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Assessing adaptive capacity of indigenous Palaw'ans in Mount Mantalingahan, Palawan, Philippines

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ABSTRACT OF THESIS submitted by:
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The capacity to adapt is contingent on different cultural, economic, political and social forces. Additionally, spatial and social differentiations occurring at sub-national levels also result to differences in levels of vulnerability in one country. One social group often excluded in the discussion of climate change is the indigenous peoples. Traditionally subsisting and living on very minimal assets, they shape and are being shaped by the different ecosystems that they live in and depend on. A group of indigenous Palaw'ans in Palawan, Philippines exhibit social-ecological dynamics with their ancestral domain, part of which is declared a protected area under the Mount Mantalingahan Protected Landscape. Through qualitative methods of key informant interviews, focus group discussions, and participant observation, this research aims to determine the adaptive capacity of the Palaw'ans as a product of interrelationships among cultural, ecological, and socio-political factors in the community. Specifically, this thesis aims to answer the research question: how do multi-level governance, social-ecological dynamics, and local perceptions of environmental change affect the Palaw'ans' adaptive capacity? The research finds that the Palaw'ans are highly dependent on ecosystem services, which are affected by environmental changes and system boundaries of the ancestral domain and the protected area. Non-government organizations are perceived by Palaw'ans to be more supportive than government agencies involved in the polycentric governance of their area. This thesis gathers knowledge on vulnerability grounded on practice and also demonstrates the inadequacy of top-down approaches to climate change in marginalized groups. On a practical level, the results of this thesis may also facilitate the formal awarding of the ancestral domain title of the Palaw'ans.

Keywords: adaptation, adaptive capacity, climate change, indigenous peoples, multi-level governance, Palawan, Philippines, resilience, social-ecological systems, vulnerability

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List of Abbreviations

ACCBio	Adaptation to Climate Change and Conservation of Biodiversity in the Philippines
ADSDPP	Ancestral Domain Sustainable Development and Protection Plan
AZE	Alliance for Zero Extinction
BOT	Board of trustees
BPPI	Bangsa Palawan Philippines, Inc.
CADT	Certificate of Ancestral Domain Title
CbA	Community-based adaptation
CCC	Climate Change Commission
CEM	Commission on Ecosystem Management
CI	Conservation International
CIP	Conservation International – Philippines
DENR	Department of Environment and Natural Resources
EU	European Union
EUR	Euro
EbA	Ecosystem-based adaptation
ECAN	Environmentally Critical Areas Network
ECAN-PRD	Environmentally Critical Areas Network – Policy Research Division
ELAC	Environmental Legal Assistance Center, Inc.
EO	Executive Order
FGD	Focus group discussion
FPIC	Free, prior and informed consent
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
KBA	Key biodiversity area
ICC	Indigenous cultural community
IKSP	Indigenous knowledge, systems and practices
IPCC	Intergovernmental Panel on Climate Change
IPRA	Indigenous Peoples Rights Act of 1997
IPs	Indigenous peoples
IUCN	International Union for Conservation of Nature
MAB	Man and the Biosphere Programme of UNESCO
MENRO	Municipal Environment and Natural Resources Office

MMPL	Mount Mantalingahan Protected Landscape
NCIP	National Commission on Indigenous Peoples
NEDA	National Economic Development Authority
NGO	Non-government organization
NGP	National Greening Program
NIPAS	National Integrated Protected Areas System Act of 1992
NTFP	Non-timber forest products
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PAMB	Protected Areas Management Board
PASu	Protected Areas Superintendent
PAWB	Protected Areas and Wildlife Bureau
PCA	Philippine Coconut Authority
PCSD	Palawan Council for Sustainable Development
PENRO	Provincial Environment and Natural Resources Office
PHP	Philippine Peso
PNNI	Palawan NGO Network, Inc.
PO	Peoples' organization
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RTNMC	Rio Tuba Nickel Mining Company
SCS	South China Sea
SCS/WPS	South China Sea or West Philippine Sea
SEP	Strategic Environmental Plan of 1992
SES	Social-ecological systems
SPPC	South Palawan Planning Council
StResCom	Strengthening Resilience of Coastal and Small Island Communities towards Hydro-Meteorological Hazards and Climate Change Impacts
UNFCCC	United Nations Framework Convention on Climate Change
UN MDG-F	United Nations Millennium Development Goal Achievement Fund
UNU-EHS	United Nations University Institute of Environment and Human Security
UNESCO	United Nations Educational, Scientific and Cultural Organization
WPS	West Philippine Sea

1. Introduction

1.1. Background of the study

Traditionally, climate change mitigation has received much greater attention than climate change adaptation from both the scientific and policy perspectives (Füssel and Klein 2006). However, in the past years, adaptation has been receiving increased attention as a response to climate change impacts. Several developing countries have already made adaptation a priority, given their high vulnerability and limited adaptive capacity. The Philippines, known as a climate hotspot (UNU-EHS 2011), stipulated adaptation as a priority in its National Framework Strategy for Climate Change 2010-2022.

It is important to note, however, that there is no generic vulnerability for all levels of governance and society in one country. Kelly and Adger (2000) point out that, within one country, enormous differences in levels of vulnerability can occur. This is related to what Saunders (1990 as quoted in Marino and Ribot 2012) says that it is a stratified social world, which receives bio-physical changes in the earth system. Thus, country-level analyses fail to capture not only spatial but also social differentiation of vulnerability occurring at sub-national levels (Adger 2006).

At the heart of social stratification discourse are those who subsist and live on very minimal assets; they are said to be most at risk due to their proximity to the threshold of disaster (Marino and Ribot 2012). It is worth noting, however, that this risk is not internally generated but is shaped by power dynamics between and within the broad political, economic and social system in which people live (Eakin and Lemos 2006; Marino and Ribot 2012). Thus, it becomes important to analyze and understand vulnerability to climate change as a product of changing ecological conditions and political, economic, and social circumstances on the ground (Marino and Ribot 2012).

One group in Philippine society that subsist and live on very minimal assets are indigenous peoples. With most still living in the periphery, indigenous peoples in the Philippines have long depended on their ancestral lands and waters for subsistence. With the advent of global environmental change such as climate change, the inclusion of indigenous peoples and their traditional environments in the global environmental discourse becomes a necessity. As Salick and Ross (2009) say, indigenous and other traditional peoples are often excluded in academic, policy, and public discussions on climate change, in spite of the

impacts that the indigenous peoples are already and/or will be experiencing from climatic change. In addition, Salick and Ross recognize that indigenous peoples are not only victims of climate change but also primary actors in climate change monitoring, adaptation, and mitigation due to their active and significant roles in different ecosystems. They shape and, in return, are shaped by the traditional environments that they live in. Thus, studying indigenous peoples in light of climatic changes is of interest, especially because there is a need to address lack of research on vulnerable social groups and social-ecological systems (Adger 2006).

The complex social, ecological, and political dynamics existing in the research site make for an interesting case study for climate change adaptation and resilience of social-ecological systems (SES). Situated on a tropical archipelago, the main island of Palawan is highly dependent on ecosystem services from both terrestrial and coastal ecosystems (Tompkins and Adger 2004). The high migration rate of non-indigenous peoples are affecting both the ecology and sociology of the area, resulting to increased marginalization of the indigenous peoples traditionally living on the island (Novellino 2000). Lastly, the research site is constituted by cross-scale boundaries. The certificate of ancestral domain title for Palaw'ans in *Barangay* Panalingaan has been approved, with part of this land declared as a protected area under the Mount Mantalingahan Protected Landscape (MMPL).

Accordingly, the research would like to gain insight into the vulnerability of indigenous Palaw'ans by looking into the interrelationships of the ecosystem services in the research site, the Palaw'ans perception of environmental change and their responses to these changes, and the approval of the ancestral domain of the Palaw'ans, which happened on the same year that Mount Mantalingahan was declared a protected area. Additionally, the research results will be juxtaposed with the view of the Philippine government, through the National Economic Development Authority (NEDA), which deems Palawan "not as vulnerable" [to extreme weather events] as the islands along the eastern seaboard (Firmeza, pers.comm.).

1.2. Aims and objectives

The aim of this research is to determine the adaptive capacity to global and local environmental change of the indigenous Palaw'ans. In order to fulfill this aim, this thesis is guided by the following research question: how do multi-level governance, social-ecological dynamics, and local perceptions of environmental change affect the adaptive capacity of the indigenous Palaw'ans? The research will focus on the adaptive capacity aspect of

vulnerability, while discussing exposure and sensitivity to some extent. As climatic change is contingent on dynamic emissions trend, projections on exposure are highly speculative in nature. This research would like to follow the approach suggested by Kelly and Adger (2000) on focusing attention on the socio-economic and political context where the process of climate change impacts takes place. This is seen as giving a robust assessment of the context that may determine not only vulnerability to climate change, but also to other environmental and societal forces (Kelly and Adger 2000). In this light, the research is concentrated on the social component of vulnerability, which is adaptive capacity. The research hopes to fulfill this aim through the following objectives:

a) Identify the roles and impacts of multi-level governance (national, regional, and local) on the living conditions of the Palaw'ans;
b) Identify and analyze social-ecological dynamics in the ancestral domain at *Sitio* Cadulan, *Barangay* Panalingaan, Rizal and in the protected area MMPL;
c) Identify local perceptions of environmental change.

The research made use of a qualitative approach, which employed key informant interviews, focus group discussions, and participant observation. These enabled the identification of processes and captured interdependencies of the different units of analysis, namely, multi-level governance, social-ecological dynamics, and local perceptions of environmental change. Through these units of analysis, the research has the potential to contribute empirical assessments of theoretical frameworks on vulnerability and resilience. These are the following:

1. Country-level analyses fail to take into consideration the spatial and social differentiation of vulnerability at sub-national levels and local conditions that affect adaptive capacity (Adger 2006).
2. Multi-level governance is part of the circumstance that determines actors' vulnerability and adaptive capacity to change (Keskitalo 2008).
3. Local perception, along with belief, influences the way people respond to climate change (Byg and Salick 2009).

This research will also potentially contribute to studies of community-level adaptation and resilience of indigenous groups and, in the process, demonstrate the inadequacy of top-down

approaches to climate change especially in marginalized groups (van Aalst *et al*. 2008). Additionally, this research will gather knowledge on vulnerability that is grounded on praxis and not on future projections. On a practical level, the research has also been envisioned by the Palaw'ans to be a valuable input to their Ancestral Domain Sustainable Development and Protection Plan (ADSDPP), which is a prerequisite for the formal awarding of their ancestral domain title.

1.3. Outline of the thesis structure

This thesis is divided into six chapters. The first chapter focuses on imparting the significance of local-level climate change research, especially with the marginalized sector such as indigenous peoples.

The second chapter introduces the concept of adaptation to climate change, which is supplemented by an examination of the linkages between vulnerability and resilience of SES. The role of multi-level governance is juxtaposed with community-based adaptation approaches in order to gauge their roles in shaping vulnerability.

The third chapter describes the qualitative approach employed in the research, detailing the primary and secondary data collection methods used. The chapter also introduces the data analysis frameworks based on SES and vulnerability studies. The third chapter ends with an identification of the research scope and limitations.

The fourth chapter provides the research results in narrative form, categorized into sections of the units of analysis (multi-level governance, SES, and local perceptions of change). Descriptions of the research site and the indigenous Palaw'ans are also included.

The fifth chapter builds on the data provided in chapter four through the analytical framework described in chapter three. This chapter describes the system of multi-level governance in the community as a product of polycentric governance, social networks, and bridging organizations. The social-ecological dynamics give insight into the architecture of entitlements and the resilience of the ancestral domain. Lastly, local perceptions of environmental change give an indication of the Palaw'ans' adaptive capacity.

The sixth and final chapter evaluates the discussions from the previous chapters and utilizes these for an informed assessment of the adaptive capacity of the indigenous Palaw'ans in *Sitio* (site) Cadulan, *Barangay* (village) Panalingaan, Province of Rizal in Palawan, Philippines. Further research areas are also identified at the end of this chapter.

2. Literature review

In the following subsections, the concept of adaptation to global environmental change will be discussed within the context of SES, vulnerability, and resilience. The role of multi-level governance and community-based adaptation on vulnerability and resilience will be explored, followed by a discussion of adaptive management to climate change. The second chapter ends with an examination of the impacts of climate change on indigenous peoples and a review of existing studies on indigenous peoples in Palawan.

Adaptation in the context of climate change

Throughout the years, the term adaptation has taken on different usages. While adaptation may have its roots in the natural sciences, it also has broad application in the social sciences in the context of human-environment interaction (Smithers and Smit 2008). However, it is notable that in the climate regime, adaptation assumes more of the natural science definition. Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC) convention text (1992) states that the level of stabilization of greenhouse gases, "should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner." The explicit reference to "ecosystems" highlights the value of integrating climate change adaptation in conservation efforts, yet, it also highlights the lack of reference to the social component of climate change.

Within the UNFCCC, two dominant adaptation approaches being promoted are ecosystem-based adaptation (EbA) and community-based adaptation (CbA). Judging from the terminologies, there seems to be a polarization between "ecosystem" and "community" when it comes to adaptation priorities. However, EbA does not seem to be exclusionary at all, especially with the definition given by Vignola *et al*. (2009). They define EbA as adaptation policies and strategies that focus on the role of ecosystem services and ecosystem management in reducing societal vulnerability and increasing the resilience of people and economic sectors to climate change, respectively. CbA, on the other hand, is characterized by a consideration of local context through strong community engagement in implementation of adaptation options (Ebi and Semenza 2008).

It should be noted, however, that not all cases of adaptation options have a choice between CbA and EbA. For urban settings without any ecosystems left, adaptation options may be reduced to choices between top-down or bottom-up approaches, with CbA closely

related with the latter. Conversely, areas with both ecosystems and human societies are faced with the choice between prioritizing either of the two. The divergent treatment of ecological systems and social systems, nonetheless, evolved towards holistic conceptualizations and models such as Berkes and Folke's (1998) social-ecological systems (SES) (Corobov 2011).

Berkes and Folke point out that biological ecology treats humans as external to ecosystems, as opposed to an ecosystem perspective that explicitly includes the social system of humans. Adger (2006) agrees that the concept of SES demonstrates the idea that human action and social systems are fundamental to ecological systems, and distinctions between social and natural systems are, therefore, arbitrary. This research would like to demonstrate that the indigenous Palaw'ans and their ancestral domain within the MMPL are social-ecological systems where politically- and socially-imposed boundaries shape the entitlement of social actors to resources in the area. The entitlement to resources determines whether the Palaw'ans have alternative or accessible resource bases that they may tap should climate change impacts severely affect their current source of livelihood and/or subsistence.

2.1. Social-ecological systems, vulnerability and resilience

While there are several other terminologies for the abbreviation SES, the term "social-ecological systems" has been widely used, owing to the judgment of Berkes and Folke (1998) to give equal consideration to both social and ecological dimensions (Simonsen 2007). Despite increased consideration of SES and the interdependency of societies and nature in global environmental change studies, Cumming (2011) thinks that there is still no full-blown theory of SES to date. Similarly, Bodin and Tengö (2012) say that there is still little methodological and theoretical progress on how to quantitatively study SES in detail. Bodin and Tengö partly attribute this to the lack of common methods between the natural and social sciences, but also point out that this might also be a consequence of the intrinsic limitations of traditional research approaches employed in studying highly complex and dynamic systems. One challenge related to this point is so-called scale mismatches in SES, which Cumming *et al*. (2006) identify as a cause for problems encountered by societies in managing natural resources. Cumming *et al*. mention that scale is a concept that goes beyond disciplinary boundaries, but they point out that the sociological scale has additional representation and organization dimensions to the spatial and temporal scales of ecology and geography. Cumming *et al*. also state that scale mismatches occur when sociological and

ecological scales are misaligned, leading to the disruption of SES functions and system components as well as promoting the onset of inefficiencies.

On a positive note, Cumming (2011) states that SES theory is still in expansion mode and that it is in a healthy state of flux as a relatively new discipline. Cumming mentioned that groups that focus on higher-level concepts of resilience, vulnerability, adaptation, and robustness, among others, dominate the study of SES. Folke (2006) confirms this by stating that the resilience perspective is increasingly being used as an approach in comprehending SES. Folke explains the role of resilience in SES, where ideas of adaptation, learning, and self-organization are incorporated as well as the ability to persist in the face of disturbance. Gallopin (2006) then explored the linkage between resilience and vulnerability, arguing that vulnerability does not appear to be the opposite of resilience as proposed by Folke et al. (2002a). Gallopin points out that while a resilient system may be less vulnerable than a non-resilient one, this does not necessarily imply symmetry. Gallopin, therefore, postulates that resilience is more related to the adaptive capacity component of vulnerability. This may be confirmed by the work of Turner *et al.* (2003) and Walker *et al*. (2009). Turner *et al*. mention that vulnerability is registered not only by exposure to perturbations and stresses (hazards) but by the sensitivity and resilience of the system. Folke *et al*. (2002b) characterize a more resilient SES as able to cope, adapt, or reorganize even in the face of inevitable massive transformation. Walker *et al*. (2009) likewise state that adaptive capacity or adaptability is the ability to manage resilience or to avoid regime shifts in order to become more or less resilient. Therefore, adaptive capacity seems to play an important role in the resilience of a system.

Adaptive capacity is said to be shaped by various social, cultural, political, and economic forces, while the interaction of environmental and social forces determines the other components of vulnerability, exposures and sensitivities (Smit and Wandel 2006). Turner *et al.* (2003) are quick to point out that there is strong variation in vulnerability by location and this brings to focus the importance of "place-based" analysis. Turner *et al.* mention that "place-based" means that there is a spatially continuous distinctive assembly of social and biophysical conditions or SES. In relation to this, Kinzig *et al*. (2006) put forward that regional SES are constituted by multiple thresholds and regime shifts occurring at different scales as well as in different and interacting ecological, economic, and social spheres. This resonates with what Adger (2006) says about country-level analysis and its

failure to capture the sub-national spatial and social differentiation of vulnerability and local conditions that influence adaptive capacity. Eriksen and Kelly (2007) likewise mention that it is challenging to make a picture of vulnerability at the national level as the impacts of climate-induced pressures are unevenly distributed in time and space and are mediated by society.

Earlier literatures have already pointed to locality- or community-based vulnerability assessment, aiming for a high degree of specificity in defining who and what are vulnerable, in what way and to what stresses they are vulnerable, and how they adapt (Ford and Smit 2004; Smit and Wandel 2006 as quoted in Keskitalo 2008). van Aalst *et al*. (2008) have studied the shortcomings of "top-down" approaches to climate change and advocate for community level adaptation practices to climate change. van Aalst *et al*. noticed the need for a methodology that allows adaptation to happen across broader regions while being rooted in the smaller scale community situations. This situation is perhaps best captured by Allen and Starr (1982 as quoted by Cumming 2011), who mention that "upper levels constrain and lower levels explain." Cumming (2011) adds that it is appealing to explore detailed causality across a variety of scales but acknowledges that this is seldom done due to logistical limitations. Brooks and Adger (2004) point out that people from the local level are generally the best equipped to identify issues that assist or hinder their adaptation. This, then, begs the research question of how entities such as government agencies figure in climate change adaptation decisions made on the local level. This research would like to ascertain the influence of national policies on local situations and, conversely, how local situations influence decisions taken on the national level.

2.2. Multi-level governance and community-based adaptation approaches

Part of a vulnerability assessment process (Kelly and Adger 2000) is defining the "architecture of entitlements," which is composed of the institutional and economic dynamics (Adger and Kelly 1999) shaping legal and customary rights to control food resources and other basic needs (Sen 1981 as quoted in Turner *et al*. 2003). Smit and Wandel (2006) point out the importance of the study of entitlements, where adaptation is considered as a stress response in relation to coping capacity and access to resources. Kelly and Adger (2000) also emphasize that there is a need to assess vulnerability based on social, economic, and political processes across different spatial scales, alongside any biophysical climate projections.

Indeed, adaptation research should also look into institutions as a determinant of adaptive capacity.

Institutional and economic dynamics are related to governance structures, which make decisions in multiple ways through multiple parties composed of public and private entities without favoring any analytical level (Keskitalo 2008). Multi-level governance, in return, stems from the devolution of decision-making responsibilities from the state level to lower levels of governance, where even private entities may develop their own internal policies or practices (Boland 1999 as quoted in Keskitalo 2008). An example of this would be a household-level analysis done by Adger (1999a,b as quoted in Kelly and Adger 2000) where government institutions in a rural Vietnamese district have benefited from increased autonomy under a "new change" process (*Doi moi*). This "new change" process resulted in privatization of formerly state-owned properties, resulting in diminished influence over private individuals and enterprises (Kelly and Adger 2000). Looking at the macro-level, therefore, might not show how policies, local institutions, and other interventions may have an impact on vulnerability (O'brien *et al*. 2004). O'brien *et al*. then suggest a qualitative research approach that may be able to show how the interaction of policies and initiatives from different scales shape vulnerability. The value of community-based approaches comes to fore.

Community-based analyses are able to show how interacting conditions that shape exposure, sensitivity, and adaptive capacity are community-specific and influence adaptation needs and opportunities (Smit and Wandel 2006). Community-based approaches are often also called bottom-up approaches, in contrast to top-down approaches, which van Aalst *et al.* (2008) deem inadequate in terms of climate change adaptation. van Aalst *et al*. point out that top-down approaches focus on the future climate as compared to bottom-up approaches, which focus on vulnerabilities to current climate variability and extremes. Stringer *et al*. (2009) see that top-down approaches "do not take into account how people adapt on the ground, as scientific research is outside the realities of everyday life in affected areas." This may be a rather strong statement against top-down approaches and scientific research, but studies such as those of van Aalst *et al*. (2008) and Keskitalo (2008) show that there are attempts in the scientific realm to be more "realistic."

Smit and Wandel (2006), on the other hand, notice the lack of research that focuses on implementation processes for adaptation. They explain there is a lack of "practical

application" research that looks into the adaptive capacity and adaptive needs in a specific place or community. Furthermore, they mention that this should be done in order to find ways of enhancing adaptive capacity or implementing adaptation projects. Smit and Wandel mention that this has yet to be seen under the label of adaptation research and more so within the field of climate change. This thesis aims to fill this gap, by focusing on practical application research that looks into the adaptive capacity of a specific group of indigenous Palaw'ans. This thesis serves as a starting point for further research that may focus on enhancing the adaptive capacity of the indigenous Palaw'ans and informing adaptation measures that different levels of government or external agencies such as NGOs should undertake in light of climate change.

van Aalst *et al*. (2008) point out that there is limited awareness or campaigning about climate change issues in the grassroots. In line with this, van Aalst *et al*. (2008) mention that in carrying out community-based approaches such as community risk assessments, "top-down" approaches may also be employed in imparting climate change knowledge to the community. However, this might just be a matter of terminologies, as communities may already have an awareness of a changing climate despite no formal knowledge of current climate research. It is important to keep in mind that local knowledge cannot be matched by generalized knowledge, yet advanced training of professionals cannot be matched by experiential knowledge of the locals (Vandermeer 2003 as quoted in Altieri 2004).

van Aalst *et al*. (2008) define adaptation at the community level as being able to maintain or improve current living standards amidst (undesirable) projections related to climate change. Marino and Ribot (2012), however, caution that the ecological conditions, entitlements, and systems of power (top-down approach) that influence the risk that certain communities face in light of climate change may also give additional risk in terms of policy responses. Marino and Ribot (2012) cite a study in Tanzania, where a Reducing Emissions from Forest Degradation and Deforestation (REDD+) project resulted to evictions as a consequence of a poorly planned well-intentioned conservation program coupled with the blinding sense of urgency of international conservation organizations. There seems to be a gap between community-based bottom-up and top-down adaptation approaches, especially when it comes to consequences of climate change interventions. The concepts of co-management and adaptive governance may be able to bridge the gap.

