International course on water and water management in the Philippines

5 January – 31 January 2016

Merlijn van Weerd, Jouel Taggueg, Sabine Luning, Marites Gatan-Balbas, Jovy Servitillo and Gerard Persoon (editors)

Hoogheemraadschap van Rijnland

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Cover: participants of the water course 2016

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International course on water and water management in the Philippines 2016

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Isabela State University, Mabuwaya Foundation and Leiden University

Cabagan, the Philippines and Leiden, the Netherlands

2016

Hoogheemraadschap van
Rijnland

Message

Winter Course 2016

In January 2016, 10 Dutch, 1 Belgian and 1 Hungarian student went to the Philippines to meet their twelve Filipino counterpart students, with whom they would participate in the Winter Course of 2016. Although the name Winter Course might confuse one 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 to 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) and the Mabuwaya Foundation.

In this booklet you find the experiences of the group of students participating in the Winter Course 2016. We are proud of the results and the fact that we could contribute to this activity.

We can now speak of a tradition, and I am confident that this sixth 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

The present booklet is the outcome of the work done by 10 Dutch, 1 Belgian, 1 Hungarian and 12 Philippine students during the sixth international water course that took place in the Philippines from 5 – 31 January 2016.

The 2016 Course would not have been possible without the funding by Hoogheemraadschap Rijnland, the Louwes Fund for research on Water and Food, the Faculty of Social Sciences of Leiden University and the Mabuwaya Foundation.

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

Participants from Isabela State University were screened from the different colleges and we thank Dr Edmundo Gumpal and colleagues of CFEM, Dr Bella Reyes and colleagues of PTIA, Dr Jane Cabauatan and colleagues of CDCAS, Dr Ambrose Hans Aggabao and colleagues of CTE, Dr Orlando Balderama and colleagues of the College of Engineering at Echague, Dr Precy de Lima of Cauayan Campus and Dr Clarinda Galiza of ISU Campus San Mariano.

The Centre for Cagayan Valley Program on Environment and Development (CCVPED) of Isabela State University (ISU), headed by Jovy Servitillo with staff members Eso Tarun, Onia Gunayon and Lenlen Morillo provided support while the students stayed in Cabagan.

Meals were provided by Josie Mirana while Onia Gunayon coordinated accommodation.

We thank the Campus Executive Officer Prof Oliveros Valiente of ISU Cabagan for all his support during the coordination and the implementation of the course.

We thank Dr. Precy de Lima of Cauayan Campus for making available the Cauayan bus.

Essential support during the preparation and implementation of the course was provided by the Mabuwaya Foundation team: Arnold Macadangdang, Bernard Tarun, Edmund Jose, Amante Yogyog, Lilibeth Baldesancho, Joni Acay, Leonalyn Tumaliuan, Dorina Soler and Nanette Cataggatan.

A large number of representatives of government, non-government and international organizations warmly welcomed the students in their offices or field sites and provided a unique insight in their work:

The water course 2016 students and staff visited the Philippine Red Cross headquarters and the WASH Project in Tondo, Manila. Many people were involved in coordinating and assisting with this visit. From the Philippine red cross: Hon. Richard Gordon-Chairman, Dr. Gwendolyn Pang-Secretary General, Dr. Ann Claire Reyta-Manager for Health Services, Mr. Rizty Dogcio-Disaster Management Services, Ms. Andrea Paola Tobias-WASH officer, Ms. Charisa Eirene Sarte-National Project Coordinator, Ms. Kensha Andrea Gardingan-National Project Coordinator, Ms. Eunice Charel Lazaro-Project Officer, Ms. May Layugan-Manager for Operations Center, Mr. Ryan Jay Jopia-Volunteer Service, Ms. Leila Gonzales Obtinalia-nternational Humanitarian Law Office, Ms. Crisanta Cayetano-Adminitrator Manila Chapter,

Ms. Pauline Codon-Chapter Project Coordinator, Ms. Jane Diane Manzano-Chapter Project officer, Mr. Edrian Fernandez-Community Organizer, Ms. Michelle Anne Senanin-Community Organizer, Mr. Monzar Datu-Community Organizer, Ms. Ma. Luisa Panis-Community Organizer and from the Netherlands Red Cross in the Philippines: Ms. Guinevieve De Jesus-Country Representative, Mr. Pradeep Mittal-Delegate, Mr. Sil Chandra Suman-Delegate and Mr. Arie Van Amerongen-Engineer. Brian Kae Enriquez-WASH Unit/Sector Head is especially warmly thanked for arranging the visit and the pleasant communication. Eileen Rose Tirona-Vizmonte-Senior Commercial Officer of the Royal Netherlands Embassy in Manila was instrumental in establishing contacts with the Red Cross team.

Joy Navarro and Rowena Tercero of the Biodiversity Management Bureau (BMB) of the Department of Environment and Natural Resources (DENR) welcomed the students in their office and gave lectures on Philippine biodiversity and conservation. Givanni Reyes of KASAPI / the Philippine Association For Intercultural Development (PAFID) gave a lecture on Indigenous People and Community Conserved Areas. Tom and colleagues of the Kalahan Educational Foundation (KEF) welcomed and toured the students in the Ikalahan Ancestral Domain.

Lectures were given at the Centre for Cagayan Valley Program on Environment and Development (CCVPED) in Cabagan. Dr Orlando Balderama, Dr Sabine Luning, Prof. Jouel Taggueg, Dr Gerard Persoon, For. Arnold Macadangdang and Merlijn van Weerd kindly shared their knowledge and expertise on a wide variety of subjects with the students.

Isabela State University President Dr Aleth Mamauag and Cabagan CEO Prof Oliveros Valiente gave inspiring speeches during the opening program.

Mayor Dean Anthony Domalanta and the other Local Government Unit officials and employees of the Municipality of San Mariano allowed and assisted the students to do fieldwork in their beautiful municipality in the foothills of the northern Sierra Madre Mountains.

Last but not least, the students experienced the famous Philippine hospitality while staying in the field sites. The Barangay Captains, officials and tanods, interview respondents, guides and host families in the field sites in Balete, Tappa, Cadsalan and Lumalog are very warmly thanked for their generosity, hospitality and support.

The editors

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On the way to the field sites in Tappa and Cadsalan in San Mariano (Photo by Merlijn van Weerd)

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 organized an international, interdisciplinary course on water issues and water management in the Cagayan River basin in Northeast Luzon in the Philippines from 5 – 31 January 2016. Twenty four students participated in this course, 12 through Leiden University and 12 through Isabela State University. The students were enrolled in different studies: Cultural Anthropology, Liberal Arts and Sciences, Political Science, Product Design, China Studies, International Studies, Civil Engineering, Public Administration, Biology, Secondary Education, Agriculture Business, Agriculture Engineering, Agricultural Technology, Environmental Science, Development Communication and Forestry.

The general focus of the course was on the utilization and importance of fresh water, water scarcity and super abundance, climate change and water, watershed 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.

At the start of the course, to get to know each other and learn something about the Philippines, the students visited the old city of Intramuros in Manila and the National Museum of the Filipino People.

The group visited the headquarters of the Philippine Red Cross in Manila and the WASH Project in Tondo where the students learned about issues with water and sanitation in a very poor urban environment.

Ocean Park Manila was visited to learn more about aquatic biodiversity. The Biodiveristy Management Bureau (BMB) of the Department of Environment and Natural Resources (DENR) provided a background on biodiversity and conservation in the Philippines, with special attention for wetlands. Giovanni Reyes lectured on the Indigenous Peoples (IP) of the Philippines and indigenous and community conserved areas.

On the way to northern Luzon, the Kalahan Educational Foundation (KEF) and the Ikalahan Ancestral Domain in Nueva Vizcaya were visited. Here the students learned about the role of Indigenous Peoples in watershed protection. Magat Dam was visited to see one of the largest dams in the Philippines and its use for hydropower generation and rice irrigation.

In Cabagan at Isabela State University, a series of lectures was given by external and academic presenters on water related subjects. During a two day field trial in the small upland village of Balete, students were introduced to field conditions and to research methods.

The students worked in couples (interdisciplinary, multi-cultural) on the development of a small field study proposal on a water-related issue. The 2016 course focused on water use in a remote rural upland area along Ialguen River in the municipality of San Mariano and the potential impact of a dam that is planned to be built in Ilaguen River. Field work was conducted by the research teams during five days in Barangays Cadsalan and Tappa. The field work period was preceded by a visit to the Municipal Philippine crocodile rearing station in San Mariano where students learned about the critically endangered Philippine crocodile and the efforts to conserve this species in the wild.

After field work, four days were available to analyze data, write a final report and present the research outcomes.

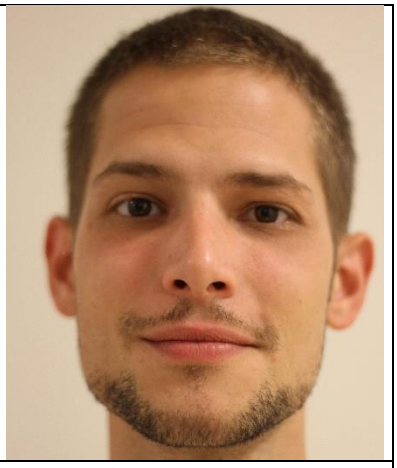
The hard work done, the students visited the rice terraces of Banaue, a world wonder of indigenous engineering and water management. In Batad, a UNESCO World Heritage Site, the students toured the rice terraces.

This booklet contains an introduction of the participating students, the course program and a short description of the field studies followed by the full student reports. The booklet concludes with the facebook blog that was kept by the students.

The Editors

Participating Students

Leiden University students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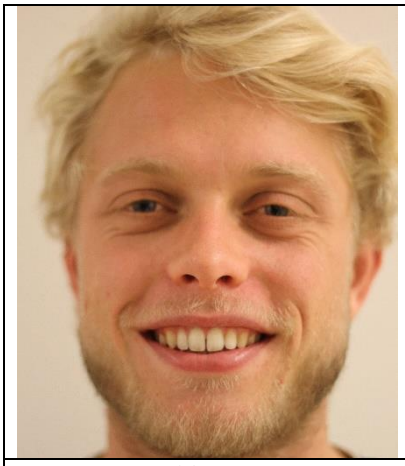
Naomi Ploos van Amstel Cultural Anthropology Leiden University	Martine Lievers China studies Leiden University	Nynke Blömer Liberal Arts and Sciences Leiden University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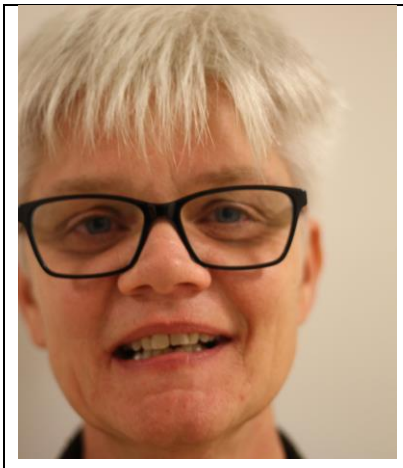		
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Joni Acay Mabuwaya Foundation	Jovy Mendez-Servitillo Isabela State University	Dorina Soler Mabuwaya Foundation

The field work area of the water course 2016: Ilaguen River and Sitio Lumalog in Cadsalan, San Mariano (photo by Merlijn van Weerd).

Program Water Course 2016: 5 – 31 January 2016

Day	Date	Locality	Activity	Accommodation
Tue	5	Manila	Welcome, visit old Manila, National Museum	Pension Natividad
Wed	6	Manila	Visit Philippine Red Cross and the WASH Project in Tondo	Pension Natividad
Thu	7	Manila	Ocean Park Manila and Biodiversity Management Bureau	University Hotel Diliman
Fri	8	Manila - Imugan	presentation about Indigenous People Travel to Imugan	Imugan
Sat	9	Imugan	Imugan	Imugan
Sun	10	Imugan-Cabagan	Travel to Cabagan via Magat Dam	CCVPED Hostel
Mon	11	Cabagan	Opening program and lectures	CCVPED Hostel
Tue	12	Cabagan	Lectures and preparation proposal	CCVPED Hostel
Wed	13	Fieldwork trial	Balete fieldwork trial	Field
Thu	14	Fieldwork trial	Balete fieldwork trial and travel back to Cabagan	CCVPED Hostel
Fri	15	Cabagan	preparation and presentation proposal	CCVPED Hostel
Sat	16	Cabagan	Refining proposal	CCVPED Hostel
Sun	17	Cabagan	Malasi Lakes	CCVPED Hostel
Mon	18	Field	Travel to San Mariano and field sites	Field
Tue	19	Field	San Mariano	Field
Wed	20	Field	San Mariano	Field
Thu	21	Field	San Mariano	Field
Fri	22	Field	San Mariano	Field
Sat	23	Field	Travel back to Cabagan	CCVPED Hostel
Sun	24	Cabagan	Free / reporting	CCVPED Hostel
Mon	25	Cabagan	Fiesta Cabagan / reporting	CCVPED Hostel
Tue	26	Cabagan	Reporting	CCVPED Hostel
Wed	27	Cabagan	Reporting	CCVPED Hostel
Thu	28	Cabagan	Presentation results. Farewell party	CCVPED Hostel
Fri	29	Banaue	Travel to Banaue. Visit Banaue	Banaue Hotel
Sat	30	Batad	Batad	Hill side Inn
Sun	31	Banaue - Manila/Isabela	Travel to Banaue. Farewell lunch. Travel to Manila/Isabela	Pension Natividad

Students on top of a jeepney in Imugan when visiting the Kalahan Educationa Foundation (photo by Merlijn van Weerd)

Sabine Luning teaches field methods in the village of Balete during the field trial (Photo by Merlijn van Weerd)

Czarimah Singson and Joris Westerveld interview Manong Boy Robles about crocodiles in the village of Lumalog (Photo by Merlijn van Weerd)

János Csala and Dayan Darween Delos Santos present an overview of the water course program during the final presentations **(**Photo by Merlijn van Weerd)

Student Reports

THE OPINIONS AND PERCEPTIONS OF IMPACTS CONCERNING THE PROPOSED RUN-OFF RIVER HYDROELECTRIC POWER PLANT OF THE LOCAL PEOPLE IN TAPPA AND CADSALAN AS WELL AS THE LOCAL GOVERNMENT UNIT (LGU) OF SAN MARIANO

Jhondee M. Quistoria and Cees Oerlemans

INTRODUCTION

In 1993, the Full Blown Feasibility study for the Ilaguen B Hydro Project was completed by Harza Engineering. The Project was originally designed as an 88 Megawatt Hydro Power Facility, included among the other Power Generation Projects being bidded out by National Power Corporation. Although the project was bidded out on several occasions, NPC was not able to finalize a transaction with any of the bidders mainly due to the price discrepancy between both parties. As a result of the repeated bid failures, NPC decided to shelf the project. In 1997, the project's development was stalled due to Asian financial crisis that swept the entire continent which placed an insurmountable obstacle on the development path of the entire Asian economy wherein projects such as this one were severely affected. It was only recently when new legislation was passed, specifically the Renewable Energy Act of 2008 (RA 9513) which provided renewable energy projects with the much-needed governmental support and incentives to allow their full development and completion. Given the recent global warming/environmental concerns coupled with the rising prices of petroleum products, renewed emphasis was recently placed on the increase of renewable energy power generation capacity to protect the nation from future energy and environmental crisis situations (Isabela Power Corporation 2011).

On the environmental front, the hydro projects with "Dam or Impounding facilities" have been strongly discouraged by the government and other environmental groups due to the adverse flooding and ecological damage these types of infrastructure can cause. Due to this, the Ilaguen Hydro Project has to be reconfigured and redesigned to become a "Run-off River or cascading type" instead of the original "Dam/Impounding configuration".

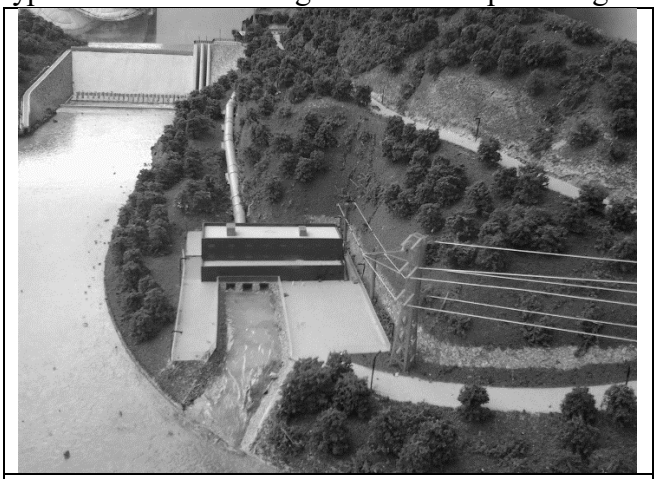

Figure 1. Miniature of the Run-Off River Hydroelectric Power Plant (IPC, 2014)

This proposed project, a Run-Off River Hydroelectric Power Plant (Figure 1), will cost P2.8 billion and will have an estimated P30 million of real property tax per year (Darwin Bulusan 2016, pers. comm.) and this will be the first in the Philippines to have a Hydroelectric Power Plant with a fish ladder. The current situation is that the construction was stopped last May 2015 and planned to continue in 2016. There was a rally before in the municipal government of San Mariano that was participated by people against the construction of this project; the Local Government Unit (LGU) failed to handle the situation.

That is why they decided to have a mediator, which is a priest, then the proponent of the dam explained everything about their proposal, presented it to the people and ended it peacefully.

Currently, there are a lot of speculations about the construction of the dam in Tappa, San Mariano.
Some people believe that there is a treasure hunting going on, others claim that the construction was stopped because of safety issues at the power plant site.

The host Community of the Run-Off River Hydroelectric Power Plant is Barangay Tappa, San Mariano. Tappa is a rural barangay with a population of 945 residents (Guiyab 2015). There are different versions of the history of the name "Tappa". The majority of the people believes that the name is derived from the Ibanag word "upper elevation". Tappa is a relocation site, the reason of the relocation was the re-occurrence of floods in the lowlands.

This research aims to investigate the different views and opinions of the stakeholders of the project and their perceptions of the impacts of the project.

RESEARCH QUESTIONS

Main research question

What are the opinions concerning the proposed Run-Off River Hydroelectric Power Plant of the local people in Tappa and Cadsalan as well as of the local government unit of San Mariano, and how do they perceive the impacts?

Research questions

What are the opinions about the proposed Run-Off River Hydroelectric Power Plant of different local people in Tappa, such as barangay officials and ordinary residents?

Are there differences in perceptions between the people of Tappa and Cadsalan?
What is the difference in point of view on the dam between the local people and the LGU of San Mariano?

Were there consultations between the community and the proponent of the dam?
What are the potential negative impacts and mitigation measures?

How have indigenous people, mainly the Agta, reacted to the plans for building the dam?
Why has the construction of the run-off hydropower project stopped?

RESEARCH METHODS

Gathering information can be done in several ways. In the case of this study, we used different methods in order to answer our research questions. We investigated different perceptions of the people regarding our topic. The data are based on the questionnaires administered to 16 persons, 13 from Tappa and 3 from Cadsalan, and these questionnaires were part of our 4-day fieldwork and supplemented with interviews of four local government officials of San Mariano and some other related literatures. The questions were in English form but during the actual interviews translations were provided depending on the preference or ethnicity of the respondent.

Transect walks

Surveying the area of research was one of the first things to do. We did a transect walk on one of the first days to identify the different actors in the area and to familiarize ourselves with the barangay. Furthermore, we gained insights regarding the use of land and the flood prone areas.

Interviews

We selected our respondents randomly by walking through the community and asked them if they are available and explained them what our purpose was. We also considered the variety of respondents: barangay officials, a teacher, farmers, wives and elderly. We also found out that the community has different ethnicities and others are migrants.

Our respondents have different points of view regarding our topic and to validate some details, we saw the need to interview people from the LGU where our topic is connected and related. We interviewed four local government officials representing different offices: the Municipal Environment and Natural Resources Office (MENRO), Municipal Planning and Development Council (MPDC), Municipal Disaster Risk Reduction and Management Council (MDRRMC), and Municipal Agriculturist Unit (MAU).

Table 1. Time schedule of field work activities

Activities	Date	Place
-Travelled to Tappa -Introduced ourselves and asked permission to conduct a research to the Barangay officials -Met host family -Investigated the area	Monday, January 18	Tappa, San Mariano
-Transect walk (with Luis Baquiran) -Interviewed residents of Tappa (1 interview) -Visit Sitio Pili -Interviewed residents of Sitio Pili (3 interviews) -Interviewed residents of Tappa (3 interviews)	Tuesday, January 19	Tappa, San Mariano Sitio Pili, Tappa
-Interviewed residents Tappa (3 interviews -Travelled to Cadsalan -Interviewed residents of Cadsalan (3 interviews)	Wednesday, January 20	Tappa, San Mariano Cadsalan, San Mariano
-Interviewed residents of Tappa (1 interview) -Travelled to San Mariano -Interviewed representatives of MENRO, MPDC, MDRRMC, MAU (4 interviews) -Travelled to the Rearing Station of Mabuwaya Foundation Inc., San Mariano	Thursday, January 21	San Mariano, Isabela
-Travelled to Tappa -Interviewed residents of Tappa (1 interview) -Presentation of results	Friday, January 22	San Mariano, Isabela Tappa, San Mariano
-Travelled back to ISU	Saturday, January 23	ISU Cabagan, Isabela

RESULTS

The questionnaire was answered by 20 people in total. After five days of research, we had interviewed local people (N=14), Barangay Officials (N=2) and representatives of the LGU (N=4) (Table 2). Various responses were gathered during the interviews.

Table 2. Number of respondents

Place	No. respondents
Tappa	13
Cadsalan	3
LGU, San Mariano	4

The total number of respondents in Tappa is 13, where 54 percent were in favor of the construction of the hydroelectric power plant (Figure 2) while in Cadsalan we had 3 respondents and nobody was in favor.

Opinions

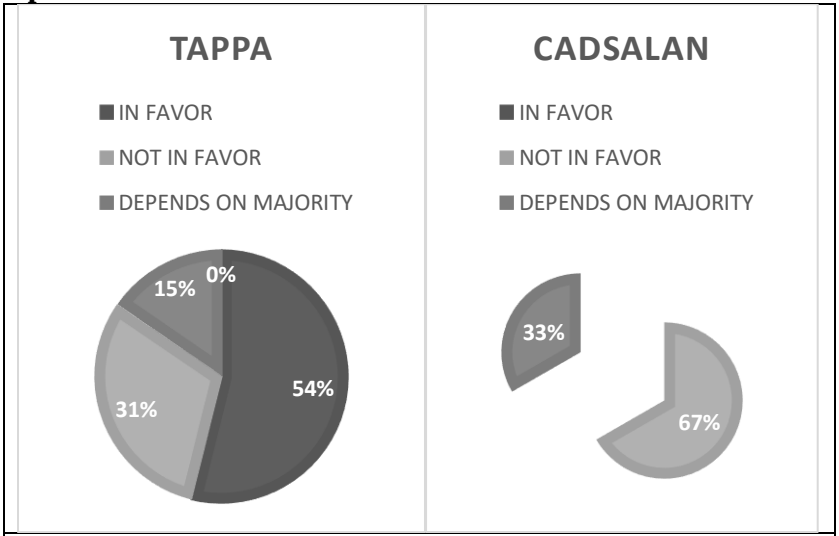

Figure 2. A Pie Graph of the percentage of the respondents who are in favour of the hydroelectric plant.

During the interviews, we asked people about their opinion on the hydropower project. The barangay officials were positive about the project. According to them, the project will give a lot of opportunities for labour and the constructed road will make it easier to transport their crops to other parts of San Mariano. Many other people agreed with the barangay officials, but there were also some people who were criticizing the project. They were afraid that the dam might break and that the whole village will be flooded. Other people thought there won't be fish in the Ilaguen River anymore because of the project. Furthermore, people were afraid that the environment will be affected by the construction of the hydropower plant. The LGU was positive about the hydropower project; they were satisfied with the opportunities that the hydropower plant will bring, including the tax of 30 million pesos per year. According to the LGU, the IPC met all of the requirements that were necessary for the construction of the dam, especially the Environmental Compliance Certificate (ECC). According to the MENRO, the project is environmentally sound.

Difference in views between the people of Cadsalan and Tappa

The people in Tappa were more positive about the construction of the hydropower project. There are different reasons why the people of Tappa are more positive towards the dam, on the one hand because of the opportunities for labour and the funds, on the other hand because they are not foreseeing any negative impacts of the dam. In Cadsalan, there is a history of the occurrence of floods. The people believed that the dam will affect the occurrence of floods in a negative way. In Tappa, there are only some cases of floods in agriculture areas.

The consultations have taken place in Tappa, not in Cadsalan. So the people in Tappa are well informed about the hydropower project, while the people in Cadsalan do not have an official source of information. Furthermore, the people in Cadsalan won't get the benefits of the funds, which they found unfair, because they believe the lowland areas will be affected more than the highlands.

Consultations

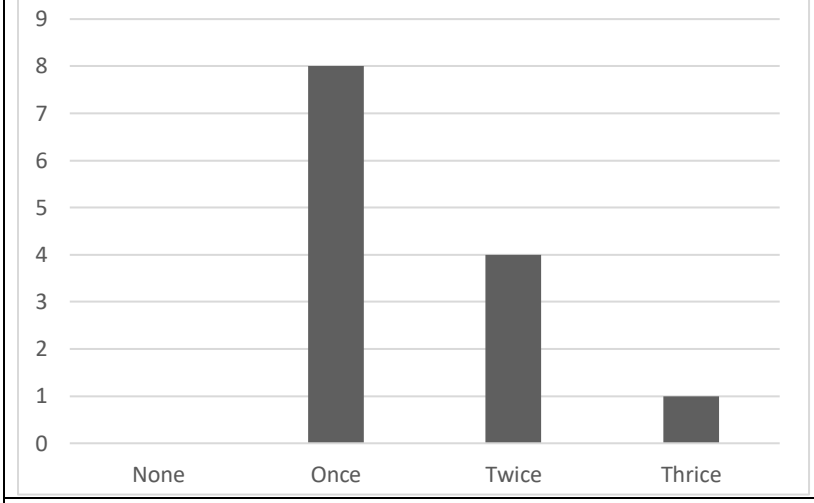

Figure 3. How often the consultation in Tappa occured within a month (N=13).

There were consultations between the community and the proponents of the Run-Off River Hydroelectric Power Plant. According to the data, 100 percent of the respondents from Tappa said that there were consultations that took place in their community, where engineers and community organizers explained and presented the proposed projects. Additionally, the proponent, IPC, also showed pictures of the plans. Other respondents said that the proponent promised road construction, a health center, an overflow bridge, electricity, an irrigation system, and a percentage of the income of the power plant. Although there were consultations, several people still do not have the right information about the project, perhaps the consultations did not always provide clear information. The three respondents in Cadsalan stated that they were not informed at all and said that there had not been any consultations in their barangay. This is confirmed by the MENRO of San Mariano; the proponent only needs to conduct consultations in the barangay where the dam will be constructed, in this case the barangay Tappa.

Difference in point of views and benefits between the LGU and the local people

There were a lot of different responses to this question during our interview days. Respondents are foreseeing numerous benefits during and after the construction of the proposed Hydroelectric Power Plant (Figure 4).

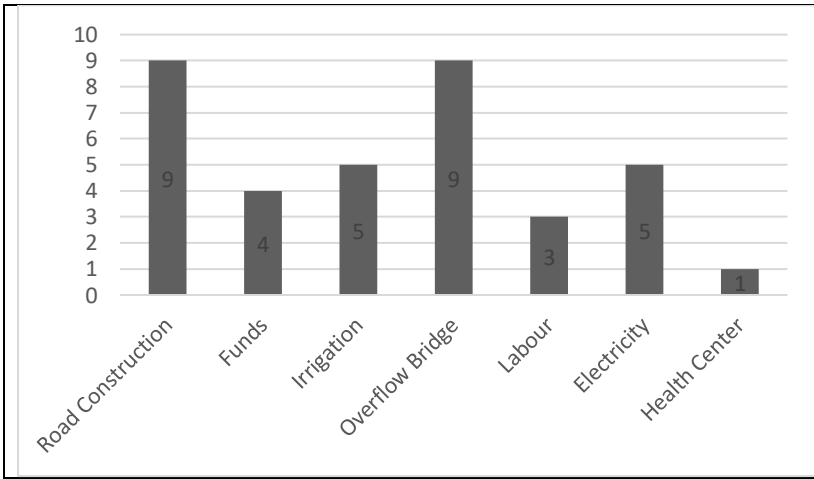

Figure 4. The benefits of the construction of the Hydroelectric plant mentioned by the 13 respondents of Tappa.

The respondents mentioned 8 different benefits in total:
-Road Construction, some respondents are happy because the road of Tappa will be concreted. Therefore it will be easier to transport their crops, but few said that the route of the road construction was changed. Instead of Tappa, the road will be constructed from Dicamay to the Power Plant site, which the MENRO validated.

-Irrigation, although the dam will not serve an irrigation purpose (Darwin Bulusan 2016, pers. comm.), many people believe that there will be an irrigation system. Some respondents were thinking that the Run-Off River hydroelectric power plant is the same as the Magat Dam, which has an irrigation system.

-Overflow Bridge, some said there is a plan for an overflow bridge from Tappa to Sitio Pili, this will help the farmer to export their crops. According to the LGU, however, there are no plans for this overflow bridge.

-Labour, during the consultations the people were told about the opportunities of labour for the local people in Tappa. Many people see the opportunities of labour as an important benefit of the dam construction.

-Funds, the LGU will get a real property tax of 30 million pesos a year from the Isabela Power Corporation and an income tax per year, which will start 5 years after the construction is finished. Furthermore there will be 1-Centavo for every kWh of electricity going to the Energy Regulatory Board (ERB). The ERB will establish development programs in Tappa through the local government. The local people know about the funds, but they do not know exactly the amount or the percentage of the fund.

-Electricity, some respondents think that the electricity generated by the hydropower dam will go directly to Tappa. They do not understand why there is a need for a new (hydroelectric) power plant, because Tappa is already connected to the electricity network. The LGU told us that the electricity is going to the Isabela Power Corporation. Only in case of shortage of electricity, a maximum of 17% of the generated electricity will go to San Mariano.

-Health Centre, only one person mentioned that the proponent promised a health centre in Tappa. The health centre depends upon the proponent.

-Prevent illegal logging, only in the unpublished documents about the Run-Off River hydropower dam the benefit of preventing illegal logging is stated.

Potential negative impacts and mitigation measures

A large project like a Run-Off River Hydroelectric Power Plant could have a large impact on the surrounding. Fortunately, there are (technical) solutions to mitigate on the negative side-effects. In this paragraph we focus on the disturbance of fish and other animals, environment, logging, changes in sediment and potential influence on floods.

There are various fish species and other animals, crocodiles for example, living in the Ilaguen river (Appendix B). A water impounding project has a lot of influence on the habitat of those species. Traditional hydro dams store enormous quantities of water in reservoirs, sometimes flooding large tracts of land. In contrast, Run-off River project do not have most of the disadvantages associated with dams and reservoirs, which why they are often considered environmentally friendly (Hydromax Energy Limited, 2015). There is a fish ladder included in the design to secure that the species are not affected by the Run-off River project. Furthermore, the fish ladder improves the transport of sediment along the river. It is important to keep the transport of sediment intact; otherwise there will be a lot of erosion downstream. Not only animals are affected by the hydropower project, to construct the River-runoff Hydropower project, the construction road and the transmission line, there is a need to cut trees. To limit the side-effects, the proponent is required to undertake specific measures, which are stated in the

Environmental Compliance Certificate (ECC), a summary of the ECC can be found in the appendix. The watershed area is predominantly vegetated with second growth Dipterocarp forest with patches of denuded areas wherein some forest occupants have their clearings/cultivations. The upper and distant portion of the aforesaid forest reserve is still undisturbed and considered haven for various flora and fauna, which needs to be protected and managed well in order to preserve its natural condition (Ilaguen River Hydro project Final, 2014).

The dam won't have any influence on the occurrence of floods, because it is a Run-Off River project. This means that the water is not completely blocked by the project, therefore the project will not have any influence on floods downstream.

Agreement with indigenous people

Unfortunately, some Agta and Calinga who are living at the riverside near the dam site will be affected. Because of the construction of the project, the people need to be relocated. Unfortunately, we have not been able to interview Agta, but we did obtain documents showing they have given their consent to the construction of the dam. On December 19, 2012, the Agta and Calinga came up with a memorandum of agreement (Ilaguen River Hydro project Final, 2014):

Translation of document IPC-REF-006:
Whereas the Calinga and Agta tribe are living harmoniously in the mountains, forest and rivers in the land of San Mariano, Isabela which started long ago until now.
Whereas the Calingas and Agta are considered brothers and sisters without discrimination
Now therefore, there is a project of Isabela Power Corporation within the Agta Ancestral Domain and the advantages and benefits has been already discussed by IPC to the Agta and also to the Calinga. With this document we affix our signatures and thumb marks as proof and statement that we have accepted the power plant project.
Furthermore, some of the Agta will be employed as forest guards, forest rangers and laborers.

Interruption of the construction

May 2015, the construction of the hydro project has stopped suddenly. There are different speculations about why the construction is stopped. Unfortunately, we couldn't contact the IPC for the official reason of the interruption of the construction.

Local people provided us with different explanations. Some people believe that there are important minerals in the ground, others believe that there is a treasure near the construction site. The project site is located in a conflict area. The NPA does not agree with the plans of the dam, because of several (unknown) reasons, so it could be a possibility that the project is stopped because of safety issues on the construction site.

DISCUSSION AND RECOMMENDATIONS

While doing the interviews, it became clear that almost every resident of Tappa knew about the dam, so we can conclude that there is awareness among the local people in Tappa. Although people were aware of the project, they often seemed not to have the right information. Some people thought that the project is about an impounding hydropower dam. So the first possible improvement that could be made is to deliver more information to the residents of both Tappa and Cadsalan. This could be organized by locating a community organizer in every barangay,

who keeps the residents up to date on the latest developments of the plans. In that way the transparency of the project will be secured as well.

For the sake of the environment, it is positive that the plan of the dam is changed from an impounding dam to a Run-Off River Hydroelectric Power Plant. As mentioned earlier, the Run-Off River Hydroelectric Power Plant does not have many disadvantages associated with dams and reservoirs. Additionally, the fish ladder is an excellent mitigation measure. Furthermore we think that it is important to monitor the environment closely to make sure that the environment is not affected. This could be achieved by working together with local communities, indigenous peoples (IP's) and environmental organizations acting in San Mariano, such as the Mabuwaya Foundation Inc..

We conclude that the Run-off River Hydroelectric Power Plant does nott have any influence on the occurrence of floods downstream, especially for Cadsalan and Tappa, which are flood prone areas (Appendix D). The Run-off River Hydroelectric Power Plant does not change the regime of the river, so therefore it flows naturally and it will not influence the occurrence of floods. This is contradictory to the perception of many people we interviewed; they were afraid that the occurrence of floods will increase. We think that if there is enough information available, the people would not be afraid anymore.

Last but not least, we want to emphasize the opportunities the hydropower project for the community of Tappa. Especially the labor and the construction road would help to develop the community of Tappa. Furthermore the municipality will benefit from the dam through the taxes.

ACKNOWLEDGEMENTS

We would like to give our sincere gratitude and heartfelt thanks to the following people who gave their knowledge, expertise, time and efforts for the fulfilment of this research paper, the fruit of our collaborative labours: to the community of Tappa, especially the barangay officials, for their hospitality and for allowing us to conduct our field research in their community; to all our respondents who genuinely gave their time, without them, it would have been impossible to have the information the that we needed to fulfil this research; to our host person, Mr. Romy Lorenzo, who didn't hesitate to welcome us in his house and allowing us to stay there for four days and be part of his family; to Bernard and Leonalyn who supervised our stay in Tappa and assisted us during our field surveys; to Amante for his guidance and who has been with us in the Local Government Unit (LGU) interview; to the representatives of different offices of the LGU, such as MENRO, MPDC, MDRRMC, and MAU, for sharing their expertise and knowledge; to sir Jouel Taggueg who gave us the a lot information regarding our topic; to all the research group companions in Tappa, who made our stay there more enjoying and superb, and of course; to Almighty God who gave us the strength, wisdom and the guidance all throughout the research study.

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ENGR. Victor C. Pagaling 2012. Flood prone area map of San Mariano.

APENDICES

APPENDIX A. List of respondents

#	Name	Resident of	Date of birth	Age	Gender	Marital status	Children	Ethnicity	Education level
1	Romeo L Villamore jr	Tappa	July 30, 1992	43	Male	Married	4	Ibanag	none
2	Eduard Pulut	Sitio Pili	Nov. 28, 1978	37	Male	Married	4	Ifugao	Elem. 4
3	Luis Baquiran	Tappa	March 12, 1943	72	Male	Married	2	Ibanag	Elem. 1
4	Pedro S. Ramoz	Sitio Pili	Oct. 19, 1959	57	Male	Married	5	Ilocano	Elem. 3
5	Lerma Tagtag	Sitio Pili	Nov 4, 1992	23	Female	Married	2	Ilocano	High school 4
6	Elena Siringan	Tappa	Unknown	84	Female	Married	4	Ibanag	none
7	Daniel Jimenes	Tappa	Dec. 29, 1979	35	Male	Married	3	Kalinga	College 4
8	Carmelita Limos	Tappa	Aug. 14, 1955	40	Female	Married	4	Ilokano	High school 4
9	Rodrigo Baccay	Tappa	Dec 10, 1948	47	Male	Married	4	Kalinga	Elem. 2
10	Dadang Siringan	Tappa	Unknown	60	Male	Married	4	Kalinga	None
11	Rodny Siringan	Tappa	July 12, 1984	27	Male	Married	1	Kalinga	High school 4
12	Rupino Magas	Tappa	Unknown	60	Male	Single	0	Kalinga	None
13	Judy M Lanquido	Cadsalan	March 8, 1982	33	Male	Single	0	Kalinga	College 2
14	Anacleto Labugnen	Cadsalan	Unknown	83	Male	Married	11	Ilokano	None
15	Alejandro Batac	Cadsalan	Set. 24, 1976	39	Male	Married	3	Tagalog	None
16	Romy Lorenzo	Tappa	Unknown	Unknown	Male	Married	3	Unknown	Unknown

APPENDIX B. List of species found near the construction site (Pinacanauan De Ilaguen Run-Off-River Project Site 1 Comprehensive Feasibility Study FINAL 2014):

Common name	**Scientific name**
A. Avifauna	
Rufous Hornbill	Bucerous Hydrocorax
Tarictic Hornbill	Penelopides Panini
Phil. Turtle Dove	Steptopedia Bitourguata
Luzon Little Crow	Cervus Enca
Spotted Wood Kingfisher	Actenoides Lindsayi
Phil. Dwarf Kingfisher	Ceyx Melannurus
Rufus Caucal	Centropus Unirufus
B. Mammals	
Phil Forest Rat	Rattus Everetti
C. Reptiles	
Monitor Lizard	Varanus Salvator
Phil. Pit Viper	Trimerusurus Flavomaculatus
Crocodiles	Crocodylus Mindorensis

APPENDIX C. Summary of measures stated in the Environmental Compliance Certificate (ECC) Amendment, ECC R02-1102-0001

1. Closely monitor possible contamination on surface waters and turbidity levels due to runoff and keep records of the monitoring activities;
2. Forty meters wide buffer zones measured landward along the river banks shall be established
3. Preservation of the natural drainage, if practicable, shall be undertaken;
4. Tree inventory shall be undertaken in coordination with the CENRO Office concerned prior to cutting
5. Stabilize heavy eroded soils, degraded areas, and stream banks with indigenous fast growing species and deep rooted grasses;
6. Install lift and ladder for passage of indigenous fish species or construction of bypass system to improve survival rate;
7. Ensure the sustainability of water used for irrigation and other domestic purpose of the community
8. Immediately provide a relocation area for the indigenous peoples to be displaced by the project subject to the approval of agencies;
9. Implement acceptable practices, procedures and standards of mitigating the exhaust emissions of the standby generator to comply with the emissions standards as provided for the Republic Act 8749;
10. Implement measures to properly mitigate migration of suspended particles in order to comply with ambient air standards as provided in RA 9749
11. Proper orientation on solid waste management shall be given to collectors and other workers in the project to ensure that waste generated are properly handled

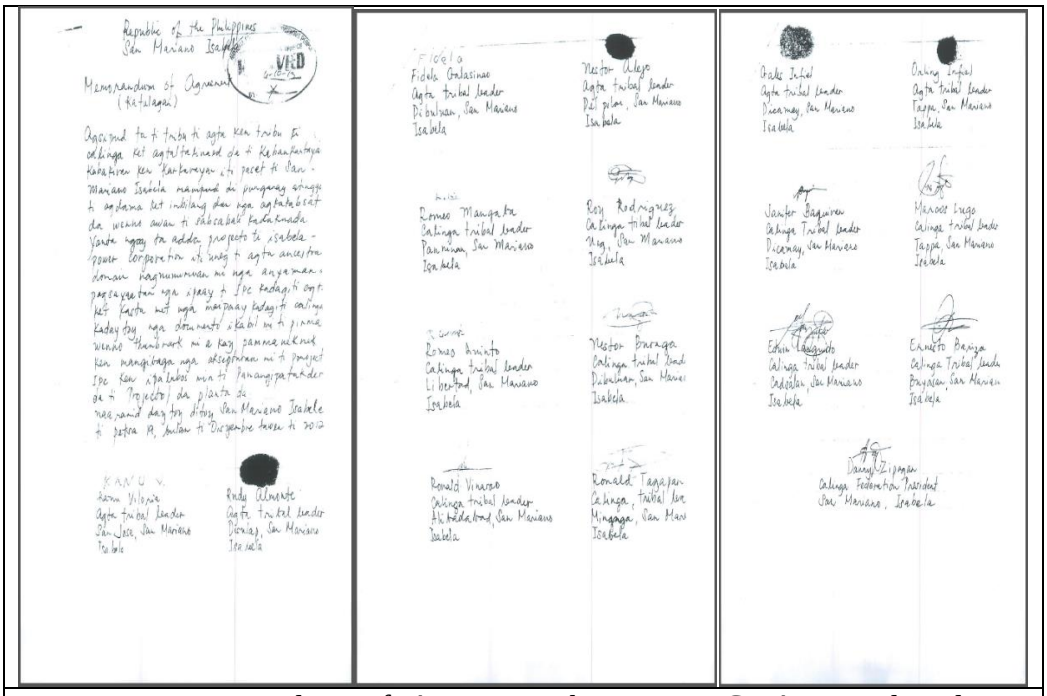
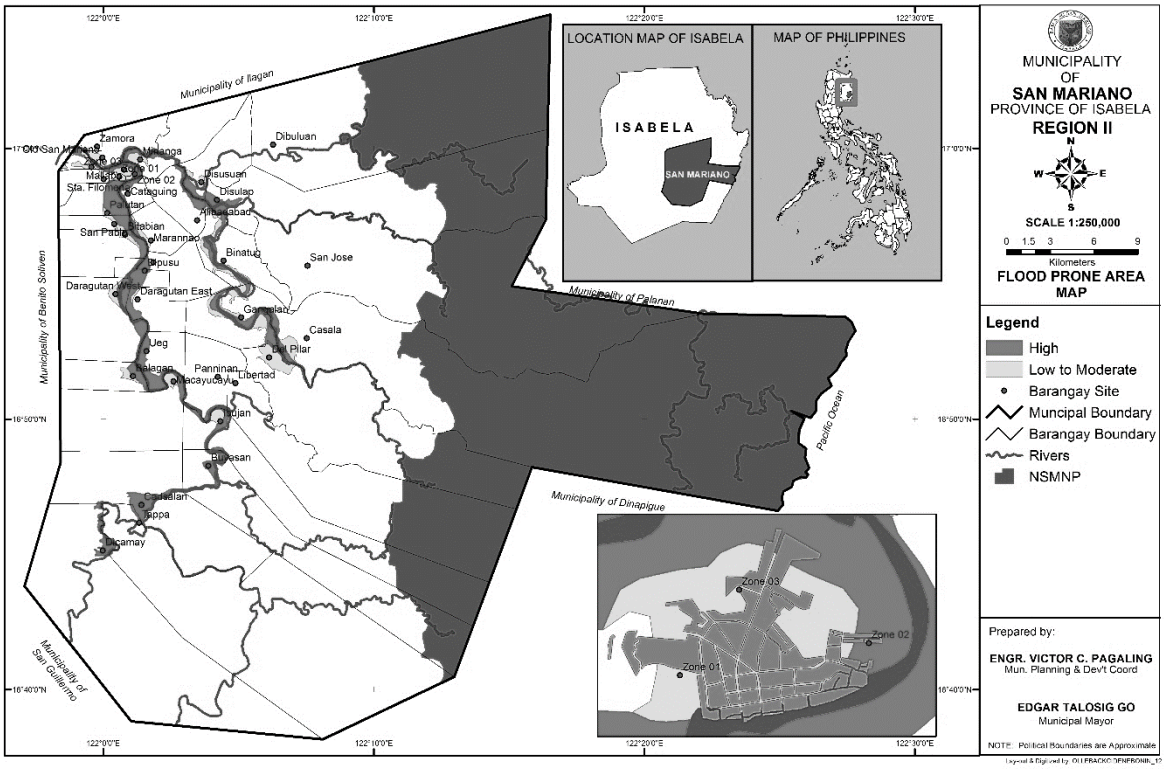


Figure 5. Memorandum of Agreement between IPC, Agta and Kalinga. (Pinacanauan De Ilaguen Run-Off-River Project Site 1 Comprehensive Feasibility Study FINAL 2014)

APPENDIX D. Flood prone area map



Source: ENGR. Victor C. Pagaling 2012

APPENDIX E. Questionnaires

I. Personal profile

Buong Pangalan (Name): _____
Tirahan (Address): _____
Petsa ng Kapanganakan (Birthdate):_____ Edad: ___ Kasarian: ___ Lalake ___ Babae
Marital Status (Civil Status): _____ Bilang ng Anak (No. of children): _____
Pangkat Etniko (Ethnicity):_____
Pinakamataaas na Edukasyon na Natapos: Lagyan ng tsek (/) ang numero
(Highest educational attainment: Put check (/) in the box)

ELEMENTARY							HIGH SCHOOL				COLLEGE				
0	1	2	3	4	5	6	1	2	3	4	1	2	3	4	5

II. Perceived impacts on floods regarding the proposed 24MW Ilaguen River Hydropower Project

Q1. Do you know about the proposed dam?
a) How do you know about the dam?

Q2. Were there consultations occurred between the community and the proponent of the dam?
a) How many consultations and meeting?
b) What sort of information did the proponent provide you in relation to the dam?
c) What projects did the proponent promise you in relation to the dam?

Q3. What is your opinion about the dam?
a) Are you in favor about the construction of it? Why?
b) What are the benefits of the dam during and after the construction?

Q4. Potential negative impacts of the dam
a) Do you think the dam has any influence on floods?
b) Do you think the dam has any influence on the fish population?
c) Do you think the dam has any influence on the environment?

Q5. Why has the construction stopped?

FLOOD RISK PERCEPTION AND THE PROPOSED ILAGUEN HYDROPOWER PROJECT IN CADSALAN, SAN MARIANO, ISABELA

Dayan Darween Q. Delos Santos and Nynke Blömer

INTRODUCTION

The Philippines yearly experiences heavy rainfall, typhoons and storms, and is characterized as one of the top three riskiest countries (World Risk Index 2011). As a result, floods are prominent in low lying areas, especially to places in the vicinity of rivers. One of these areas is Cadsalan; a barangay consisting of many farmers, in the municipality of San Mariano, Isabela, and lies within the Cagayan River Basin and floodplain. More specifically, Cadsalan is located near the Ilaguen River in the Ilagan River Sub-basin (Balderama 2016). Due to its location, Cadsalan is prone to flooding, and experiences yearly floods (NAPOCOR 1995).

Dam development in the Ilaguen river basin has been discussed by various parties since the 1990s. The initial dam development proposal was the 88MW Ilaguen Small-B Hydropower Project (IHP), and was first conceived by the National Power Corporation of the Philippines (NAPOCOR) for electricity production to supply the Luzon area (NAPOCOR 1995). In 2012, the dam proposal was referred to as the Ilaguen Multi-Purpose Irrigation and Hydro Power Project (NIA 2012). Recently, it has become evident that the proposed dam will provide 19MW, rather than 88MW (Balderama 2016). Its planned location for construction is located in the San Mariano and Dinapigue municipalities, east of Santiago City and to the west of the Sierra Madre mountains. While infrastructure construction has started, the dam has not yet been constructed and there is no clear indication as to when and if it will be constructed.

In order to understand the effects of the proposed dam development on the community in Cadsalan and other downstream settlements, it is important to understand the flood risk perception, and the perception of how a dam will affect the likelihood of a flood event. In addition, a distinction needs to be made between the facts and the norms surrounding flooding (Persoon 2016). The facts and the norms surrounding flooding can be determined by field research. The norms of the residents of Cadsalan can be defined by their risk perception. While some facts about flooding in Cadsalan are unavailable at present, there are guidelines found in the law of the Philippines in the case of a natural disaster. In the event of a typhoon and consequent flooding, the Philippine National Disaster Risk Reduction & Management Council (NDRRMC) has prepared a plan of action involving the Local Government Units (LGUs) (DILG 2015). According to the Disaster Preparedness Manual, LGUs are the main point of contact, by law, for their residents in the event of a natural disaster.

According to Birkholz *et al.* (2014), flood risk perception is an integral part of community resilience to floods. Birkholz *et al.* (2014) defines risk perception as "intuitive judgments, through which people assess the potential impacts and consequences of a hazard and choose appropriate behavioral responses." In addition, Integrated Flood Management calls for an understanding of local flood risk perception (Juarez Lucas and Kibler 2015). Juarez Lucas and Kibler (2015) define three important pillars in the conceptual framework of Integrated Flood Management; ecosystem services, livelihoods, and risk management. Combining these two frameworks, it is possible to characterize the flood risk perception of the residents of Cadsalan.

RESEARCH QUESTION

What is the risk perception of flood events and how will the Ilaguen Hydropower Project affect flood risk perception in Cadsalan, San Mariano, Isabela?
In order to have more depth to the research question, it has been divided into three sub-questions attempting to address the facts (question 1) of the flooding situation, the norms (question 2) of the residents of Cadsalan, and the impact of the dam (question 3):

1) What is the current situation with regards to flooding according to the residents; what is the frequency and intensity of flood events?
2) What is the local risk perception on floods and is there a general consensus on the cause of the floods?
3) How is the IHP dam perceived; and more specifically, in terms of flood risk?

METHODS

In order to understand the interactions between risk perception, risk management by the community, livelihoods, and the environment, a simple framework has been developed (Figure 1). The Integrated Flood Management concepts (environment and ecosystem, livelihoods, and the impact of floods) have been illustrated to depict the areas of interest for the present research. The perception of the floods and the proposed dam on livelihoods can be approached by conducting interviews, while the environment and ecosystem of the Barangay can be outlined by constructing a participatory flood map and by conducting a transect walk.

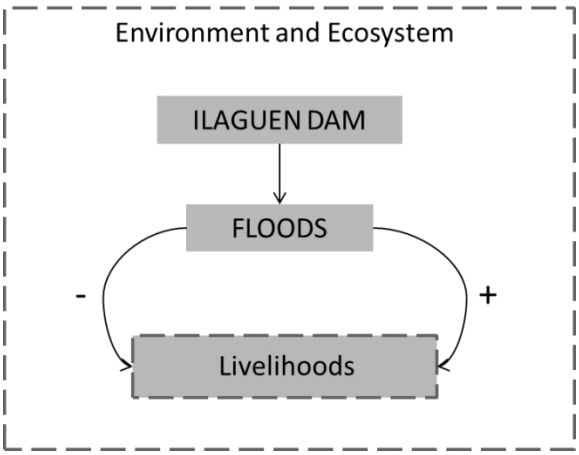


Figure 1. A simple framework of the different components of Integrated Flood Management; arrows indicate perception.

Transect walk

A transect walk was organized on the first day in order to gain an insight into the composition of the Barangay and the situation of the respondents. Key informants as well as an organizer of the fieldwork were present to guide us through the Barangay and to answer, and when needed, to translate questions. The transect walk was also used to gain some information for the creation of a sketch map of the Barangay as well as a Barangay profile, such as number of households.

