Doctoral Thesis

RESILIENCE OF COMMUNITY FORESTRY -A CASE STUDY OF COMMUNITY-BASED FOREST MANAGEMENT PROGRAM IN THE PHILIPPINES ASSESSED WITH THE TRI-CAPITAL FRAMEWORK-

(共同体林業の弾力性 - フィリピンにおける CBFMプログラムの三次元資本構造の評価事例 -)

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FRAMEWORK-

論 文 の 内 容 の 要 旨

論文題目 RESILIENCE OF COMMUNITY FORESTRY -A CASE STUDY OF COMMUNITY-BASED FOREST MANAGEMENT PROGRAM IN THE PHILIPPINES ASSESSED WITH THE TRI-CAPITAL FRAMEWORK-
（共同体林業の弾力性 - フィリピンにおけるCBFMプログラムの三次元資本構造の評価事例 - ）

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Community forestry (CF) is collective forest management and resource use that contributes to rural development by generating alternative sources of income. As these alternative income sources may be unrelated to forestry, CF's potential for rural development extends beyond the forest. Community Forestry first developed in the 1970's to address deforestation, poverty, and weak central governance. However, the current structure of CF programs creates forest user groups (FUGs) that are often not grassroots movements, are largely dependent on short-term financial assistance and low-value resources, and have limited rights to the forest resources. Only in few countries, and in small scales, have there been legislative redistribution of land titles to indigenous forest-dependent groups. Such instances are particularly evident in the Philippines, and the country's policy is thus one of the most progressive in the Southeast Asia and Pacific region.

In 1995, the Community-Based Forest Management (CBFM) policy was newly enacted in the Philippines. Under CBFM, FUGs formally receive 25-year contracts (with possibility of renewal) with the government for land tenure. Yet, due to weak governance and lack of financial and natural resources, CBFM relies on financial assistance from international and national agencies to stay afloat. In 1997, the Indigenous Peoples Rights Act was additionally enacted to enable some indigenous FUGs to acquire land titles and gain financial independence from the central government. CBFM remains the most common type of land tenure-base CF policy worldwide, and most FUGs are created under this program with partial decentralization of forest rights to users. The development of FUGs' capacities in forestry management and community development is a challenge given their resource constraints and inclination towards immediate government funds.

This issue not only threatens the resilience of FUGs, but ultimately the sustainability of the resources. Given the aforesaid limitations, CF relies primarily on the capacity of FUGs to withstand the issue at hand. Yet, addressing these issues may enable the enhancement of the endogenous capacities of FUGs, encourage self-organization, and provide reforms that will make this sustainable. Ultimately, this pertains to developing resilience, the ability to respond and adapt to changes and unpredictability in ways

that will sustain multi-functional development, and was recommended by international organizations and research but with lack of methodology. Resilience in the context of CF is still in its nascent stages and requires further studies on its concept, methodologies, and implementation.

Having these propositions stated, the overarching objective of this research is to provide the theoretical and practical basis for the operationalization of a concept of resilience in the context of CF that would be applicable for implementation in future CF projects. Four sub-objectives guided the research: i) construction of the framework for CF resilience assessment, ii) assessment of CF resilience under indigenous cultural communities and non-indigenous communities, and iv) evaluation of the potential capacities for CF resilience in indigenous and non-indigenous communities.

The framework for CF resilience in this research is the tri-capital framework, which is composed of three interconnected forms of capital: economic, socio-cultural, and natural. All three are pivotal to steering community capacities and building resilience at household and community forestry levels. These capacities change over time and shape FUGs' strategies e.g. localization, globalization, an approach between the former two i.e. glocalization, and reversed globalization i.e. re-localization.

Strong resilience in modern communities is defined by the presence of all forms of capital interacting and yielding to one another, securing the multifunctionality of groups. However, in indigenous communities, resilience was developed without a significant economic capital. Their resilience is based on localization strategy, which is limited to natural and socio-cultural capital. Both capitals under localization serve as important signifiers of changes in community forest groups' strength and strategy.

In the research, four cases of pioneering CBFM programs in the Philippines were studied. Two cases were indigenous communities and the other two were non-indigenous communities. The tri-capital framework was applied to these case studies.

Assessment of the capitals was structured into variables at the participant (household) level and the organization level. Indicators of capital forms at the household level were assessed based on a structured and semi-structured questionnaire of household heads, conducted face-to-face in two stages and with proper explanation of the questions. The questionnaire was delivered by the researcher and an interpreter or enumerator to all CBFM households in each case study and completed by 30 to 67 percent of CBFM households. Non-Project households were also surveyed. Households of non-participants in CBFM were taken into account to demonstrate other alternative resilience within the community and their competence compared to paths under CBFM.

Data were analyzed with parametric and non-parametric tests for significance and correlations. Indicators for organization level capital were assessed based on structured and semi-structured questionnaires with group chairpersons. Satellite image analysis was applied to identify natural capital openly accessible to the group. Approximate past conditions of each community was elaborated through

participatory mapping and a focus group discussion Obstacles of each group were determined utilizing problem ranking, and desired futures by surveying visions of the future and demographic trends.

Indigenous groups' resilience was found to be based on the existing localization strategy with low economic capital (too localized for resilience to change). Socio-cultural capital was related to kinship and tribal bonds, yielding natural but not economic capital. This form of localization-based resilience used to be crucial to the way indigenous communities functioned, but was no longer a valid strategy for achieving what groups desired. Socio-cultural capital was decreasing (e.g. cooperation to maintain irrigation and reciprocal work on the farm, trust due to conflicts related to CBFM) and economic functions of the community were desired but yet to be developed. Reforms through CBFM were not able to efficiently commodify local resources, resulting in low incomes that did not increase with farm size. Due to this lack of efficiency, community structures for multifunctionality and the tri-capital framework remained underdeveloped. Community-based forest management was unable to fully address key obstacles, and low prices as well as lack of markets for products made communities more vulnerable, resulting in no incentive to continue organizing CBFM. Under such circumstances, organizing CBFM was not improving the resilience of community strategies, and CBFM groups failed to pursue their activities. Non-Project households likewise continued to use preexisting strategies.

In non-indigenous groups, CBFM brought potential change at various levels, maneuvering their resilience towards strengthening their resilience with moderate use of tri-capital. CBFM was an effective instrument to distribute land to individual households. Participants were more responsive to the programs and maintained their organizational functions. However, this responsiveness was limited to those CBFM members actively taking part in collective actions, or to those holding power. Inactive members remained project land tenants and did not contribute to the collective efforts. This disproportion in participation and power distribution was affecting the socio-cultural capital. In terms of land distribution, participants were larger farm holders compared to non-participants ($p<0.01$). Moreover, FUGs' consolidated strategy yielded more economic capital from the resources, sourcing an average of 29 to 41 percent of their income in natural resources (significantly more than non-participants of the program, $p<0.01$). The CBFM farm and orchard, rather than forest, were the major sources of this income. Local fuelwood was another, more common strategy to supplement low incomes (income level and renewable energy use were strongly and negatively correlated, r=-0.5). The overall resilience of non-project groups were found to be on the decline, with increases in economic capital paralleled by decreases in the two other forms of capital.

Studies on CBFM revealed differences in the way indigenous groups manage various strategies for resilience. This difference is due either to the original capacities of indigenous communities or to their inability to form a new strategy. In non-indigenous communities, resilience was most often developed through a re-localization strategy in which economic and natural capitals were present at moderate levels and socio-cultural capital at a strong level, with each respectively interacting with the other forms of capital. Socio-cultural capital was found to be the key capital for securing the development of resilient

communities, especially with regard to trust within the group, cooperation, social network, and building of new knowledge. However, due to heterogeneity in the interests of members, different approach to resilience could be observed. In other words, there was more than one approach to resilience.

This study suggests that the tri-capital support resilience-oriented implementation of CF, and that yielding one form of capital from another would lead to ensuring resilient and multifunctional FUGs. The three, interacting forms of capital present can differentiate community forestry projects groups that are more likely to succeed. The tri-capital framework of CF resilience can be considered a tool for operationalizing CF resilience, with the limitation that economic capital must be substituted in the case of indigenous people. However, shifts in the relative proportions of the capitals are imminent for these people, and these shifts must be driven by multifunctionality for strong resilience. Further, the tri-capital framework requires further explorations of interactions between the capitals. There are also difficulties in evaluating the strength of capitals and their implication for resilience levels. Thus, resilience is comparable within specific contexts but not across contexts.

Community forestry policies must be differentiated between indigenous and non-indigenous peoples (consider e.g. the limited development of capacity for resilience of indigenous people through CBFM in the Philippines).

Indigenous people have yet to integrate to the multifunctional strategy of resilience that was based on localization. The commodification of natural resources should not become the primary approach for developing economic capital. The approach for preventing the degradation of socio-cultural capital should maintain and utilize existing cooperation rather than a new, "community-based" organization.

For non-indigenous people, CF holds considerable potential for delivering higher resilience through facilitating access to natural capital, increasing sociocultural and economic capital forms and creating space for yields from the capitals through their interactions. Tri-capital access in FUGs is capable of developing resilient strategies to resist or "soften" societal transitions towards globalization and of creating more re-localized or glocalzied sustainability. Thus, tri-capital access has the potential to merge interrelated benefits from economic and natural resources and to re-activate socio-cultural functions. The policy should enact an instrument for the objective validation of active membership in CF to prevent resilience decline.

This research contributed to i) enhancing the discussion on community forestry resilience which was underdeveloped and had shortcomings in methodology; ii) advancing the understanding of the concept of resilience which was previously unformed in the context of indigenous communities; and to iii) understanding of properties and their internal interactions that build and characterize resilient community forestry project groups.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
CADC	Certificate of Ancestral Domain Claims
CALC	Certificate of Ancestral Land Claims
CADT	Certificate of Ancestral Domain Title
CALT	Certificate of Ancestral Land Title
CAR	Cordillera Administrative Region
CARP	Comprehensive Agrarian Reform Program
CBFM	Community-Based Forest Management
CBFMA	Community-Based Forest Management Agreement
CBP	Community-Based Project
DAO	Department Administrative Order
DENR	Department of Environment and Natural Resources
FGD	Focus Group Discussion
FUGs	Forest Users' Groups
ICCs	Indigenous Cultural Communities
JBIC	Japanese Bank for International Cooperation
JICA	Japan International Cooperation Agency
KII	Key Informant Interview
NCIP	National Commission on Indigenous People
NGP	National Greening Program
ODA	Overseas Development Assistance
PACBRMA	Protected Area Community Based Resource Management Agreement
PAMB	Protected Areas Management Board
UNESCO	United Nations Educational, Scientific and Cultural Organization

1 INTRODUCTION

1.1 Resilience in community forest management

Based on the understanding that social participation in forest management will assist community development and prevent deforestation, community-based management has been considered a remedy for deforestation and problems of rural development (Food and Agriculture Organization, 1992; Pokharel, 2015). The United Nations and funding organizations have been advocating this approach to developing nations unable to maintain control over forest resources (Gadenne and Singhal, 2014) since the 1970's and with prominence since the 1990's. These community forestry programs rapidly scaled-up and were widely adapted for forest management policy in developing countries in tropical regions of Africa, Asia, and Latin America (Dressler et al. 2010; Dressler et al. 2015; Phelps et al. 2010; US Agency for International Development, 2012). However, goals of restoring the well-being of forest ecosystems and of communities remain elusive (Flint et al., 2008) and participation forced (Blaikie and Springate-Bieganski, 2013) without bottom-up development guided by proper understanding of central "community" (Flint et al., 2008) and participation is enforced (Blaikie and Springate-Bieganski, 2013). Moreover, forest user groups, the actors in community forestry, are left in a vulnerable position. They do not receive complete decision power over the forest (Ribot et al., 2006; Sikor, 2006), and their benefits are limited to conservation outcome rewards (Agrawal et al., 2008; Dressler et al. 2010; Shivakoti et al., 2015) and low commercial value resources (Anderson et al., 2015). Already, it has become evident that community-based management and development fail without careful and well-designed evaluation (Mansuri and Rao, 2004).

Community forestry projects may lead to sustainable development by developing the capacities of participating forest user groups (Kusel and Adler, 2003). Such capacity development has become associated with resilience building. Resilience of community forestry, defined as the sustenance of the multiple dimensions of well-being and the capacity to respond to changing conditions (Akamani and Hall, 2014; Nightingale and Sharma, 2014), became a prescribed goal (Akamani, 2012; Magis, 2010) and indicator of sustainable community forestry (Bass, 2001; Montréal Process, 2009). Resilience can denote how forest user groups can develop more

sustainable, resilient strategies by participating in community forestry.

1.2 Progressing deforestation and community forestry institutionalization

Forests are remarkably important for the sustainability of our society. They provide ecosystem services (Kriström, 2001) and shelter some of the greatest concentrations of biodiversity (Desonie, 2008). Global forest cover has been facing drastic deforestation, with permanent declines due to timber extraction and increases in demands to transform forests into arable land of forestland into arable land (Spray and Moran, 2006). This trend of forest loss has been concentrated in tropical developing countries. Between 1980 and 1990, 7.4 million hectares of forest were lost in Latin America. Losses of 4.5 and 4.2 million hectares followed in 1990-2000 and 2000-2010, respectively. Forest losses in Africa during these three decades were 4.1, 3.5, and 3.4 million hectares, respectively. In Southeast Asia and the Pacific, the process has been slowing down, from 3.9 million hectares in the 1980's and 2.4 million hectares in the 1990's, to 1.6 million hectares in the first decade of 2000 (Food and Agriculture Organization, 1995; 2011).

National governments failed to prevent illegal forms of deforestation such as the use of slash-and-burn, permanent conversion of forestland into farmland, and illegal logging (Andersson and Gibson, 2007; Gadenne and Singhal, 2014). Starting in 1970's, decentralization of governmental power was endorsed by United Nations and supported by financial agencies as a countermeasure for weak governance, broadly promoted in 1980's (Gadenne and Singhal, 2014). Decentralization refers to the process of power transfer from the central government to local level actors and institutions (Agrawal and Ribot, 1999). Common rationales for decentralization were that decentralized governance would lower costs of resource maintenance (Colfer et al., 2008) and increase the accountability of local authorities and the balance and security of power (Ribot 2002; Ribot et al., 2006; Tacconi, 2007). One derivative of decentralization was community forestry (CF). The concept emerged as early as the 1970's and enabled collaborative forest management. Community forestry was created according to the understanding that forest-dependent communities will protect the forest (Food and Agriculture Organization, 1992). This approach changed the view of local people as obstacles or constraints to forest management (Hardin, 1968; Eckholm, 1976; Ives and Messerli, 1989). The first programs implementing CF appeared in Asia, such as India,

Nepal, Philippines, and Laos in the 1970's. In the 1980's, CF was adapted in Malaysia and Papua New Guinea in Asia-Pacific and in Guatemala, Brazil and Peru in Latin America. Community forestry became present in all tropical regions in Latin America, Africa and Asia (US Agency for International Development, 2012). Forest user groups (FUGs) performing collective forest management within CF can be divided into three types of groups: functional groups, fundamental groups, and executive bodies of the formal village (Inoue, 2003). *Functional group* is a cooperative association that holds the rights to the forest. A *fundamental group* is a group of relatives in an indigenous cultural community. *Executive body* of the formal village is a village entrusted with forest management, but governance in this last group can be centralized or decentralized.

1.3 Sustainable forest management through community forestry

The 1990's was marked out by the Sustainable Forest Management (SFM) concept that was formulated during the Earth Summit in 1992. Sustainable Forest Management identified goals for forest protection and sustainable use, broadly encompassing social, economic and environment functions (United Nations, 1992). In operationalizing the concept of SFM, CF regained its importance as forest decentralization, or the process of transfering forest governance to local people, and the participation of local communities were understood as essential (Edmunds and Wollenberg, 2003; Sikor, 2006). Community forestry lowers transaction costs of SFM policy implementation and enforcement and helps to avoid social conflicts over the forest (Inoue, 2003). Community forestry, beyond collaborative forest management, involves also alternative income generation and rural development (Blaikie and Springate-Bieganski, 2013; Inoue, 2013)

1.3.1 Community forestry at the international scale

International organizations designed, endorsed, and provided technical and financial assistance for community-based management in developing countries (Agrawal et al., 2008; Dressler et al. 2010). The international design and use of the term "community" was found incomplete and to have been hastily applied to developing nations (Flint et al., 2008). In documented cases in various countries, loans for the implementation of model CF intensified resource extraction, diverting funds from the

intended goals of reforestation and prevention of forest degradation (Dressler et al. 2010; Taylor, 1999). Alternative solutions such as market-based models for trading carbon and other ecological services were not yet available for streaming benefits to community forestry projects (Joppa, 2012; Kinzig et al., 2012; Phelps et al., 2010; Gupta, 2012). Thus, no long-term prospective on the benefits of CF was concrete at the time of the study.

1.3.2 National dimensions of community forestry

Various interests for adapting CF policy are present at the national level. Beneath the idealistic goals of sustainability (Sunderlin, 2006; Hajjar et al., 2011), tendencies of withholding control and ownership of resources and their commercial exploitation remain (Ribot et al., 2006; Sikor, 2006; Hartter and Ryan, 2010). Top-down, bureaucratic approaches continue to prevail (Jashimuddin and Inoue, 2012; Dressler et al. 2015) and misinterpret bottom-up participation in CF (Blaikie and Springate-Bieganski, 2013). Only some countries (e.g. the Philippines, Indonesia and Laos in Southeast Asia) have forest rights been fully redistributed to their users. In these countries, some indigenous communities have become fundamental groups in forest management, entitled to resource use and decision making over the resource (Inoue, 2003).

1.3.3 Community forestry in the Philippines

Perils of CF policies that countries have experienced have been particularly evident in the Philippines. The Republic of the Philippines represents a long history of experience with leading and progressive CF programs in Asia in terms of crafting policy (Pulhin, 2003; Shivakoti et al., 2015). The umbrella program of Community-Based Forest Management (CBFM), together with ancestral land certificates such as the Certificate of Ancestral Domain Claims (CADC) - replaced by the Certificate of Ancestral Domain Title (CADT) – and CBFM modality for protected areas, Protected Area Community Based Resource Management Agreement (PACBRMA), recognizes various FUGs and forest legal status (Inoue, 2003). However, despite the very idealistic policy (Dahal and Capistrano, 2006), the CBFM scheme is threatened by low-value resource provision to communities and the Philippines' strong dependence on external stakeholders (Seki, 2001; Dressler et al. 2010; Pulhin and Dressler, 2009; Pulhin et al., 2015). Assessment of the policy implementation highlighted that the program exceeded

the governmental capacity to supervise the groups, and that the development of strong groups should be taken into account (Dahal and Capistrano, 2006).

1.4 Community forestry's resilience goal

1.4.1 Resilience concept in the sustainability

Resilience literally means to "spring back" or return to an original shape (Gordon, 1978), and found application in social-ecological systems facing worsening ecological crises (MacKinnon and Derickson, 2012). Resilience was defined as the capacity of ecosystems to maintain their functions with their associated social domain through reorganization and application of necessary changes (Anderies et al., 2004; Anderies et al., 2006). Applied to communities, this concept commonly refers to the general capacity of a group to deal with adversities related to social, political and ecological changes (Adger, 2000; Akamani, 2012; 2014). The capacity of resilience can be developed through multifunctionality that refers to the numerous benefits that agricultural policies may provide for the community and can be developed through socio-cultural, natural, and economic forms of capital the community (Wilson, 2010, 2012; Kelly et al., 2015). Resilience changes over time according to the levels of the capitals, and disruptions in changes in resilience has the potential to effect its long-term recuperation (Wilson, 2014). Localized resilience, or the resilience of rural households, is developed based on locally available natural and socio-cultural capitals, is likely to decrease with globalization through decreases of the two capitals and introduction of economic capital to such locales. A strategy that combines localization and globalization is defined as glocalization. However, in the long-term, resilience may either increase through a given community's strategy to re-localize by increasing the importance of socio-cultural capital, or decrease through further globalization that increases economic capital while decreasing the other two capitals (Wilson, 2012).

1.4.2 Community forestry resilience

International guidelines on SFM recommend resilience as an indicator of sustainability for community forestry (Montréal Process, 2009). Community forestry resilience entails positive normative value of the concept, and is related to multifunctionality through resource use (Bass, 2001) with the understanding of resilience as the ability to respond to changes. Thus, community forestry resilience is

the capacity to respond and adapt to socio-economic changes, developed based on capacities measured by capital (environmental, economic and social functions) (Akamani, 2012; 2014; Kelly et al., 2015; Montréal Process, 2009). Community forestry resilience is linked with general resilience and institutional capacity that enhance livelihoods (Akamani, 2012; Akamani and Hall, 2014; Akamani et al., 2015). The concept of community forestry resilience can be also understood in a specific context such as conflict resistance (Nightingale and Sharma, 2014). Community resilience in a globalized community in which community forest management is related to public participation is defined by multiple, capital-related factors. Economic and social factors were coupled with land degradation (Kelly et al., 2015).

1.5 Problem Statement

1.5.1 Incomplete theoretical understanding of community forestry resilience

Although capacities and resilience are considered related concepts associated with capital forms, exploration of the interconnectedness between these two concepts, and capital forms is needed (Akamani, 2012; Magis, 2010). Recent efforts to elaborate on resilience in the context of CF were undertaken with major methodological limitations. These studies linked institutional capacity and livelihood enhancement to general resilience (Akamani, 2012; Akamani and Hall, 2014; Akamani et al., 2015) or defined resilience in a specific context such as conflict resistance (Nightingale and Sharma, 2014). Shortcomings in the methodology and lack of understanding of mechanisms and assistance for evaluations of resilience remain major obstacles to the operationalization of the CF resilience concept. Few, capitalization-based indicators, descriptive or based on recall interview, have been employed to measure resilience, yet with limited knowledge on their interrelations (Akamani, 2012; Akamani and Hall, 2014; Akamani et al., 2015; Nightingale and Sharma, 2014; Montréal Process, 2009).

1.5.2 Differentiation of CF resilience in context of indigenous and non-indigenous people

Functional groups may represent different resilience strategies from fundamental groups, based on homogeneous indigenous communities, that may follow their own strategy (Inoue, 2003; Inoue et al., 2015, Larson et al., 2010; Shivakoti et al., 2015) due to lack of familiarity with the community forestry policy (Howitt and

Suchet-Pearson, 2006; Veland et al., 2013). Some social resilience studies argue that strong resilience is a possible confine of necessary change, thereby locking communities into an undesirable state (Berkes and Ross, 2013). Resilience is a concept of neo-liberal economy assumed importance of economic capital, and its paths are to be rediscovered in the western countries and determined in emerging nations (Wilson, 2010). Due to the 'western' origin of resilience, community resilience is overlooked in the context of indigenous cultural communities (Berkes and Ross, 2013). Economics may not always be necessary for developing strong resilience (Abel et al., 2006; Lu, 2010). Similarly to community resilience, FUGs can represent various strategies for CF. Three strategies were differentiated as localization, which opposes globalization, glocalization, which represents benefits from localization and globalization and creates a good strategy for collaborative forest management, and globalization, in which the forest is no longer the source of livelihood and is managed by non-profit organizations for protection or recreation (Inoue et al., 2015).

1.5.3 Lack of guidelines for operationalizing community forestry resilience

The resilience of FUG entails positive normative value of the resilience concept, and relates this value to the multifunctionality of resource use (Bass, 2001). Based on the understanding that social, natural and economic properties comprise resilience of these groups (Montréal Process, 2009). The autonomy of groups is as a requirement for effective governance and management of forest resources (Shivakoti et al., 2015). However, the properties of FUGs need in order to successfully achieve the resilient authonomy despite forced participation in CF are yet to be identified. The sustainability outcomes of FUGs are particularly opaque in the Philippines, where no official reports are released to the public and weak governence drives the communtiy forestry (Dahal and Capistrano, 2006; Pulhin, 2003).

1.6 Research Objective

Given the above propositions, the overarching objective of this research was to provide the theoretical and practical basis for the operationalization of a concept of CF resilience that would be applicable for future implementations of CF. More specifically, the following three sub-objectives guided the research:

i. Construction of the framework for CF resilience assessment;
ii. Assessment of CF resilience in indigenous cultural communities and non-indigenous communities
iii. Evaluation of potential capacities for CF resilience of the indigenous and non-indigenous communities.

1.7 Research questions

The gaps identified in preexisting literature on CF and resilience formed the basis of the research questions in this study. The core research question of this study - what are the factors that enhance or constrain CF resilience in indigenous communities? – can be broken down into the following three sub-research questions:

i. What community properties are responsible for developing the resilience of FUGs?
ii. What factors enhance or constrain CF resilience in indigenous communities and non-indigenous communities?
iii. How do CF programs contribute to the resilience paths of FUGs?

Such questions have so far been overlooked by previous research overlooked these questions. Thus, in this study, such knowledge gaps on the theoretical understanding and implementation of resilience in CF programs were addressed by furthering the discussion on CF resilience which remain underdeveloped with particular shortcomings in methodology (Akamani, 2012; Akamani and Hall, 2014; Akamani et al., 2015; Nightingale and Sharma, 2014). Secondly, this research enhanced the previously unformed understanding of resilience in FUGs in indigenous and non-indigenous contexts (Howitt and Suchet-Pearson, 2006; Veland et al., 2013). Thirdly, as guidelines for the assessment of resilient FUGs were absent (e.g. Montréal Process, 2009; Akamani and Hall, 2014), criteria for determining resilience were generated based on quantitate and qualitative research.

1.8 Thesis structure

This research was three-fold, i) construction of an assessment mechanism for CF resilience, ii) assessment of CBFM in the Philippines under indigenous communities and non-indigenous cultural communities, considering implications of their resilience capacities on their ability to sustain FUGs, iii) comparative synthesis of CF projects' outcomes and their resilience paths.

Chapter 1 briefly introduces the topic of the dissertation, global trends in policy, the emergence of community-based management and CF, introduced by foreign donors, and the diminishing grassroots movement. The lack of benefits and the enforced participation threaten the sustainability of FUGs. Resilience, a term proposed by academia and by practitioners of sustainable forest management, was designated a goal of FUGs but remained weakly defined. In order to be considered successful, FUGs must orchestrate their resilience by developing multifunctionality. The research objective, research questions, and thesis structure are subsequently elaborated.

Chapter 2 looks into global trends of CF policy, paying special attention to the Asian-Pacific region as the pioneering region in adapting the policy and describing current challenges in community forestry. These issues studied are illustrated through an in-depth study of CF programs and the current CBFM policy in the Philippines. Criteria for assessing the resilience of FUGs and to denote successful groups are needed given the rapidly changing socio-economic conditions of the country.

Chapter 3 introduces the origin and development of the concept of resilience, as well as its applicability to CF as an indicator in sustainable forest management strategy. This chapter also provides a discourse on the applicability of resilience in the context of indigenous cultural communities.

Chapter 4 introduces the analytical framework based on economic, natural and socio-cultural forms of capital. These three capitals interact and create multifunctional communities capable of responding to adversities. Such communities are considered as the most resilient, but localization strategy of indigenous communities is also the alternative resilience source.

Chapter 5, on research methodology, describes the research design, selection of case studies and variables for the tri-capital framework, tools and measurements applied to

obtain the variables, survey construction, and fieldwork methodology and application. Case studies were grouped into those of indigenous and of non-indigenous cultural communities. The selected cases covered the same time-scale and process of implementation, and each study aimed to capture the full scope of the respective CF program.

Chapter 6 introduces the case of CBFM projects in the Philippines with indigenous communities, which have preserved traditions and land from immemorial time. The two indigenous tribes with fundamental FUGs already practicing CF with their traditional indigenous knowledge were the subject of this survey. The first was the Ifugao people (Tuwali tribe) and native to the mountainous, central part of Luzon Island. This tribe was represented by two villages. The second tribe was a group of Aeta people. the oldest ethnic group to the Philippine islands. These groups were covered by a CBFM project with functional groups that should supposedly work on reforestation and livelihood improvement with government assistance. The tribe of Aeta, however, was able to transform CBFM into CADT, gaining full rights over the land and resources and making the village a functional group on the ancestral domain. In this chapter, detailed survey results of the two tribes as seen through the tri-capital framework are presented.

Chapter 7 introduces the case of non-indigenous communities, “common people” under CBFM, in the Philippines. These groups did not have traditional customs of forest management but were interested in occupying land in the vicinity of the forest. Introducing the CBFM program formalized rights to rights to the forest use. One case, in the buffer zone of a national park, caused CBFM to update their contract to allow activities on the protected area (PACBRMA). The other project was located on state forestland but was without protection status. The chapter presents CBFM projects’ impact on the community and their outcomes through detailed surveys and an analysis using the tri-capital framework.

Chapter 8 introduces a comparative analysis of the case studies, discussing resilience development paths and strategies in indigenous and non-indigenous cultural communities. It describes the roles of the different forms of capital and their interactions in developing the resilience of FGUs under CF policies. Ultimately, it provides answers to the research question and identifies key characteristics of resilient groups.

2 COMMUNITY FORESTRY

2.1 Community forestry definition

The concept of CF emerged in the 1970s and has evolved as a grassroots arrangement based on the assumption that forest-dependent communities will protect the forest, with external assistance. Initially this movement was regarded as social forestry but this was widely misinterpreted as social welfare support and the role of forest was seen only as livelihood substance. In late 1970s, the term "social" was replaced with the more appropriate term of "community" (Food and Agriculture Organization 1978, 1992a), which also indicates a collective, rather than individual, action (Inoue, 2003). Community forestry is defined by the Food and Agriculture Organization (1992a) as a situation in which local people are involved in a forestry activity. It encompasses situations ranging from woodlots used for forest products, including firewood, especially in areas with wood shortages, tree growing at the farm level for cash crops, forest products processing at the household or small industry scale for income generation, and activities of forest dwelling communities. Yet, in recent literature the debate on the appropriate term continues. Inoue (2003) argued that in light of the broad scope of CF, which consists of forest management, infrastructure development, and generation of income sources for rural development, the term social forestry is a suitable alternative, although it remains "unpopular" due to an indication of small-scale rural development based on local resources for poverty alleviation (Sands, 2005) Participatory forest management is also a suitable alternative term. As all three terms are commonly used, discussion of these topics can be problematic. Thus, in this dissertation the term "community forestry" (CF) is used in a broader scope, referring to the Food and Agriculture Organization (1992a) and Inoue (2003) definitions, and indicating collective forest management and rural development through common local forest resources use, development of alternative means for income generation, and entailing development of infrastructure through participation in CF.

2.2 Actors of community forestry

Forest user groups (abbreviated as FUGs), performing forest management in a collective way within CF, can be divided into three types (Inoue, 2003, p.52):

i. Functional Group Forestry– a forest users' group, cooperative, or association, and their forest management

ii. Fundamental Group Forestry – a group of relatives or an indigenous cultural community, and their forestry

iii. Executive Bodies of the Formal Village, or Village Forestry – villagers entrusted to manage the forest (governance can be centralized or decentralized)

2.3 Global emergence of community forestry projects

The primary reason why CF was justified, in the context of developing countries, was through the transference of the state domain concept into tropical forestry, during colonial periods (Von Stieglitz, F., 2000). Community forestry incubated in Asia, and was gradually conveyed to Latin America, and lastly to Africa (US Agency for International Development, 2012). Initial forms of CF, known more commonly as social forestry, started in 1970's, aiming to provide grassroots movements with assistance, negotiate forest occupancy, and stop illegal deforestation, in India, the Philippines, and Nepal. In India, for example, in 1975 there was a 'social forestry' project initiated to protect the forest and encourage people to plant trees on their own farms; however, it was more of an on-farm forestry initiative than a community action (Bandi and Viswanathan, 2015; Blaikie and Pringate-Baginski, 2013). In the decades that followed, new occurrences of CF were started by policy reforms geared towards decentralization, that were intended to address the severe limitations of developing states. Decentralization refers to the process of transferring powers from the central government to local-level actors and institutions (Agrawal and Ribot, 1999). Common rationale for decentralization was the idea that a decentralized governance would be cheaper (Colfer et al., 2008), but academic writings and development studies often highlighted more idealistic arguments for decentralized governance, such as local ethics, accountability of local authorities, and balance and security of power (Ribot 2002; Ribot

et al., 2006; Tacconi, 2007). Decentralization was advocated by the World Bank, followed by many other international donors (Gadenne and Singhal, 2014). Following the first steps already undertaken in 1970s, decentralization of governance was applied to forest resources and rights to use these resources gradually devolved to a local level. One of the main reasons for this regime change was a clear failure of top-down forest management practices, a lack of governments' capacities to control forest resources, and a rapid progression of deforestation (Blaikie and Pringate-Baginski, 2013; Cronkleton et al., 2008; Paulson Priebe et al., 2014). Moreover, natural disasters such as severe floods, that occurred in major cities of Southeast Asia in 1980s, increased awareness of links between the destruction of natural environments and the occurrence of natural disasters (Poffenberger, 2000, 2006). Decentralization of state power and the participation of foreign agencies in the process accelerated the idea of community-based forest management which spread through South and Southeast Asia (Poffenberger, 2006). Likewise, the World Bank and other international donors provided technical and financial assistance for government decentralization (Blaikie and Pringate-Baginski, 2013). The premises of decentralized forests were as follows: reduction of transition cost and reduction of deforestation (Larson, 2003), and up-scaling the community-based approach that was regarded as having an increased potential for improving livelihoods (Tacconi, 2007). In the late 1980s Latin American countries, such as Guatemala and Peru, also began implementing CF policies. By the end of the 1980s and throughout the 1990's there were revisions of CF policies in Asia that encompassed socio-economic dynamics, followed by a further expansion of these ideas in Asian, Latin American and African countries (US Agency for International Development, 2012). African countries, although moving more slowly since the 1990s, have been able to progress and reach genuine community-based regimes, as is seen in Tanzania (Wily, 1999). Decentralization, however, did not necessarily mean changing the locus of decision making, or devolving power. Thus, although devolution and decentralization are often used interchangeably, devolution, unlike decentralization, can be defined as relocating power away from a central focal point (Fisher, 2000).

2.4 Multiple scale challenges of community forestry

Community forestry, despite its social and environmental goals, faces number of challenges that are affecting the current and future sustainability of the movement.

Through this literature review, these challenges are classified into multiple scales.

2.4.1 International scale

The current structure of CF was found to be highly dependent on international agendas which were steering the expansion of forest devolution and CF, but the global governance still needs to address more adequately a number of issues at national levels, related to increasing global market impacts (Dressler et al. 2015; Dressler et al. 2010; Phelps et al. 2010). Development of CF was promoted by international fora in order to slow down environmental degradation and increase benefits for forest-dependent communities. International environmental organizations and donors provided technical assistance, and financial institutions secured number of Official Development Assistance (ODA) loans (Agrawal et al., 2008; Dressler et al. 2010). However, loans for implementation of the CF model in various countries were likely to drive intensification of resource extraction (Dressler et al. 2010; Taylor, 1999). Alternative solutions, including market-based models for carbon and other ecological services trading, such as Reducing Emissions from Deforestation and Forest Degradation (REDD+) and Payments for Ecosystem Services (PES) have yet to provide the expected outcomes and CF projects have benefited global and national markets as opposed to local economies (Joppa, 2012; Kinzig et al. 2012; Phelps et al. 2010; Gupta, 2012).

2.4.2 National scale

At national levels, CF programs have bundled various interests of central governments within CF policy. Despite very idealistic and often professed pro-social and pro-environment importance of CF, such as poverty alleviation and sustainable forest management (e.g. Sunderlin, 2006; Hajjar et al., 2011), central governments aim to maintain their own rules over resource ownership and commercial exploitation (Ribot et al., 2006; Sikor, 2006) and do not devolve resources to local levels (Hartter and Ryan, 2010), but practice more top-down bureaucratic approaches (Jashimuddin and Inoue, 2012; Dressler et al. 2015) or enforce participation (Blaikie and Springate-Bieganski, 2013). Contemporary studies undertaken to extensively analyze the governance of CF do not provide a clear answer about the outcomes of the agendas, which vary by country and program. A comparative study across 29 countries in Asia found that the main constraints for governments to overcome are democratic forest decentralization and autonomy for CF (Shivakoti et al., 2015). The national economies that take advantage

of a market-based approach, such as REDD+ and PES, were also contesting CF. The current structure of REDD+ threatened to recentralize forest governance, and the revenue was more likely to be gained by a central government instead of remaining at the community level due to multiple hindrances, such as a lack of tools for measurement and an unclear benefits sharing system (Phelps et al. 2010; Dressler et al., 2015); the PES system shared similar perils as REDD+ (Corbera and Pascual, 2012), although it was able to provide non-economic and financial incentives to FUGs (Van Oudenhoven et al., 2011) with contributions from foreign donors (Banks-Leite et al., 2014).

2.4.3 Forest User Group scale

In order to achieve strong groups, property rights must be devolved to the FUG level, with clearly defined boundaries (Gipson and Becker, 2000; Ostrom, 1990; 1999b; 2008). In reality, bureaucracy imposed strict regulations and permitting processes on FUGs, in which the predominantly low-commercial value resources were made available to the FUGs and extraction of resources with higher market values was restricted by formal procedures, licenses, and were given the least amount of local control. Using timber as an example, resources with the least commercial value, e.g., non-timber forest products (NTFPs), were under the control of local groups, with the least formalization of extraction processes (Anderson et al., 2015). These relations are presented in Figure 2.1. Moreover, the situation becomes more complex when such regulations effectively reduce opportunities for FUGs, in cases where FUGs had pre-existing access to the resources. For indigenous cultural groups, which were often using these natural resources *de facto*, CF was a formalization of occupancy and the resource usufruct remained *status quo* or was reduced by regulation (Hartter and Ryan, 2010; Larson et al.; 2010) by enforcing a "community-based" system into the indigenous realm that culturally was not able to embrace the western concept of "management" (Howitt and Suchet-Pearson, 2006; Veland et al., 2013). For those FUGs in which CF enabled accesses to the forest, CF brought new opportunities (Hartter and Ryan, 2010; Larson et al., 2010).

