken.

In the barangay, when Annelies and I went out for a walk, everybody looked at us and almost 20 children where following us. After one day, the whole barangay knew about us. The people of San Roque were really nice and hospitality during our interviews. It didn't matter how poor they were, we got some nice snacks from them (from fresh coconut/milk to cookies with peanut butter) and a lot of information.

We had a good time in San Roque with different habits than in the Netherlands. We went back to Tuguegarao by Jeepney with all the locals with all their rice and banana's. Those people do this weekly to get some food. Sitting on top of the jeepney, I felt like a real local. At Tuguegarao we did some more interviews where after we went back to the University to work out our research.

Tess Balbas and Sam Telan visit Vincent Vergeer and Noriel Dulatre in Peñablanca to advise them on community interview techniques.

I didn't go jogging!!! :)
How ***Nicanor Yadan*** experienced ***Wednesday the 25th of January***

It was fiesta day here in Cabagan…but I didn't get to see the street dancing. too bad..:(
We went inside the Aggabao Hall, where booths of so many things that can be bought cheaply were found. We took some pictures with a calesa decorated with flowers, and another one decorated with corn..nice.:)We just had a hearty lunch at Joseph's aunt's house. Meat, meat and more meat. I never pass out on an eating trip.hehe

After that we went to the flea market and looked for some things to buy. we saw shoes, slippers, mini-speakers and clothes.

We went back to EIC afterwards and slept the whole afternoon, while some of our Dutch counterparts in the research were busy making their drafts. haha
It's a cold night. Back to making the proposal..toodles.;)

Shopping at Tuguegarao
How ***Antje Steenhuizen*** experienced ***Friday the 27th of January***

This day started early for me, as I and the other person in charge of writing today's blog would start running at 5 AM. However, the other person did not show up, and I went alone with my flashlight to have some morning exercise.

At 7 AM I departed from the IEC together with Dan Mark, heading for the city Tuguegarao. Actually, we were supposed to write our fieldwork reports, but Dan Mark had to collect his scholarship, while I wanted to buy a cellphone. Yes, I lost my cellphone on our way back from the fieldwork. In Tuguegarao, we went to a small shopping mall, and afterwards to a building with many small vendors. This covered market reminded me very much of the shopping sites in big Chinese cities. We bought

some clothes and toiletry. We had lunch at a fastfood restaurant that offered unlimited rice refill. It was much fun to watch the waiters preparing and serving the food and clean up as fast as possible and running around with drops of sweat on their face.

When we returned from Tuguegarao we bought some ice-cream and drinks to share with our classmates. The ice-cream was well received at the perfect time for a miryenda at 3 pm.
I continued to write on the report of Marilyn and mine about agroforestry in Peñablanca. Afterwards, everybody would relax with some of the drinks that Dan Mark bought in the afternoon. And as all days, I enjoyed this day very much.

The mystery of Merlijn's armpits
How ***Maya*** experienced S***aturday the 28th of January***

After having spent a few days at the ISU Campus, I was quite excited to make another trip today! The time for departure was set at 8am, and remarkably enough all students were actually present at that time. (Perhaps there has been some reciprocal adjustment taking place - Dutch students getting used to waking up early in the morning, while Filipino students are meeting Dutch expectations of punctuality.) We visited the rearing station of the Mabuwaya Foundation Inc. in San Mariano, where an informative – yet amusing - presentation was given about the Philippine crocodile (a critically endangered species which is endemic to the Philippines). Then we moved to our camping site, where we would spend the night under a starry sky (but not before we would have had a refreshing dip in the pool of course). After dinner, we played ''Jungle Speed'' – that game will probably always remember me of this winter course. Afterwards, we told each other anecdotes, jokes, and scary stories until we fell asleep. Next morning, it was rumored that some people had difficulties in finding their tent the night before…

Josine van Velzen says goodbye to Wilda Calapoto and Tess Balbas with postcards from Holland, Tanduay Ice and tears&smiles.

A tight fit and muddy jeans
How ***Leo Smit*** experienced ***Sunday the 29th of January***

I was awakened today in much the same way as the multitude of roosters during my fieldwork experience; "Ik heb zin in zwemmen! Gaat er iemand mee zwemmen? Wie gaat er mee zwemmen?" (I feel like swimming! Is someone coming to swim? Who's going swimming with me?)… I must admit, it was indeed a great idea. I rolled into my swimming trunks, stumbled out of the tent, and tumbled into the pool (located 5 ft from our tent). After having terrorized the pool-side campsite the night before with my inebriated antics, which followed from being accustomed to the Filipino way of drinking (courtesy of Dhendhen, Ronie, Mario, Noriel, and Arnold (Everyone's Birthday!! Great night! Thanks guys!)), swimming some laps in the swimming pool was a welcome way to start the morning. I only had a little bit of breakfast today before a number of us went out to explore the nearby caves! "Mind your head!", "We should have brought flashlights..", and "Ouch, my head!" were not uncommon phrases here. Out of one, into the next; they seemed to become consistently smaller and narrower, not to mention darker. The final cave had us crawling through a gap that reminded me of my first birthday. So much for my clean clothes…

After a long bus ride and a meal in a cramped room of a classy-looking hotel we managed to make it back to home base – the EIC building on ISU campus in Cabagan. A day of report finalization and presentation preparation awaited us the next day so I made it an early night.

And after the presentations: to the famous rice terraces of Banaue!

A farewell to stairs. The final excurion to the Eight' Wonder of the World: the Batad Rice terraces in Banaue!




LONG
SHORT



TRAW HARD