Participatory flood map

According to Nogueira de Andrade and Szlafsztein (2015), community participation in mapping floods can be a useful tool to understand the effect of flood events on a community, as it gives the community an opportunity to express their concern and their perception of the flood event. In addition to a map outlining flood risk perception, a slope and natural hazards map may be useful in assessing the situation in an area (Nogueira de Andrade and Szlafsztein 2015).
Firstly, a simple sketch map was created by a key respondent during an informal interview session at their home. The most important buildings and structures to the community were outlined by the respondent. Based on the sketch, a more clear and complete map was produced by the researchers and shown to the key respondent for verification.
In order to gain insight into the flood prone areas of the Barangay, the participatory flood map was created by showing the simple sketch map to respondents, and asking them to indicate

where flooding has occurred in their experience. In addition, we tried to ask the respondents to indicate the difference between a severe flood and an average flood on the map. Lastly, a flood risk map may be obtained from the Local Government Unit of San Mariano.

Semi-structured interviews

Guiding questions were developed in order to assess the perception of flood events, through semi-structured interviews (Appendix A). The interviews attempted to address the research question and sub questions directly, and were conducted with Cadsalan locals by approaching their homestead randomly, in *Purok* (zone) 1, 2, 3, 4, and 5 out of a total of seven *Puroks*. The proposed sample size of the interviews was 30 respondents; however a sample of 20 was reached (Appendix F).

The different methods have been carried out in English, Tagalog, Ilocano, and Ybanag, based on the preference of the respondent. Before the interview commenced, the respondent was asked to state their preferred language, and whether they were comfortable with the translation to English. After each question, it was translated to English and the language of preference by Dayan Delos Santos. Further guidelines for the interviews and interactions are outlined in Appendix C.

Table 1. Time schedule during the field research.

Day	***Date***	***Activity***	***Location***
Monday	18-01-15	Travelling from ISU Cabagan to Barangay Cadsalan, San Mariano, Isabela A.M.: Visit Philippine Crocodile Rearing Station in San Mariano P.M.: Meet the host family in Cadsalan	Garita Heights, Cabagan, Isabela – Barangay Cadsalan, San Mariano, Isabela
Tuesday	19-01-15	Talk to the Barangay Officials to construct a basic flood map A.M.: Do a transect walk P.M.: Conduct interviews	Barangay Cadsalan *puduk* (Purok 3, 4, 5)
Wednesday	20-01-15	Conduct interviews (highly and moderately affected area)	Barangay Cadsalan Purok 4 and 5
Thursday	21-01-15	Conduct interviews (not affected area)	Barangay Cadsalan Purok 2 and 1
Friday	22-01-15	A.M: Conduct interviews (highly affected area) P.M: Visit the Pinacanauan and Pasung River Intersection	Barangay Cadsalan Purok 3 and Barangay Tappa
Saturday	23-01-15	Travelling back to Cabagan	Barangay Cadsalan – Cabagan

RESULTS

Barangay Cadsalan Profile

Upon arrival, the Barangay officials were approached in order to organize a transect walk, to gain an overview of the Barangay. Due to the absence of the Barangay Captain, Gervacio V. Labuguen, his son Alvin Labuguen guided the transect walk, passing important buildings for the community. During the walk, basic questions were asked about the Barangay, such as population, number of households, number of churches, and the division of the Barangay. This transect walk was the basis for a very basic map of the Barangay.

Following the transect walk, it became apparent that the Barangay is separated into seven different *puroks*, or zones, with a total of 330 households, one school catering around 300 children, two churches (one Roman Catholic and one Born-Again), a health center, and a guest house. The main income for the residents consists of commercial farming of cassava, corn, and banana, with an increasing emphasis on the production of cassava. Additionally, residents usually have home gardens with trees such as calamansi, coconut, papaya, mango, and banana. One particular calamansi tree near the guest house is the only place with cellphone signal, and is therefore an important landmark of Cadsalan (Appendix E, Figure A). Four of the *puroks* are in upland areas of Cadsalan; namely Lumalog (*Purok* 1), Santor (*Purok* 2), Diwas (*Purok* 6), and Pasung (*Purok* 7). The three remaining *puroks* are referred to as *puduk* or 'Cadsalan proper.' According to our respondent Anacleto Labuguen, the Kalinga word *puduk* means 'small island surrounded by water,' (Appendix D). Another respondent, Dolores L. Aglugub explained that the name 'Cadsalan' is derived from the Ylocano word *Ikadsal*, also meaning 'small island surrounded by water.'

In addition to the basic map, a more detailed map was constructed during an interview with Dolores L. Aglugub, the daughter of the Barangay Captain (Appendix E). During the sketching of the map, we asked Mrs. L. Aglugub to comment on what she was drawing, specifically in the context of flooding, using a few guiding questions (Appendix A). She identified the banks of the river as flood-prone areas, as well as *Purok* 2 as the designated are for evacuation in case of a flood.

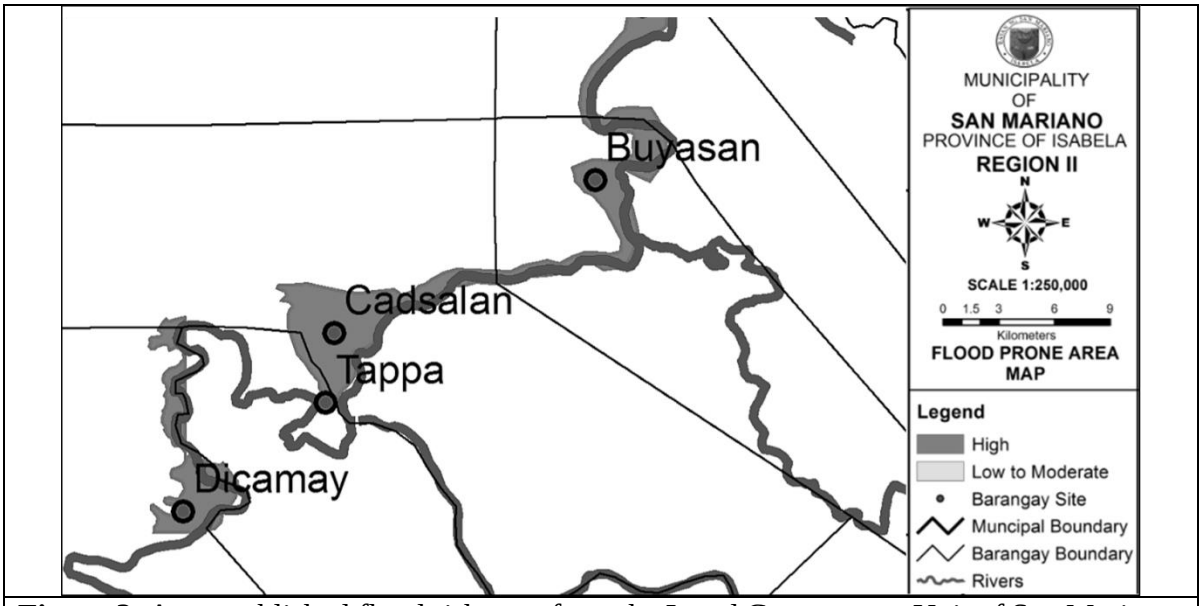


Figure 2. An unpublished flood risk map from the Local Government Unit of San Mariano, adapted to include only Barangay Cadsalan.

Figure 3. A picture of where the Ilaguen River splits into the Pasung River and the Pinacanauan River near Tappa. This area is mostly dry, except during heavy rainfall. (Nynke Blömer, January 22nd, 2016).

Figure 4. A picture of the Pinacanauan River, taken near Tappa. Interestingly, the river is much wider and deeper than the Pasung River. (Nynke Blömer, January 22nd, 2016).

Sub-Question 1: Current situation

The majority of the respondents indicated that there is a flood event twice a year, mainly occurring in the rainy season, during the months of June to December. One respondent indicated that the flooding is usually between October and December. Additionally, the main consensus is that the frequency of floods and the intensity of a flood event depend on how intense the rainfall is as well as how severe typhoons are. Several respondents indicated that a typhoon with signal number three has the ability to cause floods, as well as rain events that start during the night and last for at least a few days.

When asked about the severity of the floods (see guiding questions, Appendix B), many respondents from P*uroks* 3, 4, and 5 answered in terms of effects. In the event of a severe flood, the two rivers Pasung and Pinacanauan close off Cadsalan *puduk* from the other *puroks* and the roads out of the town. A situation where no-one can leave or enter *puduk* is considered as severe, and usually lasts three to five days.

While the *puduk* area is mostly affected by flooding, residents from Santor (P*urok* 2) indicated that they, too, can suffer from being cut off from *puduk*. One respondent told a story about a body that had to be transported to *puduk* for balming and burial, during a flood event, and that the only way to get across was by bamboo raft, thus endangering the lives of the transporters and running the risk of losing the body to the flood.

Sub-Question 2: Flood risk perception

All of the respondents from the *puduk* area indicated that they felt fear of flooding. Respondents from the higher elevation *puroks*, in Lumalog and Santor, usually do not feel fear for their own safety, but fear for the safety of their relatives and friends in the lowland areas. Two informants in particular, a 51-year-old female from *Purok* 2 and a 65-year-old female from *Purok* 5 indicated extreme fear of flooding. The 51-year-old indicated that she could not eat out of fear in the event of a flood, and the 65-year-old indicated that she has the fear of drowning and dying in the case of a flood.

The main negative effects of flooding include the formation of an island due to rivers around *pukuk*, crop destruction, threat to personal safety, health issues, and water discoloration (Figure 5). Only the upland areas experienced water discoloration and adverse health effects. On the other hand, positive effects include more fish in the river which can be used for consumption,

and logs being found in the river from illegal logging facilities upstream (Figure 6). However, most respondents did not consider any positive effects from flooding.

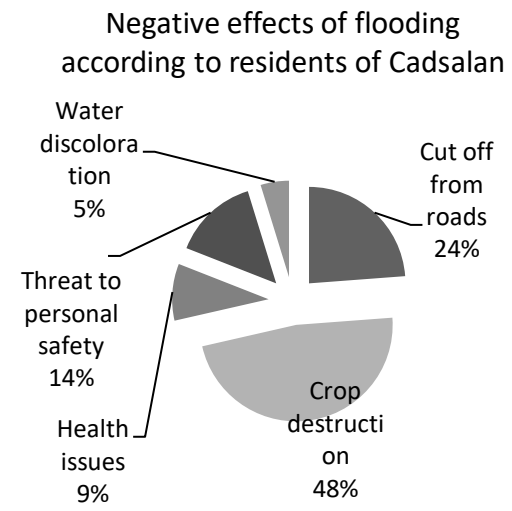


Figure 5. Negative effects of flooding according to personal experiences of the residents of Cadsalan.

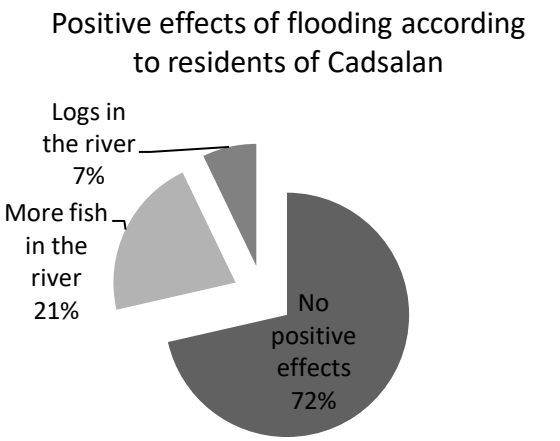


Figure 6. Positive effects of flooding according to personal experiences of the residents of Cadsalan.

According to the majority of the respondents (65%), the reduction of tree cover in the Sierra Madre region has led to a faster increase of water level during a flood event. Some respondents stated that this was due to the fact that trees have the capability to take up water during rainfall, thus reducing the amount of runoff. Reduction of flood level, according to the majority of the respondents who mentioned deforestation, can be achieved by implementing a total log ban, and reforestation. One respondent suggested the planting of bamboo near their homes.

Figure 7. Logs arriving in Tappa after being transported on the Ilaguen River. Illegal logging is still occurring in the Northern Sierra Madre Natural Park, even after the implementation of a total log ban. (Dayan Delos Santos, 22nd of January 2016).

Figure 8. *Capitana* (Corazon Labuguen) and *Apu* (Anacleto Labuguen) in their home, after an interview (Nynke Blomer, 22nd of January 2016).

A key respondent, the oldest man in the village, recounted his experience of the worst flood Cadsalan has seen, in 1947, with water levels reaching to his neck (Appendix D). According to him, Anacleto Labuguen (also referred to as *Apu*), floods at the present time are more dangerous than before, due to climate change, quarrying, siltation of rivers, and deforestation in the Sierra Madre mountain range. He has a fear that a flood as severe as the one in 1947 may happen again in the future and that it may be more risky and severe than the first one. His biggest fear is that the town of Cadsalan will be erased completely from the map of San Mariano, due to flooding.

Sub-Question 3: Perception of the proposed dam

While an interview with the Barangay Captain's wife led to the information that there was a 50 percent acceptance in Cadsalan of the proposed IHL dam, other interviews indicated a clear opposition to the dam (Figure 9). Residents of the upland *puroks* were mostly in favor, but decided to oppose the construction due to the increased flood risk in low-lying areas, as their relatives and friends reside there, and thus may be at risk. Twenty percent of the respondents had not heard about the dam, or did not want to share any opinion.

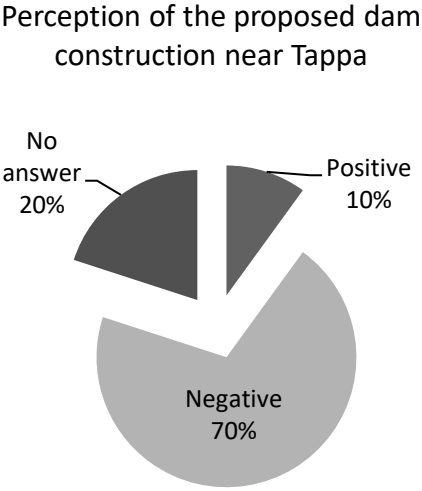


Figure 9. The perception of the proposed dam construction upstream near Tappa among Cadsalan residents.

The main reasons for opposing the dam were an increase in flooding, and fear for the safety of relatives and friends living in more vulnerable areas (Figure 10). Another reason given by some of the respondents was the fear of death by drowning during a flood or when trying to cross the river. One respondent in particular, in *Purok* 5, stated that if the dam were to be constructed, "we will all die." This indicates a very strong opposition to the dam development. Finally, one respondent indicated that foreigners may come to the area, creating noise and disturbing the peace of the Barangay.

While many respondents were against the dam construction (70%), most of the respondents also named some positive aspects. These included a more stable power supply, a possibility for

irrigation, job opportunities, and the creation of infrastructure (Figure 11). However, these reasons often did not weigh up to the negative effects of the dam. For example, three respondents said that they would rather have a less stable supply of electricity than an increased flood risk. Another two respondents said that even though the dam may supply electricity and infrastructure, they already have a source of electricity and a road. Finally, two respondents indicated a dislike for foreigners entering Cadsalan due to the fear of bad management of the area and the disturbance of peace.

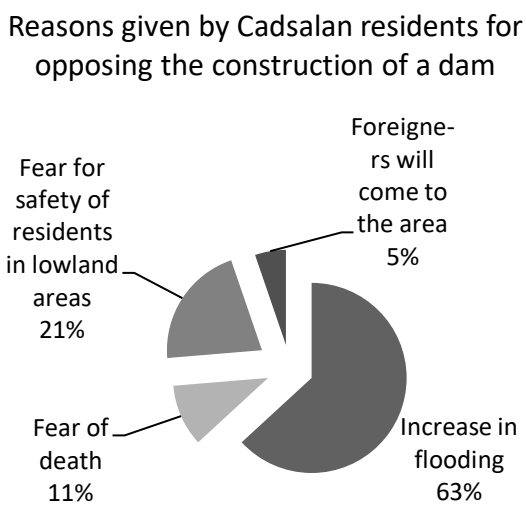


Figure 10. Reasons given by respondents for opposing the construction of the proposed dam construction.

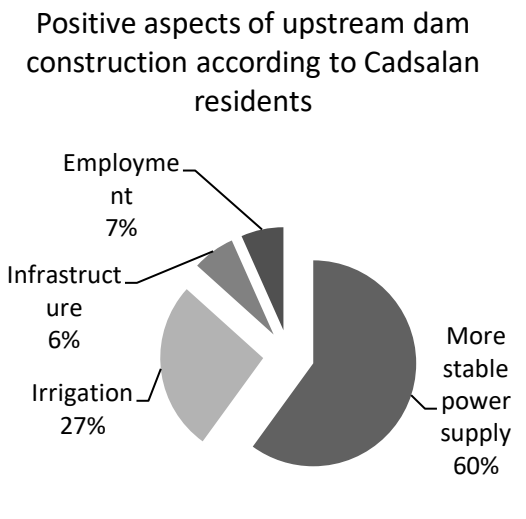


Figure 11. Positive aspects of the construction of the proposed dam given by respondents.

DISCUSSION

In summary, Barangay Cadsalan is vulnerable to floods, on average experiencing two floods per year. Floods destroy crops, property, and sometimes affect health. Most importantly, the residents of Cadsalan feel fear towards floods, and if they do not fear for their own safety, such as in the higher areas, a fear is present for the safety of others in lowland areas. Furthermore, the general opinion about the dam is that it should not be constructed due to an increase in flood risk, as perceived by the residents. Finally, many respondents indicated that deforestation has a significant impact on water levels during floods.

It is important to state that due to the lack of data on rainfall and flooding in Cadsalan, we mainly had to rely on the personal experience of the residents. This means that our first sub-question, which was meant to approach to facts surrounding flooding, is subjective rather than objective. Furthermore, it is interesting to note that there may be differences in the perception of the severity of a flood event. This is due to the differences in personal experiences of the residents. For instance, a resident of an upland area will experience the flood differently to a lowland resident.

Furthermore, in the event of a flood, there is the option to go to the designated evacuation area, Santor. However, the respondents in Santor indicated that most people in the *puduk* area wait and see what the effect of the heavy rain will be, thus missing the opportunity to get to higher ground when the flooding starts, as they will be trapped in *puduk*. According to Alvin Labuguen

(son of the Barangay Captain), there is a Barangay Disaster Risk Reduction Organization, which is headed by the Barangay Captain. However, none of the respondents mentioned such an organization. Interestingly, many residents of Santor, *Purok* 2, stated that their reason for moving to the *purok* was because of the severe flood in 2002 (see story of *Apu* in Appendix D). Therefore it can be concluded that Santor has been used as an evacuation area, but that there are few new settlers in the area.

An interesting addition to our research could have been the ways in which residents of Cadsalan protect themselves against crop losses due to floods. It would be interesting to investigate whether farmers have both land in the uplands and the lowlands to insure themselves against crop damage.

Finally, many male inhabitants of Cadsalan were in the *centro* (San Mariano proper town), and thus unavailable for interviews. The reason being they are members of '4P's' (Pantawid Pamilyang Pilipino Program), an initiative of the government of the Philippines to support families by issuing quarterly checks for, for example, supporting their children. Therefore, there may be a gender bias in our results.

Recommendations

Residents of Barangay Cadsalan have observed that flooding in their place has become more frequent and wide spread which creates damage to property and crops. As stated in the results section, many respondents identified deforestation and illegal logging as a reason for this increase. Therefore, it is recommended that reforestation initiatives take place, if they have not already.

Additionally, the residents of Cadsalan would benefit from an early warning system in the event of a signal number three or four typhoon or in the event of predicted heavy rainfall, where they have an opportunity to go to the evacuation area as well as stocking up on emergency foods.

ACKNOWLEDGEMENTS

We would like to express our deepest gratitude to the following people who helped us to make this research possible: Our host family, Dolores L. Aglugub, Bon Bon Aglugub, and their children for opening their home to us, and for the invaluable help with the sketch map. The Barangay Captain Gervacio V. Labuguen and his family, for opening his home to us and welcoming us into Barangay Cadsalan. Our respondents, for sharing their ideas, insights and for giving us essential information.

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APPENDICES

Appendix A. Guiding Topics: Participatory Flood Map

1. Flood prone areas of the Barangay?
2. Which areas are vulnerable to damage?
3. Is there an organization to manage flood risk? For example the Disaster Management & Risk Team of the Barangay?
4. Are there any evacuation areas?
5. Are there any other areas of interest?

Appendix B. Guiding Questions: Semi-structured Interviews

Name:	Settlement history:
Age:	Livelihood/profession:
Gender:	Ethnicity:

1) Topic 1: What is the situation with regards to flooding

a. How often do you experience floods per year?

b. How severe are the floods?

2) Topic 2: What is the perception of the floods

a. Do the floods have any positive effects? Livelihood, health, or property?

b. Do the floods have any negative effects? Livelihood, health, or property?

c. Do you feel at risk?

3) Topic 3: Are there any specific reasons why flood events occur

a. What can be done to prevent or reduce floods?

4) Topic 4: How will the dam impact the likelihood of a flood event

a. What is your opinion about a dam upstream of Cadsalan?

b. What are your expectations?

c. What are your fears?

5) Final questions:

a. Do you have any questions or comments you would like to share?

b. Can we use the notes we made?

Appendix C. Guidelines for semi-structured interviews

- Approach a potential respondent with respect and use the appropriate greeting
- Use simple and clear language
- Briefly introduce the purpose of our research and ask for permission to conduct an interview
- If the respondent agrees, further explain the research and introduce ourselves
- Ask the respondent to choose a seating arrangement, and whether they are comfortable with the interviewing, translating, and note taking
- Proceed with the interview until the respondent indicates that they would like to stop
- When taking pictures, always ask the subject for permission

Appendix D. Interview with *Apu*, Anacleto Labuguen.

A story from an old man of Barangay Cadsalan

Anacleto Labuguen, is an eighty-five (85) year-old Kalinga man commonly called "Apu." He is currently known to be the oldest living man of Barangay Cadsalan who also identified himself as part of the first group of people who settled in Cadsalan. According to him, Barangay Cadsalan got its name from the word "ikadsal" which means to block or get in the way — referring to a very large stone found in their place which they call "fugu." This stone barricades (holds up) the passage way of the Pinacanuan River located on the eastern part of the Barangay. This *fugu* became a landmark for the people because similarly to the stone, the whole proper area of the Barangay is an island surrounded by a river.

Barangay Cadsalan harbors mostly Kalinga and some Ilocano people of San Mariano, Isabela. The proper area of Cadsalan, refered to as "puduk" pertaining to purok 3, 4, and 5 is prone to flooding because it is a low land area. *Puduk* is a Kalinga word which means 'small island surrounded by water.' *Apu* said that in the beginning, there is only one channel of the river that lies on the east but happened to branch out in to another passage due to quarrying near the boundary of Barangay Tappa. *Puduk* was then surrounded by these two rivers─ *Pinacanuan* on the east and *Pasung* on the west. Every time they experience heavy rains these two rivers meet together and the whole *puduk* gets trapped. They wait for three days for the flood to subside if the rain continuous for days.

It was in 1947 when *Apu* experienced the two consecutive worst flood occurrences during his teen years. Based on his experience, the first flood was the most severe because the flood reached neck level (human height scale). Men always secure the safety of the women and children so they brought them to the highlands of Cadsalan, including their livestock. When the flood is high and the road is not crossable, they will make a "balsa," an improvised raft made of bamboo. He also mentioned that he experience having to sit on a balsa with snakes trying to get on the raft during the flood. The second flood was also severe and many crops were destroyed. Another memorable flood event that hit their place was brought by a signal no. 4 typhoon called *harurot* (local name) in 2002. The flood almost reached the residential area and most of the crops were damaged. According to *Apu*, two casualties were reported; they saw two bodies floating by during the flood. They presumed that the bodies were illegal loggers who did not expect the typhoon.

This old man tells a lot about the splitting of the Ilaguen River. He mentioned that one positive effect of the splitting is that the river has two paths, thus slowing the speed of the water. However, there is a high risk of being trapped in Cadsalan during a flood. He said that flood at this present time is more dangerous than the old times because of deforestation, climate change, and siltation of rivers. He has a fear that Cadsalan might not be found on the map of San Mariano in the future, due to complete inundation. He also foresees that more severe floods will be coming especially when the proposed dam is to be constructed.

Appendix E. Participatory Flood Maps

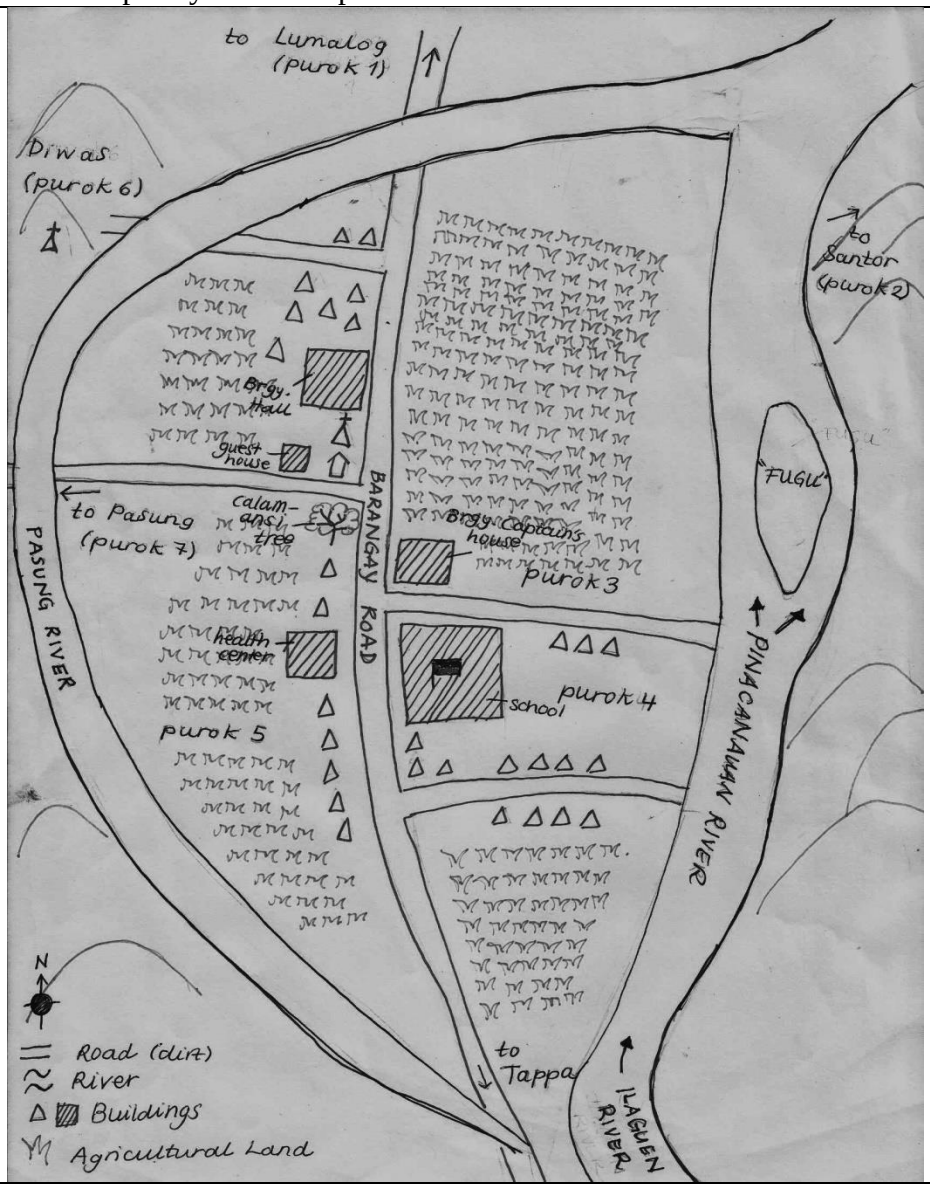


Figure A. A sketch map of Barangay Cadsalan based on the sketches of Dolores L. Aglugub, with a focus on the *puduk* (central) area.

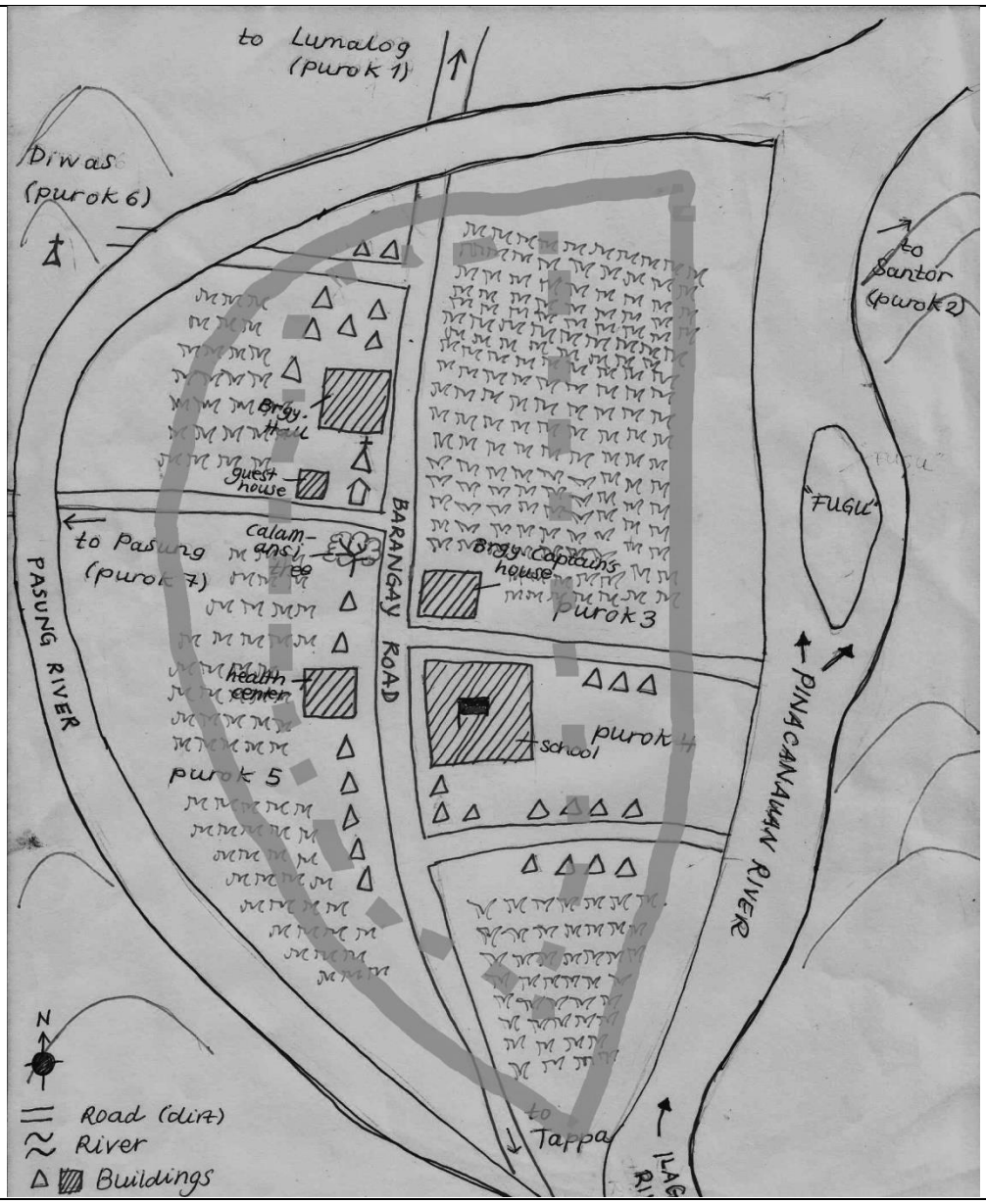


Figure B. A sketch map of Barangay Cadsalan, with a focus on the *pukuk* (central) area, including flood prone areas as indicated by the respondents. A shaded line indicates the average flood mark according to respondents, and the dashed shaded line indicates a high or extreme flood.

Appendix F. List of respondents, ordered by number of interview.

List of Respondents								
Nr	***Name***	***M/F***	***Age***	***Ethnicity***	***Profession***	***Type of Interview***	***Location***	***Date***
1	Anacleto Labuguen	M	85	Kalinga	Farmer	General in small group, and map making with Mrs. Aglugub	Purok 3	19-01
	Dolores L. Aglugub	F		Ilocano	Teacher		Purok 3	19-01
2	Sherry Ann Aglugub	F	22	Kalinga	Housewife, former IT student	General	Purok 4	20-01
3	Jane Ratli	F	18	Ilocano	Housewife	General in small group	Purok 4	20-01
	Renalyn Quilang	F	18	Ilocano	Housewife			
4	Garry Lopez	M	36	Kalinga	Farmer	General	Purok 5	20-01
	Wife of Garry Lopez	F			Teacher			
5	Solinar Lorenzon	F	16	Kalinga	Housewife	General	Purok 5	20-01
6	Maria Impier	F	65	Kalinga	Farmer	General	Purok 5	20-01
7	Edwin Languido	M	42	Kalinga	Barangay Kagawad/Farmer	General, and transect walk	Purok 3	20-01
8	Aquino Appaccag	M	24	Kalinga	Farner	General	Purok 2	21-01
9	Venancio Lorenzo	M	33	Ilocano	Farmer	General	Purok 2	21-01
10	Merlina Languido	F	51	Kalinga	Farmer	General	Purok 2	21-01
11	Noemi Pagawisan	F	27	Kalinga	Farmer	General in small group	Purok 2	21-01
	Marilou Labuguen	F	18	Ilocano	Farmer			
13	Elsa Cadiente	F	23	Ilocano	Farmer/Tenant	General	Purok 2	21-01
14	Arlyn Topiño	F	30	Kalinga	Farmer	General	Purok 2	21-01
15	Gilmar Bugasto	M	27	Kalinga	Farmer/Fisherman	General	Purok 2	21-01
16	Marcelino Palattao	M	60	Kalinga	Farmer	General	Purok 1	21-01
17	Corazon Labuguen	F	56	Ybanag	Farmer	General in small group	Purok 3	22-01
	Alvin Labuguen	M	30	Ilocano	Farmer			

DRINKING WATER AND PERCEPTIONS OF PROVISIONING AND REGULATING ECOSYSTEM SERVICES IN BRGY. CADSALAN, SAN MARIANO

János Csala and Abigail Malta

INTRODUCTION

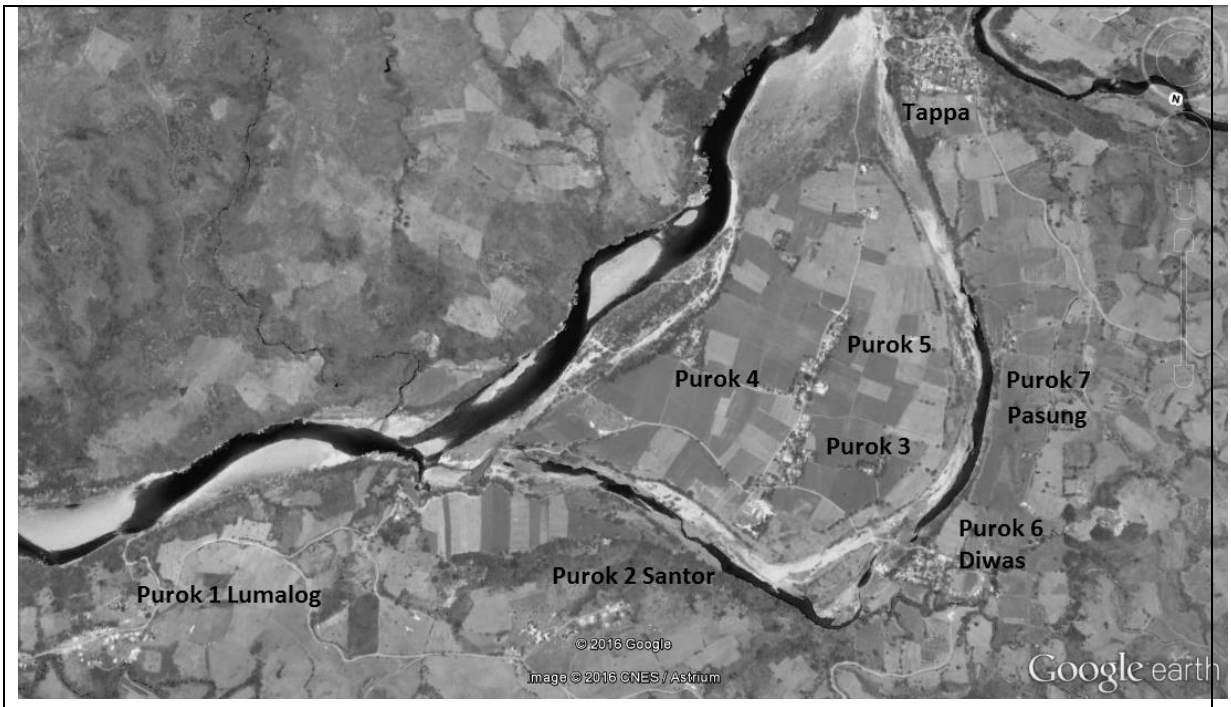
Ecosystem services (ESS) encompass benefits that humans acquire from ecosystems (ES) and mechanisms that are pivotal for sustaining the preconditions of life. Consequently, they furnish our civilization with stability and the ability to develop. Drinking water is identified as a provisioning service; water quality, floods, droughts, and climate are shaped by regulating services. ES functions (ESF) and consequently ESS are undermined by various human activities, such us land use changes, overexploitation, anthropocentric climate change and pollution. ESS are inherently linked to human well-being. Safety, security, access to essential and basic materials, health, and social relations are all either directly or indirectly supplied, and influenced by ESs. These ultimately allow individuals to pursue their personal goals in a productive manner and meet their needs (MEA 2005).

Access to clean water is a pivotal factor in health and development. According to the World Health Organization HO/UNICEF (2013), 768 million people lack access to safe and clean water. By 2030, a 40 percent shortfall is expected to occur in global fresh water supplies in case humanity does not adopt sustainable development and water management practices (UN, 2015). Inefficient and wasteful management and increasing demand are the other main factors behind the water crisis. Scarcity is expected to be exacerbated by climate change (Miller & Spoolman 2008); therefore, it is essential to manage water in a holistic manner that recognizes not only human needs, but also the ecosystem functions that provide our resources and furnish us with stable conditions. The World Water Council's (2000) definition of water security recognizes that individual's ability to pursue a productive and healthy life is dependent on having access to safe water at an affordable price. This understanding recognizes the linkages between meeting individual needs and resilience to calamities and risk induced by water related issues with the integrity of ecosystems. Political stability and sustainable development are integral in pursuing these objectives.

The Philippines has an ample supply of fresh water; nevertheless, access to water is limited by spatial and climatic factors. The majority of drinking water is derived from ground water reserves which are refilled by Earth's hydrological cycle facilitated by the underlying ESFs (WEPA 2009; Miller & Spoolman 2008). Deforestation and forest degradation are the primary land use changes in the Philippines prompted by increasing demand for agricultural land, and illegal logging (Verburg et.al 2006).

The government developed the Cagayan River Basin Management and Development Strategy (CRBMDS) with the policy objectives of reforestation, and pollution monitoring and reduction in aim to rehabilitate watershed ecosystems and consequently protect water sources. LGUs governing and communities relying on watersheds are to be linked by strategic clustering (DENR 2010). This study is conducted with the aim of assessing if the community perceives and manages drinking water as an ecosystem service.

Research area: Barangay Cadsalan, San Mariano, Isabela, the Philippines:



Map of Cadsalan (Google earth)

Cadsalan means "small island surrounded by water". The Barangay is made up of seven zones called Puroks inhabited by 330 households. The majority of the population is Kalinga, the second largest ethnic group is Ilocano. The primary source of income is agriculture. The land cover has significantly changed by the 1990s. Illegal logging is the primary reason behind deforestation.

RESEARCH QUESTIONS

- Do people perceive and manage drinking water as an ecosystem service?
  - What are the sources of and issues with drinking water?
  - How individuals or the community manage these?
  - Are the impacts of climate change on drinking water perceived?
  - What other ecosystem services are perceived?

METHODS

Semi-structured interviews on the basis of the questionnaire (Appendix B) were the primary source of information. We chose semi-structured interviews over structured to be able to gain more insight into the issues and lives of the locals. Furthermore, we went on three transect walks, and utilized participant observation as well. During the first transect walk we mapped the central area of Cadsalan (Purok 3, 4, and 5). During the second and third transect walk interviewees showed us ***bubons***. We investigated drinking water source sites and took photographs from them for documentation. We aimed to triangulate the interview answers through observations and vice versa.

We interviewed 22 people (Appendix B), who were selected randomly from Purok 1, 2, 3, 4, 5 and 7. However, we aimed to identify households that rely on different source of water and for a balanced gender ratio. Twelve females and 11 males were interviewed, the majority was identified as Kalinga, the second largest group was Ilocano, while some respondents were identified as multi-ethnic (Appendix A). No difference in perceptions and management practices between the different ethnic groups was implied. Neither conflicts nor cooperation over or for preserving water was exhibited in the responses.

Table 1. Time schedule and activities

Day/date	***Activities***
Monday 18.01.2016	Travel and arrival in Cadsalan, meeting the host family and observations
Tuesday 19.01.2016	Transect walk and mapping Purok 3, 4, and 5. Observations & interviews in Purok 5 & 3.
Wednesday 20.01.2016	Interviews, observations & transect walks in Purok 2 & 7.
Thursday 21.01.2016	Interviews & observations in Purok 3, 4 & 1. Crocodile night survey.
Friday 22.01.2016	Interviews & observations in Purok 3.
Saturday 23.01.2016	Departure from Cadsalan.

RESULTS

Drinking water sources, issues and their management

Pump well in Purok 3. Pump wells are the primary source of drinking water in Cadsalan. (Photo by J. Csala 2016)

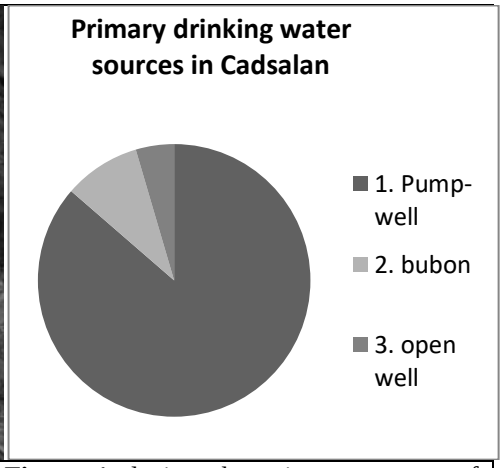
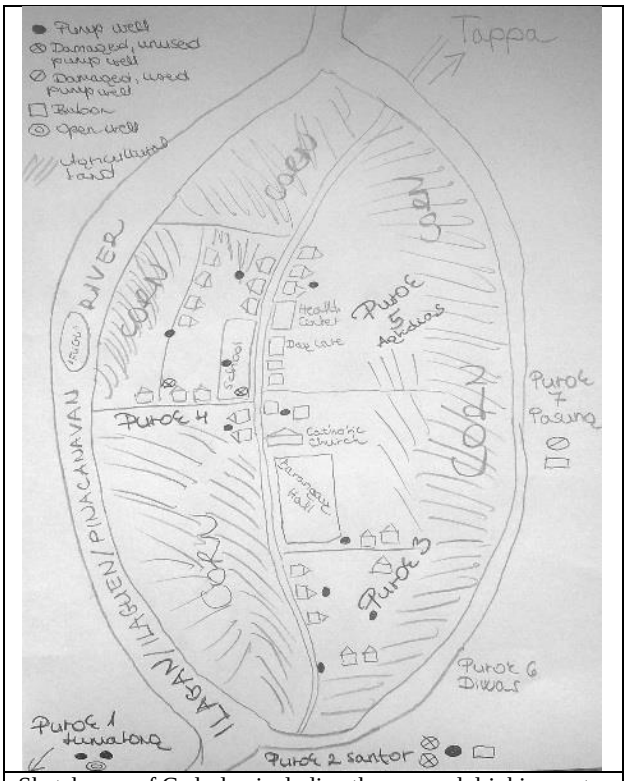


Figure 1 depicts the primary sources of drinking water and their ratio.

Nineteen out of the 22 respondents rely on pump wells as primary source of water (Figure 1). Two respondents derive their water from a ***bubon***, and one from an open well. A ***bubon*** is a hole dug in the ground; water filtrates through the soil supplying users with drinking water. Three pump wells were privately constructed and two out of these are used and managed only by their owners, while one supplies multiple households' needs. The ***bubon*** in Purok 2 was constructed by an individual and currently being used and managed by three households. On the contrary, the ***bubon*** in Purok 7 is used by many households. A respondent revealed that several farmers rely on temporary ***bubon*** for drinking water while at work due to the farms' isolated location.



Sketch map of Cadsalan including the mapped drinking water sources.

Eighteen interviewees described their source of drinking water as clean, three were not sure and one stated that the pump well is unclean due to its damaged cover, its contamination by plastic waste and mosquito infestation. According to Local Government Unit (LGU) officials, the water quality is above average; nonetheless, it has declined during the last decade. Nine pump wells, two ***bubons***, and one open well users experience discoloring during the rainy season, typhoons, and flooding; they describe water as yellow, orange, and brown. Four of them store water before rainfall, five users boil the water, two consume rain water and one uses another well (Figure 2). Water quality is not perceived to be changed by rainfall, typhoons, and floods by nine informants. Seventeen interviewees never experienced any disease from consuming water. According to five pump well users, they have experienced stomach ache from consuming the water. Two informants said that in the morning, the water is murky as during the night no one uses the pump; however, the second or third bucket of water is already clear. We experienced this twice as well.


A privately constructed ***bubon*** in Purok 2 Santor, used by 3 households. (Photo by J. Csala 2016)

A collectively managed and used ***bubon*** in Purok 7 Pasung. (Photo by J. Csala 2016)

During the dry season, 19 interviewees experience significant reduction in water availability. Five of them said that pump wells completely run dry during these periods due to their shallowness. All respondents stated that there is still enough drinking water for all their needs; however not for other uses, such as laundry, and bathing. Users whose wells dry out use other ones. Six informants use the river and one temporary ***bubon*** for doing their laundry and bathing during the shortfalls experienced in the dry season.

Most pump wells were constructed by Barangay officials as their project. According to them, in general, 8-10 families use one well and they are responsible for its maintenance. Most respondents stated that they all participate in cleaning and maintaining the wells; however, two interviewees who live nearby them claimed that they are the only ones who do so. Six informants said that there are not enough pump wells in their puroks and four expressed their need to deepen existing ones. In Purok 7, there is only one pump well which is damaged; residents installed a rope and two plastic bottles to retrieve water. In Purok 2, there are three pump wells; however, two are damaged and unused. According to respondents, they lack the financial and material resources to repair them. They notified Barangay officials both about the need for new ones and repairing the damaged ones; nevertheless, the requests were not fulfilled yet. The government is not involved in the management of drinking water according to all respondents. This was confirmed by the two interviewed LGU officials.

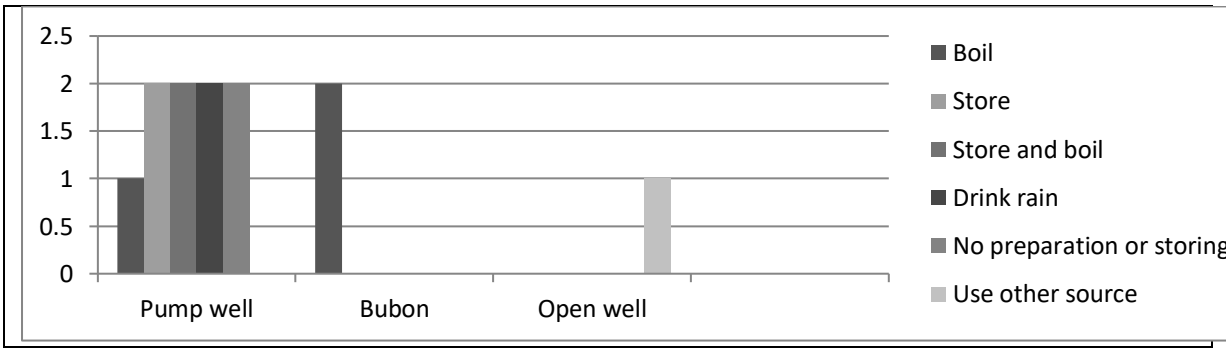
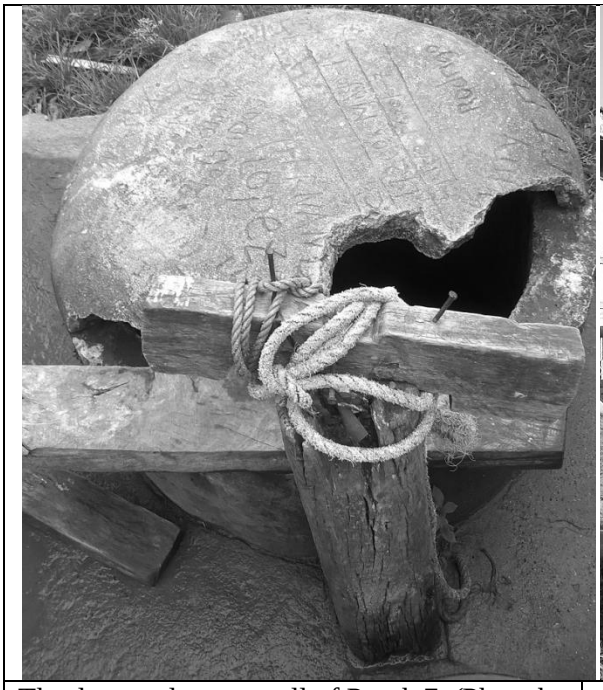


Figure 2 depicts how respondents who experience water quality changes during rain fall, typhoons and floods manage drinking water.

	
The damaged pump well of Purok 7. (Photo by J. Csala 2016)	An open well donated by Mabuwaya Foundation in Purok 1(Photo by J. Csala 2016)

The impacts of climate change

Out of the 22 respondents, 19 said that they are experiencing the effects of climate change, such as precipitation changes, extension of dry season and heavier rainfall during the wet season, and increasing storm frequency and strength compared to the past. However, the majority were not familiar with the concept itself. One of our respondents said that he first heard the term a year ago in the media when the residents of Cadsalan gained access to electricity. Three respondents did not experience the effects of climate change.

According to 10 informants, climate change already reduces water availability while two respondents projected constraints in the future only. Six interviewees did not experience or project climate change induced changes in water availability. The majority of respondents suffered significant crop failure due to droughts and stronger storms that they attributed to climate change. They expect increasing pressure on agriculture in the future as well.

With the exception of two teachers and an LGU official, all respondents including Barangay officials participated in agriculture. Rice, corn, and banana are the key outputs. Cassava was recently introduced and most of the respondents either began or plan to cultivate this crop due to its climate resilient properties. None of the respondents made a connection between the worsening effects of climate change and deforestation. However, the destruction of the original forest ecosystem was blamed for more frequent and higher floods, landslides, erosion, and higher storm damage as well.

Perceptions of ecosystem services

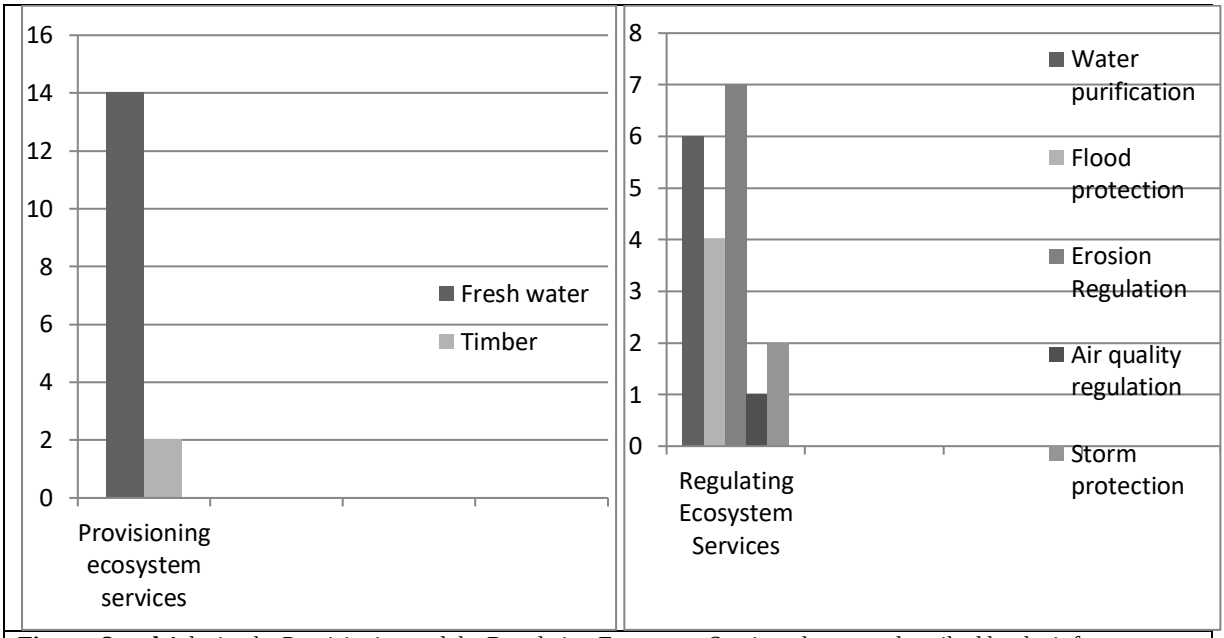
Deforestation was described to occur by 20 respondents, from which 14 of them identified the disappearance of the forest as cause of declining water availability. One respondent explicitly stated that the pump well only dries out completely in dry season since the forest cover disappeared. On the contrary, two informants claimed that the land cover did not change. Illegal logging was named as the reason behind deforestation by 12 interviewees, while one referred to agricultural expansion. Six informants identified ground filtration as water cleansing mechanism. Increasing flood frequency and height, landslides and erosion were attributed to deforestation by five and seven interviewees. The forest was seen as protection against storms

by two respondents. One of them said that good air quality is provided by the forest as well, he noted that storms cause fires that contribute to the destruction of trees as well.