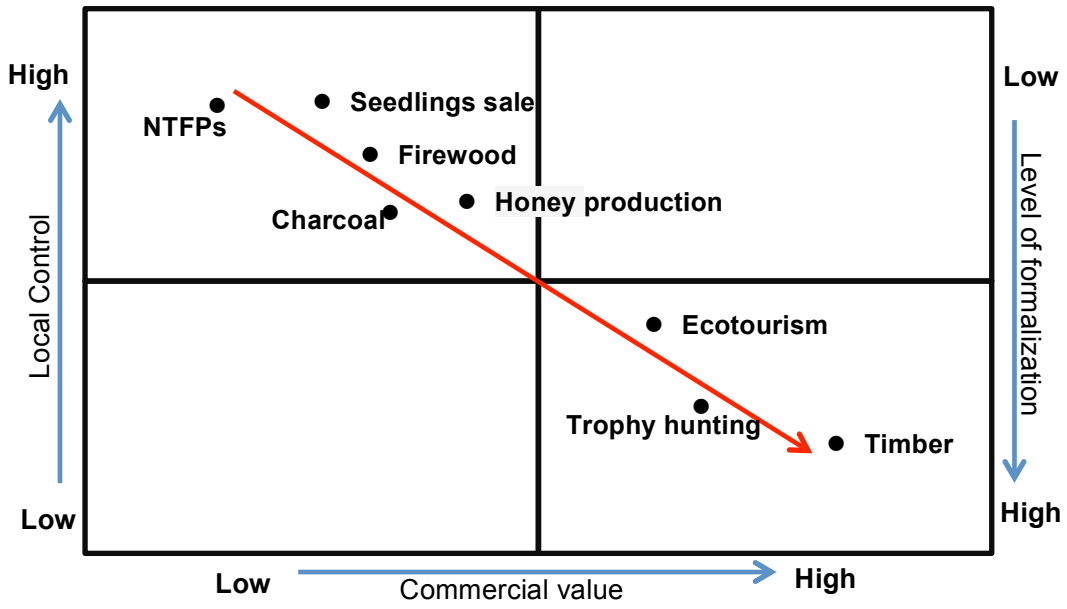


Figure 2-1. Relationship between local control, value of resources, and formalization for selected forest products

Source: Adapted from Anderson et al., 2015, p.2.

Furthermore, aside from a high level of commercialization of timber resources, CF was often excluded from an area where such resources were actually available, as they were often located on in a degraded forest area (Agrawal et al. 2008). Although such degraded forest could provide profit to the community through alternative market-based schemes, such as REDD+ or PES systems, this was debatable and unclear due to a lack of sharing and measuring systems, and often contributed at the national level instead of at the scale of the FUGs (Phelps et al. 2010; Dressler et al. 2015; and section *2.3.2. National scale*).

IN order to be successful, FUGs must have the ability to self-organize into micro-institutions and be able to regulate the resource use (Gipson and Becker, 2000; Ostrom, 1990, 1999a; 1999b); but with the current level of pay-off coming from natural resources, this ability for self- organization and self-regulation was severely contested. The current use of CF that remains oriented toward external stakeholders (Inoue et al., 2015), and a global trend of reduction of benefits from local resources and the risk of drawing the CF into a market economy may eradicate potential incentives or disintegrate FUGs. Lack of incentives higher than the cost of maintaining the community resource management plans (Ostrom, 1990, 1999a) and ability of the resources to sustain livelihoods (Adhikari et al., 2014; Ojha et al., 2009; Pokharel,

2009) are expected to drive users to an overuse of resources or otherwise negatively impact the maintenance of community resource management. Additional compulsory principals provided by Ostrom (1990, 1999a), related to the sustainability of FUGs, are equal benefit sharing, nested enterprises (if part of a larger system), mechanisms for conflict resolution, monitoring and sanctions, and collective choice arrangements. Under uncertain global and national politics there is a strong need to develop a long-term strategy for multiple benefits of CF, as this is necessary to maintain the FUGs. The initial forms of support provided in relation to reforestation, conservation and implementation, e.g., in China, Nepal, Laos, the Philippines, and Thailand (Shivakoti et al., 2015), need to be considered as impacts and temporary disturbances, which may affect long-term sustainability until the group reaches self-organization. Inoue et al. (2015) enlisted three types of strategies that FUGs may choose towards developing a role of externalities: i) a 'resistance' or localization strategy, in which people want to maintain autonomy and thus do not adapt to globalization; ii) an 'adjustment' or globalization strategy, in which local groups benefits from globalization instead of local resources, and which becomes a public welfare, e.g. groups such as NGOs, NPOs; and iii) an 'eclectic' or glocalisation strategy, which is a compromise between the first two strategies, balancing inherent and universal values and various stakeholders.

2.5 Community Forestry in Southeast Asian model

Southeast Asia has the longest history of CF, after India and Nepal in South Asia, and faces postcolonial governance. Devolution was contested and progress varied in the country. In the post-colonial history of Southeast Asia, the region experienced expensive logging and further exclusion of people from the forest. The first and symbolic pro-social forestry started to mask community exclusion from local resources in a few countries. In the Philippines, for instance, initial programs in the 1970s started to regulate illegal land occupation, but this had minor socio-economic impact; in late 1980s new CF programs increased the devolution level of forest rights, similar to the most recent scheme called Community-Based Forest Management (CBFM) in 1995 (Pulhin and Pulhin, 2003). Vietnam also established early forms of CF in 1975 in order to control forest occupancy and lead post-war development and, since 1995, the first forest owners have been entitled CF on degraded or protected land. The updated policy called Low on Forest Protection and Development, implemented in 2004, works

through Forest Land Allocation (FLA) which regulates land protection (Dang et al., 2012; Thang and Shivakoti, 2015). In Laos, in the late 1970s, policies regulating participation of local communities were initially drafted (Kitamura, 2003), but since the 1990s CF has started working through Joint Forest Management projects, strongly subsidized by international donors (Sunderlin, 1995; Matsumoto, 2001, 2015). Indonesia also started transferring power over forests to local communities in the 1990s, beginning with a partial transfer of rights in 1995 on trial basis. In 1999, with political perturbations, recognition of small scale CF was legislated, known as Community forest, Community-based plantation and Village forest (Wollenberg et al., 2009), but this was highly dependent on political will (Sardjono and Imang, 2015). Relatively late in recognizing CF, compared to the region, was Thailand, which in 1997 implemented a permission-based type of occupancy on conflicted land, but under the condition of prior occupancy (Sam and Trung, 2003); although it can be technically assisted by forest authorities, it is lacking in CF legislation (Webb and Galli, 2015). Malaysia introduced Joint Forest Management in 1992, targeting the management of degraded forests, but the program's progress is not well documented (Nurruding, 2015). In 1994 Cambodia introduced CF with 15-years contracts (Yeang, 2012; Sokh and Shigeru, 2002).

The most advanced in terms of forest devolution policies were found the Philippines, Indonesia and Laos. In the Philippines, Certification of Ancestral Domain/Land Claim in 1993 already partially recognized the rights of indigenous cultural communities (ICCs) to customary practices, and Certificates of Ancestral Domain/Land Title implemented a complete rights devolution to ICCs. Moreover, ICCs with Certificate of Ancestral Domain/Land Title cannot be excluded from protected areas. Non-Indigenous Communities can also be tenants and resource users of the land, with prior occupancy, under the Protected Area Management Board Agreement (Inoue, 2003; Guiang et al., 2001; Ballesteros, 2001). Laos, since 1996, has permitted customary rights of using land by local people, through their Land and Forest Allocation program (LFA) (Hyakumura, 2015; Hyakumura and Khophathoum (2003). In 1999 Indonesia, after a political struggle about decentralization, recognized *hutan adat* customary forest communities and their rights, with explicit recognition since 2001 by a new forestry law (Devung, 2015; Sardjono and Imang, 2015).

Based on the above literature review it was found that the CF movement is at various levels of progress, and some countries are lagging behind the forest devolution, e.g., Thailand, but other countries have reached complete forest decentralization in their policies, although only on micro scales (the Philippines, Laos, Indonesia). One country, the Philippines, was able to transfer power over protected forests to FUGs in some areas. Growing national economies and multiple strategies of support for CF programs, through us of natural resources, foreign donors and loans, and market-based trials, challenge the success of local levels of CF. This synthesis is presented in Figure 2.2 and described in Table 2.1.

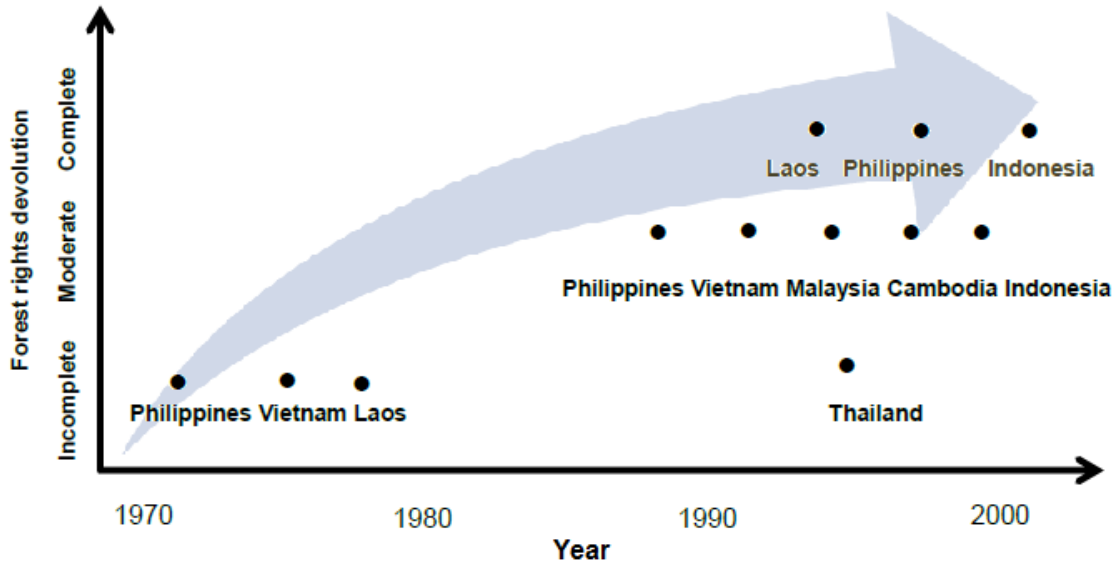


Figure 2-2. Milestones in forest devolution in Southeast Asia (by country)

Table 2-1. Overview of existing CF programs in Southeast Asia

Country and GDP growth[a] 2014	Program	Description of program	Types of actors	Available resources
Cambodia[b,c] **7.24%**	Community forestry	15-year renewable agreement (also pilot REDD+); permitted swidden fram	Functional group	Land; forest resource for household use
Indonesiad[e,f,g,h] **5.36%**	Community forest (HKm)	35 years and can be extended every 5 years. Low capacities	Formal Village (Forest farmer group)	Timber, land, non-timber,
	Community-based plantation (HTR)	60 years and extendable at most for max 35 years Low capacities (REDD+ included)	Individual and Functional (groups and cooperation)	Timber
	Village forest (HD)	35 years and can be extended every 5 Low capacities	Formal Village	Timber and non-timber, land
	Customary Forest (HA)	Customary forest recognition	Fundamental group	Timber and non-timber
Laos[i,j] **7.50%**	Joint Forest Management	Highly supported by donors in1990s	Functional group	Timber, land non-timber
	Village in protected area (The Land and Forest Allocation program [LFA])	Customary management, nature protection, utilization	Fundamental group	Timber, land, non-timber;
Malaysia[k] **5.20%**	Joint Forest Management	Local community participation on degraded forest	Local community	Timber, land
Philippines[l,m,n,o] **6.47%**	Community-Based Forest Management (CBFM) and CBFM with Ancestral Domain/Land Claim	25 years, renewable High support from multiple donors and loans	Functional group and Functional-fundamental group	Non-timber and low timber; but mostly land
	Protected Area Management Board Agreement	25 years, renewable, Supported by donors	Functional group	Harvest restrictions; land

	Certificate of Ancestral Domain/Land Title	No termination	Fundamental group	Timber, land, non-timber
Thailand[p] 2.50%	Self-initiated community forestry	Lacking legislation, coordinated by forest authorities (also pilot REDD+)	Group of individuals that proved prior occupancy	Timber, non-timber but mostly land
Vietnam[r,s] 5.60%	Community-based forest management (FLA)	To conserve the natural forest, supported by donors	Functional group	Low timber resources

Note: Sources: [a]International Monetary Fund, 2014; [b]Yeang, 2012; [c]Sokh and Shigeru, 2002; [e]Wollenberg et al., 2009; [f]Devung, 2015; [g]Sardjono and Imang, 2015; [h]Luttrell et al., 2011;[i]Sunderlin, 1995; [j]Matsumoto, 2001, 2003; [k]Nurruding, 2015; [l]Pulhin and Pulhin, 2003; [m]Pulhin, 2003; [n]Guiang et al., 2001; [o]Ballesteros, 2001; [p]Sam and Trung, 2003; [r]Dang et al., 2012; [s]Thang and Shivakoti, 2015.

2.6 Community forestry in the Philippines

In order to explicitly describe the historical evolutional process of CF, the multi-scale challenges that CF places on the lowest and most vulnerable level of FUGs will be described based on the Philippine's case, which represents a progressive policy and complete forest devolution of some areas, with an ambitious goal but ambiguous progress at its FUG level.

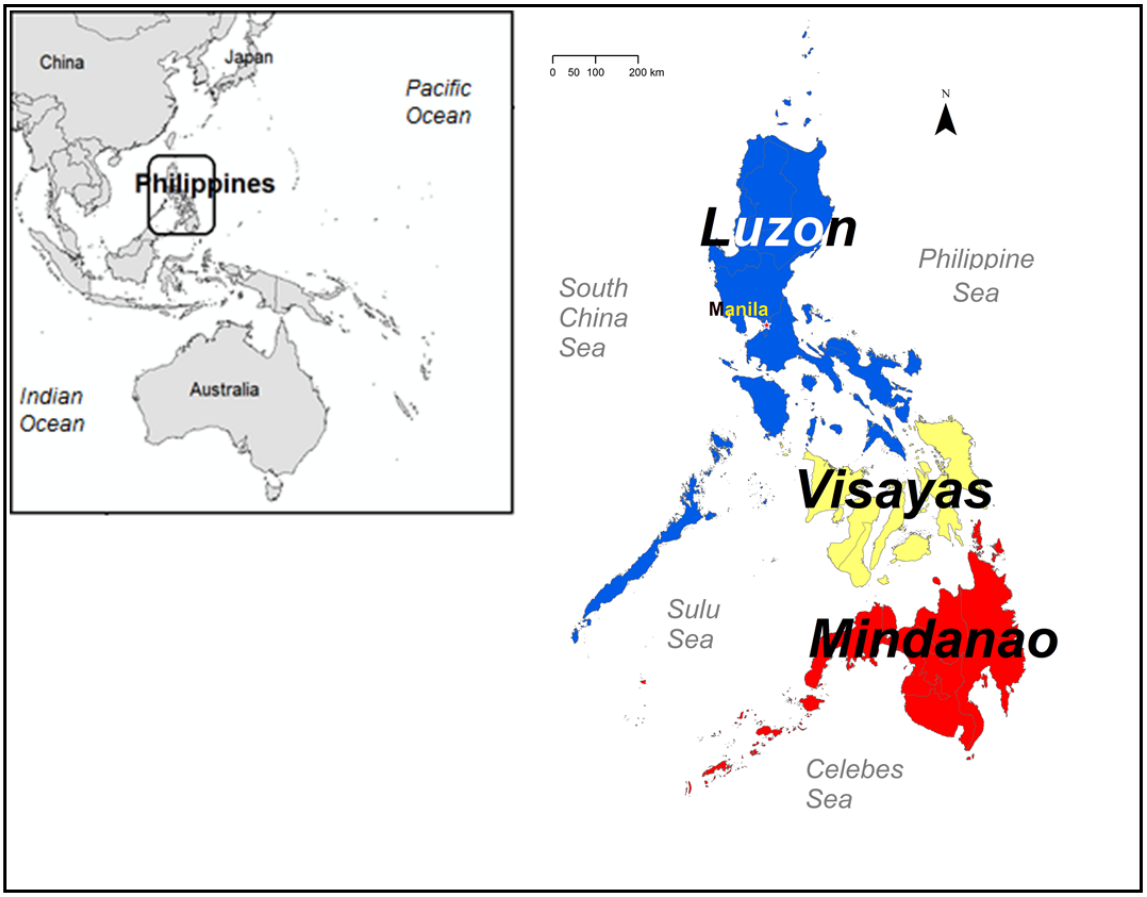


Figure 2-3. Location of the Philippine

Note: Author's figure; source of basic shapefile data: PhilGIS)

2.6.1 Note on current state of the Philippines

The Philippines, officially known as the Republic of the Philippines, is situated in Southeast Asia, in the western Pacific Ocean (Figure 2.3). The country is an archipelago consisting of more than 7107 islands. The total area of the country is 300,000 km^2. The country is divided into three primary islands groups: Luzon, Visayas, and Mindanao. Furthermore, the country is divided into 17 administrative regions and 81 provinces, 144 cities, 1,491 municipalities, and 42,028 *barangays*, the smallest administrative division (Philippine Statistics Authority, 2014). A sub-division, a territorial enclave inside a barangay, is called *sitio*. The capital is Manila, and the official languages are Filipino and English. The population, as of May 2000, the last conducted census, accounted for 76.95 million people; population growth is increasing rapidly and it is estimated to reach approximately 141.7 million by 2045, according to a medium assumption of the Philippine Statistics Authority. The population as of 2015 was estimated to be approximately 103 million by the same assumption (Philippine

Statistics Authority, 2000).

1) Economy

The Philippine economy is one of the emerging Asian markets. Philippine gross domestic product (GDP) consists mainly of services (57 per cent), secondly industry (32 per cent), and thirdly agriculture (11 per cent) (Philippine Statistics Authority, 2015a). Export commodities are semiconductors and electronic and other products, machinery and transport equipment, woodcraft and furniture, aircraft and ships, garments, copper products, petroleum products, coconut oil, and fruits, with a total growth rate of 9 per cent in the year 2013 (Philippine Statistics Authority, 2015a); however, the country is experiencing a trade deficit, as it is importing more than exporting, with an estimated 65.4 billion USD and 62.1 billion USD as of 2014, respectively (Philippine Statistics Authority, 2015a). According to the World Economic Outlook Database (International Monetary Fund, 2014), the Philippines economy was estimated at 289.686 billion USD and was the 39th largest in the world in 2004; it was forecasted to grow rapidly, approximately 6 per cent annually. The currency used in the country is the Philippine Peso (PHP) (1USD ~ 46PHP[1]).

2) Society and culture

Present Philippine society resulted from an evolution of various patterns of ethnic developments, and until the arrival of the Spanish in the 16th century, the Philippine archipelago was a haven for diverse groups and strong growth of their ethnic traditions. Further diversification of the culture was caused by Spanish and Islamic cultures, and Christianization. Therefore, cultural development of the Filipino people has both external and internal structures of culture and subculture (Tan, 2008). Nowadays, those people who still identify themselves and are identified by others as indigenous people, living in homogenous societies and having the same language and customs, and are defined by territorial boundary, are dubbed as indigenous cultural communities (abbreviated as ICCs) of the Philippines (Reid, 2009). It is estimated that 14 to 17 million indigenous people are in the country, consisting of 110 ethno-linguistic groups (United Nations Development Program, 2010); however, according to the last

[1] Rate as of August 4, 2015. The Bangko Sentral ng Pilipinas (http://www.bsp.gov.ph/), consulted August 5, 2015.

national census (Philippine Statistics Authority, 2010), only 0.1 per cent of the population maintain their tribal religious affiliations, while the predominant religion is Christianity, with 57 per cent of population belonging to the Roman Catholics (Philippine Statistics Authority, 2010).

The Philippines are struggling with poverty, with an incidence of 25.8 per cent as of the first half of 2014, a 1.2 per cent increase since 2013 (Philippine Statistics Authority, 2014). The unemployment rate, which was estimated at 7.2 per cent in 2014, was higher than in previous years, and approximately 40 per cent or more of those employed were working in the informal sector (Philippine Statistics Authority, 2014).

Their population, aside from rapidly increasing, faces a number of problems deeply rooted in society. The civil society is captured by elite interests that are anti-development, and non-elite groups are excluded from power, causing a high level of social inequality (Clarke, 2012). Education is not equally accessible, and the quality as well as value-orientation of the present education system is hindering national development (Durban et al., 2012). The country suffers from institutional failure, which is manifested in high occurrences of graft and corruption, inefficiency, incompetence, and redundancy in public service, and requires a series of reform initiatives, processes, procedures and mindsets that would lead towards more effective leadership, increased political will, and engaged citizens (Brillantes and Fernandez, 2011). Energy generation and consumption in the country has been growing, and 83.3 per cent of the population have access to electricity as of 2010 (World Bank, 2015a). Electricity generation includes a relatively high share (26 per cent) of renewable sources, as of 2013 (Department of Energy, 2013).

3) Natural environment

The Philippine archipelago is located in a tropcial marine climate, hot and humid, with three distinct seasons: a hot dry season from March to May, a rainy season from June to November, and a cool dry season from December to February. The average distribution of rainfall and temperature for past two decades is presented in Figure 2.4.

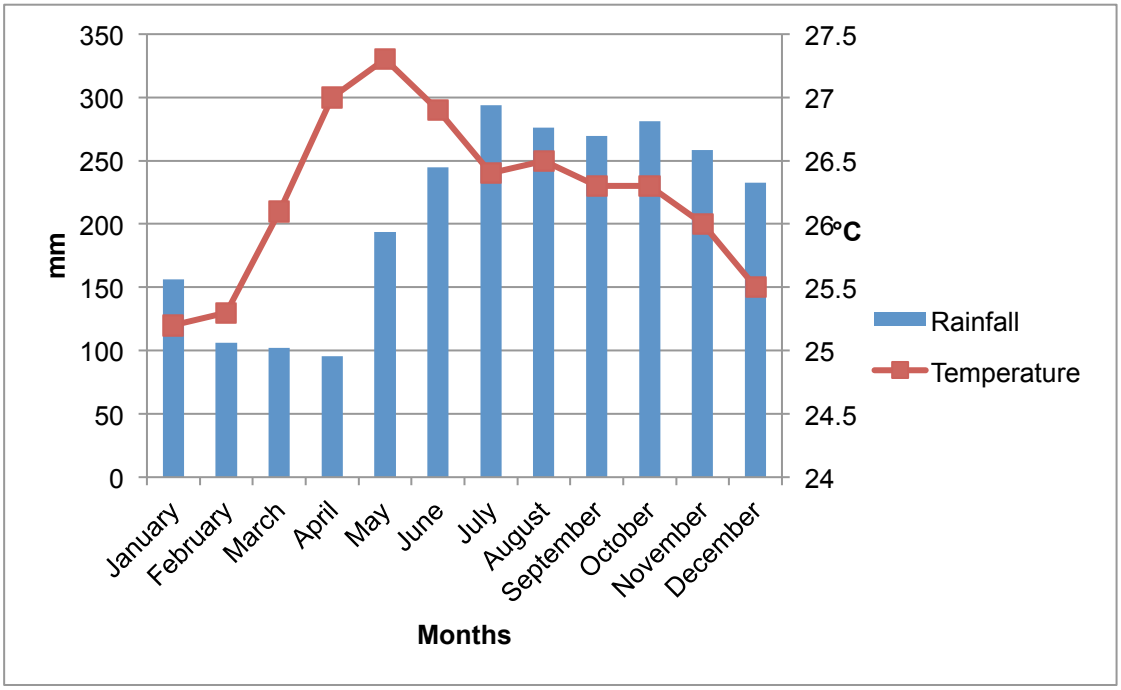


Figure 2-4. Mean historical monthly temperature and rainfall in Manila (1990-2012)

Source: Climatic Research Unit of University of East Anglia via World Bank (2015b)

Actual close forest cover was estimated as 23 per cent of the country's area, 6.84 million of hectares, based on satellite images as of 2010 (Department of Environment and Natural Resources, 2013). Within the 6.84 million of hectares of forest land, open forest accounts for 67 per cent, closed forest account for 28 per cent, and mangroves make up 5 per cent (Department of Environment and Natural Resources, 2013). The higher ratio of closed forest to open forest can be found in the northern regions (Figure 2.5).

Philippine forests are classified into following types of species groups (Razal et al, 2004; National Statistical Coordination Board, 2004):

1) broad-leaved forests, dominated by trees from *Dipterocarpaceae* family: *Dipterocarpus grandiflorus, D. warburghii, Parshorea plicata, Pentacme contorta, Shorea polysperma, S. almon, S. negrosensis, S. squamata, S. astylosa, and S. guiso*;

2) mixed dipterocarp forests, such as lauan forests composed of *Shorea negrosensis, S.*

squamata, S. polysperma, S. almon, S. contorta, Parshorea plicata and Dipterocarpus grandiflorus, lauan-apitong forest with many deciduous species, yakal-lauan forests with many deciduous and semi-deciduous species, and lauan-hagkhak (with *Dipterocarpus warburghii*;

3) mossy forests dominated by *Podocarpaceae, Myrtaceae*, and *Fagaceae*;

4) molave forests dominated by *Pterocarpus* spp*., Afzelia rhomboidea, Vitex parviflora, and Dracontomelon dao*;

5) mangrove forests dominated by *Rhizophora apiculata, R. mucronata, Ceriops tagal, C. roxburghiana, Bruguiera gymnorhiza, B.parviflora, B. cylindrica,* and *B. sexangula*; and

6) coniferous forests made up of *Pinus kesiya, P. merkusi*.

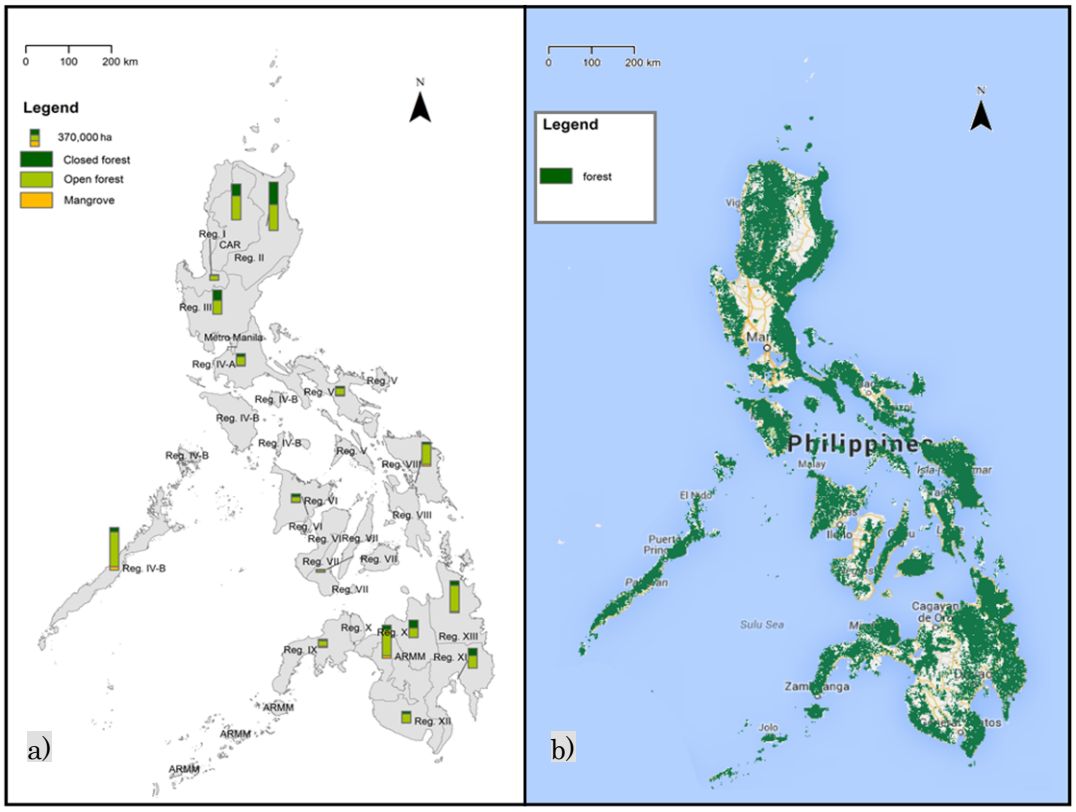


Figure 2-5. Forest cover by region in the Philippines as of 2010; (a) Governmental statistics on the forest, (b) Forest cover based on 30m resolution satellite images

Note: Source: a) Department of Environment and Natural Resources, 2013, base layer data from PhilGIS; b) GlobeLand30: National Geomatics Center of China, projected on Google Vector Map©)

The archipelago is considered to be one for the largest mega-diversity countries and hotspots in the world (Protected Areas and Wildlife Bureau, 2004). However, the country is under threat of losing their biodiversity, indicated by loss of vast areas of forest, coral reefs and mangroves. Such environmental damage severely impacts the long-term sustainability of communities, governance and national welfare (Wood et al., 2000).

2.6.2 Forest history and community forestry origin

1) Spanish colony (1521-1898) – forest centralization

In pre-colonial times in the Philippines, before the Spanish came to the islands in 1521, the forest was considered as communal property, as chronicled by the Chinese and Spanish (Guiang et al., 2001). At the moment of Spanish arrival, the archipelago was covered mostly with forest, estimated at 90 per cent of the land area (Pulhin, 2003). The Spanish people took over the islands after Ferdinand Magellan arrived in the Philippines in 1521 and centralized the land, including the forest (Tan, 2008). The so-called *Regalian Doctrine* declared all land and resources as property of the King of Spain. Further changes affecting traditional upland dwellers took placed in 1863 when the forest agency Inspection General de Montes was established, declaring control over the forest and its utilization, thus outlawing traditional users from the forests. In 1889, the slash-and-burn or swidden farm cultivation, so-called *kaingin*, was prohibited in the uplands under threat of severe penalties, according to the Definite Forest Laws and Regulations. The prohibition of slash-and-burn cultivation was followed by the Kaingin Law in 1901, which excluded slash-and-burn farmers and other forest dwellers from the forest areas and caused inequity and domination of these resources by the elites, leaving no support for community rights to forest resources (Magno, 2001). However, the Spanish were unable to control all upland areas, especially in the mountains (Tan, 2008). The colonial law also imposed free labor or labor with low to nominal compensation. People were required to provide hard labor, such as logging and carrying the wood. Some tribes were able to avoid the new people by escaping into the depths of the forest; therefore, they were able to retain their nature-dependent culture (Alino, 1993).

2) American period (1898 - 1946) – first pro-decentralization steps of centralized forest

The next period for the Philippines began in 1898, when the Philippine islands were ceded by Spain to the United States as an effect of the latter's victory in the Spanish–American War. At that time, around 70 per cent of the country area was forested, primarily comprised of secondary forests (Kummer, 1992). The Inspection General de Montes was transformed into the Forestry Bureau under United States Commonwealth Government, and the Regalian Doctrine was maintained, with the difference that the Forestry Act of 1904 provided exemptions from forest concessions for people living adjacent to forests such that they could effectively harvest timber and firewood for their domestic consumption (Guiang et al., 2001). However, in some areas of the country, such as Palawan, there were instances of displacement of indigenous groups by early settlers who were transforming the land into coconut plantations and pasture for cattle.

The American period in Philippine history also brought modern logging technologies from America and Canada (Bunker, 1928). The forest was considered as an especially potential rich source of hardwood for local and international markets (Ahern, 1901); American companies were granted renewable 20-year concessions for logging (Bunker, 1928).

Further movements towards decentralization of the forest brought Act No. 2711, the so-called the Forest Law of 1917, that established communal forests and pastures for the use of communities but the forest itself remained under state control. Later on, some of these lands were reclassified as transferable lands for tiling (Pulhin and Pulhin, 2003).

The status of the country changed in 1935, when the United States changed their association and the Philippines became a Commonwealth. The first president, Manuel Quezon, designated a national language based on the Tagalog language, introduced women's political freedom, and land reform. The Constitution of independent Philippines affirmed once again Regalian Doctrine, thus all lands, right to ownership of any public domain land, remained unchanged and in the state’s hands (Guiang et al., 2001).

According to revisions in 1941 to the Communal Forest Regulation, the Secretary of Agriculture and Commerce cancelled communal forests, upon the request of municipal councils and the Director of Forestry. Instead, the residents of the municipality were granted the right to log trees and collect forest products without payment, so long as the harvested forest products were restricted to domestic. However, a permit from the Bureau of Forestry was required even for cutting timber for domestic use (Guiang et al., 2001).

3) Postwar times (from 1946 - 1989) – from forest degradation and social injustice towards decentralized forest

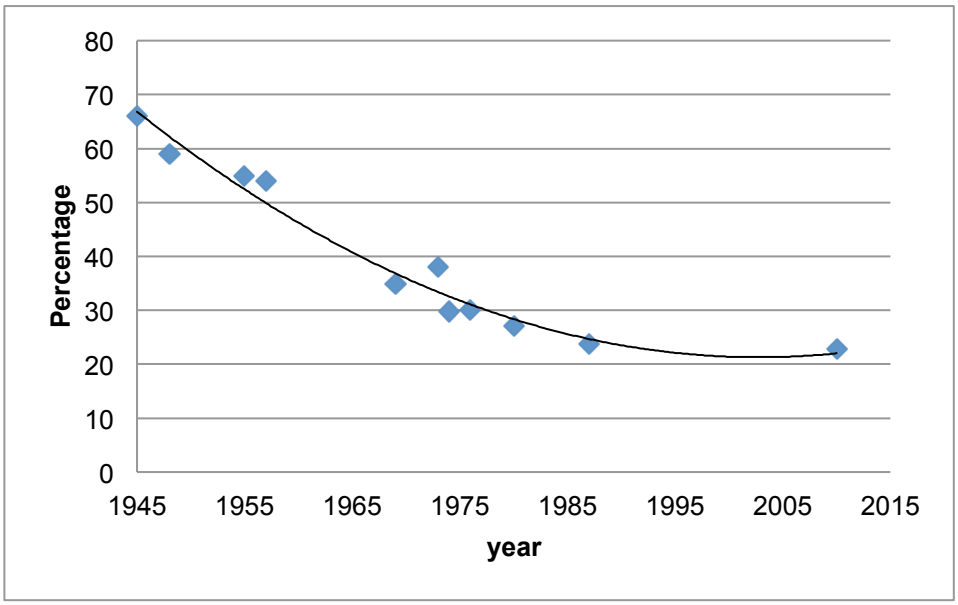


Figure 2-6. Trend line of post-war deforesting in the Philippines

Note: Data till 1987 from Kummer (1992), and for 2010 from Department of Environment and Natural Resources, 2013

Further dramatic changes of the forest cover were recorded after World War II (Figure 2.6). This period was marked with very extensive logging of timber, due to its high profitability especially as an export product (Kummer, 1992). To sustain the timber supply, in 1953 the Philippines Selective Logging System was established, but due to emerging needs for foreign exchange logging and a rapidly growing population, the extensive massive logging was maintained. President Magsaysay (who came into power in the 1950s) legalized the transformation of large areas of forestland for resettlement and agricultural cultivation (Alino, 1993; Pulhin and Pulhin, 2003). In the time of

President Marcos, since late 1960s, more Timber License Agreements have been given to big companies, supporters and family members, leaving local people with no access to timber (Guiang et al., 2001; Vitug, 1993).

By the 1970s forest resources were depleted, therefore the country started moving from logging into the mining industry as a strategy to recover revenue on the foreign exchange market. However, it was impossible to suspend the renewable Timber License Agreements due to political reasons. Moreover, this was not the only threat to forest resources. The pressure of a rising population and an escalating demand for land required further clearing the forests, and slash-and-burn practices were common, transforming forest land irreversibly into agricultural land (Jin-Bee, 1987; Vitug, 1993). In 1970, a new social forestry movement was outlined. Firstly, the very sensitive issue of slash-and-burn (*kaingin*) was progressively settled. Kaingin Permits started being issued to forest occupants and according to the Revised Forestry Code, PD 705 of 1975, those who practiced slash-and-burn cultivation could not be evicted from their land. Four programs with social approaches for forest management began: the Forest Occupancy Management, the Family Approach to Reforestation, the Communal Tree Farming program and the Program for Forest Ecosystem Management. Upland farmers and forest occupants started being seen as potential forest guardians, as well as a reforestation power. In 1974 the first Communal Forest Lease Agreement was granted. Programs in the form of land tenure or slash-and-burn permits ranged from 2 to 25 years, such as the Forest Occupancy Management and the Communal Tree Farming respectively (Guiang et al., 2001). Through the Forest Occupancy Management, the Family Approach to Reforestation and the Communal Tree Farming, the government stopped penalizing the communities and started considering land tenure security and economic development by introducing forest-based technologies that fostered soil and water conservation (Chiong-Javier, 1987; Gacoscosim, 1995). Although such pro-social objectives were outlined in these programs, the policy-makers were focused mostly on preventing forest degradation by local occupants. Therefore, inactive participation of the people actually happened instead of active involvement (Payuan, 1985).

In 1981 (Chiong-Javier, 1987; Jopillo, 1994) the Upland Development Program, supported by the Ford Foundation, was initiated with the goal of establishing an effective forest occupancy program and strengthening the agency's capabilities to

undertake participatory upland management. These goals had to be achieved through a learning process approach to social forestry that would involve research, trainings, experimentation and active participation.

In 1982 social forestry programs were reorganized. Communal Tree Farming, the Forest Occupancy Management, and the Family Approach to Reforestation were consolidated into the Integrated Social Forestry Program upon former President Marcos's instruction (Bagadion, 2000). The Integrated Social Forestry Program gained a higher importance and was expanded after the People Power Revolution (also known as EDSA Revolution) that restored democracy in 1986 (Department of Environment and Natural Resources, 1989). The Integrated Social Forestry Program had two objectives: (1) to provide livelihood opportunities for forest occupants, and (2) to develop and conserve forest resources. Provision of land tenure security to farmer-occupant was supposed to be the solution for worsened socio-economic conditions of people living in uplands, environmental degradation, such as soil erosion, and other problems in the uplands. Participants of the Integrated Social Forestry Program were awarded individual or family-based renewable Certificate of Stewardship Contracts that granted land tenure for a period of 25 years, but granting 25 years was already considered too short period for farm development (Van den Top, 2003). The Integrated Social Forestry Program encountered numerous problems: dissatisfaction of participants, land tenure issues and transferring the tenures to others, boundary disputes, lack of support and technical assistance, insufficient livelihood, limited resources and no accessible timber (Escueta, 1989).

Another social forestry program, the so called Community Forestry Program, started in 1989. The Community Forestry Management Agreements granted to participants of Community Forestry Program also secured 25-year land tenures and were renewable. The government favored those who had prepared development plans. The responsibility of protecting and managing resources was shared between the government and community. Unlike the Integrated Social Forestry Program, the Community Forestry Program was extended to natural forests and sustainable use of resources (Bagadion, 2000).

Through the Integrated Social Forestry Program and Community Forestry Program people started being considered more as partners in forest conservation and

development, not only as a power for reforestation, as it used to be in the early social forestry movement. Social forestry became a more pro-social program in the strict sense, with sustainable resource management in consideration. However, this program still had weaknesses, such as shortages in personnel and support and insufficient trainings. Technical problems, such as poor agroforestry technology transfer, and socioeconomic problems, such as the lack of market channels and capital, were encountered (Bagadion, 2000).

4) Community-Based Forest Management - decentralization and devolution of the forest (1989~)

In early 1989, the Department of Environment and Natural Resources (DENR) issued a new order and revised Guidance for the Community Forestry Programs[2], promoting community participation in forest resource management and protection; followed by decentralization of governmental functions[3], passing resource management from DENR to local government units; and National Integrated Protected Areas System, a new law on protected areas,[4] considering forests as critical for biodiversity and watershed protection. Transformation of forest law and government decentralization attracted external funding from the Development Bank, United States Agency for International Development, United Nation Development Programme, World Bank, Gesellschaft fur Technical Zusammenarbeit, and Swedish International Development Cooperation Agency in the form of grants and technical support (Guiang et al., 2001; Rebugio et al., 2007). From 1988 to 1992, the country obtained Forestry Sector Loan I (loan from five agencies, 731million USD, and 10-fold increase compared to previous loan), grants and technical assistance from the Asian Development Bank, United States Agency for International Development, United Nation Development Programme, The Ford Foundation, World Bank, Gesellschaft fur Technical Zusammenarbeit, Japanese Bank for International Cooperation and Swedish International Development Cooperation Agency (Rebugio et al., 2007). In 1993 another loan from Japan for the Forestry Sector Project was acquired (7.4 million USD)[5].