2.3. Adaptive management of climate change

Researchers of environmental justice have suggested that adaptation strategies developed by specialists and intervening agencies must address root causes of vulnerability, respond to local needs, and answer for its complex consequences (Marino and Ribot 2012). Barnett and O'Neill (2010) recognize climate mitigation and adaptation interventions as necessary, but caution that damages that these intend to remedy may increase or worsen as a consequence of lack of understanding. In reference to the vulnerability discussion in section 2.1., it seems that there is a need not only to understand the causes of vulnerability but also the possible effects of different interventions.

However, Pahl-Wostl (2007) notes that the ability of human societies to predict future key drivers, which influence an ecosystem or system behaviour, is essentially limited. In line with this, climate mitigation and adaptation interventions should employ an adaptive approach, where practices can be changed based on new experience and insight and on successes and failures (Pahl-Wostl 2007; Tompkins and Adger 2004). This then puts focus on the "end-point" notion of vulnerability, where the level of vulnerability is determined by the consequences that remain after adaptation interventions have been introduced (Kelly and Adger 2000). The "starting point" notion, on the other hand, perceives sensitivity and adaptive capacity as determinants of vulnerability. In a sense, vulnerability is also dynamic, continually evolving as shaped by technological and institutional factors that are constantly in flux (Kelly and Adger 2000). In addition, Kelly and Adger (2000) also point out that humanity constantly tries new ways of responding to change. This is an important response to the self-organizing characteristics of complex systems and associated management systems that cause uncertainty to expand over time (Carpenter and Gunderson 2001 as quoted in Folke *et al*. 2005). To work around uncertainty, there needs to be a new approach to managing complex systems.

Gunderson *et al*. (1995 as quoted in Folke *et al*. 2005) describe active adaptive management as a process where policies become hypotheses, which are thereafter, tested as experimental management actions. As ongoing learning experiments, policies should then be continually monitored, evaluated, and adapted over time (Ostrom 2005 as quoted in Folke *et al*. 2005). Note, however, that there is a type of adaptive management that is not only limited to policies or institutional arrangements. Adaptive co-management is a process where both institutional arrangements and ecological knowledge are tested and adapted through a self-

organized process that is dynamic and ongoing (Folke *et al*. 2002a). Combining adaptive management with cooperative management and collaborative management result in adaptive co-management (Folke *et al.* 2005). Folke *et al*., therefore, see adaptive co-management as a fusion of dynamic learning and linkages in addition to being a problem-solving process where management power is shared across organizational levels (Carlsson and Berkes 2005 as quoted in Folke *et al*. 2005). Adaptive co-management brings the concept of polycentric governance systems to mind. Characterized by governance units of different ranges and of different purpose, organization, and spatial location, polycentric governance systems form a self-organized governance regime (Pahl-Wostl 2009). Decision-making authority, like in adaptive co-management, is distributed at different levels of governance (Pahl-Wostl 2009). While not exactly similar, both adaptive co-management and polycentric governance systems seem to have a higher ability to adapt to a dynamic environment and have the potential for self-organization (Pahl-Wostl 2009). The decentralized government system of the Philippines is an appropriate case study for polycentric governance and adaptive co-management. However, decentralization does not automatically translate to adaptive co-management. This is one of the theoretical assertions that this thesis sets out to investigate.

2.4. Indigenous peoples and global environmental change

Some researchers have brought up that indigenous and other traditional peoples are seldom included in academic, policy, and public climate change discourses (Salick and Byg 2007). As an example, Salick and Ross (2009) have cited the Intergovernmental Panel on Climate Change (IPCC) fourth assessment report as having very limited reference to indigenous peoples. This is undesirable as indigenous peoples are seen as front liners to climate change impacts (Marino and Ribot 2012).

Perhaps reflective of social stratification and the stratum which indigenous peoples occupy, references to indigenous peoples have often focused on their victim status (Salick and Ross 2009). Similarly, Salick and Ross stress that indigenous people are, indeed, front liners in climate change not just as victims but also as primary actors in monitoring, adapting, and mitigating climate change. Salick and Ross believe that novel perspectives and practices from indigenous peoples can help society to cope with inevitable changes brought by a changing climate. In addition, Salick and Byg (2007) believe that indigenous and other traditional peoples are important and functioning parts of different ecosystems and may facilitate the resilience of ecosystems. This is, however, corollary to the perception of

governments and other intervening agencies, which see indigenous peoples either as victims or as co-actors in the climate change regime.

Perceiving indigenous peoples as victims may lead to governments and intervening agencies formulating policy responses to assist the indigenous peoples. Marino and Ribot (2012), however, caution against policy responses that may cause malmitigations and maladaptations, which will further exacerbate the situation of the indigenous peoples. This is related to the governance failures that Pahl-Wostl (2009) cites, which reflect the inability of current forms of governance to deal with present and future challenges posed by climate change. Conversely, seeing indigenous peoples as co-actors in combating climate change may lead to discovery and identification of "baseline long-term datasets" on response strategies to environmental changes that developed over hundreds of years of trial-and-error (Turner 2009). Byg and Salick (2009 as quoted in Salick and Ross 2009) stress that local perception, along with belief, influences the way people respond to climate change. As an example, Grothmann and Patt (2005 as quoted in Adger 2006) point out that, despite the availability of resources and capacity to adapt, perceptions of barrier to adaptation indeed limit adaptive actions.

2.5. Indigenous peoples in Palawan, Philippines

There are numerous anthropological studies on indigenous peoples in Palawan (Macdonald 2003; Novellino 2001) but there are limited environmental studies involving the indigenous peoples. Several anthropological studies, such as those of Dressler and Pulhin (2009) and Novellino (2010, 2011), also focused on political and land changes that affected farming practices of indigenous peoples in Palawan. Dressler and Pulhin (2009), as well as Novellino (2010), studied how government conservation policies have caused indigenous Tagbanuas to adopt intensive modern agricultural practices in lieu of swidden agriculture. They highlight the reduction in swidden productivity and cycle and point to the prohibition of "systemic 'hot' burns" as a cause of the declining productivity, because hot burns are essential for burning weeds and providing ash for soil fertility. Novellino (2010), on the other hand, offered the combined effect of El Niño and La Niña phenomena as a cause of decline of agricultural productivity in the 2000s.

There seem to be limited academic studies on indigenous peoples and climate change and this thesis would like to help in addressing this gap, especially on assessing the adaptive capacity of the indigenous Palaw'ans. As a baseline study, this thesis is in a position to

identify further research areas on climate change adaptation and vulnerability especially of indigenous peoples, who are said to be often excluded in academic, policy, and public discussions on climate change (Salick and Ross 2009). In the process, the thesis would be addressing the need for practical application research that looks into the adaptive capacity of indigenous Palaw'ans in order to find ways of enhancing their capacity to adapt (Adger 2006). Local perceptions of environmental change are important inputs to adaptive capacity research, given that it is the grounded response of the community to their pressing needs and risks that informs how much more shock or uncertainty the community can deal with (van Aalst *et al*. 2008).

This thesis uses a bottom-up approach that seeks to identify aspects of adaptive capacity and variables of exposures and sensitivities empirically from the community (Smit and Wandel 2006). As such, this thesis uses three units of analysis (multi-level governance, social-ecological systems, and local perceptions of change) that are broad enough to accommodate conditions (cultural, ecological, social, or political) that are valuable for the community. These units of analysis help in identification of which and how practical initiatives should be done and who should be responsible for implementation (Smit and Wandel 2006).

The thesis will contribute to resilience studies by tackling a system with multiple boundaries, different social actors, and different forces. The research site is unique, as it is within three different boundaries of the United Nations Educational, Scientific and Cultural Organization (UNESCO) Man and Biosphere (MAB) reserve programme, Palaw'an ancestral domain, and Mount Mantalingahan protected area. The research focuses on the indigenous Palaw'ans, but also studies the impacts of government and non-government entities in the system.

3. Methodology

A qualitative research methodology was employed by the research study, which aimed to explore the interdependency of the indigenous community on their ancestral domain, the environmental changes that have occurred within their area throughout the years, and the interactions they have with governmental (internal) and non-governmental (external) agencies. This was primarily investigated through a community-based approach where local stakeholders' definitions of environmental change and understandings of the impact of multi-level governance were gathered (Keskitalo 2008). This methodology allowed the research to be open to emerging themes of local environmental changes rather than be restricted to the theme of global climate change. It was, thus, valuable to have a place-based study that spans several scales, concentrates on different stresses and demonstrates the different capacities of diverse types of actors (Keskitalo 2008).

The research study used grounded theory as a strategy of inquiry, where a general theory was expected to be derived from views of the participants in the study (Creswell 2003). This partly resonates with the bottom-up approach that van Aalst *et al.* (2008) advocate for in the design of local adaptation methods. They mentioned that empirical and actual observations are the first steps in analyzing the suitability of adaptation methods to the local level and not theoretical and future-oriented schemes. The research study followed this recommendation by employing the inductive approach of grounded theory, where the researcher also made use of an iterative thinking process that directly analyzed data as they were collected and adjusted the problem reformulation and methodology as needed (Creswell 2003). The following sections discuss the research design in more detail, starting with the methods of data collection, followed by the process of data analysis. The scope and limitations of the study are also specified in the latter part of the chapter.

3.1. Methods of data collection

The study employed both primary and secondary data collection. Primary data collection entailed field visits that used the methods of key informant interviews, focus group discussions (FGD), and participant observation. Secondary data collection was done through desk-based archival and documentary research and meetings and correspondences with relevant organizations.

3.1.1. Primary data collection

Field visits were done in three locations: Manila (the capital of the Philippines), Puerto Princesa (the capital of the island of Palawan), and the research site (*Barangay* Panalingaan, province of Rizal, southern Palawan).

Research site

The research site is located at the foot of Mount Mantalingahan in *Sitio* Cadulan of *Barangay* Panalingaan in the province of Rizal on the island of Palawan in region IV of the Philippines (see Results section for a detailed description). Following the concept of socio-ecological systems in vulnerability and adaptation research, the research site was selected based on the mutual interactions of societal (human) and ecological (biophysical) subsystems within it (Corobov 2011). The research site includes exposure units of ecosystems and social group, which are the area of Mount Mantalingahan protected landscape within an ancestral domain and the Palaw'an community, respectively. Mount Mantalingahan is a key biodiversity area (KBA) and is one of ten Alliance for Zero Extinction (AZE) sites in the Philippines (CIP 2011). Majority of the occupants of Mount Mantalingahan are indigenous Palaw'ans (91.02 percent) who are dependent on the area's natural resources (CIP 2007). As a sector dependent on renewable resources, the Palaw'ans are in the best position to reveal present socioeconomic and environmental changes in the area (Keskitalo 2008).

The researcher was housed in one of the Palaw'an Panimusaan communities living on a hilly area in *Sitio* Cadulan with geographical coordinates of N 08°43.595' E 117°27.094' and an elevation of 64 meters. The researcher was able to gain access to the research site and to the community through the assistance of the non-government organization Conservation International – Philippines (CIP). The researcher was asked to write letters of permission to the community and, consequently, to the *barangay* captain, the municipal mayor, and the Protected Areas Management Board (PAMB) of Mount Mantalingahan (see Appendix 1 for letters of permission). Final approval was granted upon payment of a research application fee and an endorsement fee. The regional office of the National Commission on Indigenous Peoples (NCIP), however, gave a negative response to a request for interview. This was communicated to the researcher, with a copy to the NCIP region IV commissioner when the researcher was already in the research site. Despite this, the research proceeded under the permit given by the PAMB, which NCIP is also part of. Details of this response will be

further discussed in the results section, specifically in the sub-section of multi-level governance.

Field visit protocol

Field visits followed an ethical protocol, where written and/or verbal permissions were asked beforehand for any documentation process. The documentation process included audiovisual documentations in the form of voice and photo recordings during key informant interviews and focus group discussions. The researcher also guaranteed anonymity of respondents, although this was not actively sought by any of the respondents. Preconditions from different stakeholders such as pre- and post-field visit meetings and courtesy calls to governmental officials were also fulfilled (see Appendix 2 for preliminary results presentation).

Methods

a) Key informant interviews

A list of relevant institutions from the national, regional, and local levels was drawn up prior to the field visits. Requests for personal interviews along with a briefing paper of the research study were sent thereafter to the relevant officials within these institutions. Upon commencement of key informant interviews, referral (or chain) sampling was employed, where interviewees were also consulted in identifying other relevant interviewees. Interviews were held with relevant officials and personnel of the following institutions:

1. National level – Department of Environment and Natural Resources (DENR) Protected Areas and Wildlife Bureau (PAWB), Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), National Commission on Indigenous Peoples (NCIP)
2. Regional level – Palawan Council for Sustainable Development (PCSD), DENR – Provincial Environment and Natural Resources Office (PENRO), DENR – Protected Areas Superintendent (PASu), Conservation International – Philippines
3. Local level – *Barangay* Panalingaan council, Bangsa Palaw'an Philippines, Inc. (BPPI), CIP

Key informant interviews were in the form of semi-structured interviews, where general research interview questions were drafted as guiding points for interviews (see Appendix 3 for the initial draft of interview questions). The general research interview questions were

drafted with the interviewees and their socio-political roles in mind. At national and regional level, inquiries directly asked about impacts of climate change and other environmental changes to the community. At the local level, especially at the community level, inquiries avoided the explicit use of the term "climate change" as this may induce misinterpretations due to the rare usage of the term at this level.

The interviews proceeded in a manner of open discussion, where the interviewees freely discussed topics which they deem relevant and important to the research study even if not necessarily included in the draft of general research interview questions. The iterative thinking process mentioned earlier allowed for the reformulation of some questions as the interviews progressed. Ideally, the interviews were done in the order of national level then to the regional level and to the local level. Validation of key informant interview results was allotted to the lower levels of organization, where interview results of the higher levels of organizations were narrated to solicit verification and corroboration. All the personal interviews were done prior to immersion in the research site, except for the DENR-PENRO interview.

Interviews were recorded on an Olympus digital voice recorder VN-6000, whenever permission was granted. Key words were also taken note of on the pro-forma daily activity sheet (see Appendix 4), where documents obtained from the interviewees were also noted down in the section entitled "Attachments." On average, interviews lasted for 1.5 hours and tokens of appreciation were given after the interviews were conducted.

b) Focus group discussions

Three FGDs were requested from the community. One FGD was done per gender group of men and women and one FGD of mixed genders was done at the end of the researcher's stay in the community. Separate FGDs for men and women were done to allow for in-depth discussion and avoid male dominance in discussion as the Palaw'an community is culturally patriarchal. The separate FGDs also allowed a more comprehensive inquiry into the socio-ecological dynamics of the community, as each gender had different roles in the management of their natural resources. The final FGD was a validation discussion, where initial results of the study were presented to the president and board member of the people's organization BPPI, field officer of CIP, and to selected Palaw'an Panimusaan community members. This was also in line with the precondition set by BPPI, which asked for a copy of results before the researcher leaves the community.

The gender-specific FGDs made use of historical timeline and seasonal calendar to make an inquiry into the environmental changes that the men and women have noticed throughout the years and their effects. Further inquiries were then made on how they dealt with these environmental changes. The discussion also ventured into identification of decreasing biodiversity and increasing invasive (alien) species in the community's area. All of the participants were already married and were aged over 30. The last FGD used a vulnerability matrix to summarize the information gathered throughout the 12-day stay of the researcher in the community. The final FGD served as member-checking, where the final results were taken back to the community to determine whether the results were in accordance to the best of their knowledge (Creswell 2003). The final FGD also served as a confirmation of theoretical saturation, where conceptual insights were validated by the community and no new conceptual insights related to the objectives of the study were gained. Snacks bought locally were served to the participants after the FGDs were finished.

c) Participant observation

The researcher stayed in the community for 12 days for a research site immersion. The researcher was accommodated in the house of one of the board members of BPPI and used narratives and participant observation as other methods of data collection. Transect walks were also done with some of the community members, including children, in order to gain an impression of the social and physical characteristics of the area (van Aalst *et al*. 2008). The research site immersion allowed the researcher to observe and experience the way of living of the community and identify additional information related to environmental changes and coping strategies in the area. This also enabled the researcher to observe the interactions of the community with internal and external agencies. As partial fulfilment of the preconditions set by the local *barangay*, the researcher attended one *barangay* session during the latter part of the research stay to present initial results and recommendations to the local governmental council. All information gathered was documented through audiovisual processes and field notes.

3.1.2. Secondary data collection

Relevant laws, published studies and grey literature were accessed through desk-based research and correspondences with relevant organizations and persons. The international non-government organization (NGO) International Union for Conservation of Nature (IUCN) Commission on Ecosystem Management (CEM) assisted with identifying literature on

ecosystem-based adaptation and indigenous peoples. Important documents for use in the research study were identified through several visits to the government offices PAWB and PAGASA. Internal documents related to the research site were accessed through visits to NGO CIP national and local offices.

3.2 Data analysis

Data gathered in the form of audio files, daily activity reports, and field notes were initially analyzed by close reading. Audio files and its corresponding field notes were validated through playback and additional transcription, where necessary.

The data analysis followed two analytical frameworks on vulnerability and adaptive capacity. Following the nested hierarchy model of vulnerability (see Figure 1) of Smit and Wandel (2006), the research data were coded into environmental and social categories at the local or community level and at the broader or national and regional levels. The categorized information was re-organized to find interconnections that give information on three units of analysis: multi-level governance, social-ecological dynamics, and local perceptions of environmental change. Memos were, thereafter, composed from the results section as process of organization for the discussion. The discussion of the results endeavoured to demonstrate adaptive capacity as context-specific and varies among social groups and individuals, over different temporal scales (Smit and Wandel 2006).

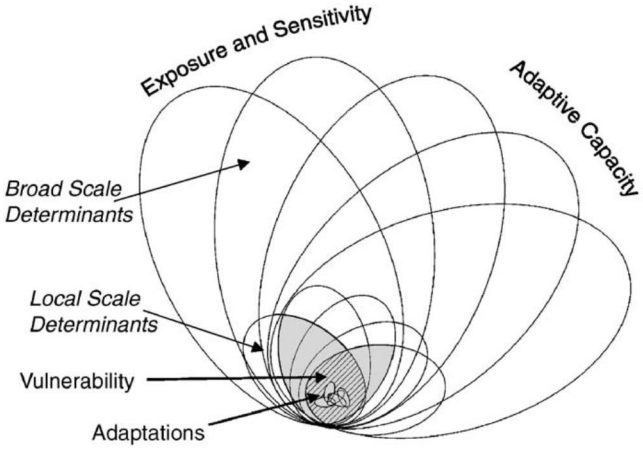


Figure 1. Nested hierarchy model of vulnerability (Source: Smit and Wandel 2006)

In analyzing the research site as a social-ecological system, the framework by Bodin and Tengö (2012) was used. This framework is intended for analyzing empirical data in order to model a social-ecological network (Bodin and Tengö 2012). The basis of Bodin and Tengö's framework is SES motifs, which is a four-node representation of a SES (see Figure

2). The nodes labelled SOC stand for social actors, while the nodes labelled ECO stand for ecological resources. SS (social-to-social), SE (social-to-ecological) and EE (ecological-to-ecological) are the three types of uni-directed linkages that exemplify the potential interdependencies between the different nodes (Bodin and Tengö 2012).

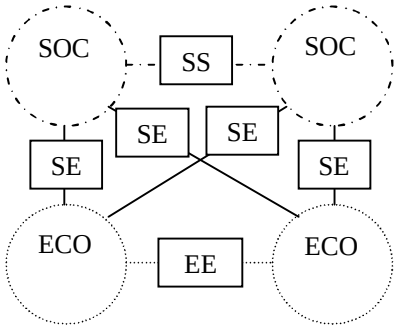


Figure 2. SES Motif (Source: Bodin and Tengö 2012, with amendments)

Additionally, the discussion will make use of what Adger and Kelly (1999) call "architecture of entitlements," which analyzes the individual level, population level, and institutional context that constructs social vulnerability. The analysis of resource entitlements offers an accurate and detailed view of the continually-evolving process of adaptation and suggests measures that may be able to offset undesirable climate impacts (Adger 2001).

3.3. Research scope and limitations

Time constraints have subjected the study to several limitations. Visits to the government offices Climate Change Commission (CCC), NEDA, and Municipal Environment and Natural Resources Office (MENRO) of Rizal, Palawan did not materialize due to the unavailability of the interviewees and limited room for rescheduling on the part of the researcher. While snowball sampling was helpful in identifying one contact in the academic institution Palawan State University working on general adaptation projects in the province, the research stay timeframe was not sufficient to arrange a meeting with the contact person. The process of asking research permission was also bureaucratic and final approval was contingent on the schedule of the monthly meeting of the Protected Areas Management Board executive committee. Following the research protocol stated in section 3.1.1., the schedule of research activities were set in accordance to the schedule of the interviewees and the community. While this may have reduced control of the researcher over the research stay

schedule, this has potentially increased validity of the research by reducing the external influence that the researcher brought as an outsider.

The scope of the study only included analysis of the present-day adaptive capacity (as opposed to speculating on future adaptive capacity) of the Palaw'an community and was limited to examination of exposure and sensitivity, which are other components of vulnerability. The study was not meant to predict future biophysical or social changes in the community and their area. Household surveys and interviews were not carried out due to the short research timeframe. As a consequence, the research results contain limited demographic data on the Palaw'ans in the research site. The research site was only limited to *Sitio* Cadulan, which is only a part of the ancestral domain and of the Mount Mantalingahan Protected Landscape. The study was conducted in the national language of the Philippines, Filipino (*Tagalog*). Translations from the indigenous language, *Pinalawan*, were facilitated by other community members when a respondent does not speak Filipino.

Despite the limitations stated above, the researcher was able to gather enough empirical data, which were supplemented with secondary data from desktop research and electronic mail correspondence, whenever possible, with individuals who are relevant to the study.

4. Results

This chapter provides the results of the research, where field work was done in Manila, the capital of the Philippines and in the project site *Sitio* Cadulan, *Barangay* Panalingaan, Rizal in the island province of Palawan. The project site is introduced as well as the indigenous community of Palaw'an and, thereafter, results are categorized into the units of analysis.

4.1. *Sitio* Cadulan, *Barangay* Panalingaan, Rizal, Palawan

Sitio Cadulan is located in the island province of Palawan (see Figure 3), which has been declared a UNESCO Biosphere Reserve in 1990 through the UNESCO's MAB reserve programme (UNESCO 2011). The archipelago of Palawan is composed of 1,768 islands, with a total coastline of 1,959 kilometers (Barraquias 2005). Dubbed as the "last ecological frontier" of the Philippines, Palawan is said to be home to 1,672 species, with several species endemic to the province (for examples, see Appendix 5) (Sandalo and Baltazar 1997).