Overlooking the Ilagan river and deforested mountains from a corn field. (Photo by J. Csala 2016)

A Barangay official informed us that the Department of Environment and Natural Resources (DENR) has an ongoing reforestation project since 1995. They have meetings with Barangay officials who subsequently inform residents who then can request paper tree seeds. According to him, the primary targets are vacant lots and that the effects of reforestation are visible. No other respondent referred to this project; however, seven informants implied that they participate in reforestation. Two interviewees stated that small trees should not be cut, they utilized trees for constructing their homes; however, they replanted them subsequently. They also noted that if deforestation continues, future generations will not have access to building materials.

Reforestation by Dinang Creek in Purok 1 was referred to by four informants. In this area, Mabuwaya Foundation's community based conservation project of buffer zone restoration ran from January 2012 to December 2014 with the objective of conserving the critically endangered Philippine crocodile. They planted forest and fruit trees with the involvement of the local community (Soler, 2016). One of the respondents was explicitly referring to this project, while others did not mention the Mabuwaya Foundation and they were talking about paper trees. This species was described as having a high water absorbing capacity by three respondents who collect its seeds by Dinang creek and plant them in the forest. Three informants from Purok 2 also said that they collect seeds at that location and plant them nearby their homes. Two of them cooperate with their neighbors in doing this and also plant fruit trees while the other does it individually with her family.



Figures 3 and 4 depict the Provisioning and the Regulating Ecosystem Services that were described by the informants.

Upon being asked about future drinking water availability (Figure 5), 11 respondents made a connection with deforestation. Four informants expected decline, one thought quality will decline but quantity will not be significantly constrained while another believed the opposite, and four stated that water will completely disappear if deforestation continues. Two respondents expected potential shortfalls due to climate; two respondents expected less water but they were not able to identify the specific reason. Five respondents were unsure about future availability and three respondents thought that there will always be enough water.

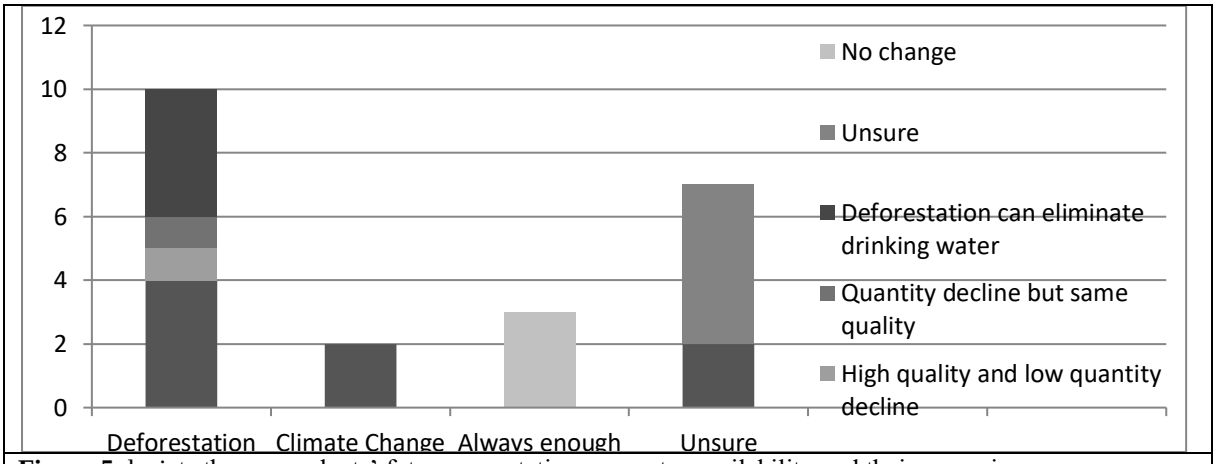


Figure 5 depicts the respondents' future expectations on water availability and their reasoning

DISCUSSION

The objective of this research was to assess if local people perceive and manage drinking water as an ecosystem service. We found that the community predominantly relies on pump wells for drinking water and other domestic water uses (Figure 1). ***Bubons*** are utilized by three households and allegedly by the residents of Purok 7, we also found an open well. Temporary ***bubons*** are created by farmers while at work on their fields for drinking water. The majority of our respondents experience significant water availability reduction during the dry season which is perceived to be exacerbated by climate change induced precipitation changes. In this period, they utilize the river or other pump wells for washing clothes and hygienic purposes. The

destruction of the original forest cover is perceived to have a negative effect on water availability by the majority of respondents as well in general, and thought to reinforce shortages during droughts. More than half of the informants experience changes in water quality in the form of discoloring during typhoons, floods, and rain storms which are managed by storing, boiling, or using alternative sources (Figure 2).

Drinking water is seen as an ecosystem service by most of the respondents (Figure 3). All of our informants stated that there is no collective water management on the community level. The government does not assist water management. Households using a pump well are supposed to maintain it as well. Thus, drinking water is not managed as an ecosystem service by the community; however, several respondents stated that they do participate in reforestation efforts either individually or collectively. Nonetheless, none of them referred to the DENR-initiated project. The DENR-initiated *Cagayan River Basin Management and Development Strategy (CRBMDS)* indicates the recognition of ESS and the objectives to preserve ESs in order to preserve access to drinking water.

In Puroks 2 and 7, pump wells are damaged; in the former, two out of three are not being used while in the latter the only available one is broken. In Purok 7, residents installed a rope and plastic containers to fetch the water, and they utilize a ***bubon*** as well. Both communities voiced out their need for repairing the existing wells, and demand for new ones. People in other Puroks also stated that the existing ones fail to meet the demand particularly during the dry season, especially the shallower ones. The community is unable to solve these issues due to socio-economic constraints. Nonetheless, all respondents stated that they do have access to sufficient amount of drinking water during the entire year. Drinking water related diseases were not experienced by the majority of respondents. According to LGU officials, Cadsalan could apply for "spring water development". This project channels water from the mountain to a reservoir which can supply the needs of three families. They recommended to utilize this to counteract future shortages. None of our respondents were aware of this opportunity.

Regulating ecosystem services, such as water purification, flood protection, erosion and air quality regulation, and storm protection were perceived as well by multiple informants (Figure 4). Forest ecosystems are interlinked with climate change. Their integrity can facilitate mitigation by carbon sequestration, while deforestation can exacerbate climate change by releasing the stored carbon (Lasco, Pulhin, Sanchez, Villamor, & Villegas, 2009). Furthermore, deforestation undermines ESS, such as climate, water, erosion, and natural hazard regulation, and fresh water provisioning which are integral to ecological and social resilience (MEA, 2005). One of the LGU respondents stated that there is a program that protects watersheds by reforestation which is linked with climate change mitigation.

The Comprehensive Development Plan of San Mariano, Isabela (2012-2017) describes deforestation as "the mother of all environmental problems". Slash and burn agriculture, illegal logging, charcoal-making and insufficient implementation of the counteracting measures are identified as the main threats to the forest ESs (Office of the Sangguniang Bayan 2011). The area surrounding Cadsalan is an illegal logging hotspot (van der Ploeg et al 2011) which was noted by the majority of our respondents as well. These activities not only exacerbate social and ecological vulnerabilities through the destruction of the ES, but also reinforce rural poverty by undermining the rule of law (Ibid). The enhancement of watershed integrity is planned through "adoption schemes". By these conservation is outsourced to individuals, groups, and companies who have more resources than the Municipal Government Unit. The government designated 26,252.08 hectares for potential reforestation project; Cadsalan is listed as possible

area for further expansion, the adjacent Barangay Tappa has 5,100 has. (Office of the Sangguniang Bayan, 2011).

Therefore, we can conclude that there is water security in a sense that all drinking water needs are met in the present even during shortfalls. Nonetheless, water security appears to be fragile and vulnerable to socio-economic factors, climate change, and the destruction of the ES which is reflected by the future projections of our respondents as well (Figure 5). These factors mutually reinforce each other as indicated above. Our findings thus underline the need to strengthen ES conservation and rehabilitation in order to alleviate prevailing socio-economic and ecological issues, and counteract climate change and other related looming problems.

Limitations and recommendations

The main limitation of this study is its scope. We were not able to gather data on the actual state of the Ilagan river watershed. Neither were we able to obtain comprehensive information on the current reforestation efforts. Moreover, our sample is rather small; 22 out of 330 households. However, we were able to identify different sources of drinking water, and we were able to visit different puroks. These allowed us to gain a more comprehensive insight into the various issues and we could also assess our informants' perceptions of ecosystem services.

We recommend to counteract and aim to halt the ongoing deforestation in the area. Community based conservation and rehabilitation efforts could facilitate the enhancement of the ESS. The community is the first to be affected by the declining ES. They have an incentive to protect the area. As the government highlighted the logging ban enforcement needs to be strengthened. Furthermore, we recommend consultations with the community regarding their need for repairing and deepening existing pump wells and constructing new ones. Perhaps if they were involved in the ES conservation and rehabilitation efforts they could be compensated by financial contribution to solve the prevailing issues with the pump wells.

ACKNOWLEDGEMENTS

We would like to express our gratitude to our host family who made us feel at home and helped us conduct our research by valuable information. We thank all our respondents from Barangay Cadsalan for their time and all the information they furnished us with. We are grateful for the warm welcome we received from all residents that we interacted with. We also thank the Barangay Captain for facilitating our work by granting us the opportunity to conduct our research in Cadsalan. We are thankful for all the support received from Arnold Macadangdang and Dorina Soler, Mabuwaya Foundation members who guided us during our fieldwork.

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APPENDICES

Appendix A: List of respondents and their source of drinking water and its origin

Gender	***Age***	***Ethnicity***	***Source of drinking water and its origin***
Female	29	Kalinga	Pump well: river
Female	34	Kalinga	Pump well: doesn't know
Male	40	Kalinga	Pump well: groundwater
Female	23	Kalinga	Pump well: doesn't know
Female	29	Kalinga	Pump well: groundwater
Female	66	Ilocano-Tagalog	Pump well: groundwater
Female	26	Ilocano	Pump well: groundwater
Female	23	Kalinga	Pump well: groundwater
Male	33	Kalinga	Bubon: groundwater
Female	51	Kalinga	Bubon: groundwater
Female	21	Kalinga	Pump well: groundwater
Male	27	Ilocano	Pump well: groundwater
Male	45	Kalinga	Pump well & bubon: groundwater
Male	33	Kalinga	Pump well: river
Male	28	Kalinga	Pump well: river
Female	50	Ilocano	Pump well: river
Male	50	Ilocano	Pump well: river
Female	33	Ilocano	Pump well: groundwater
Male	30	Ilocano-Ibanag	Open well: groundwater
Female	30	Visayan	Pump well: groundwater
Male	36	Kalinga-Ilocano	Pump well: river
Male	53	Ibanag	Pump well: groundwater

Appendix B: Questionnaire

Water

1. Name:
2. Ethnicity:
3. Settlement history:
4. Occupation:
5. What are the sources of water and which one do you use for drinking?
6. Do you know where water is coming from to this source?
7. Do you know what conditions supply water?
8. Who manages this water source and how?
   A) does the community participate in it? If yes how?
9. Do you think it is clean? Why, or why not?
10. If not how do you make it clean?
11. Have you ever gotten sick from the water?
12. How old are you?
13. Was it cleaner in the past? If yes, or no what do you think were the reasons?
14. Is there enough water now for your needs? If not what do you do?
15. Did you experience any changes in availability (since you have been living here)? If yes, do you know why?
16. Did the land cover change in this area since you have been living here?
17. Do floods, droughts, and typhoons affect availability and or quality? If yes, how?
18. How do you prepare for these events? Does the community act collectively?
19. What do you think about future water availability?
20. How do you think availability could be improved and by whom?
21. Do you experience any changes in the weather, temperature, rainfall/drought, storm strength and frequency since your childhood?
22. Does it affect water availability and quality, if yes how?
23. How do you think these will affect drinking water in the future?
24. Is there anything you would like to add or say about water?
25. Do you have any questions regarding our interview and report?

LGU official:

1. Do you know what are the sources of drinking water in San Mariano and Cadsalan?
2. Does the local government manage these or assist their management?
3. Do you know what is the quality of drinking water in Cadsalan?
4. Were there any changes in availability and quality in the past? If yes, do you know why?
5. Are there any efforts being taken to conserve the Ilagan watershed that supply Cadsalan with drinking water? If yes what? Is the local community involved?
6. Could you please briefly tell us about the future development or management plan or strategy of the Ilagan watershed?

DECISION-MAKING IN TAPPA: THE PARTICIPATION OF LOCAL PEOPLE IN THE PROCESS OF BUILDING A DAM

Cathlyn Joy Millianes and Rob Achterkamp

INTRODUCTION

Living in a world where the need for energy is growing every day we can also see a increasing global impact on the climate, caused by the use of fossil fuel to generate energy. As a reaction on this global threat to climate change different new technologies have been invented to generate energy in a more sustainable way to decrease the pressure on the global climate. These new ways of producing energy are based on renewable energy sources.

As part of the International Course on Water Management, we did a research on the planned construction of an overflow dam in the Ilaguen River in Isabela in the northern part of Luzon. The construction of the dam will have different social and environmental impacts in the area where it will be constructed. In order to have an insight in the policy making concerning the construction plans of the dam, we focused our research on the participation of the local people in the policy making process in Tappa, in the impacted area downstream of the Ilaguen dam. Tappa is a small village around 35 kilometers from San Mariano (Isabela) with a population of 742 people, divided into 145 households.

According to an information booklet of the National Power Corporation, the Ilaguen dam will be constructed in response to a growing need for power supply (Bagunu et al. 1995: 1). The location of the dam is 55 kilometers east of Santiago City in the Sierra Madre Mountains. The authors of the booklet are very positive about the opportunities the dam will provide. Furthermore they are quite optimistic about the possible environmental impacts and resolution to prevent it from happening. Nevertheless, according to the Environmental Impact Assessment (EIA) the possible environmental impacts are only measured in the direct area around the possible location of the dam and are only formulated as easily to solve instead of disastrous (FMO Ilaguen River Hydro-power Project 2010:15-17). According to the EIA for another hydropower dam in Dicatian, Isabela, there were only positive impacts on the environment and communities involved (Rodriguez 2005:53-55).

In our field research we tried to compare the local knowledge of the people about the possible impacts of the dam with their opinion on the way the decisions according to the construction plans were made. With this information we will be able to reflect on the general decision-making process and on the options of the local people in Tappa to have an equal voice in this process.

In the process of analyzing our results we will rely on the concepts ‘democracy’, ‘agency’ and ‘transparency’. Since 1987, individuals in the Philippines are governed by constitutional law as part of the democracy (Bautista et al. 2003: 860). Therefore, individuals have full human rights and provide them with agency to have a voice in the national legislation system. Furthermore through decentralization of the national governance, local communities became even more autonomous in governing and in 1991 the Local Government Code was implemented (ibid.: 324). To measure good governance it is important to have enough insights in the structure and in the decision making process (Mendoza 2000: 43). A government has to be transparent in order to provide the necessary insights. A transparent government must provide its citizens with the right information (Asian Development Bank 1999:11).

First, we start with our general research question and the sub-questions. Secondly, we discuss the used research methods. Then we will write about the results we got during the field research. Finally, we will discuss these results in our discussion in order to be able to give an answer to the general research question. In the appendices you will find the questionnaire we used to get the necessary information.

RESEARCH QUESTION

The current legislation system, according to the Local Government Code, prescribes that there should be consultations with local governments and people organizations and other concerned sectors of the community before any project or program is implemented in the jurisdiction (Antlöv et al. 2004: 50). But in reality the local participation in decision making is prone to fail, due to lack of coordination (ibid.: 51). Comparing both the EIA and the literature on local governance it is quite possible that the vision of the National Power Corporation on environmental impacts will be far too optimistic. This may be caused by a lack of input of local knowledge about the local environment and possible impacts. Furthermore we got the experience during our fieldwork that there was a difference in the influence between the barangay officials and the other residents. In order to check this reasoning we came up with the following research question:

Is there a difference in the possibilities of the residents in Tappa to influence the decision making related to the construction of the Ilaguen Dam?

We divided this research question in two different sub-questions, to be able to both do research on the knowledge of the dam itself with the different possible impacts and on the decision-making process. These sub-questions are:

What do people know about the dam?
- -Who provided the information?
- -What was the information about?

Were people involved in decision-making process?
- -Did they take part in consultations?
- -Did they have the power to agree or object the plans?

METHODS

Time Schedule

Date	Activity
January 18 2016	• Traveling • Getting to know the host family • Networking by means of the family
January 19 2016	• Interviewing barangay captain Tappa • Interviewing of local Councils (agriculture, fisheries, development) • Transect walk to see de land use and ask about possible impacts • Interviewing local people • Collecting new contacts/contact information by means of local people and barangay captain • Making appointments
January 20 2016	• Interviewing local people • Making appointments
January 21 2016	• Last day of interviewing in Tappa
January 22 2016	• Traveling to San Mariano in the morning • Interviewing municipalities of San Mariano • Saying goodbye to host family
January 23 2016	• Traveling back to Campus

Semi-structured interviewing

In order to develop a keen understanding of the decision-making process for the construction of the Ilaguen dam, a relevant and meaningful semi-structured questionnaire was made. Semi-structured interviews are conducted with a fairly open framework, which allow for focused, conversational, two-way communication. They can be used both to give and receive information. We randomly chose 19 respondents for our interview, including the barangay officials, teachers of the local elementary school, farmers, and non-farmers to create a balanced representation as a whole for the participation of the local communities in decision making. For the local people and barangay officials we used the same questionnaires, to be able to compare the different opinions on the different social levels.

Focus Group

During our interviews, we met a group of teachers at the elementary school. They offered us the opportunity to ask some questions about the local decision-making in Tappa. Although they did not know that much about the construction of the dam they provided us some information about the possibilities to vote. This focus group gave us some insights in the relation between decision-making in Tappa and the Local Government Unit.

Transect Walk

A transect walk is a systematic walk along a defined path across the community/project area together with the local people. The transect is a great tool to help us learn more details about the environmental, economic and social resources in a community. The purpose of our transect walk was to organize and refine spatial information and to summarize local conditions in the area. The information is gathered from direct observations while walking together with a guide through the community of Tappa.

RESULTS

Profile of respondents

We interviewed 19 respondents for our research on decision-making. Twelve respondents are male, seven respondents are female (table 1).

Table 1. Gender division in sample

Gender	Frequency	Percent
Male	12	63,2
Female	7	36,8
Total	19	100,0

The majority of the respondents were Ilocano (47%), followed by Ibanag (31%) (table 2). Kalingas were just a small part of the sample. The other respondents had parents with different origins and didn't see themselves as full Ibanag or full Kalinga.

Table 2. Origin of respondents in sample

What is your origin?	Frequency	Percent
Ibanag	6	31,6
Kalinga	2	10,5
Ilocano	9	47,4
Other	2	10,5
Total	19	100,0

For the profession we asked only the main source of income, because a lot of respondents had more than one job. We tried to create a heterogeneous sample by interviewing respondents with very different means of income. A large group of our respondents are farmers (37%) (table 3). Furthermore, we interviewed almost half of the 7 officials in Tappa (16% of our respondents). We included teachers in our research as well to create a broader view on the decision-making process.

Table 3. Profession of respondents in sample

What is your profession?	Frequency	Percent
Farmer	7	36,8
Mother	3	15,8
Official	3	15,8
Business	1	5,3
Teacher	2	10,5
Secretary	1	5,3
Official NCIP	1	5,3
Police	1	5,3
Total	19	100,0

Impacts of the dam in general

The first part of our interview was about the knowledge of the local people about the possible impacts of the dam and their opinion about it. First few questions were about the positive and negative impacts of the dam on the local environment. After these questions we asked the respondents to give their opinion on the impacts of the dam in general. With this question we tried to get an insight in the general perception of our respondents on the dam. The question was not only about the environmental impacts but also about the possibilities of development and the possible benefits for the people in Tappa.

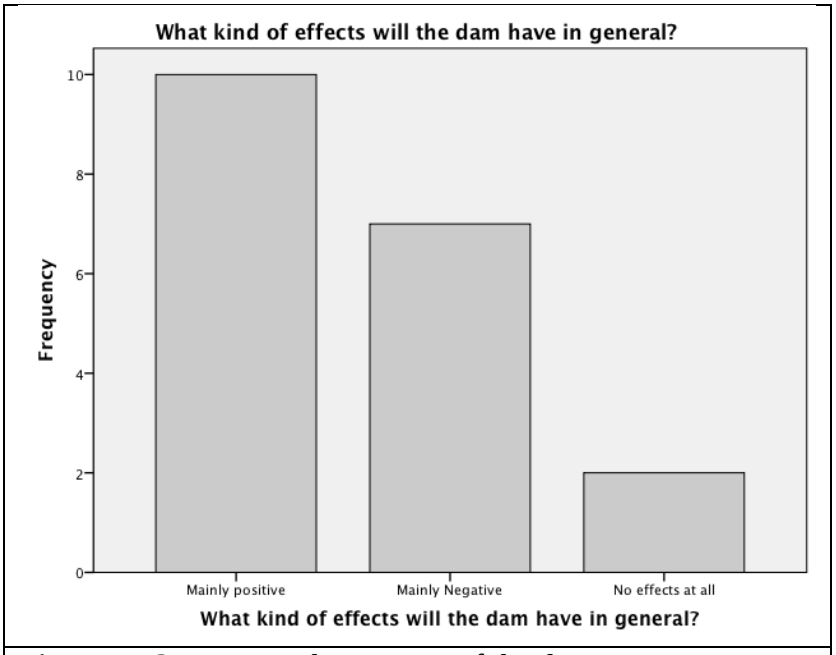

Figure 1. Opinion on the impacts of the dam in Tappa

Fifty three percent of the respondents are mainly positive about the general impacts of the dam (Fig 1). Few respondents think that the dam will have negative impacts in Tappa. Only 10 percent of the respondents think that the dam will not have any impacts at all in Tappa. The respondents that thought that there will not be any impacts at all in the future were an 18 year old man and an older woman around 70 years old. Both are not involved in any consultations and are not interested in policy making in Tappa. They only cared about their farming.

It was interesting to see that even though people were afraid of possible flooding they still see positive effects of the dam in the future. The respondents who see mainly negative effects in the future were all afraid of flooding or possible collapsing of the dam. The positive effects were mainly related to the possibilities of development for Tappa by means of financial funding and material funding, promised by the Isabela Power Corporation (IPC) (Fig 2). The barangay officials mainly mentioned the financial funding. This funding consists of a share in the financial profit of the production of energy when the dam has been finished. Three respondents also mentioned a corn dryer according to the material funding, promised by the IPC when they finished the construction of the dam.

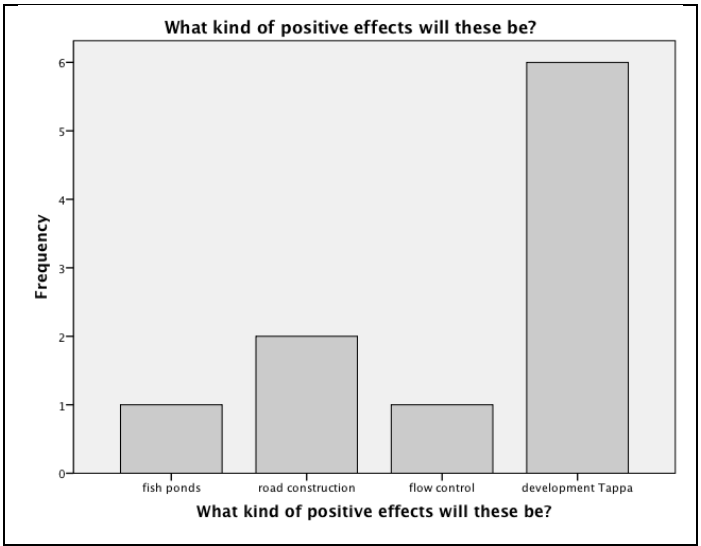

Figure 2. Different positive effects of the dam on Tappa

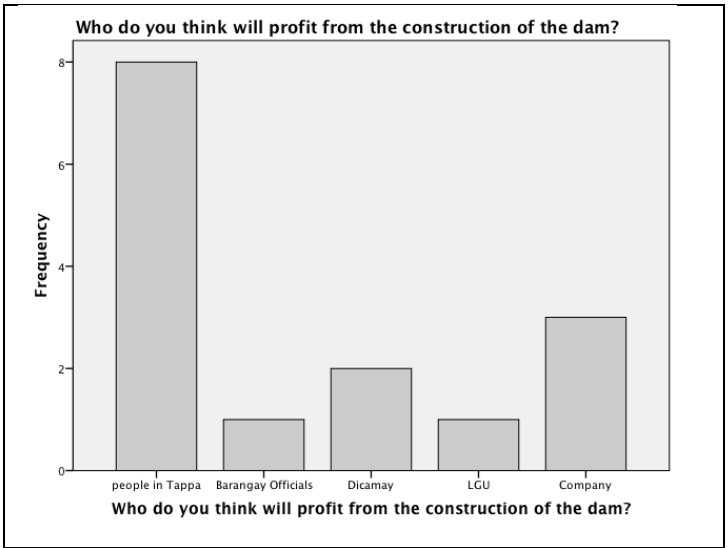

Figure 3. Differentiation in stakeholders who can profit from the dam

Less than half of the respondents (42%) think that mainly the people in Tappa will profit from the construction of the dam (Fig 3). This will mainly consist of being employed by the IPC and earn money by being involved in the constructing of the dam. The majority of the respondents put their trust in the officials and do not think that they will profit the most from the dam. Two respondents mentioned barangay Dicamay as a possible competitor in the earning of profits, especially in the employment of local workers. The Local Government Unit (LGU) and the IPC are also seen as threats to the possibility for residents in Tappa to profit from the dam. This has mainly to do with the general idea among the residents in Tappa that these institutes have the power to decide who will profit in the end.

Decision-making

During our preparations for the fieldwork we reviewed literature on the current legislation system in the Philippines and the possibility for individuals to take part in decision-making (Bautista et al. 2003: 324). To have an insight in the local participation in decision making in Tappa we asked our respondents about the consultations that have been done in the village. According to the barangay officials in Tappa, there were around 5 meetings organized to consult the local residents about their opinion about the dam. Fifty eight percent of the respondents took part in one or more consults, 42 percent of the respondents did not take part in any consultation (Fig 4). The main reason for not taking part in the consultations was the simple fact that they were not around in Tappa at the times of the meetings. According to the officials, the invitations for the meetings were done at least one week before the day of the meeting. Nevertheless, two respondents said that they did not get the invitation, although they did not leave Tappa at all. They said that sometimes the officer with the task to hand out the invitations was lazy and did not approach them in person to invite them.

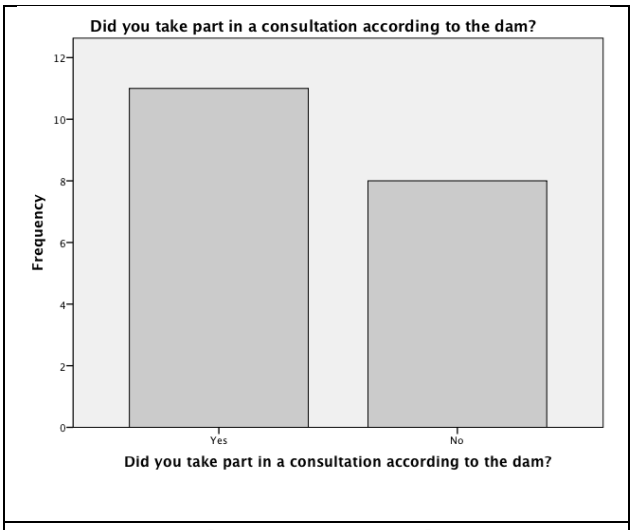

Figure 4. Involvement in consultation

The majority of the respondents (73%) confirmed that they were not well informed about the decision-making process and especially not about the construction plans of the dam (table 8). Only the respondents that attended the consultation meetings knew something about the construction plans, but they all agreed that the provided information was not enough or not relevant to be able to say something useful about the dam. The respondents based a lot of their information on stories they heard from neighbors or other organizations. Furthermore the majority of the respondents did not care that much about the knowledge they should have about the dam. Except for the official of the National Commission on Indigenous Peoples (NCIP) all the respondents trust the barangay officials in their final decisions.

The fact that most of the respondents are really reluctant to take part in the decision-making process gave us the opportunity to ask who else is involved in the process. As already mentioned, the respondents put their trust in the officials according to decision making of the dam. The officials themselves agreed that they are the ones in Tappa to have the final word in the village. Nevertheless, they mentioned that the residents in Tappa do have a voice in the local decision-making. During the consultation meetings the residents had the opportunity to share their opinions. In relation to the LGU, the barangay officials admit that they are powerless. Therefore 26 percent of the respondents said that the LGU has a substantial influence in the construction plans of the dam (Fig 5). An interesting stakeholder that was mentioned by three respondents is the New Peoples Army (NPA). According to these respondents, the NPA is the stakeholder that currently is blocking the construction of the dam. They threatened a few engineers of the IPC and due to that incident, the IPC removed their equipment out of the construction area. Residents in Tappa are still scared of the NPA and even the respondents who mentioned this organization where reluctant in sharing this information. Nevertheless we can include the NPA as an important stakeholder in the decision-making process of the dam.

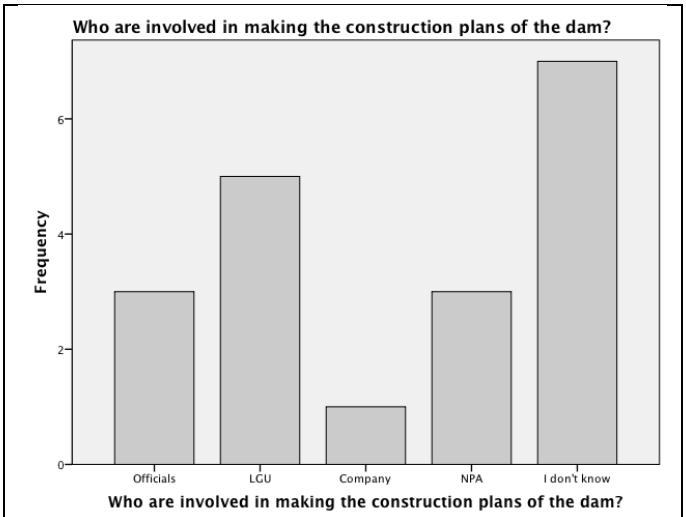

Figure 5. Stakeholders in decision making

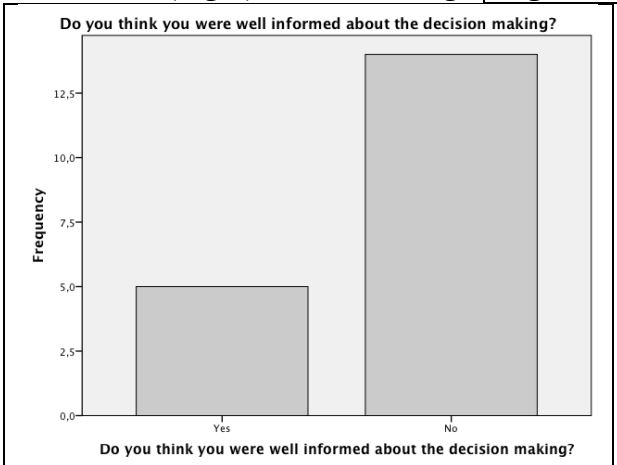

Figure 6. Provided information

DISCUSSION

We started our research in barangay Tappa with the question if there is a difference in the possibilities of the residents in Tappa to influence the decision making related to the construction of the Ilaguen Dam. During our fieldwork and the different interviews we did, we got a useful insight in the different levels of decision-making. What became really clear is the

fact that there are three main different players in the impacted area of the dam who influence the decision making of the dam: the residents of barangay Tappa, the Agta and the NPA.

A lot of people in Tappa actually do not know much or even nothing about the construction of the dam in the Ilaguen river. Respondents who knew something of the construction of the dam based their opinion mainly on the stories they heard from neighbors or other residents in Tappa. Respondents who attended one or more meetings in Tappa concerning the planned construction of the dam did get information about the dam but during the interviews we were told different stories about changing of the construction plans by the IPC. This lack of information shows a policy making process that is not transparent at all and is not a sign of good governance (Mendoza 2000: 43). Furthermore respondents shared stories about information sessions that stated only positive impacts and possible flooding was not mentioned at all. But still the respondents believe in the possibility for Tappa to develop with the financial and material funding of the IPC. Furthermore, they do believe in the possibility to be employed for the construction of the dam. With these positive options in mind more or less all the respondents signed the agreement to start the constructing of the dam. According to this process of organized meetings before the construction of the dam and the possibility to object the construction or agree by individual signing of the agreement the residents of Tappa participated in the local decision making process. In this way individuals had the agency to influence the local way of policy making and represented the Local Government Code by participating in the decentralized policy making process (Bautista et al. 2003: 324).

The officials made the final decision by signing the Memorandum of Agreement (MOA) as well. Nevertheless, in the interviews with the barangay officials in Tappa, it became clear that even the officials are powerless in relation to the LGU. Representatives of the LGU stated that the Department of Environment and National Resources (DENR) has the final word in the decision-making.

A player, mentioned by three of the respondents, that is really capable of influencing the policy-making of the dam is the NPA. Meetings organized by the NPA fueled the fear for possible flooding. Furthermore, they threatened engineers of the IPC to stop the construction of the dam. Our respondents admit that even the barangay officials of Tappa are powerless against this organization, due to their aggressive approach. One of the respondents said that the main intention for the actions of the NPA is the possible flooding caused by the dam. A common thought about the current situation is that the obstruction of the dam is totally caused by actions of the NPA. Although this organization does not work in a legal way as part of the democracy they seem to have an enormous impact on the current policy making process of the dam. In a way they do show agency in public policy making.

Although we were not able to interview the Agta they do have a really strong influence in the decision making process of the dam, Agtas have a special position in the decision making process, due to the Indigenous Peoples' Rights Act (IPRA) (Minter 2010: 285). According to a project documentation about the Ilaguen Hydro-Power dam, Agtas live in an ancestral that will be impacted by the construction of the dam (FMO Ilaguen River Hydro-power Project 2010:6-8). Based on the Free, Prior and Informed Consent (FPIC), Agtas had been consulted in different meetings and in 2013 the Agta signed the Memorandum of Agreement to approve the construction of the dam in their ancestral domain (ibid.: 8). In relation to democratic and transparent decision making, this process of decision making for the dam in the Ilaguen river went really well. The process was transparent enough to have good insights (Asian Development Bank 1999:11) and the process is well documented (Mendoza 2000: 43).

Opportunity to improve the process of decision-making

One of the most obvious results in our research is the lack of information. As mentioned earlier as part of the theoretical background, it is very important for a transparent and democratic decision making process to provide individuals with good information. In this way, individuals can have the agency to take part in this process of decision-making. As we experienced in our fieldwork, lack of information causes a lot of disinformation. When people do not have the necessary knowledge about a topic in decision-making they will be very reluctant in participating and sharing their opinions.

Reflection on our fieldwork

Unfortunately we were not able to include Agta in our field research, due to the fact that there were no Agtas living in Tappa. For a complete picture of all the different players in the process of decision making it would have been great to interview the people that will be impacted directly by the construction of the dam and get more insight into the reasons behind their approval of the dam construction. Furthermore, their process of decision making in their community could have given also a good insight or example for the way the residents in Tappa processed their decision making. With that information we had probably good insight in the factors behind a successful decision making process.

ACKNOWLEDGMENTS

We would like to take this opportunity to express our profound gratitude to the following people who extended their effort to help us and shared their knowledge to make this study possible. To our host family, ate Armida together with her children and her sister Joan, for offering their house for us to stay during the field research, for their warm welcome and of course for cooking the delicious adobong manok. Thank you for treating us as part of your family. To our respondents: the farmers, non- farmers, teachers of the Tappa Elementary School, Barangay Officials, Barangay police and the officials of the Local Government Unit of San Mariano, for offering their time to answer our questions and shared their knowledge and opinions that helped us a lot to finish our research. Above all we thank our Almighty God for giving us knowledge, strength and for keeping us always safe.

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APPENDICES

Questionnaire decision making Ilaguen Dam

January 2016

Dear Sir or Madam,

Our names are Cathlyn Joy Millanes and Rob Achterkamp and we are currently taking a course in Water management, in corporation with the ISU. In order to learn to conduct fieldwork we are doing a small research in Tappa concerning the plans to build a hydro-power dam in the Ilaguen river.

1. What is your name?
2. What is your profession?
3. Do you know about the plans to construct a dam in the Ilaguen river?

A. Yes

B. No (go to Q5)

4. What do you know about the construction of the dam?
5. Do you think the dam will cause destruction of nature?

A. Yes

B. No (go to Q7)

6. What kind of destruction will this be?
7. What kind of effects will the dam have in general?

A. Mainly positive effects (go to Q8)

B. Mainly negative effects (go to Q9)

C. No effects at all (go to Q10)

8. What kind of positive effects will these be?

9. What kind of negative effects will these be?

10. Who do you think will profit from the construction of the dam?

The next part of this questionnaire will be about the participation of local people in the decision making of the dam.

11. Did you take part in a consultation according to the construction plans of the dam?

A. Yes

B. No (go to Q12)

12. Can you explain in a few words how the consultation was done?

13. Who are involved in making the construction plans of the dam?

14. Do you know if you have any rights in the decision making of the construction of the dam?

A. No

B. Yes, because

15. Do you think you should have a voice in decision making, according to the dam?

A. No

B. Yes, because:

16. Do you think you were well informed about the decision making for the construction of the dam?

A. No (go to Q18)
B. Yes, because:

17. What would be your advise for the current decision making process?

18. What is your age?

19. What is your origin?

20. What is your source income?

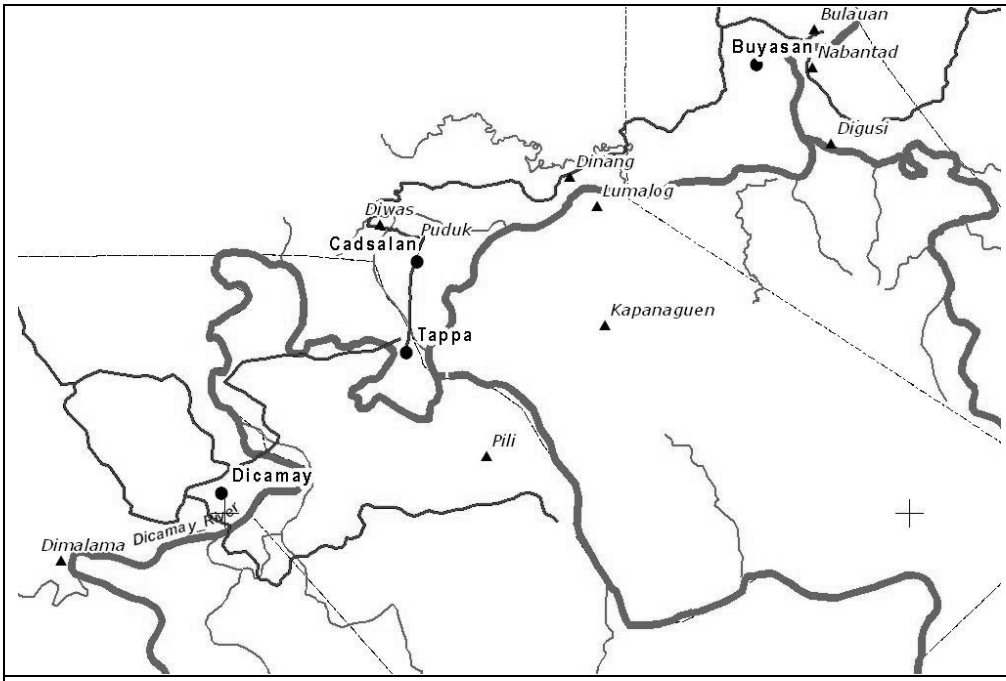
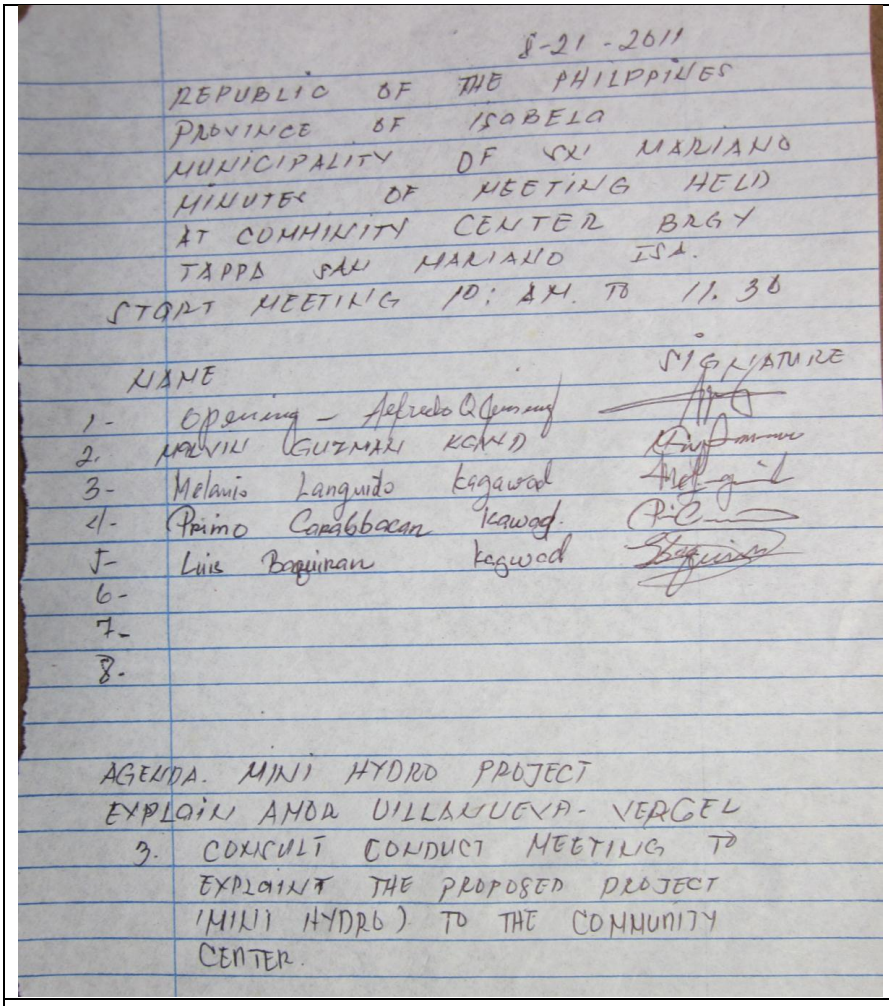


Photo 1. Map of Tappa and impacted area upstream Ilaguen River (south of Tappa) (map by Socio-Environmental Investigation)



8-21-2011

REPUBLIC OF THE PHILPPINES
PROVINCE OF ISOBELA
MUNICIPALITY OF SAN MARIANO
MINUTES OF MEETING HELD
AT COMMUNITY CENTER BRGY
TAPPA SAN MARIANO ISA.
START MEETING 10: AM. TO 11.30

	NAME	SIGNATURE
1-	Opening – Alfredo Q[illegible]	
2.	MARVIN GUZMAN KGWD	
3-	Melanio Languido Kagawad	
4-	Primo Carabbacan Icawad.	
5-	Luis Baquiran Kagwod	
6-		
7-		
8-		

AGENDA. MINI HYDRO PROJECT
EXPLAIN AMOR VILLANUEVA- VERGEL
3. CONSULT CONDUCT MEETING TO
EXPLAINT THE PROPOSED PROJECT
(MINI HYDRO) TO THE COMMUNITY
CENTER.

Photo 2. Attendance list for meeting to inform the barangay officials of Tappa. (Photo by Socio-Environmental Investigation)

LOCAL PERCEPTIONS AND KNOWLEDGE OF DISEASES RELATED TO WATER IN TAPPA, SAN MARIANO

Jerry Cabacungan and Renske Termeulen

INTRODUCTION

Water. Everybody needs clean and fresh water daily, but everywhere in the world individuals face a wide range of water problems. These problems include water scarcity and contamination. The failure to provide safe drinking water to all people is one of the greatest development failures of the 20th century. The worst consequence of this failure is the high rate of mortality among young children from preventable diseases related to water (Gleick 2002: 2).

Safe and sufficient water has implications across all Millennium Development Goals. Although much progress has been made over the past decade, there is still a lot of work that needs to be done. According to the World Health Organization (WHO), 1.8 billion people around the world lack access to safe water supply. The Asian and Pacific region is home to nearly 900 million of the world's poorest people and the pressure on Asia's water resources are rapidly becoming acute. This water scarcity and quality impacts health of many vulnerable poor people (ADB 2001). The pollution of water bodies increases the incidence of diseases related to water in rural and urban areas (ADB 2001). So, accessing adequate clean water is one of the principal concerns in this region (ADB 2001).

Diseases related to water have been eliminated in wealthy nations, but in the developing world they remain a major concern. A lot of illnesses are undiagnosed and unreported, because the true extent of these diseases is unknown (Gleick 2002: 2).

Many diseases are directly or indirectly related to water. This is typically placed in four classes: waterborne, water-washed, water-based and water-related insect vectors. The first three are associated with lack of improved domestic water supply. Waterborne diseases are cholera, typhoid, amoebic and bacillary dysentery and other diarrheal diseases (Gleick 2002: 2). Water-washed diseases, caused by skin or eye contact with contaminated water are: scabies, trachoma and flea. Water-based diseases, caused by parasites found in intermediate organisms living in contaminated water, are dracunculiasis, schistosomiasis and other helminths. Diseases indirectly related to water are caused by insects that breed in water, like malaria, dengue, and yellow fever (Gleick 2002: 2). All this diseases still occur in the Philippines (Indexmundi.com) (Philstar.com). World-wide, many people die from this every year, but they are inadequately monitored and reported, because people don't know all these water-related diseases.

Another problem is that many people don't actually see the relation between their illness and contaminated water they use daily. Thus not just the availability of clean domestic water is a problem, but also the awareness and knowledge of diseases related to water. How can people prevent themselves from getting ill? This awareness, perception and knowledge of diseases related to water is what we have been focusing on during our research in the remote area of Tappa, San Mariano.

RESEARCH QUESTIONS

What is the local perception and knowledge of diseases related to water in Tappa, San Mariano?

1. What are the main sources of water in Tappa and how accessible are they?
2. How do people use their water sources?
3. How often are people sick and what is the common health status in Tappa?
4. How much do the people know about water related diseases and do they relate their own diseases to the water they use?
5. Where do they obtain their knowledge?

METHODS

Time schedule

Table 1: Time schedule of our activities during our fieldwork

Date	Location	Activities
Monday 18	San Mariano, Tappa	Travelling to Tappa, meeting our host family, walking around the village.
Tuesday 19	Sitio Pili, Tappa	Woke up 7.00 am, had Filipino breakfast with our host family, hiked and rode a boat to Sitio Pili with Bernard and Louis. Interviewed three respondents, did a transect walk in Sitio Pili and had lunch there. Returned in Tappa before dinner with our host family.
Wednesday 20	Sitio Diwas, Tappa	Woke up 7.00 am. Hiked to Sitio Diwas with Bernard. Conducted two interviews and two focus groups and did a transect walk with our respondents. Had lunch with our host family. In the afternoon we had the focus group with the teachers.
Thursday 21	Sitio Sinubkan, Sitio Tatipahan, Tappa	Woke up 7.00 am. Hiked to Sitio Sinubkan and Tatipahan. We interviewed three respondents, did two transect walks and had fresh coconut with them. Travelled back to Tappa and interviewed the midwife in the barangay hall.
Friday 22	Tappa	Woke up 8.00 am. Focused on the centre of Tappa, interviewed Barangay official (Louis) and a teacher who lives permanently in Tappa. Had a fun goodbye spaghetti party and presented our rough results briefly to the residents and barangay officials of Tappa.
Saturday 23	Tappa, San Mariano	Said goodbye to our host family and travelled back to Cabagan.

Photo 1: Focus group discussion with |children in Tappa (Photo by R Termeulen 2016)

METHODS

To answer our research question, we used a lot of different methods. The first and most important method that we used was doing interviews. We conducted 12 interviews with one or two persons. The interviews lasted mostly about one hour, including a transect walk. These interviews were our most important source of information and actually all went very well. Some people were more talkative than others, but in the end we managed to get all the necessary information.

Photo 2: Focus group discussion with Marilou, Rosalie, Carmen and Rosabel (Photo by B Tarun 2016)

We also conducted discussions with four focus groups, all with four people. The focus group discussion with the four teachers from the elementary school in Tappa went very well; they all talked and there really was a group discussion. We also did a focus group discussion with a local group of children at the basketball court, which was very nice and interesting too. The other focus group discussions were more difficult to conduct. Mostly only one or two people spoke and the rest simply agreed.

Another method we used during every interview or focus group discussion was doing a transect walk with our respondents. We mostly asked them to show us their sources of water, and then we walked together with them through their area to see and talk about their sources. While walking around we talked about their area and about their sources and how to keep them clean. The last method we used was surveying. We asked all our respondents to answer our questions from our survey. Most of the answers were very similar, but it is still nice to compare them, as we will show you in the results later on.

Among our respondents, 26 in total, were residents of Tappa, Sitio Pili, Sitio Sinubkan, Sitio Tatipahan and Sitio Diwas. The teachers all live in San Mariano during the weekends and in Tappa during the weeks. The midwife, who visits Tappa twice a month, lives in San Mariano too. It was very interesting to talk to so many different people and to hear all their different views about this topic. The teachers knew a lot about the health and healthcare of their students, and also about the healthcare in Tappa in general. The midwife told us a lot about how she provides health care in Tappa and about the health of the people in general. Also the barangay official Louis was one of our key informants. He gave us a lot of background information about our topic.

Photo 3: Transect walk in Sitio Pili (Photo by R Termeulen 2016)

Photo 4: Transect walk in Sitio Pili (Photo by J Cabacungan 2016)

RESULTS

Photo 5: Lady and pump well Sitio Pili (Photo by R Termeulen 2016)

From the different methods, we obtained a lot of information. We asked all our respondents about their main source of water. For drinking and cooking, it is mainly the pump well in Tappa or open spring in the sitios; for doing the laundry and washing themselves, they use the river. Sometimes the pump well is not available or broken, and then the people get their water from the spring. Among our respondents, nine use the pump well, 14 use the spring and three use both (Fig.1). Everybody thought the quality of the water they use daily is 'good' or 'very good'. In Tappa itself are twelve pump wells, paid by the Local Government Unit (LGU) and built by the local people in 2008. Before that, they used a nearby spring, but a pump well is safer than a spring, because a pump well is closed. Springs get easily contaminated by pesticides from agriculture, by animals in the water and by bacteria. The people living in Sitio Diwas, Sitio Sinubkan and Sitio Tatipahan all still use springs or open wells and in Sitio Pili as well if the water from the pump well is not available. The barangay official Louis told us too that Eltor, caused by drinking polluted water, is more common in Sitio Diwas than anywhere else. So, the people in the sitios have less access to safe water than the people in Tappa. Another problem is that some of the farmers get sick because they drink too much contaminated water during their work in the fields. There is no clean water available there, so then they just drink from the river after filtering it with their clothes.

Although the people all said the quality of their source of water is very good, they told us after deeper enquiry that water quality decreases depending on the season. The water from the pump well is not always available, sometimes there is nothing left and then the people will use the spring. The water from the spring is sometimes murky during rainy season. Another problem is that the spring doesn't flow anymore during dry season. This is only in extreme situations. Normally the water from the spring or pump well is mostly available. When there is no source available, the residents rely on rain water, which they catch in pitchers.