2 DENR Department Administrative Order (DAO) 123 (1989)
3 Local Government Code (LGC) of 1991 or RA 7160
4 National Integrated Protected Areas System (NIPAS) Act or RA 7586 (1992)
5 http://www2.jica.go.jp/ consulted on July 14, 2015

In 1995 DENR, with Executive Order No. 263[6], adopted the Community-Based Forest Management (CBFM) scheme as a national strategy for the sustainable development of forest resources and social equity. The provision or rights provided by CBFM was defined by DENR Department Administrative Order (DAO) 96-29 in 1996, and a Strategic Action Plan for CBFM in 1997 by DENR.[7] Community-Based Forest Management Agreements (CBFMA) were issued to organizations, as a 25-year renewable tenure contract. Responsibilities and rights of CBFM are presented in Table 2.2. Similar to ISFP, some families or individual members can be awarded Certificates of Stewardship Contract[8] within the organization with CBFMA, and these are transferable. The Department of Agrarian Reform initiated program in 1987 for distributing agricultural land to landless farmers, under the Comprehensive Agrarian Reform Progra[9]. The Comprehensive Agrarian Reform Program can also support CBFM through the DENR Comprehensive Agrarian Program.[10] Through Guidelines on the Establishment and Management of Community-Based Programs in Protected Areas[11] and their revisions[12], CBFMA on protected areas and buffer zones were revised into Protected Area Community Based Resource Management Agreement (PACBRMA) with Community Based Programs (CBP), aligning resource use with the Protected Area Management Plan (Table 2.2) and, in practice, restricting resource extraction. CBFM also started a new Forestry Sector Loan II. CBFM, attracting further additional financial assistance from the Asian Development Bank, and then from the Japan International Cooperation Agency (JICA) for project enhancements during the years 2004-2009. In 2007, a 50 million USD loan to the Philippines for the National Program Support for Environment and Natural Resources Management was awarded by World Bank (World Bank, 2007).

The most recent reforestation phase in the Philippines, covering years from 2011 to 2016, is National Greening Program[13] aiming at forest rehabilitation and can support both ancestral lands and CBFM areas, as well as prompt the establishment of new

6 Executive Order (EO) 263 (1995)
7 DENR Memorandum Circular (MC) 97-12 (1997)
8 DENR Administrative Order No. 98 – 45 June 24, 1998
9 131 and Executive Order 229 on June 22, 1987.
10 DENR Department Administrative Order (DAO) 2003-35
11 DENR Department Administrative Order (DAO) 2002-02
12 DENR Department Administrative Order (DAO)2004-32
13 Executive Order No. 26, Feb. 24, 2011

CBFMAs. The National Greening Program aims to plant 1.5 billion trees in around 1.5 million hectares of public land, including existing and new CBFM projects support, estimated for approximately 680 million USD (Israel and Arbo, 2015), and bringing another Forestry Sector Loan and a World Bank loan under the National Program Support to Environment and Natural Resources Sector Investment (e.g. Japanese ODA Forestry Sector Project loan 2012[14]).

Ancestral lands of indigenous people were also included in process of decentralization. Initially, for the purpose of verifying ancestral domain claims of indigenous communities, including identifying forest boundaries, DENR implemented the Delineation of Ancestral Lands and Domain Claims[15] in 1993. This law can provide a tenure system, such as Certificate of Ancestral Domain Claims (CADC) or Certificate of Ancestral Lands Claims (CALC), issued by DENR (Magno, 2001; Van den Top, 2003). CADC or CALT were allowed to be merged with CBFMA, giving the benefits of CBFM to CADC/CALT. The rights of indigenous people were further strengthen by the Indigenous Peoples Right Act in 1997[16], which recognized ancestral domains and lands of indigenous people by issuing Certificate of Ancestral Domain Title (CADT) and Certificate of Ancestral Land Title (CALT), ensuring indigenous cultural communities' rights and their socio-economic well-being. These titles secure the most complete land devolution process, as the ultimate rights are in hands of indigenous community. In the light of the Indigenous Peoples Right Act there was National Commission on Indigenous Peoples that enforces the rights established. The NCIP body is independent from other governmental departments and is in charge of formulating and implementing policies, plans and programs for the recognition, promotion and protection of the rights and well-being of indigenous people. The CADT and CALT provide the ultimate rights and complete devolution for forest dependent communities (Ballesteros, 2001). In the case of CADT or CALT, by becoming functional group of CF the group secures its rights to resource use, and allows these rights to be conducted according their customary laws (Ballesteros, 2001). The process of forest decentralization is presented Figure 2.8 (p.35).

14 http://www2.jica.go.jp/ consulted on July 14, 2015
15 DENR Administrative Order No. 2, series 1993
16 Indigenous People's Rights Act or RA 8371 (1997)

Table 2-2. Comparison of rights and responsibilities of different systems

CADT/CALT	CBFM umbrella programs CADC-CBFMA and CALC-CBMA	
	CBFMA/PACBRMA	**CADC/CALC**
Rights: 1) Ownership and possession over ancestral domain/ownership over ancestral land 2) Ownership over all resources and benefits from them 3) Stay in the territory and not be removed 4) Regulating entry of migrants 5) Customary law for conflict resolution 6) Responsible development of land and natural resources 7) Cannot be sold	**Rights:** 1) Occupy, possess, utilize, and develop forestland and resources 2) Allocate among members forest resources rights and land 3) Exempt from paying rent and forest charges from project plantation or non-timber forest product from plantation (PACBRMA: harvest strictly follows Protected Area Management Plan (PAMP)) 4) Ownership of improvements 5)To be consulted about project 6) All income from sustainable forest utilization 7) Agreements and contracts with public and private sector 8) Participatory site delineation	**Rights:** 1) Occupy, possess, utilize, and develop forestland and resources 2.1) CALC: 2.1.1) Utilize trees and forest products inside the land, customary law 2.1.2) Exempt non-family/clan members 2.2) CADC 2.2.1) Benefit and share resources forest resources and land; 2.2.2) Ownership of improvements 2.2.3) Regulate migrants (NGOs, LGUS coordination) 2.2.4) Participating in government projects 2.2.5) DENR and other agencies assistance
Responsibilities: 1) In case of overlapping protected areas with ancestral domain/land Customs and traditional practices shall be reflected in Ancestral Domain Sustainable Development Protection Plan (ADSDPP) or Ancestral Domain Management Plans (ADMPs) to Indigenous	**Responsibilities:** 1) Designate land use and allocation 2) Protect and rehabilitate area of CBFMA/ PACBRMA and adjacent to CBFMA/PACBRMA areas 3) Develop internal transparent policies (benefit sharing, conflict resolution) 4.1) CBFM: 4.1.1) Prepare and implement	**Responsibilities:** 1) CALC/CADC: 1.1) Protect and conserve ecosystems 1.2) Work according with indigenous methods 2) CADC: 2.1) Prepare an ancestral domain management plan 2.2) Protect and conserve ecosystems 2.3) Activate indigenous practices

Knowledge Systems and Practices (IKSP).	Community Resource Management Framework (CRMF), Recourse Use Plan (RUP), and Annual Work Plan (AWP) 4.2) PACBRMA 4.2.1) Community Resource Management Framework (CRMF)	

Source: Partially adapted from Guiang et al. (2001), and expanded and modified according to: Indigenous People's Rights Act,1997; DENR Administrative Order No. 2, series 1993; Executive Order (EO) 263 (1995); DENR Department Administrative Order (DAO) 2002-02; DENR Department Administrative Order (DAO)2004-32; Joint DENR-NCIP Memorandum Circular No. 01-07 of 2007; and Ballesteros (2001).

The hierarchy of bodies in the Philippine administrative system, such as DENR, Department of Agrarian Reform and Department of Agriculture, that are concerned with agriculture, agrarian reform and environment sector, and National Commission on Indigenous Peoples, that is concerned with indigenous communities and their resources, is presented in Figure 2.7. Especially the four bodies, DENR, Department of Agrarian Reform and Department of Agriculture and National Commission on Indigenous Peoples, had jurisdictional and operational level issues due to overlapping areas of action, which were measured with joint agreement in 2012[17]. All of these agencies are decentralized, having regional, provincial, and local government level offices.

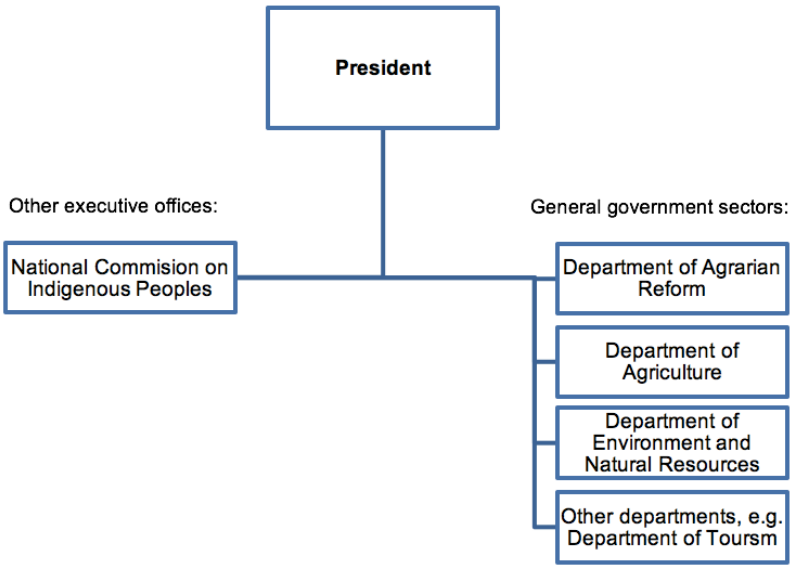


Figure 2-7. Executive branches of Philippine Administrative System

[17] Joint DAR-DENR-LRA-NCIP Administrative Order No. 01, 2012.

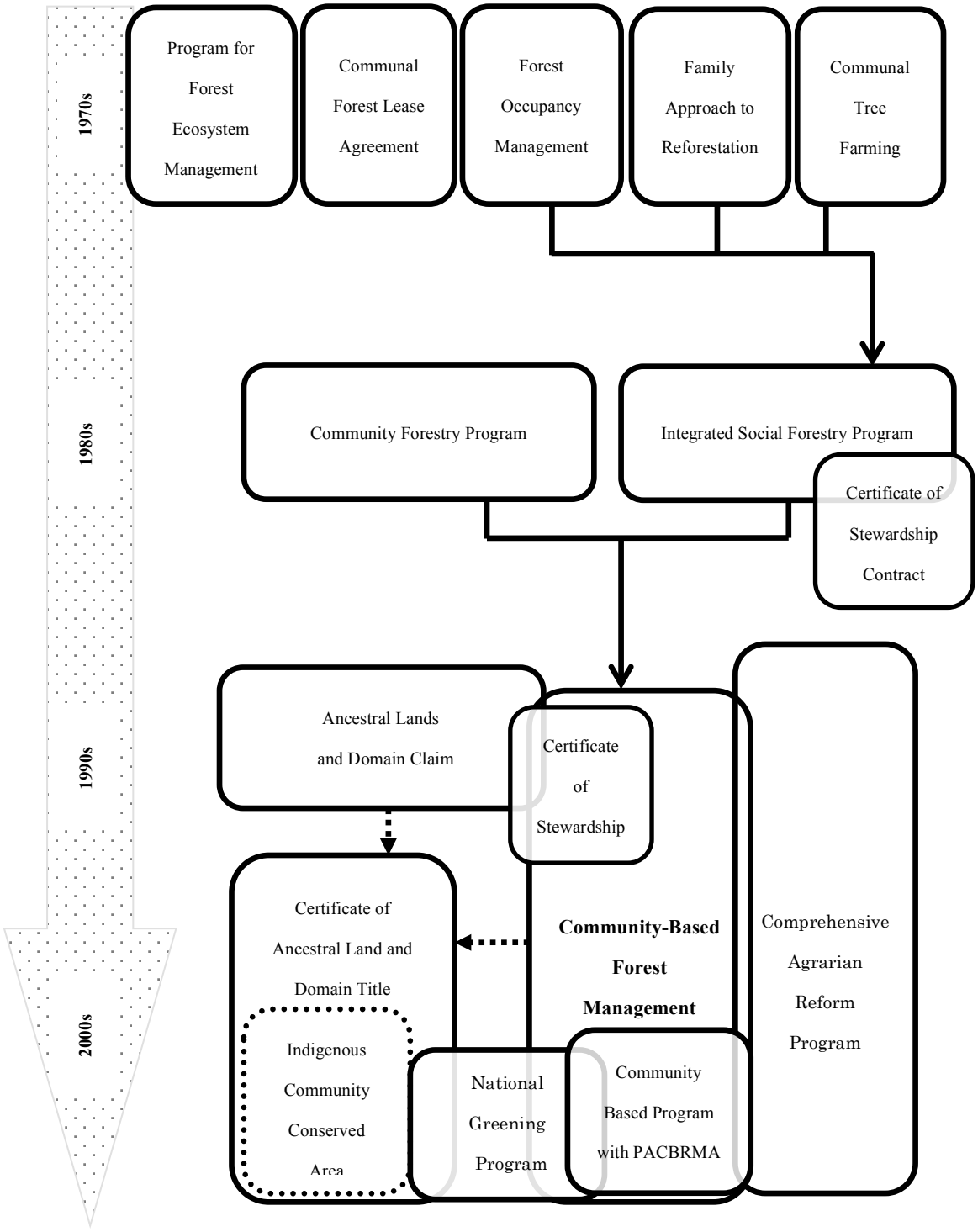


Figure 2-8. Timeline of CF programs

http://www.gov.ph/about/gov/ on April 20, 2

Note: Based on reviewed literature, sections 2.5.23 and 2.5.2.4

i. Challenges of Community-Based Forest Management

The Community-Based Forest Management Agreement (CBFMA) is a 25-year conditionally renewable land tenure tool for forest plantation and farming, concluded between DENR and local formal organizations that becomes FGUs, such as people's organization (PO), association (i.e., famers' association) or cooperative. The CBFM program in the Philippines is the largest program in Southeast Asia (Poffenberger, 2006). CBFM does not remain a static program, but continues to evolve by integrating a bundle of strategies, e.g., National Greening Program, Comprehensive Agrarian Reform Program, modified into PACBRMA, or integrated with CADC and CALC. Most recent records of CBFM clearly indicated that by February 2014 there was 1888 CBFMAs already issued, covering 1.62 million hectares of land, approximately 5 per cent of the total country area; with nearly 200 thousand people involved under CBFM[18] (Table 2.3). These figures, however, do not reflect the actual state of each CBFM area and aside from the area planted by each CBFM, there are no results of assessments or reports open to the public on the socio-economic achievements of CBFM or actual survival of the planted forest. Referring to CBFMA's conditions, each CBFM agreement shall be renewed or canceled upon individual group outcomes every 25 years, contesting the government capacities to assess and process the number of projects that have already been launched. It is unlikely all of the projects remain under continuous supervision of the government throughout the duration of the contract (Balooni et al., 2008), thus project groups or FUGs must maintain their organizations despite having only temporary technical and financial assistance (e.g. Ostrom, 1990, 1999). Through the CBFM evolution process it was also clear that projects are not run on national government capacities only, but highly dependent on external stakeholders, and funding (Seki, 2001; Dressler et al. 2010; Pulhin and Dressler, 2009; Pulhin et al., 2015).

Although the Philippines shows a very pioneering character for forest decentralization and CF, it is still going through a trial and error stage, hoping to find the most optimal scheme. Dahal and Capistrano (2006) highlighted two main strategic weaknesses in their forest decentralization policy processes. Firstly, the scholars criticized a gap between idealized policy and the complex realities of implementation,

[18] Department of Environment and Natural Resources, data unpublished, handed over private corresponded

associated with the issue of poor governance practice and weak institutional structures.

Table 2-3. Number CBFMA and coverage, as of February 2014

	No. Of CBFMA issued/ No. of PO	CBFMA Area in Hectare	No. of PO Members		
			Male	*Female*	*Total*
Philippines	**1,888**	**1,616,028.98**	**124,570**	**67,520**	**192,090**
By region[a]:					
CAR[b,c]	**88**	**62,787.48**	**1,304**	**864**	**2,168**
1	143	39,476.75	8,543	4,146	12,689
2	109	264,279.70	6,380	1,984	8,364
3[c]	**120**	**66,822.64**	**4,893**	**1,349**	**6,242**
4-A	47	18,471.19	2,239	1,403	3,642
4- B	77	90,144.63	4,566	2,270	6,836
5	119	49,702.25	5,603	2,859	8,462
6	104	34,053.61	5,691	2,864	8,555
7	211	57,655.95	9,149	5,645	14,794
8	144	117,047.26	5,412	2,858	8,270
9	145	90,192.57	6,842	4,106	10,948
10	294	209,147.49	19,365	9,172	28,537
11	105	210,063.10	5,998	2,369	8,367
12	56	96,101.42	7,462	2,481	9,943
13	126	210,082.95	31,123	23,150	54,273

Note: Including Protected Area Community Based Resource Management Agreements; Source: Department of Environment and Natural Resources, data unpublished, handed over private corresponded; [a]Two regions not covered: Manila Metropolitan Region and Autonomous Region in Muslim Mindanao; [b]CAR - Cordillera Administrative Region; [c]In Region 3 and CAR are locations of case studies

Secondly, the presence of DENR supervision of the process is an inadequate articulation of policy in devolving the management role from the state to local government units and FUGs. In such cases, the renewability of the land tenure is not secured and depends on the final DENR's decision. Pulhin (2003) argued that the CBFM policy was radical and progressive, but the goal of sustainable development was difficult to reach with policy implementation, and there was a need to empower the local people whose lives are dependent on the forest. Balooni et al. (2008) demonstrated that for successful implementation of CBFM policy a highly capable community organization with strong self-management was vital. CBFM should support the livelihood of participants through various means such as agroforestry, and forest-based, agricultural and non-agricultural activities, as well as raising environmental awareness and stimulating an active reforestation process. CBFM, highly dependent on outside stakeholders, often caused a misconception by local people who consider it as a temporary project (Pulhin et al., 2015). Table 2.4 summarizes the case studies available from peer-reviewed literature, which demonstrate that groups were highly vulnerable and that CBFM exposed groups to number of challenges that the FUGs had to overcome, otherwise they failed.

Although a number of research studies related to the initial stage of CBFM were conducted (Bagadion, 2000; Pulhin and Pilhin, 2003; Guiang et al., 2001), especially elaborating the institutional weakness of the CBFM (Dahal and Capistrano, 2006; Pulhin and Dressler, 2009) and policy evolution (Ballesteros, 2001; Pulhin 2003), there is still an insufficient amount of in-depth research conducted on assessing and developing internal capacities of CBFM communities that could withstand various socio-cultural changes, and all of the research was conducted based on interviewing key informants, such as the reviewed studies in Table 2.4. CADT forms of CF, and whether transferring some ancestral lands into new CBFMs or CADTs is able to strengthen the capacities of indigenous communities, are still undetermined in the academic discussion.

Table 2-4. Case studies drawn from peer-reviewed literature

Case Study (source)	**Staring year and CBFM size**	**Outcome**	**Constrains**
CBFM in Mindanao, after former logging concession (Pulhin et al., 2015)	1998 14,800ha 324 households	Employment through logging activities	National suspensions or delays in issuing permits
CBFM in Nueva Vizcaya (Pulhin and Dressler, 2009)	1995 2,764ha 565 households	Tree plantation Livelihood strategies; low timber volume actually cut out of permitted volume	Insufficient saw and installing band saw illegal on CBFM area; Reduced labor intensive employment to do small cut
Five CBFM study sties in norther Luzon (Dahal and Capistrano, 2006)	Started is1990s and early 2000s 87 to 55200ha 66 to 212 households	Use of forest, pasture, timber potential forest,	Inequitable sharing of benefits, fewer incentives, project incentives over volunteer, poor compliance with obligations, poor transparency, boundaries conflicts, inequitable land distribution, resource insecurity, insufficient market information
CBDM in Nueva Viccaya, watershed project; with ODA loan (Balooni et al., 2008)	1995 3000ha	Reforestation project	Some success due to mix of site-specific interventions and community endeavors that focus on securing local livelihood; exhausted project funds discontinued plantation

2.7 Summary of the chapter

This chapter explained origin and situation of "community forestry", referred to here as collective forest management and rural development through common local forest resource use and developing alternative means of income generation, and entailing the development of infrastructure, through participation in CF. The current structure of CF, driven by international and national politics, predetermines many of the community forestry groups on very vulnerable positions, depending on financial assistance in short- and long-term. These groups are already located on degraded and low-value lands, with limited usufruct to the forest. It perils the sustainability of the FUGs and the resources. The Philippines, is one of the leading countries in community forestry, especially Southeast Asia and Pacific, in terms of having the longest experience, progressive policies, including complete forest devolution, and a process of passing rights and decision-making power to local users. Community-Based Forest Management in the Philippines, enacted in 1995 and issued by DENR, could be implemented together with indigenous cultural communities' claims to land, or changed into PACBRMA. Community-Based Forest Management agreements are renewed or canceled after 25 years, dependent upon project outcomes. Community-Based Forest Management programs were recognized as a very progressive policy but on the other hand it was strongly dependent on international loans and technical assistance. At the FUG level, very vulnerable communities were barely coping with CBFM post-implementation activity, but the research available lacks in-depth studies that consider households and groups that were running the CBFM already for number of years. Certificate of Ancestral Domain Title has also not yet been studied as a form of CF.

3 RESILIENCE

3.1 Origin of resilience concept

Resilience literally means to “spring back”, returning to an original shape. The term originated in physics and is used to define the capacity of a material to withstand an acting force without losing its original properties after returning to its original form, and without breaking or cracking. In other words, it is the material’s elasticity (Gordon, 1978). Strain tells if the length of a material is increased under an acting force, and stress tells how much force is acting on a material, per cross section area (Figure 3.1a). A material’s elasticity depends on the material stiffness, which can be expressed as ratio of stress to strain and its constant for a given material (Gordon, 1978). Damage occurs with any stress above the stiffness the material (Figure 3.1b).

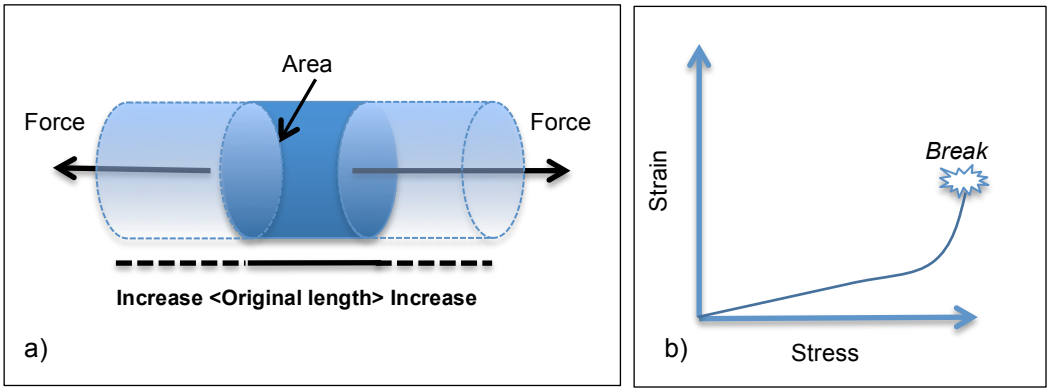


Figure 3-1. Engineering resilience (a) Material properties; (b) Stress-strain diagram

Note: Adopted and modified from Gordon, 1978, pp. 47 - 51

The understanding of resilience as it originated in physics can be defined as “engineering resilience”, with a function to maintaining the pre-existing equilibrium. A much broader interpretation of the definition of resilience is a capacity for “bouncing back” from an external shock or disaster; this is the found application of the term in complex dynamic systems (Skerratt, 2013). However, Holling (1996) also expanded the understanding of resilience, beyond an equilibrium steady state, as including a weak resilience which can flip a system into another stability domain, another regime. In the

context of development and global changes in the environment, maintaining the existence of (ecological) functions should be a goal of resilience, and resilience itself should be understood as amount disturbances that can be sustained before change of system structure and control occurs.

3.2 Resilience of social-ecological systems

The applicability of the resilience concept was extended to the socio-ecological domain in the face of worsening ecological crises (MacKinnon and Derickson, 2012), with an echo of the original meaning of "bouncing back". Resilience of a social-ecological system (SES), a coupled system of human and nature, denotes the capacity of maintaining ecosystems functions with their associated social domain, actors or institutions, through the reorganization and application of necessary changes (Anderies et al., 2004; Anderies et al., 2006). In studies on SES, resilience is explained through the concept of landscape stability (Walker et al., 2004; Figure 3.2), which also refers to Holling's (1996) discourse.

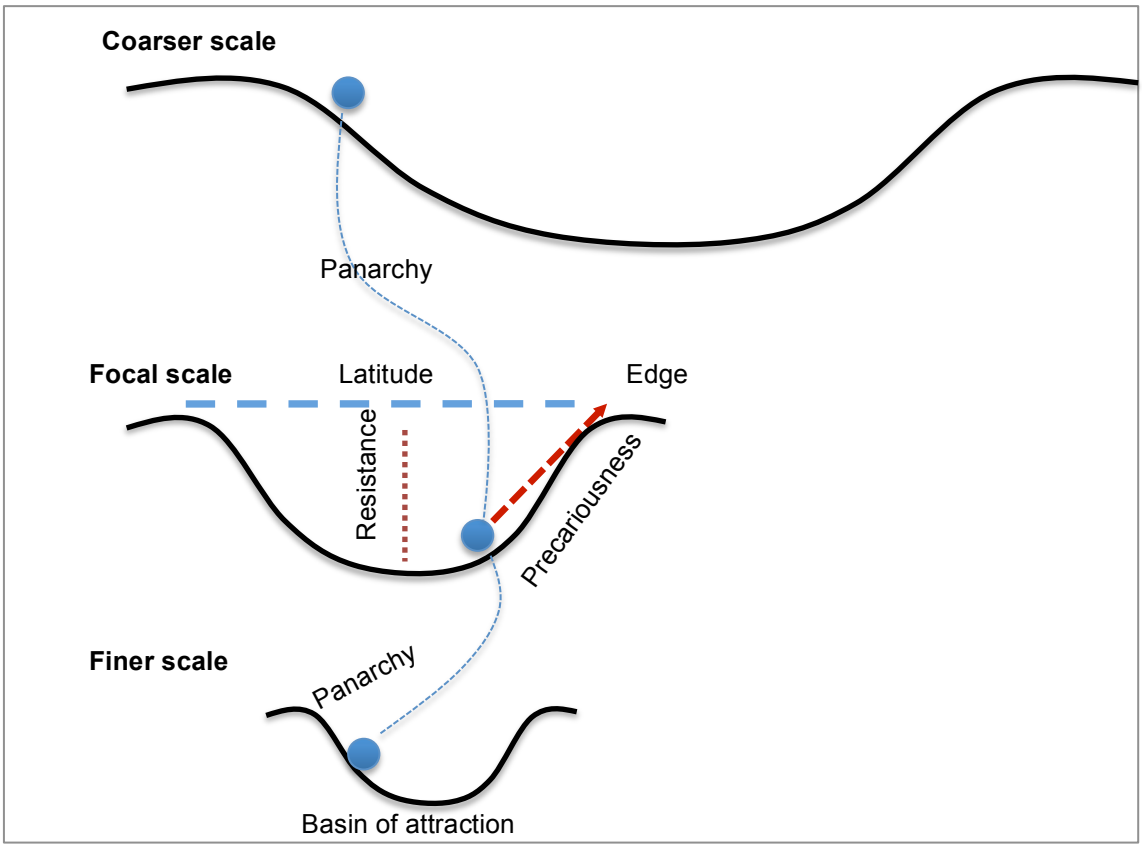


Figure 3-2. Aspects of resilience in relation to landscape stability

Note: Adopted and modified from Walker et al., 2004.

Landscape stability is the idea of a system located in a basin of attractions, representing different types of favorable settings, in which system may stay unchanged or go through adaptations and still remain in the same basin but with a different location and proximity to its edges, which represent the threshold of transformation. Within a given basin of attractions, there are three characteristics that represent a system's resilience by describe how much change is needed for transformation, namely how far the system is located from the threshold of transformation (precariousness), how far it is from one edge to another (latitude), and how far it is from the bottom of the basin to the top (resistance). However, once a system finds the setting unfavorable it may transform and shift to other basins of attraction located at the same horizontal level. Such horizontal space, consisting of many basins of attractions, is also situated in a vertical cascade of different scales. The basis of attraction of higher or lower levels also steer the basin of attraction of the focal system, through another aspect of resilience called *panarchy*. Further, each system can also be in its own adaptive cycle (Walker et al., 2004).

Walker et al. (2004), and proceeding scholars such as Folke et al. (2010), defined a social driver of SES as adaptability, which is the capacity of actors that are present in the system to influence resilience. Such resilience thinking in the context of SES gained interest among scholars trying to explain phenomena occurring in the system (e.g. Carpenter et al., 2001). Anderies et al. (2006) argued that the management of SES in a command-control, top-down, manner is not efficient and a shift in the management regime needs to be undertaken. According to the scholars (Anderies et al., 2006), management of SESs have to include both social and ecological domains, with consideration of multiple scales and slow variables. Adaptive governance is necessary to address time and scale, and management must be constantly revised in the context of change. Resilience from a short-term perspective can be costly, but in the long-term it may be beneficial; however, if transformation is unavoidable, the sooner this is recognized, the lower the transition cost is. These principals should be applied to natural resource management and rural development in order to avoid repeating past failures (Walker et al., 2010). A broader adoption of system approaches to agricultural research in the context of farming, fishing, and forestry, combined with taking into account livelihood, experimental learning between scientists and rural communities, and integration of various knowledge systems, will bring more resilient solutions to rural communities and to the management of natural resource (Walker et al., 2010).

3.3 Community resilience

Community resilience, which encompasses individual and collective human agency, is derived from psychological resilience. It maintains the engineering resilience concept of getting back to an original state. It can have either a specific nature, i.e., an ability to cope with direct and indirect social impacts of disasters (Paton et al., 2001), or it can refer to a more general capacity of a group to deal with adversities related to social, political and ecological changes (Adger, 2000). A vast portion of the research has been dedicated to developing the concept of general community resilience. In contrast to the original usage of resilience in the context of community development, here resilience should be understood beyond the "bounce-back" response, and as a normative and cumulative process that is foundational to the resilience of a community (Skerratt, 2013). Magis (2010) defined resilience more broadly as a capacity and its building process of a community to live in changing environment, with engagement of community resources,, and to cope with unpredictability and surprise. Resilience is also a possible assessment tool for perils of sustainable development (Magis, 2010). This stream was continued by Wilson (2010, 2012), who defined resilience capacity as the use of a community's capital theory to develop multifunctionality that in later discourse became equivalent of strong resilience (Figure 3.3).

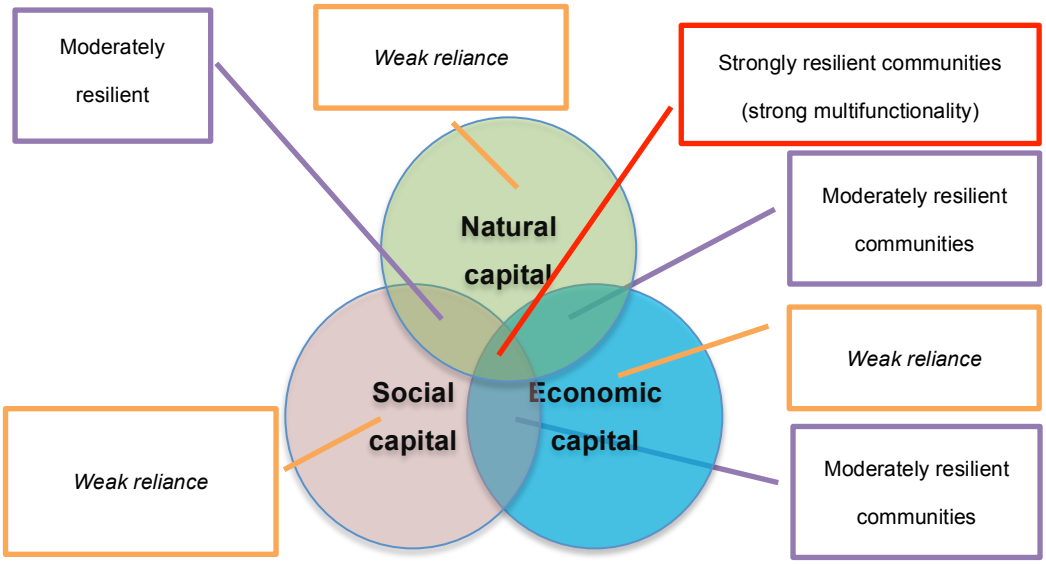


Figure 3-3. Community resilience, vulnerability, and economic, social and environmental capital

Source: After Wilson, 2012, p. 24; adapted and modified

In this understanding, capacity development through the interaction of social (and cultural), economic and natural capital makes dealing with slowly ongoing changes and abruptly occurring disasters manageable. Furthermore, policy has a capacity to deliberately influence community "transition" (Wilson, 2014). Wilson (2008, 2010, 2012) denoted three level of resilience, that are contingent of the development and interaction of social (including cultural), environmental and economic capitals (Figure 3.3). The strong capital, the ideal situation, represents a community that has all three forms of capital well develop and interacting with each other. Moderate resilience is defined by having two forms of capital well developed with the third being weak. Week resilience is a state where one form of capital is dominating the other two. Situations of weak resilience, with developed natural capital and undeveloped social and economic capital, are called *non-productivism*, i.e., a conservation area. Situations with only strong economic capital are defined as *super-productivism (or super-globalized)* states of the community, i.e., a global-market oriented economy. Communities with only strong social capital are referred as a *vulnerable community*, lacking the resources needed to create multifunctionality, and with low resilience capacities. Also in Ifejika Speranza et al. (2014) it is argued that the capital forms are the buffering capacity that, together with knowledge and self-organization, constitutes a diversity that enables livelihood resilience.

Resilience is not a static capacity changing over time, and is based on its capital-defined spectrum (Wilson, 2012, 2014). It is due to the more anticipatory nature of society, including learning and adaptive adjustments (Nelson et al., 2007; Adger et al., 2011). A so-called transition may occur under various decisions, including policy changes. The corridor of opportunities can be narrowed down by gradually embedding into a global capitalistic system, or so-called "globalized bottleneck", but it also can catalyze future changes by rediscovering a resilience path, such as a *relocalization* path, a reverse of *globalization*, based on local resources and social capital *glocalization* (e.g. the Transition Town Movement) , compromising locality with globalization; however completely embedding into globalized system leads to a state of *globalized* communities, dominated by large business (Wilson, 2012, also Quilley, S. 2012; Yanik, 2008; Meir, 2005). Different paths are differentiated by capital level. A relocalized community has weak economic capital, but maximizes the flow of natural capital through local resources and builds strong social capital. A glocalized community has three forms of

capital at the moderate level, whereas a super-globalized community is represented by strong economic capital and weak social and natural capital. These strategies of communities are presented in Figure 3.4.

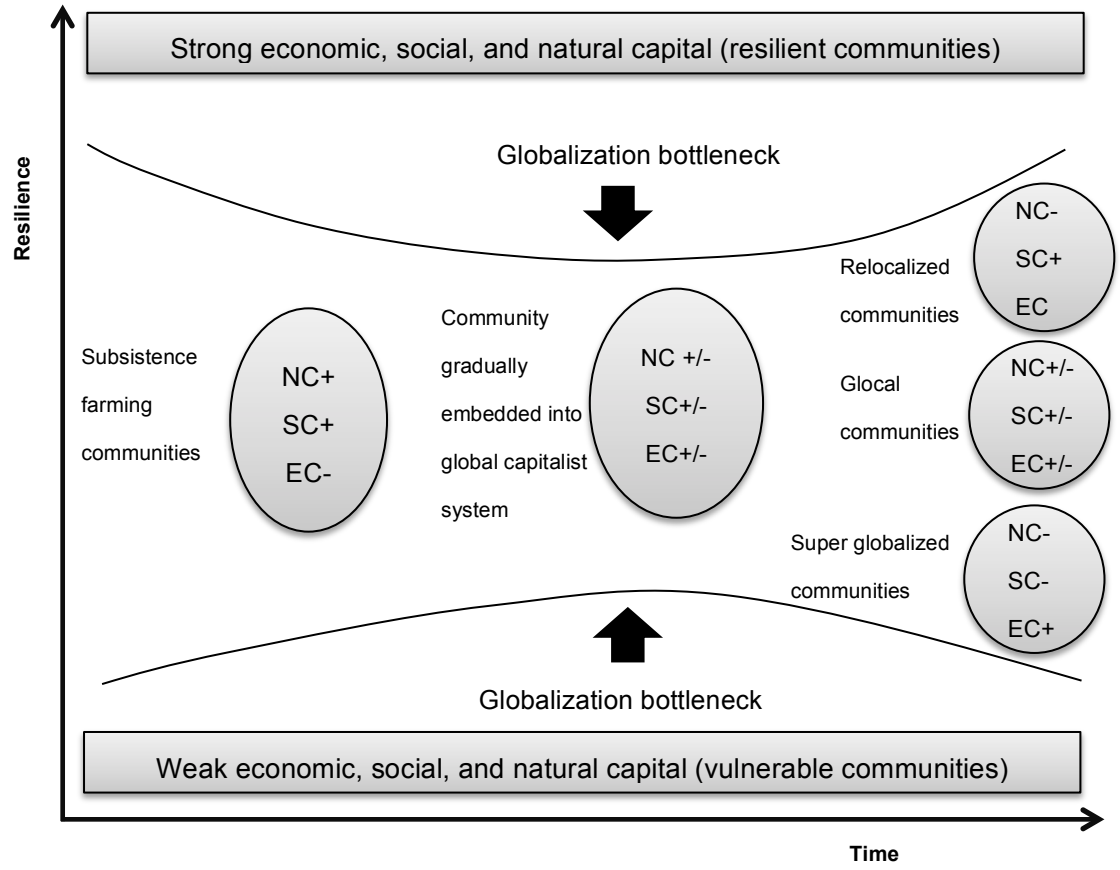


Figure 3-4. Types of communities and changing community resilience over time

Source: Wilson (2012, p. 61); adapted and modified

Note: NC – natural capital, SC- social capital, EC – economic capital

3.4 Natural and socioeconomic capitalization in determining resilience

Capital has been emphasized as the foundation of capacity necessary for resilience. The capitalization method was initiated by a concept of sustainable development in the early 1990s, and to contest the unsustainability of economic capital importance and underline the significance of social and natural capital within the concept. Pearce and Atkinson (1993) used the concept of capital as an indicator of weak sustainability, defining a sustainable economy as saving more than the depreciation of its man-made and natural capitals. Serageldin and Steer (1994), in the working paper of

theh World Bank, introduced a social, natural and economic capital-based method to assess sustainable development and to denote a possible pathway for achieving it. The capital approach gradually gained more consideration in sustainability research. Capital convertibility between its multiple forms was found necessary in social-ecological analysis (Berkes and Folke, 1998; Abel et al., 2006), and it was grafted from development studies into community resilience (Walker, 2010; Magis, 2010).
The following subsection will elaborate briefly on the understanding of different forms of capital.