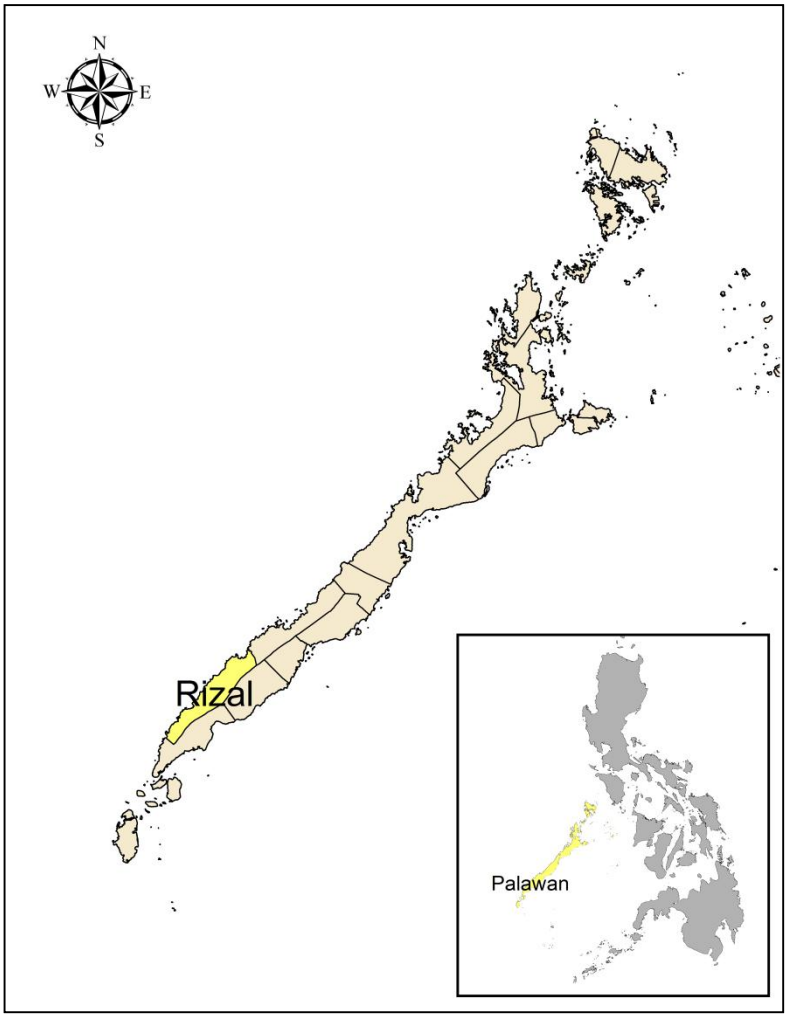


Figure 3. Map of Rizal, Palawan, Philippines (Data source: GADM 2012)

Two years after the declaration of Palawan as a biosphere reserve, the Philippine government passed Republic Act no. 7611, which adopted the Strategic Environmental Plan (SEP). It also created the PCSD under the Office of the President as the focal office that will oversee the implementation of the SEP (Sandalo and Baltazar 1997). The SEP established an Environmentally Critical Areas Network (ECAN), which divided Palawan into core zones, buffer zones, tribal ancestral lands, and multiple/manipulative use areas (SEP 1992). The buffer zones are further divided into restricted use, controlled and traditional use areas.

According to the SEP law, core zones shall be "fully and strictly protected and maintained free of human disruption," while buffer zones allow regulated use (SEP 1992). Multiple/manipulative use areas are modified landscape areas for uses such as "intensive timber extraction, grazing and pastures, agriculture and infrastructures development" (SEP 1992). It should be noted, however, that the zoning is based on elevation and has yet to have ground delineation. Hence, as the chief officer of the PCSD Environmentally Critical Areas Network – Policy Research Division (ECAN-PRD) said that they depend on the community to monitor the ECAN boundaries through "psychological and sociological" delineation.

Before Palawan was declared a biosphere reserve, the province has also been declared a Mangrove Forest Reserve in 1972 by virtue of Presidential Decree 2152 (Barraquias 2005). Of the 34 mangrove species in the Philippines, 31 can be found in Palawan and the province has a total of 44,500 hectares of mangrove areas (UNESCO 2011). The PCSD staff, however, earlier reported a yearly decline in the mangrove cover during the 80s when it declined from 46,000 hectares in 1984 to 36,192 hectares in 1993 (Barraquias 2005). Judging from the numbers, the mangrove area seemed to have recovered from the 36,192 hectares in 1993 to 44,500 hectares, which is the latest figure from UNESCO (2011).

The province of Palawan has been home to several groups of indigenous peoples, namely, the *Tagbanuas*, *Bataks*, *Palaw'ans* and their relatives *Tau't Bato* (Sandalo and Baltazar 1997). The province continues to have a high population growth rate, owing to both natural increase and in-migration of settlers from other parts of the Philippines (Boquiren 2004). The municipality of Rizal has the highest population growth rate of 8.3 percent in the province of Palawan (Barraquias 2005). The migration phenomenon, as will be later discussed, is said to have a profound impact on the living conditions of the indigenous peoples.

The project site is part of the ancestral domain of the *Palaw'ans*, which has been approved in July 2009 under Certificate of Ancestral Domain Title (CADT) number R04-RIZ-0709-129 and is now awaiting awarding pending the submission of the ADSDPP (NCIP, [2009]). The community estimates that it took 15 years before the application was approved. The area covers 69,735.23 hectares and covers the *barangays* of *Panalingaan, Taburi, Latud,* and portions of *Canipaan* and *Culasian* under the municipality of Rizal. The population of indigenous *Palaw'ans* in this ancestral domain is 7,651 as of the approval date of the ancestral domain. *Sitio* Cadulan is within the *barangay* of *Panalingaan*, where both pure-bred *Palaw'ans* and cross-bred *Palaw'an Panimusaan* live.

Part of *Barangay* Panalingaan is within the MMPL, a protected area declared in 2009. In addition to details mentioned in the methodology section 3.1.1., the declaration of MMPL was achieved after seven years of work, as recalled by the CIP programme manager (female, in her 40s) for Palawan. The MMPL mountain range covers 120,547 hectares in Southern Palawan and entailed several years of scientific research, strong partnerships, and participatory consultations before it was finally declared a protected landscape (CIP 2011).

4.2. Profile of the Palaw'an and Palaw'an Panimusaan

Along with the Tagbanuas and the Bataks, the group of Palaw'ans is one of three main indigenous groups in the island of Palawan, living mostly in the alluvial plains of Southern Palawan (Cayron 2011). There are a few settlements along the coast, but their movement inland is attributed to the arrival of Muslim groups from the Sulu archipelago as early as 1700s (Cayron 2011; Macdonald 2003).

4.2.1. Settlements

The Palaw'an community in *Barangay* Panalingaan that this research study focuses on has two distinct sub-groups of *netibo* or natives and Panimusaan, who are cross-bred Muslim Palaw'ans. Results of participant observation show that there seem to be a distinction bordering on discrimination between the two sub-groups. Most of the Muslim Palaw'ans live below the mountain area (see community 1 and 2 on Appendix 6), while the rest of the Palaw'ans live in the mountains. Despite the distinction, the two sub-groups still interact, albeit the *netibo* are quite reserved and shyer than the Panimusaan. For ease, the *netibo* and the Panimusaan will be collectively called Palaw'an in this research study.

A narrative by the anthropologist Macdonald (2003), who has started his study of Palaw'ans in 1970, is mostly consistent with results of participant observation in the Palaw'an community except for a few points. Macdonald narrates,

> "I have found for instance that religious representations and cults vary significantly from one place to the other [of different Palaw'ans] while social structure remains essentially identical, having at its core a residential unit based on kinship both affinal and consanguineous. The settlement pattern is scattered with usually small residential units (2 to 20 households). Roles are defined along the lines of consanguinity, affinity and generation. Gender relations are weakly asymmetrical. The kinship system is cognatic and kin terms are the same throughout the entire ethnic group. There is no stratification, no centralized locus of power outside the local community, no organized violence or warfare. Aggression tends to be avoided at all times. Individual autonomy is strong."

As already mentioned earlier, there are glimpses of distinction between *netibo* and Panimusaan in *Barangay* Panalingaan, although when they are placed alongside non-indigenous peoples, the slight distinction between the *netibo* and Panimusaan are overridden by the strong discrimination from the non-IPs.

4.2.2. Subsistence

The Palaw'ans live on subsistence upland agriculture, where rice is grown along with other crops such as *kamoteng kahoy* or cassava (*Manihot esculenta*) (Cayron 2011; Macdonald 2003). Macdonald (2003) points out that rice is the most valued type of food by the Palaw'ans but they also subsist on other cultigens and root crops such as cassava. Cayron (2011), likewise, states that rice is the main crop, with cassava, corn, and vegetables as supplementary crops. The Palaw'ans presently eat rice during every meal, while cassava is served as a snack. From interactions with the community, they say that when there is no rice, they eat cassava. The present preference for rice may have been influenced by the arrival of migrants, which Macdonald (2003) was able to follow during his subsequent visits to Palawan. Macdonald noticed during his visits to Palawan in the late 1970s up to mid-1980s that Christian lowland settlers were slowly invading the area, and the Palaw'ans were slowly being removed from their isolated life.

Kress (1977 as quoted in Cayron 2011) identified swidden and fallow fields, homestead clearings, virgin forest, freshwater and tidal rivers, river edges, mangroves, strand lines, estuaries and tidal flats, coral reefs, open sea, and caves as sources of subsistence for the Palaw'ans. The Palaw'ans are traditionally swidden cultivators and, in the following

sections, this will be a central topic especially in relation to the research question on environmental change.

4.2.3. Mobility

Cayron (2011) narrates the residential mobility of the Palaw'ans, where multiple camps are built on upland, lowland or coastal areas. This is still the case in *Barangay* Panalingaan, where several huts in the lowland (community number 2, see Appendix 6) seem to be unoccupied. Cayron (2011) states that upland camps are occupied during dry season, which he says as the best time to prepare for swidden cultivation, hunting and collecting NTFPs. However, one of the members of the community (male, in his 60s) mentioned that most of his fellow Palaw'ans choose to live in the upland and only go down in their lowland huts for farming. This may be an indication of the changing farming or agricultural practices of the Palaw'ans.

Conversely, the other type of mobility in the community, as in the act of movement itself, is still non-motorized (walking) for the *netibo* while the Panimusaan families (which are only three families) have one motorcycle each. This also gives a hint on the disparity of income between the Panimusaan and the *netibo*, with the former having more income than the latter. However, both of these groups essentially do not have a steady source of income.

4.2.4. Information communication

Communication within the community is mainly by done personally through house-to-house visit. While some Panimusaan have mobile phones, they only use this to communicate with people outside the community that they have collaborations with (e.g. NGOs). Also, the research site does not have advertisement banners compared to the town centre, nor were there any information billboards available.

4.3. Multi-level governance interventions

As mentioned by Keskitalo (2008), multi-level governance is part of the context by which stakeholder vulnerability and adaptive capacity are determined. The following are the results of key informant interviews with national, regional, and local government agencies and non-government agencies on their relevant programs for the project site. These are supplemented by minutes from focus group discussions with the community and notes from participant observation and transect walks.

Several levels of governance are responsible for natural resources management in Palawan and the project site. From the national level, the DENR-PAWB is the lead government bureau for the "system-wide planning, coordination, policy development, monitoring and evaluation, and technical assistance on protected area programs and projects" (DENR 2008). On the regional level, PCSD is the institution that is tasked to oversee the use of natural resources for the whole of Palawan. On both regional and local levels, a PASu is designated by DENR-PAWB to implement the Protected Area Management Plan and oversee the operations of a specific protected area (DENR, 2008). A Protected Areas Management Board (PAMB) has also been appointed, with the aim of having a representative from each stakeholder sector in making decisions regarding the protected area. The composition of the PAMB is stipulated in the NIPAS Act (1992). In addition, a Provincial Environment and Natural Resources Office (PENRO) is designated by the DENR on a provincial regional level as well as a MENRO at the municipal local level. External agencies such as NGOs and POs are also involved in the project site. CIP is the lead NGO that worked for the declaration of MMPL, and BPPI is the PO that spearheaded the application for ancestral domain title.

4.3.1. Vertical coordination among agencies

During a visit to the national level central office DENR-PAWB, a brief interview was conducted with the Palawan Desk Officer (female, in her 30s) regarding MMPL. The Palawan Desk Officer started by mentioning that she has not been to Palawan yet and proceeded to explain that the role of the central office when it comes to protected areas is to check the documents that come from the PASu office. She was able to give a document profiling the MMPL. For validation, the document was shown to the CIP Palawan programme manager, who confirmed that some of the content was taken from one of their reports on MMPL and that the section on socio-economic features with population data was not updated. The Palawan Desk Officer instead mentioned that all data on MMPL that the central office has are data from the PASu office in Palawan. This has also been the same situation with the Palawan PENRO Officer (male, in his late 50s), who mentioned that all information regarding the MMPL and indigenous peoples can be obtained from the PASu office. Most of the information, therefore, is concentrated within the PASu.

In the case of NCIP, the community mentions the disparity in the quality of service from the national level to the local level. The NCIP field officer has been cited a lot of times by the community members as not undergoing the correct procedure for obtaining free, prior

and informed consent (FPIC) from the community members. The community members mentioned that most of the time, the NCIP field officer obtains consent only from the chieftains and no longer consult the community members.

4.3.2. Horizontal coordination among agencies

As the project site is situated within different boundaries and jurisdictions, horizontal coordination of different agencies has important repercussions on the living conditions of the indigenous peoples. The agencies that have responsibilities in the project site are the NCIP, DENR, and PCSD. These agencies are represented one way or another within each other's agency. At the local level, there seems to be some degree of coordination, as detailed in the next section, where information education campaigns on the NIPAS law (1992) are done by the PASu (female, in her 40s) with representatives from NCIP. At the national or administrative level, there seems to be a lack of coordination between NCIP, DENR, and PCSD. During an interview with the NCIP regional commissioner, she mentioned that she feels that one of the challenges with the DENR PAMB is proper representation of the IPs.

The NIPAS Act (1992) states that, "one representative from each tribal community within the protected area as certified and endorsed by the NCIP" should be part of the PAMB. While the IP representative may be a chieftain or a tribal leader, the NCIP regional commissioner has reservations on the level of confidence of the IP representative. She mentions that more often than not IP concerns are not brought to the table because the IP representative is not confident enough to voice their concerns in the presence of educated politicians or professors sitting in the PAMB.

The former president of the people's organization BPPI (female, in her 40s) noted that there was a lack of harmonization of laws and procedures of the different government agencies. Lack of harmonization of the three different agencies was exemplified by multiple permit systems that the researcher was asked to go through. For an endorsement of the study from the PAMB, the researcher was asked to solicit permission from the community, the *barangay*, and the municipality, which forms part of the request to the PAMB. Permission was solicited through the submission of formal letters of request (written in the vernacular), with the proposal of the study attached. Each subsequent permission was contingent on the permission of the lower level of governance or organization. The final permission was given during the PAMB Executive Committee Meeting, where the researcher's in-depth study proposal (in Microsoft Powerpoint format) was presented. The researcher was asked to pay

two different kinds of fees, (refer to section 3.1.1 primary data collection research site of the methodology section) which were being collected on first occasion. The CIP programme manager mentioned that the PAMB is still on its early stages of development; hence, policies are still on the pilot stage.

Upon meeting the NCIP regional commissioner and the chief officer of the PCSD ECAN-PRD, the researcher was once again asked to get a clearance from their respective offices. The NCIP clearance is based on the NCIP Administrative Order no. 1 of 2012, which stipulates the research and documentation guidelines of indigenous knowledge systems and customary laws. The PCSD, on the other hand, recommended that the researcher also get a SEP clearance, which is based on the SEP law (1992). It should be noted that these requests for clearance were only communicated to the researcher after the arrival of the researcher in the project site and not in any of the electronic mail correspondences between the researcher and the offices. It is also important to note that a representative from the PCSD and a representative certified by NCIP are also part of the PAMB and have technically given their permission through the PAMB endorsement given to the researcher. There is an apparent lack of coordination within and among the agencies with regards external academic research studies.

Ultimately, the NCIP regional office sent a letter to the researcher with a negative response to the request for a study (see Appendix 7). The letter of disapproval quoted a memorandum order from the NCIP chairperson that all activities geared towards obtaining FPIC from indigenous communities are suspended pending the approval of the revised guidelines. This was in conflict with the permissions given to the researcher by the Palaw'an community, the *barangay*, the municipality, and the PAMB. As communicated by the CIP programme manager, the dissemination of the revised FPIC guidelines was kicked-off in Palawan by the NCIP regional commissioner and the regional director during the first week of July 2012, one month after the visit of the researcher to the research site.

4.3.3. Prohibited acts

The declaration of MMPL brought the research site under the jurisdiction of the PASu, in addition to the jurisdiction of PCSD. The MMPL follows the definition of a protected landscape set by the NIPAS Act (1992, p. 43), which states that,

> "'protected landscapes/seascapes' are areas of national significance which are characterized by the harmonious interaction of man and land while providing opportunities for public enjoyment

> through the recreation and tourism within the normal lifestyle and economic activity of these areas."

In line with this, MMPL also follows rule 21 on prohibited acts of the NIPAS Act (1992, p. 38), an example of which is, "hunting, destroying, disturbing, or mere possession of any plants or animals or products derived from the protected areas without a permit from the Management Board."

During the key informant interviews, *kaingin* (also known as slash-and-burn farming or swidden cultivation) has constantly come up as one of the prohibited acts that characterize the (former) lifestyle of indigenous peoples. Both the PASu and CIP programme manager mentioned that they have already conducted education campaigns to communities regarding the practice of swidden cultivation only in designated traditional use zones and not in primary forests, which are strict protection zones. The PASu, however, has an impression that education campaigns should be done in a repeated manner as some of the communities still practice swidden cultivation even after being told that it was prohibited. Furthermore, the PASu mentioned that one way to communicate the law to the communities was to mention that continued practice of prohibited acts is a jailable offense. According to the penalties section of the NIPAS Act (1992, p. 49), any violation of the act will be fined in the amount of "not less than Five thousand pesos (P5,000), nor more than Five hundred thousand pesos (P500,000), exclusive of the value of the thing damaged or imprisonment for not less than one (1) year but not more than six (6) years, or both, as determined by the court [….]" Since the indigenous communities do not have any source of income, the only penalty for any violation is imprisonment. The NCIP regional commissioner mentioned that within Palawan, there have been some instances where cases have been filed against indigenous peoples for the capture and trading of a local bird, the talking mynah (*Gracula religiosa*). She noted the lack of education in the indigenous peoples regarding prohibited acts and endangered species, also adding that all laws are written in paper and publication of these do not reach the remote areas. She also mentioned that it is very seldom that local *barangays* go to the remote areas to explain these laws. Conversely, she noted that within the research site of *Barangay* Panalingaan, there have yet to be reports of violations done by the indigenous peoples.

The NCIP regional commissioner, being a member of an indigenous group (*Tagbanua*) herself, believes that the indigenous swidden agricultural practice is sustainable compared to the non-indigenous practice of swidden. She mentioned that even researches

show that the IP practice of swidden cultivation is sustainable by allowing previously cultivated land to be under fallow for several generations or years. The PASu, conversely, mentioned that during education campaigns against swidden cultivation with indigenous peoples, some IPs would say that swidden cultivation has been their way of life for a long time and they would then question the wisdom behind the prohibition. She also mentioned that the community would ask, "Which is more important? Man or wood?" The PASu interprets this as "hard-headedness" on the side of the indigenous peoples and concludes that repeated campaigns should be done. She describes that a campaign is undertaken by a group composed of PASu staff, a representative from NCIP, and the *barangay* chairman or the *barangay* council member in charge of environmental affairs. The group, as a whole, would then explain the prohibited acts to the community.

The NCIP regional commissioner also cited the provisions of the NIPAS Act of 1992 that affect ancestral domains within protected areas. She mentioned that there is a provision for the indigenous peoples to enumerate their traditional uses of their ancestral domain through the ADSDPP. Under the NIPAS Act (1992) an ancestral domain within a protected area should be managed in accordance with an ADSDPP harmonized with a Protected Area Management Plan. The PASu, likewise, mentioned that there is already a five-year management plan for MMPL, to which the ADSDPP of the indigenous community should be in sync with. South Palawan Planning Council (SPPC), a consortium of the five municipalities within Mount Mantalingahan Protected Landscape, was tasked to assist the Palaw'an community in completing their ADSDPP. The European Union (EU) has granted a funding of EUR 0.3 Million to the SPPC for protection activities in MMPL, which includes the drafting of the ADSDPP from February to June 2012 (Lee-Brago 2011). As of press time, the ADSDPP has yet to be finished.

There is also a provision that states that the IP can submit a written notice of intent to manage their ancestral domain when it is within a protected area. Likewise, the NIPAS Act (1992, p. 31) stipulates that, "The customary rights and traditional practices of [indigenous cultural communities] ICCs/IPs shall be recognized and respected." The NCIP regional commissioner found the enumeration of these traditional practices important in light of the prohibited acts within protected areas. She was aware of the limitations of indigenous traditional practices within protected areas such as quotas for resource gathering. According to the PASu, a license from the DENR is needed for the extraction of non-timber forest

products (NTFP) such as the high-altitude (one thousand meters above sea level) *almaciga* (*Agathis philippinensis*) resin or *rattan* palm *(Calamus* spp.*)*. There is a payment for every license and there is a designated quota or volume per licensee. The quotas are set after an inventory done by DENR personnel or protected area forest rangers. She mentioned that since the IPs lack the financial capacity for licensing, they become NTFP gatherers and sell these to buyers or licensed holders of the NTFPs.

The CIP field officer (male, in his mid-30s) agrees with the information given by the PASu regarding the prohibitions for resource extraction in MMPL. However, he adds that the indigenous peoples as NTFP gatherers are at a disadvantage. He mentions that gathering usually takes three days and the IPs would usually transport 30-50 kilos of NTFP. He also added that these usually sell for only Philippine Peso (PHP) 12 (equivalent to Euro or EUR 0.23) per kilo, which would yield a small income for three days of work.

4.3.4. Indigenous community-based natural resource management

The NCIP regional commissioner stressed the importance of the presence of indigenous peoples in Palawan. She mentioned that if it were not for the presence of indigenous peoples, all these natural resources would have long been gone. As an example, she cited the Palawan Underground River, which is within the ancestral domain of the indigenous group *Tagbanua* before it was declared a protected area and became renowned as a UNESCO World Heritage Site. She said that the ancestral domain title boundary had to be moved in order to accommodate the development of the Palawan Underground River as a protected area. In the case of the research site, *Barangay* Panalingaan, the NCIP regional commissioner referred to the rich biodiversity of the forested area and how the Palaw'ans have taken care of this since time immemorial. She then conjectured if it there would still be any forests left in *Barangay* Panalingaan if only non-IPs were living within the area.

Narratives from the Palaw'an community also point to their practice of swidden agriculture as different from that of non-indigenous peoples. One of the Board of Trustees (BOT) of BPPI (male, in his early 60s) similarly mentioned that the Palaw'an way of swidden cultivation rotates around different plots, which allows the vegetation and the soil's nutrients to recover. They also said that this practice avoids soil erosion. The Palaw'ans mentioned that it was the non-indigenous peoples (whom they call *diwan* in their language) who concentrated on single plots. The chieftain (male, in his late 50s) said that concentration on a single plot for at least five years encourages the growth of a lot of weeds and the hardening of

the soil. Conversely, the Palaw'ans attribute the exploitation of marine resources also to non-indigenous peoples, saying that not just fellow Filipinos but also other nationalities fish within their ancestral waters.

The influence of the non-indigenous peoples on the lifestyle of the IPs have been noticed both by the PASu and the community itself. The community mentioned that they have learned intensive soil tillage from non-indigenous peoples they call *Ilokano* (migrants from the Northern region of the Philippines). The PASu, on the other hand, shared that they have cautioned the IPs not to copy the non-IPs' way of electrocution fishing. She encourages them, instead, to stick to their traditional way of fishing with the use of vines that stuns the fishes and other marine organisms.

The Palaw'an community in *Barangay* Panalingaan also has a group of enforcers (primarily males) who are deputized guardians of the ancestral domain. The group of enforcers have undergone paralegal training under the Environmental Legal Assistance Center, Inc. (ELAC), a non-government organization composed of lawyers. The engagement of NGOs with the indigenous community will be reviewed in later sections.