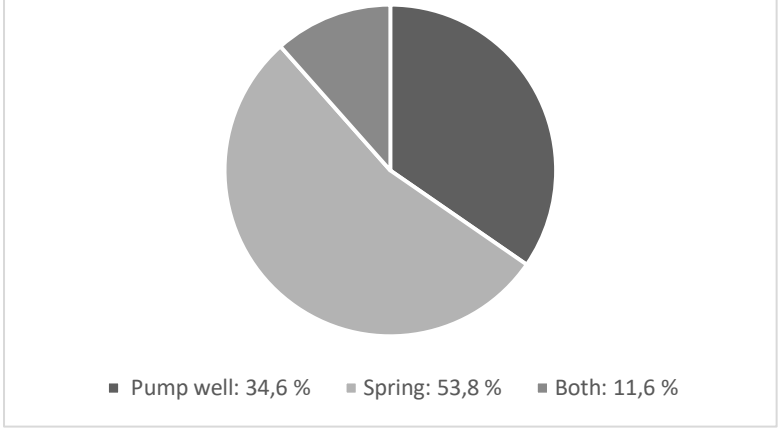


Figure 1: Main water sources used by our respondents, n=26.

Another question we asked every respondent is how many times they and their family members get sick normally during a normal month. We didn't ask the teachers (four) and the midwife (one), because they live somewhere else, so our total sample of respondents for these data is 21. The most common response that we got was 1 to 2 times a month (Fig. 2).

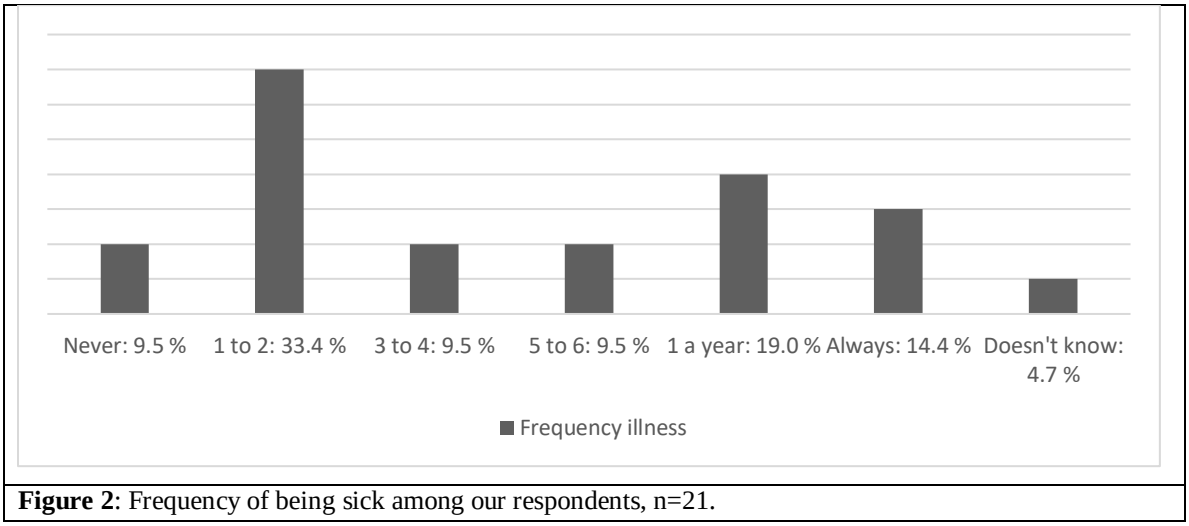


Figure 2: Frequency of being sick among our respondents, n=21.

Table 2: Top 10 of most common diseases as mentioned by our respondents, n=26.	
1.	Eltor
2.	Stomach aid
3.	Head ache
4.	Diarrhoea
5.	Malaria
6.	Dengue
7.	Skin diseases
8.	Urinary tract infection
9.	Leptospirosis
10.	Tuberculosis
11.	High blood

The most common illnesses in this area are malaria, dengue, eltor, vomiting and diarrhea at the same time, diarrhea, stomach aid, head ache, leptospirosis, tuberculosis, all kinds of skin diseases, high blood and urinary tract infection (UTI) (Table 2). Our respondents blame all this diseases on many causes: Working too hard, exposure to the sun, rainy season and many other things, but rarely on water. The barangay official and the teachers told us though that many diseases are related to the water they drink and daily use while swimming and bathing in the river. Another common disease, as jokingly mentioned by our respondents is "cancer in the pocket", which means that they don't have enough money.

Table 3: Comparison of frequency of being sick and the main source of water used by our respondents.

	Name	Place	Sick	Source
1	Maribeth	Sitio Pili	1/month	Pump well
2	Janet	Sitio Pili	1/month	Pump well
3	Daniel	Sitio Pili	1-2/month	Pump well
4	Mary Joy	Sitio Pili	1/month	Pump well
5	June	Sitio Diwas	1/month	Spring
6	Miranda	Sitio Diwas	2/month	Spring
7	Eslie	Sitio Diwas	Always	Spring
8	Melito	Sitio Diwas	Always	Spring
9	Gerald	Sitio Diwas	2/year	Spring
10	Robert	Sitio. Diwas	2/year	Spring
11	Rosaly	Sitio Diwas	1/year	Spring
12	Carmen	Sitio Diwas	-	Spring
13	Rosabel	Sitio Sinubkan	-	Spring
14	Marilou	Sitio Sinubkan	Always	Spring
15	Lorna	Sitio Sinubkan	1/month	Spring
16	Mario	Sitio Sinubkan	2/year	Spring
17	Lilia	Sitio Sinubkan	4/year	Spring
18	Princess	Sitio Sinubkan	3/year	Spring
19	Maricel	Sitio Tatipahan	-	Spring
20	Rodolfo	Sitio Tatipahan	Never	Pump well
22	Louis	Tappa	2/month	Pump well
23	Daniel	Tappa	-	Pump well

We were wondering if there might be a relationship between the source of water and people's health. We do not think there is a strong relationship to see in our respondent list, but in some cases there is. Eslie and Melito for example who live in Sitio Diwas and use the spring claimed to be sick every day. Also Marilou from Sitio Sinubkan experiences this. On the other hand, Rodolfo for example, with his own pump well behind his house said that he never gets sick (Table 3). So we concluded that there is a relationship, but our sample is too small to be sure. Also the barangay official Louis told us that it is safer to use the pump well than the spring and the teachers told us that their students living in sitios get sick more often than the students living in Tappa.

For the teachers, the barangay official and according to the literature there are still many common diseases that can come from the water that is used daily by people, but our respondents mostly say there is no relationship between water and diseases, or that they don't know.

Photo 6: Spring in Sitio Sinubkan (Photo by R Termeulen 2016)

Photo 7: Cleaning spring in Sitio Sinubkan (Photo by R Termeulen 2016)

The information the people get about the common diseases, pregnancy and other healthcare is mainly from the midwife. She visits Tappa twice a month, and everybody from Tappa and nearby sitios can come to see her. She also disseminates information and provides mosquito nets, medicines such as malaria-medicines, anticonception, antibiotics, paracetamol and vitamins. She is doing a very good job, because since 2014 no one experienced malaria in the centre of Tappa, due to the awareness created by the midwife, such as using mosquito nets and cleaning up stagnant water. The residents of the nearby sitios are still facing problems considering water. They use mostly springs, which get easily contaminated by pesticides and bacteria, and this makes them sick.

The teachers gave us a lot of background information about the general health status of the people living in and around Tappa. They said that among their students, skin diseases, eltor, diarrhea, dengue, stomach aid and malaria are very common. The cause of this is using the wrong kind of water. They say the people do have the knowledge, because the teachers tell them about it, just like the midwife. The problem, according to them is that the residents of Tappa and the nearby sitios do not apply the knowledge they obtained. For example, due to their laziness, they just use the nearest source of water instead of the best. Also, the people do not boil the contaminated water before drinking it. The teachers also told us that the Kalinga people from the different sitios experience more diseases, because they have less knowledge, less personal hygiene and less access to safe water.

When people get very sick, for example from malaria or eltor, especially children, people usually visit the hospital in San Mariano or Cauayan. It takes them four hours by jeepney.

DISCUSSION

People in the area of Tappa get sick quite often: 33.4 percent of our respondents said to be sick 1 to 2 times a month. They blame this on many things like for example working too hard, exposure to sun, food, but very rarely on the water they use daily. The teachers told us the children they teach are sick quite often too, and that the children from the sitios are more often sick than the children living in Tappa itself. This corresponds to our own data too.

In Tappa, it is most common to use pump wells. There are 12 pump wells available provided by the local government unit (LGU) and built by the residents in 2008. The springs used by residents living in the nearby sitios are polluted, and this was confirmed by tests done by the midwife and the doctors, according to the barangay official. The most common diseases are diseases from category one, waterborne diseases such as diarrhea and eltor and from category four, water-related diseases such as malaria and dengue. About this category, there is a lot of awareness: people use mosquito nets and remove nearby stagnant water if possible. About the first category, awareness can be improved. These diseases are common, but our respondents do not relate it to the water they use daily. In relation to the category of water-washed diseases there was only one respondent, Robert from Sitio Diwas, who experienced leptospirosis, a bacterial disease (WHO 2016). In the category of water-based diseases, there are no common cases among our respondents.

Our data corroborates the research done in 2015 in Diwagden. People say their water source is safe, but after asking more questions, they say there are problems, depending on the season, as shown in our results. Also the people in Diwagden are sick about once a month, and they also barely relate it to the water used (Martinez and Mandroiu 2015). It must be interesting to conduct a bigger research about this topic in a bigger area.

But maybe the biggest problem is the obvious knowledge gap between people who have and have access to knowledge about health and people who do not. The teachers, the barangay official and the midwife all told us about the water related health problems of people, but when we asked the people themselves they mostly do not know how often they get sick, how serious the diseases are, or how they should prevent themselves and their family from getting sick. Another problem, as explained by the teachers, is the fact that people do not apply the knowledge as given by the midwife. She tells them for example to boil water they get from the spring first, but when we asked them they said they only do this for their children sometimes, or when they are sick already.

Most women and children, as well as some men living in the centre of Tappa see the midwife twice a month and have access to the pump wells. The people living in the nearby sitios only go to the midwife when they are sick or in need, and sometimes they even get discriminated or sent away according to our respondents from Sitio Sinubkan. Also the Barangay official Louis told us that the sitio people feel less welcome to attend the meetings. Another problem is that it is only through a long hike that they could reach Tappa. So, there is a big difference in availability of clean water and availability of access to knowledge between Tappa and Sitio Pili, Sinubkan, Tatipahan and Diwas.

Our suggestion is to construct a pump well in every remote Sitio. If possible, the money should come from the LGU, and the labor will be provided by the people themselves. A pump well is about 25,000 pesos. Also, encouraging the residents from the sitios to visit the midwife in

Tappa more regularly and actively would help a lot, or it would be useful too if the midwife visits the sitios more often.

Photo 8: Midwife testing Renske for malaria (Photo by J Cabacungan 2016)

ACKNOWLEDGEMENTS

Foremostly, we are very grateful to our host family who took care of us for five days. Besides a bed and food, they gave us the feeling of being welcome and at home. Second, we thank Bernard Tarun from the Mabuwaya Foundation and one of the Barangay officials, Louis, for bringing us to the different sitios for three times. We also thank the midwife and the teachers for having time to talk to us despite their busy schedules. And last but not the least, we want to thank all the other parents and children for giving us the data used in this research and of course for welcoming us in their homes in and around Tappa, San Mariano.

Photo 9: Dinner with host family (Selfie by R Termeulen 2016)

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APPENDICES

List of respondents

	Name	Gender	Age	Place	Married	Number of children
1	Maribeth Bayawna	F	24	Sitio Pili	No	-
2	Janeth Magyano	F	24	Sitio Pili	Yes	2 ½
3	Daniel Magyano	M	31	Sitio Pili	Yes	2 ½
4	Mary Joy	F	23	Sitio Pili	Yes	1
5	June Gangan	M	52	Sitio Diwas	Yes	2
6	Miranda	F	40	Sitio Diwas	Yes	3
7	Eslie Gangan	M	37	Sitio Diwas	-	-
8	Melito Gangan	M	60	Sitio Diwas	-	-
9	Gerald Cabanilla	M	20	Sitio Diwas	-	-
10	Robert Dacquiog	M	12	Sitio Diwas	No	No
11	Rosalie	F	40	Sitio Diwas	Yes	1
12	Marlou	F	27	Sitio Diwas	Yes	2
13	Carmen	F	50	Sitio Diwas	Yes	6
14	Rosabel	F	14	Sitio Diwas	No	No
15	Teacher 1	M	-	San Mariano & Tappa	-	-
16	Teacher 2	M	-	San Mariano & Tappa	-	-
17	Teacher 3	F	-	San Mariano & Tappa	-	-
18	Teacher 4	F	-	Cauayan & Tappa	-	-
19	Lorna Agpuan	F	50	Sitio Sinubkan	Yes	4
20	Mario Villarde	M	45	Sitio Sinubkan	Yes	4
21	Lilia Villarde	F	41	Sitio Sinubkan	Yes	4
22	Marisel	F	29	Sitio Sinubkan	Yes	4
23	Rodolfo Padilla	M	63	Sitio Tatipahan	Yes	3
24	Telma Ancheta (Midwife)	F	39	San Mariano	Yes	-
25	Louis Bacquiran (Barangay Official)	M	72	Tappa	Yes	2
26	Daniel Jimenez (permanent teacher)	M	34	Tappa	Yes	3

Questionnaire

1. What is your name?
2. How old are you?
3. Wat is your gender?
    - Male
    - Female
4. Where do you live?
5. Are you married?
    - Yes
    - No
6. How many children do you have?
7. What is your main source of water for drinking?
8. For washing your body?
9. For washing your clothes?
10. For cooking?
11. What do you think of the quality of this water?
    - Very good
    - Good
    - Okay
    - Not satisfied
    - Bad
    - Very bad
12. Does it differ per season?
    - Yes
    - No
    - Sometimes
    - Differs per year
13. Do you often get sick? How many times a month?
14. And your partner?
15. And your children?

16. What are the causes of this illness?

17. What diseases are common in Tappa?

- Dengue
- Malaria
- Diarrhea
- Others:
-

18. How do you know about this diseases?

- Health care officers
- Barangay officials
- Teachers
- Neighbours
- Family
- Students
- Others:

19. Is there any knowledge given by organisations?

- Yes
- No
- Sometimes

20. What do you think of this information? It is..

- Very good
- Good
- okay
- not satisfying
- bad
- very bad

AGRICULTURE AND FLOODS, DROUGHTS AND PESTS IN TAPPA, SAN MARIANO

Jamicah Muncada and Lara Rodenburg

INTRODUCTION

In many developing countries, water is a very important constraining factor on agricultural output. Proper agricultural water management and access to reliable water sources could play a significant role in increasing agricultural output and poverty alleviation among the rural poor of the world (Namara et al. 2010) Major water issues that damage agricultural output are floods and droughts. Drought is defined as "an extended period – a season, a year or several years - of deficient precipitation compared to the statistical multi-year average for a region that results in water shortage for some activity, group or environmental sector" (FAO Land&Water 2016). A way of coping with drought is implementing an irrigation system, as it delivers water to an area where there is a need and a lack of enough water (Black 2016). Irrigation raises crop yields and can thus lead to more food security and poverty alleviation (David 2003). On the other hand, a flood can be defined as "a general and temporary condition of partial or complete inundation of normally dry land areas from overflow of inland or tidal waters from the unusual and rapid accumulation or runoff of surface waters from any source" (Geoscience Australia 2016). Floods can occur due to many different causes, such as heavy rainfall, and hurricanes and tsunamis in coastal areas (Barrett 2016). Another source of floods, and massive livelihood destruction in general, are typhoons. The Philippines has to endure more natural hazards, such as typhoons, earthquakes, floods and droughts, than any other country in the world, and on top of that Northern Luzon is subjected to the highest number of typhoons in the Philippines. Previous research on the coping mechanisms of farming households affected by super typhoon Imbudo in the municipality of San Mariano, Isabela, found that the changes made in farming practices as a reaction to typhoons are limited and do not include preparatory measures such as changing crops to more typhoon-resistant crops or diversification of crops (Huigen and Jens 2006).

We conducted our research in barangay Tappa, San Mariano, Isabela, the Philippines. Tappa has 945 inhabitants and the majority of them are farmers and are thus heavily dependent on the climate and the availability of water for agriculture. This barangay is located next to the Ilaguen River and the Dicamay river, which can potentially be a great benefit, but which can also threaten the area with floods. In our research we aimed to investigate what the current state of agriculture in Tappa is, what types of crops are being cultivated and why, and what kind of difficulties the farmers are facing, specifically regarding floods, droughts and pests. During our research we started to also put focus on recent crop changes that are part of natural hazard coping mechanisms.

RESEARCH QUESTION

What type of agricultural practices can be found in Tappa and what environmental issues are farmers facing there?

Sub-questions
-Which crops are being cultivated in Tappa and why?
-Are the farmers experiencing floods, droughts or pests?
-How do farmers deal with these issues? Does the government provide any assistance?

METHODS

Table 1: Time schedule

Date	Activities
Mon 01-18-2016	Morning: travelling from ISU Cabagan campus to Tappa, arriving late afternoon. Afternoon: getting to know host family.
Tue 01-19-2016	Morning: introductory transect walk around Tappa. Conducting 3 interviews. Afternoon: conducting 2 interviews.
Wed 01-20-2016	Morning: conducting 5 interviews. Afternoon: reflecting on interviews and structuring questions for barangay officials. Conducting 3 interviews and interview with barangay official (1st kagawad).
Thu 01-21-2016	Morning: hike to Sitio Sinubkan, conducting 2 interviews and transect walk through the fields. Afternoon: conducting interview which turned into focus group discussion and an interview with barangay official.
Fri 01-22-2016	Morning: hike to Cadsalan, observing fields, conducting 2 interviews on the way. Afternoon: reflecting on results.
Sat 01-23-2016	Travelling back to ISU Cabagan campus.

To gather the information needed to answer our research questions, we used several different social research methods. Our most important source of information were the farmers themselves, as our research questions focus on their experiences with floods, droughts and pests. It was very thus convenient for us that almost everyone in Tappa is a farmer. We have conducted 18 semi-structured interviews with farmers in and around Tappa, for which we had prepared a questionnaire (see Appendix). We interviewed one person at a time, but several times somebody else, for example the husband or wife, would join the interview. We attracted a lot of attention when conducting interviews, so often times there were many people surrounding us, who occasionally started to answer questions as well. On one occasion the interview turned into a focus group discussion because of this. We selected our informants randomly by walking across the village and looking for people who had the time to talk to us.

Furthermore, we interviewed two barangay officials, for which we had prepared a few questions as well. We used the results that we had from the first interviews to construct the questions for the barangay officials, so that they were more focused. The questions were about the same topics as some of the questions in the questionnaire for the farmers, because we wanted to compare the different perspectives of the farmers and the officials on the part that the officials play in dealing with the discussed problems.

We were not able to visit the Local Government Unit (LGU) in San Mariano ourselves, but we did give a few questions to another group that went, so that they could ask our questions for us to the respondents there.

Additionally, we conducted transect walks to get a good impression of the fields around Tappa and see the effects of floods, droughts and pests with our own eyes, so that we could combine the accounts of the farmers with our own observations.

During our hikes towards different Sitios we were also using observation to get a better impression of the fields in the area as we passed them by.

RESULTS

Which crops are being cultivated in Tappa?

Most farmers in Tappa cultivate multiple crops. The most popular crops are corn, cassava and banana. The farmers would prefer to cultivate rice, because they believe that to be more profitable and they would be able to consume some of their own rice themselves, whereas they only sell the other crops. However, almost all the farmers are not able to cultivate rice due to different causes. The main reason is that there is no irrigation system in place and there is too much drought (which will be discussed in more detail below) to cultivate rain fed rice. Additionally, some farmers say that they would not be able to benefit from an irrigation system, because their land is too steep and the water would simply flow down.

Picture 1: A corn field in Sitio Sinubkan with cassava and banana fields in the background (photo by L. Rodenburg 2016)

During our research we found that the farmers in Tappa have only started to cultivate cassava very recently, mostly in the past three years. The reason for this shift towards cassava is that the farmers have found out that cassava is much more resilient in harsh circumstances than other crops, especially corn. Cassava can withstand drought and typhoons much better than corn, which are serious issues the farmers in Tappa deal with every year, and cassava is thus more profitable for them. In addition to that, cassava has lower inputs than corn: it is cheaper to plant cassava than corn and many farmers that cultivate corn have to borrow money to buy seeds. This is not necessary for cassava, because farmers can simply replant the stem of the cassava for the next cropping season. When we asked how the farmers knew about the advantageous aspects of cassava, they responded that they saw other farmers cultivating it and thus realized that it is more profitable than corn.

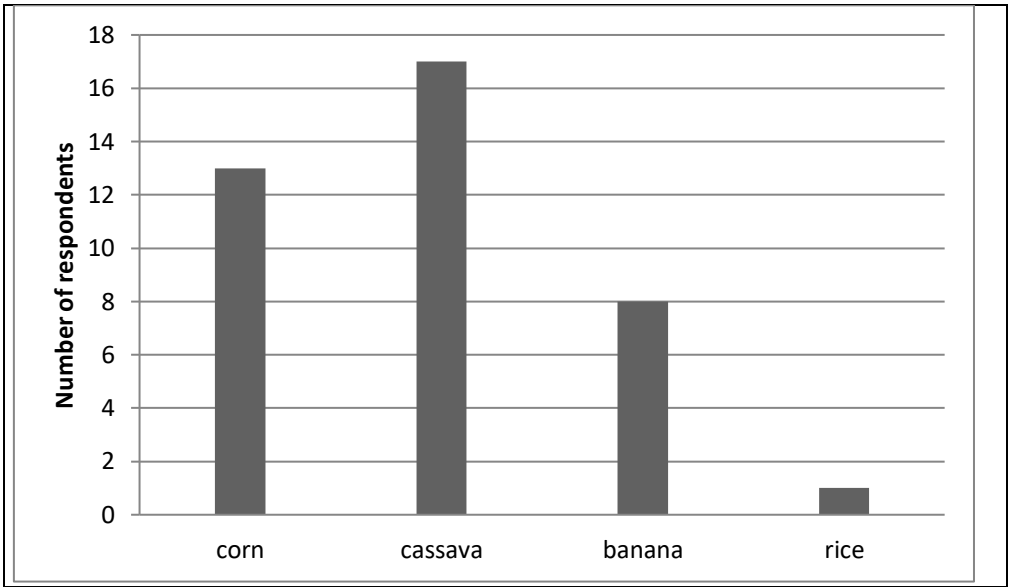
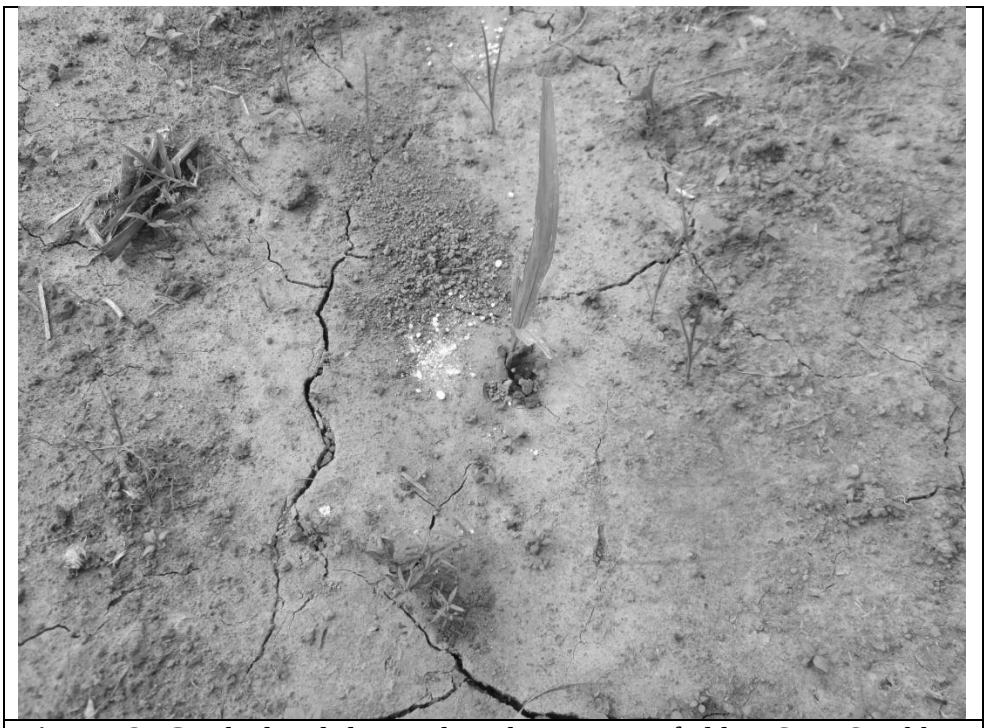


Figure 1: Number of respondents currently cultivating corn, cassava, banana and rice. N=18.

Are the farmers experiencing droughts, floods or pests?

Every farmer that we interviewed during our research confirmed that they experience droughts. However, not every farmer suffers equally from drought; some farmers say that they experience drought every year, whereas others say that they are only experiencing drought some years. This also depends on where the farmer's land is located, as the drought is more severe higher in the mountains than in the lower areas.



Picture 2: Cracked soil due to drought in a corn field in Sitio Sinubkan (photo by L. Rodenburg 2016)

The occurrence of floods is of course also heavily dependent on the location of the farmer's land, as land that is located high in the mountains is extremely unlikely to be flooded. Even so,

12 out of 18 respondents confirm that they have experienced floods on their land (Figure 2). Within this group there are also some differences, as is the case with the drought, with regards to the frequency and severity of the floods on their land. Additionally, most farmers are afraid that there will be more floods if the dam is built. When we asked the farmers what they think of the dam, 11 respondents replied that they are not in favor of the dam, because they fear that the dam will cause floods. The four respondents and the kagawad that replied that they are in favor of the dam said that they are also afraid of floods caused by the dam, but that they think that the benefits of the dam, such as more jobs and electricity and the construction of the road, outweigh the perceived risk of floods. The remaining three respondents replied that they do not know what the effects of the dam will be and are thus not able to pick a side.

Picture 3: The effects of a flood on a corn field next to the river: the whole field had to be replanted with new corn plants (photo by L. Rodenburg 2016).

With regards to pests, only one of the respondents said not to be troubled by this problem. The pests that farmers mention being troubled by are rats, tungro virus, birds, corn borer, insects and weeds. Rats are the most common pest, especially in cassava, because the fruit of the cassava is found in the ground, where the rats live. It is thus easier for the rats to eat cassava than corn. More precisely, 14 out of the 17 respondents that cultivate cassava are troubled by rats. The other three respondents have not been troubled by rats on their cassava, which could be due to the fact that they started cultivating cassava very recently.

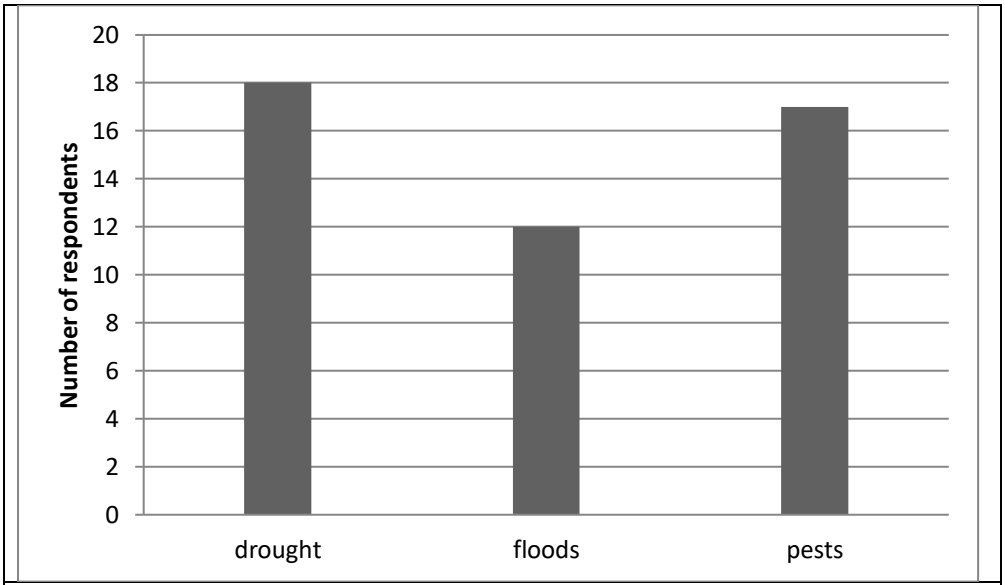


Figure 2: Number of respondents experiencing drought, floods and pests. N=18.

How do farmers deal with these issues? Does the government provide any assistance?
When it comes to droughts and floods, farmers say they do not have any means to combat those forces of nature. However, some farmers say that in the case of a big calamity due to droughts, floods or typhoons, the government occasionally provides assistance in the form of relief goods, such as basic food products and seeds, or even financial aid. More precisely, 50 percent of the respondents say that they have received relief goods after a calamity, the other half say they have not. When it comes to financial aid, 72 percent of the respondents deny ever having received financial aid from the government, whereas 28 percent says that they have received money. With regards to information about how to cultivate the crops more efficiently, only 33 percent confirm that they receive information from the government, whereas 28 percent says that they receive information, but only from the private company that produces and sells agricultural products (Figure 3).

We asked the barangay officials about the distribution of aid as well and they confirmed that the officials sometimes go to San Mariano to ask for aid or information. They claimed to distribute what they receive in San Mariano among the inhabitants of Tappa. Mr. Louis Baquiran described the process of distributing relief goods after a calamity as assembling the goods in the barangay hall and then calling each household of the community one by one to the hall to receive their share.

The respondent of the LGU in San Mariano confirms that they distribute relief goods and seeds upon request of the barangay officials and in the case of a calamity. The LGU denies that they distribute cash, but the cash that the farmers in Tappa have received comes most likely from the provincial government.

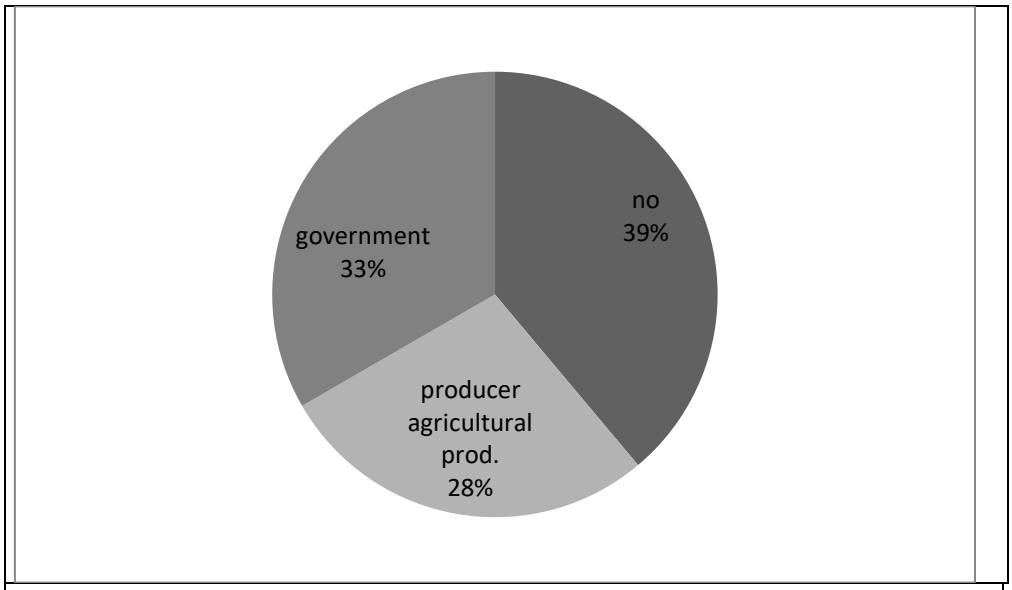


Figure 3: Percentage of respondents receiving information from the government and the producer of agricultural products.

In contrast with the droughts and floods, farmers do have some methods to combat the different pests. For example, some farmers use poison, traps or extra food next to their fields to keep away the rats. When it comes to the tungro virus, farmers say that they cut off the leaves that have turned yellow, or in a worse case the whole tree, in order to prevent the spreading of the virus. Other methods that farmers have mentioned are scarecrows against birds and spraying pesticides and insecticides against corn borer and insects. Weeds compete for nutrients with the crops and also attract rats to the field, but farmers use weedicides against it.

DISCUSSION

Most of the farmers cultivate multiple crops on their land, which are corn, cassava, and banana. As shown above, cassava is the most cultivated crop in Tappa. However, the number of farmers cultivating cassava does not provide information on the size of the total land area where cassava is cultivated; some of the farmers only cultivate cassava on a small area of their land, because this is the first time that they cultivate it and they are testing the cassava. Several farmers have said that they are most likely willing to start cultivating cassava on a larger area of their land, meaning that they would exchange the corn for cassava. The farmers' accounts of cassava are almost always very positive for the reasons that have already been mentioned above. The only issues concerning cassava that farmers mention are the rats and the fact that the land needs to have a fallow period of one year after cultivating cassava for 4 or 5 years. The farmers have not experienced this yet, but have only been informed about this, because they have not been cultivating cassava for a long enough period.

Drought is the most common problem that the farmers face and there is not much that they can do about it, as there is a lack of an irrigation system. Furthermore, as mentioned before, some farmers would not be able to benefit from an irrigation system, because their land is too steep.

Pests are also widely experienced among the farmers, but the type of pests differs per crop. Luckily the farmers have ways to combat the pests, as opposed to floods and droughts.
With regards to floods, this is a regularly recurring problem for farmers that have land next to the river. Especially during the rainy season, farmers are being plagued by floods. They do not

know of a way to combat this problem; not one of the farmers mentioned anything about flood risk reduction.

On a more positive note, the recent shift towards cultivating cassava instead of corn ensures that the farmers are able to cope with the natural hazards that they cannot prevent. If the respondents' optimism is justified, cultivating cassava has the potential to increase the farmers' profits and livelihoods significantly under the difficult circumstances that the farmers face currently.

The government does give some aid and information, but unfortunately the responses of the different farmers vary widely on this topic. Some farmers claim that they never receive help, others say that some people are randomly picked from a list when it comes to financial aid, and another group claims that they do receive help in the wake of a calamity. All these factors make it difficult to judge who is speaking the truth and what the reality is. We especially have doubts about the afore mentioned account of barangay official Louis Baquiran regarding the distribution of relief goods in the barangay hall, as he specifically mentioned that all the households are called upon one by one, whereas 50 percent of our respondents claim not to receive relief goods in the case of a calamity. Moreover, one respondent mentioned that she received financial assistance from the provincial government, but that she was randomly picked from a list and that this was during the campaign for the then upcoming elections, so that she suspects that this was only part of a political campaign. Furthermore, several of the farmers that said that they did receive aid from the government told us that this has only happened once, more precisely in December 2015. Therefore we cannot judge if the farmers receive or will receive aid regularly.

When it comes to receiving information from the barangay officials regarding efficient cultivation, 39 percentof the respondents claims not to receive any. Some farmers even believed that the barangay officials go to San Mariano to gather information, but keep the information to themselves or only distribute it selectively when they return to the village. The fact that some farmers feel excluded from receiving the information can be due to several reasons. Firstly, our host family told us that some farmers know about the meetings and are able to go, but do not go because they believe that it would be a waste of their time. Secondly, some farmers said that the information that is available is only about cultivating rice, which is not useful for them because they cannot cultivate rice. Finally, there is also a group of farmers that live too far away from the barangay hall to be able to receive the information.

Additionally, a constraining factor on our research was the fact that we had limited time to conduct it and consequently only had a small sample of respondents. Even though we started to hear a lot of the same answers being repeated, especially regarding our questions about cassava, it is always better and more representative of the community to have a larger sample. Moreover, if we had had more time to conduct our research we would have had the opportunity to reflect more thoroughly on our results during our research and thus investigate issues that we came across in more depth.

Recommendations

We noticed that the farmers who claim not to receive any information from the barangay officials feel excluded. We think that the barangay officials could make a bigger effort to reach more farmers when they distribute information, even if some farmers are a bit reluctant themselves to receive the information. This way the barangay officials could remove the sense of exclusion among the farmers.

Furthermore, we realized that most farmers have very limited information about flood risk reduction in general and the possible effects of the dam. When we asked the farmers how they recover from disasters such as floods and droughts, they responded that there is no way to do so, making it clear that they have no knowledge of ways to reduce flood risks. We think it would be good for the farmers to be informed about this, so that they know how to combat floods.

ACKNOWLEDGEMENTS

First and foremost, we would like to thank our host family; Uncle Lito Lorenzo, Auntie Connie Lorenzo, Denmark, Charlene, Leny Marie for their warmest welcome, hospitality and providing us place to stay at Tappa, San Mariano. We would also like to thank our respondents for extending their knowledge, time and effort and expressing their opinions, and by doing so contributing to this research. Furthermore, we would like to express our gratitude towards the two barangay officials that we interviewed, Kagawad Louis Baquiran and Kagawad Nelson Pauig for providing us with their time and information. Finally, we would like to thank Cees Oerlemans and Jhondee Quistoria for interviewing the LGU in San Mariano on our behalf.

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APPENDICES

Appendix A: Questionnaire farmers

Location:_____Date:_____
Name respondent:_____Ethnicity:_____
Age:_____Gender:_____
Highest ducation:_____Profession/livelihood:_____
Family income:_____

Q1: What crops do you cultivate on your land? Why these crops?
Q2: Do you sell them or consume them? If you sell them where?
Q3: How many times do you plant a year? What months do you usually plant and harvest your crops?
Q4: Are you using fertilizers or pesticides in your crops?
Q5: How and when did you obtain your land? (Do you own your land?)
Q6: How do you make sure that there is enough water for you crops on your land? Do you have an irrigation system?
Q7: If you had the possibility to have an irrigation system would you change your crops?
Q8: Have you experienced drought in your land? How often? Has this changed over the years?
Q9: Have you experienced floods on your land? How often? Has this changed over the years?
Q10: Have you experienced pest's attacks on your crops? How often?
Q11: Have you experienced lower yield or financial problems because of the problems you are facing in your crops such as droughts, floods and pests?
Q12: How do you recover from something like a flood, drought or pest? What do you have to do to repair the damage that is done to your land?
Q13: Do you receive any help for that? If yes, from whom?
Q14: Do government officials inform you how to solve this kind of problem? In what from?
Q15: Do you know about the Ilaguen River Dam? What do you think about it?
Q16: Is there anything else that you would like to add?

Appendix B: Questionnaire barangay officials

1. Do you help or advise the farmers regarding their problems such as droughts, floods and pests?
2. Do you ask for help or any assistance from the government about the problems of the farmers? How? In what form?
3. Have the issues (floods, droughts or pests) changed over the years? Have things gotten better or worse? How severe?
4. If there is a disaster or calamity are you distributing some financial aid or some relief goods in the community?
5. How do you distribute financial aid or relief goods?
6. What do you think about the Ilaguen River Dam?
7. What would be the benefits of the dam if it will be built? Will it provide irrigation for example?
8. What are the possible problems that the dam will cause?

Appendix C: General information respondents

Number	Name	Age (y/o)	Gender	Highest education	Ethnicity	Profession
1	Gilbert Agpoon	33	M	High School Graduate	Ilocano	Farming
2	Laurencio Gulapan	47	M	Elementary (grade 5)	Gaddang	Farming
3	Eulagio Antonio	57	M	Elementary (grade 3)	Ilocano	Farming
4	Rosemer Lugo	21	F	High School (3rd year)	Ilocano	Farming
5	Maricel Jimenez	33	F	High School Graduate	Kalinga	Farming
6	Lilicia Mercado	57	F	Elementary (grade 2)	Kalinga	Farming, Feeder of Pigs (hired)
7	Linda Ramos	54	F	Elementary (grade 4)	Kalinga	Farming
8	Rodalyn Lorenzo	28	F	College Graduate	Palanan	Farming
9	Salvador Mercado	21	F	College Graduate	Ibanag	Farming
10	Nelson Pauig	50	M	Elementary Graduate	Ibanag	Farming, Barangay Official (Kagawad)
11	Alma Siringan	29	F	College Graduate	Ilocano	Farming
12	Ronald Arribay	16	M	Elementary Graduate	Ilocano	Farming
13	Lito Lorenzo	56	M	Elementary (grade 3)	Ibanag	Farming
14	Alfredo Agpoon	66	M	Elementary Graduate	Ilocano	Farming
15	Argie Villa Cruz	29	M	High School Graduate	Tagalog	Farming
16	Wilma De Guzman	43	F	Elementary Graduate	Kalinga	Farming
17	Eric Castro	32	M	Elementary Graduate	Kalinga	Farming
18	Teodoro Mabborag	60	M	No Education	Ibanag	Farming
19	Louis Baquiran	72	M	Elementary (grade 1)	Ibanag	Barangay Official (oldest baraggay official in Tappa), Carpenter

Note: the two barangay officials that we interviewed are included in this list, one of them is also one of the farmers.

WASTE MANAGEMENT IN CADSALAN

Rodel Nacomel and Anniek van Mierlo

INTRODUCTION

This research will consist of two parts, conducted by two teams. Team 1 consists of Anniek van Mierlo and Rodel Nacomel. Team 2 consists of Melvin Palos and Martine Lievers. Both teams will conduct separate research under the umbrella of waste management, but with a different focus. Team 1 will focus on the status quo of waste and waste management. Team 2 will focus on general awareness and attitude of community people towards waste and waste management. The gathered data will be presented in two separate reports but has complementary data. Some parts of the research are also conducted in cooperation with team 1.

In part one of this study, we will focus on the status quo of waste and waste management in the barangay Cadsalan, San Mariano municipality, Isabela province, in the Philippines. No day goes by without the disposal of some kind of waste. Plastic wrappers, human leftovers, chemical residues from the agricultural sector and so on. Even though laws and regulations are made to guide the correct disposal of waste, it slowly seeps into our environment.

In the rural areas of the Philippines, a lot of household waste is burned in the backyard or along the road (own observations). This type of waste disposal is unsustainable because it pollutes the air with particulates, carbon monoxide, toxic metals such as mercury, and other toxic materials (Miller 2008). The burning of household waste also adds CO2 to the atmosphere, a greenhouse gas, which is causing global warming because the amount of CO2 in the air already reached critical levels. Another way to dispose of waste is burying it. This can cause the seeping of dangerous substances into the groundwater on which the inhabitants of the rural areas so heavily rely. Besides the dangerous effects of the unsustainable disposal of waste, it is also a waste of valuable materials (Miller 2008) and an insult to the beautiful views the Philippines has to offer. In the report of the watercourse of 2012 we can discover another way to deal with waste by reusing or recycling material (Buraga et al. 2012). In this research, we will try to answer the research question “What are the environmental impacts of waste in Cadsalan?” by answering the following sub questions: “what types of waste are found in the area”, “is there any effect noticeable of waste on the environment”, “is there an effect of waste on the overall human health and wellbeing” and “how do people dispose of their waste”.

We hope to identify existing problems concerning waste management and by that, formulate options to decrease the knowledge gap between the people who create the laws and the people that adopt them.

METHODS

Our research will take place in the barangay Cadsalan, San Mariano, Isabela. We will aim to investigate what the general perception towards waste and the environmental impact of waste is in the barangay. This research will be combined with part two of the research on the rules and regulations, education and the general awareness concerning waste management. In order to answer our main research question: “What are the environmental impacts of waste in Cadsalan”, we will use a series of research methods. First, we have to establish the perception of waste by interviewing villagers and let them tell us what they see as waste without doing any suggestions. Counting the actual waste in an area (according to our own perception on waste)

will be done to establish the amount of waste. We will draw a map showing the areas where we did the counting. For the counting, we will take a look at a random area in the barangay and count the waste within this area. This process is then repeated in other parts of the barangay taking into account that the same area-size will be used. Waste analyses and interviews will be done to establish the different types of waste. The impact of waste on the environment and the overall human health and wellbeing is explored by conducting interviews with the villagers.

Cadsalan, San Mariano, Isabela: The location of our research

Barangay Cadsalan, San Mariano municipality, Isabela Province is located in the North Eastern part of Luzon, Philippines. It is situated at the foot of Northern Sierra Madre Natural Park (NSMNP) and it is located 20 km from San Mariano proper. Cadsalan means "Small Island surrounded by water". The barangay consists of seven scattered purok (zone) with a total population of 330 households. There is one school located in the center of Cadsalan, which facilitates around 500 children from grade 1 to 12. There are 16 teachers working at the school. There is also a health centre situated in the centre of Cadsalan. Furthermore, there is a barangay community centre and a barangay hall for seminars, assembly meetings and fiestas. Agriculture is the main source of livelihood in the barangay such as banana production, corn and cassava plantation.

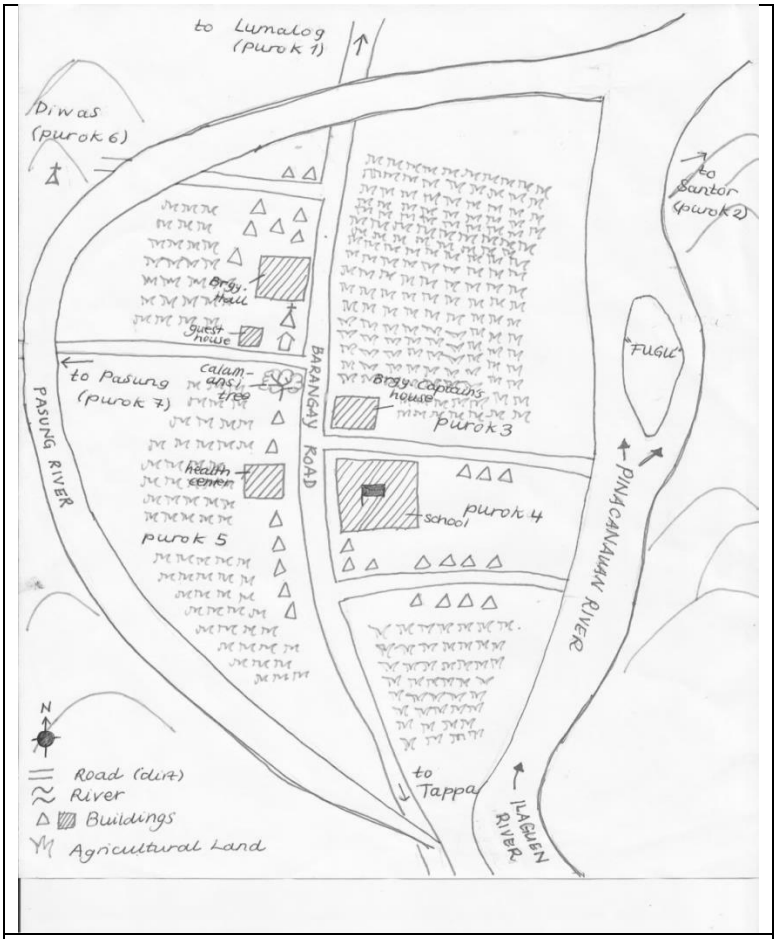

Figure 1. Sketch map of Cadsalan. Credits for the construction of this map go to Dolores L. Aglugub, Nynke Blömer and Dayan Delos Santos

Table 1. Time schedule of the activities for team 1 during the fieldwork in Cadsalan	
Day/date	Activities
Monday 18-01	- Traveling to the barangay Cadsalan - Meeting with host family
Tuesday 19-01	- Constructing a general profile of the Barangays together with other groups - Observations of daily practices locals - Area counting regarding waste - Waste analyses
Wednesday 20-01	- 6 in depth-interviews
Thursday 21-01	- 6 in depth-interviews
Friday 22-01	- 4 in depth-interviews - Recycling workshop

RESULTS

We interviewed 16 inhabitants of barangay Cadsalan, counted the waste in 16 areas of approximately 5 by 10 meters and analyzed eight garbage belts. Garbage belts are usually owned by one family or shared with multiple families; they are located at the side of a road, or in the back of the garden (personal observation). The garbage belts are usually one to two square meters big. They will not grow much in size, because the trash ending up in the garbage belt is frequently burned.

We analyzed the waste on the garbage belts and categorized it by type of waste. Chemical waste includes batteries, empty pesticide bottles, but also empty medicine bottles. Plastic waste consists of a variety of plastic materials like wrappers, slippers, toys and plastic bags. On average we found per belt 69 pieces of plastic, one or two pieces of chemical waste, less than one piece of glass or ceramics, one or two pieces of paper or cardboard, less than one piece of iron and one to two pieces of textile (Table 2). Beforehand we established what we count as waste. Every piece of a material that is placed in the environment by humans but not used for anything anymore and can harm the environment in any way, we counted as waste. If a wrapper is torn into two pieces, we counted the two pieces separately.

Table 2. Total and average pieces of waste found in garbage belts categorized by type of waste		
Type of waste	**Total**	**Average**
Plastic	552	69
Chemical waste	13	1-2
Glass/ceramics	7	0-1
Paper/cardboard	12	1-2
Iron	6	0-1
Textile	9	1-2

The counting of waste resulted in a number of 1320 pieces of waste in total, in 16 areas of approximately 5 by 10 meters. On average, this is 82 to 83 pieces of waste per area. On the map (appendices) the areas where we counted the waste are visible.

From counting, we learned that there are more waste found in the center of the barangay and the crossing of two roads (see figure 4 and 10). There are some exceptions, which can be explained by the presence of a (former) garbage belt in the counting area or the dumping of waste by cars passing by (interview).

Table 3. The amounts of waste per area (see map in appendices for location)

Area	**Pieces of waste**
1	135-136
2	157
3	93-94
4	146-147
5	97
6	68-69
7	180
8	38-39
9	28-29
10	42-43
11	58
12	113-114
13	35
14	39-40
15	45
16	40

In addition, we counted 3 broken mobile phones during the fieldwork, 14 batteries laying around the village and over 25 used slippers among many more pieces of waste.

The general perception on waste was investigated by asking the participants the question: ‘What do you see as waste?’ All participants mentioned plastic (wrappers), 69 percent of the participants mentioned leaves or biodegradables and 38 percent of the participants said they saw paper and cardboard as waste as well (see figure 2).

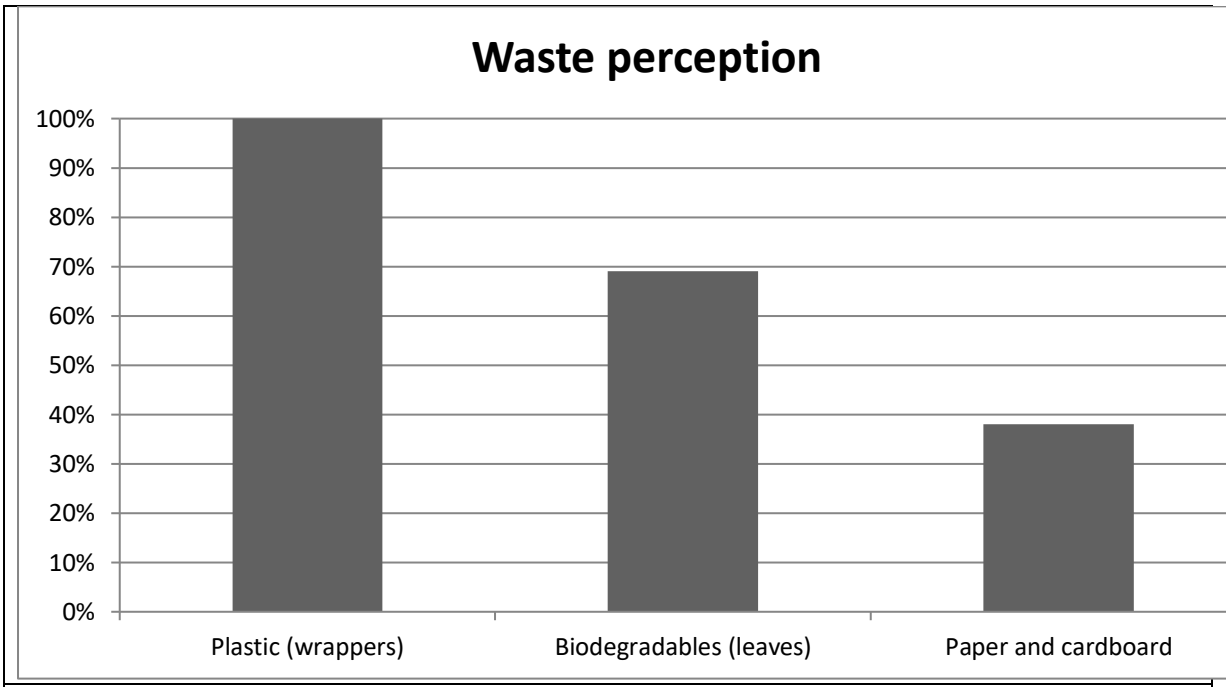

Figure 2. Perception of waste according to the participants in percentages

We also tried to establish the amount of waste produced per day. Beforehand, we decided to interview a garbage collector, but we came to the conclusion that the waste that arrives in the village is burned there, or will stay there until eternity. Plastic bottles and cardboard are sold, but we were not able to reach the buyer. The buyer comes approximately 2 times a month without notice. Some villagers also go to the buyer themselves, but the distance was too far for us to travel. Either way, it is good to know that some materials are not burned or buried in the village. We asked the participants the question how much waste they produce. Many were not able to formulate an answer because the production of waste relies heavily on the consumption. After a few interviews we discovered it was easier for them to answer the questions when we gave an example; 'Do you produce a full bin, half a bin, or a little bit of waste per day?' The answers were too few and too random to count it as reliable data, but we can say that most of the participants who were able to answer the question produced 1 full bin per day. Multiplied by the amount of households, that is 330 full bins of material are produced per day, which end up in the ground (water) or the air when they are burned. Based on our personal observations and the questionnaire, we can say that most of the waste is burned (either in a hole, along the road or in the backyard), followed by buried, just left lying around and some waste is sold again in the form of cardboard and plastic bottles.