3.4.1 Economic capital

Economic capital can be recognized by two forms of capital, financial and produced (Organisation for Economic Co-operation and Development, 2013). Financial capital is composed of financial assets, such as funds and money deposits while produced capital is a set of human-made assets, such as infrastructure, buildings, and computer software.

3.4.2 Natural capital

Natural capital is defined in some literature as environmental or ecological capital, and refers to the plurality of heterogeneous environmental stocks that provide a flow of goods and services and includes energy sources, minerals, soil, water, climate, food, fiber, vegetation and biodiversity (Daily et al., 2011; Loon et al., 2005; Brand, 2009). It reflects specific environmental and socio-economic human preferences (Harte, 1995), and it must be maintained for societal development (Ekins et al., 2003).

3.4.3 Social and cultural capital

Social capital is the least tangible among capital forms but, similar to the other capital forms, investing in social capital is expected to bring future returns (Alder and Kwon, 2002). Social capital encompasses social norms, values such as trust and reciprocity, and nurturing cooperation and networks within or among groups (Dekker and Uslaner, 2001). Social capital can be differentiated into the subgroups of cognitive and structural social capital. Structural capital refers to networks and relationships while cognitive capital refers to norms and values (Krishna and Uphoff, 1999; Pretty and Ward, 2001; Robins and Loë, 2009). Moreover, it can be characterized by the following dimensions: bonding, ties and networks within a group; bridging, ties and networks

between groups (Gittel and Vidal, 1998; Narayan, 1999; Warren et al., 2001), and linking, connecting with higher institutions and authorities (Warren et al., 2001; Woolcock, 2001; Szreter et al., 2004; Liu and Besser, 2009).

Social capital at the institutional level (sometimes referred to as institutional capital) represents institutional arrangements, e.g., Ostorm's (1999) principals of common-poll resource management. Cultural capital, on the other hand, denotes education (Bourdieu, 1986), a way of knowing and acting, a sense of place, and language (Flora and Flora, 2008).

Social and cultural forms of capital are dubbed socio-cultural capital in latter part of this dissertation in order to represent these forms in the systematic manner.

3.5 Resilience as a sustainability proxy of community forestry

Resilience started to be considered as "the preferred way to think about sustainability in social as well as natural systems" (Perrings, 2006, p. 417), but the concept of resilience is not equal to sustainability and it must be understood as one of the paths to build sustainability or sustainable development (Lebel et al., 2006). "Resilience as a descriptive concept gives insight into the dynamic properties of an ecological-economic system. Sustainability as a normative concept captures basic ideas of intergenerational justice when human well-being depends on natural capital and services. Thus, resilience and sustainability are independent concepts" (Derissen et al., 2011, p.1122). Resilience is a normative value but it depends on the configuration of the system we desire to sustain; thus the concept cannot be labeled as "good" or "bad" (Walker et al. 2010). Some social resilience studies argue that strong resilience is a possible confine of necessary change, thereby locking a community into an undesirable state, i.e., persistent poverty (Berkes and Ross, 2013). However, it is one of the important criteria that should be taken into account when crafting policies for sustainable development and it can be utilized as a tool for community monitoring, to determine effects of sustainable development policies (Magis, 2010) and resource management (Anderies et al., 2006). Yet, resilience of SES is still insufficient in understanding the dynamics caused by human agency, thus more attention began to be paid to the concept of community resilience in the context of SES management (Davidson, 2010; Skerratt, 2013).

Table 3-1. Emergence of CF resilience

Engineering resilience	Social-ecological resilience	Community forestry resilience	Community resilience
Spring back, returning to an original shape (Gordon, 1978) * Multi-functionality of hard-infrastructure to disaster prevention and recovery (Khew et al., 2015)	Self-organizing on endogenous capacities (Carpenter et al., 2001) * Resilience-based management to control variables based on feedbacks, alternate system regimes, and thresholds, instead of top down management (Anderies et al., 2006) * Multiple form of capital stock source of resilience/capacity to self-organized by indigenous groups (Abel et al., 2006) * Social domain drives SES adaptability and resilience (Folke et al., 2010) * Intervene at multiple scales - the focal scale interacts with other scales; state of system denoted by capital stock (Walker et al., 2010) * Capacity to absorb disturbances and maintaining structure and functions (Walker et al., 2014) * Facilitates understanding indigenous people - nature long-span sustainable interactions (Lu, 2010)	Multi-functionality of resource use (Bass, 2001) * Capacity to respond and adapt to social and economic changes; based on environment, economic, and social conditions (Montréal Process, 2009) * General resilience, set of capitals that can be mobilized as repose to changes (Akamani, 2012; 2014); institutional design and implementation important (Akamani, 2015) * Multiple capital-related factors (Kelly et al., 2015) * Specific resilience – conflict resistance (Nightingale and Sharma, 2014)	Specific to disaster, "bounce-back" coping direct and indirect (social) disaster related hazards (Paton, 2001) * General. The ability to "cope with external stresses and disturbances as a result of social, political and environmental change" (Adger, 2000, p. 347) * "Existence, development, and engagement of community resources by community members to thrive in an environment characterized by change, uncertainty, (..) and surprise" (Magis, 2010; p. 401) * Scalar and mix of household and community pathways; interaction of capitals, transitions in political corridors (Wilson, 2010, 2012, 2014) * Resilience bridging human agency resilience and 'bounce back' resilience; multi-scale (Skerratt, 2013)

International sustainable forestry management guidelines are recommending that communities be resilient in their socio-economic domain, designating resilience as an indicator (Montréal Process, 2009). It entails a positive normative value of the concept, and relating it to the multi-functionality of resource use (Bass, 2001). However, resilience has remained ambiguous and qualitative, lacking in theoretical constructs (Indicator 6.3c, Montréal Process 2009). The first attempts to elaborate the concept of general resilience in the context of CF were made in recent publications, and the emergence of CF resilience was found on the edge of SES and community resilience, interlinked by scale and capital-based capacity (Table 3.1). Community forest resilience was linked to general resilience through institutional capacity and livelihood enhancement, estimated by referring to social memory as a reference point (Akamani, 2012; Akamani and Hall, 2014; Akamani et al., 2015). Specific resilience, conflict resistance (Nightingale and Sharma, 2014) and community resilience (public participation), in the context of degraded forests, were seen as part of a socio-ecological system (Kelly et al., 2015), understood by multiple capital-related factors, in which land degradation issues were found to be coupled with economic, institutional, and social factors, and improvement of the state of nature was related to the social domain. These initial attempts in understanding community resilience were made, but development of metrics and in-depth analysis were still recognized as the major limitations to this approach. Furthermore, no studies have been conducted in the area of CF programs that consider post-implementation effects in which the program is an actual shock to the local group of forest users, especially within the top-down approach, in contrast to actual community capacity building and steering the potential resilience paths of FUGs, which effect the external stakeholder orientation. In these cases, resilience would be enhancing the endogenous capacities of FUGs, enabling self-organization (Abel et al., 2006; Carpenter et al., 2001).

Understanding of resilience concept in the indigenous cultural communities is informed by the current resilience discourse. A study of Abel et al. (2006) that examined long-span SES of indigenous groups in Zimbabwe and Australia argued that capital-based capacity is necessary in order to self-organize, and it is important to invest in this capital, unless the system is not viable, in which case a fundamental change would be necessary and more cost efficient. In aboriginal cultures the economic capital has never been a source of capacity. The researchers hypothesized that resilience was

attributed not only to abundant natural capital, but also to social and cultural capital: social networks, knowledge of how to collectively manage natural capital, and cultural memory, including beliefs, values, and knowledge. Cultural capital was claimed to enable communities to resist colonialism, even as the natural capital was invaded and controlled by new rulers. Lu (2010), through a study of human hunter-faunal prey dynamic in Amazonia described as cross-scale complex and non-linear, found that long-span cycles were likely important to maintaining system resilience.

3.6 Summary of the chapter

This chapter presented the concept of resilience, which developed from the engineering definition of resilience as a material's ability to "bounce back" to equilibrium. It pre-determined the future understanding of the concept as it is applied to ecological and social domains, as a concept of social-ecological and community resilience. In a more recent discourse on resilience, community resilience is more representative of a system in which human agency is able to drive the socio-ecological system, and rather than the capacity to bounce back to a previous state, a process of developing such capacity gains attention. Capacities of communities to create resilience are described by previous research with use of a capital metaphor, as a set of social, economic and natural capital. Moreover, resilience is a dynamic concept, changing over time, between levels of capital. In the context of CF, resilience was sourced in community and socio-ecological resilience. The resilient state would be defined as enhancing endogenous capacities of FUGs, and enabling their self-organization. Developing resilience, aside from being recommended by an international forum for forest-dependent communities in sustainable forest management guidelines, is considered by most recent scholars as an ability of a community to respond to drivers of change and unpredictability in ways that sustain their multiple dimensions of well-being. Resilience is still in a trial stage within this CF context, with major methodological limitations that require further endeavors in order to understand the concept and its operationalization.

4 TRI-CAPITAL FRAMEWORK FOR COMMUNITY FORESTRY RESILIENCE IN A MULTI-SCALE REALITY

4.1 Objective of the chapter

The objective of this chapter is to construct the framework for CF resilience assessment based on multifuntionality of communities. This framework and set of variables, provides answer for question -what community properties are responsible for developing the resilience of FUGs?

4.2 The research framework

Community resilience based on capacities measured by the dynamic concept of capital was found to be common across community and SES resilience studies (Table 3.1, p. 50) and it was considered as the foundation of CF resilience for this framework (Figure 4.1). Following the classification of Walker (see also Jarzebski et al., 2015), three forms of capital - economic, natural and socio-cultural[19] - were recognized as contributors towards building resilience (Wilson, 2010, 2012). These capacities are responsible for the group's ability to self-organize (Abel et al., 2006; Akamani, 2012), one of the principles of community resource management (Ostrom, 1999a). In the context of resilience thinking, utilization of capital should also be facilitated by feedback from responses and adjustments (Anderies et al., 2006; Walker et al., 2010). Interactions between forms of capital are argued to enable future yields from capital (Flora and Flora, 2008). According to Wilson (2010, 2012) the three forms of capital, when developed and interacting together, are able to produce a strong resilience of communities, based on *strong multifunctionality*; when only two capitals are interacting, a moderate resilience is created, and when there is only one developed form of capital a weak resilience is present. Weak resilience is related to a lack of multifunctionality

[19] Walker (2012) used "cultural" instead of "social" capital, defining it as a domain that includes other social, cultural and institutional attributes; in this work the term socio-cultural capital is used to systematically represent both the social and cultural capital forms, as opposed to institutional capital, which is actually an inherent part of social capital *at the institution level*, and is represented by institutional principals of common-pool resource management (Ostrom (1990).

within the community. In a situation where only economic capital is present, a state of *super-globalized* is indicated in which intensive farming or industrialized communities are fully dependent on the global economy; a state in which natural capital is maximized indicates a *non-productivism* state, such as nature conservation or local embeddedness; and a society without natural or economic capital is considered to be a *vulnerable community* (Wilson, 2008, 2010, 2012). Additional states, representing moderate functionality and resilience, were defined in relation to different strategies of CF groups (Inoue et al., 2015; also Wilson, 2012), namely a *localization strategy*, based on strong socio-cultural and natural capital and weak economic capital, such that autonomy is maintained, limiting adaptation to globalization or *re-localization*, returning to a localized strategy by rejecting globalization; a *globalization strategy*, whereby the local group benefits from globalization, while protecting natural resources without extracting them for livelihood subsistence; and a *glocalisation strategy*, which emphasizes balancing the inherent and universal values of various stakeholders. In a light of discussion on the resilience of indigenous people (Abel et al., 2006; also Lu, 2010), an localization strategy could be dubbed as providing strong resilience, thus for indigenous cultural communities that want to maintain their cultural autonomy, the localization strategy would be the strongest path to resilience, and it is defined here as an alternative to strong resilience. This state can also embody an undesirable strong resilience, i.e., persistent poverty that a group cannot escape (Berkes and Ross, 2013). Understanding of resilience and whether resilience is the desirable path for a group, aside from a state of current capacities assessment, is facilitated by exploring past states (Carpenter et al., 2001; Wilson, 2012). The interacting capital forms are, in a dynamic way, the capacity building mechanism for FUGs located in a multi-scale dimension (Walker et al., 2004), in which the finer scale, individual households, are steering the resilience of the FUGs, and it is the coarser scale, institutions, both national and international (policies and agendas, economy, climate), that creates opportunities as well as cause slow or abrupt changes to the FUGs.

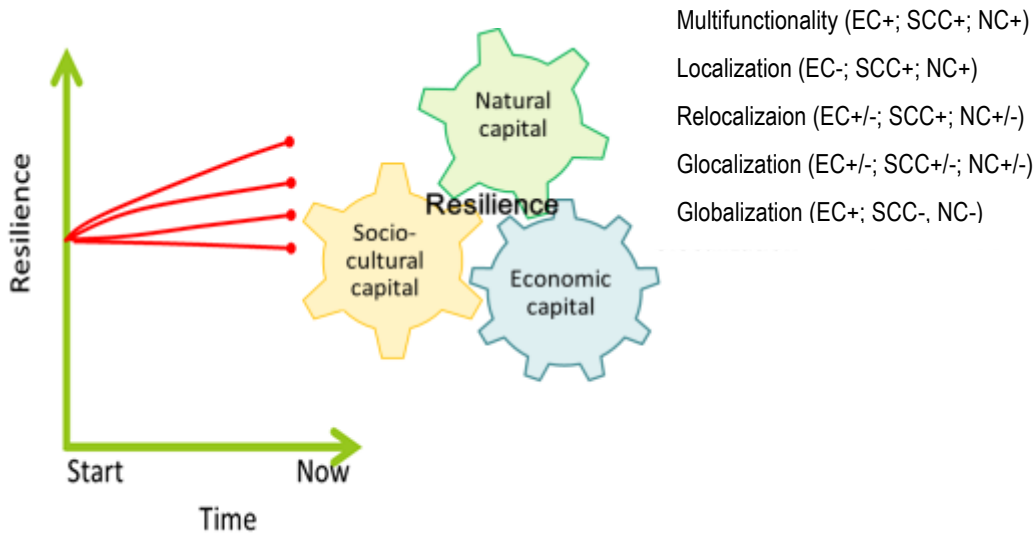


Figure 4-1. Tri-capital Framework for community forestry resilience in multi-scale reality

4.2.1 Transition of communities under community forestry implementation

By understanding the resilience traits of a community, a transition model can be defined for FUGs. The FUGs, with formalized CF, receive number of opportunities from the implementation process that brings knowledge, financial assistance, and also a number of obligations that a group must fulfill (Blaikie and Springate-Bieganski, 2013; Anderson et al., 2015). The CF arrangement aims to improve the socio-economic and environmental dimensions of the groups (Food and Agriculture Organization, 1992; Inoue, 2003), thus creating opportunities for self-development. However, receiving top-down support has its downsides, which cause various impacts on the FUGs (Shivakoti, et al., 2015) and the support has a termination date.

Through opportunities of CF implementation, but under changes such as globalization, FUGs can develop various paths toward different resilience levels (Wilson, 2008 2010, 2012; Inoue et al., 2015), based on the earlier described strategies of *strong multifunctionality* (strong resilience), *localization, relocalization, glocalization,* or *globalization,* and the three extreme configurations as *vulnerable communities, non-productivism, and super-globalized* at the weak level of resilience (Figure 4.2). The localization strategy of autonomous FUGs may indicate an alternatively strong resilience, based on socio-cultural and natural capital maintained purposefully, and separated from an external economy (Abel et al., 2006; also Lu, 2010); yet, in the case when a strong resilient state persists despite a willingness to transform then this strong resilience becomes an undesirable state (Berkes and Ross,

2013). For some indigenous communities, the CF implementation and partition are likely to maintain *status quo* or reduce *de jury* opportunists (Hartter and Ryan, 2010; Larson et al.; 2010).

4.3 Variables used to measure economic, natural and socio-cultural capital in the context of community forestry

This section explains variables used to measure resilience capacities, established based on existing capitals in the context of resilience and community resource management (also adapted and modified from Jarzebski et al., 2015), and on the institutional principals of common-pool resources developed by Ostrom (1990). All these variables were applied to this research.

4.3.1 Economic capital variables

1) Economic capital at household level

i. Income diversity

High income diversity is necessary for increasing economic stability and capacity to cope with unpredictable changes in income source (Adger, 2000; Buikstra et. al., 2010; Heubach et al., 2011), thus maintaining better benefits over cost in the case of CF participation (Ostorm, 1999a).

ii. Income dependence on local resources – withdrawn (in-farm including forest) and non-withdrawn (on-farm) resources

The relationship between community and local resources is recognized as one of the components of a resilient system (Cabell and Oelofse, 2012) and necessary for participation in CF (Ostrom, 2008; Shivakoti, et al., 2015) as it affects decisions about protecting forest resources in participatory forestry (Sharaunga et al., 2013).

iii. Income level versus poverty threshold and income satisfaction

The poverty threshold is the amount of income required to meet the minimum needs of a family (Lal, 2012). Those who fall under the poverty threshold have an increased vulnerability to natural disasters, and health and social problems, and have limited access to education (e.g. Narsey, 2012; Asian Development Bank 1999; Akter

and Mallick, 2013). Income is necessary for the self-organization of a group (Ostrom, 1999a).

iv. Equal income distribution

Unequal income distribution indicates unequal power, e.g., when only elites benefit from current arrangements, as is seen in CF projects in Nepal (Thomas, 2008); this leads to resource destruction and conflicts, as has been documented in the Brazilian case (Torpey-Saboe et al., 2015). Equal income distribution nurtures healthy, resilient communities, individuals, and natural resource protection (Rose and Krausmann, 2013) and enables cooperation (Adger, 2000) and self-organization of FUGs (Ostrom, 1990).

v. Housing quality

Housing quality is an indicator of an accumulation of produced capital and is used in CF assessments (e.g. Islam and Sato, 2012); stable housing also increases disaster resilience (Lizarralde et al., 2015; Thomas et al., 2010; Tuan et al., 2015).

vi. Access to electricity

Access to electricity illustrates development and wealth within a community; equal coverage also indicates not only wealth but also equal access to opportunities (Springate-Baginski and Blaikie, 2007).

vii. Mobility (vehicle ownership)

Lack of transportation increases a community's vulnerability due to an inability to access markets and other events. Vehicle ownership is important for transportation and product delivery to a market (Sunderlin et al. 2005, Buikstra et. al., 2010).

2) Economic capital at Forest Users' Group level

i. Income to common budget

Income represents the common flow of financial capital of the group and reflects the collective-choice arrangements of the FUGs (Ostrom, 1990).

ii. Deposits in the bank

Deposits in the bank indicate that the group has accumulated financial capital over time (Organisation for Economic Co-operation and Development, 2013).

iii. Fixed assets

Infrastructure and support services are necessary for resilience; having fixed assets indicates the development of the group or community (Buikstra et. al. 2010).

4.3.2 Socio-cultural capital variables

1) Socio-cultural capital at household level

A) Structural bridging and bonding social capital

i. Number and structure of individual cooperation networks

Mutually beneficial collective action allows for development in rural areas and uses resources more efficiently by promoting an exchange of labor and resources. As a strategy for decentralization and community-driven programs, the ability of a group to sustain collective-choice arrangements has been shown to alleviate poverty and resource shortages (Gerichhausen et al., 2009; Ruben and Pender, 2004; Warren et al., 2001; Ostrom, 1990). Bonding occurs between members of same groups (within FUGs), and bridging between groups (FUG with local community).

ii. Social networks in the community

Social networks are important for resource and knowledge sharing, maintaining community identity and a collective capacity to sustain and renew community, and nurturing both community and individual levels of resilience (Buikstra et. al., 2010; Magis, 2010; Pretty, 2003). It enables different actors to collaborate and coordinate management efforts, and the development of trust (Bodin et al., 2005); it develops a feeling of belonging and group identity (Coleman, 1990).

ii. a) Reliable friends in time of need

Friendship is a necessary part of social networks (Apicella et al., 2012). Friendship also increases the ability to respond collectively in crisis situations, providing psychological support and leading to quick recoveries, (Aldrich, 2012).

ii. b) Interaction in community

A sufficient number of interactions is the basis of social networks (Falk and Kilpatrick, 2000) that provide benefit by developing a sense of cooperation (Apicella et al., 2012).

B) Cognitive bridging and bonding of social capital

iii. Degree of trust in:

iii. a) Local community

iii. b) Forest Users Group

High trust (*iii.a and iii.b*) enables collective action, cooperation, management of change, and avoidance of conflicts (Koutsou et al., 2014; Poortinga, 2012; Pretty, 2003). Trust among FUGs members (*iii.a)* represents a bonding of capital, enabling cooperation within the group, whereas *(iii.b)* trust between FUGs and the local community represents a bridging of capital.

iv. Feeling of being understood by

iv. a) Local community

iv. b) Forest Users' Group

"Feeling understood" *(iv.a and iv.b)* is the expression of personal perspectives that builds cognitive capital (Cunningham, 2013) and it provides cognitive feedback on the mutual perception of the group.

C) Cognitive linking of social capital

v. Degree of trust in local government.

Trust in local government facilitates co-management (Derek et al. 2009), and it is responsible for so-called synergy, an ability to work together for a positive development outcome (Warren et al., 2001; Woolcock, M. 2001).

vi. Feeling of being understood by local government

Feeling understood by local government builds the bonding part of cognitive capital (Cunningham, 2013).

D) Cultural capital

vii. Traditional knowledge/way of farming or modern farming

This indicator is understood differently in application to indigenous cultural

communities and non-indigenous groups. In the case of indigenous cultural communities, cultural capital demonstrates an adaptation to local environment and accumulated knowledge and social memory (Anderson, 1996; Berkes, 1999; Van Oudenhoven et al., 2011). It represents a resistance to loss of indigenous knowledge (Abel et al., 2006) which demonstrates a localized strategy within the community (Inoue et al., 2015). For non-indigenous communities, cultural capital represents a progressive knowledge of farming and the benefits of agricultural trainings; it also represents an intensification of farming and might indicate unsustainable practices, if the modern techniques rely heavily on fertilizer and pesticides.

viii. Traditional practices and rituals (only for indigenous cultural communities)

Customary practices and rituals increase awareness of the importance of resources and helps avoid its misuse (Cochrane, 2006; Anderson, 1996; Berkes, 1999). It also represents a resistance to the loss of indigenous knowledge and social memory (Abel et al., 2006) and that demonstrates a localized strategy within the community (Inoue et al., 2015).

ix. Importance of belief in life

Religious ethical code increase awareness of the misuse of resources (Cochrane, 2006; Anderson, 1996; Berkes, 1999). Belief or faith, regardless of its nature, is important for a resilient community and individuals (Buikstra et. al., 2010).

x. Feeling spiritual in the forest

Spirituality is another component that, in case of indigenous cultural communities, demonstrates a high value being placed on feeling connected with the forest and leads to strict preservation or a high regulation of resource use (Anderson, 1996; Berkes, 1999); it can represents either a localized strategy or glocalized strategy with maintained inherited values (Inoue et al., 2015). For non-indigenous communities, developing universal values about the importance and spirituality of a forest is supportive for regulative arrangements of resource use.

xi. Formal education level

Formal education represents a higher capacity for a community to accumulate other forms of capital, e.g., economic capital through employment/production or social capital through the building of networks and rules (Bourdieu, 1986; Harmon and Schafft, 2009). It also provides a potential for building strong leadership within the group (Harmon and Schafft, 2009). Lower levels of education and leadership qualities limit the decision making power of FUGs (Paudyal et al., 2006). For indigenous cultural communities, this form of cultural capital is alternative to that which comes from indigenous wisdom (Anderson, 1996), but formal education might be necessary if a community wants to change their local strategy and build their economic capital.

2) Socio-cultural capital at Forest User Group level

A) Cognitive bonding of social capital

i. Conflict resolution in the group

Conflict resolution plans are critical for FUGs and the success of their self-organization (Ostrom, 1990).

ii. Monitoring and rules violation protection

Monitoring and rules violation protection by the FUGs is designated by Ostrom (1990) as the institutional form of social capital.

B) Structural linking of social capital

iii. Cooperation with external institutions and companies

Constructive cooperation and building synergy with external institutions and companies can improve social well-being, combat poverty, and open new opportunities (Warren et al., 2001). It also can represent a glocalized strategy of the FUGs or community (Inoue et al., 2015).

iv. Trainings

Trainings increase community capacity, knowledge of farming and production of goods and builds leadership and entrepreneurship (Chaskin, 2001).

4.3.3 Natural capital

1) Natural capital at the household level

i. Land area

Land provision is necessary for food self-subsistence and income generation (Lal 1989). At least half a hectare of cropland per capita is required to provide a diverse, healthy and nutritious diet composed of plant and animal products (Lal, 1989; Giampietro and Pimentel, 1994). It also represents non-financial dependence on local resources that are found to be important for CF management (Ostrom, 2008).

ii. Livestock

Livestock provides a work force in farming, income to the community, and is an important part of a balanced diet, especially for the healthy development of children (Daily et al., 2011).

iii. Renewable energy use

Dependence on local resources for energy generation is one of the resilience strategies, and is of rising importance to all actors. Wilson (2012) attributes renewable energy as a natural capital important for resilient communities. It decentralizes energy sources, increases local sufficiency, and helps with adaptations to climate change (León-Camacho et al., 2014; Sikka et al., 2013).

2) Natural capital at Forest User Group level

iv. Forest cover and health

The forest provides eco-services (Kriström, 2001), including high rate of biodiversity (Desonie, 2008). Existing research recommends that 40 per cent of forest cover be used for sustainable multifunctional communities (Vogot et al., 2010). The forest is also a necessary and natural stock for forest dependent indigenous cultural communities and forest depletion can trigger a high vulnerability within these communities (Abel et al., 2006).

v. Forest resource use rights

Rights to withdraw resources are essential for FUGs (Ostrom, 1990, 2008) and

access to forests increases the economic capital of the group and nurtures collective social capital (Anderson et al., 2015; Hartter and Ryan, 2010; Larson et al.; 2010; Pretty, 2003).

vi. Clearly defined boundaries of the forest

Clearly defined forest boundaries are essential for FUGs, in order to protect their rights and increase the security of future benefits (Ostrom, 1990, 2008).

4.4 Summary of the chapter

This chapter responded to the first research question: *What community properties are responsible for developing the resilience of FUGs?* by providing framework of community forestry resilience developed through an interaction of three key forms of capital (economic, socio-cultural, and natural) which help to navigate and multiply community capacities and build resilience at household and organization levels. Such capacities are also an indication of different strategies that FUGs are undertaking, e.g., localization, globalization, glocalization, or re-localization. A strong resilience in modern communities was defined by the presence all three forms of capital, which interact with and yield other forms of capital, securing the multifunctionality of groups. However, in the context of indigenous cultural communities, in which resilience was originally developed without strong or with no economic capital, their strong resilience is denoted by the localization strategy, based on local resources and socio-cultural capital. Current impacts, including changes from past, were set to denote the transitions of community forest groups and local communities.

5 RESEARCH METHODOLOGY

5.1 Research design

Research on CBFM in the Philippines was designed to capture resilience based multifunctionality of FUGs (Figure 4.2, Chapter Four). The present status of the investigated group was analyzed through economic, socio-cultural, and natural capital variables described in Chapter Four, section 4.3, which were designed based on comprehensive literature regarding each form of capital in the context of collective resource management and resilience. Each FUG, which is CBFM Project group in this research, has one corresponding group of nonrelated to CBFM residents of the same area, regarded as Non-Project group (Figure 5.1), thus representing potentially same local settings, but possibly different individual conditions and paths (Ferraro and Pattanayak, 2006; Kleijn and Sutherland, 2003; Pagiola et al., 2007). It represents the alternative paths of resilience in the same community and reflects how CBFM participation is influencing the transition of the community, whether it leads to a more resilient state, or reduces the multifunctionality of the community.

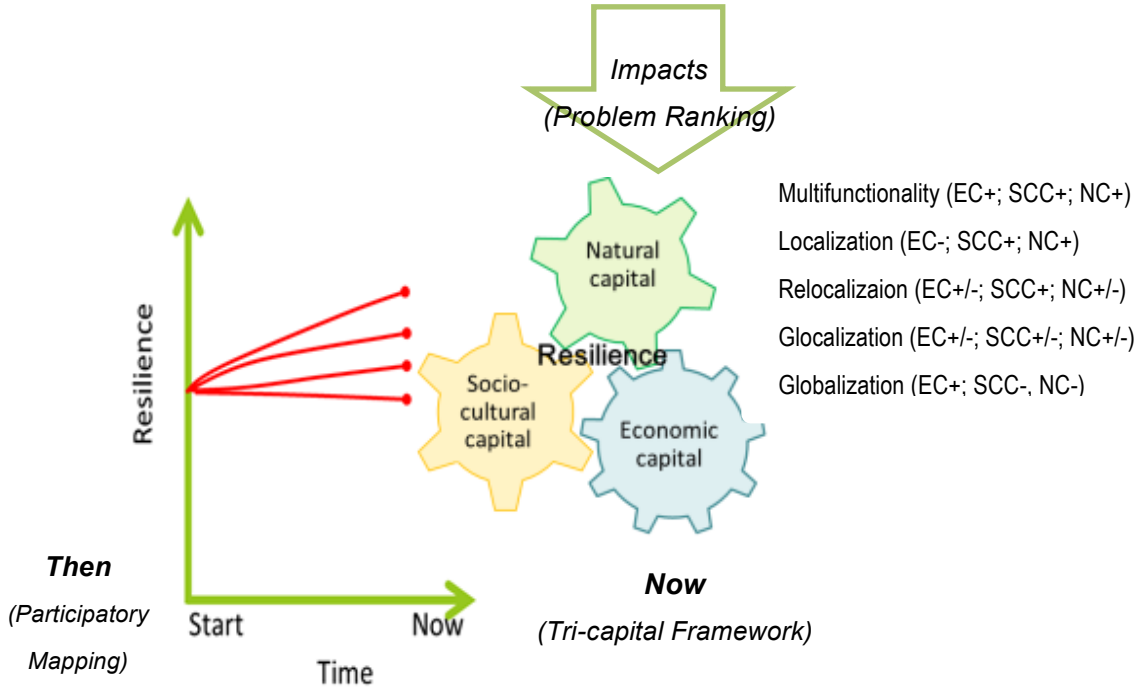


Figure 5-1. Research design

The ultimate goal of CBFM policy is to increase socio-economic well-being and ecological sustainability[20]. The reality is that CBFM programs are driven by external support causing burdens to long-term objectives of CBFM by falsely interpreting CBFM as a short-term project (Pulhin et al., 2015; Shivakoti et al., 2015). The pressures and impacts on the current community and FUG were intended to be recognized through problem ranking and talks with participants (Focus Group Discussions, Key Informant Interviews). To obtain the community settings before CBFM implementation, participatory mapping was designed.

5.2 Case study design

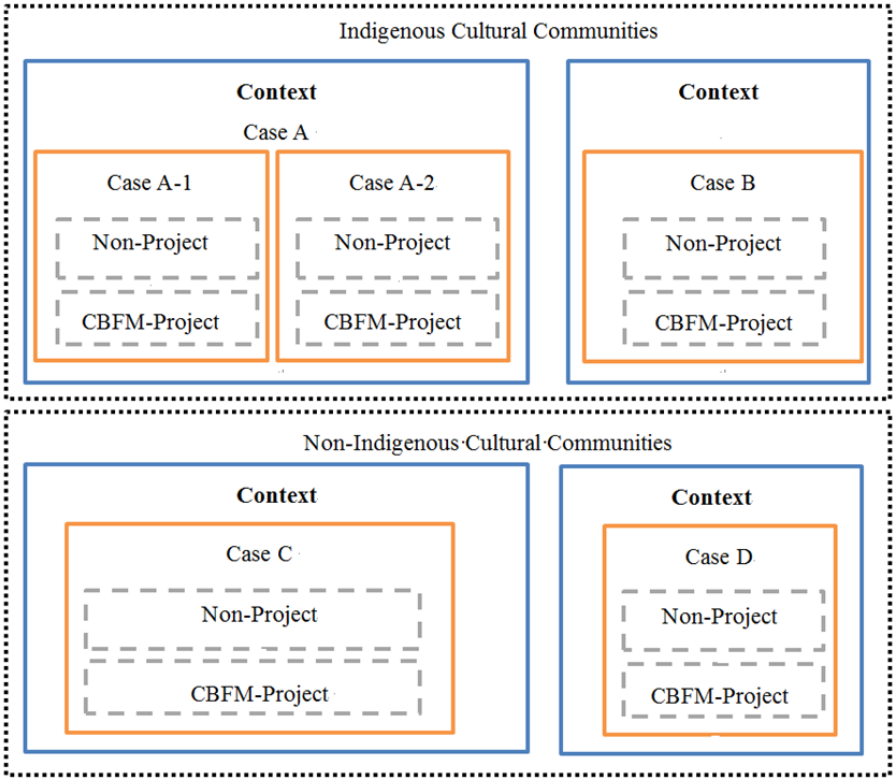


Figure 5-2. Case study design

The research case study approach was a multiple-case "comparative" design embedded with multiple units of analysis verification in one case study for the purpose of differentiating between CBFM Project and Non-Project groups (Yin, 2003). To respond to research questions 2 to 4 in Chapter One, the priority of this study was to investigate projects that had already been operating for approximately 15 years, starting

[20] Executive Order (EO) 263 (1995)

in the early years after CBFM scheme was enacted, and it was set as the first criterion. Such pioneer project sites could ideally manifest a long-term process of resilience building. The second criterion was the type of main actors. The two groups of cases were composed of four case studies, two on CBFM project on indigenous cultural communities, Case A and Case B; and two case studies on non- indigenous cultural communities, Case C and Case D (Figure 5.2). The third criterion were the same characteristics of CBFM program in each case study that were present in the stage of implementation with community organization, reforestation and livelihood projects for income generation. After the case study setting (described in the next section), Case A was divided into two sub-cases, due to geographical and social proximity of these two groups. Two sub-cases are referring to implementation to two neighboring FUGs, increasing replication of results (Yin, 2003). In Case D, to represent factual situation of the community, additional group of non-indigenous cultural community members living with Case B, under indigenous cultural community, was added to increase the contrast with the indigenous cultural community group.

5.3 Selecting project areas for investigation

Taken into consideration the criteria set in the previous section, four project areas were located on the main island of the Philippines, Luzon Island (Figure 5.3). Case studies were purposefully sampled through reviews of existing project sites and literature on customary forest management in the country to meet set criteria of case studies. Projects were not selected by recommendation of government to avoid biases of outcome or respondents being set by officials, and research was conducted as much as possible independently from governmental assistance. The government, however, was consulted for permits to access and do research on selected sites.

Case A was set in indigenous cultural communities in Ifugao Province, in the Cordillera Administrative Region (CAR), a remote area of the Tuwali tribe. Forest system and communal or private management of the Ifugao Province in contemporary literature is regarded as a viable and recommended model of sustainable community forestry based on customary law (Pulhin and Pulhin, 2003; Perera, 2009; Hlaing et al., 2013). The forest is an integral part of the hill ecologically and semantically,; it provides water for rice terrace irrigation, firewood, and timber for carving and construction. However, there has been no study on CBFM agreements concluded with Ifugao people. The

CBFM in such case could be enhancing the fundamental community forestry or imposing regulations over timber resources. Two CBFM agreements were initiated by DENR and funded by the World Bank (WB). Prior to CBFM, the CADC was awarded to the area to recognize the indigenous community, but no title was awarded afterwards. In 2010 an additional short-term livelihood project was implemented. This case study aimed to show the viability of actively implemented CBFM on strong customary forestry system(s). Upon a courtesy call to local DENR, the extension officer of the project assessed the CBFM as "very successful".

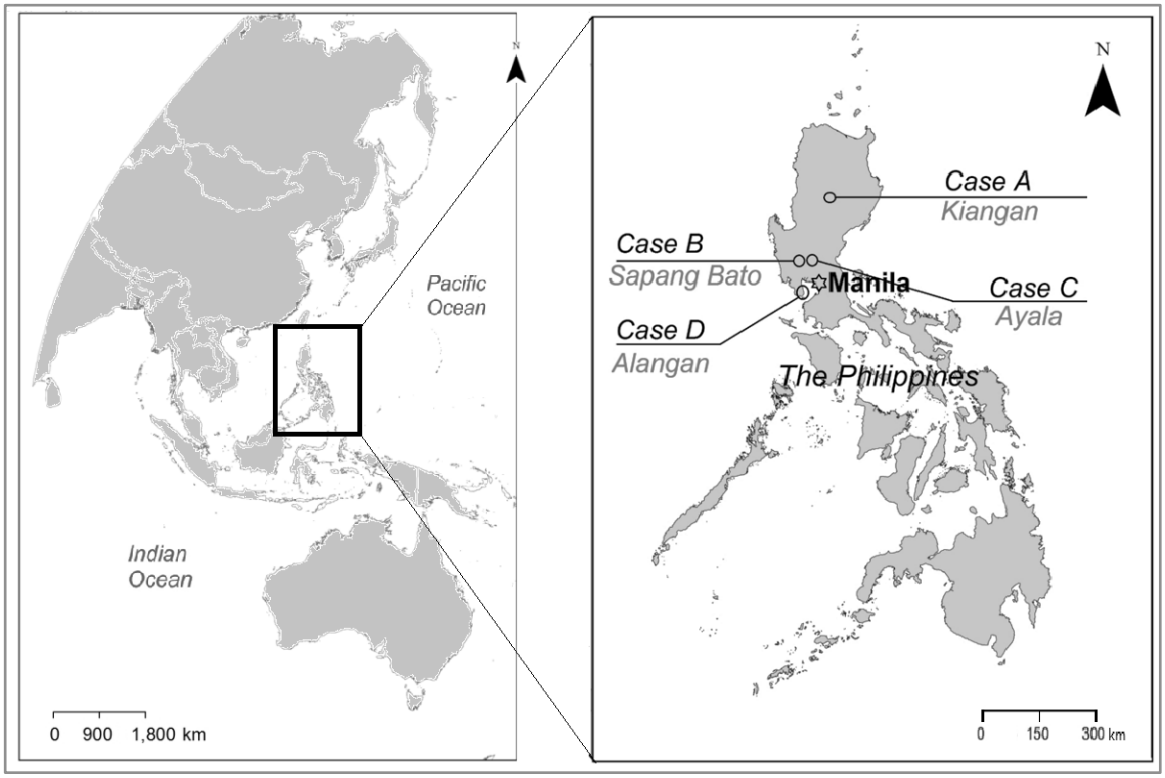


Figure 5-3. CBFM case study location

Source: PhilGIS

Case B was on the indigenous cultural community of Aeta people, in the Pampanga Province of Region 3, that was recognized as strongly dependent on local forest resources for firewood, hunting, and agroforestry (Reed, 1904; Seitz, 1998), and are spiritually connected with their forest (Shimizu, 1989). Aeta people are in constant stress of their land area reduction (Reed, 1904; Heather, 1991; Seitz, 1998; Gaillard, 2006). Although few studies are concerned with the cultural heritage of Aeta, no detailed study on their forestry system and foremost impact of CBFM or CADT on their

sustainability and resilience was conducted. Group was awarded by two funds sourced by the Japanese Bank for International Cooperation (JBIC) and the Japan International Cooperation Agency (JICA).