4.3.5. Government agencies' and political entities' engagement with the community

The national government agencies as well as the local government have different levels of engagement with the indigenous community of Palaw'ans. A climate change-related project called Adaptation to Climate Change and Conservation of Biodiversity in the Philippines (ACCBio) was carried out by DENR from 2008 – 2011 with funding from the former German Society for Technical Cooperation (GTZ). The project aimed to develop and implement relevant adaptation strategies to counteract climate change impacts and biodiversity loss in selected areas in the Philippines (DENR FASPO [2010]). The DENR-PAWB, the PENRO in Palawan, and the MMPL PASu all mentioned that their area has not been chosen for the ACCBio project.

When asked if the agencies have climate change-related projects in Palawan and the project site, the government agencies CCC, NCIP, DENR-PAWB, PCSD, Palawan PENRO, and the MMPL PASu mentioned that they do not have any existing adaptation projects yet. On mitigation, the PCSD and the PASu mentioned that there are pilot projects for the UNFCCC's decision on REDD+. The PCSD mentioned that they do not have any direct contact with the Climate Change Commission but noted that a REDD+ project has been contracted to an NGO. He then emphasized that this project would undergo the SEP

clearance from their office in any case. The PASu, likewise, shared that communities have a hard time comprehending how REDD+ works, with community members asking questions such as, "How do we measure the carbon? Who will get paid?"

The PASu mentioned that their active project in MMPL is the National Greening Program (NGP), which is mandated by Executive Order (EO) no. 26 issued by the President of the Philippines in February of 2011. The NGP aims to plant 1.5 billion trees within 1.5 million hectares from 2011 to 2016 in public domain lands such as forestlands, mangrove protected areas, ancestral domains, among others (Republic of the Philippines 2011). The PASu explained that in the case of MMPL, only non-fruit bearing trees will be planted since utilization and cutting are not allowed in protected areas. Fruit bearing trees may be planted within the open areas. She added that the indigenous peoples are paid for planting trees, especially in areas where they have practiced swidden cultivation. As a priority project of the government, EO 26 has been conceptualized to consolidate and harmonize all greening projects as well as to address "poverty reduction, resource conservation and protection, productivity enhancement, climate change mitigation and adaptation [….]" (Republic of the Philippines 2011, p. 01). EO 26 also specifically called on the NCIP to mobilize indigenous peoples to participate and to identify sites inside ancestral domains. The Palaw'an community mentioned that, so far, only an ocular has been done in *Sitio* Cadulan with regard to the NGP. The CIP programme manager for Palawan, however, noted that the budget for the NGP is PHP 10 Million (EUR 0.2 Million) while the annual budget for the operations of the PASu is only PHP 0.84 Million (EUR 0.016 Million).

Due to limited time and unforeseen circumstances, a visit to the municipality's MENRO was not possible. This would have filled the research gap of municipal level engagement. Nonetheless, during a thanksgiving event of the community for the water system that was sponsored by the NGO CIP, the mayor and other officials arrived to join the event. Together with the mayor is a representative from the national government agency Philippine Coconut Authority (PCA), who attended the event in order to disseminate biological controls called earwig (exact species unknown, either *Nala lividipes* Duf. or *Euborellia annulata*) for the coconut (*Cocos nucifera* L.) pest coconut leaf beetle (*Brontispa longissima*). Initially, the representative wanted to distribute the plastic bottles containing the biological controls to individual families, but the mayor suggested to leave the distribution to one of the BOT members of the people's organization BPPI. The BOT member said that he will study the

efficacy of the earwig as a biological control before distributing it to his fellow Palaw'ans. Other community members expressed some reservations regarding the biological control. The chieftain mentioned that the very same species is the one infesting his coconut trees. He surmised that the aim of the distribution of the earwig is to increase the infestation and thereafter introduce a pesticide that will be sold to them.

On a local level, the *barangay* council member for the environment mentioned that he does not have any budget for environmental projects in the area (Valencia, pers.comm.). This has been, however, disputed by one of the community members who is also the teacher of the alternative learning system in the community (female, in her 30s). She mentioned that there is a budget for each *barangay* council member equivalent to 20 percent of the total budget of the *barangay*, but mentioning that he might not have chosen not to avail of the budget. During the *barangay* session, where the researcher was invited to attend and present a small report to the council, the project report of the *barangay* council member for the environment was an attendance to a marine protected area workshop conducted by CIP.

When asked about assistance from government agencies and political entities, the community would consistently answer that there is none or very limited short-term and long-term assistance that they acquire from the government. One example which was often given was the shooting incident that occurred during the times that the CADT application was in process. The aforementioned BOT member of the BPPI constantly received death threats presumably from non-IPs and a manifestation of this was a shooting incident within their grounds. The sister of the BOT member (in her late 40s) mentioned that they sought support and protection from the municipality and the *barangay* but did not receive any. She mentioned that it was the Western Command of the Armed Forces of the Philippines, which gave them the assistance that they sought. The BOT member mentioned that they rarely get support from the government because they (the indigenous peoples) are not paying any tax. Indeed, according to section 60 of the IPRA law (1997, p.67),

> "all lands certified to be ancestral domains shall be exempt from real property taxes, specially levies, and other forms of exaction except such portion of the ancestral domains as are actually used for large-scale agriculture, commercial forest plantation and residential purposes and upon titling by other by private person: Provided, that all exactions shall be used to facilitate the development and improvement of the ancestral domains."

This has also been explained earlier in section 4.3.1. on local boundaries within the ancestral domain, where individual titling would open the ancestral domain to tax payments. But despite the existence of the IPRA law, passed only in 1997, the community still refers to what they call "*Batas ng Katutubo*" (Law of the Indigenous Peoples), which is their customary law. The municipality of Rizal, where the project site is located, was founded only in 1953, thereafter creating 16 *barangays.*

From the side of the community, they were disappointed with the local government especially during an unexplained death episode in April 2011, which took more than 10 lives within their group, not including those who died at the other side of the mountain (the municipality of Bataraza). The local government through the *barangay* health workers and the national agency Department of Health concluded that a diarrhea outbreak occurred due to faecal contamination of the water source of the indigenous peoples (Pasaylo 2011). The community members found it unacceptable that their way of living has been judged as unsanitary and causing deaths within 24 hours. The community members argued, as well as the former president of the BPPI that their way of living has been the same for decades and they have yet to witness deaths on a scale as massive as the one that happened in April 2011. The current president of the BPPI (male, in his 40s) also said that they should long have died if their living conditions were unsanitary enough for living. They also mentioned that they were able to gather narratives from the survivors that, prior to the outbreak, there was a "poisonous bad-smelling fog" that hovered, where birds passing through the fog immediately dropped dead to the ground. The indigenous peoples also mentioned that they could only get fresh air if they stay on the ground. They mentioned that the local government and the national agency did not believe them and did not listen to their narratives. They shared their theory on the diarrhea outbreak, which they believe is related to the mining operations at the other side of the mountain. They hypothesize that plumes from a sulphuric acid plant (for smelting of nickel) adjacent to the mountain area contaminated the water source through acid rain, facilitated by the Southwest monsoon.

In terms of climate projections in Palawan, the PAGASA was sought for information. The assistant weather services chief of PAGASA mentioned that the general trend for the Philippines is increasing temperatures. She provided the researcher with a copy of the report, "Climate Change in the Philippines" published in June 2011, with funding from the United Nations Millennium Development Goal Achievement Fund (UN MDG-F). This report

contains observed climate data and climate projections for the whole of the Philippines as well as predictions of likely impacts. She mentioned that per recommendation by the IPCC, they have provided local government units with climate projections under the A1B (medium-range) emission scenario. For the province of Palawan, the projections for the year 2020 are increasing temperatures especially during the months of March, April, May, June, July, and August and increased rainfall during the months of September, October, November, December, January, and February (PAGASA 2011). For the year 2050, the temperature increase is predicted to double and rainfall will increase except for the months of March, April, and May (PAGASA 2011).

The PAGASA cautioned, however, that the publication she has provided only contains seasonal data and that there is still no baseline daily data for Palawan (e.g. rainfall that causes flooding) and initially offered to provide the researcher with this data, which, unfortunately did not materialize. Conversely, she requested the researcher to gather data on indigenous knowledge systems and practices (IKSP) on weather forecasting. She mentioned that these IKSPs may have scientific bases, which will be useful for the weather bureau. She referred to the study done by a professor in the state university in cooperation with UNESCO. The study, called Strengthening Resilience of Coastal and Small Island Communities towards Hydro-Meteorological Hazards and Climate Change Impacts (StResCom), focuses on linking IKSP with science in order to design policies on disaster risk reduction and climate change for indigenous communities (UNESCO 2012). Interestingly, the Philippine government, through NEDA, deems Palawan "not as vulnerable" [to extreme weather events] as the islands along the eastern seaboard (Firmeza, pers.comm.).

4.3.6. Non-government organizations engagement with the community

Different non-government organizations have involvements in the Palaw'an community of *Sitio* Cadulan. After the declaration of Mount Mantalingahan as a protected landscape in 2009, CIP continued their involvement in the area. Their most recent project is a water system, which was completed through a conservation agreement with the community. The conservation agreement was given as a sub-grant, where the community themselves were responsible for the procurement of materials, financial management, and maintenance of the completed water system (Tabangay pers.comm.). CIP then only had to do the monitoring of the project (Apostol pers.comm.).

The community gave very positive feedback for the assistance that CIP had given, narrating that it took only three months to get approval for their request for the water system support. CIP, on the other hand, mentioned that there were challenges that the community's request posed in line with the organization's financial calendar. The request was done near the closing of the organization's fiscal calendar, resulting in limited funding for the project. Nonetheless, this project is seen by the community as a turning point, especially in terms of their visibility as a community in need of assistance. During the research period, a mining company came to offer that they would donate materials in order to lengthen the reach of the water system. The community members mentioned that they have been asking for assistance from the said mining company for quite some time. The donation did not push through after much reflection from the community leaders that such assistance from a mining company is not a proper supplement to a project that a conservation organization has started (Japson, pers.comm.). In addition, there was no scientific assessment done whether the present capacity of the water source will be able to sustain additional households to those that it is currently supporting.

The community also mentioned assistance from other NGOs, such as the Environmental Legal Assistance Center, Inc. (ELAC) and the Palawan NGO Network, Inc. (PNNI). ELAC has conducted paralegal training sessions in the community as well as teaming up with PNNI in apprehending illegal loggers. The community always mentions that most of the assistance that they have received came from NGOs. As one of the BOT members of the people's organization BPPI would often say, "If there are no NGOs, what would happen to us?" The NGOs are seen as important actors within and, hence, exercise some influence over the community.

4.4. Social-ecological dynamics in *Sitio* Cadulan, Panalingaan, Rizal

4.4.1. Boundaries

The project site is bounded by an ancestral domain title boundary and is within a protected landscape boundary (see Appendix 8). These boundaries were granted by two different government agencies: NCIP for the ancestral domain boundary and DENR-PAWB for the protected landscape boundary. The process of delineating of the ancestral domain will not be discussed, but the consequences of the boundaries will be given focus instead.

Ancestral domain boundary

For the president of the people's organization BPPI, the approval of the ancestral domain title of the Palaw'ans in *Barangay* Panalingaan is important in protecting the rights of the indigenous peoples. The approval of the ancestral domain title, however, is not without challenges. According to the regional commissioner of the NCIP (female, in her 40s), the ancestral domain title boundary is problematic with the non-indigenous peoples (hereafter referred to as non-IPs). This is problematic on the grounds of natural resource access and land ownership. She mentioned that non-IPs are afraid of losing land, especially in cases where indigenous peoples (IPs) sold to non-IPs their share of land, which are within the ancestral domain boundaries. Additionally, she also mentioned that adjacent *barangays* or lands are areas of great conflict in terms of the ancestral domain title.

As stipulated in the national law Indigenous Peoples Rights Act (IPRA) of 1997, a CADT formally recognizes the "rights of possession and ownership of ICCs/IPs over their ancestral domains identified and delineated in accordance with this [IPRA] law." This means that the right to use resources within the ancestral domain is exclusive to the IPs. The Palaw'ans share this point-of-view of the NCIP regional commissioner. According to the BOT of the BPPI, the problem is that the lands within their ancestral domain do not have individual titles; hence, if one of their fellow IPs sells their share of land to non-IPs, the proof of land ownership is only through some natural markers such as tree species or river boundaries. In addition, it was mentioned that some non-IPs have gained lands within their ancestral domain by buying lands from IPs usually through some form of deceit, mentioning that the IPs do not have any knowledge on the market price of land per hectare. When asked about the consequence of the approval of their CADT to non-IPs within their ancestral domain, the BOT member mentioned that they had verbal agreement with the non-IPs that they can continue to live in the ancestral domain as long as they cooperate with the Palaw'an community. This, however, is still questionable.

During a transect walk to the water source with the same BOT member and some children, the BOT member pointed to an adjacent land that belongs to a non-IP. This land is close to the water source and is being used as a plantation of different vegetables such as bitter gourd, chilli, and eggplant. The land is situated on a slope, with an elevation of 65 meters (213 feet) above sea level and uses an overturning tillage by a carabao (*Bubalus bubalis carabanensis*). The BOT member narrated that the non-IP owner of the land wanted to clear the green cover of the area near their water source, which they think would

negatively affect their supply of water. In addition, he mentioned that the overturning tillage using a carabao might be causing erosion, which causes turbidity of their water supply. While the community was able to prevent the clearing of the area near the water source, it seems that they are still very careful when dealing with non-IPs, especially when it comes to livelihood.

During the final FGD, which is also the preliminary results presentation with the community, one of the members of the community (female, in her 50s) mentioned that a non-IP (who has bought land from an IP) has laid claim on some coconut trees that are within the boundaries of their respective lands. She mentioned that these trees are part of her property and that she planted these trees herself. When asked how they settle issues of land ownership such as that previously mentioned, one member of the community (male, in his 30s) just said, "Whoever has the loudest voice and whoever is the bravest wins." Initially, this answer elicited a few laughs but was eventually confirmed by several nods of approval from the community.

Local boundaries within the ancestral domain

The local boundaries or boundaries within the ancestral domain are left to the discretion of the IPs. During one of the transect walks in *Sitio* Cadulan, the community members, both young and old, always mention the owners of the land patches with different types of crops or plantations that are being traversed. Usually, there are no *mojón* stone markers or barbed wires separating the land patches, and delineations are based on visual memory. In one transect walk from the river, the children suggested to take a detour, with one teenager (female, aged 15) saying that, "We have to be careful on that land because it belongs to another person, and we do not want to ruin his *pechay* (*Brassica rapa L.*) or green leafy vegetable crops, or we may be asked to pay." This is consistent with section 53 of the IPRA (1997, p. 65), which states that, "the allocation of lands within any ancestral domain to individual or indigenous corporate (family or clan) claimants shall be left to the ICCs/IPs concerned to decide in accordance with customs and traditions."

Protected landscape boundary

The protected landscape boundary seems to have both pros and cons in relation to the living conditions of indigenous peoples. The regional commissioner of the NCIP believes that IP access to resources has been limited by the declaration of the MMPL, where part is within the ancestral domain of the Palaw'ans. She mentions that the project site, *Barangay* Panalingaan,

has a forested area which is rich in biodiversity and which has been taken care of by the Palaw'ans since time immemorial. CIP meanwhile mentions the formal definition of "protected landscape" in the National Integrated Protected Areas System (NIPAS) Act of 1992, which states that protected landscapes or seascapes "are areas of national significance which are characterized by the harmonious interaction of man and land, while providing opportunities for public enjoyment through recreation and tourism within the normal lifestyle and economic activity of these areas." CIP points out that the traditional uses associated with the protected landscape will still be honoured such as areas for swidden cultivation. However, CIP stresses that opening up new areas for swidden cultivation is no longer allowed under the law.

The community did not exactly point to this prohibition as severely affecting their livelihood, but instead focused on the positive consequences of the declaration of the protected landscape. During the final FGD, one member of the community (female, aged 50) mentioned that after Mount Mantalingahan was declared a protected landscape (previously referred to as MMPL), they could hear less chainsaw noise within their vicinity. She mentioned that there used to be massive illegal logging in the area, but it is now lessened after the declaration of MMPL. This has also been supported by other members of the community during the FGD. Likewise, the president of the BPPI mentioned that the declaration of the MMPL decreased illegal activities in the area and designated areas where the community can practice swidden cultivation.

During the FGDs with the community, there has been no explicit mention of the zoning that was set by the PCSD after Palawan was declared a UNESCO Biosphere Reserve. However, this came up during key informant interviews with the CIP programme manager for Palawan and the former president of the BPPI. The CIP programme manager mentioned that a couple of municipalities in Palawan (such as Narra, Quezon, Bataraza, Brooke's Point and Roxas) are amending the core zones in the municipalities. As mentioned in the previous section, core zones are supposed to be free from human disruption. The former president of the BPPI also confirmed this amendment. Post-fieldwork meeting with officers from the DENR-PAWB Protected Area Community Management Division mentioned that the PCSD stated before that these zones are fixed and will not "move." As relayed by the CIP programme manager, amendment of core zones became possible through a decentralization

measure during the term of the previous governor, who deemed municipalities knowledgeable about their own zones.

As mentioned in section 4.1., the chief officer of the PCSD ECAN-PRD acknowledged that one of their limitations is the lack of ground delineation for the ECAN zones. He repeatedly stated that they depend on "psychological and sociological delineation" of communities, pertaining to the community's interpretation on the ground of the delineation drawn on a paper map. He also stated during an interview that sometimes the ancestral domain claims are too big that there are no longer areas left for municipal governments to develop. In addition, he stressed that it is a misconception that a "reserve" in the UNESCO MAB reserve means the same as with any other reserves that disallows any kind of human activity or disruption. Conversely, the PASu mentioned that they will temporarily be following the ECAN zones for the protected landscape since the management zone has yet to be established.

Delineation issues arise from environmental and cultural boundaries as well as political boundaries. The SEP (1992) and the NIPAS (1992) laws are instrumental in understanding the environmental boundaries, while the IPRA (1997) law supports cultural delineation. The IPRA law (1997, p. 63) section on delineation and recognition of ancestral domains states the following:

> Self-delineation shall be guiding principle in the identification and delineation of ancestral domains. As such, the ICCs/IPs concerned shall have a decisive role in all the activities pertinent thereto. The Sworn Statement of the Elders as to the Scope of the territories and agreements/pacts made with neighboring ICCs/IPs, if any, will be essential to the determination of these traditional territories. The Government shall take the necessary steps to identify lands which the ICCs/IPs concerned traditionally occupy and guarantee effective protection of their rights of ownership and possession thereto. Measures shall be taken in appropriate cases to safeguard the rights of the ICCs/IPs concerned to land which may no longer be exclusively occupied by them, but to which they have traditionally had access for their subsistence and traditional activities, particularly of ICCs/IPs who are still nomadic and/or shifting cultivators.

The delineation of ancestral domains follows a process, which entails the presentation of proofs and coordination with several government agencies. Once an area has been certified by NCIP as an ancestral domain, it terminates any "legal basis for the jurisdiction previously claimed" by other government agencies (IPRA 1997, p. 65). The NCIP regional

commissioner, however, pointed out that private lands within the envisioned ancestral domain are "subtracted" from the total land area of the ancestral domain title.

Political jurisdiction boundaries

Political jurisdiction boundaries arise from the government's political structure, where provinces are divided into smaller units of government into municipalities and *barangays*. The research site is just one of the three *barangays*, which constitute the ancestral domain of the Palaw'ans in the area. Altogether, the three *barangays* belong to the municipality of Rizal. It should be noted that indigenous Palaw'ans are living all over the province of Palawan and that the group of Palaw'ans involved in the study is just one of the aforementioned distribution. Conversely, MMPL covers five different municipalities (Bataraza, Brooke's Point, Sofronio Española, Quezon, and Rizal) and 36 *barangays* (Cruz *et al*. 2008). The research site, *Barangay* Panalingaan, is part of MMPL but the other two *barangays* (Taburi and Latud) in the ancestral domain are not.

4.4.2. Natural resources, subsistence, and livelihood

Key informant interviews with the NCIP regional commissioner, the CIP programme manager for Palawan, the PASu, the CIP field officer, and the president of BPPI provided external information on the dependency of the Palaw'ans on the natural resources of their ancestral domain, and consequently, the MMPL. The NCIP regional commissioner mentioned that the IPs on the mountains primarily live through farming, hunting, and gathering of NTFP. In addition, IPs living at coastal areas subsist through fishing. Subsistence benefits have also been enumerated by the president of BPPI. He pointed to fruits, the forests, animals, and seafood as the benefits that the indigenous peoples gain from their ancestral domain, not to mention the important medicinal herbs that they obtain from the forests.

The CIP programme manager likewise stressed that the primary crop of the Palaw'ans is the root crop cassava (*Manihot esculenta*) and not rice. The CIP field officer narrated that some of the indigenous peoples no longer go down from the mountains to buy rice and subsist on the produce from their swidden plots. According to the CIP field officer, once their stock of rice from the swidden plots are depleted, they turn to root crops as source of food.

The practice of swidden agriculture, as mentioned by one of the community members (male, in his 30s) is part of the culture of the Palaw'ans. They also mention that the products of swidden cultivation taste differently from those in paddy fields. The chieftain says that the

rice from swidden plots tastes better than the rice grown in paddy fields, which he describes as "bland." Likewise, one of the women in the community confirmed that swidden plots products taste better and cited, as an example, that *malagkit* or glutinous rice (scientific name unknown) already tastes sweet upon harvest unlike those in the paddy fields. Conversely, the CIP field officer pointed out that if the practice of swidden agriculture continues especially by IPs living in the mountains, the forests will be continually denuded.

During the immersion in the research site, the researcher was also able to gain insight on the use of natural resources for subsistence and livelihood. The host family had a small bitter gourd plant at the back of the house, which serves as a viand to rice. Vegetable viands such as *langkawas* (see Appendix 9, scientific name unknown) or bamboo shoots would sometimes be harvested from the ancestral domain. Other vegetables such as *pechay* (*Brassica rapa L.*) or eggplant are bought from plantations of non-IPs. Rice, however, is also bought elsewhere by the host family. Fish is bought from peddlers on motorcycles, when financial resources allow. Fried banana and cassava (*Manihot esculenta*) cakes are also regularly served by the host family. The other families would have small maize, peanut, rice, and coconut plantations, among others. The researcher was also able to join the harvesting of peanuts with the young girls of the community (aged 08 up to 19), which were planted by the family as boundary markers and for personal consumption. The cultural practice of the community is such that those who helped in harvesting get a share of the harvest.

Coconut plantations are deemed important by the community as this is a source of income. As mentioned by one of the women (in her 40s) in the community, copra-making (see Appendix 10) (drying coconut meat through prolonged heating) is the primary source of income and paddy farming only comes in second. Another woman (in her 40s) in the community, whose family is involved in the copra-making, mentioned that there is no other source of income other than copra-making.

4.3.3. Natural resources, landscape features, and recreation

The Palaw'ans, particularly the children and teenagers, make use of the landscape features as recreational areas. A transect walk with some children of the community led to trips to two places where the community usually goes to swim. The children identified these as Dalni Falls and Mundugen Falls (see Appendix 11 for location). These are river streams within the ancestral domain. In the Dalni Falls, a makeshift swimming pool can be found where part of the river stream was bordered with stones in order to trap the water. It is notable that this part

of the river stream has more sediments than the other parts. The children, however, are conscious of the sedimentation and attempt to improve the turbidity by shifting or removing some stones to allow a larger volume of water to flow.

During these transect walks, the children would also point out and mention how the surrounding place looked much better before plots of land were sold to non-indigenous peoples. They would mention that non-IP landowners would scour and dig the area in search of gold and minerals, which destroys the beauty of the area.