Figure 3. Hole in the ground used to collect and burn waste. (Photo taken by Rodel Nacomel, 2016)

Workshop on recycling Friday 22nd of January

During the interviewing phase of our fieldwork, we noticed that most respondents did not have an exact answer when they were asked to give examples of how waste materials (or: *basura* in Tagalog/Ilocano) could also be beneficial to them in terms of recycling and creating new things. Perhaps the villagers do not immediately see the link between things they create and the term *basura*, or perhaps they are just not able to mention anything on the spot. Therefore, we (Anniek and Martine) decided to organize a workshop on waste management on the last day of the fieldwork as a means of experiment. The aim of this workshop was to experience the community people's creativity, and their ability to create new things out of waste materials. We were also interested to see whether or not people would join us on their own initiative. In the days prior to the workshop, we collected different kinds of waste materials from all over Cadsalan such as straws, plastic bags, slippers, candy wrappers, cans, plastic bottles, pieces of ropes and cords, a fishnet and so on. We sat down in front of the house of our host family, and spread the materials we had collected on a big table. Immediately, two young girls were interested to join us as well as Ma'am Corazon, the lady of the house.

Within a matter of minutes, a group of 7-8 other neighbouring ladies gathered around us and they were all helping us to make decorations for the "Last-day-of-fieldwork-party" at our host family's place. Over the course of the evening, the group grew larger and larger, and eventually we used almost all the materials we had collected to make different kinds of decorations. It was interesting to see that, in contrast to our experiences during the interviewing phase, the community people are actually really creative, and they actually do use waste materials to create new things.

Figure 4. Recycling workshop with participants. (Photo taken by Rodel Nacomel, 2016)

DISCUSSION

The question we asked ourselves at the start of the fieldwork was: "What are the environmental impacts of waste in Cadsalan?"

Through the questionnaire, we discovered that there are visible effects on the overall human health and wellbeing and surrounding wildlife in Cadsalan. The main cause of these effects was the burning of garbage and the use of pesticides. Thirteen out of 16 participants acknowledged damage to the environment as a result of waste or pesticides (Figure 5).

The effects were: animals and even people dying through pesticides ending up in the water, villagers coughing, having irritated throats, noses, and/or lungs as a result of inhaling smoke caused by garbage burning, air pollution, the burning of trees near the garbage belts, feeling dizzy, fainting and even losing weight caused by inhaling smoke or pesticide fumes and the indirect effect of diseases transmitted by mosquitos which are attracted by (the water in) waste. Three out of 16 participants knew about air pollution, and one respondent even knew about the link of garbage burning, air pollution, global warming and climate change. There was also one person who was not aware of any effects of pesticides or waste on the overall human health and wellbeing and the environment.

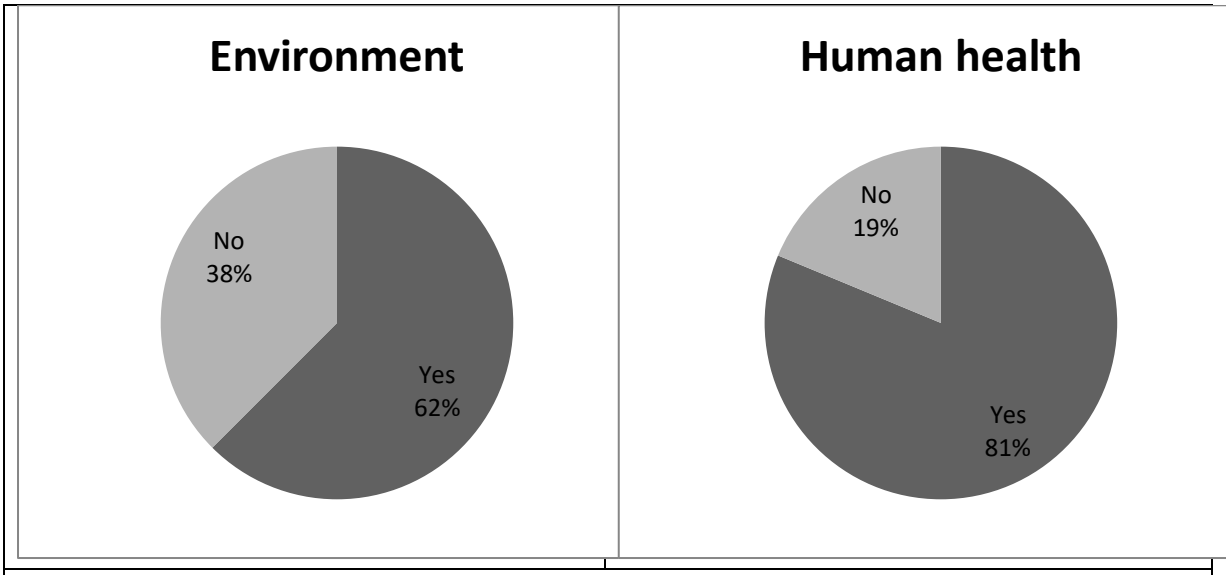

Figure 5. Outcomes of the participants awareness of effects of chemicals and waste on the environment and overall human health and wellbeing

Our main concern is the burning and burying of batteries and other chemical waste and the general lack of knowledge that this is very dangerous. We had an encounter with a little girl who helped us collect waste for the workshop. She picked up an energy saving light bulb to make something new with it, unaware of the fact that the chemicals in an energy saving light bulb are dangerous for human health and the environment.

For any recommendations, we would like to refer to the Consumer's Handbook for Reducing Solid Waste. It consists of four spear points: the avoidance of waste, the reduction of waste, the reuse of waste and recycling of waste. To avoid more waste, disposable goods such as throwaway razors, pens and diapers should be avoided. Household toxic waste should be eliminated from the garbage streams and products made from non-renewable resources should be avoided as well. For the reduction of waste, the amount of unnecessary packaging should be limited and practices that reduce waste toxicity should be adopted. Tips to reuse waste are: consider reusable products, maintain and repair durable products, reuse bags, containers and other items, borrow, rent, or share items which are used infrequently, sell or donate goods instead of throwing them away.

To increase recycling, people should be motivated to choose recyclable products and containers and actually recycle them; they should be able to select products made from recyclable materials and compost yard trimmings, food scarps and other biodegradable waste. The burning of waste should be prohibited (Solid waste management for local governments, 1998)

Figure 6. The collective burning of waste along the road. (Photo taken by Anniek van Mierlo, 2016)

ACKNOWLEDGEMENT

One cannot possibly accomplish a research study without the valuable assistance of some people who in one way or another have contributed a lot to it. Thus, we wish to express and put on record our heartfelt gratitude and appreciation for such assistance and encouragement, without reservation.

To our host family in Cadsalan, San Mariano, Isabela, Barangay Captain Gervasio Labuguen, Auntie Corazon and their family, to Sir Arnold and Ma'am Dorina, for their moral support, prayer and encouragement which served as our inspiration in accomplishing this piece of work. To all of our respondents in Barangay Cadsalan, San Mariano, Isabela who gave their time as our interviewees. We were able to gather a lot of data, thanks to them.

To all of them, this humble piece of work is heartily and lovingly dedicated.

APPENDICES

Interview

Demographic data:

Q1. What is your name?
Q2. How old are you?
Q3. Do you live in this area? (if yes, Q4.)
Q4. Since when do you live in this area?
Q5. How big is the family you live with?
Q6. What is your position in this family?
Q7. What is your occupation? (If you are a famer Q24.)

Questions:

Q8. Can you show us around and tell us what you think is trash or waste?
Q9. Why do you consider this trash or waste?
Q10. How do you dispose of waste in your household?
Q11. What kind of materials are these?
Q12. Do you recycle anything? (reuse materials/collect trash separately) (if yes Q13.)
Q13. Why do you recycle?
Q14. What do you think is the most hazardous waste in your barangay?
Q15. Do you think the waste or disposal of waste has any effect on the environment? (water, land, animals, air) (if yes, Q17.)
Q16. Do you think the waste around you has an effect on your own health? (if yes, Q17.)
Q17. What kind of effects?
Q18. Are there any local initiatives regarding waste? (if yes, Q19.)
Q19. Who is responsible for this?
Q20. Will you still live here in 10 years; do you have plans to move?
Q21. Can you tell us why (not)?
Q22. Can you tell us the difference between 10 years ago (or when you came here) and now?
Q23. How do you think this Barangay will look in 10 years?

Q24. What is the waste found in your farm?
Q25. Does the waste affect your plants?
Q26. Do you use any pesticides? (if yes, Q27.)
Q27. How do you dispose of your chemical waste?

Q28. Do you want to tell something yourself?
Q29. Do you want to ask something or is there still something unclear?

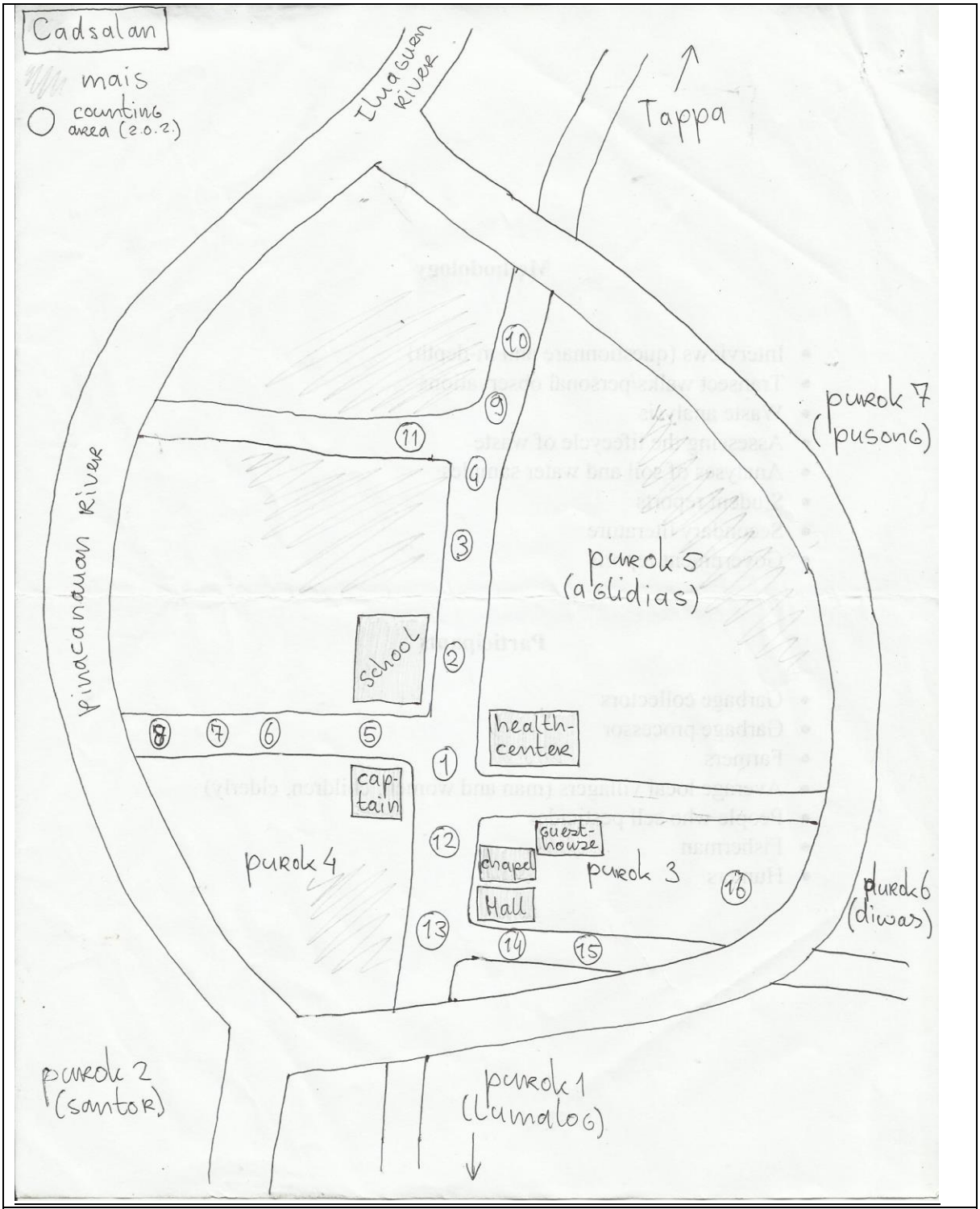

Figure 7. Locations of the 10 by 5 meter area's where waste was counted

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Weerd, M. et al. (2012), International course on water and water management in the Philippines. Solid waste management for local governments, Second Edition (1998)

GENERAL AWARENESS AND ATTITUDE TOWARDS WASTE AND WASTE MANAGEMENT IN CADSALAN

Melvin Palos and Martine Lievers

INTRODUCTION

Proper waste management is one of the crucial dimensions we should seriously take into consideration, since it matters to every individual, to our everyday life, to the environment we live in, to our health, to our future thus indeed it affects everything around us. Improper waste management is not only a serious problem, but it is interconnected with other environmental and social problems such as pollution and health and sanitation issues (*Allapitan 2001*). According to Angelo T. Reyes, who was the former Secretary of the Department of Environment and Natural Resources (DENR) and Chairman of the National Solid Waste Management Commission (NSWMC) in 2007, the focus in the Philippines has been mainly on economic growth over the past years, and efforts to preserve and protect the environment have been lacking. The urgent need for proper waste management has been recognized by the (DENR) and therefore the Republic Act No. 9003, otherwise known as the Ecological Solid Waste Management Act of 2000 has been included in their agenda. *"The agenda includes implementing the proper closure and rehabilitation of dumpsites nationwide; developing sanitary landfills and safe disposal systems; promoting recycling and waste recovery; and providing guidance and technical assistance in waste management strategies and options to all local government units through the NSWMC"*. (Solid Waste Management Made Easy). Examples of other national ordinances are the Establishment/Construction of Material Recovery Facility (MRF 2012-2017) and Bantay Triple K (Kalinisan, Kalusugan at Kaunlaran) *(Viernes 2001: 147)*.

Cadsalan, San Mariano, Isabela: The location of our research Barangay Cadsalan, San Mariano municipality, Isabela Province is located at the North Eastern part of Luzon, Philippines. It is situated in the foot of Northern Sierra Madre Natural Park (NSMNP) and it is located 20 km from San Mariano proper. Cadsalan means “small island surrounded by water”. The barangay consists of seven scattered purok (zones within the barangay) with a total population of 330 households. There is one school located in the center of Cadsalan, which facilitates around 500 children from grade 1 to 12. There are 16 teachers working at the school. There is also a health center situated in the center of Cadsalan. Furthermore, there is a barangay community center and a barangay hall for seminars, assembly meetings and fiestas. Agriculture is the main source of livelihood in the barangay such as banana production, corn and cassava plantation.

Waste Management Projects in the municipality of San Mariano

In the municipality of San Mariano, there are two different programs on waste management. The Municipal Environment and Natural Resources Office (MENRO) has the project of the Greencard Holder. The aim of this program is to reduce waste in general. It is funded by the Internal Revenue Alotment (IRA), which is a municipal budget. They are also providing school supplies to elementary schools, such as notebooks and pencils.

They regularly pick up waste in the barangays. Municipal Planning and Development Coordinator (MPDC) has the Three G's Project (Green Growth Generation). It is an innovative idea of the LGU San Mariano under the BuB Program (Bottom-Up Budgeting) which is a national budget. The program is in partnership with some governmental organizations and non-governmental organizations such as the DENR, Department of Interior and Local Government (DILG), Department of Education (DepEd), ILAW Inc., Liga ng mga Barangay (LnB). This program entails conducting seminars in elementary schools educating children about proper waste disposal and giving them incentives to collect waste. Furthermore, 1kg of waste or 10 bottles is equivalent to 1 notebook, which they are supplying to elementary schools. (Darwin Bulusa, Local Government Unit (LGU), pers. comm.)

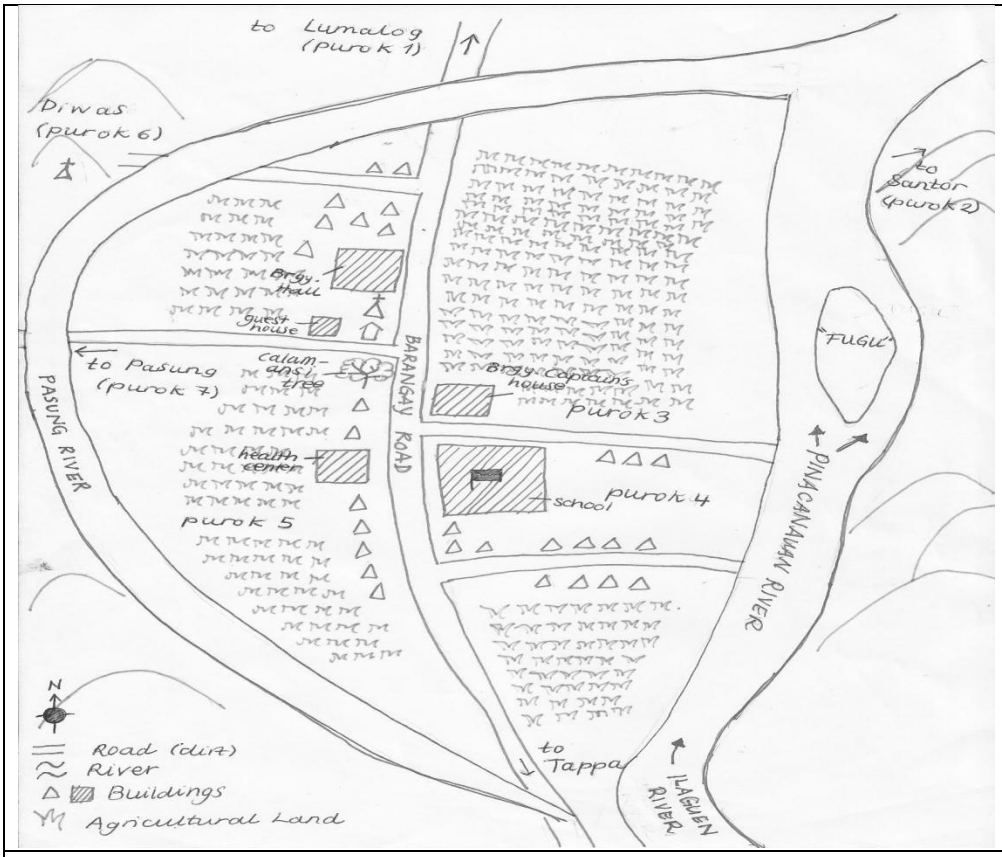
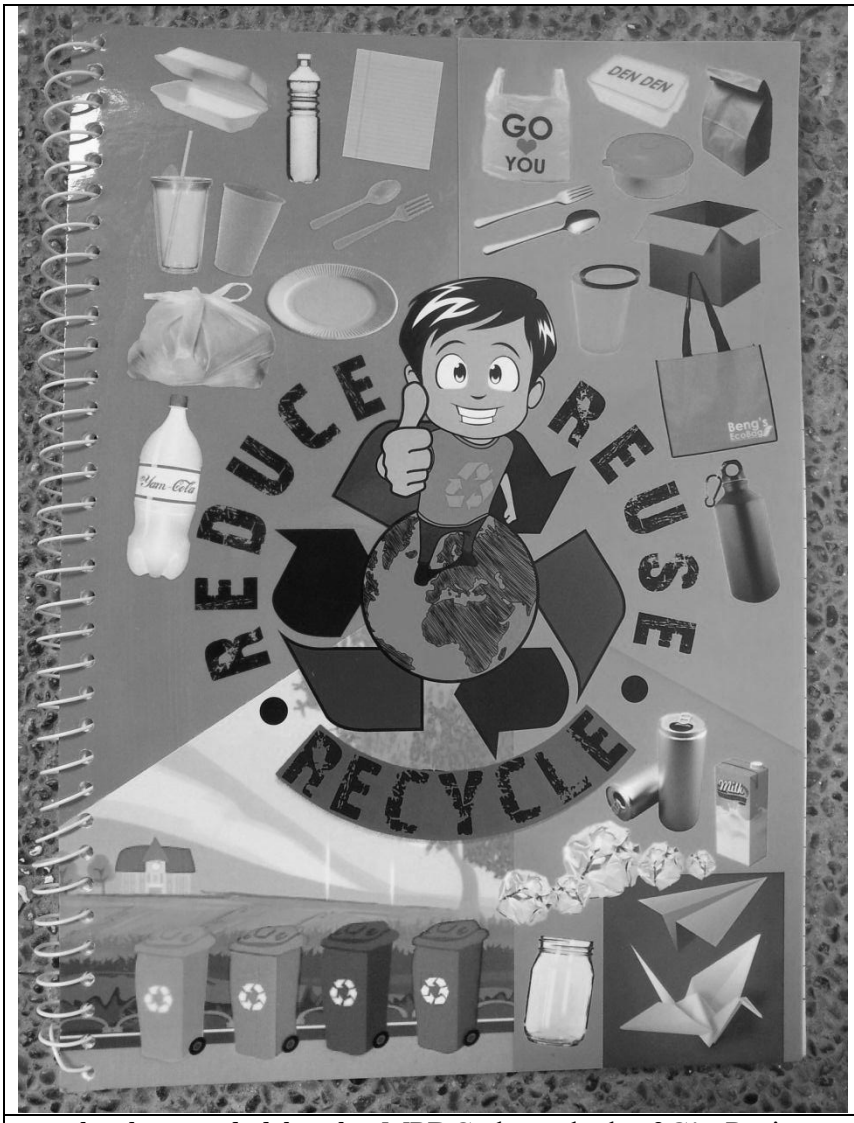


Figure 1. Sketch map of Cadsalan. Credits for the construction of this map go to Dolores L. Aglugub, Nynky Blömer and Dayan Delos Santos

Clarification to research approach

This research consists of two parts, conducted by two teams. Team 1 consists of Anniek van Mierlo and Rodel Nacomel. Team 2 consists of Melvin Palos and Martine Lievers. Both teams conducted separate research under the umbrella of waste management, but with a different focus. Team 1 focused on the status quo of waste and waste management and local practices. Team 2 focused on the general awareness and attitude of residents towards waste and waste management. The gathered data is presented in two separate reports but has complementary data. Some parts of the research are also conducted in cooperation with team 1. In this part of the study, Melvin and Martine focused on the ideas and perceptions regarding waste and waste management. People's awareness and general attitude towards waste management in barangay Cadsalan are assessed. We have looked into existing laws, rules and regulations and their implementation. Also, the extent to which regulations and conventions are accepted and/or adopted by locals are assessed.



Notebook provided by the MPDC through the 3G's Project to elementary schools in exchange for collected waste. (Photo by Martine Lievers 2016)

RESEARCH QUESTION

What is the general awareness and attitude in Cadsalan towards waste and waste management?

Sub-questions

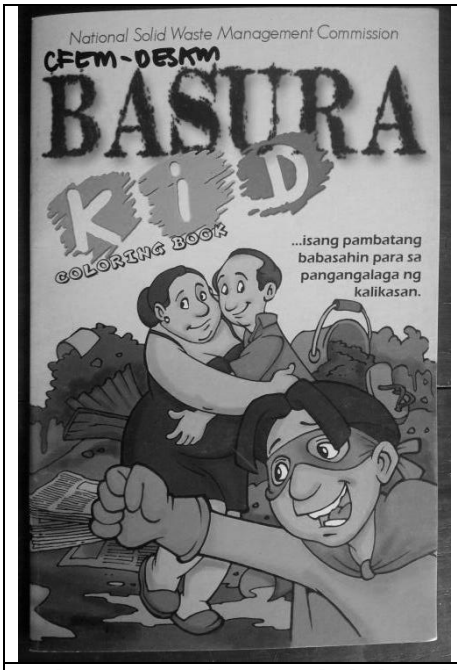
1. How do residents distinguish different kinds of waste?

2. To what extent are people in Cadsalan aware of any regulations and conventions regarding waste management?

3. What are the rules and conventions regarding waste management in Cadsalan?

METHODS

This study is conducted using several methods. These methods include reviewing secondary literature, government reports and student theses. In order to gain a better understanding of the present situation, spatial methods are used such as a transect walk and personal observations. In addition, there is original data collection in the form of interviews with government officials, municipality staff, barangay captains and local residents. In this way, we hoped to find out about people's knowledge and attitude towards waste and about the extent to which residents in Cadsalan are aware of any rules and conventions. Also, a focus group interview/group discussion in the form of a workshop on recycling and re-using waste materials is organized. Thus, we hoped to gain better insight in people's creativity and ability to re-use and recycle. Furthermore, we looked at educational and promotion materials, such as schoolbooks, flyers, information leaflets, banners and signboards to examine the extent to which people are informed by (local) governments about waste (Figure 3).



Coloring Book provided by the NSWMC to educate children about waste management
(Photo by M. Lievers 2016)

TIME FRAME

Day/date	**Activities**
Monday 18-01	- Traveling to the barangays of Cadsalan - Meeting with host family - walk through the barangay and general observations
Tuesday 19-01	- Constructing a general profile of the Barangays together with other groups - Observations of daily practices of locals - Transect walk - Interviews
Wednesday 20-01	- Interviews - personal observations
Thursday 21-01	- Interviews - personal observations - Preparations for workshop (Anniek and Martine)
Friday 22-01	- Interviews - Workshop on waste management (Anniek and Martine)

RESULTS

A total of 17 randomly selected respondents were interviewed and participated during research. Almost all 16 (94.11) of the respondents who participated in the research were coming from 'barangay proper' which consists of purok 3, 4, and 5. Furthermore, one respondent from purok 1 was also able to be interviewed during the research. About half of the respondents (52.94%) depend on farming as their main source of income. Respondents are represented by different ages where the youngest is a 15-year old student and the oldest is a 65-year old grandmother. The respondents are also comprised of a teacher, sari-sari shop owner, barangay health worker (BHW), a utility worker, a housewife, out of school youth, a student, and barangay officials. When walking through the village, we asked residents if they would be willing to participate in the research. In the data collection, we used a semi-structured questionnaire and also observed the area regarding how people deal with their waste. The map of barangay Cadsalan is also sketched to point out the location where majority of residents reside and often go.

General attitude and perceptions of waste

All of our respondents had a corresponding view about what they consider waste and what not. In general, things that are scattered around, things that are found beside the roads or in public places such as the barangay hall or the basketball court as waste, and things that are not pleasant to see as waste. Sixteen (94.11%) respondents mentioned that plastics wrappers such as of candies, biscuits and whatsoever are waste while leaves of all kinds are also a kind of waste as mentioned by 14 (82.35%) respondents. Furthermore, six (35.29%) respondents mentioned kitchen waste such as vegetables and fruits peelings as kind of waste (Figure 2). Plastic bottles, glass (if not broken) and cans were not considered waste because they can sell those to the garbage collector and get a few pesos in return. Sometimes, glass bottles are kept to stock water. The garbage collector, usually someone from San Mariano just comes occasionally to Cadsalan to collect waste, there are no regular visits. Four (23.52%) respondents mentioned that cans are no longer sold to the garbage collector, because he does not accept them anymore. No specific reason for this change is mentioned.

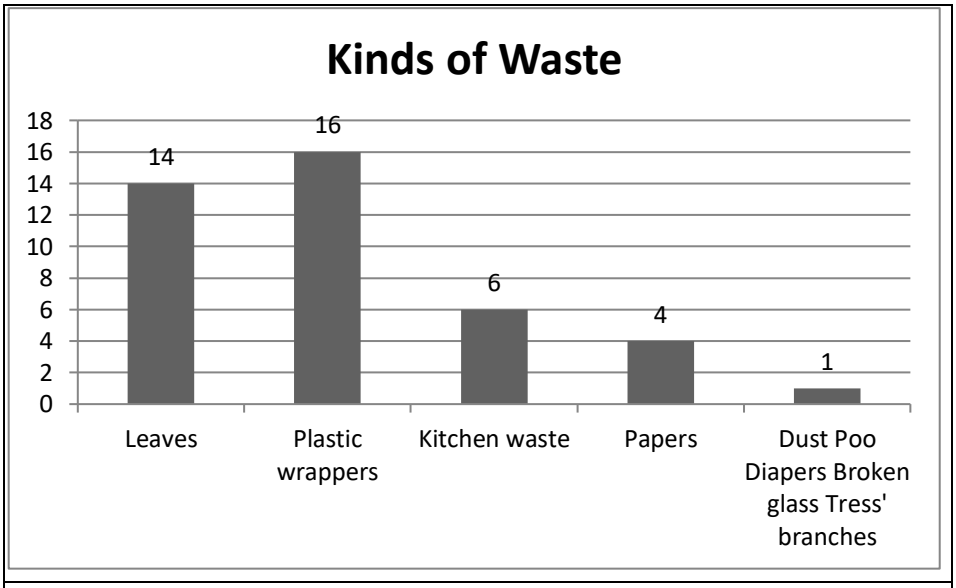


Figure 2.Distribution of respondents' answers what do they consider waste*** Multiple response: n=17

Segregation of Waste and Recycling

There also seems a general consensus on how waste should be handled. Degradable waste is put in a compost pit and let to be decomposed. Few respondents (17.64%) keep kitchen waste such as vegetable peels to process it into organic fertilizer while majority of the remaining respondents (83.35%) is not familiar with this practice. The rest of the non-degradable waste is gathered and burned in the backyard. Basically, things that can still be useful or beneficial in some sort of way are not considered waste, and things that they do not have another purpose for are considered as waste. Thus, all respondents were familiar with segregation of waste. Four (23.52%) of them learned about it in school, six (35.29%) of them were informed by barangay officials during seminars and assembly meetings, but also 7 (41.17%) of them indicated it is just a matter of common sense, and they were not taught by anyone in particular.

Negative aspects of waste

When respondents were asked about negative aspects of waste, a big majority of them which comprised of 12 (70.58%) answered that if you leave waste scattered around, a bad smell will occur, it might cause diseases such as rashes, and mosquitos are attracted to the waste, which can cause dengue fever or malaria. Two (11.76%) respondents indicated to have contracted dengue or malaria as a result of mosquitos dwelling on waste. There also seems to be a link with hospitality and waste management; all of them answered that scattered waste is not good to see, and that it is shameful to visitors, which corresponds to the general hospitality of Philipino people. A clean and neat house and surroundings are highly valued. One of the total number of respondents answered that improper waste management is bad for the environment; another respondent even mentioned that if you burn plastics, it will destroy the ozone layer.

Education and Information about waste

The way through which residents are informed and/or educated about waste differs. One (5.88%) respondent learned about it through reading a magazine that was available in the market at San Mariano. Three (17.64%) respondents learned about waste management in school/college, one (5.88%) respondent was informed by the midwife, and the big majority of the respondents 12 (70.58%) were informed during an assembly meeting at the barangay hall. None of the respondents had ever received any educational materials or information leaflets in the barangay of Cadsalan. In the local school, there are also no specific projects organized to educate school children about waste management. However, during the TLE class (Technology and Livelihood Education) students are being informed about segregation of waste and they collect bottles and cans which are sold to the garbage collector. The fund goes to the school. The only respondent that received educational materials regarding waste management, received it in college in San Mariano, but no one received any in the barangay of Cadsalan. During our transect walk through Cadsalan, we also did not see any signs or signboards informing people about waste management. In general, people that received education or trainings to some extent are more aware of existing rules and conventions.

Familiarity with any rules and conventions

The familiarity of the respondents with any specific rules and conventions regarding waste and waste management was asked during the research. A big majority (76.47%) of the total respondents are not familiar at all with any specific rules and regulation regarding waste and waste management (Figure 3). Nevertheless, 4 (23.52%) of the remaining total number of respondents exemplified that there are rules and conventions regarding waste and waste management.

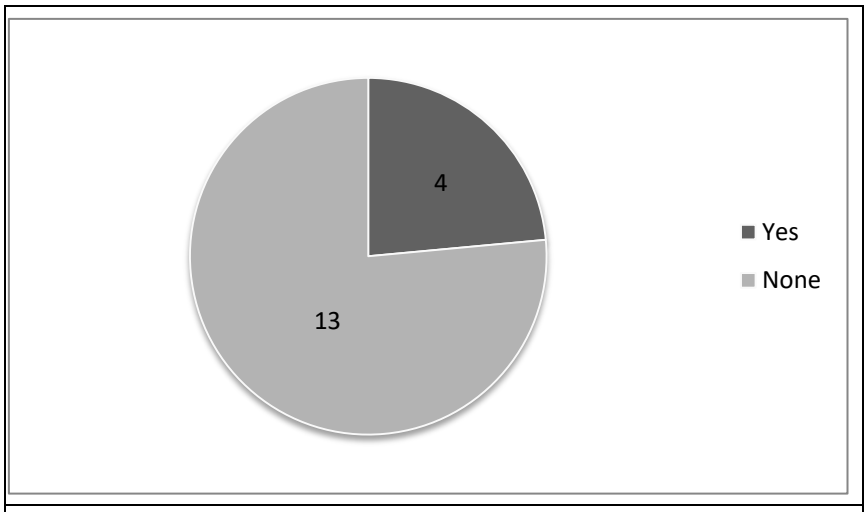


Figure 3.Distribution of respondents who are familiar with any rules and regulations regarding waste and waste management

Barangay projects

Of the total 17 (100%) respondents we interviewed, six (35.29%) of them exemplified that there are projects in the barangay promoting waste management. The other 11 (64.70%) respondents were not familiar with any specific ordinances or projects whatsoever. Of these (35.29%) respondents that were aware, they mentioned about 'Tapat ko Linis ko (Clean your own area)" and Barangay General Cleaning as projects in the barangay that promote waste management. Tapat ko Linis ko is a project in the barangay in which the residential area of particular household is their own responsibility to maintain its cleanliness. They are required to have their own garbage pit and burn their waste there. Usually this happens in their own backyards. Furthermore, according to these respondents, there is also general cleaning being held specifically on the barangay proper by basis when it is highly needed. One respondent was able to recall the name of a specific ordinance regarding waste management, namely the Municipal Recovery Facility) MRF, or Republic Act 9003.

Responsibility

In general, respondents agreed that waste management is a matter to everyone, thus cooperation between barangay officials and residents is of utmost importance. Four (23.52%) respondents indicated that a utility worker assigned by the barangay officials is responsible for cleaning up public areas such as roadsides, basketball courts, barangay halls etc., but they need to be provided the proper tools and utilities in order to make it work. There seemed to be a division in the perceptions among our respondents on who is responsible for implementing barangay ordinances. On the one hand, all of our respondents would like barangay officials to be more active in implementing ordinances and promoting proper waste management. Barangay officials are seen as the fathers of the barangay and as role models for the rest of the residents. They should guide people and lead the cleanings and consequently residents will follow. Their authority and expertise are highly valued and people seem to rely on their guidance and instructions for changes. One respondent emphasized that if you are not an official, people don't accept it when their behavior is corrected by other residents. On the other hand, residents are very active and not shy to take own initiatives. One respondent mentioned that residents are very willing to organize activities or put trash bins themselves, but again they need to be provided with the right materials. Seven (41.17%) of the respondents indicated that you should not sit and wait until other people mandate you to do something.

Examples of proposed changes include: regular visits of garbage collectors, more trash bins across the barangay, communal segregation systems, a communal compost pit for making organic fertilizer and more education about waste management in the local school.

Basura Workshop Friday 22nd of January.

During the interviewing phase of our fieldwork, we noticed that most respondents did not have an exact answer when they were asked to give examples of how waste materials (or: *basura* in Tagalog/Ilocano) could also be beneficial to them in terms of recycling and creating new things. Perhaps they do not immediately see the link between things they create and the term *basura*, or perhaps they are just not able to mention anything on the spot. Therefore, we (Anniek and Martine) decided to organize a workshop on recycling and re-using waste on the last day of the fieldwork as a means of experiment. The aim of this workshop was to experience the residents' creativity, and their ability to create new things out of waste materials. We were also interested to see whether or not people would join us on their or initiative. In the days prior to the workshop, we collected different kinds of waste materials from all over Cadsalan such as straws, plastic bags, slippers, candy wrappers, cans, plastic bottles, pieces of ropes and cords, a fishnet and so on. We sat down in front of the house of our host family, and spreaded the materials we had collected out over a big table. Immediately, two young girls were interested to join us as well as Ma'am Corazon, the lady of the house. Within a matter of minutes, a group of 7-8 other neighbouring ladies gathered around us and they were all helping us to make decorations for the "Last-day-of-fieldwork-party" at our host family's place. Over the course of the evening, the group grew larger and larger, and eventually we used almost all the materials we had collected to make different kinds of decorations. It was interesting to see that, in contrast to our experiences during the interviewing phase, the residents are actually really creative, and they actually do use waste materials to create other things.

Figure 4. Different kinds of collected waste in Cadsalan used for the workshop on recycling and re-using waste (Photo by Martine Lievers 2016)

DISCUSSION

Factors such as an increasing population, urbanization, industrialization and intensifying economic activities are all contributing to the increasing generation of solid waste (DENR, Solid Waste Management for Local Governments, 1998). Even though plenty of ordinances that regulate adequate waste management and proper segregation of solid waste have been created and implemented on national, provincial and local level, there seems to be a disconnection between government officials that create laws and local communities that are supposed to adopt them and a knowledge gap on proper management of waste among individuals is still a pressing issue *(R.A No. 9003).* The Local Government Code (RA 7160) is ought to bear the responsibility to enforce laws on environmental issues, but in practice it is still a big challenge to cope with problems on solid waste management (DENR, Solid Waste Management for Local Governments, 1998). A good example of this, are our experiences during the fieldwork in Cadsalan, since none of the respondents were familiar with any specific laws on waste, nor the two projects on waste management, the Greencard Holder Project and the Three G's Project that are initiated by the municipality of San Mariano. After obtaining information about these projects from the Local Government Unit (LGU) in San Mariano, it becomes clear why the residents in Cadsalan don't benefit from these projects. Due to their remoteness, the barangays of Cadsalan and neighboring Tappa, are excluded from these programs. Therefore, there is no waste collection or processing, and the school in Cadsalan does not benefit from the Greencard Holder project either. The results of a study on household disposal in the municipalities of San Pablo and Santa Maria, Isabela, Mallano in 2000, showed that there is a clear link between the level of education and proper waste disposal (Allapitan 2001). This supports our notion that the availability of information and education on waste and waste management is of utmost importance to ensure proper waste disposal and environmental friendly practices.

During the first day of fieldwork, the barangay captain as well as the majority of residents left for San Mariano for the 4P's program. Due to the absence of the barangay captain, and other circumstances, we have not been able to interview any barangay officials, and we were thus unable to interview them about any specific ordinances and projects in Cadsalan. However, we consulted Bonbon Aglugub, Barangay Secretary, about a copy of barangay ordinances, but he did not have any in his possession.

Overall, we noticed active and interesting segregation practices. Residents in Cadsalan are familiar with segregation of waste, and also take initiatives themselves to dispose of their waste. They value a clean environment, and are very willing to receive education. Although there are no specific written regulations regarding waste in Cadsalan, there are definitely community conventions to which residents are very committed. The great success of the Basura Workshop showed that people are very committed. The playful and informal setting of the workshop was well received by the residents and showed that very willing to participate in activities. It is a great promise to new forms of learning and engaging people in activities to increase awareness. Even though Cadsalan is situated in a remote area, information could easily be disseminated. Because of their positive and active attitude, residents can also easily educate each other or work together to organize activities on their own initiative.

ACKNOWLEDGEMENTS

We would like to express our great gratitude to everyone that facilitated us doing our research in Cadsalan. Of course to our host family, the Barangay Captain, Sir Hervacio Labuguen and his wife Ma'am Corazon Labuguen and family for welcoming us in their barangay and letting us stay in their house. They made us feel very welcome, which contributed greatly to feeling confident and free to do our research. Furthermore, we would like to thank the residents in Cadsalan for their willingness to cooperate with us and to be interviewed. Also, we would like to thank Ms. Dorina Soler and Manong Arnold Macadangdang for their guidance and support. Also, words of gratitude to my professors from the Department of Development Communication and Languages (DDCL) and to Micael Zipagan for always being a good adviser and classmate.

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APPENDICES

A. Interview Questions

Name:
Age:
Gender:
Civil status:
No. of children:
Occupation:
Original settler in the area:
Migrated in the area (From where and since when):
Ethnicity:

Questions
Q1: What do you consider waste and what not?
Q2: How do you think waste should be handled?
Q3: Do you know what happens when waste is scattered everywhere?
Q4: Are you familiar with segregation of waste?
Q5: Did you ever hear about any rules and regulations regarding waste? If yes, from whom?
Q6: Have you ever receive educational materials such as flyers, promoting proper waste management? -When, from whom and how often?
Q7: Do you experience any negative impacts from waste?
Q8: Do you think waste could be beneficial or useful in some sort of way?
Q9: Do you think there are/is barangay ordinances concerning waste management in your Barangay? -Will you name one/some?

Q10: Do you know about any project in the barangay promoting waste management? -Will you cite example/s of this project?
Q11: Who do you think is responsible for implementing ordinances and laws concerning waste management?
Q12: Who do you think is responsible for cleaning in your barangay?
Q13: Do you think the government/barangay officials should be more active in waste management/disposal?
Q14: Do you want to share anything else with us that we did not think of?
Q15: Do you have any questions for us?

THE AGRICULTURAL PRACTICES AND PERCEPTIONS ON CLIMATE CHANGE IN CADSALAN, SAN MARIANO, THE PHILIPPINES

Christopher Queddeng and Kaat De Bleeker

INTRODUCTION

The Philippines is listed as number 3 on the world risk index of natural hazards. This means the country is vulnerable to storms, floods and droughts (Balderama 2016). In the Philippines, 88 percent of the used water is used for agricultural practices (WEPA 2009). This shows that a lot of people, especially farmers rely on the availability of water. Climate change will have an effect on that water availability. It may also have an impact on the water cycle, intensify pollution and rising temperatures will increase the demand for water. However, the regional effect of the supply and demand effects on water available to agriculture ranges widely. So the response to climate change differ across regions (Strzepek et al, 2010). We wanted to find out how aware the farmers of Cadsalan are of this concept, how they experience the changes and how they adapt to this, like the introduction of climate resilient farming practices.

In Cadsalan, a subdivision of San Mariano, the ethnicity of the people (around 957) consist of Kalinga, Ilokano and Ibanagare. The majority are farmers and fishermen, which means that their livelihoods depend on agricultural practices and fishing. The main crops are Cassava, Yellow Corn, Rice and Banana. The water impounding of the creek Dinang is used for the irrigation of the rice lands of the farmers. The other crops are rain fed. The environmental problems occurring in the area are typhoons and droughts which causes impacts on the people livelihoods and farm inputs. A result of Geographic Information System (GIS) analysis showed that 43% or 13 million hectares of the Philippines will be under dry environment as a consequence of climate change in the near future (Obien 2008 in Balderama, 2016). With our research, we hoped to get a general idea of the Cadsalan farming practices and how farmers perceived changes in relation to climate change. We also wanted to find out about possible climate change information given from the (local) government such as the REPUBLIC ACT NO. 9729 which was passed into law in 2009 mainstreaming climate change. This law consists of policy formulation, development plans, poverty reduction strategies and other development tools and techniques. We wanted to know if some of these are implemented in a small village like Cadsalan.

To conclude, our main goal was to get an answer to the question if climate change has an effect on the agricultural practices now and how the farmers of Cadsalan see and handle these changes.

RESEARCH QUESTION

What are the effects of climate change on the agricultural practices in Cadsalan, San Mariano, The Philippines?

To answer this research question, we formulated the following sub questions:

- How do farmers experience changes in the climate? How do they get information about this?
- Do farmers experience changes/ damages in the production or planning of crops in terms of climate change? Do they get training/ information about agricultural practices?
- How do farmers adapt to these changes?

METHODS

Our research took place in Cadsalan, San Mariano, which has a population of 330 households divided in 7 districts (Puroks). Our target informants were farmers, including 3 Barangay officials who were also farmers. In total, we have interviewed 22 farmers (including the officials): three in Purok 7, six in Purok 2, one in Dinang and 10 in Purok 3, where our host family was situated. These farmers were randomly selected as we walked by or when people were coming to us, eager to be interviewed. We also visited three farm fields as a transect walk to show us the different crops. We intended to participate in farming but planting or harvesting was already done or the farm fields were too far away. On our walk to Purok 2, we did see some farmers preparing their fields and planting cassava (Photo 1).

We have interviewed farmers through a qualitative questionnaire and added some questions in the course of our fieldwork about the cassava. We asked every farmer about their planting and harvesting schedule in order to get a seasonal calendar. The reason for doing a seasonal calendar is to have quantitative data about the crops being cultivated. But this was also a way to get to know their perception of changes in the weather and how it affects their production planning. So it is important to know that we did not actually measure these weather conditions. We have also asked three farmers to make a sketch of their farming fields. The Barangay officials were asked the same questions as the other farmers, but we have added some questions about their role as a Barangay official.

Time Schedule of fieldwork

Jan. 19, 2016	o Transect Walk of the area o Interviewed 7 farmers of Purok 3
Jan. 20, 2016	o Visited Purok 2 & Purok 7 o Interviewed 10 farmers: 6 of Purok 2, 3 of Purok 7 and 1 in Purok 3 (Barangay Official) o Visited one of the respondents' farm fields
Jan. 21, 2016	o Visited Dinang o Interviewed 4 farmers: 3 of Purok 3 and 1 in Dinang (Barangay Official) o Visited one of the respondents' farm fields o Night survey
Jan. 22, 2016	o Interviewed 1 farmer in Purok 3 and visited his farm (Barangay Official)

RESULTS

Crops

The agricultural crops consist of banana, rice, cassava and yellow corn (Figure 1). Eighteen farmers of the 22 do multiple cropping to have a continued flow of income. The crops are for income purposes to pay for daily needs and to send their children to school. The main crop of the Cadsalan farmers is yellow corn which is sold in the market in San Mariano. There are five months between planting and harvesting for corn and four months for the rice fields, both twice a year. The little rice that is cultivated is mostly used for own consumption, which is why the parcels of land are small. The number of people planting rice is not much, only four out of our 22 respondents. The reason is because of the droughts: the irrigation of rice is through the Dinang creek and if there's no water, they can't start planting.

Bananas are also sold in the market and in the village as well, which are weekly harvested. They are mostly planted on top of the land, because it takes one year to bear the fruits, so there's no need to check on the land within this year. Bananas are mostly vulnerable to typhoons but are resilient to droughts. Multiple cropping is usually practiced with banana, cassava and corn. This is in this order, according to labor intensive practices (Photo 2).

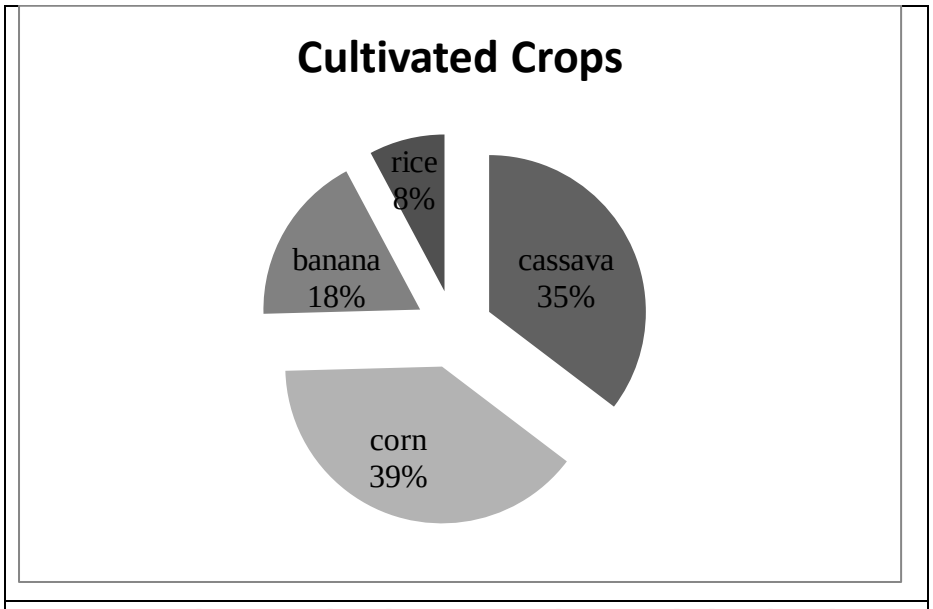

Figure 1: The agricultural crops used in Cadsalan by the 22 interviewed farmers

Farmers get their inputs from traders and sometimes sell their crops directly to the traders. The transport of the crops is by logging trucks or jeepneys. People are using fertilizers for their corn and rice which hasten the growth of crops but cause negative impacts on the soil quality. Nevertheless people are using fertilizers because without these, the crops are undersized and not suitable for selling.

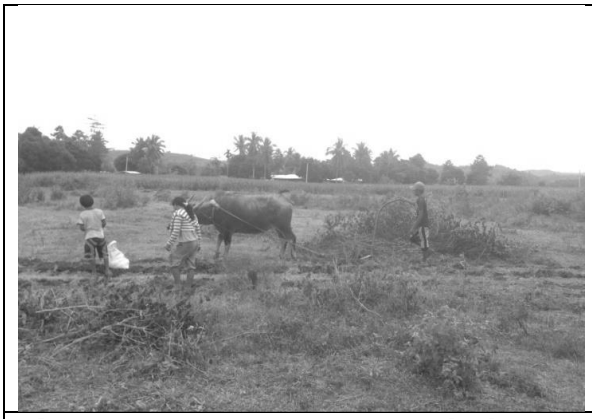	
Photo 1: Farmers preparing and planting the land with a carabao. (Photo by K. De Bleeker, 2016)	**Photo 2**: From bottom to top: the production of corn, cassava and banana. (Photo by K. De Bleeker, 2016)

Although yellow corn has been around a long time, since 2014 there's been an uprise of the cassava production which has a 1 year planting and harvesting time. People can plant it anytime of the year. After harvesting, people can plant it again, even if there's no rain. There are lots of edible and non edible variations of cassava, used for flour or feeding the livestock. Before selling, the cassava is being dried for four days. According to two farmers in Purok 2, a 'Cooperative of Cassava' visited them in 2015 to teach about the planting of cassava and there seems to be a huge market for it, called 'bodega'. This probably led to the booming of the crop. Most farmers saw the benefits other farmers got from planting the cassava, so a lot of people started doing it this year. The main reasons for planting cassava are the following:

-Not labor intensive: 1 year between planting and harvesting, at whatever moment.
-Little inputs, no fertilizers needed so less expensive than corn.
-Resilient to droughts and rain.
-Sure income (crops are rarely destroyed).

Through the seasonal calendars we discovered that planting corn usually takes place in May and harvesting is done in October. The 2nd planting is done in October and the harvesting in March. Because of the changes in the weather like droughts, the planting in October is slightly moving to November or December and the harvesting to April.

Climate change

Only one of the 22 respondents we have interviewed knew about the concept 'climate change' and believed climate change is a revenge from nature because of the illegal activities done in the area like logging. All respondents except one noticed changes in the weather which has an effect on their production of the crops. The people get their information about the weather on television or radio. The main problem people addressed are droughts, followed by typhoons that cause severe rainfall and storms. Last year, the farmers of Cadsalan experienced a massive drought which caused a lot of corn crops to fail.
According to the farmers, the rainy season is usually from May to June and from September to February. The drought season is usually just one period: from March to April. Both seasons are slowly moving to more and longer periods and droughts are happening twice a year now, with the second rainy season turning into a drought season (Figure 2).