Case C is a group of non-indigenous cultural community, which through CBFM program participated in community forestry due to prior occupancy of the land and need of its formal regulation. Because the project area is located within a protected area, the CBFM was revised as a Protected Area Community Based Resource Management Agreement (PACBRMA), a modality of CBFM restricting timber harvest and introduction of exotic species, and soon after was awarded with JICA's grant, the Enhancement of CBFM Projects (E-CBFMP), similarly to Case B. The purpose of selecting this case study was to show the viability of CBFM on protected areas that gained momentum thanks to external support. Moreover, there was no study yet concerning CBFM modality PACBRMA as a case study, whereas this policy model is unique and at the front of decentralization in Asia that allows the occupation of protected land, but with a prescribed management plan (Inoue, 2003).
There was no study concerning CBFM neither under indigenous cultural communities nor under CADT in the context of community forestry, making these case studies a contribution to existing limited literature on progress of CF in the Philippines.

Case D, the last case study, covered non-indigenous cultural community that is located on state forests without any protection status. This group was funded by the Asian Development upon implementation and later supported by JICA and the Comprehensive Agrarian Reform Program (CARP). This purpose of this case study was to present CBFM on a non-protected area that potentially allows timber harvest. It is the most common type of CBFM agreements.

A brief summary of case studies is presented in Table 5.1, and a timeline of each case study is shown in Figure 5.4.

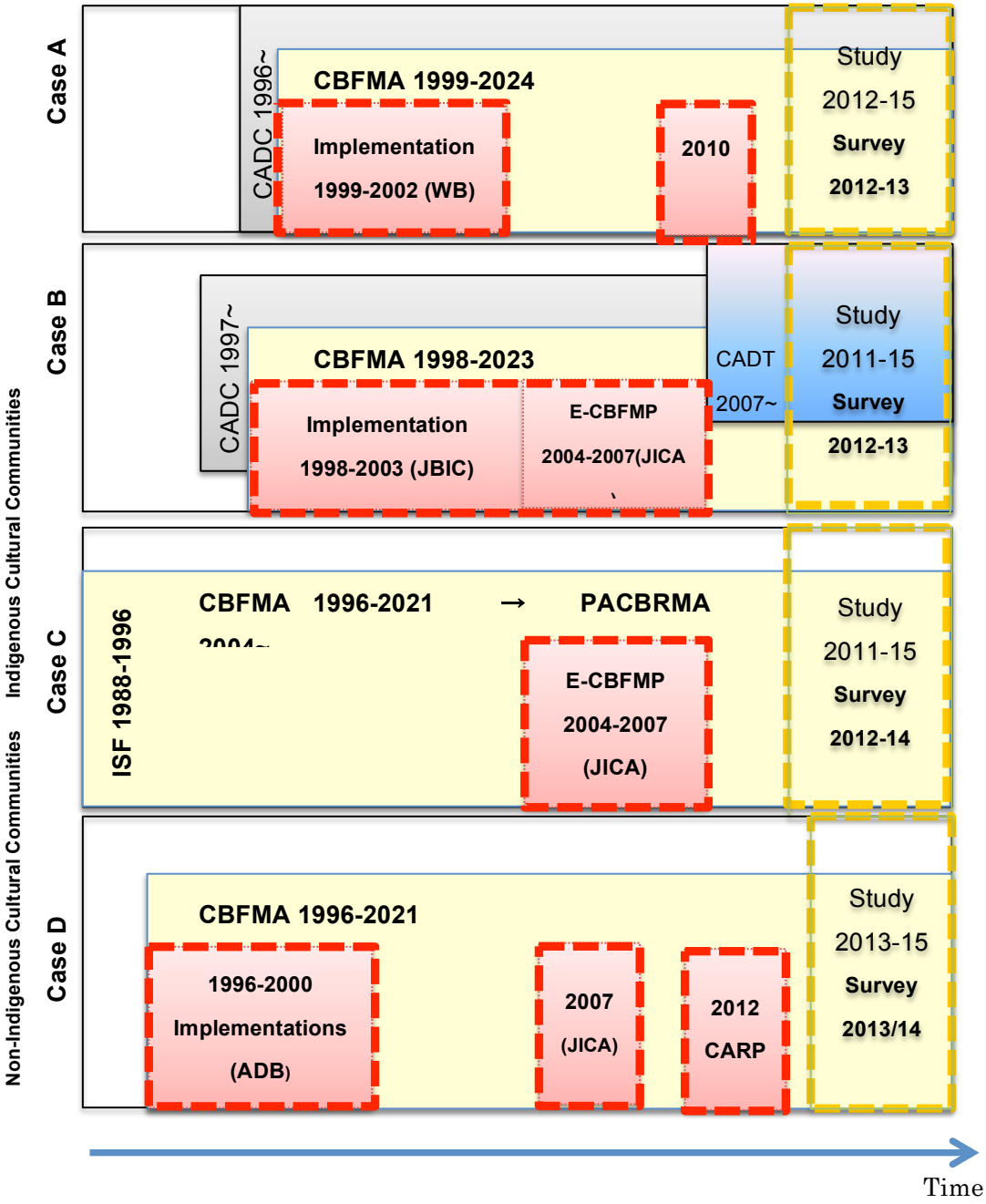


Figure 5-4. Case studies timeline

Table 5-1. Summary of information on case studies

Case & Location		Contract & Duration	People & Forest Status	No of households	Project Activities
Indigenous Cultural Communities					
A.	A1. Kiangan: Dalligan	CADC-CBFMA Since 1999	Ifugao People, Tuwali tribe; private and communal forest	33	274.26ha (developed only 160ha of reforestation, 55 ha of agroforestry); ginger production, WB fund 1999-2002; 2010 Livelihood project
	A2 Kiangan: Lingay	CADC-CBFMA Since 1999		25	106.77ha (reforestation and agroforestry); WB fund 1999-2002; 2010 Livelihood project
B.	Sapang Bato Sitio Target	CADC since 1997, CBFMA Since 1998 CADT since 2008	Aeta people; CBFM-CADC communal forest and CADT forest;	89 in Target (total 242)	2165ha (Target ~796ha) (883.31ha actually reforested, 207.6ha developed under agroforestry) livestock production, infrastructure JBIC fund1998-2003 JICA 2004-2007
Non-Indigenous Cultural Communities					
C.	Ayala: Orchard village	CBFM since 1996; since 2004 CBP with PACBRMA	Kapampangan people, Forest on protected area zone	38	125ha of reforestation, 56.8ha of agroforestry and land cultivation, mushroom production JICA 2004-2007
D	Alangan	CBFM since 1996	Non-ICC, mostly Tagalog CBFM forest;	87 (52 residing within Alangan)	100ha, agroforestry, handicraft (baskets, brooms) Funds: ADB 1996-200; JICA 2007, CARP 2012

5.4 Research flow

Research started with a literature review, and the selection of the first two case studies, Ayala and Sapang Bato respectively, and then the third case study in Kiangan. The selection of case studies was followed by the acquisition of study permits and participatory observation, key information interviews and report review. In-site situation review was used for the problem statement. Afterwards, variables on socio-economic status of households were designed and implemented in the field, together with focus group discussions. This first stage of the survey helped me to get acquainted with the villages and respondents, gain their trust, and prepare the ground for second step interviews on socio-cultural capital that required a higher level of trust from the respondents. A two-step survey was also beneficial as each step allowed collecting insights of happening in each respective group. This stage also provided feedback to the modification of my analytical framework, and variables to the second stage interview. This second step survey was implemented parallel to establishing the fourth case study. Next was the institutional assessment of each FUG and acquiring land use sample data for the analysis of satellite images. Institutional assessment was implemented at a later phase to acquire valid data on the institution rather than obtaining idealistic picture of the organization, which could be achieved after familiarizing myself with the group. Data from surveys were digitized into data bases for data analysis at a later time. , Survey results validations were conducted together with additional workshops helping to explore the context of local resilience – changes and impacts via community mapping and problem ranking. At last, the final discussion and conclusion were drawn. The research structure is presented in Figure 5.5.

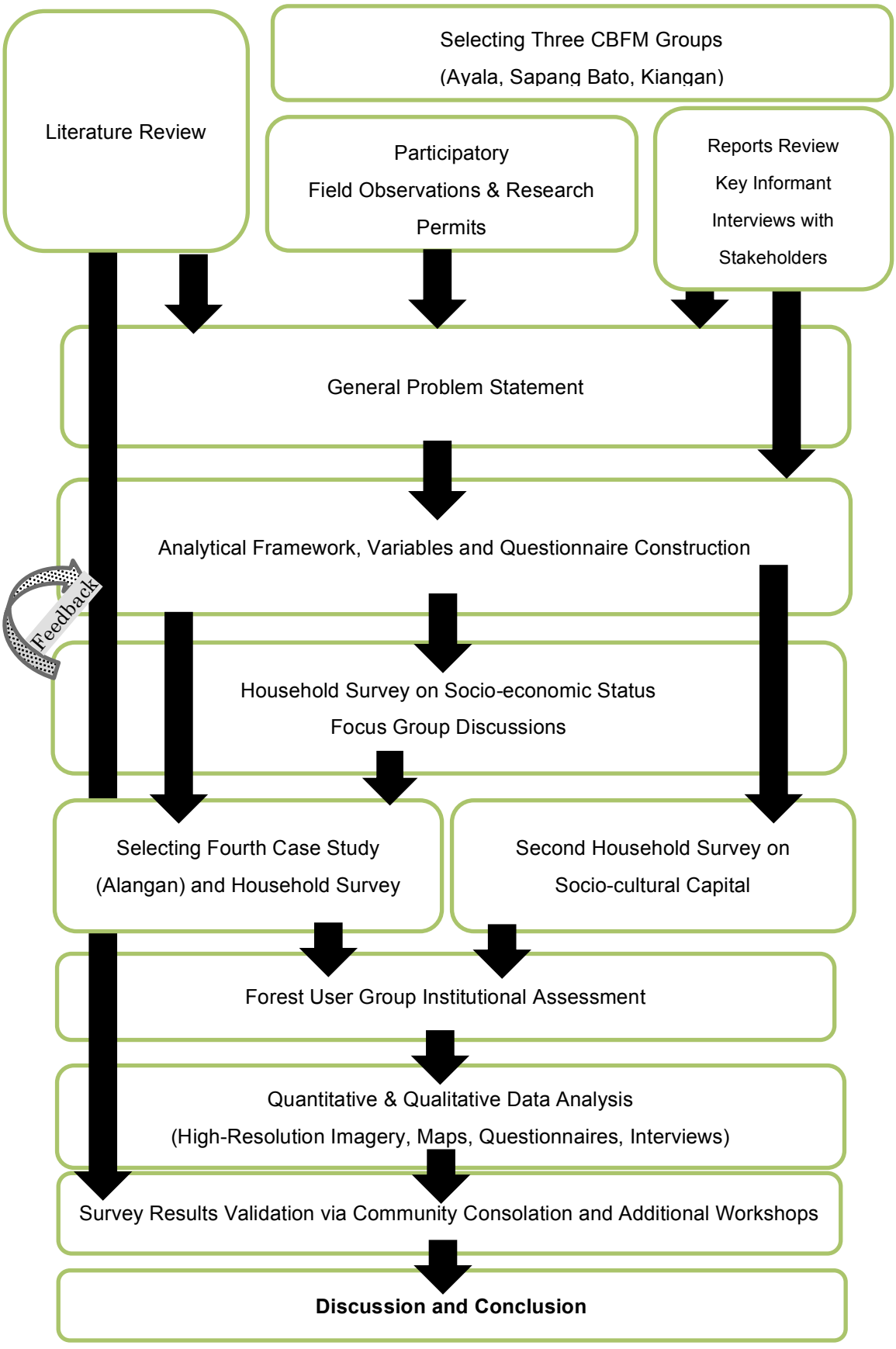


Figure 5-5. Research flow

5.5 Field work methodology and application

5.5.1 Community consents and permits

The consents of the indigenous people have been secured by undertaking the processes presented by the National Commission on Indigenous Peoples (NCIP), in accordance to The Indigenous Peoples Rights Act of 1997. In Lingay, Dalligan of Kiangam (Case study A) and Sapang Bato – Target (Case study B), the process was conducted on the following dates: March 27, March 28 and April 24 of year 2012 respectively. Moreover, local authorities, such as the Barangays Office and the Municipality Office were informed and consulted about the research.

For the community of Ayala – Orchard (Case study C), of which project area is located on protected lands, after community consent for the research, a permit was secured by undertaking the processes presented by Protected Areas Management Board (PAMB), conducted on March 19, 2012 on their official quarterly meeting. PAMB consisted of community level members of DENR, professors of the Pampanga Agricultural College and the president of CBFM group and the Barangay Chairperson of Ayala. The permit was granted through voting of PAMB members. Regional and Provincial DENR were informed about the research.

The community of Alangan (Case D) was consulted for research directly, but also with the Regional and Provincial Department of Environment and Natural Resources, and with the Barangay Chairperson of Alangan.

5.5.2 Participatory observations

In the initial stage of the research, short-term participatory observation was conducted. Participatory observation is a type of beneficiary assessment, where an outsider resides within a community or organization to make observations as a participant of that community, develop an in-depth understanding of people's attitudes and everyday life. Thistype of observation is useful to gather data on the reality of community arrangement rather than official procedures. The observations are much shorter than conventional observations conducted in social anthropology. In the process of participatory observations, it is important to state the reason of the stay and strategically choose a residence among the households. Being close and open to all rather than in one group and being involved in activities but independent at the same

time, are the key to making productive observations (Rietbergen-McCracken and Narayan-Parker, 1998). The observations of Case A were conducted in March/April and May 2012, Case B in August and December 2011and March 2012, Case C in July, August, September and December 2011, and Case D in May 2013.

5.5.3 Key Informant Interviews with CBFM members and stakeholders

The Key Informant Interview (KII) is an interview with an individual, a key informant, who has specialized knowledge, skills, and is able to give informative insights and comments, and may produce further inquiry for the researcher (McKernan 2006). KIIs were conducted during the initial stage of research. In Case A, KIIs were conducted with the provincial DENR officer responsible for CBFM implementation in the studied areas (February 1st, 2013), and with the former Barangay Chairperson responsible for CBFM implementation (February 4th, 2013). In Case B, the key informants were Barangay Chairperson, pastor, and project leader (August 10, 2011) and with the provincial DENR officer responsible for CBFM implementation (July 21, 2011). In Case C, KIIs were conducted with the president of the CBFM organization (July 21, 2011), the provincial DENR officer responsible for CBFM implementation (July 21, 2011), and the former president of the organization (February 16, 2014). For Case D, the key informant was the provincial DENR officer responsible for CBFM implementation and chairman of the organization (May 6, 2013).

5.5.4 Problem ranking

The problem ranking method was implemented to identify problems and impacts that could be overseen during interviews and discussions in a more systematic way. Problem ranking is a technique of eliciting the most important problem that local people face. The method relies on people's self-reporting of the problems they have. The participants list six main problems in their community (general or specified), afterwards, they are asked to rank them in order of importance, which is recorded in a matrix for pairwise systematic ranking using two cards at a time, asking the participants to choose one with the bigger problem. Number of problems being selected when presented in pairs gives the ranking of the most urgent problems in the community (Rietbergen-McCracken and Narayan-Parker, 1998). The problem ranking was conducted during the same workshop with survey results validation and community mapping; in Case A on February 19 and 20, 2015, in Case B on February 26, 2015, in

Case C on February 25, 2015, and in Case D on February 24, 2015.

5.5.5 Participatory mapping

Participatory mapping was conducted during the same workshop as problem ranking. The purpose of the participatory mapping application was to identify changes in the community by drawing and describing maps of "before" and "after". Participatory mapping is one of the tools of the Participatory Rural Appraisal approach developed to integrate knowledge and ideas of rural people into planning and management of development projects. Participatory mapping enables local communities to explain various aspect of locality through drawing maps. It provides not only physical but also socio-economic conditions. It shows different types of natural resources and local environments. The mapping process helps to discuss opportunities and constraints, generating a variety of data in a short period of time. Participatory mapping consists of spatial drawing on a paper by local people to depict their localities. During the process of mapping key performers are the ones who actually draw the map, while the other present participants provide active support. The process of participatory mapping starts from deciding with local people which type of map shall be drown, followed by exercise with people who know the area and are willing to share their knowledge. Letting people work in a more comfortable place, and watching the group work, providing support whenever needed. Output of the community work was questioned by the researcher and all issued were noted (Mukherjee 2002; Rietbergen-McCracken and Narayan-Parker, 1998).

5.5.6 Focus group discussions

Focus Group Discussion (FGD) is a type of beneficiary assessment, and is a facilitated discussion held with a small group of people with common concerns. The FGD was not the primary source of data for the final conclusion, but it was used to drive the context of the implementation of CBFM projects in each case study. The FGD has advantage of cross-checking information from other sources, such as documentation on the implementation. A group of seven to 10 people is optimal. In the process of the group discussion, a few key topics is necessary to determine the purpose of the group discussion (Rietbergen-McCracken and Narayan-Parker, 1998).

1) Implementation of focus group discussions data

Focus Group Discussion in all case studies were conducted with the theme of reason of joining CBFM, implementation of the program, livelihood strategies, ideas and constrains for new strategies, and use of natural resources. Participants of the discussion were identified with the help of local leaders, but the rule was to avoid biased suggestions.

In Case A, FGDs were conducted on February 3 and 5,, 2013 with a group of seven people in sub-case Lingay and nine people representation ages from 20s and 70s in sub-case Dalligan. In Case B, the FGD was conducted on February 10, 2013 with four people representing ages from 30s to 50s. In case C, the FGD was conducted on May 5, 2013 with ten people representing one-third of the organization. In Case D, there were two FGDs conducted, one on May 6 and another on September 3, 2013, with nine people in each meeting.

2) Reliability and accuracy of focus group discussions data

In practice, obtaining unbiased discussion was most challenging in the non-indigenous cultural communities, in which either chairpersons of CBFM group or government representative tried to influence the group by introducing participants who were representing similar opinions as the leader or governmental officials. In Case C, in the first phase of the research, the chairperson was hesitant to introduce FGD for unknown reasons, resulting in the cancellation of FGD twice. To overcome the issue, a group of participants was organized with the assistance of staff from Pampanga Agriculture College, who prior my arrival disseminated invitation for the meeting. It helped to gather an unbiased group but the chairperson to organize the meeting was not welcome by him despite his respect for the university staff. During the FGD, the most important was that the participants were honest about internal issues of the group and that the chairperson was not taking part in this discussion but without spoiling relation. Case D was the only one case in which the research was fully facilitated by the government in its initial stage. In this case, the presence of the government representative was causing bias in the beginning. During the FGD I moderated the group to allow CBFM group members to speak and to avoid interference from the government. However, to gain further insights on the group, the next field stage of the research was conducted without presence of the governmental officials, and through

staying at homes of CBFM members. In Case A and B, there were no such issues, as encountered in both cases. CBFM group activities ended, and neither chairpersons nor participants of each group were interested in creating a "good image" of the group, considering CBFM as past issue, not concerning them anymore.

The accuracy of the quality of the FGD was secured by systematic procures of a semi-structured discussion with the same set of questions, but exploring issues through moderating the discussion and refocusing questions. Each FGD was interpreted and protocoled as such that ads to the rigor and consistency. Trained translators were able to retain the intents of the speakers due to their good knowledge of language, as recommended by (Hennink, 2014) to increases the accuracy of the data. The focus group discussions were conducted in the local dialect and English, with interpreters from local universities, University of the Philippines, Ifugao State University, and Pampanga Agricultural College. In Case B, Filipino was used due to the lack of competent interpreters of the local dialect, as the local tribe had a good level of Filipino proficiency.

5.5.7 Forest Resource Group Level Assessment

Institutional assessment of FUGs, which in case of CBFM projects are formal bodies in the form of an association or people's organization contracted by CBFM, was designed based on the standard form of assessment conducted by DENR and it was adapted and modified for the purpose of this research. The assessment was composed of five sections 1) general profile, including contracts, land tenure, services, membership, sources of financial assistance, 2) organization – structure, activities, trainings, 3) Projects implementation after CBFM, 4) monitoring and evaluation system, 5) records of management, 6) networking, and 7) additional development benefits after CBFM.

This survey was a basis to assess the self-organization of the group based on the framework of Ostrom (1990). To depict the factual and not idealistic state of the organization, the assessment was implemented in later phase of the research. CBFM assessment was conducted in all case studies in September 2013 upon interview with informants who were current and former chairpersons of their respective organizations. The survey structure is presented in Appendix A.

5.5.8 Household survey

1) Household survey design

Household survey design was consulted with related literature (Grosh and Glewwe, 2000), and constructed based on open-ended questions, and the Likert scale questions to be conducted face-to-face, preferably with the two-step approach. Other forms of questionnaires were not feasible in the studied areas due to the lack of internet access, lack of post offices and different levels of literacy. Both questionnaires were tested on volunteer households in the communities neighboring the areas of Case A, B, and C, and necessary modifications were completed. The questions were formed based on the variables elaborated in Chapter 4, section 4.2.

First step of the questionnaire, based on open and open-ended questions, was to cover the detailed socio-economic profile of the household, including access to natural capital concerning the state of the previous year. This part of the questionnaire also included respondent's vision for the future. In brief, the questionnaire composed of the following themes, 1) household size and education 2) vision for the future and what should be changed, 3) vehicle ownership and energy consumption, 4) livestock agricultural land and agroforestry – area, production, farming inputs, 5) sources of income – in-farm (withdrawn resource), on-farm (non-withdrawn resource), and off-farm (non-resource), market, 6) forest – planting and harvesting, and 7) spending on various good and services (Appendix B).

In the second step, the questionnaire was designed to capture the socio-cultural capital of households, after acquiring sufficient trust with local respondents. This questionnaire was built based on a 5-level Likert scale (Norman, 2010; Cohen et al., 2013; also applied in other research for capital level assessment - Ifejika Speranza et al. 2014), to justify the responses for further in-depth qualitative analysis. Open-ended questions regarding the cooperation network required specifying the type of cooperation and households that cooperation was linked to. In summary, this questionnaire covered the following themes, 1) income satisfaction, 2) knowledge of farming, 3) practices, beliefs and spirituality, 4) trust level towards organization, community, and local government, 5) reciprocal feelings understood by the group, 6) social network and cooperation (Appendix C).

Both questionnaires were implemented to CBFM Project groups and Non-Project groups, thus two questions, namely plans to leave the project group and feeling understood by members of project group due to not sharing same type of interests were not addressed to groups not participating in CBFM,. Moreover, in non-indigenous communities, the question of rituals in farming and forest was not asked.

2) Household survey implementation

All members of CBFM organization were targeted as potential respondents and were attempted for the research survey; similarly, all households that were not participating in the project were targeted as respondents. It was feasible due to the relatively small number of households. In Case A, due to the difficult mountainous topography of the region, each household representative was invited for the survey three times, at a specified place, through invitation disseminated by local officials. In Case B and C, all households were invited to participate in the survey. In Case D, a geographical sampling was applied for CBFM group; the members who live in Alangan were surveyed. Non-members of Case D, due to high population of the town, were systematically randomly sampled by house number generated by online randomizer (Radnom.org), without replacement, and each house was attempted once for the interview (Lavrakas, 2008; Royse, 2007).

Respondents were the heads of the household, regardless of gender. Similar to the procedures of the FGD, household surveys I conducted in the local dialects, face-to-face with an interpreter or simultaneously by two enumerators who were already well-trained with the questionnaires with the presence of the author for immediate consultation of questionnaire issues. Interpreters and enumerators were graduate students from local universities, University of the Philippines, Ifugao State University, and Pampanga Agricultural College. In Case B, Filipino was used due to the lack of proficient interpreters and enumerators in the local dialect.

In Case A, the first step of the survey I carried out in May and September 2012, and the second step in September 2013. In Case B, CBFM Project group of case C the first step of the survey was conducted in February and September 2012, and the second one in September 2013 with visits paid to the community in the interim, maintaining a

strong bond with the village. In Case D, the first step on the survey in the CBFM group was conducted in September 2013, and the second step of the survey in the CBFM Project group was conducted in February 2014. Entire survey of Non Project groups of Case C and D were carried out in February 2014. The information on respondents, such as number, gender ration, average age, household size, and share of household within the locations covered by the survey are presented in Table 5.2. Case C and D of the non-project group had one-step interviews due to the low possibility of revisiting the same households. The residents were mostly employed resulting in a lower probability of meeting the same respondent for a second time,. These interviews were conducted upon the good will of respondents to participate. The questions were asked with the proper systematic explanation of the question.

Table 5-2. Information on respondents

Case	Group	Sub-group	Number of respondent (completed)	Respondents				Household	
				Female	Male	Average age	Average size	Coverage	Incomplete
Indigenous Cultural Communities									
Case A Kiangan	Case A-1 Dalligan	CBFM Project	19	10	9	36	5.9	58%	10
		Non-Project	30	10	20	40	3.6	64%	5
	Case A-2 Lingay	CBFM Project	9	3	6	51	6.4	36%	5
		Non-Project	33	7	26	43	3.9	60%	2
Non-Indigenous Cultural Communities									
Case B Sapang Bato-Target	Aeta People	CBFM Project	35	21	14	39	6.54	39%	4
		Non-Project	16	11	5	36	5.94	53%	2
Case C Ayala-Orchard	CBFM Project		25	5	20	44	5.04	67%	1
	Non-Project		30	17	13	38	5.77	20%	1
Case D Alangan	CBFM Project		26	15	11	51	4.8	30%	4
	Non-Project		32	21	11	43	4.7	3%	0
Total			**255**	**120**	**135**	**41**	**5.1**		

3) Validity and reliability in questionnaire

The questionnaires were checked at the end of every survey day to check if there were omitted inquiries by enumerators. In such instances, immediate or next day follow-ups were conducted. Layout printed questionnaires were also adjusted for a more optimal distribution of questions, to avoid previously encountered problems. The questionnaire was entered into the database by two people, where the enumerators entered data and the researcher checked for errors, and vice versa. In the case where respondents were not met for the second step interview on socio-cultural capital, the first questionnaire was not included into the analysis as it was considered incomplete because it was not possible to establish the correlation between variables from the two-step questionnaire.

a) Convergent and discriminant validity of construct

In the analysis of social capital two variables were describing similar constructs. In such instances, in social, behavioral, and psychological sciences, the validity of such variables can be measured by convergent and discriminant validity measured by correlations of similar variables. It is a method to detect biases and improve the quality of the data and strengthen the survey approach (Gobo and Mauceri, 2014). Construct validity is defined as the degree to which implications can validly be made from the operationalizations of the research to the theoretical constructs on which those operationalizations were based (Trochim and Donnelly, 2006). Convergent and discriminant validity are both considered subcategories to be applicable for such purpose. Convergent validity reflects same ideas that should be interrelated and the discriminant validity confirms that the ideas which intended to be unrelated remained so through the study (Trochim and Donnelly, 2006; Luthans et al., 2007). Designed variables should be representing similar or different characteristics of the capital, such as cognitive, structural, linking social capital, or forms of cultural capital. The convergences were expected in the cognitive social capital, such as trust and feedback on feeling understood by the same group are expected to be related, as one is stimulating the intensity of the other one (Cunningham, 2013). Divergence of in social structural capital variables, such as friends to rely on and the number of cooperations, was expected. In the cultural capital, traditional practices and farming, measuring different aspects of indigenous knowledge (Berkes, 1999) shall be unrelated.

Spirituality and belief in indigenous cultural communities dependent on the forest should possibly indicate both convergence and divergence in in non-indigenous cultural communities (Anderson, 1996). Moderate convergence was expected to be represented by variables of social capital that are providing ground one for another, such as friends to rely on and interactions in the community (Falk and Kilpatrick, 2000). It was tested by thenon-parametric Spearman test, wherea coefficient from 0.5 to 1 represents higher correlation, from 0.25 to 0.5 describes moderate relations, and from 0 to 0.25 weak interrelations (Ashtana and Bhushan, 2007; Trochim and Donnelly, 2006). The results of the validation are presented in Appendix D. Invalid cases of variables were further analyzed in the thesis with more emphasis put on the context and type of justification of responses the respondents provided, to question the lack of interrelation in the case of convergence and interrelation present in the case of divergence.

b) Survey results consultations

Respondent validation is a research step taken in order to obtain feedback from the people studied on research results, to reduce the misinterpretation of their self-reported behaviors and opinions (Yin, 2011). Within the same workshop as problem ranking, the presentation of results in the form of a Power Point presentation on laptop or printed form on A3-size paper was made, and additional feedbacks from the respective groups were gathered; in Case A on February 19 and 20, 2015, in Case B on February 26, 2015, in Case C on February 25, 2015, and in Case D on February 24, 2015. For example, consultation of the survey in Case A was used to explain unexpected results, such as the smaller area of land in CBFM group and confirm that the results was not skewed, or the lack of spirituality that the majority of respondents self-reported.

5.5.9 Descriptive statistics of data

The purpose of descriptive statistics data is to quantitatively describe the main features of information. However, statistical interpretations of data in socio-economic studies are different from natural science. In natural sciences the random deviation are more expected than in the socio-economic data, which cannot be objective as natural science are influenced by cultural and behavioral biases, giving the data a less “hard” and more “soft” character such as the Likert scale data (Warnecke et al., 1997; Winkler,

2009). Thus, these data does not necessarily need to be normally distributed (Winkler, 2009). For example a project group in CF may be skewed by participation in this program, which was based on incentives or interests of people to become members of CBFM project. In such instances, statistics is also insufficient to data describing qualitative issues and relying on local contexts, thus the analysis must be supported by qualitative data (Winkler, 2009).

Moreover, it is already established that Likert scale data are subject of non-parametric tests (Razali and Wah, 2011).ummary of the descriptive statistics on natural and economic capital data are in Appendix E. Distribution of economic and natural capital variables are presented in the results of chapters 6 and 7, by box plot generated in R Project. The method of interpreting the box plot charts is presented in Figure 5.6. Threating the Likert scale with descriptive statistics such as mean or median, which represent options, is not truly representative as these values are interval-level data, argued as not ordinal one (Guerra-López, 2008). The results of variables designed on the Likert scale was represented by frequency of answers instead.

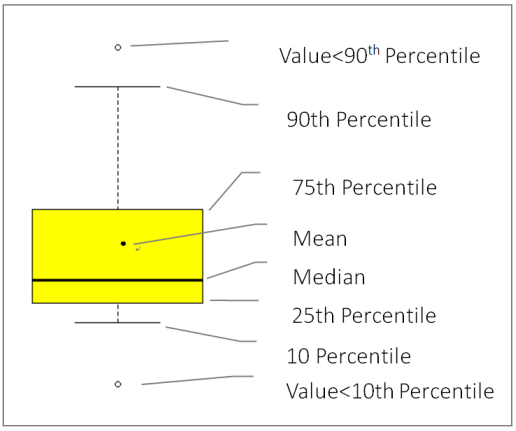


Figure 5-6. Box plot interpretation

5.6 Indicator processing

5.6.1 Economic capital variables

Monetary values of different periods were inflation-adjusted (Starbuck et al., 2004; Ungerböck et al., 2015) based on the inflation rate of 3.2 per cent in 2012 and 3.0 per cent in 2013 (World Bank, 2015c). The economic capital variables which were derived from values acquired from the survey will be described in this paragraph.

1) Income diversity

Income diversity of each household was estimated based on the Simpson index (Adger 2000; Heubach et al., 2011) that originally is used in measuring the biodiversity of ecosystems. The index is as follows:

$$Income\ of\ diversity\ (Simpson\ index) = \sum_{i=1}^{N} P_i^2$$

in which a *i* number of different income sources *N* generates income *Pi* each (Heubach et al., 2011). Following Illukpitiya and Yanagida (2008) and Heubach et al. (2011) income sources were categorized into 1) off-farm jobs, 2) crop production, 3) fruit income, 4) livestock income, 5) other on-farm incomes, and 6) non-timber forest products. The more divers income sources, the higher the values, but it always falls between 0 and 1, in which 0 indicates no diversity, and 1 indicates highest diversity.

2) Income dependence on natural resource

Income is classified into sources in natural resources and sources from outside, such as employment, subsidies, and overseas revenue. Income dependence on the resource was calculated as shared income from natural resource to total income generated by the household.

a) Dependence on withdrawn resources (in-farm income)

It is a share of income from withdrawn resources (in-farm income) such as timber, non-timber forest products, fruits, vegetables, and livestock to total household.

b) Dependence on non-withdrawn resources (on-farm income)

It is a share of income from no-withdrawn resources (on-farm income) such as

eco-tourism, labor on the farm, delivering harvest to the market to total household income.

3) Equal oncome distribution

Equal income distribution is measured by the Gini coefficient/index (Cowell, 2000); applied to community forest elsewhere, e.g. in Nepal by Sharma (2010). The coefficient has values from 0 to 1, where 0 represents perfectly equal society. The index was applied elsewhere in research on forest dependent communities, i.e. in community forestry groups in Nepal, the lowest value was found to be 0.215, and in the same research in a different study site, the highest was measured at 0.678 (Sharma, 2010). The Gini coefficient was calculated in R-Project with Package "redlist" (Handcock and Morris, 2015).

4) Income versus poverty threshold

Poverty threshold is defined as the income meeting poverty threshold to meet minimum needs of a family (Lal, 2012). Poverty threshold is reported by governmental statistical office, as minimum income that provides subsistence in form of food, clothing, housing, transportation, health, and education expenses (National Statistical Coordination Board, 2015).

5.6.2 Socio-cultural capital variables

1) Cooperation - network analysis

Visualized network presents how evenly the group or community is cooperating, and to indicate if there are distortions. Networks also can be representative for security/resilient strategy or efficiency. Complete network (Figure 5.7b) is more structured but less efficient, whereas a star graph (Figure 5.7a) is most centralized and the least secure network but with higher efficiency. Optimum network is a reinforced ring (Figure 5.7c) (Zinoviev, 2012). Star network might also indicate intermediaries between other actors; in some cases, it may represent elite capture in the group, and lack of network may indicate disaggregated society (Cunningham, 2011).

Networks in this study were projected in Cytoscape 3.2 software (U.S. National Institute of General Medical Sciences). Cytoscape is a popular software for biological network visualization as it has capabilities to compute network in a dynamic way

(Smoot et al., 2011). Actors in cooperation – households, and their links to other household via cooperation, and the type of cooperation were used for projecting the network.

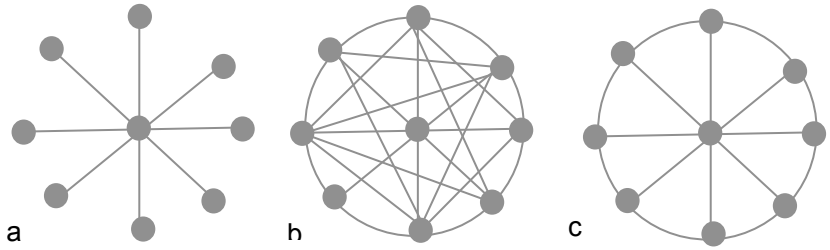


Figure 5-7. Optimal structures of covert networks (a) star graph, (b) complete graph, and (c) reinforced ring:

Source: Adapted from Zinoviev (2012)

5.6.3 Natural capital variables

1) Satellite image processing

In contemporary literature, there is a discussion whether multiresolution segmentation with high resolution images is more accurate than image object (Belgiu and Drăguţ, 2014). Moreover, supervised and unsupervised classification has already been proven to be accurate in the era of high-resolution images available (Zhou et al., 2009). With acquired high resolution images (Table 5.3). The object-based image segmentation, using multiresolution algorithm, a supervised (semi-automated) classification was used to classify land cover.

Table 5-3. List of images used for the analysis

Case	Image	Resolution	Date	Rationality of the scene slection
A	Quick Bird-2	Multispectral, 2.4m	June 6, 2010	Rice terraces with water – easier to distinguish active terraces; season for swidden farm clearign with fire
	Wold View-2	Multispectral, 0.46m	January 1, 2010	
B	Geo Eye-1	Multispectral, 1.65m	December 6, 2009	Season of swidden farm clearign with fire
C	World View-2	Multispectral, 0.46m	February 16, 2010	The only available scene
D	Geo Eye-1	Multispectral, 1.65m	December 19, 2013	Clear picture of the proejct area

Primary software used to conduct the analysis was eCognition Developer 9 (Trimble). Using pre-collected samples from the ground and acquiring knowledge of land use in the area, served to created classes of land use. Classes were divided into forest, grassland or lower vegetation, agricultural land, built areas, and other classes, specifically required by the site. During the process of classification in the eCognition, a segmentation to divide image to alike segments, and geometrical and band related algorithms were selected to individual image in order to reflect in the most accurate way the quality of the image and type of targeted objects. Random sample points were created in in ArcMap 10 (ESRI) for accuracy verification, and minimum accuracy of 85 per cent was set as the standard for the final outcome of the land classification map, and in the case of a less accurate outcome, the process was repeated based on learning the origins of mistakes and adjusting samples, geometry, and band-based algorithms (Zhou et al., 2009).

To compare the parameters of canopy, the Normalized Difference Vegetation Index (NDVI) is frequently used, which is explained by following equation:

$$x = \frac{R_{IR} - R_R}{R_{IR} + R_R}$$

The variable R_{IR} is the reflectance in the near infrared and R_R is the relfecance in the red (Wiegand et al., 1991).

The process was conducted primarly in Arc Map 10 by function of image analysis. The prior prepararion of the image was undertaken in order to remove cloudes and shadowes. Due to differences between images, the NDVI was compared between different areas of the same satellite image scene.

2) Renewable energy use

Renewable energy use is presented as a ratio of renewable energy, such as firewood, charcoal and renewable electricity, to non-renewable sources. It was estimated at levels of each individual household's consumption and converted to kilocalories (kcal). In Table 4.4 conversion factors between units are gathered. Moreover, renewable energy share of the electricity was sourced from Department of Energy (2013).