In relation to the previous section on natural resources and subsistence, most excursions would end with the children taking fruits from plantations that they pass by, as long as the plantations belong to their parents or relatives. Most of the time, the children would harvest coconuts and the responsibility of climbing the coconut trees and opening the coconuts with *itak* (bolo knife) always falls on the young boys (aged 12 and 13), although some of the girls (aged 13 and 15) can also wield the *itak*.

Within the community grounds, young girls (aged 03 and 09) would also play with leaves and flowers and also with some animals. In one instance, a girl was seen with a bird tied with a string to her wrist (see Appendix 12). When asked if this practice was not life-threatening for the bird, one of the children (boy, aged 13) said that it was not the case.

4.5. Local perceptions of environmental change

4.5.1. Non-physical change: climatic change

The key informant interviews and the gender-specific FGDs (historical timeline and seasonal calendar) asked members of the local community if they have noticed any changes in the season or their environment throughout these past years. As detailed in the methodology (section 3.1.1), caution was exercised not to use the term “climate change” during the inquiry. However, some of the community members, especially those who are part of the BPPI BOT, already heard of the term and articulated the term as a response to the inquiry, “Did you notice any changes in the season during these past years?” This may be attributed to their attendance in a climate-related seminar conducted by CIP in late 2011. Nonetheless, two common answers from the community point to a changing climate: there is not good enough heat anymore for preparing their swidden plots due to erratic weather patterns and, incongruously, there is increased intensity of heat and rain.

Increased intensity of heat and rain

During interviews with the PASu and the CIP field officer, they already referred to a changing climate by citing extreme and out-of-season weather events. The PASu mentioned that the changing climate is certainly felt in the area and that the weather pattern has changed. She mentioned that the seasons are no longer being followed, saying that when it is supposed to be rainy season, it will be dry. Similarly, during the dry season, there will be sudden episodes of rain.

The community articulated the same observations with regards the changing weather patterns and extreme weather. They mentioned that the heat of the sun has become unbearable, with one woman (in her late 40s) saying, "Before, I can work in the fields until noon. Now, the heat has become unbearable that I can only work until 10:00 in the morning. The sun is already very painful on the skin at around 09:00 in the morning." She added, as an example, that she planted *kamoteng kahoy* or cassava (*Manihot esculenta)* working under the sun for three days and, as a consequence, became sick for one week. She concluded her narrative by saying that, "Maybe the earth is just really old."

Another member of the community (male, in his 40s) said that, "Now, when it rains, it really pours very hard. And when the sun is shining, it is very hot and stinging your skin." Other members of the community say the same, recalling that the sun has not been that harsh on the skin in the earlier days. During the research site immersion, the researcher has noticed that the intensity of the heat in the area already stings the skin at around 07:30 in the morning.

The women also shared that every summer, the deep water wells dry up. However, during the summer seasons of 2011 and 2012, the deep water wells no longer dried up. This may also be related to the next section on abandonment of swidden practices. As one woman (in her 40s) in the FGD shared, she abandoned her swidden plot just last year, 2011.

Abandonment of swidden cultivation practices

Key informant interviews with the CIP programme manager and field officer led to discussions on the swidden practices of the Palaw'ans. The CIP programme manager mentioned the prohibition of swidden cultivation especially within the limits of the protected area. She, however, stressed that indigenous peoples are still allowed to practice swidden cultivation in old plots, but opening up new plots is prohibited. The discussion with the CIP field officer, on the other hand, revolved around the productivity of the swidden cultivation of

the Palaw'ans. He mentioned that in recent times, there has been a lot of pests attacking the cultivated crops, specifically rice, of the indigenous peoples. He narrated that, prior to pest infestation, the IPs did not use insecticides.

Separate informal narratives from the community confirmed that swidden cultivation is no longer productive and is no longer worth the effort of long preparation of the soil for planting. Most of their reasons stem from the lack of proper heat needed to burn the plants that were cleared or "slashed." They related this to unpredictable weather patterns, with one of the community members (male, in his 60s) saying that, "The season does not seem to have any direction anymore." This may be related to what another community member (male, in his 30s) says that more weeds seem to grow now in their swidden plots, thus their amount of work in cultivating their plots is more than what is needed before.

The chieftain (male, in his 50s) and the head of the host family (male, in his 60s) explained the seasonal calendar of their swidden practice. They narrated that their swidden cultivation starts in January. They spend two weeks in cutting the understory and then another two weeks in cutting the bigger plants. Two weeks in the month of February would be spent in burning the plants that were cut down. Reminiscent of bioenergetic agriculture, the chieftain mentioned that they await the appearance of seven stars in the sky (referred to as *marupuro*) prior to the commencement of burning. The months of March and April are spent planting (*panggas*), where the man punches a hole with a stick and the woman follows with planting the seeds. The seeds are placed in a small basket called *baka-baka*, which they explained as the appropriate size for bringing seeds since it is not too heavy. By the month of May, planting is finished and weeding or "grass" removal is the next occupation in the swidden plots. The chieftain said that if by the month of May, they have not commenced with planting (e.g. due to wet conditions), it would no longer be possible to have a successful harvest of good-tasting rice. They allow four months of cultivation before they harvest in August. The chieftain added that after harvesting, they first offer the harvested products to the gods through a ceremony before consuming the produce.

The women also described the challenges with practicing swidden in recent times. One of the women present during the FGD (aged 48) mentioned that in 1975, there were no weeds if they plant in swidden plots or no water lilies if they plant in paddies. Now, she added, apart from having more weeds, there are also pests. The women mentioned that in order to increase productivity of their cultivated plants, they need to apply both fertilizers and

insecticides. They narrated that a sack of chemical fertilizers that they call "1620-triple-40-complete" and "urea" cost around PHP1,500 up to 2,500 (EUR 30-50) per sack. They mentioned that among all crops, only *kamoteng kahoy* or cassava (*Manihot esculenta)* and *kamoteng baging* or sweet potato (*Ipomoea batatas*) are the ones that do not need any fertilizers. However, they mentioned that these are also in need of insecticides, which are applied to the above-ground portion (leaves) of the root crops.

The head of the host family mentioned that the arrival of the non-indigenous peoples and the commencement of mining operations brought different changes to their practice of swidden cultivation and to their harvests. He mentioned that the indigenous peoples have their own way of doing swidden cultivation, which the non-indigenous peoples have modified through damaging practices such as overturning the soil (tillage). He said that other indigenous peoples copied this practice until they lost the knowledge of the traditional way of doing swidden. The women, on the other hand, mentioned that abandonment of swidden cultivation led to paddy farming or tillage, which also has its costs. While paddy farming is rain-fed, tillage entails rentals of tractor and carabao, which costs PHP1,500 (EUR 30) per hectare of tillage and PHP 200 (EUR 4), respectively. Usually, they borrow money in order to afford these costs. They pointed out that should there be proceeds from the harvest, these are just enough to pay the debt they incurred in obtaining inputs and services.

The commencement of mining operations at the other side of the mountain is associated with the arrival of pests that are eating the crops in their swidden plots. The community as well as the former and current presidents of the people's organization BPPI believe that the black bug (*Scotinophara coarctata*), one of the first pests feeding on rice crops, was brought by one of the ships of the mining company. They believe that the black bug was attracted to the light of the ship and went all the way with the ship to the Philippines. Someone in the community (male, late 60s) identified the ship as coming from Japan. Since then, the community has had its share of different pests that were infesting their crops and food sources. They have identified several insect pests (specific species unknown), mammalian pests such as rats, amphibious pests such as the bullfrog (scientific name unknown), and invertebrate pests, such as the golden *kuhol* or the golden apple snail (*Pomacea canaliculata*) and earthworms (specific species unknown). One member of the community (male, in his 30s) lamented that all their crops have their respective pests, even

the root crops *kamoteng kahoy* or cassava (*Manihot esculenta)* and *kamoteng baging* or sweet potato (*Ipomoea batatas*) which did not have any pests before.

The spread of pests or invasive species was consulted with the PENRO, who mentioned that there have yet to be scientific studies on the invasive species in the area and whether these are alien species. He suggested that land use change may be driving the proliferation and distribution of the invasive species, citing that the current increase in palm oil plantations in the province may be encouraging these pests. The former president of the BPPI surmised that rats live within the palm oil plantations. Whether it is a changing climate or land use change driving the proliferation of invasive species in *Barangay* Panalingaan is a research question that urgently needs to be addressed. While this research need arises from the current research, it is, however, beyond the scope of this research.

Decreasing forest products productivity

The PASu and the PCSD chief officer of the ECAN-PRD mentioned that the changing climate has decreased productivity of forest products such as wild fruits, honey, and agricultural products. The PCSD chief officer even went on further to recount their hypothesis that climate change is affecting flowering plants, which the honey bees visit. The concern of the PASu and the PCSD ECAN-PRD chief officer on decreased forest products productivity included the loss of commercial opportunities of these forest products. The PCSD chief officer mentioned that there is an international demand for the honey and their office is interested in finding the chemical composition of honey in order to satisfy the international organic market. The CIP field officer, on the other hand, mentioned that the decrease of honey production depends on the area. The Palaw'an community, however, only mentioned the decreasing production of honey when they were asked about it during the final FGD. Most of the time, they would mention the decreasing productivity of swidden crops and associated this with increased pest infestation.

4.5.2. Physical change: land use and land cover change

The Palaw'an community, both young and old, are aware of the loss and presently reporting rare sightings of several species in their area. They enumerated several birds such as *agay* or Philippine cockatoo (*Cacatua haematuropygia*), *talusi* or Palawan hornbill (*Anthracoceros marchei*), *kiyaw* or talking mynah (*Gracula religiosa*), *pikoy* or *loro* (parrot) as called in the national language (scientific name unknown), *gukguk* or owl (which can either be Palawan scops-owl *Otus fuliginosus* or Mantanani scops-owl *Otus mantananensis*), *balud* or the grey

imperial pigeon (*Ducula pickeringii*), *uwak* (crow) (common and scientific name unknown), and *balinsasayao* or Palawan swiftlet (*Collocalia palawanensis*). They have also mentioned a bird called *biskor* (common and scientific name unknown), which they said is migratory. The former president of the people's organization BPPI confirmed this, saying that the *biskor* can only be seen during the rainy season or when it is corn season.

The husband (in his 30s) of one of the cross-bred *Panimusaan* said that a woodpecker (common and scientific name unknown) can also no longer be seen because "there are no longer any wood to peck but only metal." Additionally, they shared that they can no longer see mammals such as the *binturong* or Palawan bearcat (*Arctictis binturong whitei*) and the *biyok* or wild pig (*Sus ahoenobarbus*) in their area. Most of these species are of restricted range and are vulnerable under the IUCN red list status (Cruz *et al*. 2008). A detailed listing of the status of the different species can be found at Appendix 5).

The community gave several explanations and theories on the loss of these species. Most, if not all, of the community members mentioned that the loss of big tree species contributed to the loss or rare sighting of these species. The community members living within the deeper areas of the mountain said that some of these animals have retreated to where there are still larger tree species. One of the female members (in her 40s) of the community mentioned that sometimes these species come out at night. The chieftain mentioned that the wild pigs disappeared when rough roads were constructed, with some roads branching out to the forests. He also supposed that the wild pigs, along with the birds, may have been affected by the noise of bulldozers. He also added that the arrival of "foreigners" or non-indigenous peoples in the area brought additional noise, especially those who blast areas in search of minerals. Other members of the community, however, narrated that wild pigs also disappeared due to "pig bombs" that people created to annihilate the pigs that are eating the crops. The CIP programme manager for Palawan and the PASu confirmed this and stated that this is essentially a prohibited act covered under the NIPAS Act (1992).

Another member of the community (male, in his 30s) said that he believed the *balinsasayao* or Palawan swiftlets disappeared because the eggs and nests were sold to traders from Sabah (Malaysia), and the parent birds follow their offspring. He offered the same explanation for the marine organisms (no species enumerated) that they can no longer find in their ancestral waters. He made an analogy where he asked other members of the community, "Why, if your children go somewhere else, will you not go and look for them?"

4.6. Local coping strategies with social-ecological changes

The chieftain and other members of the community recalled how life before was easy compared to their lives now, which one member of the community (male, in his early 30s) attributed to "constant hunger."

One of the women (in her late 30s) shared that now they go deeper into the forest in search for food. She stated that she would go and look for root crops like *gabi* or taro (*Colocasia esculenta*) despite the itchiness that the plant brings. She further added if she is not able to find food, she would just stay at home hungry instead of stealing from other people's food supply.

The chieftain also mentioned that life was "abundant" up until the birth of his third child (between 20-25 years old). He also narrated that during the time when cutting trees or *rattan* palm *(Calamus* spp.*)* were still not widespread, produce from his swidden plots could fill his *kamalig* or storage area with a height of an arm span and a half. Likewise, the women recalled that the amount of rice they harvested from their swidden plots in 1975 could surpass the height of an average man.

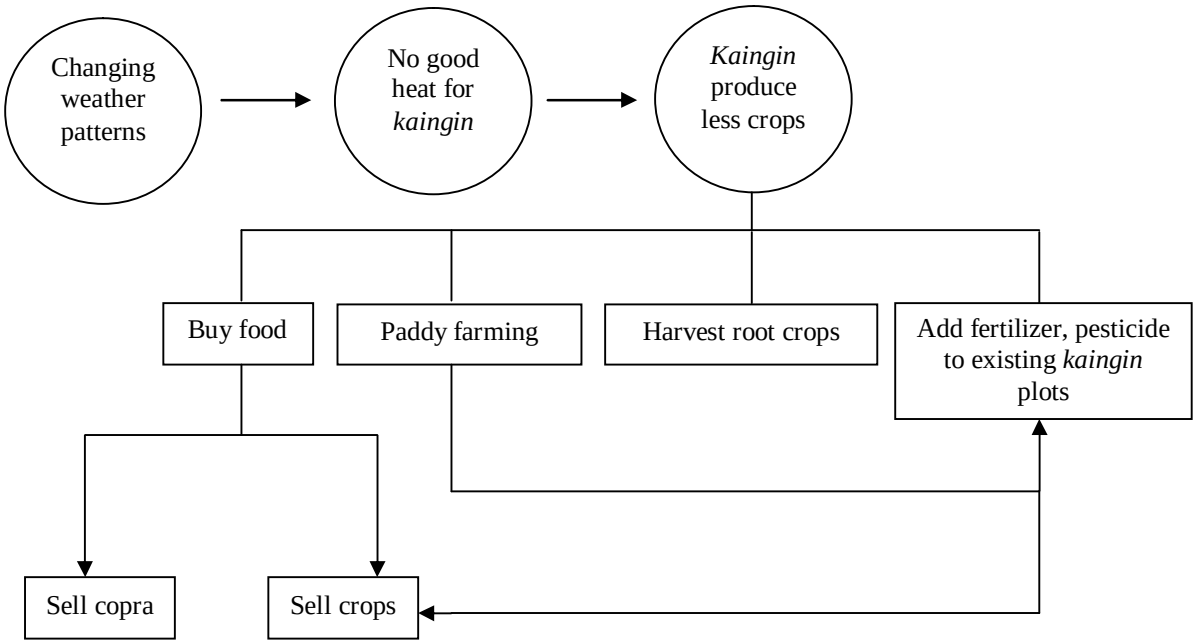
However, now that swidden is no longer productive, they have turned to other means (see Figure 4). One is rain-fed paddy-rice farming (rented paddies) or tilled swidden, which some women say as better because the soil is softer and weeding is easier. Yet another option is to subsist on root crops or to buy food, if there are any financial resources at hand. In order to have income, some of them are engaged in copra-making or selling native agricultural products on weekly market days called *tabuan*.

From the narratives of the community, it was during the 1970s when their life completely changed for worse. Prior to 1975, they narrated that they were still engaged in a barter system, where the terrestrial and coastal members of the group would exchange commodities without any monetary valuation. One member of the community recalled that it was in 1975 that they became aware of what money is. According to the community, this is also the year that the mining company at the other side of the mountain started their operations. The community recalled that exploration began in the year 1967.

Along with their integration to the monetary system is their exposure to unnatural products, such as chemically-processed foods like canned goods or soy sauce. The chieftain recalled that one of their elders in the earlier times cannot eat meat seasoned with salt or soy sauce. Likewise, the BOT member of the BPPI noticed that their life expectancy has lowered

compared to the average age of 100 to 120 in the earlier days. He attributed this to their consumption of unnatural food, which they still continue to do so despite this awareness.

Figure 4. Impact of changing climate on subsistence and local responses



5. Discussion

This chapter summarizes the research results and examines the relationships of social-ecological dynamics, multi-level governance, and perceptions of environmental change in determining the adaptive capacity of the indigenous Palaw'ans in *Sitio* Cadulan in *Barangay* Panalingaan, Rizal, Palawan. The social-ecological dynamics in the research site give insight into the architecture of entitlements of social actors as well as the resilience of the ancestral domain. Lastly, local perceptions of environmental change give an indication of the transformability of the Palaw'ans and the resilience dynamics occurring within and outside their area.

Summary of research findings and overview of discussion

Institutional interplay

According to the narratives of the community, external agencies such as non-government organizations (specifically CIP, ELAC, PNNI) and people's organizations (BPPI) seem to be more visible and more accessible to the Palaw'ans than internal governmental agencies. During the field visit, an event called *Pasasalamat* (Thanksgiving) was held for the water system grant from CIP. Local and municipal government officials came and a representative from the national agency PCA also came to distribute biological controls earwig (exact species unknown, either *Nala lividipes* Duf. or *Euborellia annulata*) for the pest coconut leaf beetle (*Brontispa longissima*). Similar efforts from internal governmental agencies may increase the adaptive capacity of the Palaw'ans to local and global environmental changes as long as these efforts are well-informed and designed with the local situation in mind. An example of a well-intended but misinformed support would be the use of the species *Nala lividipes* Duf. (black earwig) as a biological control, which has long been known as a pest to corn (Hargreaves 1970). While this may be a biological control for coconut leaf beetle, it is a potential pest to corn, which is also one of the crops planted by some in the Palaw'an community. These results are the bases for the subsection on multi-level governance.

Social-ecological dynamics

The Palaw'ans have a high dependence on natural resources and land for subsistence and livelihood. Root crops such as *kamoteng kahoy* or cassava (*Manihot esculenta*) and vegetables such as *langkawas* and *batbat* (common and scientific names unknown) are examples of natural resources that are valuable for the subsistence of the Palaw'ans. Land

(soil) is also valuable especially for agricultural practices (swidden or paddy) and livelihood opportunities (fruit trees such as coconut trees for copra-making). Part of the ancestral domain is declared part of the Mount Mantalingahan Protected Landscape (MMPL), where no new areas can be opened up for swidden cultivation. This research finding is the basis for the subsection on social-ecological dynamics and the architecture of entitlements (Adger and Kelly 1999). The ability to cope or adapt to stress in a particular group is determined by the extent to which they are "entitled" to utilize these resources (Sen 1981, 1990 as quoted in Kelly and Adger 2000).

Global and local environmental changes

The Palaw'ans seem to be affected by both local and global environmental changes. Some of the pests that have arrived in their area have been attributed to mining at the other side of the mountain (Rio Tuba Nickel Mining Company or RTNMC). According to interviews, the Palaw'ans believe the black bug (*Scotinophara coarctata*) arrived with the ship of RTNMC presumably in the 1970s. They mentioned that old and new pests are now affecting all of their crops and not sparing even *kamoteng kahoy* or cassava (*Manihot esculenta*). Old pests include golden *kuhol* or the golden apple snail (*Pomacea canaliculata*) and the black bug. The more recent pests identified are the bullfrog, rats and mice, earthworm, *tiyangaw* (insect), an insect which has no wings but jumps on the rice stalks, and another insect which just arrived this year, which feeds on the stalk of *kamoteng kahoy* or cassava.

The Palaw'ans also seem to be affected by global environmental change, specifically climate change. Many have noted that the heat has become unbearable compared to the earlier times, with one woman in her mid-40s citing that at 09.00 in the morning, the sun's rays are already stinging and this makes it difficult to continue work in the fields. However, despite the increased intensity of heat, they have pointed out that the wet and dry seasons have changed, with erratic weather patterns that some attribute to the earth being "old" or the times or seasons having "no direction." This has, thus, been cited several times as a cause for the abandonment of swidden cultivation, with both men and women participants saying that there is no longer "good heat" for doing the burning phase of swidden cultivation due to erratic rain episodes. It has been mentioned that if the swidden plot has not been burned properly it results in the soil being less fertile and more weeds will grow in the plot. In addition, they also mentioned that the rice does not grow well in plots that were not burned properly. The Palaw'ans state that it is no longer worthwhile to pursue swidden cultivation

when the local and environmental changes are put together. They have then turned to other sources of subsistence such as rain-fed paddy farming, swidden that uses tillage instead of burning, gathering of other root crops or buying food sources from the market. An assessment of land-cover transformations in tropical forest-agriculture areas worldwide by van Vliet *et al*. (2012) show that swidden cultivation in Southeast Asia appear to be faster than in other regions. This research finding opens up the subsection on local perceptions of environmental change and the corresponding responses to the perceived changes, which affect the resilience dynamics within and outside the research site.

5.1. Multi-level governance

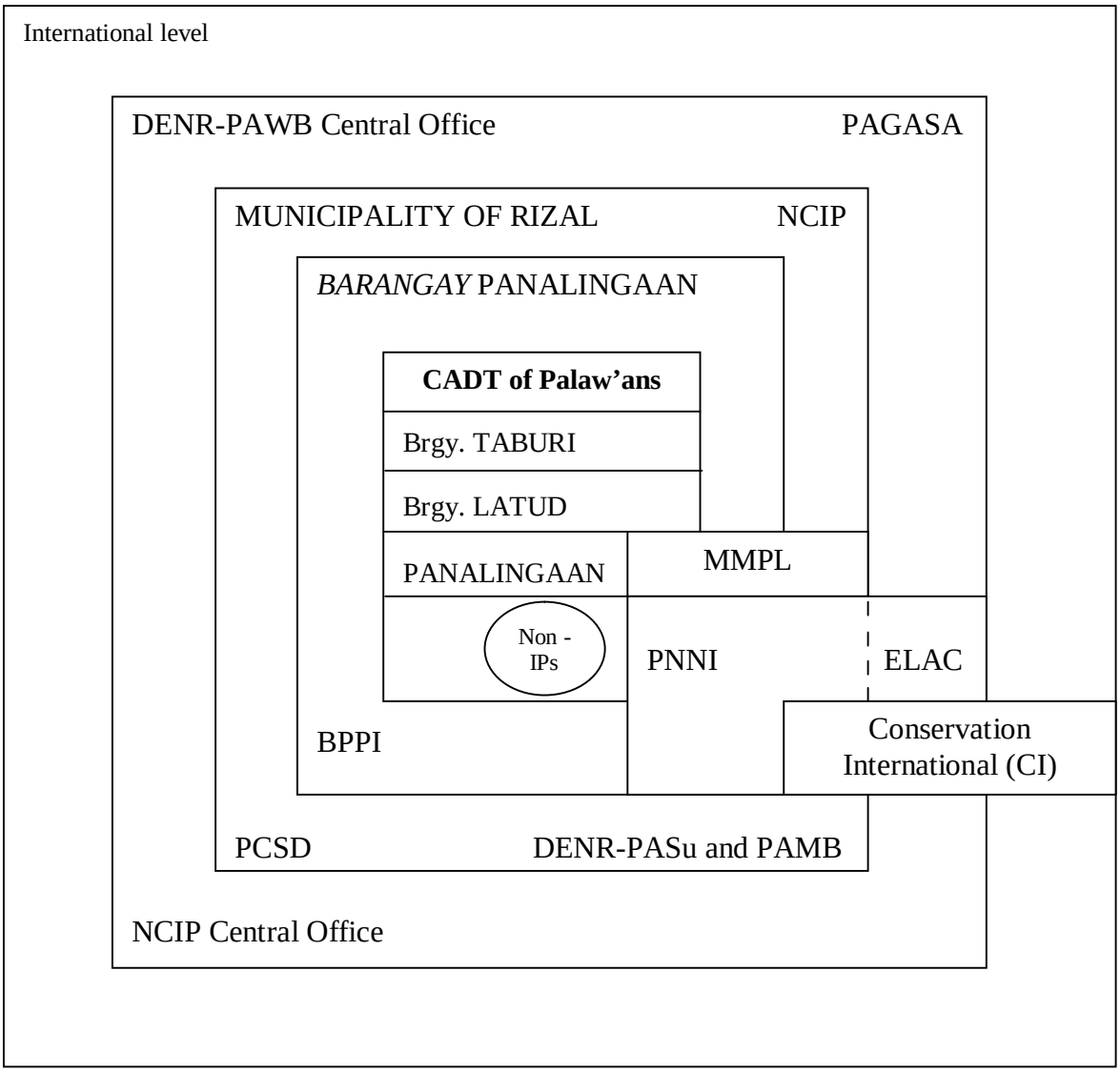


Figure 5. Multi-level institutions and the project site

Institutions have been identified as important for coping and for fostering adaptive capacity (Berman *et al*. 2012). While not necessarily referring to organizations or physical structures, institutions are consequently understood to be made up of rules, norms, and cultural beliefs (Pahl-Wostl 2009; Scott 2001 as quoted in Berman *et al*. 2012). One institutional level identified in the research is that of the Palaw'ans in *Barangay* Panalingaan. As stated in the results section (4.3.5.), the Palaw'ans speak of *batas ng katutubo* or law of the indigenous peoples that they have long been observing. Despite these, they are still subject to the laws of the state, to which their indigenous laws are subordinate.