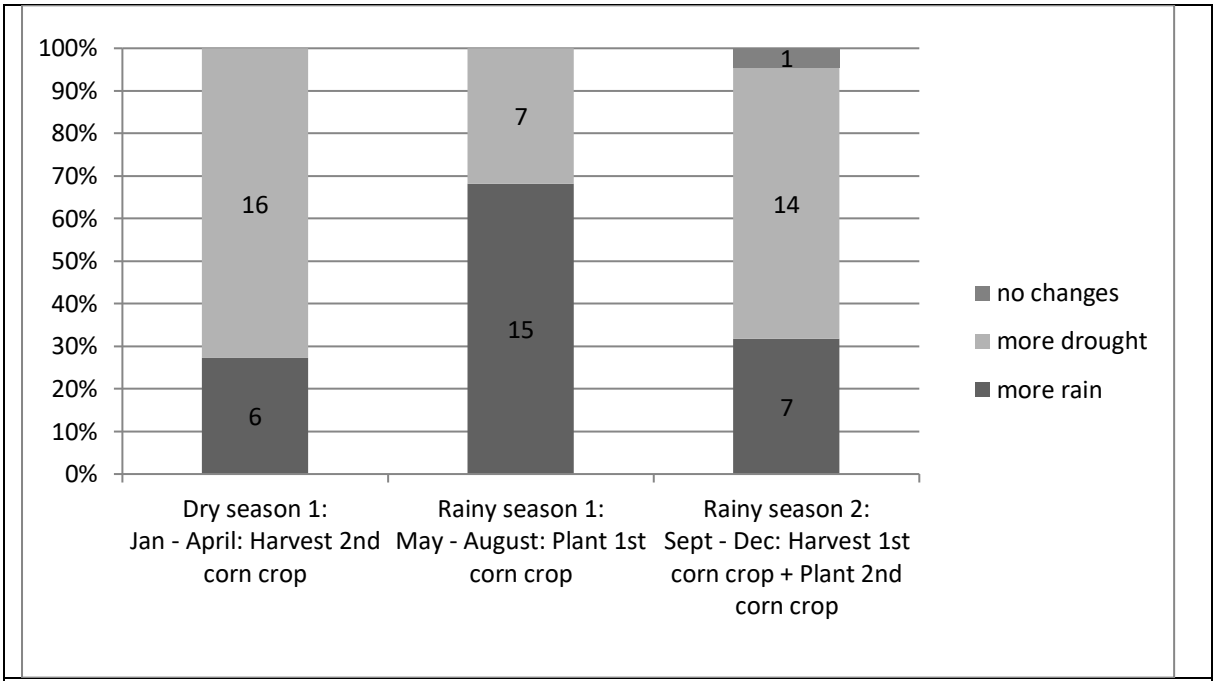

Figure 2: Perceived changes from 22 respondents in the seasonal drought & rainy periods

Corn is mostly affected by climate change: the irrigation is rain fed and drought causes a small growing size of the corn. Small corn is less income, less income is more debt. Most of the farmers are still in debt with their trader. A lot of farmers do not have enough savings to pay the expenses until the next harvest, which causes them to either sell their products or go into debt to traders or local moneylenders, both of which threaten to push them further into poverty. Farmers don't really prepare for an upcoming storm, except storing food and make sure their lives| are safe. When a crop fails, farmers try to save and sell what they can. When nothing can be saved, there's an increase of illegal logging and farmers will work for others on other farm fields. The average number of people working on a farm is 20 and planting is usually done in one day, the same for harvesting. Men and women do the planting and harvesting together so there is no division of labor. We were pleased to see that there is no gender gap in the agricultural practices in Cadsalan.

Farmers affected by storms or droughts will plant again because they are not insured. They do get assistance from the government: There are 3 types of relief goods: groceries (like rice), cash money and seeds. Farmers' names affected by a storm or drought are collected by a Barangay official who is part of the committee of agriculture. He gives these names to the Department of Agriculture (DA), who will send certain relief goods. However, according to some farmers, not all those who are affected get help. Only the official Barangays know about the DA and according to 19 of the 22 farmers, there are no trainings or other information about agricultural practices or climate change given in the village. Farmers learned how to cultivate the land from their parents or by observing other farmers.

Land

Most of the people own 1 to 2 hectares of land for their crops, which the farmers don't own on paper but is known as 'possession'. According to one of the Barangay officials, this means the Barangay officials have a contract with each farmer owning a certain land area so that it can be used as evidence in case a farmer wants to sell his land. It is also an important tool for the many land conflicts going on in the village. People claiming land without having a right or fighting over boundaries are common in the area. Affected farmers go to the Barangay officials to get

the problem solved, but it takes a long process to go through which causes people taking matters into their own hands. This leads to fighting and sometimes even killing. According to the older farmers born in Cadsalan, the area was full of wildlife and forest when they were little which is now transformed into agricultural land.

DISCUSSION

Climate Change Experience

When it comes to the knowledge of climate change, our respondents were not familiar with the concept. There seems to be no information flow or governmental projects about it but farmers do experience changes in the weather throughout the recent years. As the farmers of Cadsalan rely mostly on the rain, climate change makes weather more unpredictable than ever. Traditional approaches to predicting the arrival of the rains are becoming less and less effective, with rain sometimes falling too sparsely and at other times, too hard. The main problem for the production of crops is linked to the droughts. According to the GIS analysis showed in the introduction, the Philippines will face a severe dry environment in the future (Obien 2008 in Balderama, 2016). Talking to the farmers of Cadsalan, we have seen through the seasonal calendars that the drought periods are expanding and occurring twice a year which causes mostly the corn crops to fail. The planning of planting and harvesting is also slowly moving up which causes a decrease in crop production.

When comparing our research to the watercourse research done in 2012 about climate perceptions in Aparri, we see a similarity. In both researches, the people experienced changes in the weather that affected their lives. The major differences are that the people of Aparri linked the changes in the weather to mining activities and that the local government is implementing projects about climate change, which is not happening in Cadsalan. In Cadsalan, they experience changes but they don't really think about reasons for this to happen. We have experienced that the farmers in the Philippines do not look a long way forward, they live for the day. When asking about their future, they did not know. We think the government should pay more attention to the changes happening in the lives of these farmers and do more projects based on climate change, as implemented in the Republic act. So there is a lot more work to do besides this little research so that the people of Cadsalan are more aware of the concept in order to adapt and prevent more damages done by climate change.

Information and insurance

People do wish they could get more information about climate resilient farming practices and other trainings about agricultural practices to increase their production or reduce disasters. (Judy 2016, pers. Comm.) There seems to be some of those trainings going on once a year, as some farmers mentioned the cassava cooperative and Technical Education and Skills Development Authority (TESDA). But those were a minority of the people (only 3). The majority do not know what it is about or say that this does not happen in the village. That's why our recommendation would be a better information flow of the agricultural trainings or information sessions that are supposedly happening in the village. According to the Barangay officials, most people are not willing to go to these trainings but we had a feeling people did not even know about these trainings. So there seems to be an information gap between the officials and the people. We have also discovered that none of the farmers insure their lands and according to the United Nation Development Program in the Philippines (UNDP), crop insurance products cover less than 10 percent of total rice and corn production in the Philippines. An alternative form of crop insurance in Cadsalan could be the weather index-based insurance (WIBI). The advantage of WIBI is the speed of payouts, which are triggered by a predefined index (such as cumulative rainfall) rather than the verification of damages. So

farmers receive a payout for low rainfall. The speed of payouts makes the farmers' livelihood more resilient, allowing them to restart agricultural activities within the same cropping season (Taichi 2015). Because droughts are happening more than before, we think this could be another solution to adapting to the changes in the weather in Cadsalan.

Adapting

We can conclude that climate change and other factors like the little inputs caused the introduction of cassava nearly two years ago. We could say that cassava is a form of a climate resilient farming practice and will probably change the area into a cassava producing area. Nineteen out of our 22 respondents think this will happen. Referring to our research question, we can say that the farmers are affected by climate change in terms of decreasing crop production, low growths and damages in their corn crops and rice fields. But transferring or adding cassava to their multiple crops, shows that people adapt to their environment and can take matters in their own hand. A lot of farmers explained that cassava saved them and see a bright future ahead of them. However, 14 of the 22 respondents don't want their children to become farmers and see education as a priority. This made us think about who will feed the people in 10 years from now.

Photo 3: The cassava plant up close.
Photo by C. Queddeng, 2016

Photo 4: The cassava being dried.
Photo by K. De Bleeker, 2016

ACKNOWLEDGMENTS

Dealing with a new environment and strangers is not always easy, but we didn't feel strangers at all because the people were so helpful and willing to provide us with everything that we needed. Cadsalan is a beautiful place, filled with hospitable and friendly people. We would like to extend our sincere appreciation to our host family, Mr. and Mrs. Appaccag, who made us feel at home and treated us like their son and daughter throughout our stay in Cadsalan. We would also like to express our gratitude to the grandmother of our host family because she always cooked the best meals. And of course, a big thank you to the children of our host family who made us smile every day. A special thanks to all our respondents, who were all so hospitable and friendly when we visited their homes and farm fields and who were very willing to be interviewed in sharing their knowledge and helping us with our research.

We would also like to give a special thanks to Alvin Labuguen, the son of Barangay Captain of Cadsalan for his time and assistance in providing us the needed information during our transect walk and visit to Dinang.

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APPENDICES

Appendix A – Respondents

Number	*Name*	*Gender*	*Profession*	*Age*	*Purok*	*Date of Interview*
1	Elimar Appaccag	M	Farming	33	3	January 19, 2016
2	Emily Rivera	F	Housewife & Farming	37	3	January 19, 2016
3	Bernadeth	F	Housewife & Farming	23	3	January 19, 2016
4	Vangie Infien	F	Housewife & Farming	30	3	January 19, 2016
5	Perlita Ambatali	F	Housewife & Farming	50	3	January 19, 2016
6	Sharon Duerme	F	Housewife & Farming	26	3	January 19, 2016
7	Marites Babarang	F	Housewife & Farming	22	3	January 19, 2016
8	Alvin Labuguen	M	Farming	30	3	January 20, 2015
9	Aquino Appaccag	M	Farming	24	2	January 20, 2015
10	Ariel Dawag	M	Farming	27	2	January 20, 2015
11	Mario	M	Farming	39	2	January 20, 2015
12	Naomi	F	Housewife & Farming		2	January 20, 2015
13	Janice Bugasto	F	Housewife & Farming	26	2	January 20, 2015
14	Melito Gangan	M	Farming	60	7	January 20, 2015
15	June Gangan	M	Farming	51	7	January 20, 2015
16	Esly Miranda	M	Farming	37	7	January 20, 2015
17	Edwin Languido	M	Brgy. Official & Farming	42	3	January 20, 2015
18	Delia Estrela	F	Housewife & Farming	24	3	January 21, 2015
19	Ramil Zipagan	F	Farming	28	3	January 21, 2015
20	Alma Mundo	F	Housewife & Farming	26	3	January 21, 2015
21	Dionisio Labuguen	M	Brgy. Official & Farming	33	1	January 21, 2015
22	Judy Languido	M	Brgy. Official & Farming	45	3	January 22, 2016

Appendix B – Questionnaire

Location:
Name respondent:
Age:
Gender:
Settlement History:
Date:
Ethnicity:
Highest education:
Livelihood:

1. When did you first arrive in this area?
2. Why did you move here?
3. How did you find this place?
4. How was the area when you first came here (wildlife and environment)?
5. What do you do for a living?
6. Are you married? / children?
7. Did you go to school? Where and what education did you finish?
8. What crops do you plant? Multiple?
- cassava: why and when did you start planting it? What varieties of Cassava are there?
9. When do you plant and harvest -> seasonal calendar
10. How many times do you plant annually?
11. How do you irrigate the land?
12. Do you own the land? Do you have it on paper?
- Where do you get your inputs?
13. Is it for own use / commercial use?
14. How is the land divided? How many land can you use?
15. How do you prepare the land? (Farming system like shifting cultivation)
16. Is there any division between men and woman?
17. How many people work on the land? Do people help each other?
18. Are there any land conflicts?
19. What happens when a crop fails?
20. Do you use fertilizers? Chemical or Biological?
21. How did you learn how to farm?
22. Are there any governmental programs teaching farming methods? Do you participate? Do you talk about agricultural practices with other farmers?
23. Do you see any changes in the weather throughout the years?
24. Does this affect your production?
25. Do you experience storms or droughts? How many times in a year?
26. Do you prepare for this and how?
27. Are there any governmental programs informing about climate change?
28. Do you have any other sources of income?
29. How do you see your future?
30. Do you have any questions for us or want to add something to our topic?

FISHERIES IN ILAGUEN RIVER, TAPPA: PRACTICAL KNOWLEDGE AND PERCEPTION

Jan Rey Aquino and Naomi Ploos van Amstel

INTRODUCTION

Worldwide the freshwater ecosystems are seriously threatened, largely by anthropogenic influences. Freshwater fish seem to be even the "most threatened group of vertebrates" according to the International Union for the Conservation of Nature or IUCN (IUCN Freshwater Fish Specialist Group 2015). In the past decades, the population of freshwater species severely declined and about 20 percent of known 10,000 species became extinct or endangered (National Geographic 2016). One of the main threats for the extinction is the construction of dams. Creation of this structure will become hindrance to the fish migration upstream (International Rivers 2015). Due to the change of river flow, natural habitats also change especially downstream. Other primary culprits are pollution, global warming, overfishing, climate change and introduction of exotic species. The latter is therefore strictly forbidden without thorough research on possible effects as stated in chapter 2, section 10 of the Philippine Fisheries Code of 1998 (Philippine Fisheries Code 1998).

The Philippines turn out to be one of the countries in which the most fish is being caught (Van Lieshout 2014). To pave the way for conservation and preservation of fisheries, the Philippine government created the Philippine Fisheries Code of 1998. By the establishment of fish sanctuaries, the government intends to repopulate wetland areas. At least 25 percent but not more than 40 percent of certain water bodies have to be protected. Fishing in those areas is not allowed. Another regulation stated in the code includes the restriction on commercial fishing without a license or permit. People not following those rules will be fined for an amount of PhP10, 000.00 and will be imprisoned for six months. Furthermore, destructive fishing methods are highly prohibited as stated in Chapter 6, Section 88. Those methods include "the use of electricity, explosives, noxious or poisonous substance" (Philippine Fisheries Code 1998). To avoid the catching of small and not fully grown fish the use of fine mesh nets are prohibited as well. Since 2006, an ordinance has been implemented in the region of Tappa to establish a fish sanctuary. However, the boundaries seem to be still unclear (Vermeersch 2014: 77). The objective of the fish sanctuary is to protect and conserve freshwater fish and the Philippine crocodile. Therefore damaging fishing practices and littering are illegal though people are often not aware of those rules and violate them (ibid.). Also outsiders are involved in those practices. On the other hand, the Barangay officials turn out to poorly implement the ordinance and the general fishery code.

In addition, the construction of the hydroelectric dam in Ilaguen River upstream is likely to affect the tracks of migratory fish. This will probably affect the populations of especially migratory fish like the Ludong. To prevent this from happening fish ladders could be an option to provide the fish with a possibility to go through the dam. Therefore we want to look at the local knowledge and perception of the different fish species in the river.

RESEARCH QUESTIONS

Main research question: *What practical knowledge do the fishermen in Tappa have of the fish of Ilaguen River?*

The following sub-questions will be used to answer this main question:

1. *What are the fishing techniques being used by the fishermen?*
2. *What are the fish species known and found in the Ilaguen River in the area of Tappa?*
3. *To what extent do the people of Tappa rely on fish in Ilaguen river in the area of Tappa?*
4. *What is the perception of the people in Tappa about the future effects of the dam on the fish population?*

METHODS

Table 1: Time schedule

Date	Activities
day 1: 01-18-2016	Arrival at Tappa at about 5 pm. Met our host family.
day 2: 01-19-2016	Transect walk with to Tappa Pilli: another part of Tappa. 3 interviews
day 3: 01-20-2016	1 'group interview' (7 respondents) 4 interviews Took part in setting up a net, interview with fisherman and his wife during this activity.
day 4: 01-21-2016	Took part in checking the same net, interview with fisherman and his wife. 2 'group interviews' (5 respondents, 6 respondents, 5 respondents respectively) 1 interview
day 5: 01-22-2016	3 interviews 1 'group interview' (4 respondents)
day 6: 01-23-2016	say goodbye and travelling back

Research methods

To provide the needed information and answers to our research questions we used various methods.

Transect walk

The second day, we started with a transect walk to get familiar with the area where we conducted our fieldwork. This transect walk led us to Sitio Pili, another part of Tappa. This method also gave us prospective respondents along the way.

Semi-structured interviews

We wanted to know about the knowledge and perception of the villagers about fish. Therefore we brought with us different pictures of fish species and asked them if the species are currently living in the river. Questionnaires have been used as a lead for our interviews (appendix 1). We conducted our interviews instantly mainly among men because they are most likely to engage in fishing than women according to our own viewpoint. However, we found out that also women having their laundry at the river practice fishing using a rod. Our target was to only conduct interviews with one person but most of our interviews accidentally turned into a 'group

interview' due to other people gathering around us during the interview. Although this was not our intention it provided us with interesting information as well. It gave us the opportunity to reach more people for instance and showed us that even children take part in discussions about the identification of a certain fish species.

Participatory Observation

In order to validate the information from the interviews we tried to participate in fishing activities. However, this turned out to be very difficult in our part because there were only few people fishing at the Ilaguen River at that time. In total we were able to only participate once in setting up the net at around 6 pm and checking the same net at 6 am the following day. We also observed the women having their laundries at Dicamai River while fishing with the rod. During our participation we asked why they were fishing in that particular part of the river, why they used that particular method, and why in the way we observed. We also asked about the fish they caught and measured the catch.

RESULTS

1. What are the fishing techniques being used by the fishermen?

The fishermen of Tappa make use of different fishing methods which differ among men and women. Women usually make use of a fishing rod which occurs in a few sizes, depending on the preferred fish species to catch. We witnessed women using this method while doing their laundry in the river. Those two activities turn out to be combined very often and seem to have a social function as well.

Woman preparing her fishing rod (Photo by Naomi Ploos van Amstel)

The men, on the other hand, make use of more different fishing techniques because they practice fishing more often and therefore know how to use all the techniques. Furthermore, it would be too hard for women to practice the other methods because one needs to be strong according to a few of our respondents.

One of the methods being used by the men is spear fishing or compressor fishing which includes diving with a spear. This method is only practiced in summer when the water is not too cold. This is also the time that the water is higher and there is an abundance of fish present compared to the dryer season. In this period fishing with nets is not practiced to prevent entanglement of the fishermen in the nets and the nets of being destroyed by the spears.

Nets are therefore the most commonly used fishing technique in the colder seasons. They occur just like the fishing rods in different sizes, each having its own name: the *tarpa*, *sigay*, *tabukol* and *tugol*. Generally, a net costs about Php1, 300.00 each which therefore is a big investment for the fishermen. As we observed, fishing with a net is also a time consuming activity. The setting up of the net and checking the net the next day takes about 45 minutes in total. Afterwards a lot of garbage like leaves and branches are entangled in the net and therefore have to be removed. This is done by drying the net in the sun first and then it still takes about three hours to remove everything by hand.

One of the fishermen with his net (Photo by Naomi Ploos van Amstel)

Other methods being used include fishing with an arrow and catching shrimps by putting leaves into the water. Furthermore some people make use of a *wanid*, which exists of a line with baits. This method is mainly used to catch eel and *corilau*. One respondent also mentioned to make use of *sayot*: a triangle shaped net.

According to our host some people in Tappa practice electric fishing as well especially during a *fiesta* for which a lot of fish is needed. This illegal fishing method together with dynamite fishing or *bungbong* and super lights is, however, mainly done by outsiders from Cataguen and other villages in the surrounding of Tappa. Those outsiders have a lot of equipment compared to the fishermen of Tappa which causes an unequal situation in which local fishermen are negatively affected.

2. What are the fish species known and found in the Illaguen River in the area of Tappa?

Table 2: Local names based on the pictures shown by us

	Scientific Name	***Family***	***English Name***	***Ilocano Name***	***Kalinga Name***	***Ybanag Name***	***No. of respondents***
1	*			Bukto	Bihikos/Balla/Galebau/Bunug		11
2	*Liza melinoptera*	Mugilidae	Otomebora mullet	Banak	Bunog/Ilaguen	Ikan	11
3	*Liza melinoptera*	Mugilidae	Otomebora mullet	Banak/ Carpa	Bunog/Dugong/Ikan/Ilaguen/Ludong		11
4	*Liza melinoptera*	Mugilidae	Otomebora mullet	Banak/ Imelda	Bunog/Dugong/Ikan		11
5	*Zenarchopterus buffonis*	Hemiramphidae	Buffon's River-garfish	Susay	Dulang/Balamban/Piddayeg		9
6	*Zenarchopterus philippinus*	Hemiramphidae	Halfbeak	Susay	Balamban		11
7	*Cottus hangiongensis*	Cottidae	Freshwater Sculpins	Mori	Galebau/Bunog/Bihikus/Mudi	Pokpoklit	9
8	*			Paltat/ Mori	Bihikos/Bunog/Pelang/Galebau	Pokpoklit	8
9	*				Bihikos/Bunog/Pelang	Pokpoklit	7
10	*Cyprinus carpio*	Cyprinidae	Common Carp	Tutot	Dulis/Gahutut		9
11	*				Native Tilapia		9
12	*Carassius carassius*	Cyprinidae	Crucian Carp	Imelda	Karpa/Dugong/Tilapia		11
13	*Carassius carassius*	Cyprinidae	Crucian Carp	Imelda	Karpa/Dugong/Tilapia		11
14	*Oreochromis niloticus*	Cichilidae	Nile Tilapia	Imelda	Giant Tilapia		11
15	*Oreochromis mossambicus*	Cichilidae	Mozambique Tilapia		Native Tilapia		11
16	*			Bunsilan/ Mori	Bihikos/Mudi/Bunog/Native Tilapia	Pokpoklit	9
17	*Rhyacichthys aspro*	Gobiidae	Loach goby	Bunsilan	Bihikos/Mudi/Galebau/Native Tilapia/Bunog	Pokpoklit	7
18	*			Bunsilan	Bihikos/Mudi/Galebau/Paltat	Pokpoklit	8

	Scientific Name	***Family***	***English Name***	***Ilocano Name***	***Kalinga Name***	***Ybanag Name***	***No. of respondents***
19	*Glossogobius celebius*	Gobiidae	Celebes Goby	Mori	Bihikos/Amlid/Bihikus/Mudi/Galebau / Bunog	Pokpoklit	11
20	*			Balla/ Mori	Lutag	Pokpoklit	7
21	*			Bukto	Lutag/Balla/Dulang/Burarug		8
22	*Awaous melanocephalus*	Gobiidae	Largesnout Goby	Bukto/ Mori	Kammadin/Mudi/Galebau/Bunug	Pokpoklit	9
23	*Rhyacichthys aspro*	Gobiidae	Loach goby	Bukto	Kammadin/Mudi/Galebau/Bunug	Pokpoklit	7
24	*				Galebau/Pelang	Pokpoklit	4
25	*				Galebau	Pokpoklit	3
26	*			Mori	Kammadin/Mudi	Pokpoklit	8
27	*Cottus hangiongensis*	Cottidae	Freshwater Sculpins	Mori	Kammadin/Mudi/Galebau/Bunug	Pokpoklit	11
28	*Awaous melanocephalus*	Gobiidae	Largesnout Goby	Mori	Kammadin/Gahutot/Mudi/Galebau		10
29	*Leiopotherapon plumbeus*	Terapontidae	Silver Perch	Ayungin/ Tutot	Gahutot/Mamuduk/Galebau/Toktok		7
30	*Leiopotherapon plumbeus*	Terapontidae	Silver Perch	Ayungin/ Tutot	Gahutot/Dapilang/Toktok		11
31	*			Lasik	Dapilang/Udang/Kaladangan		8
32	*Genus: Paratya*	Atyidae	Freshwater Shrimp	Lasik	Udang/Kaladangan/Udang		9
33	*Macrobrachium rosenbergii*	Palaemonidae	Giant Freshwater Shrimp	Lasik	Dapilang/Udang/Kaladangan		11
34	*Macrobrachium rosenbergii*	Palaemonidae	Giant Freshwater Shrimp	Lasik	Dapilang/Udang		9

Underlined = introduced species
*=unknown to the researchers

While showing the pictures of the fish it became clear that there are ambivalent identifications for almost every fish species. The local names we got from our interviews are therefore not necessarily the common names of those species. Moreover, some of the interviews have been conducted with more than one person at once as mentioned before. Therefore the information is not an indication of the knowledge of specific individuals. A few exceptions are the *native tilapia*, *giant tilapia* and the *balamban* on which almost everyone agreed (Table 2). Those fish are also fish species which are commonly caught or used as bait in the case of the *balamban.*

Other species which are often caught are the *dugong*, *golden* or *vurasi,* and *corilau.* The latter were not present among the pictures shown by us so therefore we asked about those species separately. Though those species are abundantly present the general fish population in Illaguen River and Dicamay River decreased in the last ten years. According to some fishermen the reason why the fish population is depleting is the introduction of the already mentioned illegal fishing methods like electro and dynamite fishing which are performed by fishermen from the neighboring villages. This threat to the fish population together with other factors leads to the reduction of catches.

A fisherman showing his catch (Photo by Naomi Ploos van Amstel)

Especially electrofishing and dynamite fishing were mentioned by our respondents as harmful fishing methods. Electrofishing is basically prohibited in all Philippine waters according to Fisheries Administrative Order No. 84. It stuns and kills almost all fish in a certain area. This is fatal especially to fingerlings or embryos which will die immediately and will not grow anymore.

Aside from electrofishing another culprit to fish proliferation mentioned by the respondents is dynamite fishing. It is also included in the Philippine Fisheries Code of 1998 that dynamite fishing is prohibited due to strong damage. This kind uses explosives to stun and kill schools of fish, also called blast fishing. Compared to electrofishing this method is even more extreme in terms of magnitude and effect. Just like electrofishing it is harmful to embryos and it is also subjective to fish sizes.

According to one of our respondents global warming is dangerous to all fish living in the river as well. Global warming is a possible reason for a decrease in fish population due to the increasing of water temperature. Heat reduces the amount of oxygen in a certain water body and therefore the chances for life in the water decreases. In this case, the river will decrease aid to sustain life (NASA Summer Camp).

Also the introduction of non-native fish species is mentioned as a possible cause for the fish stock decline. Over the past years the *dugong* or Crucian Carp is proliferating in the area. Our respondents told us that this species is just new to the river. The respondents are suspecting that this type of fish is eating the embryos of another fish species and that this is the reason why the fish population is decreasing.

Most of the respondents, however, are putting the blame both on floods and typhoons. Heavy precipitation carried upon by storms make the river wider due to extra water. When a storm occurs the river gets even bigger and the current will be stronger. The people suspect that fish has been washed away by the strong current collide against boulders in the rivers. Fish mortality was theorized because of this.

3. To what extent do the people of Tappa rely on fish in Illaguen River in the area of Tappa?

According to our host 40 percent of the total population of Tappa practice some sort of fishery (Figure 1). This is mainly for own consumption. However, when people catch more than one kilo in one catch they sell the remainder to their neighbors, friends or family in the village itself. Fishery in Tappa is therefore largely for non-economic purposes but also one of the main food resources for many. This reliance on fishery for food nevertheless varies between our respondents. The most important source of income for every respondent is agriculture containing cassava, corn, bananas, and rice. Therefore a few respondents indicated that if the amount of fish in the river would drop they would simply switch to buying more fish on the market. However, others state that a decline would have a big impact on their livelihood because of their reliance on their catches as a food resource. Those people are mainly fishermen who fish more often than the people who do not really care about a possible decline.

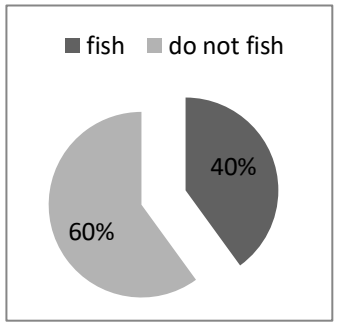

Figure 1. Percentage of the population of Tappa involved in fishing

4. What is the perception of the people in Tappa about the future effects of the dam on the fish population?

All people we interviewed know about the dam but it seems that there have been no or few consultations about the impacts of the dam. The ideas about the possible impacts therefore highly diverge between the respondents and are largely based on gossip (Figure 2). All respondents from Sitio Pili believe the dam to have no impact at all or a small positive impact on the fish population because the fish will be trapped in one location.

In Tappa, five of the respondents indicated that the dam shall have no effect on the fish population. In five other interviews the respondents were less positive: those people are no advocates of the dam because of several reasons. One of the reasons mentioned is that because of the dam the fish stock in the area of the dam will increase but downstream will decrease due to a decline of water supply in those downstream areas. Also four people mentioned floods in those areas as a result of the dam. The residents of those lower areas are therefore often not in favor of the dam. Tappa however is situated higher so the impact here is thought to be smaller than in the lower areas. According to one respondent, the dam will especially have a negative impact on migratory fish like the *ludong* because of the dam blocking their track. In two of our interviews, the people suspected that a treasure or gold has been found in the area of the dam.

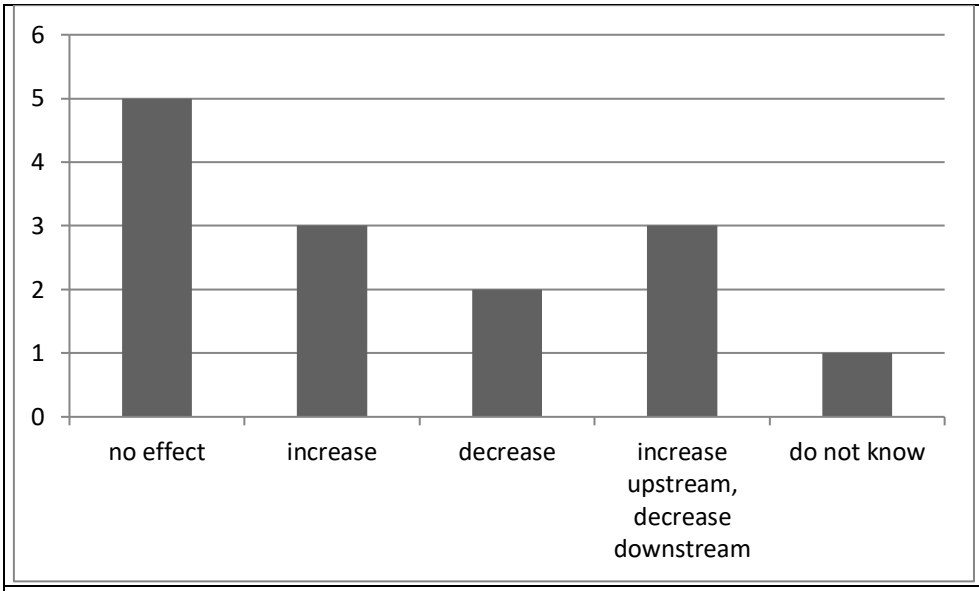

Figure 2: The suspected influence of the dam on the fishpopulation

DISCUSSION

What is the practical knowledge from fishermen in Tappa of the fish of Ilaguen River?
Nowadays, fishing is not the most important livelihood activity among the people in Tappa. Fish plays a relatively unimportant role in daily life. The fishermen mainly use gill nets to catch fish but they make use of other methods as well, especially in the rain season. The women are also into fishing but not very skilled in terms of using different methods. They are only familiar with using the fishing rod while doing their laundry. People in Tappa and Sitio Pili only fish during their spare time because they normally engage in agricultural activities with corn and cassava as their main crops. The river does not play a major role in their livelihood as what it was in the past decades. Though a lot of people fish in the area, everyone we spoke to saw their fishing practices as mainly for their own consumption. If they are lucky enough to get at least three kilograms of fish they would probably sell a part of it to their neighbors. Due to the lack of fish, people just prefer to make their catch as their own food rather than for economic purposes. According to the people there was an abundance of fish more than 10 years ago. This provided them with the opportunity to sell more of their catches than they do now. It was indeed a very rich river in the past full of freshwater fish. However, different factors contributed to the drop in fish stock as stated before. This includes the adoption of harmful fishing methods by outsiders, floods and climate change in general. Another contributing factor is the introduction of non-native fish species like the *dugong* which eat the fingerlings of other fish. The introduction of such species contributes a lot to the shrinking fish population. The people, however, find this fish species tasty as well and they easily reproduce. The declining fish population paved the way for agricultural advancement and knowledge because the river and its resources are not enough anymore to feed them. The villagers prefer to buy fish at the market rather than to fish for themselves. In addition, fish nets are expensive. Therefore they are often unable to buy their own equipment for fishing. This is one of the compelling reasons why fishing is not a main livelihood anymore. We think this might also be the reason for the disagreement of the people concerning the identification of the pictures. Because of the decrease in importance of fishing, respondents' knowledge about the different fish species became less important as well.

Furthermore, people notice that there is a lot of fish in the river when the river is not clear and when the level of water rises. Most of the fishermen said that the moon is also a big factor in fishing. When the moon is very bright or when it is full moon it is expected that the occurrence of low catch is high. During the night at around six, the fishermen set their net and check if there is fish caught after twelve hours.

Whether or not the dam will have a negative or positive impact on the fish population or no effect at all is still unclear among the villagers of Tappa. Their theories are mainly based on gossip because of a lack of informed consent. Only two of our respondents were aware of the fact that a dam would probably block the tracks of migratory fish which would cause a decrease in fish. Most of the respondents said that the future dam will give an increase to fish population for the reason that they will be blocked in a certain part where the dam will be built that will cause the fish to stay and that spot to reproduce. Thus, people are not fully aware of the future impacts of the dam to the fish quantity.

However, the officials of the dam stated that the dam will actually be a river runoff hydroelectric power plant where there will be a possibility for the fish to cross the area. To create more support for the dam, it would therefore probably be helpful to inform the people in the areas involved about the actual plans. People would be less suspicious and know better how to adapt to possible changes especially concerning fish. This is therefore one of our recommendations. Another recommendation will be to start environmental information campaigns on the different fish species living in the river and the effects of the different fishing methods and introduction of new species in the river. This could contribute to more sustainable fishing methods in a more effective way and the reinforcement of fish practices. To reach this goal, the people from other towns need to be informed as well. Perhaps further research will be necessary about the possible fishing methods which could be used and about the exact influences of the introduction of non-native species.

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APPENDIX

Questionnaire

1. Location:
2. Date:
3. Time:
4. Name:
5. Age:
6. Gender:
7. Occupation:
8. Ethnicity:
9. Hometown:

10. What is the name of this fish species/ (softshell turtle)? (being caught/on the pictures shown)
11. Do you know of other fish species living in this river? (fist as an open question and then based on the pictures which we brought with us)
12. On what location do you find this particular fish in the river?
13. What equipment do you use to catch this fish species?
14. Which equipment do you use most often?
15. How often do you catch this particular fish species?
16. When/ in what season do you find this fish species?
17. Do you only catch adult fish or also the not fully grown ones?
18. How often do you catch fish generally?
19. How much of your fish do you eat (kilograms)?
20. Do you sell your fish? If yes:
    a) How much of your fish do you sell (kilograms)?
    b) How much do you generally get paid for the particular fish species?
    c) If yes: Which job gives you more profit?
21. Do you have other jobs than fishing?
22. Do you know of the dam which will be constructed upstream in Illaguen River (Nagsabaran Dinabigao)?
23. Do you think the dam will affect the fish? If yes:
    a) What will be the effects?
24. What will happen when certain fish species will disappear or decrease?
25. Did the fish populations already change in the last ten/five years? If yes:
    a) In what way?
    b) Why?
26. What do you think are threats to fish populations?
27. Is there anything you would like to add on this topic which you think is important?

PRESENCE AND PERCEPTIONS OF THE PHILIPPINE CROCODILE ALONG THE ILAGUEN RIVER AROUND CADSALAN AND TAPPA, SAN MARIANO

Gerold Nieves and Ard Vogelsang

INTRODUCTION

The Philippines is one of the 25 hotspots for biodiversity in the world, where high concentrations of endemic species are undergoing enormous habitat loss. Of these hotspots, the Philippines is one of the hottest (Myers et al. 2000). One of the most affected ecosystems for biodiversity loss is the freshwater ecosystem, which is also the habitat of the *Crocodylus mindorensis* also known as the Philippine crocodile, the rarest crocodile in the world. The Philippine Crocodile is classified as critically endangered by the IUCN with fewer than 100 adult crocodiles surviving in the wild (Weerd & van der Ploeg 2012).

The Philippine crocodile has suffered from hunting and habitat loss and viable populations might only be found in Mindanao, the Cordilleras and at the foothills of the northern Sierra Madre in northern Luzon. In the foothills of the northern Sierra Madre, a small population is surviving in an area that is highly cultivated. This makes the conservation more problematic, as it is more likely that human-crocodile conflict will arise. On the other hand, local engagement of the community can also give an impetus for the conservation of the crocodile.

Thanks to conservation projects that have taken place to save the Philippine crocodile, in which the Mabuwaya Foundation played a pivotal role, we know a lot more about the habitat and behavior Philippine crocodile. The knowledge that is necessary for the survival of the Philippine crocodile in the wild. Nevertheless, some parts of the habitat of the Philippine crocodile have not been fully studied and surveyed due to the enormous logistical efforts that conducting research in remote areas requires. Such an area is the Ilaguen River in the surroundings of the Barangays Cadsalan and Tappa in the Municipality of San Mariano. Therefore our research tries to fill this knowledge gap, however small our contribution may be, by investigating the presence and perception on the Philippine crocodile in Cadsalan and surroundings.

During our field research we stayed in Lumalog, which is located between the Dinang Creek and the Ilaguen River. Lumalog is a sitio of barangay Cadsalan. It consists of 74 households with a total of 349 inhabitants (Labuguen 2015). Dinang Creek is a small tributary of the Ilaguen River. It is an 11 kilometer-long creek that meanders through gently sloping grassland. Dinang Creek is the habitat of multiple Philippine crocodiles, also locally known as *bukarot*.

Photo 1: Gerold interviewing Boy Robles about the history of the crocodile in Cadsalan

According to Boy Robles, an elder and one of the most respected men in Lumalog, the history of the crocodile in Dinang Creek started in 1960. It started when a Kalinga caught a crocodile, and kept it tied up at a tree at Dinang Creek. One day when the Kalinga came back to his house from his farm, he saw the crocodile escaped and since then, there have

always been crocodiles in Dinang Creek. Many decades ago, when Robles had just moved into this area, there were also many crocodiles in the Ilaguen River. The riverbanks were covered by grasslands and forests and people were scared to go near the river because there used to be many big crocodiles in the Ilaguen River. Today, we could see with our own eyes that this is no longer the case. There are many people now that come to the river for fishing, washing clothes or just for having a picnic. The forests and the dense vegetation are gone now between Lumalog and Tappa and we could see why. Still today, many people are transporting hardwood along the river even though a logging ban was imposed in San Mariano in 1992 (Persoon and van der Ploeg 2015). Nonetheless, there is reason to believe that there still might be even more crocodiles surviving in the Ilaguen River than in Dinang Creek as some people still make observations of the crocodile (van Weerd 2016, pers. comm.).

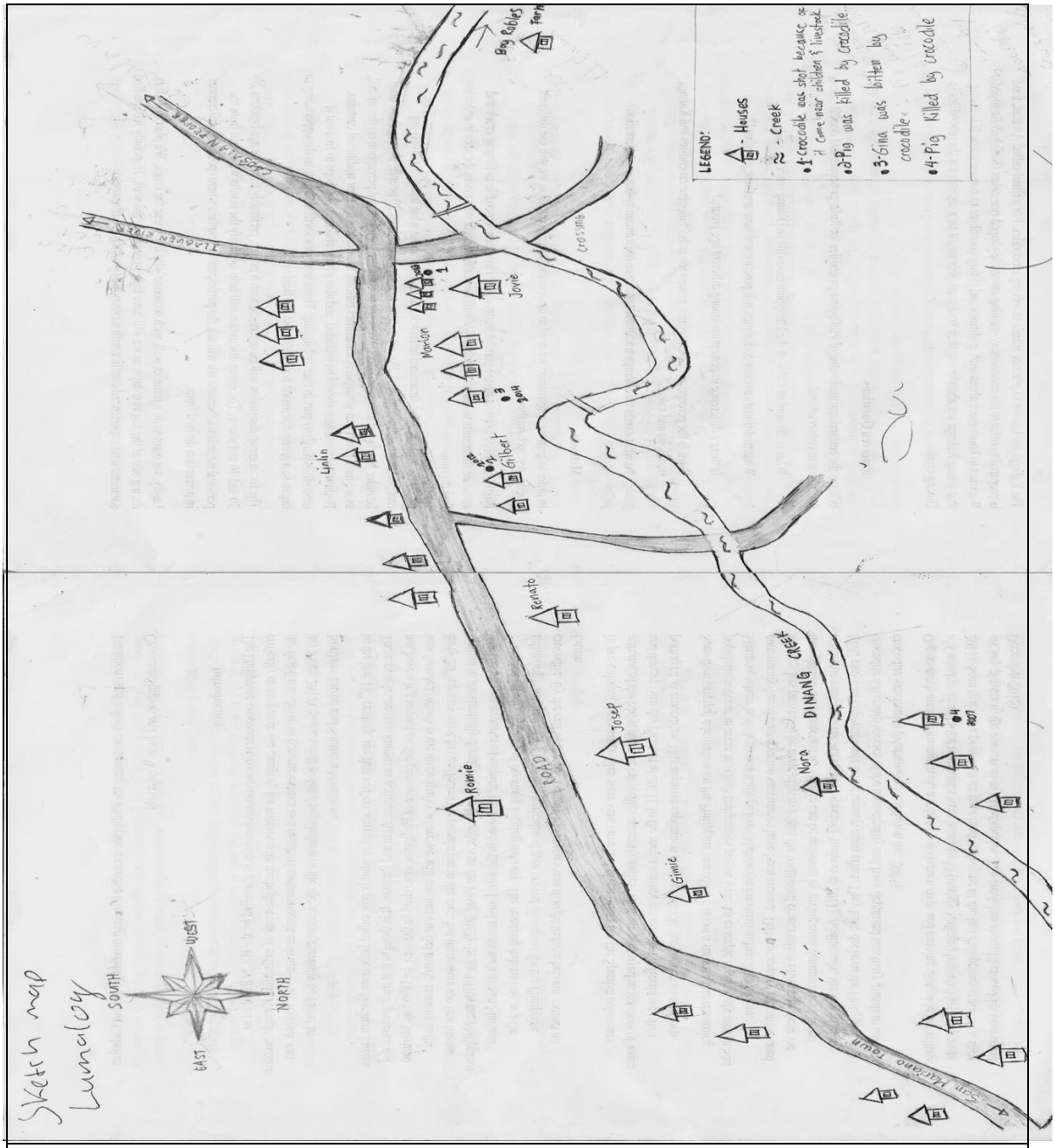

Figure 1: Sketch map of Lumalog, made by Barangay official and sanctuary guard Marlon Robles

RESEARCH QUESTION

What is the presence and perception of the Philippine crocodile along the Ilaguen River in Cadsalan and Tappa?

Sub-questions:

- Are there sightings of the Philippine crocodile and is there an increase or decline in sightings compared with the past?
- What are the perceptions of people of the Philippine crocodile and how do these perceptions differ between different places and people?
- What are the stories, traditions and cultural attitudes towards the Philippine crocodile along the river?

METHODS

Our research is based on interviews and observations.

Interviews

In order to answer our research questions, we walked along the Ilaguen River between Lumalog and Tappa in order to gain insight into where the crocodiles are located, how people use the land and water along the river and how people perceive and interact with the crocodile along the river. During these walks, we gathered data through short semi-structured interviews along the river about the presence and behavior of the Philippine crocodile. In order to gain more in-depth knowledge about the perception of the Philippine crocodile and the stories, tradition and cultural practices that surround this critically endangered animal, we conducted some in-depth interviews with some key target respondents. These key target respondents are fisherman, farmers, laborers, indigenous (Kalinga and Ibanag) and migrant people (Ilocano). We conducted 18 interviews with 21 respondents in total.

Observations

Our research is also based on the observations that we made during our walks along the Ilaguen River, and on the basis of three night surveys. These night surveys took place along Dinang Creek, as this creek provides excellent hiding place for hatchlings and juveniles that later disperse themselves along the Ilaguen River (van Weerd and van der Ploeg 2012). Furthermore, we also did a daytime survey along the Dinang Creek to get a better image of what a Philippine crocodile looks like in the wild.

Table 1: Overview of time schedule

Day / Date	**Activities**
Day 1: January 18th	Travel to San Mariano and night survey
Day 2: January 19th	walk along the river, conduct 7 interviews, night survey
Day 3: January 20th	3 interviews and daytime survey
Day 4: January 21th	8 interviews and night survey
Day 5: January 22th	Sketch map and swimming

RESULTS

Presence of the Philippine crocodile in Dinang Creek

In order to determine the presence of the crocodile in Dinang Creek and to be able to comprehend the perceptions of the people about the crocodile, we did night surveys. Following a standard surveying protocol, we did three night surveys to determine the population in Dinang Creek. Unfortunately, due to heavy rainfall we were not able to go on three consecutive nights, and instead did the night survey on the 18th, 19th and 21st of January. We did our surveys during nighttime as it is easier to spot the crocodile because their retina reflects in the light of our torches.

Photo 2: **S**ub-adult crocodile basking during daytime in Dinang Creek

Photo 3: Eyes of a juvenile crocodile illuminate in the reflection of light of the torch

The highest count in observation is the last night survey with the total of eight crocodiles (Figure 2); we saw one hatchling, five juveniles and two adults on the 21st of January. Seven of these crocodiles were spotted in a part of the Dinang Creek that is very close to many houses of Lumalog while the other juvenile was spotted further upstream (Figure 3).

In the first night, there were at least five different crocodiles, four juveniles and one adult. In the second night, we saw one hatchling and three juvenile crocodiles. In the day survey, we saw one adult and one juvenile. If we follow standardized survey protocol, we can conclude that the minimum population in Dinang Creek is at least eight crocodiles. As the maximum count of each category of any of the three nights is taken as the minimum count of the true population (Van Weerd & Van Der Ploeg 2012).

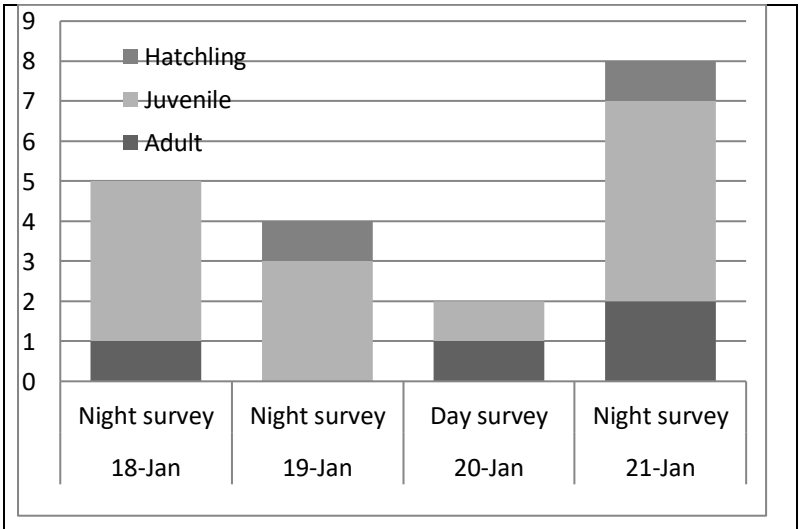

Figure 2: Observations during surveys at Dinang Creek

Figure 3: Map displaying the geographical distribution of the crocodile observations of our night survey on 21st of January at Dinang Creek. Note: first observation was in the small water impoundment at Boy Robles, way further upstream northwest of this map.

Presence of the Philippine crocodile in Ilaguen River

In determining the presence of crocodiles in the Ilaguen River, we were not able do night surveys like in Dinang Creek. The Ilaguen River is a big river that at certain points is almost a hundred meters wide even at low water levels. Therefore, we resorted to interviews for getting information about the presence of the Philippine crocodile in the Ilaguen River.

Unfortunately, we did not get any positive answers on the question whether they saw or heard about recent sightings of the crocodile in Ilaguen River. In the part of the Ilaguen River near Lumalog, nobody had seen or heard about a crocodile in this part of the river even not long ago while many respondents crossed this river daily when going to their farmlands or for fishing both during day and nighttime. At the part of the Ilaguen River near Cadsalan, two respondents stated that they or their parents had seen a crocodile basking on the rocks. The first respondent said that her parents had seen a hatchling basking a long time ago. The other respondent stated that he saw a juvenile, about four feet long, basking on the same rocks and that the last time he had seen the crocodile was about 18 months ago in 2014. Alvin Labuguen, one of two Bantay Sanktuwaryo (sanctuary guards) in Cadsalan and responsible for the surveying of the crocodiles in Cadsalan and Tappa every three months, stated that they have not seen a crocodile in the Ilaguen River since 2012 during their surveys. He thinks the crocodiles went away because they were starving due to deforestation and overfishing.

In Tappa, there were more talks of crocodile sightings. One respondent, a day laborer and fishermen, and who had by far the most negative perception on the crocodile stated that long ago, he saw a 16-feet crocodile basking on the rocks at the other side of the Ilaguen River at Tappa. This seems hard to belief though as the longest crocodile ever caught in Luzon was

about nine feet long (van Weerd and van der Ploeg 2012). One respondent, living at the convergence of Ilaguen River and Dicamay River stated that there was an adult living near his house sometime between 2003 and 2004 but he chased it away by throwing rocks because it destroyed his fishnets and had not seen a crocodile ever since. The other respondent who joined the interview with this respondent told us that his uncle was bitten in his hip by an adult crocodile in 2014 when he mistook the crocodile for a wooden log and pushed it away when he was collecting his fish from his fishnet. This happened about 2-3 hours walk from the convergence of Ilaguen River and Dicamay River and the respondent thinks the river came there after the typhoon in 2014, destroyed his former habitat. After this incident and after the army who caught the crocodile released the crocodile again in the river, they have not seen the crocodile anymore. Another respondent also talked about several crocodiles at his farmland at Ambag, at the Dicamay River, an hour walk from Tappa. He also mentioned that after a typhoon, he did not see any crocodile anymore. Before, there were sightings of 6-7 feet long adult, four hatchlings and three juveniles. The teachers at Tappa Elementary School have not seen these crocodiles themselves but noted that some of their pupils that come from the Sitio Pili sometimes talked and bragged about crocodiles in Dicamay River.

Perceptions of the people of the Philippine crocodile in Lumalog, Cadsalan and Tappa

In the interviews that we conducted, almost all the interviewed people expressed a mixture of attitudes towards the Philippine crocodile. All except one day laborer expressed that they are proud of having the Philippine crocodile in their area. Of the respondents, 62 percent expressed that they fear the crocodile, 33.3 percent said they are not scared and 4.7 percent (1 respondent) sees juveniles as friends while explicitly stating that he fears the adults. All the respondents that were residents of Tappa were also scared of the crocodile. Of the seven respondents that were not scared, four are living in Lumalog, while the other three respondents that were living in Cadsalan were all related to a position in the Barangay Cadsalan. Two were the sons of the Barangay captain, of whom one was also a sanctuary guard while the other respondent that was not scared of the crocodile is a Barangay official.