Table 5-4. Energy conversion factors

Energy by Source	Energy Unit Measured	Energy (kcal)	Source
Electricity	kWh	860	Pimentel and Pimentel, 2007, p. 11
Gasoline	L	8179	Pimentel and Pimentel, 2007, p. 12
Liquefied Petroleum Gas (LPG)	Kg	10800	Chatterjee, 2006; p. 33
Firewood	Kg	3700	Morgan and Iceman, 1981, p. 85
Charcoal	Kg	7400	Morgan and Iceman, 1981, p. 85

5.7 Data integration and statistical analysis

Combining data of different natures, such as hard data and soft data, from natural sciences and social sciences, is still a challenge. There are few well or less established approaches to deal with such data that offer methods to consolidate such data. Odum (1994, 2007), in his 'energy' theory, integrates social and ecological domains via concepts of energy and power. In another paper, Jarzebski et al., (2015) postulated a form of scaling variables against established standards, and project them in the multi-dimensional space (Jarzebski et al., 2015). However, this analysis retains most established methods of statistical analysis (e.g. Tretter and Halliday, 2012) to integrate and interpret the data. Results of survey and other derivative indicators were analyzed for statistical differences between CBFM and Non-Project groups by parametric or non-parametric tests accordingly to distribution, except results of the Likert scale questionnaire that were analyzed by non-parametric tests (Razali and Wah, 2011). Used tests for distribution and significant difference were as follows: Shapiro-Wilk normality test for normality, non-parametric Wilcoxon rank sum and parametric Welch Two Sample t-test, in R Project (The R Foundation). Statistical tests may lead to wrong conclusions either in hard science (Olivier and Walter, 2015) or social science (Lewis-Beck et al., 2004). Statistical differences in this study are strengthened by direct quotations of respondents to reflect on the local context and possible biased that it could cause (Gobo and Mauceri, 2014). Correlation tests were conducted for those variables, which were significant between groups, allowing for further explanation of phenomena and integration of data representing different forms of capital. Used correlation test was Spearman correlation test, conducted in R Project with 'pspearman' package. The

correlation coefficient *r* was interpreted based on social science prescribed categories, in which 0 means correlation absent, and 1 the perfect correlation. Values from 0 to 0.25 represent a very low correlation and from 0.25 to 0.50 a low correlation. More meaningful are correlations above 0.50, coefficients up to 0.75 denotes high correlation, and above 0.75 a very high correlation, and 1 as a perfect one. Positive or negative values denotes direction of the relationship, negative or positive relation (Ashtana and Bhushan, 2007).

5.8 Summary of the chapter

This chapter presented the methodology applied to the research that includes research design, case study design, research flow, field research methodology and implementation. It described how the data was collected and analyzed, and the procedures taken to secure the data reliably and accurately.

6 COMMUNITY FORESTRY IN INDIGENOUS CULTURAL COMMUNITIES UNDER CBFM PROGRAM

6.1 Objective of the chapter

Objective of this chapter is to respond to ii) sub-research question. Two cases represented CBFM that was introduced to indigenous cultural communities, formalizing CF through the CBFM project.

6.2 Case A. Kiangan – Dalligan and Lingay

6.2.1 Kiangan municipality

Kiangan is a municipality in southwest of Ifugao Province, located along the south flank of the Cordillera Administrative Region (CAR) in Luzon (Figure 6.1). In terms of distance, Kiangan lies within 330 kilometers from Manila. Kiangan has estimated land area of 20,419 hectares. The total population of Kiangan in 2010 was 15,837 (Philippine Statistics Authority, 2010).

The land use of Kiangan is dominated by forest (35.88 per cent), grassland (27.44 per cent), agriculture, predominantly rice terraces (25.66 per cent), agro-forest (9.23 per cent), and built-up area (1.75 per cent) (Local Government of Kiangan, 2011).

In 1996, Kiangan municipality has obtained a CADC, covering entire area of the municipality, namely 20,419 hectares[21].

The Ifugao Province is known for its traditional landscape with rice terraces and culturally distinguished indigenous people. The people there call themselves as “Ipugo”, which literally means “form the earth”, after “Ifugaw” which the Spaniards called them, later turned into “Ifugao” by the Americans. The Ifugao people resisted colonization of

[21] The was one CADT area in Kiangan established, but it did not cover the former CBFM area studies in this research.

their land by the Spaniards for four centuries from colonizing their land (from 16th to 19th century). Therefore, Ifugaos were able to maintain their customary land management. However, during the American occupation in the 20th century cultural, political and economic changed in the province began (UNESCO, 2008). The tribe of Ifugao people that settled in Kiangan is called Tuwali.

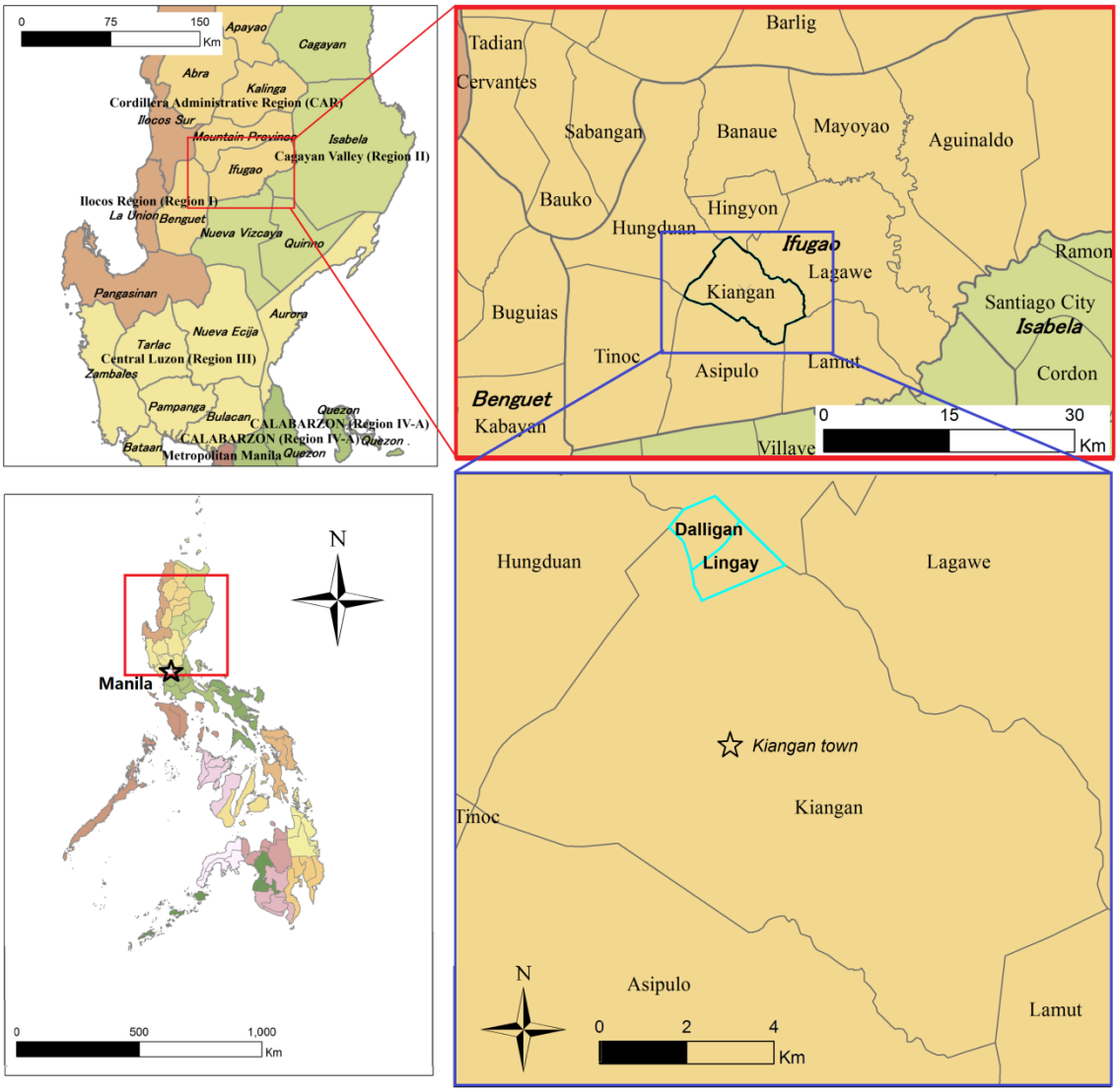


Figure 6-1. Location of Kiangan, and two studies barangays, Dalligan and Lingay

Note: Author's figure; boundaries sourced from http://philgis.org/)

The rice terraces (Picture 6.1), carved into the mountains, are the main tourist attraction

of the province, and since 1995 five rice terrace clusters are registered as a UNESCO World Heritage Site (UNESCO, 2014). This astonishing human-made structure, believed to be built 2000 to 3000 years ago due to the estimated long time required to construct valleys of terraces (Barton, 1919; UNESCO, 2014) might not actually be that old but it still represents an old adaptation of local tribes (Acabado et al., 2014; Acabado, 2009, 2012).

Kiangan municipality is subdivided into 15 barangays[22], namely: Ambabag, Baguinge, Bolog, Bokiawan, Dalligan, Duit, Hucab, Julongan, Lingay, Mappit, Mungayang, Nagacadan, Pindongan, Poblacion and Tuplac. Two barangays, Dalligan and Lingay became recipients of CBFM project funding in late 1990s.

Picture 6-1. Cluster of rice terraces in Nagacadan, Kiangan, enlisted as UNESCO site

1) Barangay Dalligan

Barangay Dalligan has a population of 369 people in 81 households (Local Government of Kiangan, 2011), and is located within 25km distance from Kiangan town and is the barangay furthest from the town. It has no road connection yet; however, a road has been gradually developed over past few years. Barangay is located on both, high and low elevations, approximately between 500 and 1500 meters above sea level (Figures 6.2a and 6.2b). Through the lowest part of the barangay, at on its west boundary, Ibulao River is flowing.

[22] A barangay is the smallest administrative division in the Philippines, term for a village, district or ward

Barangay Dalligan was separated from barangay Lingay in the 1970's. The name originated from a hardwood tree which was abundant in the early years of the settlement. The first settlers in the current area of Dalligan are estimated to have arrived before World War II and came to the area to farm sweet potatoes as their staple food, and later on to produce rice on wider tracks of land (Local Government of Kiangan, 2011).

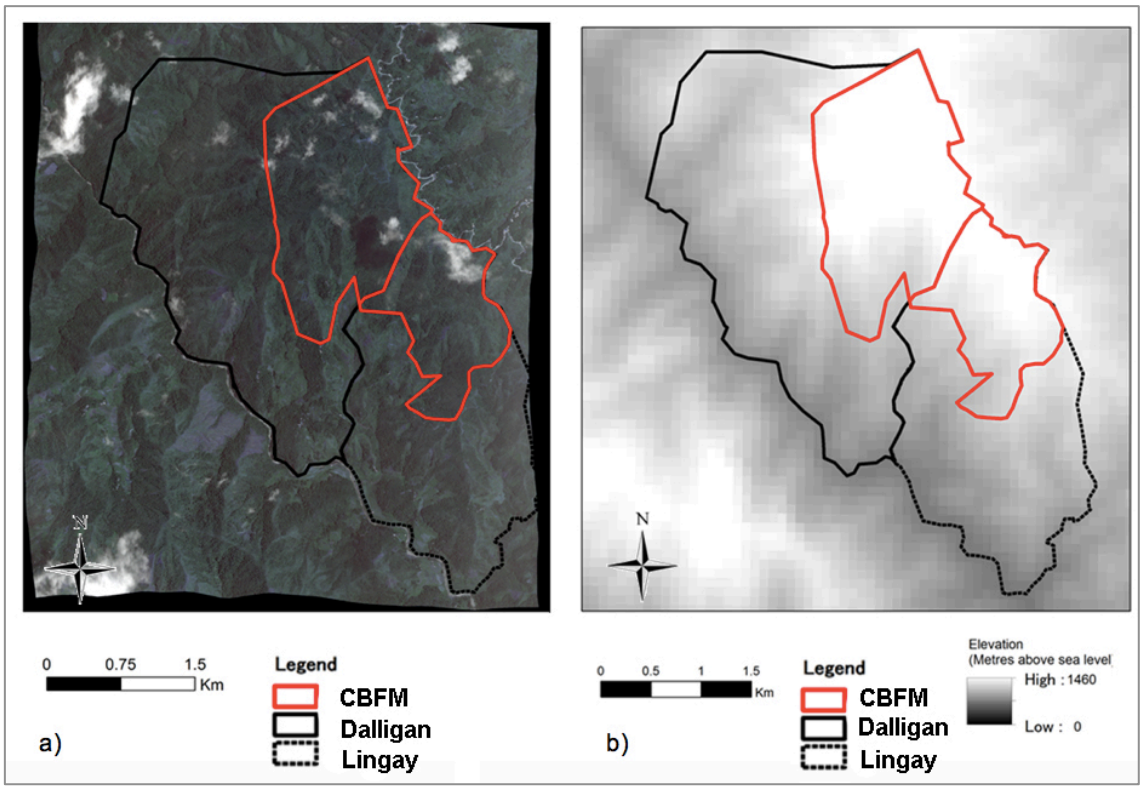


Figure 6-2. Barangay Lingay and Dalligan and their approximate CBFM areas: (a) on satellite image Quick Bird-2 (June 6, 2010); and (b) digital elevation map (NASA)

2) Barangay Lingay

Barangay Lingay, with a population of 375 people in 80 households (Local Government of Kiangan, 2011), is located 23 km from Kiangan town. The center of barangay Lingay was connected to the town by unpaved road, not suitable for all season drive, but some parts of the road have been paved already. Similarly to Dalligan, Lingay is located on the mountain slope, ranging from approximately 500 to 1500 meters above sea level, with Ibulao River flowing in the lowest valley (Figures 6.2a and 6.2b).

In 1962 from Bakiawan, a sitio[23] in Lingay, became an independent barangay and in

[23] A sitio is a sub-unit of a barangay (village)

the early 1970's the sitio Dalligan too separated and became an independent barangay, due to its large population and long distance from Lingay. According to old narrations, it was originally named Hapuan from its mother barangay. The mother Hapuan was not peaceful, thus, kind and peace loving settlers moved to the new area of current Lingay, establishing a new image of the settlement as *maule*, meaningkindness and peace loving. The place was called *boblen di makaule*, a place of kindhearted people, later changed it into Linge in order to be easier to pronounce. When further opening up to civilization the name was once more changed, into Lingay (Local Government of Kiangan, 2011).

6.2.2 Social-ecological context of Kiangan

Analyzing the development path of the Ifugao people requires a deep and broad understanding of their socio-cultural, political and economic background as well as of changes that have taken place in recent times and what is the residents´ vision for their own future. Such context facilitates understanding of the CBFM role plays in such a community and of what could be the potential role of CBFM in resilience building.

1) Rice terraces

The land is understood by the local people as a uniform uni the *pu-gu*, meaning "hill", without differentiation of forest and farmland. of the land has zoning, securing its sustainable use, especially water flow (Figure 6.3). On the upper part of the mountain a community forest is usually located, open to the local villagers; below that the *muyong*, the clan forest of the family is commonly located. At the edge of the forest the swidden farms *habal* are located, serving as tuber plantations. *"Sweet potato, or camote, fields are clearings on the mountain sides about the village. They are nearly always steep slopes, and quickly lose their fertility. For that reason, they are abandoned after a period that varies in different districts of Ifugao according as camotes [sweet potato]are a more or less important factor in the subsistence of the people"* (Barton, 1919, § 45). Below the swidden farm a settlement is usually located. The lower part is occupied by rice terraces *poyoh*, and below it is open grassland *magulon*. The rice terraces, although believed to be built 2000 to 3000 years ago (Barton, 1919; UNESCO, 2014) might be a more recent structure (Acabado et al., 2014; Acabado, 2009, 2012). Rice could possibly have come later to the mountains, and initially the main source of carbohydrates were tubers, such as taro, and several other plants in the *Araceae* family

(Acabado, 2012).

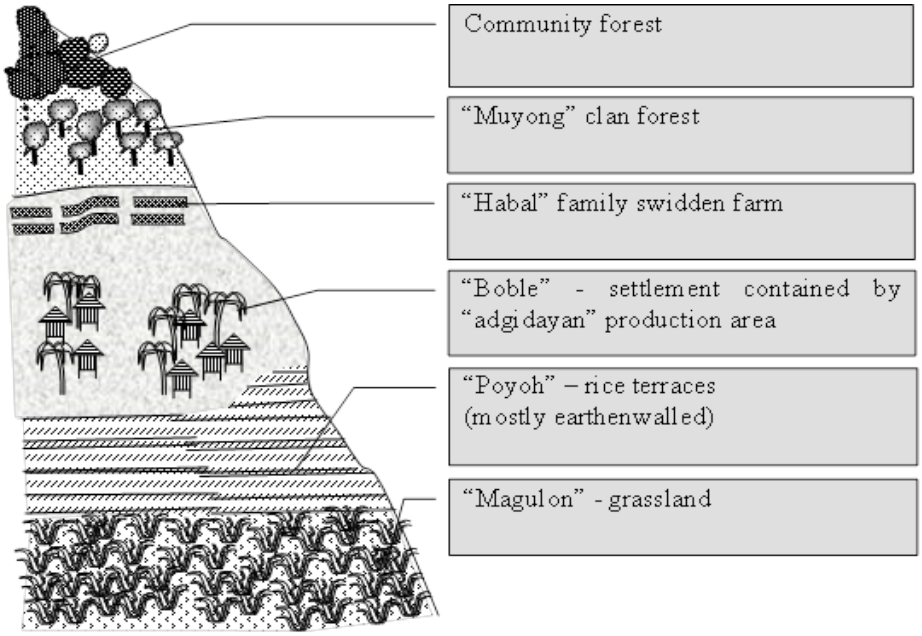


Figure 6-3. Image of pugu hill - land use and indigenous zoning system in Kiangan

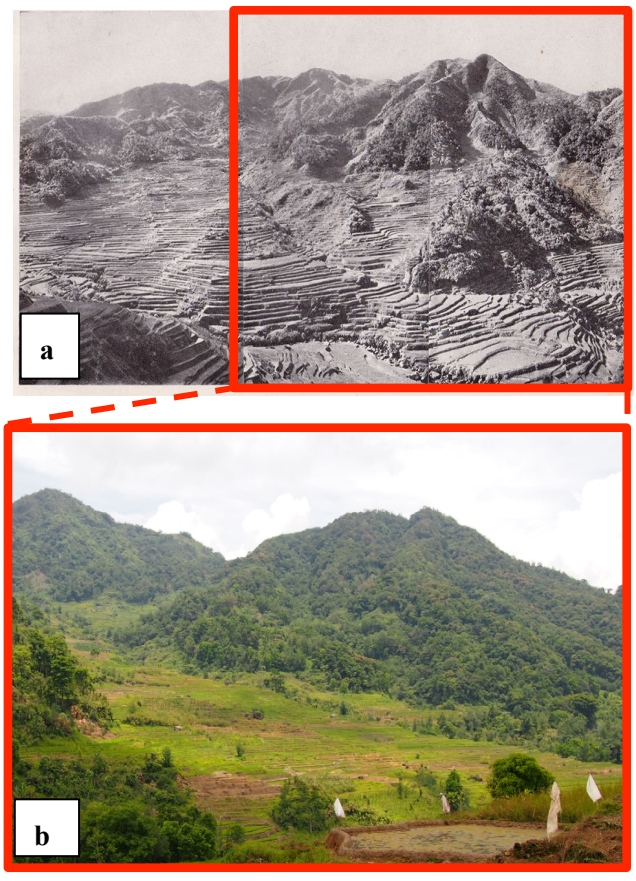
Source: Adapted from UNESCO, 2008, p. 19.

2) Forest

Tropical thick forest is a source of water for rice field irrigation as well as for drinking; recent water shortages in rice terraces were attributed to deforested land. The forest is a source of non-timber forest products (NFTPs) and utilized for hunting. Wood-cutting is culturally prohibited, related to superstitions and taboos. *Muyong* or private/clan woodlots is a forest zone where people are allowed to gather their own lumber for house construction purpose or for firewood, and it is constantly being replenished with new trees, enriched with species that can be used as food, fuel wood, house construction, wood carving, medicines, and for veterinary purposes (Rondolo, 2001). The *Muyong* woodlot is also a buffer zone of the communal forest, limiting people's activities to the private area (UNESCO, 2008; Conklin et al., 1980). *Muyong* is considered as an outstanding form of landscape management, a sustainable way of managing the forest, based on traditional knowledge and experience (Perera, 2009; Hlaing et al., 2013).

There are three possible origins of *muyong* forest in the Ifugao culture. The first is the high awareness of Ifugao ancestors about forest-water relationship, securing water for rice terraces by maintaining the forest; the second depleting sources of firewood reinforced establishment of private woodlots; the third theory is that *muyong* forest as established for uplifting socio-economic status of families in the community (Serrano and Cadaweng, 2005).

Forest cover was also regulated by other factors, such as war and population size. During tribal war times in Ifugao forest on some hills was cleared, for example in Nagakadan, Kiangan (Pictures 6.2a and 6.2b). The upper part of the mountain, regarded as communal forest, was bare in the early 1990s, nowadays the hill is covered by thick forest. The area was utilized to provide stable food for large population, by the growing of tubers on swidden farms (Conklin et al., 1980).



Picture 6-2 Forest over the rice terraces in terraces in Nagacadan, (a) bare hills in early 1900s and (b) thick forest cover over the hills in 2012

Note. Picture 6.2a - Barton, 1930, PLATE XXII facing p. 73; credits to SITMo, Ifugao, esp. Mr. Marlon 6.2a - author's photo; Picture Martin, for the idea

3) Changing Ifugao - Review

Banaue, a neighbor municipality to Kiangan, which also have rice terrace clusters listed as UNESCO Heritage Site, is experiencing uncontrolled development, with negative impact of tourism on the natural environment and cultural settings. Modern buildings constructed randomly, destroyed *muyong* forests and increased population and pollution. Traditional rituals become commercialized, and performed upon tourist demand, thus disconnected from the rice planting cycle (UNESCO, 2008). In Kiangan such threats are not that obvious yet. More apparent is rice terrace abandonment due to outmigration leading to shortage of manpower for cultivating rice as well as introduction of new techniques, (such as fertilizers), other varieties of rice and cash crops that are not following the annual cycle, thus, incurring physical damage on the rice terrace construction which is vulnerable in its drained water state (Peñafiel, 2007; UNESCO 2014). Introducing crops with multiple yielding or herbicides deteriorate annual customs, too (Peñafiel, 2007). Communities are also vulnerable to climate change, especially to changing rain seasonality, as the water is an ecosystem service supporting their landscape. Other problems described in the literature on Ifugao are invasive alien pests such as tanezumi rat *Rattus tanezumi* (Temminck) (Stuart et al. 2007; Stuart et al. 2008), the earthworm *Polypheretima elongate* (Perrier) (Blakemore et al. 2006), and golden apple snail *Pomacea canaliculata* (Lamarck) (Joshi et al., 2001; Halwart, 1994) that people do not know how to eradicate.

Yet, two barangays, Dalligan and Lingay, are not impacted by tourism due to their remoteness. However, outmigration, lack of external income, and pests are threats to the continuity of the cultural landscape.

6.2.3 CBFM in Kiangan

In 1996 Kiangam, including two concerned barangays, Dalligan and Lingay, were covered by CADC to recognize the claim of indigenous people to the land under governmental jurisdiction.In 1998 CBFM agreements were concluded in the two barangays, with FUGs created for that purpose, and merging the CBFM with the formerly established CADC. The CBFM projects to both barangays were funded by the World's Bank the Social Security Special Sector Adjustment Loan (SECAL). CBFM in Establishment of both groups was a top-down procedure, in which organization of groups was a first step to implement the CBFM project. CBFM in barangay Dalligan

1) CBFM in Barangay Dallian

Dalligan Multi-Purpose Development Farmers Organization with 33 members was the foundation for the CBFM project, becoming a formal FUG, which was initiated in 1999. The SECAL was the source of the funds for the program. The CBFM covered 274.26 hectares and aimed for enhancement of the forest and livelihoods through agro-forestry. The organizational goal was that the FUG will become self-sustaining and capable of managing the CBFM area. The CBFM project was implemented to public lands, establishing forest and fruit trees plantations, and to private *muyong* home forests. In 2010 there was a livelihood project additional to CBFM called Hunger Mitigation Project implemented, aiming at poverty alleviation, covering 55 hectares of agro-forestry, introduced by DENR. One of the features of the Hunger Mitigation Project was introduction of ginger that was to be sold by cooperative/association.

Villagers joined the CBFM project for their benefits as well as future benefits for their children, according to a Focus Group Discussion conducted on February 5th, 2013. The CBFM project provided them with fruit trees, forest trees and payments for planting, as well as seminars in which they gained knowledge on farming. The CBFM project helped people during the implementation stage through employment, providing alternative sources of income.

2) CBFM in barangay Lingay

Barangay Lingay already participated in a reforestation program in 1974, according to a Key Informant, a former Barangay Chairperson (Key Informant Interview conducted on February 3rd, 2013). Participants were paid per planted area, but they did not maintain the plantations after subsidies finished, as they had to focus on their own work to survive.

In 1999 the Lingay Farmers Association with 15 members contracted CBFM[24]. The project covered 106.77 hectares. The project was an extension of the project in Dallligan, also funded by the SECAL. Similarly, the project's goal was to protect and rehabilitate forest resources and biodiversity therein, improve water supply, ensure better access to forest resources and to derive benefits out of it, as well as general empowerment of the community. CBFM was targeting abandoned public land lots and

[24] CBFMA No. 000005036

private lands. Participants were paid for carrying out seedling plantation (payment per seedling), and for home forest planting they received seedlings of fruit trees, such as rambutan (*Nephelium lappaceum*), and palm rattan (belonging to *Calameae*) for fruits and furniture production. Additional help was given in form of fish, and chicken. Money was a help to purchase especially food.

During three Focus Group Discussions conducted on February 3, 2013, knowledge on project implementation was gained. The implementation of the project was not recalled very clearly by the participants. DENR officers and the former Barangay Chairperson were the ones who initiated the program to the barangay as it was in need of an increase of food production and income generation. The organization started from an initial capital of twenty thousand pesos from SECAL and reached four hundred thousand pesos.

6.2.4 Resilience assessment

1) Past to present – changes in Dalligan and Lingay

Participatory Mapping and subsequent discussions were able to provide a picture of the changes that have taken place in both Lingay and Dalligan, which have essentially undergone similar changes over the past few decades. An example of the maps that were drawn in these locations is presented in Figure 2. Initially both districts were unified as one, called Lingay. However, due to population growth a remote part of the district was separated from the main Lingay, and named Dalligan.

Due to intensive slash-and-burn practices mountain slopes were bare by the late 1960's. In 1968, wood carving started in the area as a source of income. Wood carvers and blacksmithing knowledge came from another district. Thanks to these new skills the residents in Lingay and Dalligan could make new products and exchange them for rice. As a consequence of introducing these alternative livelihoods, fewer slash-and-burn practices were needed to produce alternative staple foods such as sweet potatoes. Slash-and-burn practices continued to decrease –being abandoned in the 1970s- and gradually the forest regenerated.

In 1979 the Department of Natural Resources started introducing a number of trees into the area, such as gmelina, pine trees, mahogany, alder, and acacia, though

these turned out to be generally unsuitable to the local environment. According to participants, gmelina should not be planted near a source of water, as its roots absorb large quantities of water and other trees could not grow around it. gemelina was found to be suitable for furniture but wooden nails, (as opposed to those made of steel) had to be used to avoid rusting, as gemelina wood contains much water. The best types of trees for the area were found to be alder and mahogany. Mahogany, which was intended to be a source of hardwood, actually became a good source of firewood. Alder leaves were good fertilizer for other trees. Acacia was good for wood carving but the trees did not grow well in the land. In general the fruit trees provided by Department of Natural Resources did not grow well, except rattan, of which fruits and weaved furniture from strands of rattan can be occasionally sold. The introduction of hard wood trees was thus rather unsuccessful, and wood supply became insufficient to maintain carving. Thus, residents of Dalligan and Lingay started cultivating coffee beans, and afterwards began migrating to other areas.

However, in 1986 when the Deparment of Natural Resources officers came to Lingay and Dalligan for their survey they were surprised by the small amount of forest cover. Essentially, trees were still young as they were only planted in the late 1970's. Moreover, after the funds for the reforestation work were finished the maintenance of planted forest was abandoned. Most of the planted trees died, and some of the plantations were even cut down by dissatisfied participants. Essentially, natural regeneration after slash-and-burn practices were abandoned was the primary reason for the forest's regeneration, rather than the planting of trees in the late 1970s.

The current diet of people has been gradually changing from the 1960s to present, from one of sweet potatoes and rice from their local farms to predominantly non-native rice purchased in the town, with money earned from selling wood carvings, furniture, coffee, rattan, or temporary income from working on reforestation projects. Another change that took place in Lingay and Dalligan was Christianization during the 1980's (before this time people believed in the Ifugao gods), and since then many churches have been built. The gradual change in religious practices caused a reduction in rituals associated with rice planting and the forest. Other developments that occurred

in recent times in Lingay were electrification, the building of a clinic, a concrete bridge replacing the wooden one, a concrete local district hall and teacher's quarter, and the school being rebuild using concrete. Nowadays, wooden carving has disappeared due to the high cost of the hardwood, its lower availability, and difficulty in transportation. The housing patterns have also changed, from traditional houses covered with thatched roofs, to metal sheet roofs, with some of the houses already being made of concrete. At present there are already concrete and metal pipes connecting houses with local springs, and some people are able to take a bath in their homes instead of in the spring.Maps produced during workshop is presented in Appendixes F and H.

Dalligan and Lingay in 1999 were once again (i.e. after the first projects 30 years earlier), included into a reforestation program, this time under CBFM. Similarly to the former project, the CBFM provided only temporary employment through paid forest planting. Participants receive seedlings that were used for reforestation, planting communal orchard, and for private woodlots. Plantation of fruit trees as well as planted forest were abandoned after the reforestation funds were over. Therefore, only the planted forest tree species were able to improve private forest lots, but not the common plantation. Moreover, low rates of planted seedlings' survival were reported in common areas due to lack of maintenance. This lack of incentive to provide care to young forest plantation was similar to the failure that was recorded during the reforestation program in the late 1970's. However, compared to the past, forest cover was already higher, and an increase in biodiversity could be noticed, e.g. respondents reported how monkeys had returned to the forest. Implementation of CBFM was not a very significant event in these communities, and thus participants of the workshop had difficulty to recall the implementation of the CBFM. However, CBFM promoted livestock, and prior to it local inhabitants used to keep native pigs for private rituals and consumption, though at present they are raising hybrid pigs for selling. Animal feed has also changed, from sweet potatoes and other root crops that the native pigs used to be fed with to commercial food for hybrid pigs. Maps produced during workshop are presented in Appendixes G and H.

2) Impacts and challenges in Dalligan and Lingay

i. Problems of barangay Dalligan and Lingay

Major problems in the communities were related to having no road connection and discontinuities in the irrigation or drinking water system. Compared to the past, nowadays the road was wider, with some part covered with concrete. However, it is

generally still not good enough to be safely transited during rainy seasons, when its poor condition sometimes prevents locals from accessing the market, where they could potentially sell their products and purchase food.

The problem of some rice paddies being without water was caused by a lack of maintenance of the rice terrace system. Once some of the rice fields were abandoned or stop being maintained, it triggered rice terraces below them to be cut off from the water. Such abandoned rice fields created a haven for pests such as rats, which can reduce rice yields in adjacent fields. The problem of the maintenance of potable water pipes, listed during the workshop, was also caused by a lack of collective action between all household to maintain the system. A shortage of some facilities, such as health centers and schools, were also pointed in Dalligan as being important. All these problems are listed in hierarchical order in Table 6.1.

Table 6-1. Problem ranking in Dalligan and Lingay

Kiangan	
Lingay	Dalligan
1. Drinking water supply	1. Road connection
2. Farm to market road	2. Irrigation for livelihood
3. Irrigation	3. Health center
4. Sources of income	4. Drinking water system
5. Lack of food supply (esp. rice)	5. Facilities in the school
6. Reforestation (boundary disputes)	

3) Tri-capital assessment of Dalligan and Lingay

a. Economic capital

Economic capital at household level

i. Income diversity

Income diversity in the two barangays, in both groups was found to be relatively low. In barangay Dalligan average income diversity, expressed by Simpson Index, was 0.25 in the Non-Project group, and in the CBFM Project group it was 0.20. The values were found to be even lower in barangay Lingay, 0.22 and 0.17 respectively (Figure 6.4a).

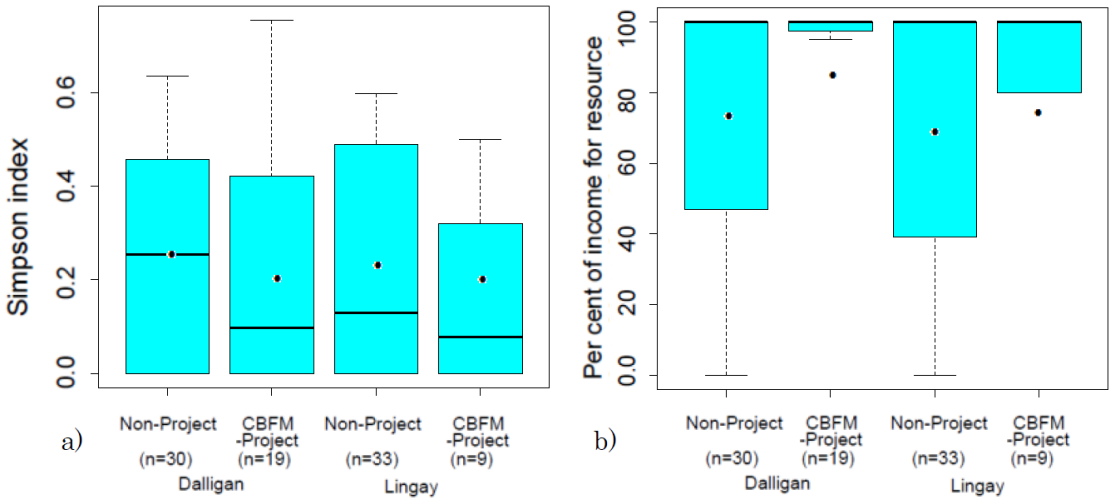


Figure 6-4. Economic capital in Dalligan and Lingay a) Income diversity, and b) Resource dependence

ii. Income dependence on local resource – withdrawn (in-farm including forest) and non-withdrawn resources (on-farm)

Barangay Dalligan and Lingay are characterized by high dependence on natural resources in income generation, but mostly through paid labor in the farms, which to some extent is a circulating money replacing former reciprocal work. In Dalligan, the percentage of income generated from local resources was 75.07 per cent for Non-Project group households, and 84.11 per cent for CBFM Project households.

In Lingay, income based on farms products and paid work in the farm Non-Project households was 68.03 per cent for Non-Project households, and 75.56 per cent for CBFM Project households(Figure 6.4b). Figure 6.5 presents income generation per source, for an average household in each group.

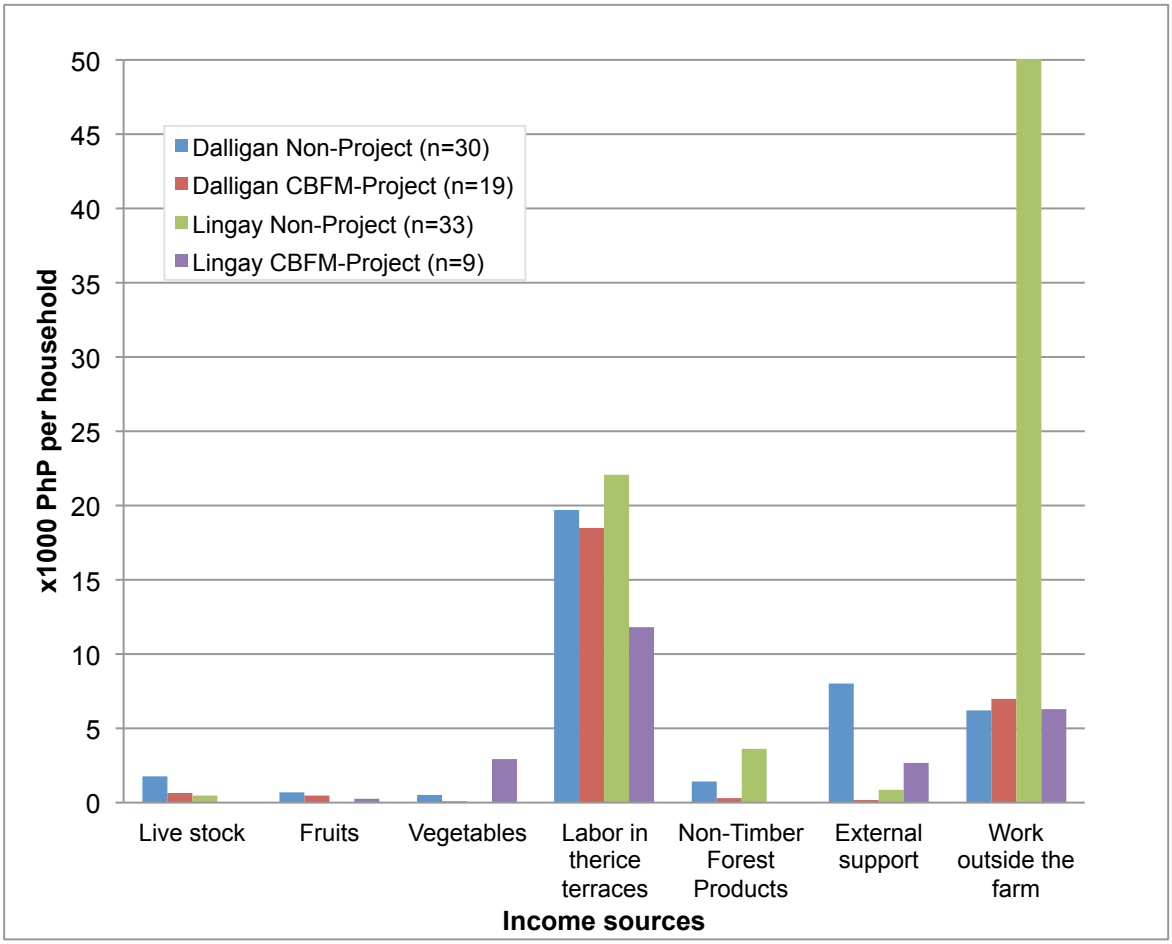


Figure 6-5Composition of household annual income

Note. 1000PHP~22.8USD in 2011 (Source: Bangko Sentral ng Pilipinas)

Income dependence on withdrawn resources, such as farm products and non-timber forest products in was found to be very low in both barangay, with no significant difference between CBFM Project and Non-Project groups. The major sources of income were labor and work outside the farm. Distribution is presented in Figure 6.6a.