5.1.1. Local institutions as social networks

The IPRA law (1997) of the Republic of the Philippines has a chapter on self-governance and empowerment for the indigenous peoples, where the inherent right of indigenous peoples to "self-governance and self-determination" are recognized by the state, along with the "integrity of their values, practices and institutions." In addition, the state guarantees the right of indigenous peoples to "freely pursue their economic, social and cultural development" (IPRA 1997). Under the same chapter of the IPRA law (1997), a provision stipulates that indigenous peoples may also form a separate tribal *barangay* but in accordance to the Local Government Code of 1991 (Republic Act no. 7160).

The Local Government Code of 1991 states that *barangays* may be created "out of contiguous territory which has a population of at least two thousand (2,000) inhabitants […]" or by Act of Congress, notwithstanding the previous condition. One of the BOT members (male, in his early 60s) ran for office as *barangay* chairman in the 2010 elections but lost by 50 votes. Additionally, he said that he would petition for the creation of a tribal *barangay* for their indigenous group in order to properly govern the Palaw'an group in their *barangay* (Panalingaan) and manage their part of the ancestral domain better.

Currently, Palaw'ans in the three *barangays* that the CADT covers are organized by the PO BPPI (see Figure 5). This brings to mind what the current president of the BPPI said, "If we were not organized and did not have any system of leadership, we would not have this CADT today" (Japson, pers.comm.). He stressed the importance of a leader in organizing and unifying the community. He referred to other IP groups in Palawan, saying that they are in a more difficult situation because they do not have any system of leadership. BPPI typifies an informal network that developed in a bottom-up process, with no formal linkage to formal governance and management regimes (Pahl-Wostl 2009). BPPI also demonstrates the

limitation of an informal shadow network, which is weak influence on policy and real implementation despite having an autonomy that increases their ability to self-organize, innovate and think creatively (Pahl-Wostl 2009).

The community constantly mentioned the lack of assistance from governmental bodies despite requests from the community. The BOT member repeatedly shared that it was his retirement pay a couple of years back that paid for seedlings of fruit-bearing trees such as coconuts that have been distributed to his fellow Palaw'ans for planting. They are now benefiting from these trees both for subsistence and livelihood. This BOT member serves as both "maven" and "connector" in the community, where his altruistic nature and influence on fellow Palaw'ans go beyond information-sharing (Gladwell 2000 as quoted in Folke *et al*. 2005).

The community members themselves support each other for job generation, an example of which is copra-making. The working relationship is not strictly on employment terms but that of giving assistance to both sides. While the Palaw'ans do not have a strong network of engagement with governmental bodies, they seem to have a significant capacity for collective action. A more recent demonstration of collective action is their maintenance of the water system from a sub-grant from the CIP. The Palaw'an community in *Sitio* Cadulan have formed themselves into a local water users' association called *Danum na Buwal et Mundugen*, which agreed on terms and actions on maintenance of the water system (CIP 2012). They have a monthly tree planting activity that aims to plant fruit-bearing trees as markers along the water pipes. They also specified a cleaning schedule for the water tanks.

The community's social memories on water availability and water quality helped in their self-organization as well as demonstrating framed creativity in the creation of maintenance mechanisms (Folke *et al*. 2005). On water availability, the women shared that, during the summer season prior to 2011 and 2012, the water wells would always dry up and it was always a race among families to the water well in the morning. Conversely, the water-related deaths in April 2011 of fellow Palaw'ans, while not believed to be caused by faecal contamination, still served as a reminder to the community on water quality.

Tompkins and Adger (2004) suggest that collective action and its preconditions may increase the resilience of a community to changes. The case of the Palaw'an community in *Sitio* Cadulan demonstrates the three principles for collective action. These principles state that there is a greater chance of success in smaller groups than in larger groups, an equitable

distribution of entitlements lead to greater success and alternative institutional designs overcome failures of collective action (Tompkins and Adger 2004). In addition, the Palaw'an community demonstrate social learning in terms of turning subsistence sources (cassava) into potential livelihood sources. The Palaw'an community, as well as the BPPI, have exhibited sustained development of attitudinal and behavioural change since their direct application for CADT. The success of the cassava flour grinder is yet to be seen, as Adger (2001) points out that important subsistence farming systems do not have "developed hedonic markets." There is a possibility that the income the Palaw'ans would generate may potentially be less than what the product is really worth. The CIP field officer mentioned that during market days, the agricultural products of the IPs are usually bought at a price lower than the market price. This is a potential hurdle for the Palaw'ans, but this may also be a point for social learning of the community. Knowledge gained from social learning may be able to guide future decisions of the community. Having a knowledge bank or a developed social memory reinforces the adaptive capacity of the community. Apart from the knowledge gained, the process of social learning itself is important in the community's ability to respond to any changes.

5.1.2. Shifts in governance

The decentralization of the Philippine government may be a response to the critique that centralized institutions are not effective, as they lack the needed multi-scale outlook and associated flexibility that is required to solve problems occurring at scales beyond their understanding (Cumming *et al*. 2006). However, as the research results on vertical coordination show, the government agencies of the Philippines seem to work under a "policy silos," where there is a lack of cohesion between the national, regional, and local offices (Cumming *et al*. 2006). An example of this would be DENR, where the central and regional offices have limited information on MMPL and depended on the local level (PASu) for details on MMPL, which they are supposed to monitor. The government agency NCIP also lacks cohesion, as shown by the conflicting permission given to the researcher. The NCIP representative in the PAMB was not aware of the suspension of the FPIC; hence, the researcher was able to obtain permission from the PAMB. The regional office based in Metro Manila, the capital of the Philippines, did not give permission to the researcher to conduct a study and only gave a response three weeks after the request was sought.

The current president of the BPPI surmised that the national or central agencies based in the capital have yet to show concern for the local level. As decisions are still done

centrally, there is a tendency that decision makers are unaware of the real situation "on the local level" (Cumming *et al*. 2006). This consequently leads to a spatial mismatch, where decisions are done on a broad-scale level to address fine-scale situations. A demonstration of this would be the classification of Palawan as "not as vulnerable" by the government agency NEDA, since Palawan is not along the "vulnerable eastern seaboard." This might causing a lack of attention to the province, due to broad-scale level perceptions based on projections. However, this research was able to demonstrate that Palawan, specifically at the local level of the indigenous Palaw'ans, is still vulnerable to climate change impacts even if projections say otherwise. This confirms the theoretical assertion made by Turner *et al*. (2003) that there is strong variation in vulnerability by location, hence, place-based analysis are important.

5.1.3. Polycentric governance and bridging organizations

The case of the MMPL demonstrates polycentric governance where many different actors are involved in policy development and implementation (Mayntz 2006 as quoted in Pahl-Wostl 2009). Different institutions such as PCSD, DENR-PASu, NCIP, and CIP are involved in the development, formulation, and implementation of public policy through the PAMB, which are in addition to existing government policies (Rhodes 1997 as quoted in Pahl-Wostl 2009). The PAMB represents the "many centres of decision making" that transcend jurisdictions and incorporate other types of coordination (Pahl-Wostl 2009). While this may be indicative of co-management, the research results suggest that there is still room for improvement in vertical linkages.

Berkes (2002), as quoted in Tompkins and Adger (2004), characterizes co-management as the delegation of rights and responsibilities from the government to local resource users, thereby involving vertical linkages. Responsibilities were delegated to the local communities as stipulated in the prohibited acts section of the NIPAS Act (1992) but these consequently diminished the local communities' rights to observe their traditional practices. This is supported by one of the narratives described in the results section. A rhetorical question posed to the PASu, "Which is more important, man or wood?" pertained to the prohibition of swidden cultivation (subsistence agriculture) in favour of conservation of wood. Likewise, this shows how the engagement of the government with the indigenous peoples may only be limited to the law implementation phase. Involving the indigenous peoples during the conceptualization of the law would have been helpful in garnering support for the law implementation phase.

Pahl-Wostl (2009) states that involving local actors in the construction of formal institutions will increase compliance and effectiveness, as these local actors are designing the very same institution that will govern their behaviour. This is why Tompkins and Adger (2004) argue that sustainability of plans and their implementation are uncertain when collaborative planning is not practiced. Collaborative planning is contingent on "when" or at which point of the planning process were the local stakeholders involved. Informing the local stakeholders when the plan has already been formulated is a form of tokenistic engagement, which does not pass for collaborative planning. In the case of the Palaw'ans, it seemed that collaborative planning has not been conducted, leading to non-compliance of the community on prohibited acts. However, it is also important to note that this might also be due to a lack of social connectivity between the community and the government. When there is a connection between two social actors, there might be room for communication, coordination, common agreement (*inter alia*) that may facilitate understanding (Bodin and Tengö 2012).

Organizations that have an intermediary function that may facilitate understanding between disconnected social actors, such as the government and the indigenous community, are called boundary or bridging organizations (Cash *et al*. 2006). The NGO CIP can be called a "bridging organization" for their work on establishing MMPL as well as livelihood projects for communities within the MMPL. They have, indeed, provided a space for co-production of knowledge, trust building, learning, and vertical and horizontal collaboration (Berkes 2009; Folke *et al*. 2005) for both the MMPL management and the local communities. In some ways, this is also the case for ELAC and PNNI, which coordinate with several government agencies in monitoring for environmental compliance.

A consequence of the engagement of CIP with the local community is an emerging space of dependence. This space of dependence is indicative of the trust that the community has accorded to NGOs. As mentioned in the results section, community members would always cite the NGOs as sources of assistance. Folke *et al*. (2005) point to trust as the basis of all social institutions and essential to social influence, which CIP can exert on the community and on the PAMB as well. Social influence is important for CIP in terms of fulfilling their project aims and objectives. However, too much trust may also lead to automatic acceptance of any knowledge given by influencing social actor. This may discourage creativity and critical thinking in the dependent social actor.

As a bridging organization, CIP has made scientific knowledge relevant to policy and action through its work on the MMPL (Folke *et al*. 2005). As Wondolleck and Yaffee (2000 as quoted in Folke *et al*. 2005) point out, the assistance, leadership, and social incentives for collaboration that bridging organizations bring are important in building adaptive capacity. The presence of CIP as a bridging organization may reinforce the adaptive capacity of the Palaw'ans. However, too much dependence of the Palaw'ans on CIP may potentially lead to a limited adaptive capacity of the Palaw'ans through the decline of creative and critical thinking processes as a community.

5.2. Social-ecological dynamics

Using the framework developed by Bodin and Tengö (2012) to model a SES as a social-ecological network, the research site is found to have both symmetric and asymmetric access to ecological resources. Social actors for the symmetric resource access are the individual families of Palaw'ans. For the asymmetric resource access, apart from the individual Palaw'an families, the *diwan* or the non-indigenous peoples are also social actors.

The symmetric resource access (one-to-one resource access) is exemplified by the type of land ownership prevailing within the community in their ancestral domain. Each individual family has their own land, which has been passed on to them by their forefathers. Each family has exclusive access to the ecological resource on their land and, therefore, has no direct resource sharing occurring between each other (Bodin and Tengö 2012). This form of resource access is also suggestive of the community's collectivist nature, which allows them to peacefully co-exist as a community. As Bodin and Tengö (2012) state, this type of resource access has little risk of turning the SES into a tragedy of the commons (Hardin 1968). Hence, within the community there is little risk of each family of Palaw'ans competing for the same resources.

The asymmetric resource access, on the other hand, is exemplified by the Palaw'ans' ownership of their ancestral land and waters, which *diwan* or non-indigenous peoples fundamentally have no rights to access and exploit. The mediated resource access states that the only way for one of the social actors to gain resource access is through the other social actor (Bodin and Tengö 2012). This is exemplified by the case of the non-timber forest product harvesting, which has already been detailed in the results section (4.3.3.). This case is the harvest of non-timber forest products in the ancestral domain by the indigenous community, which they sell to licensed holders. While it may be thought that the indigenous

community is in a more favorable position being the actor with direct access, the opposite is the actual situation, where the IPs are dependent on the licensed holders for income. They have access to resources, but this access does not automatically translate to subsistence or livelihood.

The framework by Bodin and Tengö (2012) is useful in characterizing the resource access in a SES such as the research site. The researcher of this thesis study agrees with Bodin and Tengö that their analysis of the relationships between the relational characteristic of SES and governance challenges need additional theoretical- and empirical-based explanations. The framework needs to be refined in terms of incorporating the influence of "disconnected" governance (such as that of the MMPL PASu or PAMB) that does not access resources in the SES but nonetheless makes decisions on the access of resources by the social actors. Multi-level governance also has a role in SES and this demonstrates one of the interrelationships among the units of analysis that affect the adaptive capacity of the community. Access to resources is similar to entitlement to resources, which will be discussed in this subsection along with social-ecological dynamics and their impact on the resilience of the research site.

5.2.1. Entitlement to resources

A study by van Vliet *et al*. (2012) focuses on the decrease of swidden agriculture in tropical forest-agriculture frontiers. Their meta-analysis found that there is a trend of cessation in swidden cultivation in forest agriculture frontiers, especially in Southeast Asia (Padoch *et al*. 2007 as quoted in van Vliet *et al*. 2012). van Vliet *et al*. (2012) attribute the high rate of decrease in swidden cultivation to government policy prohibitions on swidden or government incentives on conversion to permanent agriculture.

The prohibition of swidden cultivation in the Philippines is consistent with the study of van Vliet *et al*., especially on the grounds of government prohibition. As shown in the results section of this research, the NIPAS Act (1992) prohibits swidden agriculture. However, as stated by the NCIP regional commissioner, there have been studies confirming the ecological value of swidden agriculture especially when compared to permanent agriculture like paddy rice farming. An increase in soil erosion and decrease in soil fertility have been associated with paddy rice farming (Vu 2007; Ziegler *et al*. 2009 as quoted in van Vliet 2012). In addition, wild biodiversity and agro-biodiversity have declined also because of paddy rice farming and monoculture tree crops (Rerkasem *et al*. 2009; Xu *et al*. 2009 as quoted in van

Vliet 2012). The study of Novellino (2010) on the *Bataks*, another group of indigenous peoples in Palawan, has shown that the ban on swidden agriculture in Palawan altered the entire agricultural system, with local varieties of rice becoming rare or extinct. An interview with the eldest *Batak* by Novellino gave an insight on the practice of swidden, where he said,

> "[…] because of government restrictions to cut old fallow forest, the people clear their swidden plots after three to five years, when trees have not even reached the size of a leg. When you burn them, little ashes are produced – not enough to make your rice healthy."

Padoch and Pinedo-Vasquez (2010 as quoted in van Vliet *et al*. 2012) suggest that swiddening promotes biodiversity through short cultivation periods, long fallows, and the varied character of traditional systems. The latter resonates with what Altieri (2004) states about small-scale multiple cropping systems having higher productivity per unit area than mono-cropping systems of the same level of management. One swidden practice of Palaw'ans can be considered a small-scale multiple cropping system, which the chieftain described as planting different crops altogether in one swidden plot. The chieftain added that these crops would grow at different times, even if they are planted at the same time.

It is important to note, however, that the research results show that the Palaw'ans are slowly abandoning swidden cultivation due to erratic weather patterns, which result in a lack of the intense heat that they need for burning their swidden plots. Conversely, the prohibition of new swidden plots as a result of government interventions are consistent with other studies (Novellino 2010; van Vliet *et al*. 2012) and gives an insight into the architecture of entitlements (Adger and Kelly 1999) prevailing within the community.

The prohibited acts stated in the NIPAS Act (1997) are an issue of entitlement. The former chairperson of the UN Permanent Forum on Indigenous Issues stated in a conference that indigenous peoples "remain in very vulnerable situations because most States do not recognize their rights to these forests and the resources found, therein" (Tauli-Corpuz 2007 as quoted in Davis 2010). Governments control the resources originally belonging to indigenous peoples and the indigenous peoples lose their resource base, which is their source of subsistence and livelihood. A lack of a readily available resource base decreases the adaptive capacity of the indigenous peoples.

In the case of protected areas and forest reserves, deforestation trends may have been slowed down but at the expense of local food security, where conservation measures have led to a decrease in the land available for subsistence agriculture (Belsky and Siebert 2003;

Thongmanivong *et al*. 2005; van Vliet 2010 as quoted in van Vliet *et al*. 2012). A diversified and accessible resource base is seen as a first level protection of indigenous peoples against unpredictable environmental changes (Salick and Ross 2009). This is supported by the statement of Adger and Kelly (1999) on entitlements as determining the ability of a population to cope with and adapt to stress.

The Philippine laws, however, seem to contradict each other when it comes to the utilization of resources by indigenous peoples in their ancestral domains, which are coincidentally protected areas. The IPRA law (1997, p.66) section 57 on natural resources within ancestral domains states that, "The ICCs/IPs shall have the priority rights in the harvesting, extraction, development or exploitation of any natural resources within the ancestral domains." The NIPAS Act (1992, p.38), on the other hand, prohibits the activities stated in the IPRA law section 57 unless there is a permit from the PAMB. While the rights of the indigenous peoples have been formally recognized in the IPRA law (1997), the NIPAS Act (1992) limits the exercise of these rights. The indigenous peoples have an entitlement to resources but access to these resources is contingent on several conditions.

When it comes to access to resources, the Palaw'ans seem to be limited by the institutions governing them. Traditional styles of environmental management have often excluded users through the top-down application of scientific knowledge in inflexible programs (Tompkins and Adger 2004). Such types of management may be inflexible to change, resulting in a time lag between changes in the environment (e.g. climate) and changes in institutions and, ultimately, resulting to maladaptive policies (Barnett and O'Neill 2009). Multi-level governance has a role in social-ecological dynamics and the management style currently in place in the research site seems to be traditional. This has a negative impact on the adaptive capacity of the Palaw'ans.

5.2.2. Spatial resilience

Cumming (2011) states that the spatial variation inside and outside of the system influences and, in return, is influenced by the resilience of the system across spatial and temporal multi-scales. The research site is constituted by two interacting boundaries: one is the ancestral domain and the other is the MMPL. The internal and external elements of these two systems influence the resilience of the research site and the Palaw'ans.

While the ancestral domain is already a hard boundary limiting the access of resources of *diwan* or non-IPs, the MMPL can be considered a "harder" boundary in the

sense that access is limited and anyone caught violating the prohibited acts is punishable by law. Likewise, as a "harder" boundary, ancestral domains that are under the MMPL earns more respect from potential violators than the ancestral domain of the Palaw'ans. As the CIP programme manager relayed, there was a request from the former president of the BPPI (a member of the indigenous group *Tagbanua*) to have adjacent ancestral domains also declared under MMPL. The CIP programme manager surmised this request was asked on the grounds that protected areas have an added "protection" from resource exploitation compared to an area just being an ancestral domain, whether formally recognized or not. Power dynamics also have an effect on how "hard" a boundary is.

The issues surrounding swidden cultivation exemplify spatial variation in temporal dynamics. Foremost, the changing weather patterns have caused the increasing abandonment of swidden cultivation by the Palaw'ans, which results in alteration of the landscape in favour of permanent agriculture such as paddy rice farming. The consequences for biodiversity and agro-biodiversity have already been stated in the previous section. Secondly, the prohibition of opening new swidden plots has resulted in shorter fallow periods in existing plots, which might have consequences for succession, re-colonization, and re-vegetation of the area. This is one of the further research areas that this thesis opens up. Studying the sustainability of swidden cultivation and its ecological benefits may inform the prevailing conservation discourse, which restricts forest clearing and encourages commercial agriculture (van Vliet 2012). The intensification of agriculture may even have worse consequences than forest clearing, especially in the research site, which site exhibits location-based spatial variation. This possibly explains the high biodiversity in the area, resulting to the indigenous peoples' diverse knowledge of ecosystems (Altieri 2004).

While there have yet to be a comprehensive land assessment for the research site, a transect walk showed that the research site has limestone, mangrove, and primary and secondary forests with multiple watersheds. The community, as detailed in the results section, benefit from the research site in different ways. The research site offers multiple ecosystem services and the social-ecological dynamics are indicative of a co-evolutionary process between the Palaw'ans and their ancestral domain. The ecosystem appropriation by the Palaw'ans is a result not only of observation but also on experimental learning (Altieri 2004). It is also interesting to note that indigenous peoples' knowledge of ecosystems may also go beyond the boundaries of their ancestral domain and extend to other ecosystems that exhibit

connectivity with their ancestral domain. The Palaw'ans' awareness of the situation in the South China Sea (SCS), also called the West Philippine Sea (WPS), is indicative of the extent of their knowledge of ecosystems.

The SCS or the WPS borders the research site on the west. The SCS/WPS has connectivity to the Pacific Ocean, which has an impact on the circulation dynamics of SCS/WPS with the Sulu Sea and the region around the Philippines (Metzger and Hurlburt 1996). In addition, the complex geometry as a marginal sea and the proximity to the Tropic of Cancer of the SCS/WPS leading to seasonal monsoon climate also influence the circulation dynamics and the biodiversity of the SCS/WPS (Metzger and Hurlburt 1996; Morton and Blackmore 2001). As a marginal sea, the SCS/WPS is surrounded by land, which is composed of the countries of the Philippines, Malaysia, Indonesia, and Taiwan (Morton and Blackmore 2001). In addition to these four countries, China, Thailand, and Vietnam have also laid claims to the SCS/WPS and have yet to resolve their conflicting claims on these waters (Morton and Blackmore 2001).

This connectivity in the context of the SCS/WPS has led to intra- and international illegal activities in the SCS/WPS and on the island of Palawan, such as wildlife poaching and illegal logging. This has also brought about the influx of migrants from the Visayas and Southern part (Mindanao) of the Philippines, which has been mentioned in results section 4.1. as one of the causes of the high population growth rate in the province of Palawan. This may potentially create a spatial feedback, especially on illegal resource extraction by foreigners, who may not be aware of the depletion of resources in the area and only serve to increase the risk of a regime shift by accelerating the system's approach to its carrying capacity threshold.