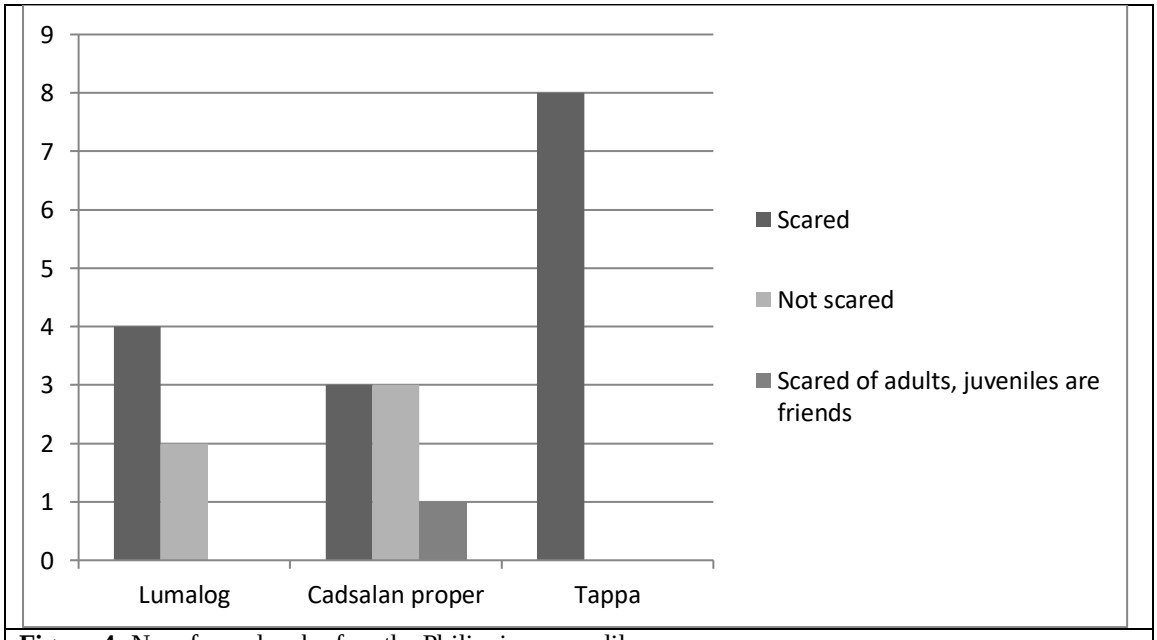

Figure 4: No. of people who fear the Philippine crocodile

When we asked about the value or the perceived benefits of the crocodile here in Cadsalan and Tappa, we got a wide range of answers. In Lumalog, the perceived benefits were mostly

expressed in terms of money and materials that people received from the Mabuwaya Foundation. People specifically mentioned the pump wells as a benefit of the crocodiles. In the interviews, many people did not mention the intrinsic value of crocodiles specifically but some mentioned that they did not mind the crocodile because it is a part of nature and the environment. On the negative side, some people explained that the crocodiles can be dangerous for their livestock. Also in several interviews they mentioned that the crocodiles could harm their children and therefore they did not allow their children to go near Dinang Creek.
In Tappa, some people also expressed the benefits in terms of pump wells and the teachers at Tappa specifically mentioned the school supplies that they received from the Mabuwaya Foundation. On the contrary, some people expressed that they did not see any benefits or did not see the value of the crocodiles at all. In the interview with Rupino Magas and Freddie Palatao and the interview with June Calagui the crocodile was blamed for the fish shortage and for destroying their fishnets.

During our interviews, we looked at whether there was a relation between one's cultural background or ethnicity and the perception of respondents on the crocodiles. Especially whether there was a difference between migrant and indigenous people. Our respondents were Ibanag, Kalinga, Ilocano or a mixture of these ethnicities (Figure 5). Of our respondents, only the Ilocano are considered migrants in this area. In our interviews, we did not see such a specific relation between one's ethnic background and positive or negative attitude. Six of our respondents were at least partly Kalinga, but all of them had very different attitudes toward the crocodile. One Kalinga respondent still made offerings to the crocodiles whenever he was emotional, not feeling well or on All Saints Day on November 1st for his parents who past away. He did his offerings at his house or near the river, and offered candy, cigarettes, chicken or beetle nut. Nonetheless, Antonio did not think that crocodiles had any value or brought any benefit. And also Edwin, a Barangay official of Cadsalan, who remembers the stories of his grandfather in which the crocodiles were immortal and that if you harmed the crocodile, it came back to harm you. Although Edwin did not believe these stories because of his conversion to Christianity; he still tells his own children these stories as well. On the other hand, there were also respondents, the aforementioned fishermen in Tappa, who were also Kalinga and did not believe nor remember any stories or traditions that included the Philippine crocodile. Rather, they emphasized the negative effect of the crocodile on their fishing and potentially on their livestock. The Ilocano people we interviewed also had a wide range of attitudes on the crocodile. From the data that we gathered, there is therefore no reason to believe that indigenous people have a more positive attitude towards crocodiles than migrant people or the other way around. This might also have something to do with the fact that many of our Ilocano respondents are not recent migrants but have been living in this area for years or decades.

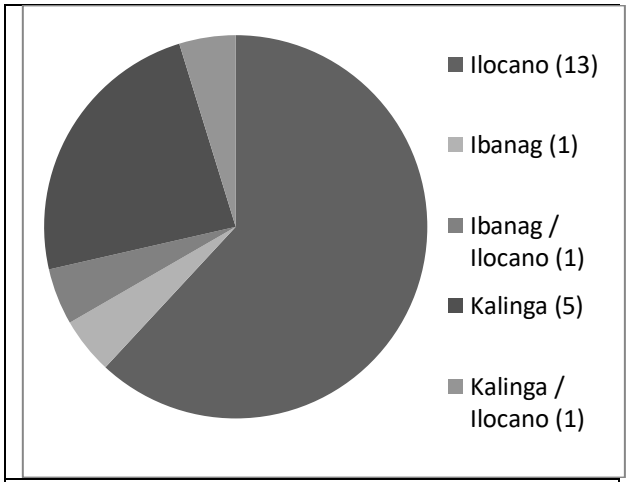

Figure 5: Ethnical background of respondents

DISCUSSION

Although we did not have any respondents that could confirm the presence of the crocodile in the Ilaguen River at Lumalog, Cadsalan and Tappa in the last year, we do not want to be too quick to draw the conclusion that there are no crocodiles in this part of the river at all. During our interviews, the people who did see a crocodile, whether basking on the rocks at Cadsalan or in the Dicamay River stated that they had not seen the crocodiles since 2014. Two respondents especially noted that they had not seen the crocodile since a typhoon in 2014. This might give us an explanation why there are no recent crocodiles in the Ilaguen River right now if we take into consideration the information gathered from our respondents. On the one hand, the crocodiles might have been killed or drowned due to the high water levels as a result of the typhoon. On the other hand, the adult Philippine crocodiles are known to make excursions over several kilometers river stretch in response to strong river currents and might be hiding in small creeks or lakes outside of the Ilaguen River (van Weerd and van der Ploeg 2012). Another possibility is that the crocodiles have moved to another area due to depletion of fish like Alvin, the sanctuary guard, believed. In our interviews, many respondents claimed that they still saw people doing electro and dynamite fishing in the Ilaguen River, especially north of Tappa. Generally, freshwater crocodiles do not display migratory behavior but researchers have found that Nile crocodiles migrate between South Africa and Mozambique due to changes of water levels in dry and wet season (Calverly and Downs 2015). During a flood in South Africa, one crocodile was even found 75 miles from its original habitat (Smith 2013). Also in north-Australia, the flooding of waterways and low-lying areas increases the mobility and distribution of crocodiles, and as a result these crocodiles might move to areas that they previously did not inhabit (DEHP 2015). It therefore seems plausible that the Philippine crocodile has moved to other parts of the Ilaguen River, but that also means that they might come back. Another aspect that needs to be taken into consideration is that there still might be crocodiles living in the Ilaguen River between Lumalog and Tappa. We were only able to interview a relatively small sample of respondents, who are not doing night surveys themselves (except for Bantay Sanktuwaryo) and are not always at the river so there is still a good chance that there are crocodiles present right now in the Ilaguen River in Cadsalan and surroundings.

In our research, we found that the people in Lumalog that live closer to the crocodile, and therefore are more prone to human-crocodile incidents, where more positive about the Philippine crocodile and were significantly less scared than the people who live further away from the crocodile in Tappa. The people who were not scared of the crocodile in Cadsalan were either Barangay official, Sanctuary guard or son of the Barangay captain. We suggest therefore that the perception of the people on the Philippine crocodile depends more on the knowledge and information that people have of the crocodile and the benefits that the people get in terms of money and materials than other factors like ethnicity, traditions and beliefs. People who live next to the crocodile might have a better image of the dangers of the crocodile, as their perception is more based on their experience than the stories and incidents they heard from others or the news.

A similar case as our research area is in north-Benin where crocodiles moved into a lake formed by an agro-pastoral dam and disturbed the livelihood of people in three villages. In two villages, the people tried to deal with the negative effects of the crocodile by changing the environment, i.e. chasing the crocodile away or by harming the crocodile. In the third village, the people dealt differently with the problem by changing their own behavior and adapting to the crocodile. In this village, the crocodiles were less aggressive and there were fewer incidents between humans, livestock and crocodiles (Kpéra et al. 2014). In our interviews, people in Tappa blamed

the crocodiles and were glad that there was no crocodile anymore near their fish spot, farm or in the Ilaguen River. In Cadsalan, our respondents were also more open to more crocodiles in the future because they knew that as long as you do not harm the crocodile, the crocodile will not harm you as well as they get more money and material benefits.

ACKNOWLEDGEMENTS

We like to thank our host family Labuguen for their hospitality and the delicious food. It exceeded all our expectations. We want to thank Amante and especially Edmund for their guidance and explanation of the rules. Also, we would like to thank Marlon Robles for his assistance with the sketch map and also for the hospitality of his family. Also, our special thanks to Marlon and Alvin for their assistance with the nights surveys. Without them, we would have never found so many crocodiles. We would like to thank all our respondents for taking the time to answer all our questions. Lastly, we want to thank the other half of the Crocodile Dreamteam, Czarimah and Joris, for helping making this dream a reality.

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APPENDICES

List of respondents

Name (Gender)	**Age**	**Profession and/or Barangay position**	**Ethnicity**	**Date and Place of interview**
1. Edward Aribbay (M)	-	Farmer and fisherman	Ilocano / Kalinga	Lumalog, January 19 2016
2. Ferdinand Pauig (M)	-	Farmer	Ibanag	Ilaguen river, Lumalog, January 19 2016
3. Paulino Duque (M)	47	Day laborer	Ilocano	Ilaguen river, Cadsalan, January 19 2016
4. Jane Patle (F)	18	Housewife	Ilocano	Ilaguen river, Cadsalan, January 19 2016
5. Antonio Quilang (M)	45	Farmer and fisherman	Kalinga	Ilaguen river, Cadsalan, January 19 2016
6. Alvin Labuguen (M)	35	Farmer and sanctuary guard	Ilocano	Cadsalan, January 19 2016
7. Renato Cagurangan (M)	28	Farmer	Ilocano	Lumalog, January 19 2016
8. Jimmy Mundo (M)	54	Farmer and Fisherman	Ilocano	Lumalog, January 20 2016
9. Nora Urbano (F)	44	Farmer and housewife	Ilocano	Lumalog, January 20 2016
10. Boy Robles (M)	67	Farmer	Ilocano	Lumalog, January 20 2016
11. Robert Barroga (M)	18	Day laborer and fisherman	Ibanag /Ilocano	Ilaguen river, Tappa, January 21 2016
12. Rupino Magas (M) and Freddie Palatao (M)	60 and 28	Fisherman	Kalinga	Ilaguen river, Tappa, January 21 2016
13. Jay Mart Langito (M), Gherlie Pacon (F) and Lillosa Domingo (F)	23, 33, 37	Teachers at Tappa elementary school	Ilocano	Tappa, January 21 2016
14. June Calagui (M)	41	Farmer, Fisherman and secretary-general of the Barangay	Kalinga	Tappa, January 21 2016
15. Arjay Labuguen (M)	23	Farmer	Ilocano	Cadsalan, January 21 2016
16. Dolores Aglugub (F)	27	Teacher	Ilocano	Cadsalan, January 21 2016
17. Janeth Zipagan (F)	35	Day laborer and	Ilocano	Cadsalan, January 21 2016
18. Edwin Languido	42	Farmer and Barangay official	Kalinga	Cadsalan, January 21 2016

Questionnaire
English version:
Q1: Name?
Q2: Occupation?
Q3: Ethnicity/ Origin?
Q4: Where do you live?
Q5: How often do you go to the Ilaguen river and for what reason?
Q6: Have you seen any crocodile here in the Ilaguen river?
Answer: YES
-Where? When? How often?
-Size of the crocodile? Hatchling, juvenile or adult? Same crocodile or different ones?
-Activity of the crocodile?
-Have you seen any nest?
-Is there a time of the year that you see them more often?
-Is there a time of the day that you see them more often?
-Do you see them more today than in the past?
-Do the crocodile come close to farmlands or human activity?
Answer: NO
- Have you hear about any crocodile living in the Ilaguen river ?
-Do you anyone who might know more about where to find the Philippine crocodile in the Ilaguen river?
Q7: Do you take into account that there might be crocodiles here when you are near the river?
Q8: Do you think it might be dangerous to go near the river?
Q9: How do you think about the Philippine crocodile living in the Ilaguen river?
Q10: Do you know about any incidents that occurred between crocodiles, humans and livestock?
Q11: Are you proud of having the endemic crocodile living in the Ilaguen river?
Q12: Is there anything else you could tell us about the crocodile that we should know?

Kuwestyonaryo
Salin sa Tagalog:
T1:Pangalan?
T2:Trabaho?
T3:Pangkat etniko/lahi?
T4:Saan nakatira?
T5:Gaano kadalas pumunta sa ilog Ilaguen at ano ang dahilan?
T6:Nakakita kana po ba nang buwaya sa ilog Ilaguen?

Sagot: Oo
-Saan? Kailan? Gaano kadalas?
-Gaano kalaki? (Bata o Matanda) Pare-pareho o magkakaibang buwaya?
-Aktibidad ng buwaya?
-Nakakita ka na po ba ng itlogan ng buwaya sa ilog Ilaguen?
-Gaano kadalas Makita sa isang taon?
-Gaano kadalas Makita sa isang araw?
-Anong mas maraming nakikita kumpara sa nakaraan o ngayon?
-May mga buwaya bang lumalapit sa bukid o pang taong aktibidad?

Sagot: Hindi
-Narinig mo na po bang may nakatirang buwaya sa ilog Ilaguen?
-May kakilala ka po bang taong nakakaalam kung saang banda matatagpuan ang buwaya sa ilog Ilaguen?

T7:May mga buwaya po bang lumalapit sayo kapag nasa ilog ka?
T8:Sa iyong pagkakaalam, mapanganib po ba ang lumapit sa ilog?
T9:Paano nabubuhay ang buwaya sa ilog Ilaguen?
T10:May alam ka po bang aksidente na nang-yari tungkol sa buwaya, tao at mga hayop?
T11:Maipagmamalaki mo po ba na may buwaya na dto lang makikita sa ilog Ilaguen?
T12:May iba pa po ba kayong masasabi tungkol sa buwaya na dapat nating malaman?

TRADITIONS AND BELIEFS CONCERNING THE PHILIPPINE CROCODILE IN LUMALUG

Czarimah Singson and Joris Westerveld

INTRODUCTION

The Philippine crocodile (*Crocodylus mindorensis)* is classified by the IUCN Red List as critically endangered: the category for species with the highest risk of extinction (IUCN 2016). It might become the first Crocodilian to become extinct as a result of anthropogenic activities (van Weerd & van der Ploeg 2012). Some small isolated populations of the species can currently be found in Northern Luzon and Southern Mindanao.

In the late 18th century, the first settlers arrived in what is now called Isabela on Northern Luzon. These people are now known as Kalinga, Agta and Paranan. It is thought that their presence did not have a big impact on the presence of Philippine crocodiles in the area. In 1896 San Mariano was founded, which is the municipality where we will conduct our fieldwork. Hunting in the early 20th century must have affected the crocodile population in the area, but there were too few human settlers to substantially damage it (van Weerd & van der Ploeg 2012). In the 1970s the Philippines was the biggest exporter of tropical hardwood in the world, and towns such as San Mariano expanded rapidly because of booming logging industry. The resulting habitat loss and the following transition of the land into agricultural area proved disastrous for the Philippine crocodile. By the end of the 20th century the species was thought to have become extinct on Luzon.

In pre-colonial times crocodiles were venerated and given offers but the Spanish colonizers introduced the bad reputation crocodiles currently suffer. They are portrayed as symbols of anger and danger (van der Ploeg et al 2011). In the media, corrupt government officials are often portrayed as crocodiles. This negative reputation is a big obstacle for conservation efforts.

It is a remarkable fact that remaining populations of the Philippine crocodile occur in areas where Indigenous people live, a proof of the latter's original admiration for the species. An example is our study area in San Mariano, where both Agta and Kalinga live (Mabuwaya Foundation Inc. 2005). Here, community-based conservation sanctuaries have been created. This parcipatory incentive based strategy has proven to be more effective than the traditional conservation efforts, in which conservation is thought to be achieved by creating a direct economic interest in the survival of species (Araño et al 2011). Additionally, the San Mariano LGU plays an important role in the conservation effort. They have declared the Philippine crocodile a flagship species of the municipality and have deputized sanctuary guards to monitor crocodile sanctuaries (Mabuwaya Foundation Inc. 2005).

Our research area was in Lumalug, a small settlement 3 hours from San Mariano. The village lies between Ilaguen River and Dinang creek, one of its tributaries and home to a small Philippine crocodile population. Before our surveys, the last count (December 2015) was 10 crocodiles (van Weerd 2016, pers. comm.). In 2015, the riverbanks were home to 74 households and 349 people (G. Labuguen. 2015). Since these people share their land with some of the last Philippines crocodiles, they are key players in the conservation of the species. The creek is a community initiated crocodile sanctuary, and Mabuwaya has provided a lot of benefits for the local people in trying to conserve the crocodile population. There have been some attacks on people and more on livestock, which might explain the killings of some crocodiles. These

attacks are marked on the sketch map made by our host and barangay official of Lumalug Manong Marlon Robles (Figure 1). He also included the main road, Dinang creek and most of the houses around these. The map is inverted but really accurate seen the satelite image of the area (Figure 3).

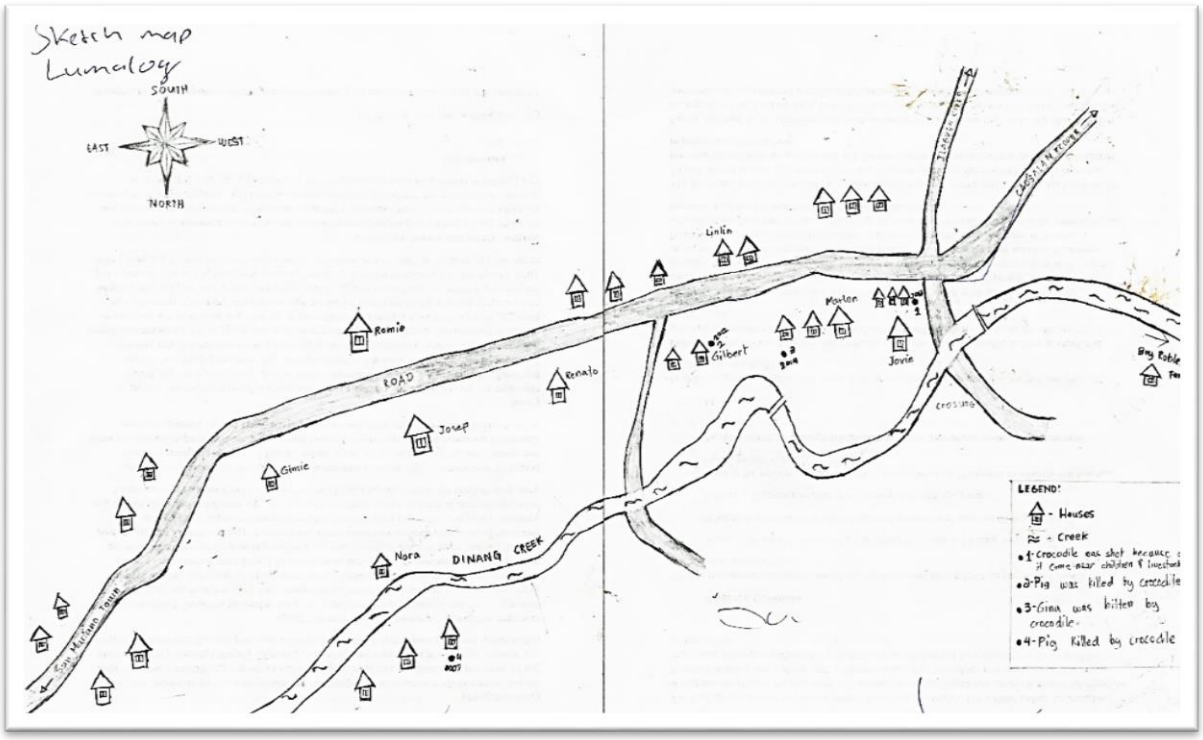

Figure 1: Sketch map of Lumalug, indicating some of the houses, the road & Dinang creek. Also indicates crocodile attacks. By Manung Marlon Robles

Mabuwaya foundation is doing a great job in conserving these last crocodiles in Dinang creek by aiding the community in Lumalug in several ways. However, the crocodile population is so small, that one person with a gun could easily eradicate it. How come this did not happen yet? The Kalinga are known to practice rituals and tell each other stories involving crocodiles. For a ritual called *Awatan*, food is prepared to offer to the ancestors, containing crocodile-shaped rice cakes (Knibbe & Angnged). We want to know more about such traditions and if they contribute to the conservation of the crocodile population in Dinang creek.

RESEARCH QUESTIONS

Main question
What is the cultural/spiritual value of Philippine crocodiles for Kalinga people and does it contribute to conservation?

Sub-questions
-What is the current status of the Philippine crocodile in Dinang creek?
-What traditional customs do Kalinga still practice and how are these perceived?
-Is there a difference in perception among different age groups?
-What is the perception of other ethnic groups towards Philippine crocodiles and Kalinga traditions and values?
-To what extent do Kalinga traditions contribute to community-based conservation?

METHODS

We have used different (social) research methods to answer our questions. Firstly, we needed to estimate the current status of the Philippine crocodile in Dinang creek and compare the results to earlier surveys. We conducted three night surveys around Dinang creek together with the other crocodile team in order to find this out (Table 1). Big flashlights were used, preferably with a bulb light, to search the creek after sunset. Crocodile eyes would illuminate redly, and were therefore easily distinguishable from white reflections of other animals (Picture 1) Our guides Amante and Edmund would estimate the crocodile's length by looking at the size of the eyes and we would proceed by marking the sighting on a map.

Secondly, we have used semi-structured interviews to find out about what traditions involving crocodiles are still being used. We interviewed 17 individuals, among these were 12 people with an age over 33 and 5 people 33 or below. We wanted to compare their cultural perception on the animal and their familiarity with traditions. Most of the respondents were from the sitio Lumalug, but we also interviewed people in Cadsalan proper. Even in Lumalug the focus of our questions was on Dinang creek and the sanctuary there.

Lastly, we did a group interview at a Kalinga community in Diwas, Cadsalan. Although just an hour walking from Lumalug, most of the people there had never seen a crocodile. They did know some stories though, these are used in the results section.

Table 1: Timetable of activities in the field

Date	*Activities*
Monday 18	*Travel to Field. Night survey*
Tuesday 19	*Interview (1). Night survey*
Wednesday 20	*Interviews (7). Focus group discussion (1)*
Thursday 21	*Interviews (7). Night survey*
Friday 22	*Interviews (2)*
Saturday 23	*Travel back to ISU Cabagan*

Picture 1: Amante using flashlight to find crocodiles during night survey

RESULTS

Current status of the Philippine crocodile in Dinang creek

We applied the standardized survey protocol used by Mabuwaya Foundation for the past 15 years. This method consists of nocturnal spotlight counts during three consecutive nights. The maximum count per size category (adult, juvenile, and hatchling) is used as the minimum count of the true population (van Weerd & van der Ploeg 2012). We slightly deviated from these methods, as the third night survey was not conducted on the third consecutive night, but on the fourth. The maximum count was eight crocodiles during the last night (Figure 2). The first individual cannot be seen in the map (Figure 3), as we found it in the marsh area a while away from Lumalug.

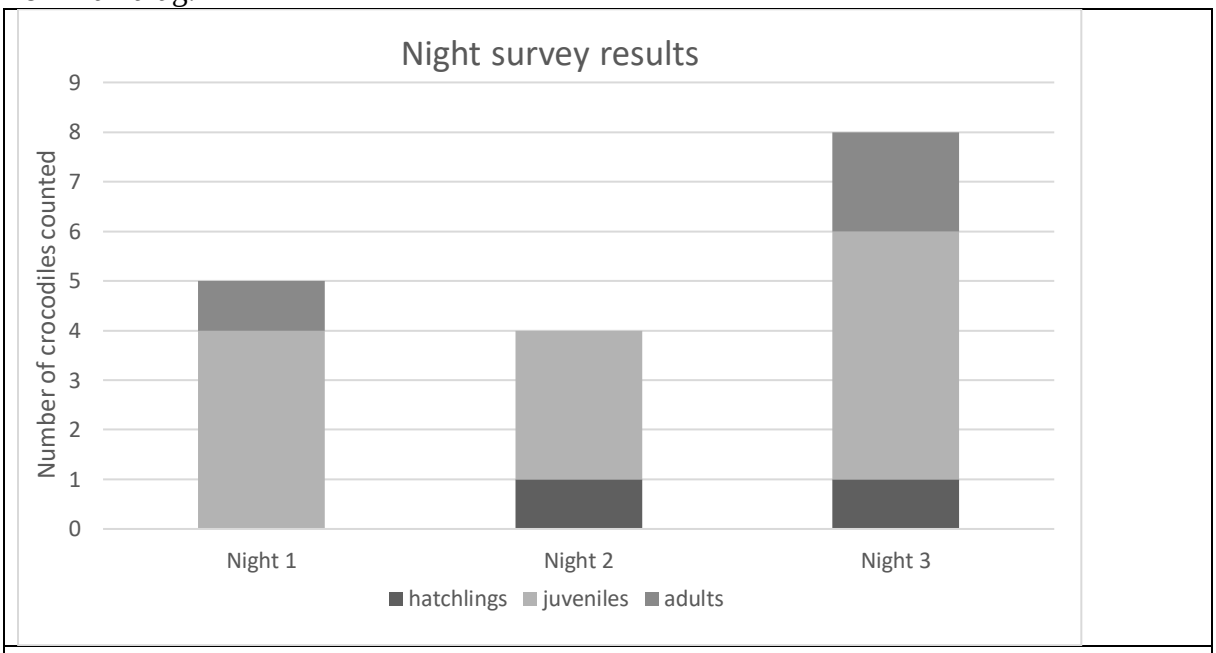

Figure 2: Number of crocodiles counted during three night surveys, including counts of different size categories

Figure 3: Eight (1-8) observations of crocodiles in Dinang creek during third night survey (pin is marked number 3) and four observations from the other two nights (pins 1 and 2)

Kalinga crocodile-related traditions

In order to learn what kind of traditions still take place in Kalinga communities, we asked about crocodile-related stories. We heard one particular story a lot. It says that you should not kill or harm a crocodile, because its breath will make you severely ill and will eventually kill you. You can go to a ritual healer to be cured, he or she will perform *Alalag*, a ritual in which the healer will offer a chicken, a pigs head and rice, and the participants need to dance around this offering. Of 17 people we interviewed, nine were familiar with this story. These nine people differed in their perception of the story: four respondents thought the story was a myth ('do not believe') while five respondents believed the story was true ('believe'). Three of the four people who did not believe the story were of mixed ethnicity, one was Kalinga. Of the five people who did believe the story, four were Kalinga and one mixed (figure 4).

Figure 4: comparison of people who do (not) believe the crocodile breath story and their ethnicity (n=9)

We also heard other stories during the interviews. two people mentioned that crocodiles bring fortune, one of them said a scale from the tail attached to a rooster would make it win in a cockfight, the other mentioned that the water in which a crocodile bathed should be used for good fortune. During the group interview a combination of these stories surfaced, a man who wanted a piece of crocodile tail for his rooster got sick because of the breath of the crocodile. *Alalag* was performed, but the man died anyway. Most people said stories and rituals like these used to be common in previous generations, but since most people are now Catholics they have disappeared.

We heard one story explaining the presence of crocodiles in Dinang creek. Orlando Languido told us that the first inhabitants of Lumalug used vine rope to pull the crocodiles from Ilaguen River up to Dinang creek to accompany them in Lumalug.

One Kalinga lady, Tersing Infiel, knows a lot of stories and also practices spiritual rituals, of which some involved crocodiles. She told us about *Alalag*, the ritual that should be done to cure the disease that results from the breath of a crocodile. She explained that you get sick because the crocodile *anito* (spirit) is stronger than you. When you kill or harm a crocodile, its spirit will get you sick. Tersing knows how to perform the ritual. Besides a food offering, the victim must shout to the *anitos*, confessing what he or she has done to the *anito*.

Manang Tersing Infiel practices a ritual called *Awatan*, in which a crocodile-shaped rice cake is offered when planting rice to secure good luck during harvest.

Tersing also told us about a woman who went to the river and turned into a crocodile. She also said that when a crocodile spirit enters a person, he or she can communicate with crocodiles. She does not believe crocodile ancestry. She pities crocodiles that are killed because they are animals with the right to live just like humans. If they disappear *Awatan* would not work anymore either. But she does not think the crocodiles are close to extinction, she thinks they want to leave, that is why their numbers declined.

Perception of crocodile traditions among different age groups

Six people aged 33 and above believe stories, beliefs, traditions and rituals about crocodile while no one (five respondents) 33 and below believes in them. The remaining 11 people do not know these stories or do know but do not believe them. All the younger respondents (five) were included in this second group (Figure 5).

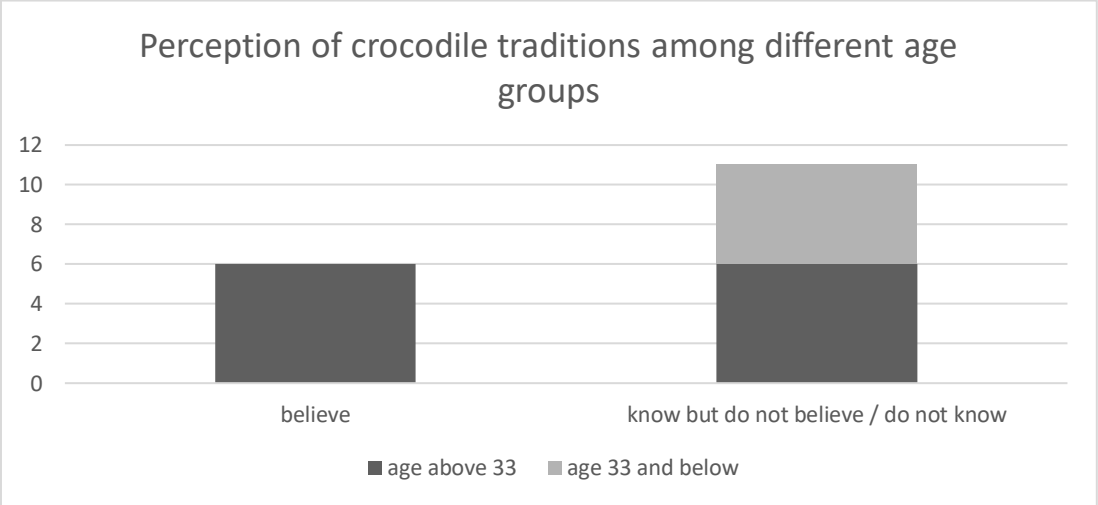

Figure 5: Perception of crocodile beliefs, stories or rituals among different age groups (n=17)

Perception ethnic groups towards Philippine crocodiles

Six out of eight Kalinga people (75%) said that they were scared of the crocodiles near their area while two of them (25%) said that they were not. Of other ethnicities, four out of nine people (44%) claimed that they were scared and five of them (56%) said that they were not scared. Kalinga seem to be scared of crocodiles more often than other peoples.

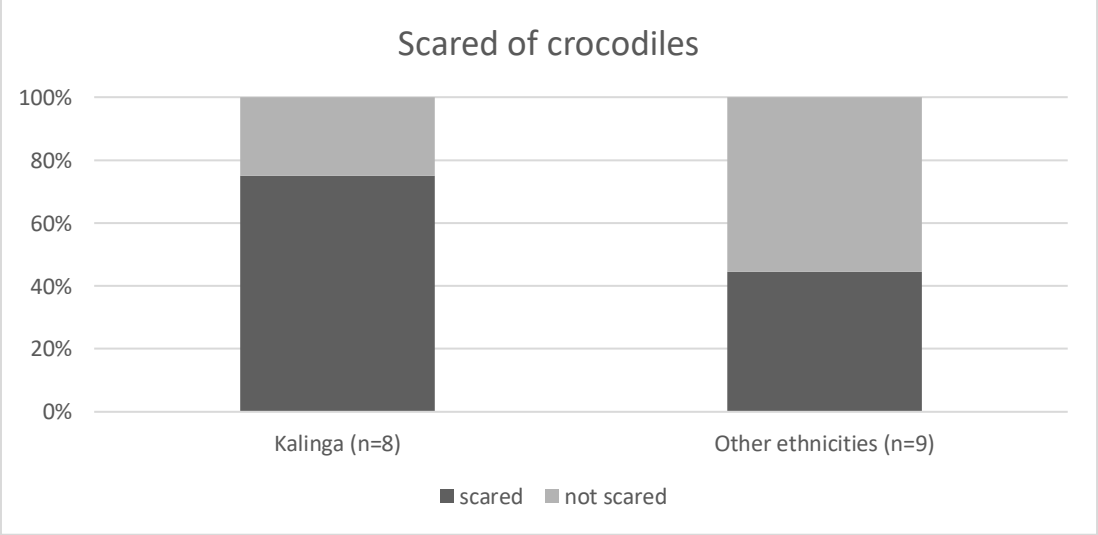

Figure 6: Fear of crocodiles among different ethnicities (n=17)

Contribution of Kalinga traditions to community-based conservation

Six out of eight Kalinga people felt positive towards the Crocodile sanctuary in Dinang Creek (75%). Twenty-five percent of them remained neutral towards it. Eight out of nine of the other ethnic group (Ilocano, mixed Kalinga/Ilocano) responded positively towards the crocodile sanctuary (89%) while 11 percent said that they were neutral. There was no negative response among our respondents from neither of the ethnic groups about the crocodile sanctuary in Dinang creek (Figure 7).

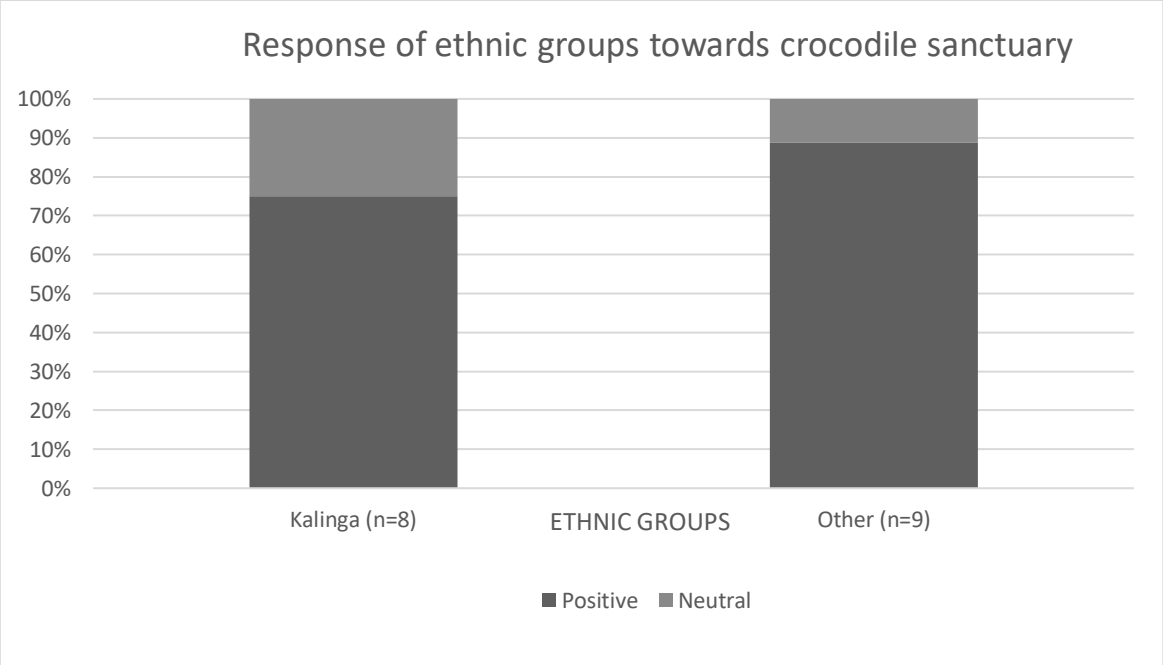

Figure 7: Response of different ethnic groups towards crocodile sanctuary in Dinang creek

DISCUSSION

Current status of the Philippine crocodile in Dinang creek

Using the standardized survey protocol used by the Mabuwaya Foundation, we counted a maximum of eight Philippine crocodiles (one hatchling, five juveniles and two adults). However, we believe a higher number of 10 can be justified. During each of the first two night surveys we found two juveniles in a bend in the creek quite far from the observations made of juveniles on the last night survey (Figure 3). That means the juveniles must have travelled there before our last survey, and in doing so, must have crossed the territories of two adult crocodiles. For the sake of scientific continuity, our official estimate remains eight. We do however suggest to future researchers at Dinang creek to include all the previous observation sites during the last night survey and not be limited by time like we were. That way the estimate of the crocodile population will be most accurate. Also, we did not visit the marsh area during the second night. The baseline of our survey is: there are still crocodiles in Dinang creek. Even though Mabuwaya Foundation has made good connections with the local people and provide benefits and development aid, the presence of such large predators in Dinang creek is a miracle. The water is polluted by washing and trash, often disturbed during harvest, crossing people and bathing carabaos, yet the crocodiles find a way to survive in such a densely populated area.

Kalinga crocodile-related traditions

All it would take for the crocodiles to disappear from Dinang creek is one farmer with a gun, frustrated by crocodile attacks on his livestock or just plain aversion to the animal. What stops the people of Lumalug from doing so? In the pre-colonial Philippines people believed a variety of ancestor spirits and nature gods could take the form of crocodiles. These spirits were venerated as guardians and thought to secure good harvests (van der Ploeg et al 2011). These beliefs have made way for a mix of fear, respect and disinterest. We met one lady who still practices spiritual rituals, of which some included crocodiles such as *Alalag* and *Awatan.*

Van der Ploeg and van Weerd suggest that crocodiles still play an important role in Kalinga culture in the northern Sierra Madre: 'The Kalinga believe that the crocodiles are the embodiment of the ancestors, and sometimes make a small food offering to the ancestor crocodiles when crossing a river.' (van der Ploeg et al 2011). Our data suggests otherwise: nobody we spoke to in Cadsalan or Lumalug still believes crocodile ancestry, not even the ritual healer we met. Most people know some stories, and Kalinga seem to believe these more often than people from other ethnicities (Figure 4). However, this does not seem to influence their opinion towards the conservation of crocodiles: 75% of Kalinga were positive towards the crocodile sanctuary, while 89% of other ethnicities were positive towards the sanctuary (Figure 7).

Perception of crocodile traditions among different age groups

Six of 17 respondents believed crocodile related traditions or stories. These were all older than 33. The remaining 11 respondents did not know any stories or did not believe them. This group contained the five younger people we interviewed. Many respondents told us that these beliefs were important for older generations, but that the traditions were not passed on to younger generations. Catholicism was mentioned a few times as an explanation. This suggests that crocodile traditions are a remnant of a past, widely spread belief system.

Contribution Kalinga traditions to community-based conservation

The acceptance of local people toward the presence of wildlife is always a delicate balance of different factors. Sometimes, religion or spiritual traditions play a big role. In India, orthodox Hindus consider monkeys to be sacred, and thus they must be revered and protected. Even though monkeys often cause human-wildlife conflicts, people tend to accept the difficulties they cause (Imam and Malik 2012). Even non-religious, but general reverence towards animals in some Indian regions has often been reported to be the main reason for people not persecuting large carnivores and a positive attitude towards wildlife and nature reserves (Madhusudan 2003).

This general reverence towards a wild animal might be the product of a past tradition or belief system that has largely disappeared. In our case of Kalinga traditions, this would mean a large cultural loss, but one that still provides a form of security for crocodiles that share their area with these people.

Of course, there are more reasons for people to preserve a dangerous animal close to a community. In the Gourmantché area of Niger, in spite of attacks on livestock and sometimes people, residents preserve a balanced attitude toward lions. Next to their symbolic value and their emblematic importance to the environment, lions are accepted because of the potential income they provide in terms of tourism revenues (Galhano Alves and Harouna 2005). In Dinang creek this factor plays a role since Mabuwaya Foundation is active in the area. All the respondents who were happy with the sanctuary stated to be so because of the benefits

Mabuwaya has provided (and still does) to their communities. Zenaida Pauig: 'my children have been able to go to school because of the crocodiles and Mabuwaya'.
Still there are more reasons for accepting the presence of crocodiles so nearby. One of our respondents, Erwin Lorenzo, 28, mentioned that he would miss the crocodiles if they would disappear, as they are his 'neighbors' in Lumalug. 'But I don't want them as a pet, because they bite and kill my dogs.' Only one person mentioned that it is silly to harm a crocodile because it is against the law.

Conclusion

Our data suggests a remnant of a past belief system that still provides a certain degree of security for crocodiles in Dinang creek. This differs from the findings by van der Ploeg et al in 2011, who suggest that crocodiles are still an important part of Kalinga culture. Our research was however limited in number of respondents and number of villages visited. It would be interesting to conduct a new, extensive research across the sierra Madre to compare the current status of Kalinga culture to previous findings.

Even though it is hard to find an exact explanation for the persevering Philippine crocodile population in Dinang creek, we can conclude with certainty that the attitude of people towards these animals is an intricate combination of spiritual beliefs, traditions, legal and economic drivers, disinterest and people simply being used to their presence.

ACKNOWLEDGEMENTS

We would like to express our deepest, widest, longest gratitude to the following people. Without them, our study would not have been possible. In advance, we want to say Salamat po and Bedankt! To our 17 respondents from Sitio Lumalug and barangay Cadsalan: Thank you for your time and, of course, for your honest opinions, sentiments, and answers to our questions which helped us a lot during our research. To Kuya Marlon, Ate Lailanie, Anthony, Melanie and baby Gian- Thank you for accommodating us in your home. We really like your house, and especially the people in it. Thank you very much. To the Crocodile Dream Team: Ard-Gerold-Joris-Czam team! Thanks for the funny moments. Alright, for the company and relevant ideas too! To Kuya Edmund and off course, to our short and amazing guide, Amante. Thank you for the 'rules' (especially rule number 2) Thanks for the valuable information during the fieldwork and night surveys, and for the fried rice too. Lekker! Masarap! To all the people involved and helped before and during the conduct of our research but were not mentioned, still we thank you. To the Big man above, thanks for the guidance.

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Picture 2: Manong Boy Robles at his ricefield (photo by Merlijn van Weerd)

APPENDICES

A: Questionnaire

During the first interview, we quickly discovered that the original questionnaire we wrote was way too extensive and did not allow for a dynamic conversation. That is why went on using a very simple structure (table 2)

Table 2: topic list and data for interviews

Topic list	Social demographic data
Crocodile sighting around the area/ Dinang creek	Name, age
Thoughts towards the crocodiles	Gender
Thoughts towards the Crocodile sanctuary	Ethnicity
Traditions, beliefs and stories about crocodiles	Livelihood
Perception of crocodile vulnerability	Settlement history

B: List of respondents

NAME	GENDER	AGE	OCCUPATION	ETHNICITY	SETTLEMENT HISTORY
Domingo "Boy" Robles	M	68	Farmer	Ilocano	Moved to Sitio Lumalug around 1960
Gloria Natividad	F	63	Farmer/Housekeeper	Ilocano	Moved to Sitio Lumalug from Roxas, Isabela around 2003
Anaklito Labuguen	M	83	Farmer	Ilocano	moved to Cadslan (pudoc) since time immemorial
Adelfa Infiel	F	23	Housekeeper	Kalinga	Born in Cadsalan
Maria Infiel	F	65	Housekeeper	Kalinga	Born in Cadsalan
Tersing Infiel	F	59	Housekeeper/healer	Kalinga	Born in Cadsalan but moved to Echague during the World War II and came back
Hermohenes Simangan	M	70	Farmer	Kalinga	Born in Cadsalan
Robilyn Palattaw	F	28	Housekeeper	Kalinga	Born in Cadsalan
Orlando Languido	M	50	Farmer	Ilocano/Kalinga	Born in Cadslan
Leoncia Lorenzo	F	50	Housekeeper	Kalinga	Born in Cadsalan
Belen Catalonia	F	53	Housekeeper	Kalinga	Born in Cadsalan
Joielyn Catalonia	F	17	Farmer	Kalinga/Ilocano/Ibanag	Born in Cadsalan
Estralita Velasco	F	40	Housekeeper	Kalinga	moved to Lumalug since time immemorial
Erwin Lorenzo	M	28	Farmer	Ilocano/Kalinga	Born in Cadsalan
Lailanie Robles	F	33	Housekeeper	Ilocano/Kalinga	Born in Cadsalan but stayed in San Mariano proper before marrying
Felicidad Labuguen	F	51	Housekeeper	Ilocano/Kalinga	From Paninan, San mariano, Isabela then moved to Cadsalan after getting married
Zenaida Pauig	F	51	Housekeeper/farmer	Ilocano/Kalinga/Ibanag	Moved to Cadsalan around 1971 from San Pablo, San Mariano, Isabela

Facebook blog Water course Philippines 2016

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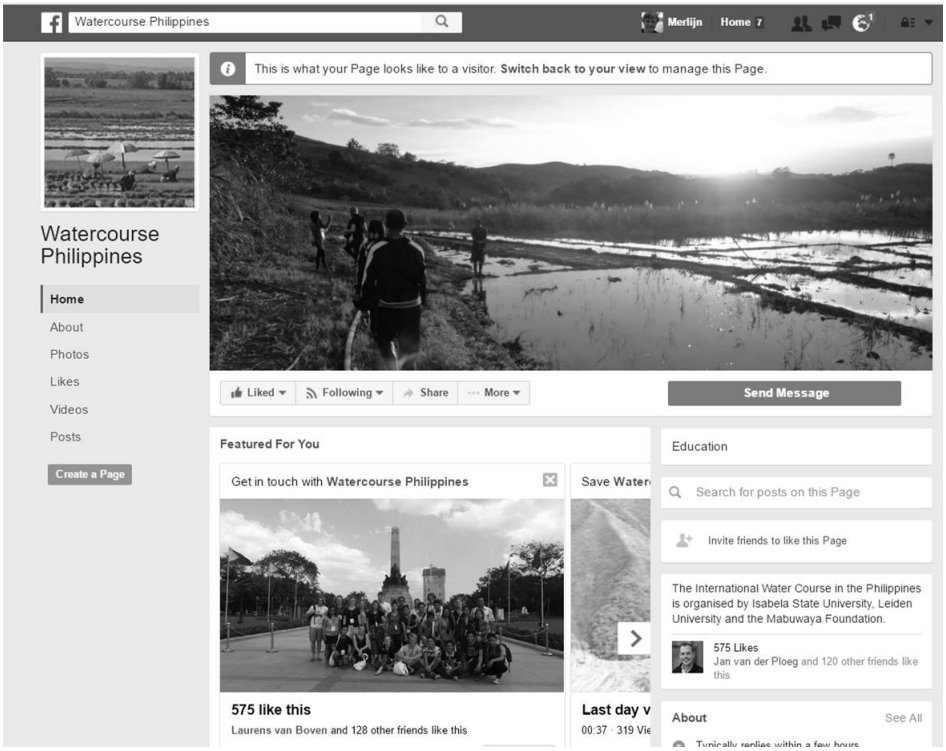


Hi everybody, We are going to coordinate this Facebook page and make sure all our colleagues write their blogs in time:) Every day a new story will appear, written by a Filipino and a Dutch student. We hope you will enjoy reading our updates from the Philippines! Czarimah will start off with what happened today.

I'm Czarimah! How do I put my experiences during the first day? One word: AWESOME! I got to meet my colleagues from the Netherlands during this course and I'm gonna share some of my 'first impression' on them. To be honest, I thought that they are physically, literally huge! Well, they are tall but not as gigantic as how I imagined them to be. They are,actually,very nice, easy to talk to and fun to be with.

Since this is the first day, I am looking forward to working with everyone. So, what really happened on Day 1? First stop: Road tour around Manila! It was nice and very "historical". Next was at the Rizal Park where we had our very own, very first GROUP PICTURE!) It was my first time stepping on that place actually. So, yeah, it was overwhelming! For lunch we went to the Filipino version of Macdonalds called Jollibee. This place serves spaghetti and deep fried chicken! Then we journeyed to Intramuros (I remember Maam Dolly, our tour guide, saying- INTRA means "within" and MUROS means "wall") and went over to Fort Santiago for a short visit at Rizal's last place before his execution. Jose Rizal is a national hero who helped the liberation of the Philippines from the Spanish through his writings. We headed to the National Museum after that and it was fun learning more about my country's rich history, culture and tradition. Joris liked it too, but he especially enjoyed dinner which he will tell you about now:)

Thanks Czarimah! It was great to finally meet you and the rest of the Filipino students, I'm really looking forward to working together! This first day showed us the megacity of Manila and this was nicely illustrated by the mall we visited before dinner. Apparantly Filipinos love big malls, because Mall of Asia is the 5th biggest mall in the world. For dinner we went to Vikings, a buffet restaurant which served everything from roast lamb to sashimi, to Filipino food and French cuisine. It was delicicious! We were so full we had to crouch back to Pension Natividad! It's a nice hotel in the center of Manila (Malate) and the other occupants are mainly peace-corps volunteers. Tomorrow we will visit a Red cross project in Tondo, a very poor area. You will hear all about it tomorrow! Cheers, Czarimah & Joris

How Gerold Nieves and Ard Vogelsang experienced the second day of the international course on water management.

This day was as heavy as our stomach was yesterday after our all-you-can-eat dinner at Vikings. Though today it was not the food, but our experience with Philippine Red Cross and the visit to the slum called Tondo in Manila. Because here we experienced that having a good meal or even safe drinking water is not self-evident for many people in Manila. The day started for Gerold as always at 4 o'clock in the morning, being used to it in his farmers live. In the meantime, Ard was still sleeping for two hours and needed five alarms to wake up at 6 o'clock. Nevertheless, Magandang umaga / Good morning, everyone was in the bus as promised at 7 am ready to go to the headquarters of the Philippine Red Cross. Not surprisingly, we were stuck in a traffic jam, again, so there was time to learn our first words in Tagalog and Dutch. For instance, anong pangalan mo (What is your name)?, Mijn naam is Gerold (My name is Gerold). After these fun first basic phrases it was time for more serious business.

At the Philippine Headquarters we were given lectures about the work that the independent Red Cross does in the Philippines and how they try to prevent any disasters like earthquake, flood and of course typhoons in the Philippines. One of the most pressing issues in Philippines is water and sanitation. During the lectures we learned how simple things like washing your hands and access to safe drinking water have an enormous impact on the health of the people. But to really learn about the scale of the problem, we needed to see the problems concerning water and sanitation for ourselves. Therefore the Red Cross guided us through the slum Tondo and there we witnessed how thousands of smiling Filipinos have to live in such poor circumstances, with the risk of flooding, without safe drinking water and amidst a pile of garbage. For both the Dutch and the Filipinos this was a very emotional experience. For the Filipinos it was hard to see that their fellow countryman had to sleep outside in the dirt. In Isabela there are no beggars, people are separating their garbage and most families have their own house and can grow their own food. For the Dutch, to witness such poverty, we became consciousness of the fact that not everyone is living such a privileged life as we do in the Netherlands.

So when we came back to the hostel we were in a state of sadness, confusion and disbelief. Luckily Cees cheered us up after dinner with a traditional tinikling dance where he won and became the pride owner of a pineapple. In conclusion, it is still fun in the Philippines, but today we learned this is not always the case for everyone. Thank you / Salamat po/ Dankuwel!

Gerold Nieves and Ard Vogelsang

How Jamicah Muncada and Lara Rodenburg experienced the third day of the international course on water management.

Today had a good start, because we didn't have to get up as early as yesterday! After a nice breakfast, we got on the bus to Manila Ocean Park. Of course, we took the necessary group pictures first. Even after the photo shoot, we still had time before the park opened, so we roamed around first and did some shopping. Especially Ard and Cees had a successful shopping session, as they purchased lovely hats that reflected the biodiversity theme of the day.

When we could finally enter the Ocean Park in style, we saw lots of impressive and beautiful fishes. We also saw the very important buwaya or Philippine crocodile. Jamicah also saw the "dancing jellyfish", they were nice and there were a lot of them! After that, everyone went to see the sea lion show, performed by the lovely sea lions Sandra and Isis. They know a lot of tricks and they know how to dance, they certainly have the Philippine talent for performing! We were glad we didn't volunteer to participate in the show, because then we would have to kiss the sea lion.