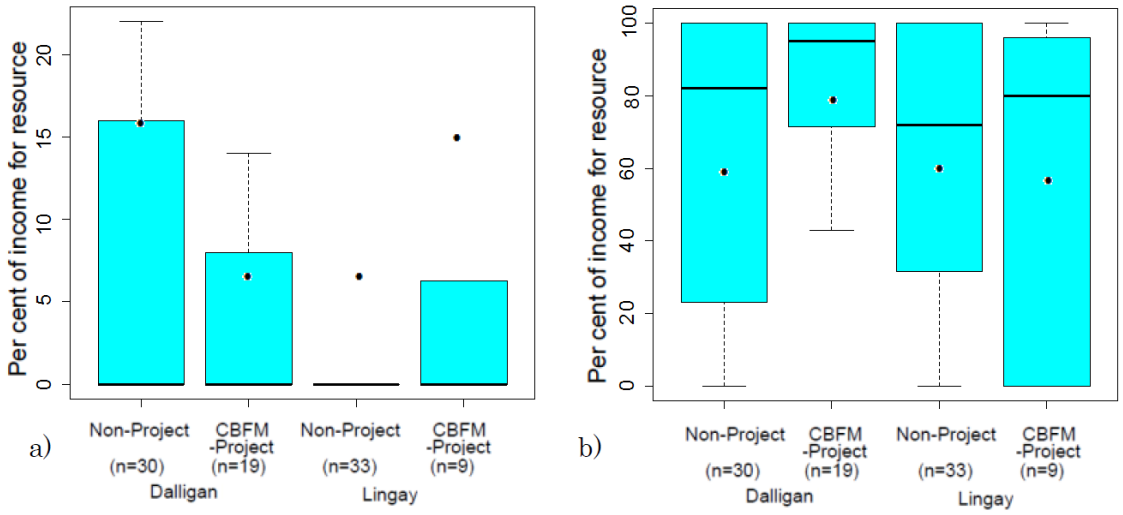


Figure 6-6. Financial dependence on a) withdrawn resources; and on b) non-withdrawn resources in Dalligan and Lingay, per households

In Dalligan, Non-Project households obtained 60.13 per cent of the total income from paid work in the farm on average, CBFM Project group households gained 78.05 per cent of the income form paid work in the farm on average (Figure 6.6b). In Lingay, Non-Project and CBFM household generated 61.88 per cent and 58.97 per cent of total income from paid labor work in the farm on average, respectively. The reason for labor work occupying a high percentage of the income was gradual replacement of reciprocal work on farms into pay-based labor.

Aggregated data on community income presented in Figure 6.7 demonstrated that in Dalligan labor work had the highest importance for income generation; in the Non-Project group the second most important source was external support, and the third one was work outside the farm. In Lingay, the most important source of income for the Non-Project group was work outside the farm, and the second one was labor work; in the CBFM group, labor work was the most important source of income, and the second one work outside the farm; ranked third was vegetable sale. External support also made a quite significant contribution into group income, in Dalligan this was the case for the Non-Project group, whereas in Lingay the CBFM project group received more external support than the Non-Project group.

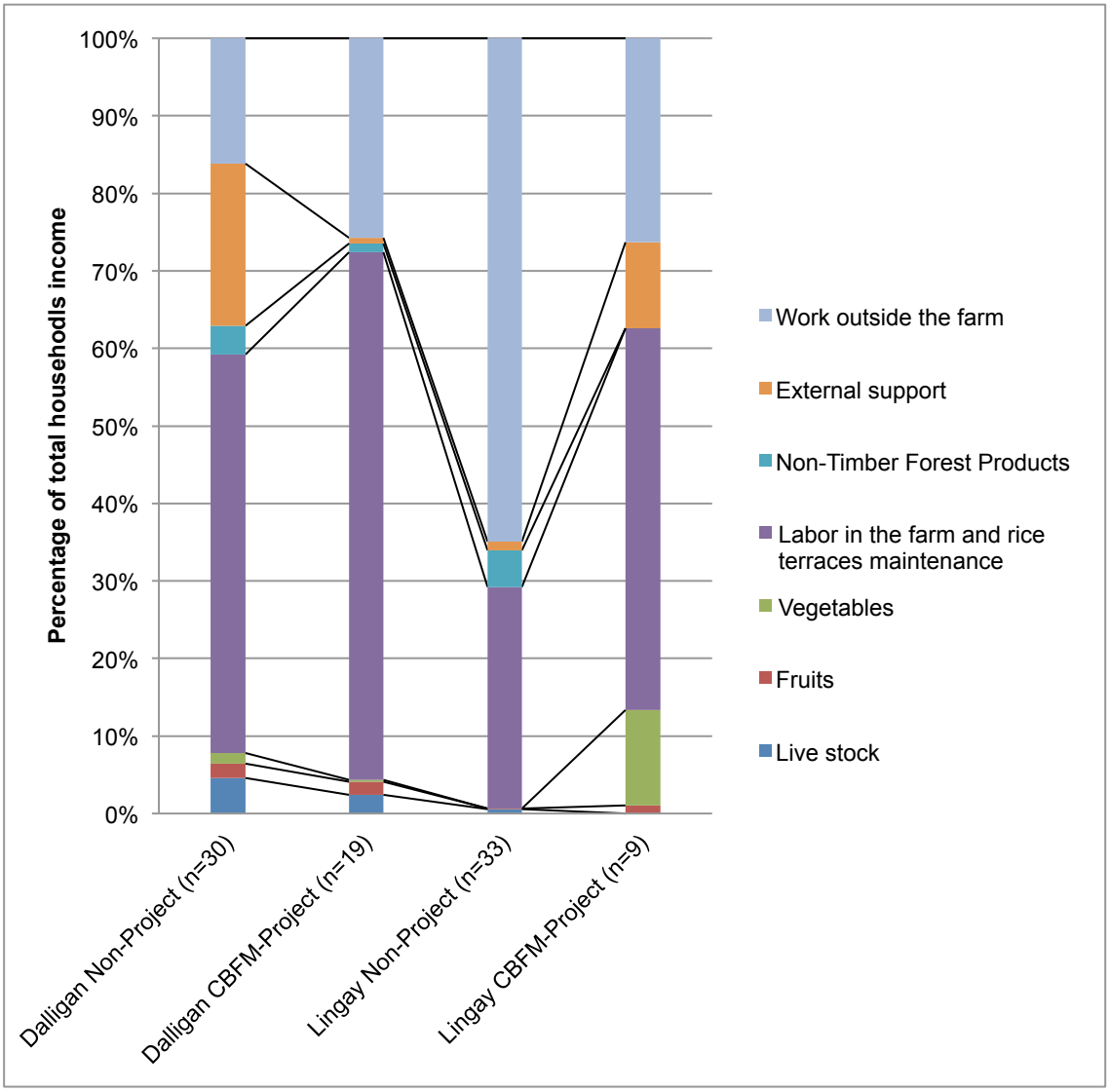


Figure 6-7. Total annual revenue per source in barangay Dalligan and Lingay

iii. Income level against poverty threshold and income satisfaction

None of the surveyed groups had an income level reaching the poverty line. However, two Non-Project groups in Dalligan and Lingay reached 67.28 and 80.55 per cent of the poverty line respectively. CBFM groups in Dalligan and Lingay were in higher poverty, reaching 27.23 and 34.90 per cent of recommended minimum income per person respectively. Figure 6.8a presents the values distribution.

In Dalligan and Lingay, respondents were divided into satisfied and unsatisfied with their financial situation, with higher dissatisfaction in the Non-Project group in Lingay, and equally divided into dissatisfied, uncertain and satisfied in the CBFM group

in Lingay.

The Non-Project group in Dalligan was most satisfied (Figure 6.8b).

iv. Equal income distribution

Equal income distribution, estimated by the GINI coefficient, was more even in Dalligan, where especially the The CBFM group had more equally distributed, with GINI coefficient 0.32, than Non-Project group, with GINI coefficient 0.43. In Lingay income distribution in the Non-Project group was the most uneven among all groups, estimated as 0.60 of GINI coefficient, and in the CBFM Project it was estimated as 0.41, a level similar to the Non-Project group in barangay Dalligan.

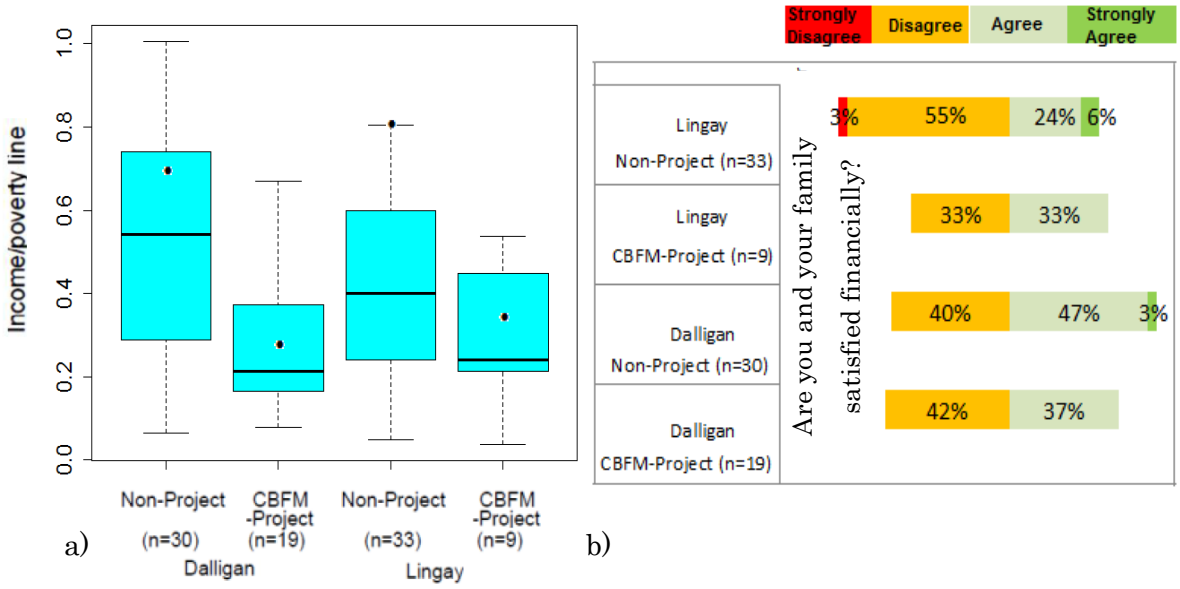


Figure 6-8. a) Income versus poverty line, and b) financial satisfaction in Dalligan and

Note: Neutral answers in b) are not projected in the graph

v. Housing quality

Houses in Kiangan are traditionally made of wood, standing above ground on four pillars, thatched with cogon grass (Conklin et al., 1980). In Dalligan the houses were still in common uses, but frequently these houses were modified by replacing

thatched roof with metal sheets, which requires investment in produced capital. In the Non-Project groups of Dalligan and Lingay, two thirds of the houses were still maintaining their traditional form, and one third are traditional houses with metal roofs, for the Non-Project group in Lingay 3 per cent of houses were one-storey concrete housing. On the other hand, in CBFM Project groups there was a noticeable higher share of houses which had metal roofs, compared to Non-Project groups, but no concrete house was found in the CBFM Project groups. However, metal roofs are more vulnerable to corrosion and the lifespan of such roofs is shorter than that of thatched roofs. Moreover, such roofing, changes the traditional landscape of Ifugao, just like concrete houses.

vi. Electricity access

Electricity access in barangays is high, in Dalligan 70 per cent of Non-Project households had access to electricity and even more, 84.21 per cent of CBFM households were using electric power; in Lingay 87.88 per cent of Non-Project households were connected to electric grid, but less CBFM households was connected, 77.78 per cent.

vii. Mobility (vehicle ownership)

Dalligan and Lingay are not connected by fully functional roads, and only in Lingay the road could be used by some vehicles during dry weather, but it only connected Lingay center with the main road. Therefore, in Dalligan no vehicle was reported to be owned by any of the households; in Lingay 9.1 per cent of Non-Project households owned a vehicle, and 11.11 per cent of CBFM households owned a vehicle. In both barangays there was no public transportation, and most of the journeys was done by hiking by foot.

Economic capital at Forest User Group level

i. Income to common budget

The CBFM group in both barangays, Dalligan and Lingay, were found to not maintain the budget of the organization anymore. Initially, the common budget was constituted by members' initial payments, and project funds, and it was maintained with

the project incomes.

ii. Deposits in the bank

In Lingay there were no deposits in the bank according to the chairperson, but the money's whereabouts was unknown to members since officials had changed and the new management was not working properly. Members were anxious about the savings of the group. In Dalligan there were savings on the account but it was unused by the group.

iii. Fixed assets

Only the CBFM group in Dalligan had their own fixed assets, the multi-purpose building; in Lingay there were no fixed assets of the group. In both barangays groups however had common access to barangay facilities, as well as well as barangay halls that can be used as multipurpose halls; churches, kindergartens, elementary schools (but with joined classes – one teacher was teaching two to three grades simultaneously, in both barangays). Moreover, in Lingay there was a small shop with narrow range of products, and it was located more distantly to households side of the barangay.

b. Socio-cultural capital

Socio-cultural capital at household level

A) Structural bridging and bonding social capital

i. Number and structure of individual cooperation networks

In Dallian and Lingay, The Non-Project group households were found to have more cooperation than CBFM Project group households. In Dalligan, on average Non-Project households were cooperating with 4.73 households, and CBFM Project households were cooperating with 3.53 households; in Lingay, on average Non-Project households cooperated with 4.55 households, and CBFM Project group households cooperated with 2.11 households.

Types of networks in both barangays indicated that in Dalligan the cooperation type diversity was higher and multi-cooperation is more common compared to households of CBFM-Project group. In the CBFM Project group more than 80 per cent

of the cooperation was based on rice farming, whereas in the Non-Project group only 30 per cent was accounted for as single cooperation rice farming based, having higher diversity in cooperation. In Lingay, results demonstrated the opposite situation, in which Non-Project households had approximately 50 per cent cooperation based on rice farming only, whereas in the CBFM Project group only one third was rice farming based, with the number of cooperations recorded (Appendix I). The structure of cooperation network, presented in Figure 6.9, was complete, enforced by multiple cooperation between households, but in both barangays cooperations were not related to CBFM.

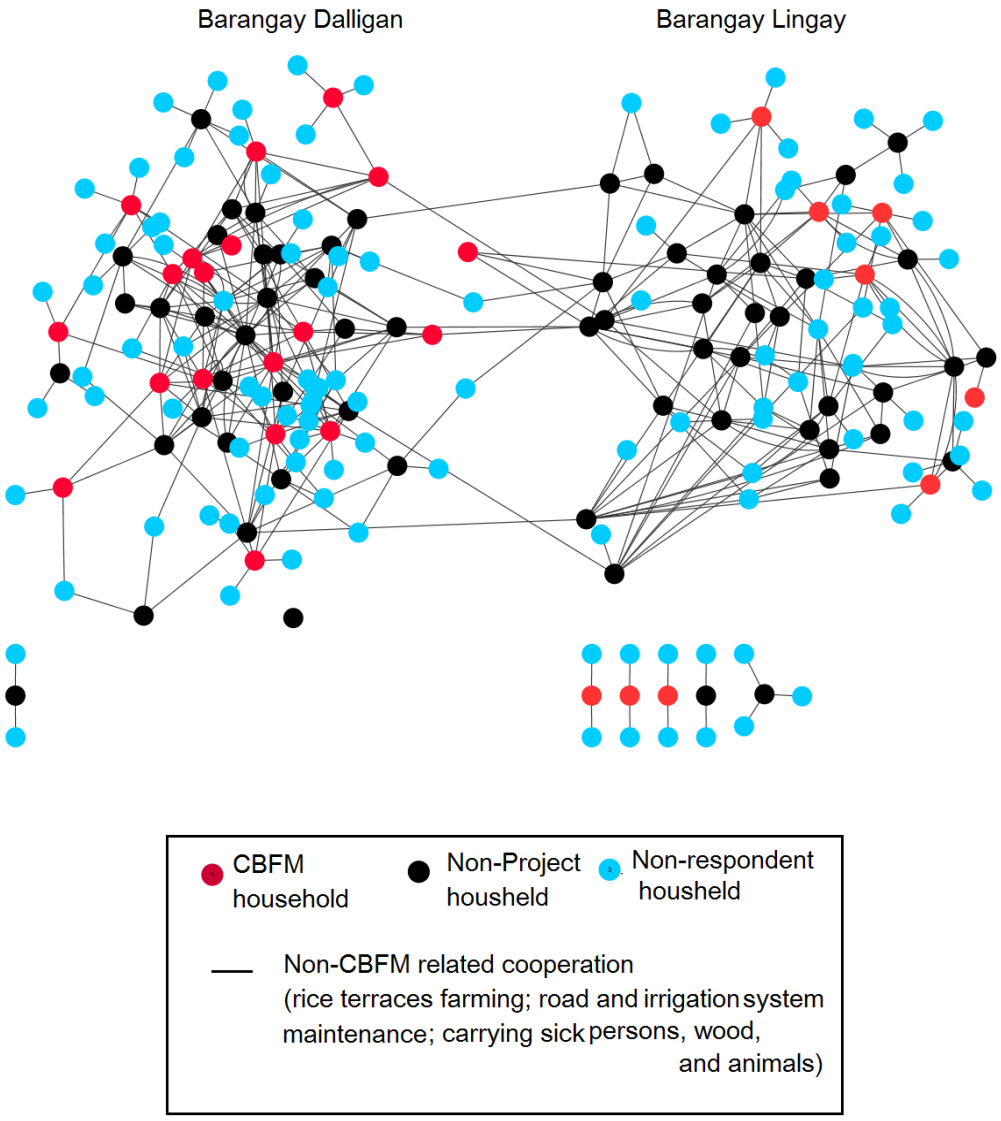


Figure 6-9. Network of cooperation between households in Dalligan and Lingay

ii. Social network in the community

ii. a) Reliable friends in time of need

Both Lingay and Dalligan respondents responded that they had friends they could count on (Figure 6.10a). In CBMF groups there were no respondents who did not agree; unlike in the Non-Project group where there were respondents who had no support from friends. In terms of certainty to have such friends, The CBFM group respondents in Dalligan were more certain than Non-Project group, by strongly agreeing with the statement, while in Lingay there was less certainty compared to Non-Project respondents. Friends in Dalligan and Lingay, in Non-Project and Project groups were related to general help when the there is a problem or to having good friendship.

ii. b) Interaction in community

Interaction in the community is important for creating bonds and social network were found to be weaker in Dalligan compared to Lingay (Figure 6.10b). In Dalligan lower level of interaction in the community was indicated for the CBFM Project group compared to the Non-Project group.

The type of responses from the CBFM Project groups indicated more of work between barangays instead; work in the barangay and within the cooperatives. Respondents of The Non-Project group instead related interactions to working together, so called *ubbu*, but also to community meetings. In both Non-Project and CBFM Project groups there were respondents claiming the presence of interactions in the barangay relied on the competence of the Barangay Chairperson who organizes meeting and communal work.

In Lingay, Non-Project respondents had richer interactions with the community compared to the CBFM Project group respondents. In the CBFM Project group, justification related to their strong responds was joining neighboring barangays in work, and local festivals.

B) Cognitive bridging and bonding social capital

iii. Degree of trust in:

iii. a) Local community

Trust to the community was found to be higher in barangay Lingay than in Dalligan; however, in both groups the CBFM Project groups indicated lower level of trust compared to Non-Project groups (Figure 6.10c).

In Dalligan CBFM Project group, those who strongly agreed to trust the neighboring community were justifying it with that the community can offer them help during calamities and other kinds of help, working together, kindness and peace. Respondent who just agreed upon trusting the community justified it by them receiving occasional help or some part of the barangay. No trust was motivated by only occasional help received and limited bonding.

In the CBFM group in Lingay, similar reasons for strong trust was pointed out, such as kindness and peace, but also help in the field without needing to pay for it (*"Helping each other without any payment"* ***32 years old female respondent, elementary incomplete***). When lesser trust was expressed, it was explained as there being a limited number of people who could be actually trusted or it was deemed a dependent on officials who maintained the community sense. Distrust was related to discontinuation of the CBFM organization.

of.

In the Non-Project group in Lingay, the expression of trust of respondents who strongly agreed or just agreed to the statement, was related to kindness and friendship, kinship, helpfulness and working together (*"Though help in ubbu, helping one another"* ***23 years old male respondent, college incomplete****; "They are very helpful in times of calamities"* ***30 years old male respondent, high school incomplete****; "Some of them are friends some are my relatives"* ***63 years old female respondent, elementary incomplete***).

iii. b) Forest User Group (CBFM Project group)

In both barangays the project group was criticized bythe Non-Project group respondents as well as those of the CBFM Project member group.

In the Dalligan, the CBFM group was trusted to a smaller extent than the CBFM group in Lingay (Figure 6.10e). Expressions of not trusting at all, the most critical opinion about the organization was related to lack of transparency regarding the money, even allegations of corruption; and to lack of progress. On the other hand, respondents who trusted the organization were very generic in their responses.

In CBFM group respondents who did not trust their own organization complained about the group being dysfunctional, not lasting long, conflicts, and that plans of DENR were not conducted by the officers of barangay and CBFM adequately, and it was corrupted. Those who were trustful appreciated the help that was given by CBFM, that the organization somehow was managed well, and that trees grew well.

In Lingay, there were respondents who were trusting their own group not being corrupted. CBFM members in Lingay who did not trust their own organization justified it with corruption happening in the organization; uncertain respondents had similar doubts. Trust on the other hand was related to help that was offered bythe organization during the implementation.

iv. *Feeling of being understood by:*

iv. a) Local community

The Question on feeling understood by the community, indicated that the CBFM group in Dalligan was feeling more understood by their community than Non-Project group, expressing a perception of reciprocal sharing (Figure 6.10d). In Lingay the CBFM group instead felt less understood by the community, than the Non-Project group. In overall, Lingay respondents expressed more reciprocal sharing perception than respondents in Dalligan.

The CBFM Project group in Dalligan was responding with a higher degree of certainty about feeling understood by the community than the Non-Project group, perceiving community as a ready to offer help, peaceful, well cooperating, and they felt as a part of the community. Those who did not feel understood by the community as a whole explained that it depends on the person, or that they did not feel comfortable in the community. Good understanding was perceived similarly towards the CBFM group by Non-Project group members.

The CBFM Project group in Lingay attributed their perception on feeling strongly understood by the community to collective work and sharing community ideas. Agreeing with the statement of trusting the community was related to peace in the community, gatherings, and help. In the Non-Project group members felt more understood by the community than the CBFM Project group with reasons similar to those given by the CBFM group members, additionally adding kinship in the tribe and

friendship in the community as justifications. Those who just agreed to the statement saying that they feel understood by the community had similar explanations.

iv. b) Forest User Group

This variable revealed that Lingay had more deficiencies in their own CBFM organization, than the CBFM Project group in Dalligan (Figure 6.10d). In the Dalligan CBFM those who claimed they are not sure whether the CBFM group was understanding them or they just did not feel understood by the CBFM gave lack of change and communication (*"There is no change"* ***32 years old female respondent, elementary incomplete****; "No communication to the officials"* ***31 years old female respondent, university graduate***) as justifications. Those members, who just answered "agree", felt somehow understood, as they were included in the meetings, and they commonly agreed upon plans, but some complained they should have been given crops instead of just trees and salary, and that fights and frictions sometimes arose.

In Lingay, those who did not feel understood by the organization felt the CBFM failed (*"Because organization did not last"* ***52 years old male respondent, elementary incomplete****; "It did not succeed"* ***32 years old male respondent, high school graduate***). Those who agreed felt that the CBFM helped them, for example by providing ginger for planting.

C) Cognitive linking social capital

v. Degree of trust in local government.

Trust to government in Dalligan was found to be higher among CBFM Project members than in the corresponding Non-Project group, whereas in Lingay the result was the opposite (Figure 6.10e).

In Dalligan respondents' trust was attributed to the money being already invested in the barangay.. The CBFM Project group in Dalligan pointed out the importance of leadership in the barangay the government had (e.g. *"They are the one who lead the community"* ***31 years old female respondent, college incomplete***).

In Lingay Non-Project members responded similarly to Dalligan, perceiving the government as a supporter and an institution implementing projects to the barangays, whereas in the CBFM Project group respondents trusted the government as an institution that leads the community, and provides support.

vi. *Feeling understood by local government*

In both barangays, trust in the community was found to be higher among CBFM Project group respondents than among Non-Project respondents (Figure 6.10f).

In the CBFM group in Dalligan who did not perceive the local government as trustworthy attributed it to lack of support, improvement and dialog with officials. Respondents who agreed with the description of the local government as an institution understanding their needs, perceived this through the help and support they received in form of projects and immediate help upon urgent need; but also through sharing same the ideas and goals. For Non-Project respondents who did not feel as the local government was trustworthy, the reason was lack of understanding of their needs, similarly to the concerns of the CBFM group elaborated above. Those respondents who did agree with feeling understood by the government were able to notice improvements, and direct help tending to their needs.

In the Lingay CBFM Project group's trust for the government was attributed to help provided, although limited; respondents also felt they were being listened to by getting invited to meetings. The Non-Project group perceived the local government as tending to their needs and providing support by implementing projects.

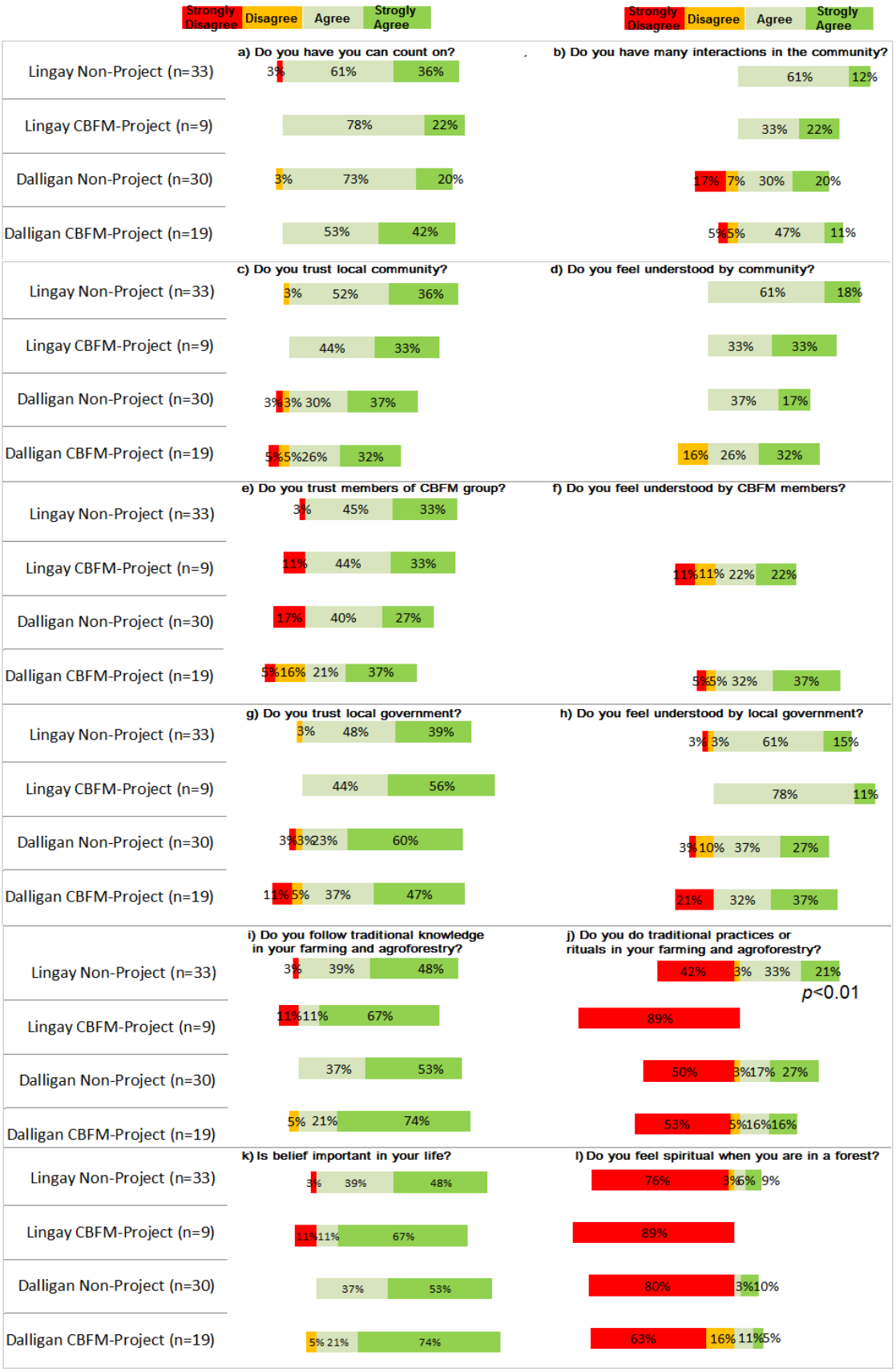


Figure 6-10. Socio-cultural capital in Dalligan and Lingay

Note: Neutral answers are not projected in the graph

D) Cultural capital

vii. Traditional knowledge/way of farming or modern farming

Use of traditional knowledge in Dalligan and Lingay was more common in CBFM Project groups than in Non-Project groups (Figure 6.10i).

In the Dalligan CBFM group not practicing traditional farming was related to need of new ways of farming. In the CBFM group respondents who continued their traditional way of farming perceived it as a method adapted to the conditions, and an insurance of good yield and safeness of crops (e.g. *"Because that is how our rice will grow"* ***36 years old male respondent, elementary incomplete;*** *"We plant on terraces so it is not easy to plant using machineries"* ***32 years old female respondent, high school incomplete****),* heritage from their ancestors, and it was and part of their life. The Non-Project group provided similar explanations. Additionally, not practicing traditional knowledge enabled planting unrestricted by the traditional cropping cycle, and use of modern methods.

In Lingay the CBFM Project group was most positive about continuance of traditional methods, as the only way they did know (e.g. *"Because we do not have any other knowledge in farming"* ***50 years old female respondent, elementary graduate***), efficient, and yielding rice (e.g. *"If not, we would not have grains"* ***37 years old male respondent, elementary incomplete)***. In the group there were no respondents who did not disagree with the statement. In the Non-Project group respondents who did not follow traditional planting were not conducting traditional rituals, or using herbicides.

viii. Traditional practices and rituals in farming

Traditional practices in farming, especially rituals, were more practiced in the Dalligan CBFM than in the Lingay CBFM (Figure 6.10j). In Lingay there was significant difference between the Non-Project group and the CBFM Project group ($p<0.01$), and the Non-Project group carried the practices more commonly.

CBFM Project group respondents in Dalligan who did not perform the rituals were attributing it to Christian religion, vanishing customs, lack of people who could perform it, and high cost. Respondents who still practiced the rituals believed in its importance in protecting plants and increasing the crop yield (*"[…]the plants will live longer and have better fruits"* ***31 years old male respondent, elementary incomplete****; "Rituals*

before planting are performed to boost production and protection for plants" ***32 years old female respondent, high school incomplete****; "So that the plants will not die"* ***32 years old female respondent, elementary incomplete***). The Non-Project group shared similar concerns and opinions.

In Lingay, CBFM Project households group had the least number of respondents who affirmed continuance of rituals. In the CBFM Project group and the Non-Project group not practicing rituals the reasons were the same as for groups in Dalligan. Non-Project group households where practices were conducted considered it as their legacy, and it was believed to increase crop yield, protecting plants, and bringing God's favors.

ix. Importance of belief in life

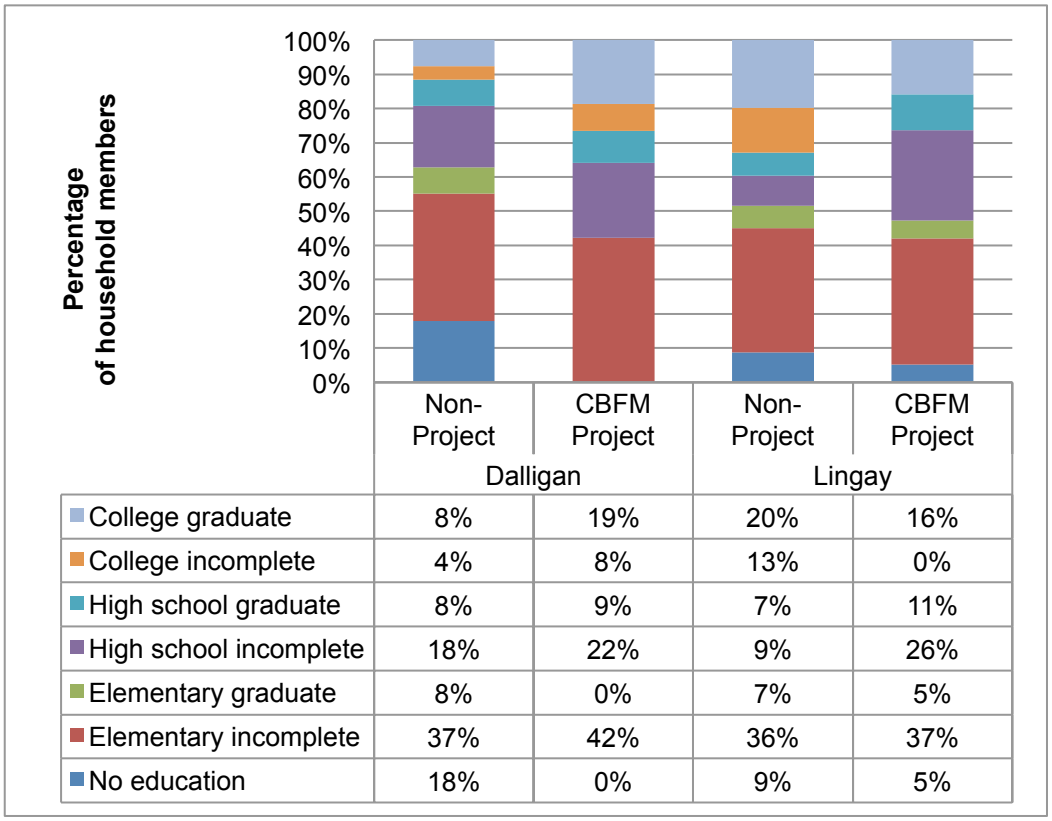
Importance of belief, regardless whether it was modern or traditional beliefs, was found to be high, with more certainty in answers in CBFM groups (Figure 6.10k).

x. Feeling spiritual in the forest

A feeling of spirituality in the forest was found to be low in both barangays, especially in Lingay, in where the CBFM groupwas found to not feel spiritual in the forest at all(Figure 6.10l). In both groups it was caused by Christianization of communities (e.g. *"Because they are gone now"* ***50 years old Lingay CBFM group female respondent, elementary graduate****; "We are Christians"* ***25 years old Dalligan CBFM Project female respondent, high school incomplete***). Respondents who felt spiritual claimed existence of gods in the forest (*"There are forest that full of goddess so when I go there I feel nervous"* ***24 years old male Dalligam CBFM group respondents, elementary incomplete****; "Sometimes I feel that my hair is standing"* ***61 years old male Dalligam CBFM group respondent, elementary incomplete;*** *("We pray especially when we are in the forest****" 40 years old male Lingay Non-Project respondent, college graduate***).

xi. Formal education level

Education is important for residents to maintain strong leadership, introduce new ideas, protect their own rights, and also for finding employment outside the farm in overpopulated villages or poverty-stricken places.



	Dalligan		Lingay	
	Non-Project	CBFM Project	Non-Project	CBFM Project
College graduate	8%	19%	20%	16%
College incomplete	4%	8%	13%	0%
High school graduate	8%	9%	7%	11%
High school incomplete	18%	22%	9%	26%
Elementary graduate	8%	0%	7%	5%
Elementary incomplete	37%	42%	36%	37%
No education	18%	0%	9%	5%

Figure 6-11. Education of all household members in Dalligan and Lingay (age 15 and above)

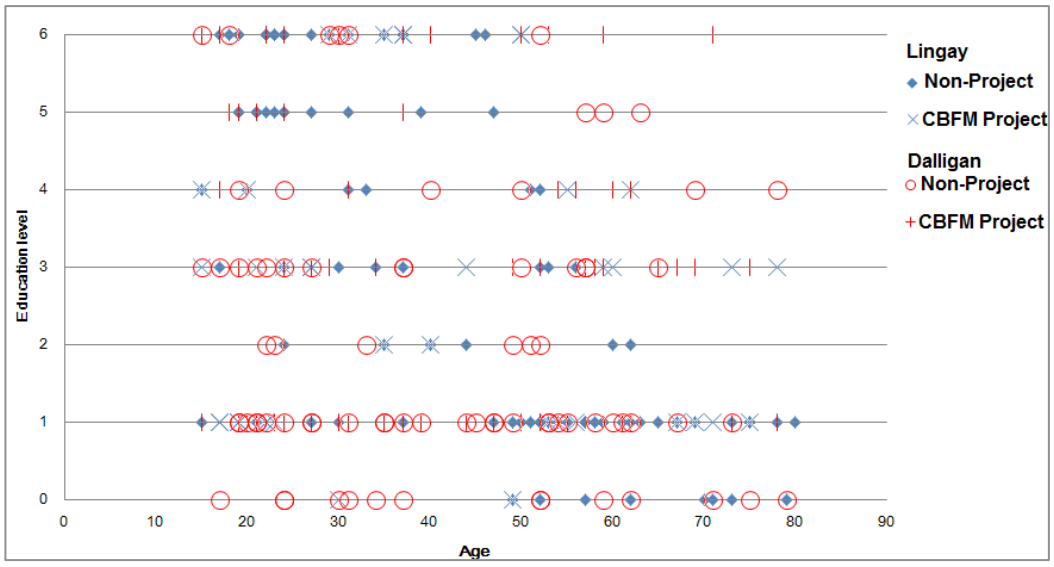


Figure 6-12. Trend of education, by age, in Dalligan Lingay and Dalligan (age 15 and above)

Note: Each household member marked by age and education; Education levels (y-axis): 0 – no education, 1- elementary incomplete, 2 – elementary graduate, 3 – high school incomplete, 4 – high school graduate, 5 – college incomplete, 6 – college graduate

In the Dalligan CBFM Project households had higher education in terms of level of education, In Lingay, a higher trend of education was observed tthe Non-Project group (Figure 6.11). In Dalligan and Lingay education was higher in the younger generation, but even this generation is composed of different levels of education, from basic literacy to college graduate (Figure 6.12).

Socio-cultural capital at Forest Users' Group level

A) Cognitive bonding social capital

i. Conflict resolution in the group

There were no conflict resolution rules set in the CBFM group, but there was a functioning peaceful Ifugao conflict resolution system. There was no present conflict withing CBFM groups or within the barangay community reported in interviews with informants orduring focus group discussions; however, during the CBFM implementation conflicts arose due to unequal benefit distribution, such as allocation of seedlings; and some of the people were trying to become more influential and closer to DENR representatives, and that issue was not resolved by the group at the time of the study.

ii. Monitoring and rules violation protection

Both CBFM Project groups did not continue monitoring of plantations and the entrance to the CBFM area. Moreover, monitoring of plantations was abandoned after the project fund was finished, due to the prioritization of farm work as being most necessary to provide immediate subsistence. There was no rules violation reported, and Ifugao indigenous system were still vibrant, built upon trust. Although it was not concerning the CBFM forest specifically, cutting wood and illegal logging was prohibited in the communal forest and these activies was reported by informants. In case people wanted to acquire timber for house construction or renovation, purchase from other's private forests or borrowing of wood took place. Forest and rice terraces were marked by owners with symbols; such "locks" were found to still be respected by residents, according to informants.