5.3. Local perceptions of environmental change

5.3.1. Transformability, resilience, and adaptability

Ecological, economic, and socio-political factors have affected the living conditions of the Palaw'ans. Ecologically, a changing climate coupled with the invasion of pests has made their indigenous practice of swidden agriculture impractical. Economically, their former system of trade or barter is no longer honoured especially with non-indigenous peoples. The Palaw'ans have then shifted to a current undesirable state of constant hunger. While they have been in this state or basin of attraction (Walker *et al*. 2004) for a number of decades now, the Palaw'ans have shown they have the capacity to find new ways of making a living. An example would be their plan of fabricating a mechanical cassava grinder as narrated in the

results section. As the Palaw'ans have long lived on subsistence and have only in recent times explored copra-making or paddy rice farming as a means of livelihood, selling cassava flour is a completely new way of living. When ecological, economic, or socio-political conditions of a system make it unsustainable, a fundamentally new system may be created if there is the capacity to do so (Walker *et al*. 2004). This capacity is called transformability, which introduces new mechanisms and ways of making a living (Walker *et al*. 2004). The Palaw'ans have demonstrated their transformability through their plan for the cassava grinder.

Despite this, the resilience of the SES of the Palaw'ans in *Sitio* Cadulan remains to be seen. The study's focus on adaptability or capacity of the Palaw'ans to influence the resilience of their ancestral domain can only give a limited view of the overall resilience of the area (Walker *et al*. 2004). In the same vein, some Palaw'ans seem to have influenced the resilience of their SES by using agricultural inputs such as chemical pesticides and fertilizers on their swidden plots. This coping strategy may sustain their swidden cultivation for the short-term, but a longer-term study is needed to ascertain whether this will succeed in bringing back the productivity of their subsistence agriculture. This is in line with what Lal (2008) states that soil degradation, water pollution, and air contamination result from the indiscriminate use of chemicals and excessive tillage, both of which are being practiced by the Palaw'ans albeit in a non-indiscriminate and non-excessive way. Whether these chemical pesticides and fertilizers are suitable adaptation strategies in the long-term or not, the social network of the Palaw'ans provides an atmosphere conducive for social learning. The social network plays a role in the transformability of the Palaw'ans. In addition, the social network also shapes the local perceptions of change through collective thinking processes.

5.3.2. Alternate states and resilience dynamics

While it is not within the scope of the research to do a biological or ecological survey or to explore exposure and sensitivity of the SES, the research has found interesting manifestation of alternate states and resilience dynamics in the research site. The loss of species in the area may have led to a decrease in resilience through trophic cascades and decrease of functional-group diversity (Folke *et al*. 2004). In addition, the research has also gathered information on the impacts of a changing climate and cross-scale interactions as a potential consequence of resource extraction activities such as mining.

During a transect walk to the water system (N 08°43.614' E 117°27.079'), two alternate states were seen existing in the karst aquifer water source (see Appendix 13). At the entrance of the karst aquifer, one side is characterized by clear and free-flowing water (see left side of the photo on Appendix 13). The other side, which has been sealed with cement and attached to a water pipe of the water system, is characterized by turbid, slow-moving water with sedimentation. There were also small fishes present in the turbid, slow-moving water with sedimentation.

While the water system was constructed with a filter tank, the clear and free-flowing water is still desirable over the turbid, slow-moving water as water source. This may, eventually, have consequences not just for water quality but also for nutrient cycling in the area where the water flows. Whether this will eventually lead to regime shifts remains to be known. A spatial feedback between the community and the water system may also occur, owing to the different locations of the two and their considerable distance from each other (see Appendix 14). The transect walk to the water system has shown that the water flow is quite strong; however, participant observation has shown that the community still has room for improvement when it comes to managing water use such as closing the faucet when right after use.

A potential source of another regime shift would be loss of functional groups. Some of the species enumerated in the results section 4.5.2., especially those with restricted ranges, constitute functional groups in MMPL. One example would be the grey imperial pigeon (*Ducula pickeringii*), which feeds on the fruits of *Ficus procera* (common name unknown) and *Ilang-ilang* or perfume tree (*Cananga odorata*), tree species which can be found in primary forests and secondary habitats (Riley 2003). *Ficus procera* usually grows on alluvial sites, near or along rivers and streams (NHN n.d.) while *Cananga odorata* is known to tolerate periods of waterlogging (Manner and Elevitch 2006). Both of these species may be important for flood management and the loss of these species may lead to a regime shift especially in periods of heavy rain.

Another area of potential regime shift would be the increasing number and kinds of pest in the area. These are attributed by the community to land use and land cover change as well as to mining activities at the other side of their mountain territory. Conversely, the changing climate might also be encouraging the survival of these pests in the research site. It is also unknown whether these pests (except for the golden apple snail and the bullfrog) are

alien species or native species expanding their range. This is one area that needs further research, especially since the community has stated that these pests are infesting all their possible food sources. In addition, some of the pests have only arrived recently in the past two years (2011-2012). It is important to note, however, that the pests golden apple snail (*Pomacea canaliculata*) and the bullfrog (scientific name unknown) were introduced as alternative food sources, which eventually became invasive species. As one of the community members pointed out, the golden apple snail and the bullfrog are also wiping out the native species of snails and frogs.

It is also important to look at the possibility of ships of mining companies bringing in invasive species. While most of the studies on invasive species introduction by transoceanic vessels have focused on ballast water introducing marine and aquatic species (Costello *et al*. 2007), the possibility of arthropod species and others as invasive species is not excluded. This is a second area for further research, as some researchers like Crooks and Soulé (1999) caution that it may not be long before invasive species outdo habitat destruction and fragmentation as major causes of ecological degradation.

The narrative of some of the indigenous peoples regarding the presumed diarrhea outbreak that killed some of their fellow IPs living within the mountains (section 4.3.5.) is worth looking into, as there are studies documenting heavy metal pollution on local soils and waters within mining areas (Liu *et al*. 2005 as quoted in Liao *et al*. 2005). Mining, along with industrial processing, is one of the main sources of heavy metals in the environment through mining operations coupled with grinding, ore concentration, and tailing disposal (Boamponsem *et al*. 2010). The narrative of the Palaw'ans that there was a fog that hovered above their area prior to the presumed diarrhea outbreak that caused deaths within 24 hours could be explained by the study of Cape (1992), which states that fog and cloud may contain greater concentrations of pollutant ions than rain. The study by Cape was conducted on vegetation in mountain and coastal cloud, with the conclusion that the montane forest growing close to the cloud base have vegetation that are at risk of injury due to the high concentration of ions.

This is a third area for future research, to see whether acid rain and polluted cloud have contributed damages to soil and vegetation in Mount Mantalingahan and to the health condition of the indigenous peoples living in the mountain. This research area may also give insights into the productivity of the soil in the research site, which the Palaw'ans say is no

longer as productive as before. Field investigations show that crop yield and quality are much lower in mining areas (Liu *et al*. 2005).

The case of the Palaw'ans is interesting in SES research because while it exhibits the interdependencies of the Palaw'ans and their ancestral domain, it also exhibits the impact of another external force, which is not part of the SES at all. The cross-scale linkages manifest through loss of resilience induced by social actors (Palaw'ans, non-IPs, mining companies, or the government), begging a further inquiry of which group of social actors has the most impact.

5.4. Interrelationships of the units of analysis

Multi-level governance has an impact on both social-ecological dynamics and local perceptions of change. The prohibited acts under the NIPAS Act (1997) limit the access to resources of the Palaw'ans traditionally living in the MMPL, which has been declared as a protected area in 2009. This limits the adaptive capacity of the Palaw'ans by reducing access to alternative resource bases. As for local perceptions, bridging organizations such as CIP influence the Palaw'ans' perceptions of change through sponsorship of workshops on topics such as climate change. While the transfer of knowledge from CIP to the community potentially reinforces the adaptive capacity of the Palaw'ans, there is a danger that understanding at the community level is different from what technical terminologies require. As van Aalst *et al*. (2008) caution, there is a gap between complex scientific inputs and the kind of discussions at community level. This is also demonstrated by one of the narratives of the PASu on the climate change mitigation mechanism REDD+, which the PASu mentioned as still incomprehensible for the communities due to the technical nature of discussions (e.g. carbon measurement).

Social-ecological dynamics and local perceptions of change are directly related, with a one-way influence of social-ecological dynamics on local perceptions. Social-ecological dynamics would be clearly affected by global environmental changes, consequently influencing local perceptions of change. In relation to climate change, Salick and Ross (2009) stress that it is a global phenomenon but human responses will be at the local scale. The impact of changing weather patterns on the subsistence agriculture of the Palaw'ans show how local perceptions are indicative of global climate change but rooted in locally-important subsistence sources. This shows how the appropriate governance scale for climate impacts is at the local level and not at the global level (Adger 2001).

6. Conclusion and further research areas

The research aimed to assess the adaptive capacity of the indigenous Palaw'ans through the examination of multi-level governance, social-ecological dynamics, and local perceptions of environmental change. Determining the adaptive capacity of the Palaw'ans through an examination of these three units of analysis is valuable in finding leverage points where intervention can be effectively targeted. The following sections summarize the examinations done on different units of analysis as well as assess how these affect the overall adaptive capacity of the Palaw'ans.

6.1. Conclusion

Through qualitative assessment, their adaptive capacity to environmental changes has been judged to be limited by multi-level governance and lack of access to resources. Social networks, bridging organizations, and the demonstration of transformability by the Palaw'ans reinforce their adaptive capacity to some extent.

6.1.1. Multi-level governance

Overall, the formal institutions in the Philippines seem to have a negative impact on the adaptive capacity of the Palaw'ans, which is a cause for concern since they are mandated to serve the people, including the Palaw'ans. If it were not for NGOs and POs, the Palaw'ans would have a very low adaptive capacity, when it comes to institutional linkages.

Policy silos and polycentric governance resulted from shifts in governance in the Philippine government, where the Local Government Code of 1991 devolved responsibilities to local governments. The research results on vertical coordination show that the government agencies lack cohesion among their national, regional, and local offices. Since decisions are still done centrally, a policy silos affects Palaw'ans through a spatial mismatch, where decisions are done on a broad-scale level that does not exactly address fine-scale situations on the local level. The spatial mismatch serves to decrease the adaptive capacity of the Palaw'ans.

Polycentric governance is demonstrated by the different actors involved in policy development and implementation in the MMPL, where part of the ancestral domain of the Palaw'ans is included. The prohibited acts under the NIPAS Act (1992) coupled with the permission given to Palaw'ans to practice their traditional swidden cultivation in designated traditional use zones may be indicative of co-management in MMPL. However, it seems that

there is an unequal delegation of rights and responsibilities, with the Palaw'ans taking on more responsibilities at the expense of some of their land use rights. This also diminishes the adaptive capacity of the Palaw'ans.

One of the narratives of the PASu about the non-compliance of the IPs on prohibited acts may be due to a lack of collaborative planning or lack of social connectivity between the IPs and the government. On the other hand, social connectivity has been observed in the relationship of the Palaw'ans with CIP, which created room for communication, coordination and common agreement that may facilitate understanding of laws or prohibited acts. In addition, CIP can be considered a bridging organization for their work on establishing the MMPL and their current livelihood projects with communities living within the MMPL. The trustworthy relationship of CIP with the local institution of the Palaw'ans such as BPPI serves to increase the adaptive capacity of the Palaw'ans.

The BPPI, as a local institution of the Palaw'ans of the ancestral domain covering three *barangays*, serves as a social network. Despite having a weak influence on policy and real implementation, being a social network enabled the BPPI to have an autonomy, which increases their ability to self-organize, innovate, and think creatively. This increases the adaptive capacity of the community.

6.1.2. Social-ecological dynamics

With the multitude of social actors (especially indigenous Palaw'ans and migrants) in the research site, competition to access of resources potentially decreases the adaptive capacity of the community. Additionally, multi-level governance also affects the social-ecological dynamics in the area due to its protected area status. Forces external to the SES such as government agencies also contribute to social-ecological dynamics.

As an example, the prohibited acts of the NIPAS Act (1997) have diminished the entitlement to resources of the Palaw'ans. The prohibited act of swidden agriculture shows a spatial connectivity of the Palaw'ans to other tropical forest-agriculture frontiers, where there is a global trend of cessation in swidden cultivation due to government policy. The increasing abandonment of swidden practice by the Palaw'ans due to increased pests and changing weather patterns caused the Palaw'ans to seek alternative sources of subsistence. In the issue of entitlements, the contradictory nature of the Philippine laws becomes apparent; where rights are given, more responsibilities are required. This is the case for the ancestral domain,

as well as the protected area, and this has a negative impact on adaptive capacity in terms of accessible resource base for the Palaw'ans.

The resource base of the Palaw'ans exhibits spatial variation inside and outside of its boundaries. This spatial variation influences and is influenced by the resilience of the system across spatial and temporal multi-scales. For example, the abandonment of swidden cultivation due to changing weather patterns alters the landscape in favour of permanent agriculture such as rice paddy farming. This potentially leads to decreased agro-biodiversity and biodiversity. Another example is the SCS/WPS, which borders the research site on the west. Its accessibility and connectivity to other countries have led to intra- and international illegal activities in Palawan such as wildlife poaching and illegal logging as well as an influx of migrants from other parts of the Philippines that share the same seas. This creates a potential spatial feedback, where users of the resource base are not aware of the depletion of the resources in the area, thereby increasing the risk of a regime shift by continued exploitation of the resource base.

6.1.3. Local perceptions of environmental change

The Palaw'ans demonstrate transformability, which is a positive reinforcement of their adaptive capacity. Despite being in an undesirable state of poverty and hunger, the Palaw'ans have shown that they have the capacity to find new ways of making a living. The plan of the Palaw'ans to fabricate a mechanical cassava grinder reflects the transformability of the community, which seems to be able to introduce new mechanisms and ways of living. Transformability increases the adaptive capacity of the Palaw'ans.

On the other hand, the Palaw'ans have influenced the resilience of the SES of their ancestral domain by using chemical pesticides and fertilizers as agricultural inputs to their farming practices. This coping strategy may sustain the productivity of their swidden or rice paddy plots, but potential positive feedbacks may arise that will keep them in a cycle of pests and chemical agricultural inputs. The increasing number of pests, along with the loss of biodiversity in the area, has the potential to bring a regime shift that will alter the landscape and the social-ecological dynamics in the research site. If the present undesirable state of hunger and poverty revert to a more undesirable state, it will be difficult for the Palaw'an community to persist. Nonetheless, their demonstration of transformability is a positive reinforcement of their adaptive capacity.

6.1.4. Overall assessment of adaptive capacity and theoretical frameworks

The adaptive capacity of the Palaw'ans is limited, especially with the impact of multi-level governance. This demonstrates the theoretical assertion made by Keskitalo (2008) that multi-level governance is part of the circumstance that determines actors' vulnerability and adaptive capacity to change.

The Palaw'ans exhibit a capacity for transformability, but the impacts of external actors are neutralizing the community's resilience. The theoretical assertion of Salick and Byg (2007) that local perception, along with belief, influences the way people respond to climate change is partially demonstrated by the Palaw'ans through the increased abandonment of swidden cultivation. The lack of "good heat" for their traditional swidden practice along with the changing weather patterns has caused the Palaw'ans to seek other means of subsistence. The sustainability of these coping strategies has yet to be seen, especially in relation to other factors such as impact of multi-level governance and the persisting social-ecological dynamics.

This research has empirically proven the theoretical assertion of Adger (2006) that country-level analysis fails to capture spatial and social differentiation of vulnerability occurring at sub-national levels. The Philippine government does not see Palawan as particularly vulnerable due to climate projections, but this research shows that climate change is already affecting Palawan as shown by the place-based study of the indigenous Palaw'ans.

6.2. Further research areas

This study may be considered as a baseline research, which opens up several areas for further research in the research site. As the approach used in this thesis has enabled the identification of emerging themes in the research site, the following further research areas are suggested specifically for *Sitio* Cadulan, *Barangay* Panalingaan, Rizal and the Palaw'ans living in this area:

1. Swidden cultivation and social-ecological dynamics – The ecological benefits of swidden cultivation are not well-established as well as the consequences of spatio-temporal deviations from the traditional practice of swidden. A research into the social-ecological dynamics from the traditional practice of swidden may inform the prevailing conservation discourse that prohibits swiddening. In addition, the impact of a changing climate on the productivity of the swidden plots should be studied.

2. Invasive species and spatio-temporal changes – The increasing number of pests in the research site may be due to land use change or to a changing climate. It is necessary to look into the causes and sources of invasive species as soon as possible, given that pests are infesting all sources of subsistence of the Palaw'ans.
3. Mining impacts and spatial connectivity – The impacts of mining at the other side of the mountain where the Palaw'ans are living may not only be concentrated within the mining site but may also be going beyond to farther areas. The narrative of the Palaw'ans on the presence of a possibly polluted cloud prior to the presumed diarrhea outbreak may be an indication of a spatial feedback of mining. Apart from consequences for human health, the potential ecological consequences of mining for soil and vegetation (heavy metal deposition) even outside of the mining area should be studied.

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Appendix 1. Letters of permission

Bangsa Palawan-Philippines, Inc., (BPPI)
Indigenous Alliance for Equity and Well-being
[illegible]

Abril 18, 2012

Bb. Denise Margaret Matias:

Pagbati ng kapayapaan.

Kaugnay sa iyong hiling na pagpayag para sa iyong pananaliksik sa pamayanan ng mga Palaw'an sa lupaing ninuno ng Panalingaan, malugod kong ipinaaalam sa inyo na base sa napag-usapan ng Kapulungan ng Konseho ng Bangsa Palawan Philippines, Inc. noong ika-28 ng Marso 2012, kami ay nagkasundo na ipakgkaloob sa iyo ang aming pagpayag at pagtanggap. Subalit gusto naming ipaabot sa iyo ang aming mga kondisyon:

1. Nais naming makipagpulong sa iyo bago umpisahan ang iyong pakikipanayam sa iba pang mga katutubo sa lupaing ninuno ng Panalingaan upang mas malaman namin ang iba pang mga detalye ng iyong mga gagawin;
2. Nais naming makakuha ng kopya ng mga nakalap na impormasyon bago ka umalis ng aming lugar, at maipaliwanag mo sa amin ang mga ibig sabihin ng mga resulta na may kasamang malinaw na report.

Ang aming pagtanggap at pagpayag sa iyong pananaliksik ay batay sa aming inaasahan na ang resulta ng iyong pag-aaral ay makakatulong sa aming ginagawang ancestral domain sustainable development and protection plan (ADSDPP).

Salamat at mabuhay!

ROMEO L. SAPSON
President/Project Director

Republic of the Philippines
Province of Palawan
MUNICIPALITY OF RIZAL
-oOo-

OFFICE OF THE MUNICIPAL MAYOR

E N D O R S E M E N T

I hereby endorse the conduct of the study:

Title of Study: Assessing the adaptive capacity of indigenous Palaw'ans in Mt. Matalingahan, Philippines

Location: Barangay Panalingaan, Rizal, Palawan

Proponent: Ms. Denise Margaret Matias

Duration of Study: 3 months (May – July 2012)

Conditions:

1. Researcher to present preliminary results of the study though the Municipal Environment and Natural Resources Office;

2. Researcher to acknowledge the local government of Rizal in publications provide printed of such.

This endorsement is issued without prejudice to the action of MMPL Protected Area Management Board and others agencies.

Issued this 7th day of May 2012.

Approved:

NICOLAS T. MONTAÑO, SR.
Municipal Mayor

Republika ng Pilipinas
Lalawigan ng Palawan
Pamahalaang Bayan ng Rizal
Barangay Panalingaan
Tanggapan ng Punong Barangay

07 Mayo 2012

Bb. Denise Margaret Matias:

Makakalikasang pagbati!

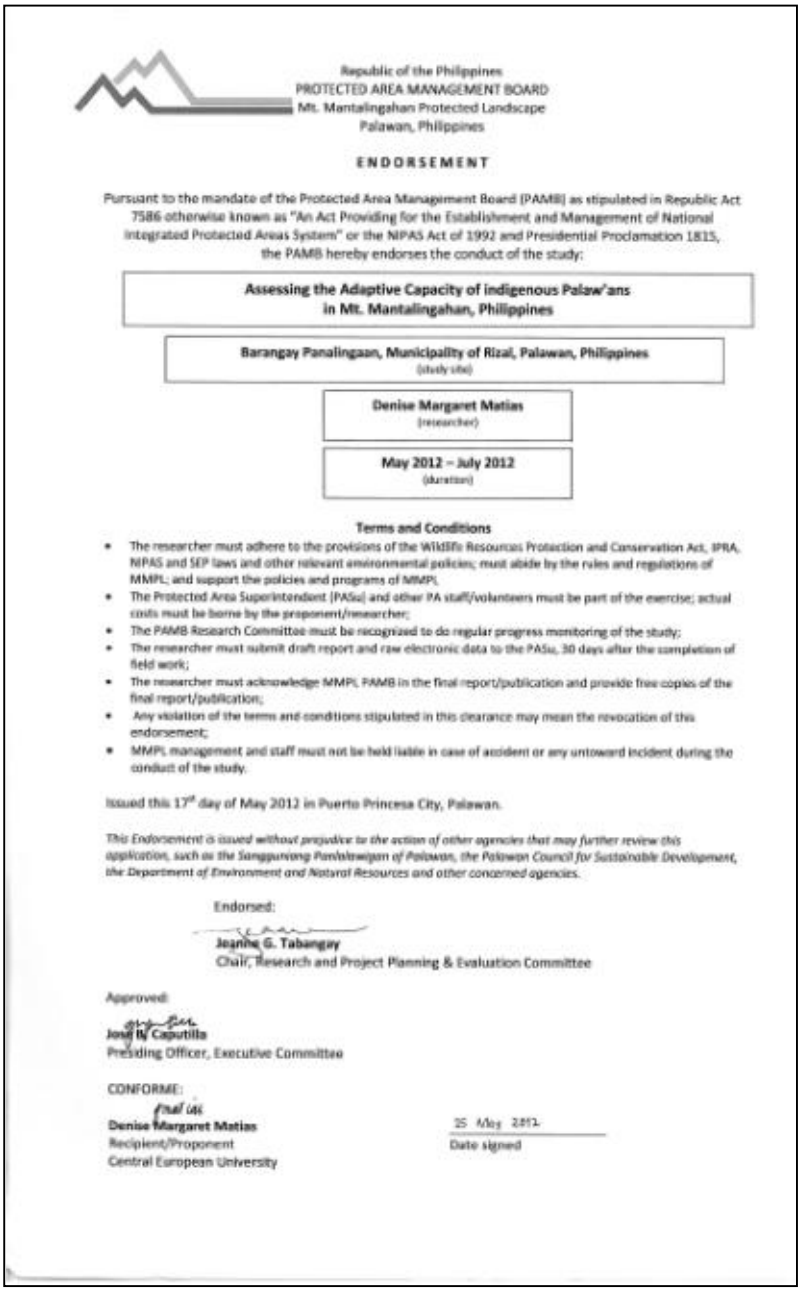
Kaugnay sa inyong hiling ng pagpayag para sa inyong pananaliksik sa lupaing ninuno ng Panalingaan, malugod kong ipinaaalam sa inyo na ito ay aming napag-usapan sa regular na pagpupulong ng Barangay Council ngayong ika-7 ng Mayo, 2012. Batay na rin sa pagpayag at pagtanggap ng komunidad, ang Barangay Council ng Panalingaan ay nagkasundo na ipagkaloob sa iyo ang aming pagpayag at pagtanggap, subalit gusto naming ipaabot sa iyo ang aming mga kahilingan:

1. Nais namin makipagpulong sa iyo bago umpisahan ang iyong pakikipanayam sa ibva pang mga katutubo sa lupaing ninuno ng Panalingaan upang mas maunawaan namin ang iba pang detalye ng iyong mga gawain.