After the sea lion show, we got on the bus to Quezon City Circle, where we had our lunch. The lunch was very satisfying, so Ard and Joris had to lie down in the grass. Cees then cut up his pineapple that he won in the Zamboanga restaurant last night, and shared it with us. Then we had to get on the bus again, which was starting to get a bit tiring. Luckily it was only a short ride to Ninoy Aquino Parks and Wildlife Center, where we learned about biodiversity, and the very abundant Philippine biodiversity in particular. Especially the lecture about wetland biodiversity was very interesting for us as water course students. Then we had a guided walk around the park, where we saw different types of eagles, among which the Philippine eagle, and other animals that were rescued by the center. There was a talking parrot, a very big and scary python and two tigers. It was interesting to learn from the staff how the center tries to rescue the animals and get justice, which is not always easy. There was also a very cute, tiny kitten following Lara and Renske that was stealing the show.

The final bus ride of the day took us to the University Hotel, where we arrived early, so we had the opportunity to visit the market nearby. Dinner at the hotel was a very cheerful end of the day, as everybody was telling jokes. Especially "knock-knock" jokes were very funny, but sometimes hard to understand for the Dutch people, and sometimes the jokes were "waley". This was a very nice last night in Manila, and we are very excited to go to the north tomorrow afternoon!

How Jhondee and Naomi experienced the fourth day of the international course on water management.

“Indigenous people are important to the environment because their ways of protection are more effective than the establishing of protective areas.” - an excerpt from our speaker Giovani Reyes who is the director of the Indigenous people of Philippines and also an indigenous person himself who belongs to the Igorot.

But before the topic started we were clueless of what would be the activity this morning because the speaker who was supposed to give a lecture about indigenous peoples (IP) was not available anymore. During our early breakfast – still a bit sleepy – we heard from Merlijn our new schedule. After a short introduction by Merlijn the inspiring and enthusiastic Giovani Reyes arrived and told us more about the subject of IP’s and their rights in relation to the environment.

Reyes introduced us some acts considering the subject matter especially the Indigenous Peoples Rights Act (IPRA) which gives the IP’s a formal right to the ancestral domains. However, there are certain issues in the Philippines in terms of claiming conservation areas. This concerns mainly politics and contradicting laws. What became clear was that it is all a very complex and broad topic that gave more questions than answers.

After an interesting lunch with the speaker we had to pack our stuff and carry our heavy bags to the bus which would bring us up north to the very small village named Imugan. During the way we kept our fingers crossed for no more flat tires which turned out to be very effective: we arrived safe and sound in the mountainy area with crooked roads and a lot of traffic. Though the journey took around seven hours we weren’t bored at all looking at the sceneries and singing while others were sleeping. After a short jeepney trip we finally arrived in the dark at our next (chilly) destination where we got a terrific meal and reflected on the day. So now we are going to sleep after this long day, looking forward to the next!

Goede nacht and Magandang gabi!

How Nynke Blömer and Jan Rey Aquino experienced the fifth day of the international course on water management. This one is called: Memories From a Day in the Mountains.

Today was really quite impeccable, something very cliché and something really unique and awesome happened. First, we went to see the three-dimensional map of Imugan just behind our quarters. It was nice seeing the map. Mapping the whole location was useful to all of the residents of the place who call themselves Calahan. They actually belong to what they refer as Indigenous Peoples, who seem to have extraordinary and uncommon distinctions in terms of culture. Before, I (Jan Rey) don't really care about them. I view them as not that interesting but then after several lectures I learned that they contribute a lot in preserving the nature itself. Now, I find them more like excellent stewards of the environment. I admire their passion and driving force in resisting other people who want to destroy their settlement area due to some industrial and economical improvements.

After the introduction we finally got to experience the real Pilipino Jeepney experience, riding up the mountain on top of the Jeepneys! Not only was the drive exhilarating due to the speed, but the view was also breathtakingly beautiful with many mountains and steep slopes (very unusual for someone from the flat Netherlands). The road was winding steeply up the hill, and at first I (Nynke) was happy to be sitting inside the Jeepney. I was very wrong, because on the way down I got to experience sitting on the top which was more fun by far! However, you need to make sure that you are holding on tight enough, to prevent yourself from falling down the cliffs. Also, if you don't sit properly you might break your tailbone when the Jeepney drives over the bumpy road. Definitely the best transport in the Philippines!

After a not so long but not so short trip we stopped at a ridge dividing the territories of different provinces like Pangasinan, Nueva Vizcaya and Nueva Ecija. We stayed there for a while (on a mountain top). We were at the top of the world that time, with an elevation of around 1,300 meters above sea level. Then we had some smile and pose sessions "say cheese." It is strange that you can see the boundaries of different provinces just through observing the environment, like the vegetation. One side of the mountain was full of pine trees indicating the Benguet part and the other side with dipterocarp species.

We headed to Barangay Malicu not very far from the ridge. There we climbed a little bit to a mountain top to have a whole view of the village. Down there an elementary and secondary school are erecting near the village proper. People of the village did not value the education before but in the present times they are striving to get a proper education, for them not to be left behind. Interestingly though, they have this uniqueness of educational curriculum incorporating their culture and practices to it, such as an additional Ecology program.

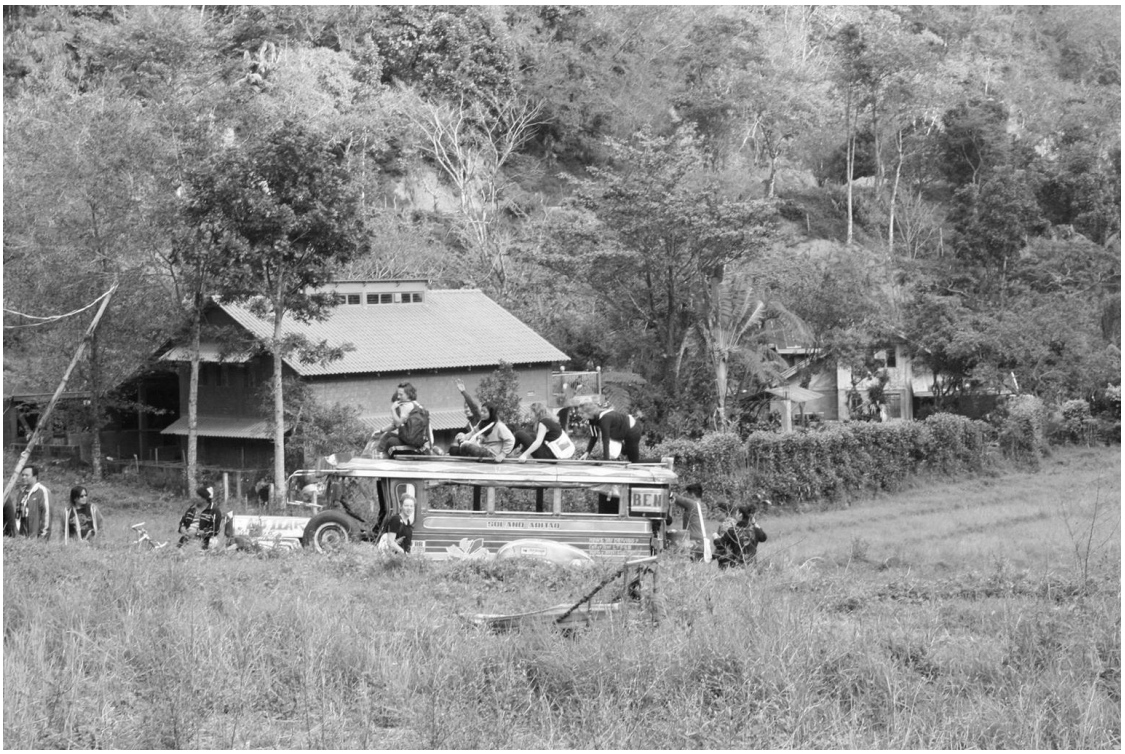
When we got back from Malicu, we visited the community jam and jelly factory, where non-timber forest products are processed for the Pilipino market. Local community members collect fruits from the forest and sell them to the processing plant, which gives an incentive to the community to protect the forest and its products. The main product is a delicious Guava Jelly, which we tasted during our merienda (snack time). They also make turmeric and ginger teas, as well as passion fruit and bignay juice. Their market is in Manila, and it is said the products are popular among people who own three cars.

We decided to go to the waterfalls after long tiring activities but I (Jan Rey) guess going to the falls multiplies the excruciating pain we had. The path to the falls is too tricky. You have to be very careful if you don't want yourself to get killed along the way. The travel took 15-20 minutes. But we don't need to rush the 15-20 minutes of hiking as it contains too many challenges. In the first place the road was narrow and not flat, we have the steep ups and downs. On our right side trees grow robustly and on our left is a cliff planted with a vine vegetable called "sayote." We encountered many slippery boulders along the way. Then we reached the falls. It was magnificent and mesmerizing; I don't have the right words to describe the place. Dipping and submerging yourself into the water makes you want to say "I don't want this anymore." Then you realize you had a long journey. Then an argument will definitely pop-out inside your dip fried brain "I have to do this," then the problem was settled. Despite of the cold water we swam until there's a need to go back.

Before dinner we played the Pinoy Henyo game, which is a Pilipino game where a person gets a word they cannot see on their forehead, and they have to guess what word it is in less than two minutes. Essential to the game are of course laughing and cheering, which the whole Barangay could probably enjoy with us! I (Nynke) got the word Spider, and guessed it in about 10 seconds! The reason being that people (Sir Arnold) have been trying to scare me with creepy spider stories for a few days in a row now… I am proud to announce that I survived my first encounter with a spider, which tried to crawl up my leg…

After dinner the 6 topics for the field research were revealed by Sir Merlijn. The six topics will focus on describing and studying the current situation in three Barangays in San Mariano, focusing on either flood risk, decision making processes in dam development, fish and fisheries, the situation of the Philippine crocodile, water use, and agricultural practices. We speedily chose our topics and preferred partners and we now eagerly await the reveal on Monday of who will study what…


LEGEND:



How Jerry Cabacungan and Renske Termeulen experienced the sixth day of the international course on water management

After a short night (because some people were chatting in the evening) we woke up when we smelled our lovely breakfast: Banana's, tomato's, rice, fried chicken, vegetables and coffee. After swallowing this we hopped on the bus at 9.00 am. O no, first the jeepney (love it). In the bus everyone found a nice bus-buddy and we read books, we listened to music, we talked, we sang and we laughed a lot as always. We had some delay due to the traffic jam (surprise!)… We stopped in Solano to buy some snacks, drinks and of course we jingled (UP). The views were stunning, full of rice terraces, trees, animals, cute houses, rivers, mountains and of course the ever smiling Filipino's. Finally it was lunch time! We drove by the Robinson's place Santiago were we ate pizza, fries, fried chicken, lasagne and rice. The hot bus was waiting for us in the sun. "Keep calm and sweat".

In this day full of travelling we were desperately waiting for some information and education! So that's why we made a stop-over at the famous Magat Dam. The view was absolutely fantastic, with at one side a beautiful lake with boats, birds and floating houses and at the other side the 'old' river in a rural landscape. The Magat Dam is located at Ramon, Isabela. It was constructed in 1982. One of the main purposes of the dam is hydroelectric power which goes into the grid of Luzon. This used to be 60% of the total electricity deliver in Luzon, but is not anymore. Another main purpose of the dam is irrigation. The water is used by over 50,000 farmers living in this area. One of the threats to this dam is siltation. All the sediments, who come from deforested areas upstream get stuck in the dam, so the water cannot flow freely anymore through the dam. But luckily our very smart civil engineers Johndee and Cees will know how to fix this shit in the future! Good luck guys!

So, enough education for today. Back into the groovy-mode in the bus (after taking the 1,000th group picture). The sun was shining romantically orange and pink light into the bus and suddenly we saw… ISABELA STATE UNIVERSITY, Cabagan Campus! Our home for the next weeks.

The nice conversations were over, because everyone was able to connect to the WiFi again. Our mothers are all happy that we are still alive!

During dinner our teachers from the Netherlands, Sabine Luning and Gerard Persoon arrived. Very nice that they will join our fun-loving group! Now we are sitting in the corridor in the nice and hot tropic climate. Everybody is doing their laundry in the CR's and hanging around in the Campus. It's 22.00 pm and time to get some sleep! See you tomorrow!

How Christopher Queddeng and Cees Oerlemans experienced the eighth day of the international course on water management

Hi everyone! We are the smallest and the tallest guy of the water course and we are going to discuss the events of today!

Today we had a lecture by Dr. Gerard Persoon about environmental problems. He talked about how we should define a problem and how you could solve a problem. Then we had a lecture of Dr. Sabine Luning about the Social Research Methods in the fieldwork. We gained more practical knowledge about how we can do fieldwork and what are the important things to bear in mind. Tomorrow we are going to practise fieldwork in Balete. The third speaker of today was Arnold, he spoke mainly about snacks and food and how we should deal with the Ifugaos in Balete. The most important thing that we have learned from Arnold is that we always have to show respect. The last lecture of today was about photography, by Dr. Gerard Persoon. On the first hand it seems a boring subject, but is was actually quite interesting. We learned that we always have to be aware of the framework and the context of pictures. Furthermore he emphasized that a photo could be a powerful tool, but that you have to be careful with the message of the picture.

In the afternoon the groups started with the writing of the proposal. Writing a proposal is difficult, so it is nice that the Mabuwaya staff helps us a lot. They have a lot of knowledge about the area where we are going to conduct our fieldwork and are willing to guide us.

Everybody is really tired of the party last night and the work of today so we are going to sleep early. Tomorrow at 8am we are leaving to Balete, first we will take a jeepney for half an hour and then we will hike 4 hours to reach the barangay.

Matulog ng mabuti and weltrusten

How Melvin and Martine experienced the 7th day of the international course on water management

Today was a very exciting day for the both of us because we were asked to be the Masters of Ceremony for the international course on Water and Water management of 2016. We were both a bit nervous but we were well prepared and all went well. We were very honoured that Dr. Aleth Mamauag, ISU President, was able to make some time in her busy schedule to join us and of course the happy smiles of the faculty staff that were present. Even some of the students that participated in the course last year were also there, which was very nice indeed. Also, there was the launching of the very first Watercourse Coffee table Book, a summary of 5 years of watercourse. Thumbs up for all the authors and editors for the great work! After the opening program, it was time for lunch. If you happen to have read the previous blogs, you can maybe guess what was on the menu. After lunch, we have had three very interesting lectures. The first lecture was given by Dr. Orlando F. balderama, ISU Echague Professor, on Integrated Water management in Cagayan River Basin, the second by sir Jouel Tagueg, Water Course Coordinator, about The Cagayan Valley and the third by Merlijn van Weerd, Water Course Coordinator about Biodiversity in North Eastern Luzon.

Of course, when there is an official opening program, there should also be an official opening party!! Something that we all have been looking forward to, not that we did not have great fun already, but still, there is never too much singing and dancing in the Philippines!! We were also provided a very special dinner and drinks in the patio of the university building, which is of course always very well received by everyone. It was so well organized it looked like a wedding reception. A live band came to perform for us, and then it was time for some dancing!! We were all impressed by the dancing performance of the ever young and energetic sir Arnold, we almost could not keep up with him, seriously! And, when there is a party in the Philippines, there is singing/karaoke/videoke involved. For those that are unfamiliar with the last term: videoke is like karaoke but then with a screen and lyrics with which you can sing along.

Overall, we had such a great time and we really enjoyed the company of the whole group! Salamat everyone!! You are awesome!!

How Dayan and Anniek experienced the ninth day of the international course on water management

Tick-tock, tick-tock, tick-tock, as the clock says it's already 7:00 in the morning. This means that we need to wake up in order to be on time for our trip going to Balete. Unfortunately, Anniek got up this morning with an ear infection.

We were so excited for this day, and especially the ride with the large Jeepney. Everybody went out eagerly to secure a spot on top. Too bad, it was already full. We drove through the beautiful landscape of Limbauan, San Pablo, Isabela. During the ride the road became worse by the minute, after 30 minutes we stopped when the Jeepney was not able to take us further. That is when our hike started. It was the first time for us to hike that far in the mountainous landscape, and even though we were really tired, we liked the experience very much. We stopped several times to rehydrate and get some 'snaks' (snacks) from Arnold, who kindly brought them for us. Once we stopped at an abandoned chapel, where Arnold told a story and a lot of jokes off course!

At the end of the hike, we passed a really big Balete tree. The story goes that the Balete tree is a home of different creatures like 'Kapre', a large black man who smokes a sigar. Once you smell the smoke of the sigar, they say you cannot return to where you came from. The Balete tree is also a home for the centaur according to the legend. It's also said there is a really big snake-like creature, Batibot, is living in the tree, this is especially told to children to scare them of playing outside after dark.

After 3 hours we finally made it to Balete, which is a remote area of the barangay Limbauan. We met the villagers for the first time and shared our candy with the children. The people of the village are Ifugao who migrated there from Aguinaldo in 1996, the year that Dayan was born. In the past they hunted animals, but after the deforestation most of them became farmers.

To practice our fieldwork-skills, we did a transect-walk with the man who guided us during the hike. He told us about slash and burn farming that is practiced in the area. They will grow a crop on a hectare of land for one year, then they will proceed to the next hectare of land. They will let the first patch of land rest for 3 years, so the fertility of the soil can regenerate. The Ifugao do not have a title of ownership of the land. On the way we spotted one lonely Balete tree in a field of corn. The farmers use the shade of this tree to rest in.

When we came back to the village, Joris and Czam interviewed the guide in front of the group to show us how to do a proper interview. Anniek was hurting really bad at that time, so she had to lay down and unfortunately she could not join the campfire and the Ifugao-dance. The rest had a nice dinner with cucumbersalade and Chapsuy, which is a dish with carrot, beans, mushroom, evaporated milk, Chinese cabage and cauliflower. Anniek feels really bad now that she missed that. After dinner the Ifugao performed their traditional dance and taught the steps

to the students as well, supported by the gong Merlijn brought with him. After that, we went to bed early, because we were all very tired of the long hike and the beautiful impressions.

The kids at Balete

How Cathlyn and Rob experienced the 10th day of the international course on water management

After a few hours sleep we were waked by the lovely jungle sounds of chickens and crickets. Full of energy we started discussing our topics for the practicing of interviewing later this day. In the meantime our hosts prepared a nutritious Pilipino breakfast: boiled eggs, tomatoes, tuyo (dried fish) and….rice!

After breakfast we had a short meeting concerning the chosen topics for the interviews and the planning of the day. We all came up with different topics, as easy is it can be. The different topics concerned environment, housing, schooling, making a living and material culture.

We got two and a half hours to try to practice our interviewing skills in the peaceful village of Balete. Due to the few inhabitants every research team went out in a hurry. Luckily the local people were really friendly and everybody succeeded in conducting several interesting interviews.

After the two and half hours interviewing we went back to the meeting point in the village to discuss all the different experiences. Gladly a lot of interviews went really well, despite the difficulties in translating. Furthermore we were able to share a lot of interesting insights and could also advise each other in various interviewing aspects. This moment of reviewing was really helpful for us in conducting interviews in the upcoming fieldwork in San Mariano. During the reviewing session we could already smell the preparation of a tasty lunch, again prepare by the lovely host family. With the upcoming hike this afternoon in mind everybody did their very best to enjoy all the food.

After repacking our bag packs sir Arnold surprised us with a fountain of ‘snaks’ (snacks). Most of it ended up in the hands of the tall Dutch guys, but they shared it of course with the local children.
As part of the course we are trying to improve our skills in taking group pictures. This day was no exception and before leaving Balete we took a beautiful picture with the host family included. Overloaded with maganda impressions we headed west for our hike homeward-bound. This was easier said then done, because we had to cross four rivers on our way. Luckily we had a refreshing swim in the river, halfway our hike. After the last crossing a jeepney was already waiting to take us ‘home’ to the campus of ISU; finally an opportunity to take a shower and do the laundry again, sometimes a necessary evil.

Time to hug a tree

Paalam! Bye Bye!

How Kaat and Rodel experienced the 11th day of the international course on water management

After a good night sleep from our adventure hike, Jeepney ride and swimming in the river, we woke up to work on our proposal for our research. With some stress in our tummies, we finally presented our proposals a day in advance, because Gerard Persoon had to leave the country the next day. After more than 3 hours of presenting, we finally could show the pictures we had to take during our research trial in Balete. We had to take 1 picture that you found the most interesting or beautiful and we would all vote the winner of the picture contest. There were a lot of intriguing pictures: from little children playing to very detailed aspects of everyday live in the village. And the winner was… drumroll… Yani! He took a beautiful shot of the drinking water with the reflection of the banana trees in it. He got some nice accessories as a price: a medal, a winter hat (he won't be needing this in this heath), bird stickers and a bag + children sized t-shirt from the Mabuwaya Foundation. We're sure it will fit perfectly as pyjamas.

The best part of the day was the famous Dutch dinner. We must admit the foreign students enjoyed eating something else than rice. We prepared stuffed eggs with mayo and mustard, kale (boerenkool, applesauce (jum!), mashed potatoes with carrots, onion soup, smoked sausages and off course: cheese! For dessert we had waffles (stroopwafels) and 'nicnacjes', the typical Belgium cookies given to children with Sinterklaas (Different from the 'Pepernoten' in the Netherlands). We enjoyed a nice evening singing videoke, drinking beer, laughing our hearts out to the singing voices of some (We're not naming anyone and enjoying each other's different eating habits. It was a perfect evening, ending with an emotional goodbye speech of Gerard Persoon.

How Abigail and Yannie experienced the thirteenth day of the international course on water management

This morning we visited the Malasi tree park and wildlife sanctuary at Malasi, San Antonio, Cabagan. 10% of the endemic Philippine duck population, sometimes even 20% can be found here. There are only 10.000 individuals left from this species making this area a crucial sanctuary. The sanctuary is the home of many other different species, and it is the temporary home of migratory birds from Japan, and Northern China that overwinter here. We saw Kingfishers, Egrets, Northern Pintail ducks, Whistling ducks and… For the first time in my life I saw a turkey as well. After the Malasi sanctuary we went to the Cabagan market and did our groceries for the next week which we will spend in the field. We leave early tomorrow morning to San Mariano. Half of the group will be staying in Cadsalan, and the other in Tappa. We will conduct our research in these two Barangays of the municipality. Abigail and me will study drinking water issues, and the locals awareness of drinking water being an ecosystem service which is supplied by the Ilagan river watershed. This afternoon we finalized our research proposal and questionnaires, and packed our bags.

Abigail and me will study drinking water issues, and the locals awareness of drinking water being an ecosystem service which is supplied by the Ilagan river watershed. This afternoon we finalized our research proposal and questionnaires, and packed our bags.

After we malasi lake, we went to the super market to buy all the stuff we need to San Mariano. We had dinner at the ccvped after that and the girl group decided to go in the round rock report for swimming.. yeah!! a pool for crying out loud.. i slept late last night so im running out of time now. the bus is here and i really need to fix my things now. READY for San Mariano research study.. Have a good day everyone!!

We will be offline until Saturday, expect a lot of stories about our fieldwork next week!

How Czarimah and Joris experienced the fourteenth day of the international course on water management

Hello everybody! It has been quiet for a while from watercourse side, and as you may have read in previous posts, this is because we were conducting fieldwork in the municipality of San Mariano. We all had such an amazing time! Today more posts will follow about how some of us experienced this week.

Monday morning everybody got up early to pack the last things we would need in the field, especially lots of food. We were advised to bring fruit and vegetables as those wouldn't be available out there. Czam and me made sure we brought snacks, coffee and batteries for our flashlights. We have definitely made good use of these three things during the night surveys we did last week, counting the Philippines crocodiles in Dinang creek.

The bus took us from Isabela State University campus in Cabagan to San Mariano town, the capital of San Mariano municipality. Before commercial logging was banned in the 90s, this town used to be a centre of logging activities, with sawmills and big 6x6 logging trucks hauling in tropical hardwood from the nearby Sierra Madre. Logging companies were so effective in destroying the forest, that today only 30% of the original forest is left. Thousands of people were employed in the industry in San Mariano and had to find another job after the logging ban. Most of these took to farming, further increasing pressure on the environment. The Philippine crocodile, a species endemic to the Philippines and now critically endangered, severely declined in numbers during the logging era. When we got to San Mariano, we went to Mabuwaya Foundation's crocodile rearing station.

The staff at Mabuwaya is doing a great job in breeding the crocodiles at the rearing station. Hatchlings are very vulnerable in the wild, that is why Mabuwaya collects the eggs and keeps the juvenile crocodiles until they are strong enough to be released back into the wild. This is called the head-start programme. They currently have around 40 crocodiles in the rearing station, and seen the estimated number in the wild (200) this is a huge contribution! We were all so excited to hold a juvenile Philippine crocodile and have our picture taken with it. Presentations were given by Merlijn and Ma'am Tess and we learned a lot about biodiversity conservation in this area. Mabuwaya's approach is effective because they involve local people and are really strong in education. The rearing station has a lot of visitors every year, especially schoolchildren. Additionally, Mabuwaya is involved in many community improvement projects, in the past they have provided pump wells for clean drinking water and schooling materials.

After the visit to the rearing station, we did some final shopping at the market and had lunch there. Then we boarded a huge converted jeepney which was equipped with the engine of an old logging truck and was able to fit us all. After San Mariano there is no more asphalt, so the truck proved itself on the track that is paved with river stones, but does not deserve to be called a road. This made sure we had very bumpy ride! The views from the ridges, looking out over fertile farmland, Ilaguen river and in the distance the Sierra Madre mountains made up for that though!

After three hours, including occasional stops to cool down the engine with water from creeks, we got to Lumalug. This small settlement consists of a few houses at the road and Dinang Creek. Dinang creek is home to some Philippine crocodiles and juveniles from the rearing station have been released here. The creek is a community initiated crocodile sanctuary, and Mabuwaya has provided a lot of benefits for the local people in trying to conserve the crocodile population. There have been some attacks on people and more on livestock, which might explain the killings of some crocodiles.

This is the place where the crocodile dream team got off! Ard, Gerold and us would be staying here for the coming week. We got off the truck at a really nice house, owned by Labugen family. The others continued to their research sites in Cadsalan and Tappa, another 30 minute ride.

The sun had already disappeared when met the host family and settled in. We decided to go for our first night survey straight away. Armante and Edmund from Mabuwaya joined us, as they would do for the rest of the week. Marlon, the local sanctuary guard, and Merlijn also came. We searched the creek using a big mac flashlight. Crocodile eyes will illuminate a red glow, which is easily distinguished from the white glow of cattle or water insects. By estimating the size of the eyes, we found three juveniles, one hatchling and one adult crocodile. The night surveys are really exciting and every time we discovered a crocodile we felt like shouting! But you have to keep really quiet not to disturb the animals, so we celebrated when we got back to the house.

Back at the house we had dinner and fell sank into a deeeep sleep. So far for the first day of field work!

How Gerold and Ard experienced the fifteenth day of the International course on water management

On the 19th of January 2016, the second day of our field research in San Mariano, we went to the riverside for doing interviews for our research. We want to find out about the presence and the perceptions of the people on the Philippine crocodile, the most endangered crocodile that survives in a highly cultivated area. We started walking along the Ilaguen River, were people doing fishing, washing clothes and swimming and even illegal logging. We interviewed them about their own perception on the Philippine crocodile, some people telling that unfortunately there is no crocodile on the Ilaguen River but some people said that there was a crocodile in the Ilaguen river long time ago but now they didn't see it anymore. On that day, we interviewed seven respondents for our research.

At night time we also went for night survey together with Czarimah, Joris, Edmund and Amante on the Dinang Creek, a tributary to the Ilaguen River. During this night survey we walked very quietly using our torchlight for spotting illuminating crocodile eyes. During our 3 hour night survey we were able to spot three juvenile crocodiles and even one adult crocodile! We also saw an unexpected tree snake In short it was a tiring but very rewarding day in the field!

How Jamicah and Lara experienced the sixteenth day of the international course on water management

On the second day of our fieldwork in Tappa we woke up before 6 like real Filipinos. Jamicah (the best cook in town) prepared a wonderful breakfast, which gave us a good kick-start of the day. By 9:30 we had done 5 interviews already, so we decided to have a nap. That escalated into a deep sleep of 2,5 hours, and when we woke up it was time for lunch, which was of course prepared by Jamicah. After lunch it was time or our daily afternoon swim. Jamicah decided to live on the edge and get in a boat with Jerry, which was quickly taken by the strong current. Renske and Lara had already said their goodbyes to Jerry and Jamicah as they saw them nearing the rapid part of the river, but luckily it ended well.

After this exciting water adventure we went to conduct another round of interviews in the village. Our research topic is agricultural practices and the occurrence and effects of floods, droughts and pests in Tappa. We have learnt from our respondents that most farmers in Tappa suffer from one or several of those problems. There is no irrigation system in place, so the farmers are not able to combat the drought. Even if there was an irrigation system, many farmers would not be able to use it, because their land is too steep. Farmers that have land next to the river suffer from floods regularly, especially during the rainy season. Almost every farmer suffers from pests, such as corn borer, rats and birds, but this is easier to combat than the drought and floods. However, the farmers have recently discovered that cassava is easier to cultivate and more profitable than corn, which had been the most important crop in the area, because it can withstand harsh circumstances, such as droughts and typhoons. We found the current shift from corn to cassava a very interesting and positive development.

After the interviews every group in Tappa went home to cook, and the dinner was enjoyed at Jerry and Renske's host family's house. The day was completed with a few lovely massages from Jhondee and Jan Rey, and in turn Jhondee received a swimming lesson in the air and a big hug from Lara and Renske. Then it was time for bed, as the filipppino lifestyle requires you to go to bed before 10.

How Jhondee and Naomi experienced the seventeenth day of the international course on water management

Hello again my friends… this is our second time for the blog!!! And this is our third day in the field in Tappa, San Mariano. Unfortunately we had to separate today so we both will tell you about our adventures separately.

Let' s start with poor Jhondee who had to start quite tired due to a long trip- 3 hours of bumpy ride- but we arrived safe and sound to our destination.

I woke up 6:30 in this morning -thanks to the alarm of my research partner (Cees)- although it was quite late that's why we hurriedly cooked for our breakfast. This day was scheduled for the Local Government Unit (LGU) Interview with my buddy Cees and we were accompanied by ma'am Tess and Merlijn. While waiting for Merlijn's go signal, we took the time to interview our host person, Mr. Romy, and we had a nice conversation with him. About 8:45am we started to travel going to the municipality proper and to Municipal Hall (via company car of Merlijn) but while on our way we had some stopovers in Cadsalan and Dinang. I, Cees and Merlijn grabbed the opportunity, while waiting for Amante in Dinang, for a crocodile sighting and "lucky us!!!" we saw one in the creek so after that we continued to travel and it was really an exhausting, wobbly and bumpy 3-hour road trip. All the exhaustion was paid off because on our way we saw different species of amazing birds and ate a fantastic burger at Billy Joe to feed our pampering stomach.

Finally, we reached the Municipal hall -what a relief- then we interviewed four government officials from Municipal Environment and Natural Resources Office (MENRO), Municipal Public and Development Council (MPDC), Municipal Disaster Risk Reduction and Management Council (MDRRMC) and Mucipal Agriculture Unit (MAU) respectively and we were assisted by Merlij, ma'am Tess and Amante. At the first two interviews, I was so nervous (with a tongue tied…kiddingly) that I didn't what to say actually but thanks to Merlijn that he was the one who guided us and boosted our confidence and the last two interviews were more relaxing, comfortable and better of course. We gathered a lot of information not only for our topic but also for the other groups that could help us to finish our research studies.

After the interview, I, with Cees and Amante, went to the market to buy some foods for dinner and had some street foods which my buddy really enjoyed while Merlijn and Ma'am Tess went to Cabagan for some things to be done.

I am now at MABUWAYA rearing station, this will be our last stop for this day where we can rest ourselves and have enough sleep. Thanks to Amante for the mouth-watering dish we had for dinner.

Good night fellows!!! I'm Jhondee signing off…

And here is Naomi signing in again!

Meanwhile I had another early day, starting again with the alarm at 5.20 am to participate in our (Jan Rey – my excellent research "partner"- and me) first fishing trip. This because of our topic fish and fisheries in the rivers surrounding Tappa. Hoping to find some fish in the net 'our' fisherman set out the other evening we went to the

river, the moon still shining. With a canoe we went together with the fisherman and his wife to the spot. However, we were unlucky: no fish today probably because of the bright moon and the smartness of the fish of course.

After this small disappointment but nice trip we went on interviewing some other people involved in fisheries (40% of the population, so not very difficult to find…). This included also the women doing their laundry in the river, chatting and fishing at the same time. Participating in their chatting we eventually saw our first five fish being caught and we were therefore able to take our first measurements of the fish themselves (and only ones I can tell you now)! Here I also learned how to say "thank you" in the different languages being spoken in the area:

- Of course the already known "Salamat po" (Tagalog)

- "Agiaman kami" (Ilocano)

- "Mabalo" (Ibanag)

After those wise lessons (which of course I forgot already after a few minutes) and a long swim in the river afterwards – my "partner" almost tipping over with a canoe in the rapid – we proceeded with our interviews. We finally ended this nice day with an extended dinner at Rob and Cathlyn's host family (our neighbors) to celebrate the birthday of one of their kids with a lot of "snaks" and candies given by us. Already a bit used to the rhythm I already got tired very early and returned to my bed , of course again curious about the next day.

So salamat po, mabalo, agiaman kami, bedankt and thank you for reading and you will hear from us soon!

How Jan Rey and Nynke experienced the eighteenth day of the international course on water management

Because we didn't experience the day together, apart from swimming in the Ilaguen River at the end of the day, we wrote our blog post individually. First, Jan Rey will tell his experience, and then Nynke will tell hers.

Jan Rey's day

Interviews are good way to kick start your day. Somewhat productive but it really drains your guts. Especially when you're an interviewer slash translator. Early in the morning, I (Jan Rey) and my partner (Naomi) started our day with bunch of interviews. It was the last day of our field work and we are not yet satisfied with our data, that's why we were in a hurry. Our topic mainly talks about fisheries—the fish species found in the Ilaguen and Dicamay River, dam building and future impacts to fisheries, fishing techniques and other related fishy stuffs.

After lunch, the Tappa team (Jan Rey-Naomi, Kathlyn-Rob, Jhondee-Cees, Jerry-Renske and Jamicah-Lara) went swimming to the Ilaguen River. We were surprised and glad when team Cadsalan made their way to join us. The scorching sun radiated thrill to the swimming party. The overwhelming hotness of the sun drove away most of the Filipino students to just swim later for darn reasons, "I don't want to get my skin even darker." Nah! Excluding me. On the other side of the coin, the Dutch students are embracing the temperature because it is not common to their country and for some reasons they want to get sun tanned.

The water makes me happy (for a fact that I am a demigod—Poseidon's son: JOKE). In fact, the son of Poseidon is not a good swimmer. Well that's the lamest part. The children from that place whose age ranges from 9 to 12 are far better than me (face palm). I envy them because they are able to swim on the middle part where there is an occurrence of strong current and it is where the deepest parts reside. I still love my precious life and I don't want to die in drowning (FACT: Drowning is one of the many ways to die as "idiot").

To make the day even exciting, we (five Filipino students) borrowed a canoe to a certain fisherman slash illegal logger. Aye captain! So I sat at the back part of the canoe and act as their captain (Shut up! That's not a ship to call yourself a captain). Using a wooden paddle and an improvised bamboo paddle we made it to the other side of the river.

Few lime stones lay rest on that side of the river. We climbed up and jumped from the top of the boulders down to the bluish shallow waters. After we got bored in repeating the same scenario we decided to move away. We paddled to the middle part of the river. Then we let the current to carry us through until we were washed away by the rapids. On that part we were shouting and screaming because of glee and fear. The hardest part was pushing back the boat upstream. That activity was quite invigorating because pushing back against the current is so delirious. It was really a pain in the ass.

When the night took over, we conducted farewell and thanksgiving party since it was our last night at Tappa, San Mariano. We had spaghetti, beer and other stuffs for the dinner with our host families and other barangay officials. It is a way to express our deepest gratitude for accepting and treating us as part of their family. Then we presented our initial research findings. We ended the day by going to the riverbank. We laid down on the sand while the beautiful Luna gleamed. It was a wonderful and nostalgic feeling. The whole day was great and worth remembering.

Nynke's day

After a good night's sleep, and a lazy morning, (the Cadsalan group went on a night survey to find crocodiles the night before in Dinang creek) Dayan and I (Nynke) interviewed the Capitana about her experience with flooding in Cadsalan. She gave us lots of valuable information for our research. Just as we were leaving, she offered us coffee.

Next, we went to Christopher and Kaat's host family to buy some bread in their small shop. When we got there, two other pairs were there (Christopher and Kaat, and Lara and Jamicah) so we sat down on the patio to catch up. When, the grandma of the house offered us some of her home cooked lunch consisting of milkfish (beware of bones), rice (of course), mango juice, and homemade battered fish snacks. We accepted her kind offer, and while we were eating the delicious food we came up with the plan to go swimming in the Ilaguen River in Tappa.

By the time we finally left for Tappa, many more people decided to join us on our swim (Melvin, Anniek, and Martine). In Tappa, we met the other students, some of whom we had not seen for a few days. We were happy to see them! Also, Dayan and I finally saw the place where the Ilaguen River splits into the two rivers that surround Cadsalan. These two rivers cut off Cadsalan from the road in the event of a flood, creating a small island.

The river was beautiful; many local children from Tappa were swimming despite the strong current. Meanwhile, ladies were bathing and washing their laundry, and near the road logs for commercial trade (from the Sierra Madre forest) were arriving. We quickly got into the water, because the sun was very hot. After watching our hair, we swam a bit in the river. After working on our suntan and munching on unripe mango, Naomi and I decided to swim across the river to the other side, where some others were already resting in the sand. We thought it was a short swim, but because of the current it was quite tiring. Using our flip-flops (or slippers as our Philipino counterparts call them) as paddles, we swam to the beachy river bank, which dotted with very large boulders. Some children were climbing on top of them, and jumped into the river from a great height. After a quick assessment of the depth of the river beneath the boulders, we also climbed to the top, and took the 5 meter plunge. It was exhilarating, and although we wanted to jump again, it was time for the Cadsalan team to walk back to Cadsalan for our despedida party.

For the party, we all cooked some dishes at the Capitan's (Barangay Captain) house, and shared our food with our fellow students and their host families, Pilipino style. Arnold and Merlijn shared some words of thanks, after which the students and then their host families shared the fieldwork experience with the group. We were all very thankful for the kindness of the host families, who took us into their homes. We took the obligatory group pictures, and then it was time for bed. Friday; it was the last day in the field. While I miss my bed at the CCVPED, I really don't want to leave Cadsalan yet. Everyone I met during my interviews and strolls through the Barangay has greeted me with a big toothy smile, and some even invited me into their homes for a cup of Nestle 3-in-1.

When we leave tomorrow, I will miss the people of Cadsalan, and the beautiful area they call home.

How Jerry and Renske experienced the nineteenth day of the international course on water management

Today was a sad day, because we had to leave the field and our lovely host families. After some amazing days in Tappa and Cadsalan we had to go back to the Cabagan. After a nice real Filipino breakfast with rice, egg and dried fish we had a final swim in the river. The jeepney was waiting for us and the rest of the Tappa group was waiting for us (Jerry & Renske) because we were still packing our bags.. finally the Dutch and Gerold found their spot on top (tanning) of the jeepney and the Filipino's and Joris inside (afraid of the sun). We spent there 3 hours, and everyone got their best sleeping-position.

After a lot of sun, hills, views and cigarettes we reached San Mariano. While waiting for the bus we had some games, snAcks and burgers. The bus arrived and we slept again on our way to the North Star Mall in Ilagan city. On our way we stopped at the army-dump-store to buy hammocks. In the mall we ate MacDonalds which we all needed after the fieldwork. Bus again, sleeping again with some nice, relaxing background music (guns 'n roses). We arrived at the campus at 3:54 pm and went back to 'normal' life: doing the laundry, cigarettes, no beer, volleyball, wifi-connection, dinner (chicken and rice, surprise), calling our gf's and bf's, cigarettes and snAcks. 9:41, time to sleep like baby's and wake up late. See you tomorrow!

How Melvin and Martine experienced the twentieth day of the International course on water management

Yes! Yes! Yow! Good morning beautiful day!

Indeed it is a very beautiful day because there wasn't anything particular on the program for us! After a week of field work, we all felt that we could use some off-time. I mean off-time to recover from the hang-over of being in the fieldwork for the research and hang-over because of the bumpy-long road we traveled after Cadsalan, San Mariano and traveling back to Cabagan. This time, many more people wanted to sit on top of the jeepney instead of inside, because Ard, Renske, Gerold, Joris, Anniek and Martine did not do a great job in trying to convince the rest the ride on top was really horrible on the way there.

Everyone really enjoyed this day and so did we. We spent the whole day hanging around, and lying on the ground ("I mean like basking, he he he!"), chit-chatting, doing our laundry, washing our hair, playing some volleyball (did anyone already mention that Christopher has this crazy badass serve? He is incredibly fast indeed!), and checking our whatsapp and facebook, because we did not have internet or cellphone coverage for one week. It's a miracle that the wifi was not overloaded by everyone accessing the internet at the same time. It was actually quite relaxing not to have connection there. Martine had 23 emails in her mailbox and 62 whatsapp messages waiting to be answered, pfff!!

This was also the first day in weeks that the weather was actually rather chilly.

Martine: "At least we didn't bring our warm sweaters and socks for nothing"

Melvin: "Well, you can still use them because we have nice air-con in our rooms." (Kidding)

Martine: "That is true, it is freezing in the dorms! I might use my sleeping bag tonight and wear socks and pyjama's."

Early in the afternoon, the whole group went to Centro Cabagan since the town fiesta is on-going. At the fiesta, there was this ferriswheel, which was really crazy! I did not trust the construction of the thing at all, so I didn't dare to go in. There was actually a guy sitting on a plateau, controlling a huge old diesel motor connected to a steel cable that drove the ferriswheel. When he wanted the thing to go faster, he just gave more gas. When he switched to the third gear, the thing was going round like crazy! Yannie, Cees, Joris, Ard, Jerry, Janray and Gerold were brave enough to go. Props for you guys!

Martine: "It was my first time to have ketchup and mayonnaise on a pizza, not sure what I thought about that, haha. I also enjoyed playing Perya and Running light (an enchanting Filipino gamble) together with Merlijn and Sabine. Merlijn, Sabine and I also went in a small train that went through a horrorhouse. That was great fun!

Melvin: "Well, I enjoyed walking around. I mean walking back and forth and directed nowhere, Hehehe. I am alone because my companion, Abigail, left me and that she rather wanted to be with her boyfriend. In short I am out companion and out of place AKA O.P."

The two of us, Martine and Melvin, with the other five ladies of Dutch students (Lara, Ninke, Kaat, Renske and Naomi) went home ahead.

Martine: "Well, just to remind you we didn't go home together because I rode in Merlijn's Hilux, great!! I also want to have such a car!!"

Melvin: "Oh yeah, I almost forgot. And also to mention, I rode in the top of a tricycle we hired just to get out myself to the place where everybody left me behind."

After we got back to the CCVPED building, the university building where we are staying, we all felt like prolonging the party there, which we did. The hangover will be tomorrow's worry.

How Christopher and Cees experienced the twenty-first day of the international course on management

Today is the Fiesta Festival of Cabagan it is a tradition here in Philippines they usually patronized saints and they usually prepare for it and celebrate it within two days. Today also is the christening of the son of ma'am Beth, the finance manager of Mabuwaya Foundation. We had our meeting first with Sir Merlijn about the schedule this week and the preparation of our report and presentation of our research. After the meeting, we rode into a tricycle going to the cathedral of cabagan for the christening, when we got there we attended mass, when the mass was ended we went out in the highway to watch the street dance and parade they call this "Zambaly" or dance of indigenous people especially agtas, different dance of high school students we have seen and it was excellent.

After the show, we walked going to the house of ma'am Beth to have our lunch there. There were so many foods and we all liked it because it was delicious. When we were all done eating we went to the square park to watch the street dance competition but suddenly it was finished when we got there, that's why we just went around to buy something we want. After an hour, we went back now in CCVPED by riding again in a tricycle, when we were in our rooms everyone were busy in making their blog profiles, and others start doing their report in their research studies. All the following days, we will be preparing for our report and presentation. Good Luck to all of the participants of the watercourse.

Goodnight! Goedenacht! Tomorrow is another day!

How Anniek and Dayan experienced the twenty-second day of the international course on water management

Dayan got up very early to start writing the report, while Anniek was still in bed at 8 because she felt like sleeping in after a busy fiesta yesterday.

Before starting to write the report, Merlijn gave us proper guidelines. He also told us the mayor of San Mariano will visit the presentation on Thursday, together with the former watercourse participants and some of the professors. First, we adjusted the time schedule, because we all experienced that during the fieldwork everything went different than planned, as always We miss it a lot though, and starting to write the report makes us think of that amazing time we had there. Unfortunately Dayan's partner wasn't feeling well, but Dayan started working on the report about 'Flood risk perception and the proposed Ilaguen Dam'. There might have been something wrong with a thing we ate because we already had 5 sick people in the past two days (including Ard, who had an allergic reaction on a peanut). We hope the fevers and stomach aches are over before the big presentation! We are also very excited for the 'Despedida' party, but we rather don't say goodbye yet. We cannot wait to go to Banaue to see the rice terraces! And the amazing waterfalls in Batad.

Anniek, Martine and Rodel visited Arnold today! Which was truly amazing. Arnold has an enormous house and an even bigger garden, full of fruit trees and vegetables. We ate a Papaya and picked some more to bring home, together with some Kalamansi and Guava. Arnold told about his house, on the old campus of the Isabela State University and about his family. He misses his daughter, Kristel Joy, very much. She is now in Cebu for 18 months. We also saw his cacao tree! And even tried it, it was delicious. We are all very grateful that we were able to visit and very jealous of Arnolds amazing garden.

Dayan misses her family very much, when she comes home, the first thing she will do is hug her mother. Anniek especially misses cheese, and wine, and cheese and wine.

How we experienced the last week of the international course on water management

Just like that, the course has ended. We said goodbye to our new friends at the Manila – Isabela junction yesterday. Most of the Filipino students will be in class today at ISU, while the dutchies will be in the airplane either back to the Netherlands or to a sunny holiday destination somewhere else in the Philippines.

Saying goodbye was really hard. We spent one month together, but this was not a normal month. We fitted eight days in a week and 25 hours in a day, and managed to work hard, learn and above all laugh together with this amazing group of students and Mabuwaya/ISU/Leiden uni staff. Needless to say a few tears were spilled.

Because of the nearing end of the course, the last few days have been really hectic. That is why the blog managers were not able to keep you updated! We have really enjoyed ourselves, I will try to give a short overview of what we have been doing, I hope the pictures will speak for themselves.

Wednesday was the last day we worked on our projects. Thursday we finalized and prepared for the presentations later that afternoon. It was amazing to see what everybody had done and how much work everybody got done! For example, Rodel, Melvin, Martine and Anniek organised a workshop during the fieldwork concerning waste, and it turned out that many people of Cadsalan joined. At the same time they managed to gather enough data for their research as well. Props to Jhondee and Cees too, they spent a night in San Mariano during fieldwork to interview officials at the LGU (local government unit) concerning plans for the construction of a hydro power dam in our research area. They gathered information for other groups too.

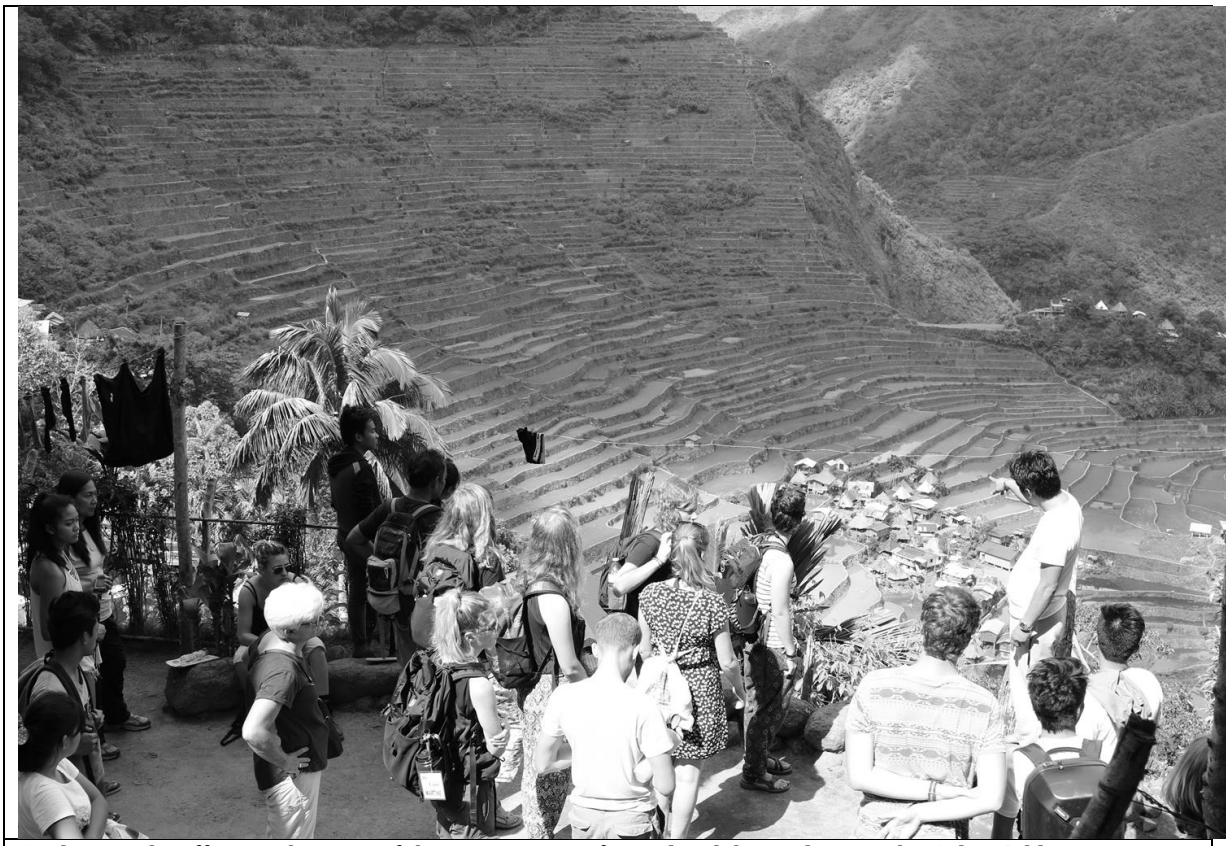
After the presentations we all received the water course 2016 certificate! Then it was time for the farewell party at CCVPED (ISU building where we have been staying). Pilipino students from previous water courses were invited and we enjoyed baboy (roast pig), videoke and a cultural dance show.

Luckily the fun was not over yet. Friday morning we woke up really early for the bus trip to Banaue. We headed west, crossing the Cagayan River Basin and entering the Cordillera mountain range on North Western Luzon. We drove straight up to viewing platform from where we could see the famous 2000 year old rice terraces on the mountain slopes. Pictures were taken, the drone was launched and Melvin dressed up as a real Ifugao! That night we enjoyed a buffet at Banaue hotel, followed by another cultural show in which Ifugao men and women showed ritual dances. We all joined for a dance that is done to secure a good harvest.

The next morning, an exhilarating jeepney drive took us further into the mountains, to Batad. Since we were all seated on top of the jeepney, the views were amazing. Batad is actually even more beautiful than the rice terraces we had previously seen. From our rooms in the hostel, we could look straight into this beautiful valley! Here all the rice terraces have been constructed using stones, and walking through them we were amazed at how much work it must have been to construct them! We learned that the hard way, as we were invited to help reconstruct a collapsed wall in one of the terraces, resulting in a pile of soil that covered the valuable rice terrace beneath it. It was great to help, but sad to see that one hour labour be such a large group had little effect on the pile of soil. We were rewarded by a swim in the beautiful waterfall in the next valley.

That night was our last night together. We drank rice wine and beer, played the guitar and sang. The national anthem of the water course 2016 was played at least three times. I don’t want to talk about it! Other funny and exciting things happened that night also. But what happens on the ancient terraces of Batad will forever stay there.

Byebye dear friends, thanks for all the fun we have had together and for everything we have learned. Take care!



Students and staff enjoy the view of the rice terraces of Batad and the explanation by Orlan Addug

Some of the guys

Some of the girls


Minanga, San Mariano, Isabela


Only the caretaker can take a crocodile out of its tank.
Please do not tease the crocodiles.
Be careful. Never place your hands in the tanks. Do not remove the lid.
Feel free to ask questions to the caretaker.


WELCOME!


MUNICIPAL PHILIPPINE CROCODILE
REARING STATION
Minanga, San Mariano


REARING STATION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