2. Nais naming makakuha ng kopya ng mga nakalap na impormasyon bago ninyo lisanin an gaming lugar, at maipaliwanang mo sa amin ang mga ibig sabihin ng mga resulta na may kasamang malinaw na report.

Kami ay naniniwala na ang iyong pananaliksik ay makakatuylong sa aming komunidad at barangay.

Hon. RODOLFO L. GASPAR
Punong Barangay



Republic of the Philippines
PROTECTED AREA MANAGEMENT BOARD
Mt. Mantalingahan Protected Landscape
Palawan, Philippines

ENDORSEMENT

Pursuant to the mandate of the Protected Area Management Board (PAMB) as stipulated in Republic Act 7586 otherwise known as "An Act Providing for the Establishment and Management of National Integrated Protected Areas System" or the NIPAS Act of 1992 and Presidential Proclamation 1815, the PAMB hereby endorses the conduct of the study:

Assessing the Adaptive Capacity of indigenous Palaw'ans in Mt. Mantalingahan, Philippines

Barangay Panalingaan, Municipality of Rizal, Palawan, Philippines
(study site)

Denise Margaret Matias
(researcher)

May 2012 – July 2012
(duration)

Terms and Conditions

- The researcher must adhere to the provisions of the Wildlife Resources Protection and Conservation Act, IPRA, NIPAS and SEP laws and other relevant environmental policies; must abide by the rules and regulations of MMPL; and support the policies and programs of MMPL
- The Protected Area Superintendent (PASu) and other PA staff/volunteers must be part of the exercise; actual costs must be borne by the proponent/researcher;
- The PAMB Research Committee must be recognized to do regular progress monitoring of the study;
- The researcher must submit draft report and raw electronic data to the PASu, 30 days after the completion of field work;
- The researcher must acknowledge MMPL PAMB in the final report/publication and provide free copies of the final report/publication;
- Any violation of the terms and conditions stipulated in this clearance may mean the revocation of this endorsement;
- MMPL management and staff must not be held liable in case of accident or any untoward incident during the conduct of the study.

Issued this 17th day of May 2012 in Puerto Princesa City, Palawan.

This Endorsement is issued without prejudice to the action of other agencies that may further review this application, such as the Sanggunyang Panlalawigan of Palawan, the Palawan Council for Sustainable Development, the Department of Environment and Natural Resources and other concerned agencies.

Endorsed:

Joanne G. Tabangay
Chair, Research and Project Planning & Evaluation Committee

Approved:

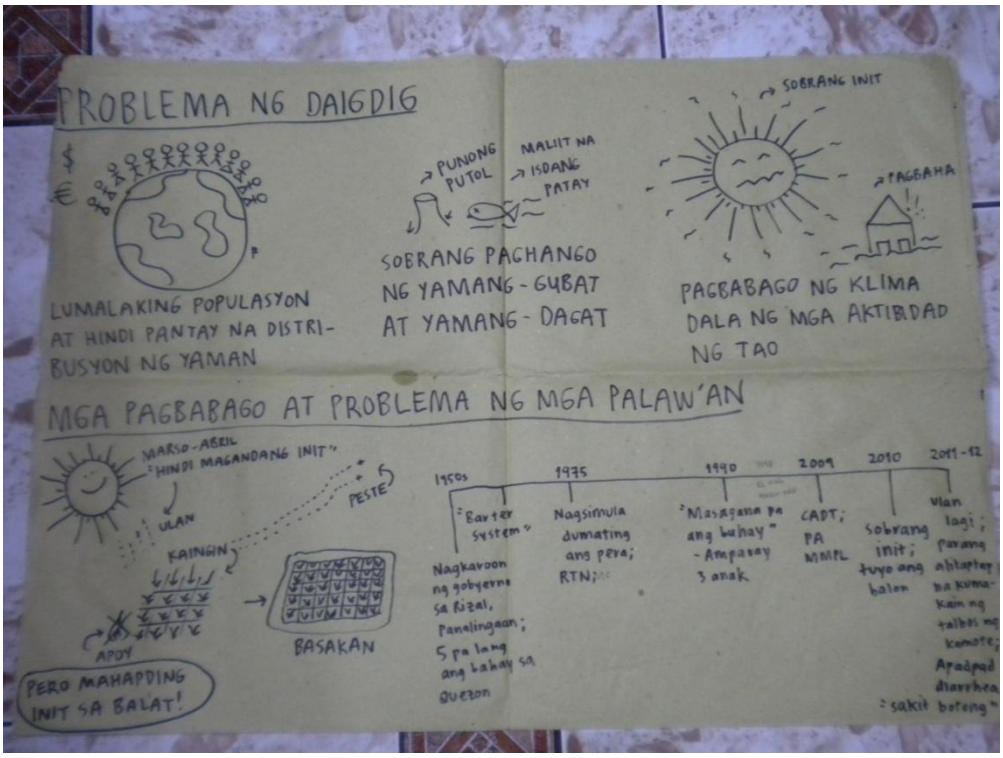
Jose N. Caputilla
Presiding Officer, Executive Committee

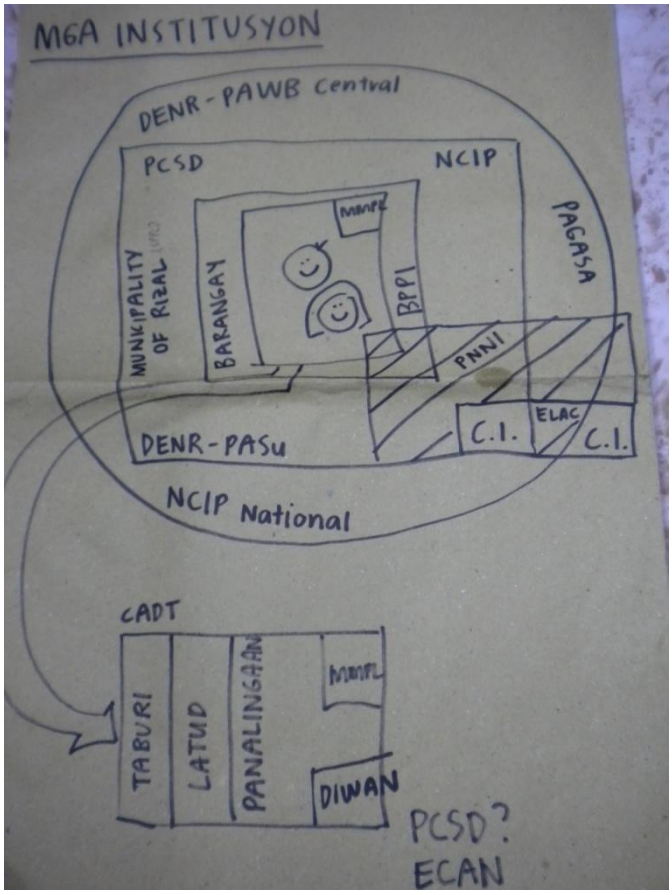
CONFORME:

Denise Margaret Matias
Recipient/Proponent
Central European University

15 May 2012
Date signed

Appendix 2. Preliminary results presentation to community





Appendix 3. Research interview questions

Research interview questions for national level agencies and institutions

Protected Areas and Wildlife Bureau (PAWB) Department of Environment & Natural Resources

1. Are there any anticipated impacts of a changing climate on natural resources in the Philippines?
2. If yes, what are the anticipated impacts of a changing climate on natural resources in MMPL?
3. Are there any adaptation projects for the natural resources that are in place?
4. Which natural resources are the indigenous peoples Palaw'ans dependent on?
5. Re: declaration of MMPL as a protected area, what role did the Palaw'ans play?
6. Ask for details of Adaptation to Climate Change and Conservation of Biodiversity (ACCBio) project, Philippine National REDD-Plus Strategy

National Economic Development Authority (NEDA)

1. What is the extent of adaptation in practice and what are the barriers, obstacles or incentives to adaptation? (Burton *et al*. 2002)
2. To what extent have stakeholders (including those at risk) been involved in the policy development process, and how can this be facilitated? (Burton *et al*. 2002)
3. How does the NFSCC related to economic and sustainable development policies and strategies in place? (Burton *et al*. 2002)
4. Are there international laws or treaties to which the NEDA adhere to in terms of its work direction?
5. Ask about Philippine Council for Sustainable Development (NEDA – PCSD) local Agenda 21 or any plans to edit it or release strategies on climate change adaptation

Philippine Atmospheric, Geophysical, Astronomical Services Administration (PAGASA)

1. What are the anticipated changes in climate in the Philippines (based on which emission scenario and global circulation models)?
2. Are there any trends in climate variability and extreme events, and if so to what can they be attributed? (Burton *et al*. 2002)
3. What are the anticipated changes in climate in the region of Palawan?
4. What are the historical changes in climate in the region of Palawan?
5. Which international scientific bodies does PAGASA consult or rely on?
6. Ask for PAGASA projects on climate projections

Climate Change Commission (CCC) Office of the President

1. What adaptation policies and measures have been used to reduce vulnerability and how successful have they been used? (Burton *et al*. 2002)
2. To what extent have stakeholders (including those at risk) been involved in the policy development process, and how can this be facilitated? (Burton *et al*. 2002)
3. What role does the CCC play in relation to climate adaptation policies in national, regional, local level?
4. Are there international laws or treaties to which the CCC adhere to in terms of climate change adaptation policies?
5. Ask for details on the second national communication on climate change to the UNFCCC

Conservation International Manila office

1. Are there any anticipated impacts of a changing climate on natural resources in the Philippines?
2. If yes, what are the anticipated impacts of a changing climate on natural resources in MMPL?
3. Are there any adaptation projects for the natural resources that are in place?
4. Which natural resources are the indigenous peoples Palaw'ans dependent on?
5. Re: declaration of MMPL as a protected area, what role did the Palaw'ans play?
6. What role does CI play in MMPL?

National Commission on Indigenous Peoples (NCIP)*

1. What are the demographic information on Palaw'ans? (Way of living, area of settlement)
2. What are the cultural practices of Palaw'ans?
3. What are the main problems of indigenous Palaw'ans?

Research interview questions for regional level agencies and institutions

Palawan Council for Sustainable Development (PCSD)*

1. What is the extent of adaptation in practice and what are the barriers, obstacles or incentives to adaptation? (Burton *et al*. 2002)
2. To what extent have stakeholders (including those at risk) been involved in the policy development process, and how can this be facilitated? (Burton *et al*. 2002)
3. How do input of or output from the Philippine Council for Sustainable Development (NEDA – PCSD) figure in the strategies of PCSD?
4. Are there any anticipated impacts of a changing climate on natural resources in Palawan?
5. If yes, what are the anticipated impacts of a changing climate on natural resources in MMPL?
6. Are there any adaptation projects for the natural resources that are in place?
7. Which natural resources are the indigenous peoples Palaw'ans dependent on?
8. Re: declaration of MMPL as a protected area, what role did the Palaw'ans play?

DENR – Provincial Environment and Natural Resources Office (PENRO) Palawan*

1. Are there any anticipated impacts of a changing climate on natural resources in Palawan?
2. If yes, what are the anticipated impacts of a changing climate on natural resources in MMPL?
3. Are there any adaptation projects for the natural resources that are in place?
4. Which natural resources are the indigenous peoples Palaw'ans dependent on?
5. Re: declaration of MMPL as a protected area, what role did the Palaw'ans play?

Office of the Mayor Municipality of Rizal, Palawan*

1. Do you know how climate change could impact your area? (Brooks & Adger 2005)
2. What has been the recent experience with climate variability and extremes? (Burton *et al*. 2002)
3. What economic damage has resulted and how has this been distributed spatially and among socio-economic groups? (Burton *et al*. 2002)
4. Are there trends in damages and other impacts, and if so how can they explained? (Burton *et al*. 2002)
5. What support does the municipality of Rizal give to its constituents in terms of climate variability and extremes?

Research interview questions for local level agencies and institutions

Office of the Barangay Chairman *Barangay* Panalingaan, Rizal*

1. In your term of office, have you heard about climate change in Palawan?
2. If yes, have you heard about anticipated impacts of a changing climate in *Barangay* Panalingaan?
3. Which natural resources are the indigenous peoples Palaw'ans dependent on?
4. Do your current policies, strategies and plans include provisions for the impacts of climate change? (Brooks & Adger 2005)
5. Are you addressing climate change in your local community strategy or community plan? (Brooks & Adger 2005)
6. What is the extent of adaptation in practice and what are the barriers, obstacles or incentives to adaptation? (Burton *et al*. 2002)

Bangsa Palawan-Philippines, Inc. (BPPI) Board of Trustees

1. How big is the area of your ancestral domain?
2. How long have you been living in your ancestral domain?
3. What are the natural features of your ancestral domain (e.g. forests, rivers)?
4. What benefits do you get from your ancestral domain? What is the most important use of the ancestral domain to the Palaw'an community?
5. What difference did the declaration of MMPL as a protected area make in your lifestyle?
6. In the past year, did you notice any extraordinary environmental changes in your ancestral domain?
7. If yes, since when did you notice these changes?
8. What did you do when you noticed these changes?
9. Did your efforts on addressing these changes work?
10. Did you have to deal with the changes on your own or did you get any assistance? If yes, from whom?
11. What is the nature of this assistance? Is it emergency assistance or long-term assistance?

Conservation International Palawan

1. How big is the area of the ancestral domain of the Palaw'ans?
2. How long have they been living in your ancestral domain?
3. What are the natural features of the ancestral domain (e.g. forests, rivers)?
4. What benefits do they get from your ancestral domain? What is the most important use of the ancestral domain to the Palaw'an community?
5. What difference did the declaration of MMPL as a protected area make in their lifestyle?
6. In the past year, did you notice any extraordinary environmental changes within the ancestral domain?
7. If yes, since when were these changes noticed?
8. How did the Palaw'ans deal with the changes?
9. What did Conservational International do when these changes were noticed?
10. Did your efforts on addressing these changes work?
11. Can these be considered as assistance to the Palaw'ans? What is the nature of this assistance? Is it emergency assistance or long-term assistance?
12. What is the nature of your projects in Brgy. Panalingaan, Rizal?

Appendix 4. Pro-forma daily activity sheet

Project: Assessing adaptive capacity of indigenous Palaw'ans in Mount Mantalingahan Protected Landscape **Date: _____**

Daily Activity Report

Activity	Location	Details	Results

Attachments:

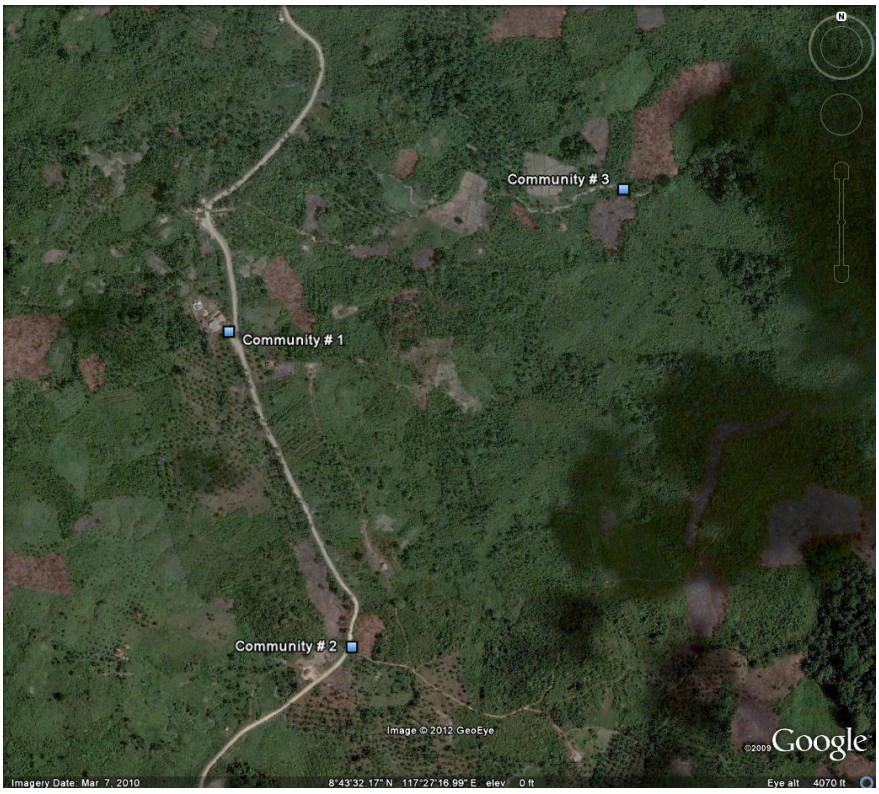
Denise Margaret Matias
MSc ESP 2011/12, Central European University

Appendix 5. Animals identified by the community as rarely or can no longer be seen

(Data source: BirdLife International 2012a,b,c,d,e,f,g,h,i; Diesmos and Palomar 2004)

Common name	Scientific name	IUCN/ Status	Range	Habitat
1. Philippine cockatoo	*Cacatua haematuropygia*	Critically endangered	Endemic (Philippines)	Lowland primary and/or secondary forests, mangroves
2. Palawan hornbill	*Anthracoceros marchei*	Vulnerable	Endemic (Palawan)	All storeys of forests, mangroves, cultivated land, bushland
3. Talking mynah	*Gracula religiosa*	Least concern	Native	Semi-evergreen forests in lowlands, hills, mountains
4. Palawan scops-owl	*Otus fuliginosus*	Near threatened	Endemic (Philippines)	Lowland forest
5. Mantanani scops-owl	*Otus mantananensis*	Near threatened	Native	Coconut groves, wooded habitats
6. Palawan swiftlet	*Collocalia palawanensis*	Least concern	Native	Terrestrial
7. Grey imperial pigeon	*Ducula pickeringii*	Vulnerable	Native	Lowland, primary forest, secondary forest, cultivated area
8. Palawan bearcat	*Arctictis binturong whitei*	Vulnerable	Native	Arboreal
9. Palawan bearded pig	*Sus ahoenobarbus*	Vulnerable	Endemic (Philippines)	Primary and secondary forests, cultivated and managed areas

Appendix 6. Community structure in *Sitio* Cadulan



Appendix 7. Negative response of NCIP

Republic of the Philippines
OFFICE OF THE PRESIDENT
National Commission on Indigenous Peoples
REGIONAL OFFICE NO. IV
3/F, Argo Building, EDSA, Cubao, Quezon City
Telephone No. 910-9693

NCIP -- REGION IV
RELEASE
JUN 04 2012
RECORDS

MS. DENISE MARGARET MATIAS
Email Address: Matias_Denise-Margaret@student.ceu.hu
Mobile No. +639174280966

Dear Ms. Matias:

This has reference to your emailed letter signifying the intention to conduct a study within Mount Mantalingahan Protected Landscape located in Barangay Panalingaan, Rizal, Palawan.

We would like to inform you, with regret that for the moment we cannot act on your request. The Chairperson issued a Memorandum Order No. 188, series of 2012 directing us to suspend all FPIC Activities pending the approval of the revised guidelines.

Be advice therefore, to coordinate occasionally with our Provincial Office located besides Barangay Hall of Barangay Sta. Monica, Puerto Princesa City, Palawan for you to be properly guided and updated of the same. Your utmost understanding on this regard is highly expected.

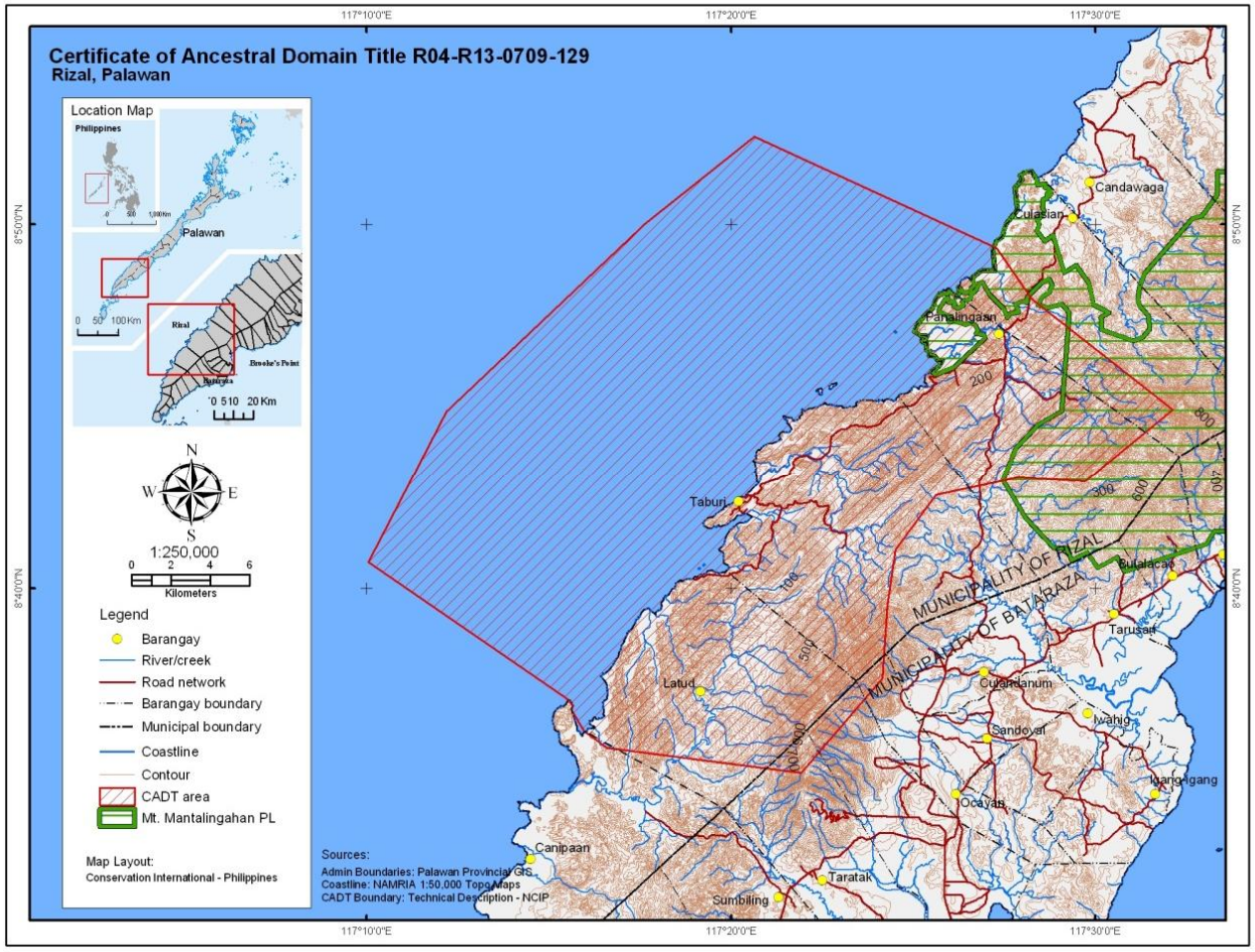
Very truly yours,

ROBERTO L. ALMONTE
Director IV

Cc:

Hon. Dionesia O. Banua
Commissioner
Representing Island Groups & Visayas

Appendix 8. Palaw'an CADT boundary with MMPL boundary (Source: CIP n.d.)



Appendix 9. Head of the host family holding a bunch of *langkawas*

Appendix 10. Copra

Appendix 11. Location of Dalni and Mundugen Falls

Appendix 12. Young Palaw'ans and a pet bird

Appendix 13. Alternate states existing in the water source

Appendix 14. Location of new water source (piped water system)