B) Structural Linking

iii. Cooperation with external institutions and companies

Both CBFM groups were found to have no external counterpart, aside from the local government, neither the barangay itself nor the CBFM Project group. Further, local municipality officers were rarely paying a visit to the place. DENR only attended seminar meetings during the implementation of the CBFM Project. Both barangays were supposed to be potentially included in the National Greening Program, according to a representative from the DENR in Lamut (Key Informant Interview, on February 1st, 2013); however, a follow-up interview with same informant (Key Informant Interview, on February 18th, 2015) disclosed that communities were never informed, and officers were not deployed to the barangays to disseminate the information and initiate the procedure. Another potential partner was the National Commission on Indigenous People which was found to not have connection with either of the groups; and none of the barangays did apply for issuance of CADT.

C) Cultural capital

iv. Trainings

The organization received training, in planting trees and farming during the implementation of CBFM. In 2005, there was training in entrepreneurship, cooperation of CBFM groups with DENR, and sustainable forest management practices to regulate wood cutting. In 2010, training on ginger production was conducted, but groups did not implement the production successfully.

c. Natural capital

Natural capital at household level

i. Land area

Land areas owned by respondents of CBFM Project group and the Non-Project group were found to be signifnicantly different, and higher among Non-Project respondents in Dalligan and Lingay (Appendix H). An average Dalligan Non-Project household owned 2.26 hectares, 0.80 hcectares per person, and in correspodning CBFM

Project group the corresponding figures were 0.82 (Figure 6.13a) and 0.15 hectares respectively. In Lingay, Non-Project group household owned 2.40 hectares of land on average, with 0.89 hectares per person, and in corresponding CBFM Project group the figures were 0.52 and 0.15 hectares respectively.

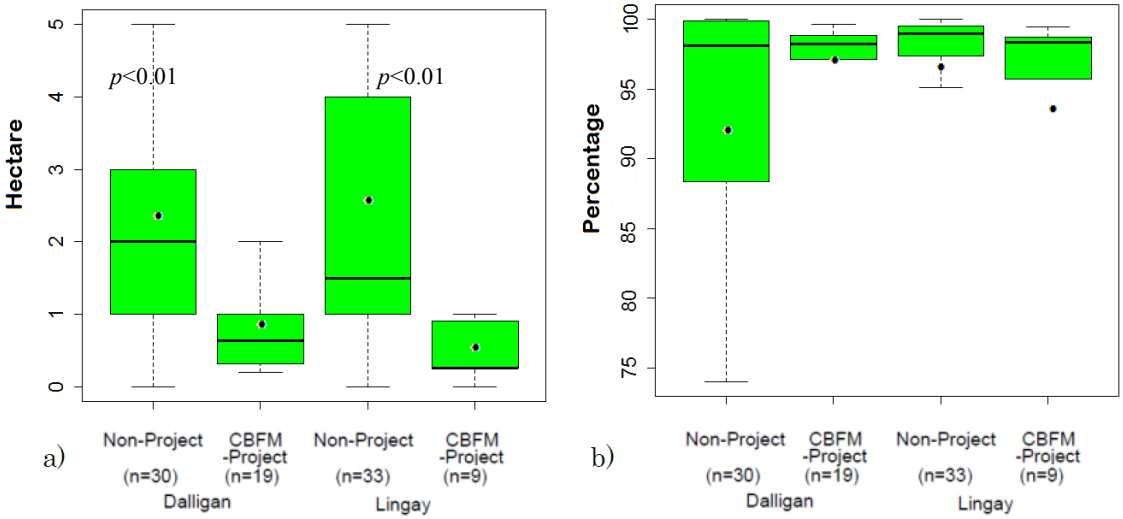


Figure 6-13. Natural capital: a) Land area of household, and b) Use of renewable energy

In both barangays, rice terraces with maintained water systems were found to be actually relatively small, in Dalligan, there was 25.9 hectares (3 per cent of total area of barangay) of rice terraces being maintained, 0.7 hectares of rice terraces used for other crops (0.1 per cent of total area of barangay), 10.8 hectares of abandoned rice terraces (1.3 per cent of total area of barangay), and 1 hectar of swidden farms (0.1 per cent of total area of barangay). Most of the agricultural land is located outisde the CBFM area, with same tendency in Lingay.

ii. Renewable energy

Renewable energy use in Dalligan and Lingay was very high; most of the energy consumed in the community was generated from burning firewood. However, electricity was also used, to a small extent. Occasionally, liquefied petroleum gas and gasoline used for own or rented vehicles were also used by residents. In Dalligan the average Non-Project group household used 92.17 per cent of renewable energy, and

CBFM Project households 96.93 per cent. In Lingay the values were ranging at a similar level; Project households used 93.26 per cent (Figure 6.13b).

iii. Livestock

Livestock was one of form of livelihood propagated by the CBFM program. Results of the survey demonstrates that CBFM Project households in Dalligan and Lingay were raising livestock more often than Non-Project groups (Table 6.2 and Figure 6.14), the difference was statistically significant. In the Dalligan CBFM group 89.5 per cent of surveyed households conducted animal husbandry with an average headcount of 13.26; in The Non-Project group 16.37 per cent of households kept livestock, with headcount of 2.6 in the average household (p<0.01). The most commonly kept animal in all groups was chicken (Table 6.2), which is necessary for consumption and for rituals. Only in Dalligan the number of pigs were higher, with greater numbers in the CBFM Project groups. Pigs are also important animals for ritual sacrifice and for consumption and sale. Water buffalo, which has high value and is used as a working animal was found in one household in The Non-Project group of Dalligan.

In Lingay, all CBFM Project households had 9.11 animals per household on average, 100 per cent of households kept animals, whereas 21.21 per cent of Non-Project households kept livestock, with the average household keeping 2.27 animals (p<0.01).

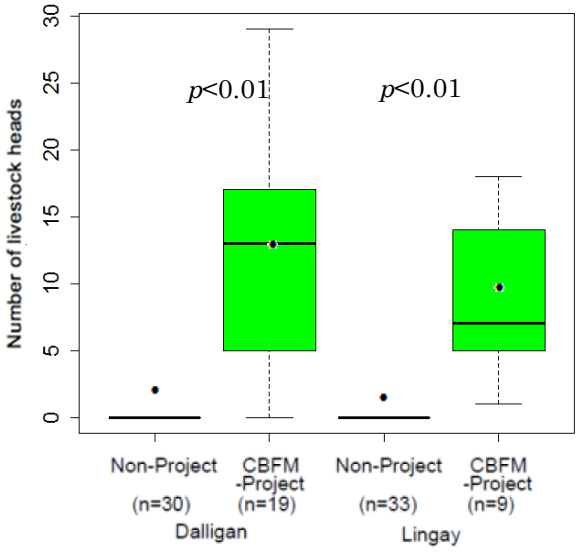


Figure 6-14. Livestock count per year

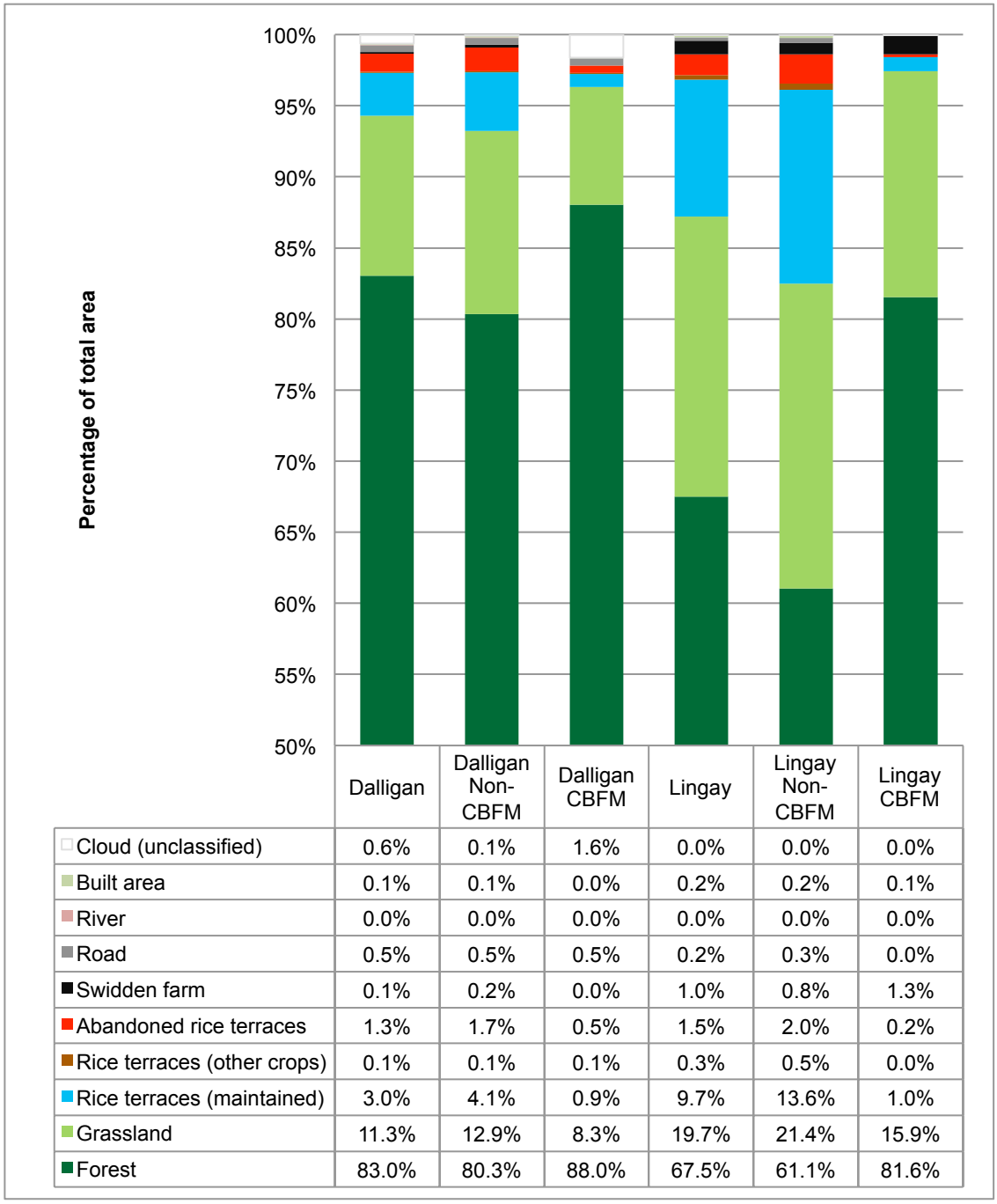
Table 6-2. Livestock specification of household in Dalligan and Lingay

Group	Dalligan		Lingay	
	Non-Project (n=30)	CBFM Project (n=19)	Non-Project (n=33)	CBFM Project (n=9)
Number and per cent of household keeping livestock				
	5 (16. 7%)	17 (89.5%)	7 (21.2%)	9 (100%)
Average number of head per household				
Water buffalo	0	0	0	0.00
Pig	0	0	0	0
Chicken	2	12	2	8
Duck	0	1	0	1
Total livestock	3	13	2	9

Natural capital at Forest User Group level

i. Forest cover and health

Forest cover in both barangays was found to be high (Figure 6.15 and 6.16) in Dalligan and Lingay, covering 83 and 67.5 per cent of the areas respectively; and in both barangays the share of the forest in CBFM areas was higher compared to non-CBFM areas. In Dalligan the CBFM area 88 per cent was covered by forest in, whereas the corresponsing non-CBFM area was covered by forest by 80.3 per cent. In Lingay the difference was higher;81.6 per cent of the CBFM area was covered by forest in, and the non-CBFM area by 61.1 per cent. However, the character of the CBFM focusing on areas needing reforestion, non-CBFM forest areas were originally devoted to agriculture. Also representative for change would be the area of grassland, which was smaller in CBFM areas, indicating that higher portions of land without forest vegetation was effectively reforested; in both barangays the grassland was found to be smaller on CBFM areas compared to non-CBFM areas.



	Dalligan	Dalligan Non-CBFM	Dalligan CBFM	Lingay	Lingay Non-CBFM	Lingay CBFM
Cloud (unclassified)	0.6%	0.1%	1.6%	0.0%	0.0%	0.0%
Built area	0.1%	0.1%	0.0%	0.2%	0.2%	0.1%
River	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Road	0.5%	0.5%	0.5%	0.2%	0.3%	0.0%
Swidden farm	0.1%	0.2%	0.0%	1.0%	0.8%	1.3%
Abandoned rice terraces	1.3%	1.7%	0.5%	1.5%	2.0%	0.2%
Rice terraces (other crops)	0.1%	0.1%	0.1%	0.3%	0.5%	0.0%
Rice terraces (maintained)	3.0%	4.1%	0.9%	9.7%	13.6%	1.0%
Grassland	11.3%	12.9%	8.3%	19.7%	21.4%	15.9%
Forest	83.0%	80.3%	88.0%	67.5%	61.1%	81.6%

Figure 6-15. Land use pattern of barangay Dalligan and Lingay

Note: The *x* axis begins with a value of 5 per cent

Normalized Difference Vegetation Index (NDVI) of non-agricultural land, namely forest and grassland, was found at the same levels in the CBFM project area and non-project area in Dalligan, but higher in the CBFM area than non-CBFM area in Lingay (Table 6.3).

Table 6-3. Normalized Difference Vegetation Index (NDVI) of non-agricultural land

	Dalligan			Lingay		
	Total	**Non-CBFM area**	**CBFM area**	**Total**	**Non-CBFM area**	**CBFM Area**
NDVI	0.40	0.40	0.40	0.36	0.36	0.38
(std. deviation)	(0.06)	(0.07)	(0.06)	(0.06)	(0.07)	(0.06)

Note: Analyzed in eCognition Developer 9, and ArcMap 10, based on high resolution images: Quick Bird-2: June 6, 2010

ii. Forest resource use rights

CBFM did not increase the actual rights to use the forest. It has only underlined the regulatory role of DER. People remained dependent on their private woodlots *myoung*. The most long-term benefit of CBFM to the group was seedlings planted on their private woodlots.

iii. Clearly defined boundaries of the forest and Forest resource use rights

CBFM forest had not very clearly set boundaries. Forest was planted on bare mountain sides and without clear ownership, only a few areas were clearly designated as communal areas of CBFM, covered with fruit trees, and trees for future timber harvesting. However, these plantations were abandoned. People did not regard CBFM areas as tenured from the government. CBFM was difficult to define due to multiple private forests between communal forests that could be defined as CBFM area. DENR did not have very clear maps of the plantation, and the CBFM area presented in Figure 6.35, had the boundary set upon consultation with the planning officer of the project and with the former leader of the group. In Lingay there was a conflict with neighboring barangay reported, about administrative location of the reforested area.

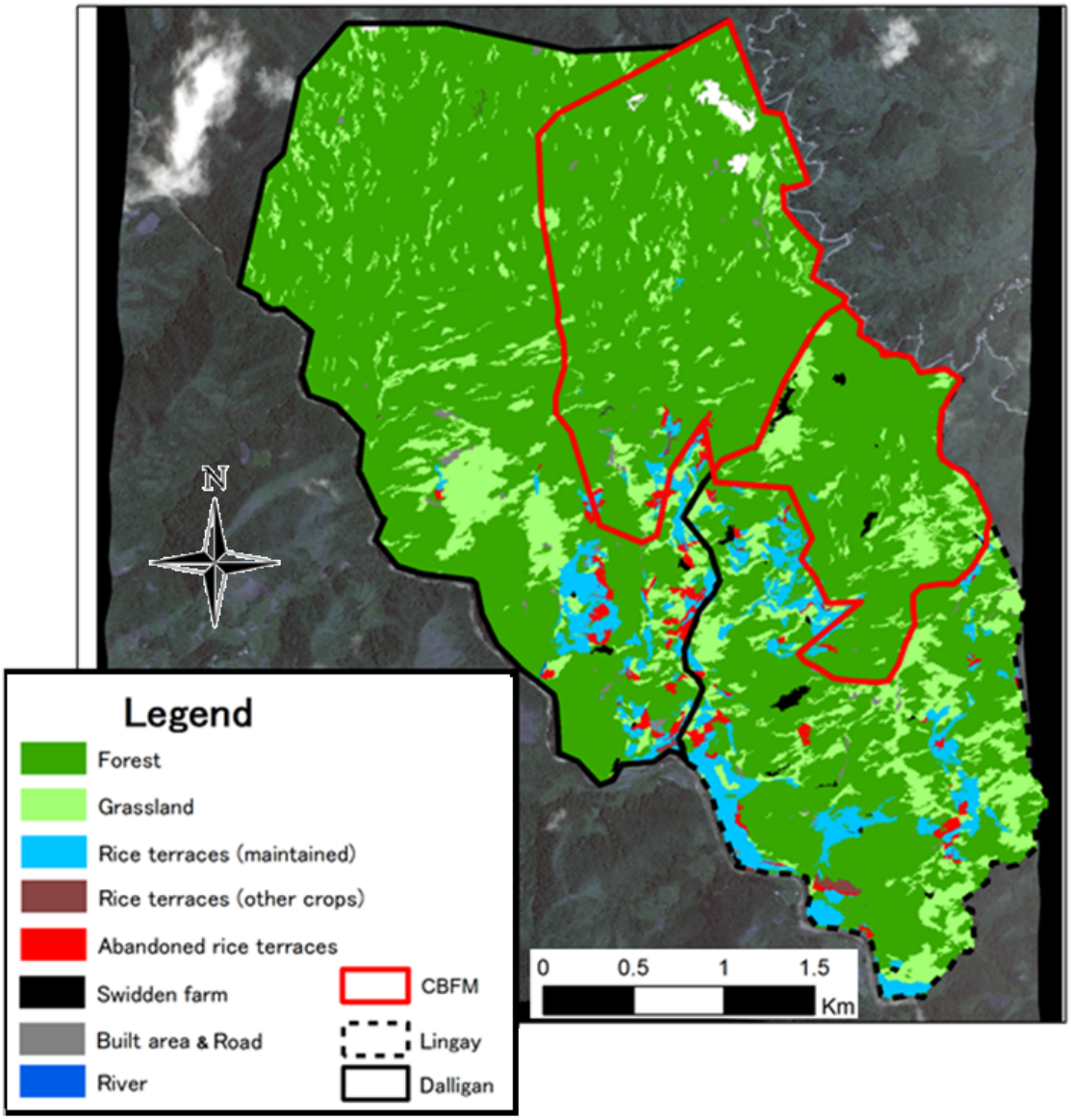


Figure 6-16. Land use mosaic of barangay Dalligan and Lingay

Note: Quick Bird-2: June 6, 2010, and WoldView-2: January 1, 2010

4) Capital interaction

Interaction of capital, based on correlation of significantly different indicators (Appendix J)in Dalligan and Lingay, are presented in Figure 6.17a and Figure 6.17b. In both barangays, Lingay and Dalligan, CBFM groups embraced livestock as a form of income generation, whereas the Non-Project groups had decreased income with increasing number of livestock and traditional practices. It was also evident that farmers of CBFM groups with larger areas had more traditional practices continued; traditional practices were also positively related to cooperation, and people who had more

cooperation indicated more reciprocal work, instead of paid labor in the rice terraces which was becoming more common. Lingay households did less cooperation with larger farms, whereas the non-CBFM group was able to utilize cooperation on the larger farms. Dalligan was more vibrant with cooperation, the CBFM group and the Non-Project group were creating more cooperation within a larger farm area. *r* coefficient values are included in Appendixes K and L.

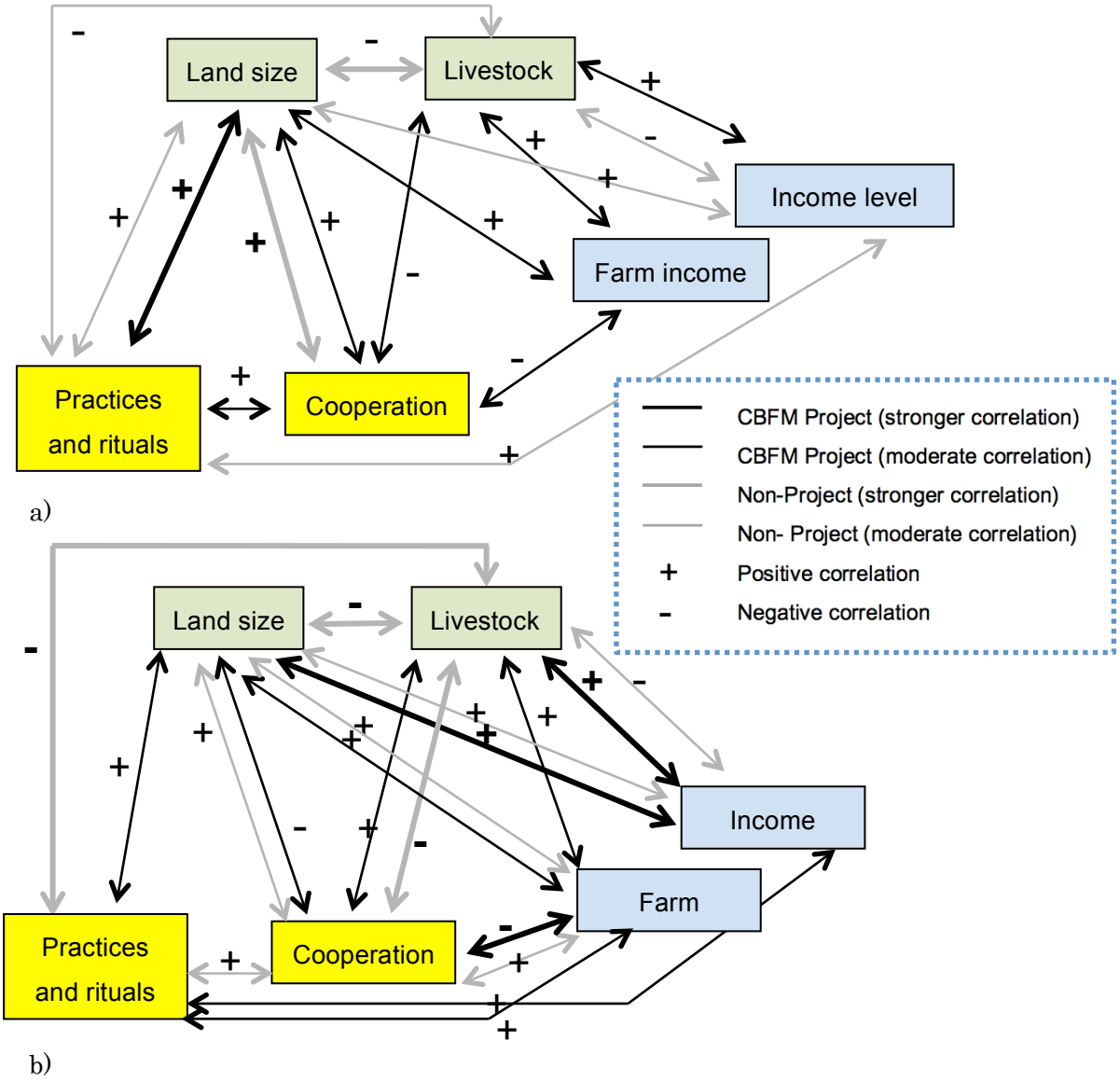


Figure 6-17. Correlation between significant variables, (a) in Dalligan, and (b) in Lingay

6.3 Case B. Sapang Bato

6.4 Barangay Sapang Bato

Barangay Sapang Bato is administratively located within Angeles City, Pampanga Province, and approximately 100km away from the capital, Metro Manila (Figure 6.18). Sapang Bato lies in close proximity to Mt. Pinatubo, a volcano which last erupted in 1991 (Figure 6.19).

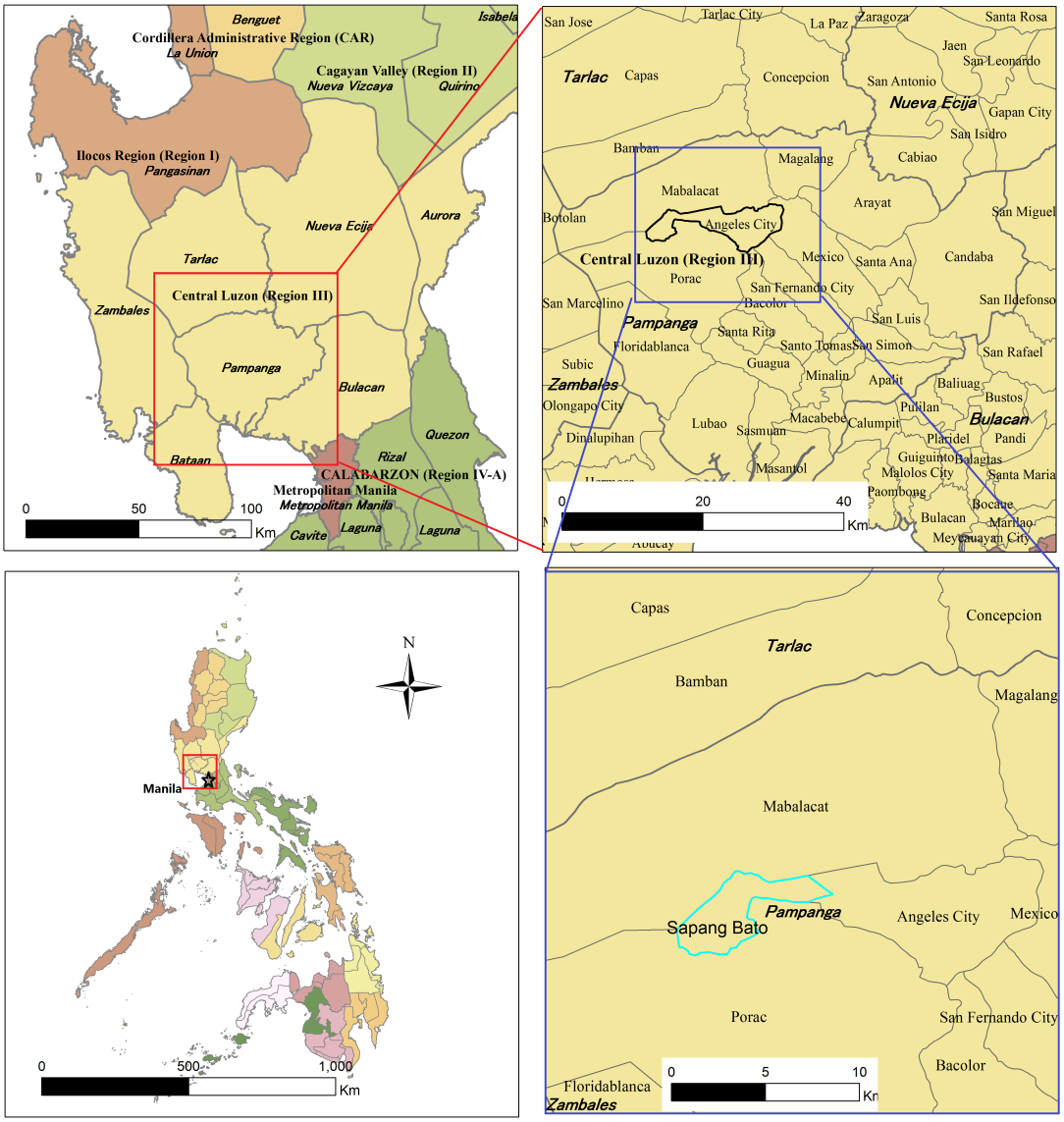


Figure 6-18. Location of barangay Sapang Bato

Source: Author's figure; boundaries sourced from http://philgis.org/

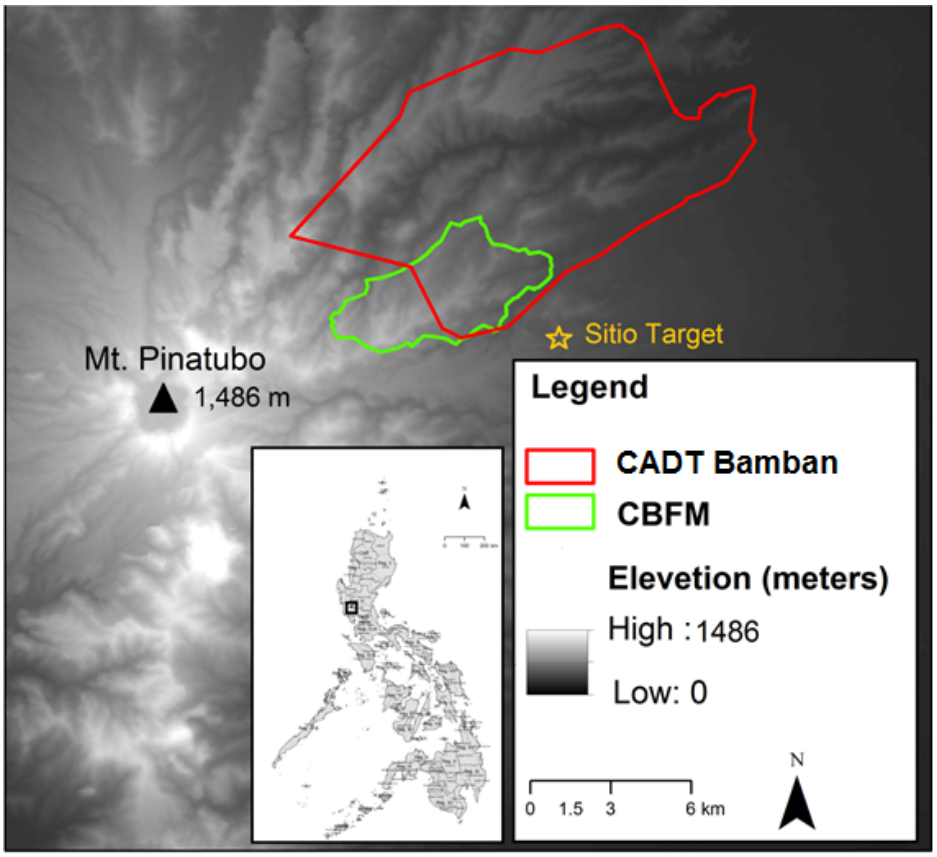


Figure 6-19. Location of Sitio Target in the range of Mt. Pinatubo volcano.

Note: CBFM area (source: DENR), and Certificate of Ancestral Domain Title (CADT) Bamban area (source: NCIP); elevation map from (Digital Elevation Model 90m; NASA)

Sapang Bato is on the northwest of Angeles near Clark International Airport and the Clark Freeport Zone, a former U.S. Air Force base; and Clark Special Economic Zone, nowadays a prosperous economic zone that attracts various foreign investors to establish tourist resorts, factories, and service providing enterprises.

Sapang Bato has a population of 11,262 people, with 2253 households. In Sapang Bato there are two nursery schools, two kindergartens, two elementary schools, and one high school. Health services are provided by one hospital, the barangay health center and one rural clinic[25].

The first inhabitants of Sapang Bato were the Aeta people, and they named the area. The Aeta people, still present in Barangay, are an indigenous semi-nomadic tribe, and the first group who inhabited the Philippine archipelago (Tan, 2008). The Aeta group is

[25] http://www.angelescity.gov.ph/city/barangay/sapangbato, consulted on June 1st, 2015

very distinctive due to its appearance, characterized by a small body structurewith sub-Saharan African features, including dark skin and fine curly hair (Allingham, 2008). The Aeta live in separate communitiesin the upland areas; in Sapang Bato the Aeta people live in Sitio[26] Target. The Aeta of Sitio Target and other neighboring municipalities were the ones who became contractors of CBFM.

6.4.1 CBFM in Sapang Bato – Target

The CBFM[27] was initiated in a top-down manner in 1998, first by the creation of the organization *Samahang Pangkalikasan at Pangkabuhayan ng Sapang-Bato*, Incorporated (SPPSI) with assistance of Saint Augustin SAMBALI Fund Inc, and an NGO contracted by DENR. Prior to the CBFM there was CADC[28] issued to the community. The membership of the SPPSI was comprised of 242 members, in which 95 per cent were Aeta. The project covered 2,176 hectares and 242 members in total. The project covered not only Barangay Sapang Bato (Sitio Target) but also three (3) other Sitios: Aduhan, in Marcos Village of Mabalacat, City Pampanga province; and the Sitios San Martin and Burog, in Bamban town, Tarlac province. The project site is a watershed under the administrative jurisdiction of Clark Development Corporation (CDC). The CBFM met opposition from CDC as allegedly the CBFM area was on the property of the company. As a resolution, in 2003 the CBMA was re-issued together with CDC. For the first five (5) years, 1998 – 2003, the CBFM was running a 5-year Sapangbato Watershed Rehabilitation Subproject, which was also an incentive to start the CBFM itself, as the project came with funding from the Philippine Government through a loan from the Overseas Economic Cooperation Fund of the Japanese Government. The project aimed for reforestation of deforested lands, agroforestry, the planting of roadside greenbelts, riverbank stabilization, infrastructure (bridge construction), livelihood projects (pig raising) and promotion of socio-economic development of communities through forest resources. After project completion, in 2004, the SPPSI was included into Enhancement of Community-Based Forest Management Program (E-CBFM) of JICA and DENR. The objective of the project was to conserve, rehabilitate, and sustainability utilize forest and land resources of the CBFM area. In the interim, in 2004 the Aeta tribe applied for issuance of CADT as well,

[26] A sitio is a sub-unit of a barangay (village)
[27] CBFMA No. 030402016
[28] CADC No. RO3-CADC-107

that was awarded to the Bamban Aeta Tribal Association, Inc. in Bamban in 2008. It covered 10,684.25 hectares. The CADT formerly issued in 1997 was replaced by the CADC . CADT, unlike CADC, is contradictive to CBFMA because of different nature of ownership. As a result, the JICA project was stopped in 2007, as the land rights conflict arose. GIS maps (Figure 6.44) reveal that the larger half of the CBFM area (61 per cent) was covered by CADT. There CADC was issued by DENR, as well as CBFMA. A Key Informant Interview in the Central National Commission on Indigenous Peoples office on August 30, 2013, revealed that there is no coordination or contact between the offices of DENR and the National Commission on Indigenous Peoples, and projects are implemented without acknowledging each other, and both offices have conflicted view on resource use. A similar conlusion was drawn during a key informant interview at Central DENR, Quezon City, on February 8, 2013.

As described above SPPSI was a larger organization spanning over four sitios. The one located in Sapang Bato was Sitio Target. Sitio Target accounted for 89 members out of total 242 members of SPPSI. Sitio Target has a population of 717 people, with 151 households, in which 119 are Aeta households; 32 households were non-Aeta migrants to the community, according to local census as for October 2011 (Target, 2012). The Sitio was not located on the project site but in a close proximity, 2km away.

At a Key Informant Interview with community leader conducted on February 10, 2013, people revealed reasons why Target and other Aeta in Sapang Bato joined CBFM Project: *"We wanted to reforest and re-populate mountains with birds and other animals to Aetas' neighborhood, for our benefit. Before Pinatubo eruption there was no need to go far to hunt wild pig, wild chicken. We also wanted to restore the rivers".* It took over three months To get into agreement with DENR. People were afraid that DENR wanted to corrupt the land and trees. *"We agreed on the project with understanding that whatever plants we plant, will be used by us, Aeta. They [DENR] made the contract clear for us. After the contract is signed we will still be owners of the land."*

6.4.2 Social-ecological context of Target

Fields where Aeta had their crops were located in the mountains, and according to interviews it was taking around three hours travel by foot to get to their fields (Picture 6.3a). Because of the long distant to the fields, people very often stayed in a

shed in the mountains for a few consecutive days, up to one week. Sometimes the long period of rain made the people unable to travel to the mountain (Picture 6.3b). Traditionally, whole families do work in the farm. Some farmers make charcoal in order to diversify their income, especially during the dry season when their farm is unproductive. The mountain is also a source of firewood which is used for everyday cooking (Picture 6.4a). Stoves are made of a simple three-stone stand which the pot or kettles is placed on top of(Picture 6.4b). After being fetched from the mountains to the sitio, fruits, vegetables, tubers, and charcoal are sold to an intermediating agent coming with a vehicle (Pictures 6.5a and 6.5b). Lack of vehicles was also limiting the opportunity for people to earn more from their products: *"We have to carry our products to Sapang Bato, if we have money for the fare we can take tricycle. Sometimes middlemen come to the village and buy the produce but they give very low price, that's why some of us prefer to sell our products in the market" (Focus group Discussion, 10.02.2013).*

A number of local Aeta also found employment in a spa resort located in the mountains and a restaurant in Sitio itself (Picture 6.6a and 6.6b). The Aeta worked as massagers, waiters, guides, drivers, and guards. The resort was established in 2005 by a Korean investor, by initiative of the Department of Tourism. According to the management of the office, approximately 50 people from Sitio were hired, and in the high season there was from one to two hundreds of visitors daily, mostly foreign (Key Informant Interview with the management of Spa Resort, December 29, 2011). However, the spa resort was not an important part of the community for respondents of the CBFM group , who keep on farming: *"The Spa resort is not important for us. Even if we have chance to work in the spa, whatever we earn is not good enough for our needs. If I work in the spa resort income support is important for me, but if I don't work in the spa the income support is not necessary for me. Even if we have our sources of income, prices are high, like sugar, so we are not satisfied with our income" (Focus group Discussion, February 10, 2013).* Moreover, some local farmers found there is a market for fruits and vegetables, as well as for handicrafts in the form of bracelets, necklaces, and flutes. *"We make beadworks, flute, and water flute toys. We make bows and arrows, but we don't sell them, unless someone orders them. The resort buys some of our products like papayas and bananas" (Focus group Discussion, February 10, 2013).*

Picture 6-3. Farming in the CBFM area (a) trip to the farmland and (b) temporary sheds

Picture 6-4. Selling of farm and forest products (a) carrying harvest; (b) middleman buyer

Picture 6-5. Firewood (a) carrying from the mountain, and (b) firewood using stove

Picture 6-6. Spa-resort (a) restaurant part inside Target and (b) spa in the mountains

6.4.3 Resilience assessment

1) Past to present – changes of Sapang Bato – Target

In the 1960's and 1970's only six houses of the Aeta people were in what is currently the Target village, which was mostly composed of buildings belonging to the American army, who had a base in the area. In fact, the village of Target used to be an area where the American military conducted practice shooting, which is at the origins of the village's name - Target. At the time the Aeta were semi-nomadic, and their population was spread over the adjacent mountain fields. Houses were constructed using traditional materials, with walls made of bamboo, and roofs thatched with cogon grass. In 1990, a year before Mt. Pinatubo eruption, a map drawn during a community mapping workshop depicted already 50 houses at the current location of Target. Residents were mostly Aetas, with some people coming from outside the community. The community had a communal farm (present till now). The road through the settlement had a different layout to the current one. Some areas adjacent to the settlement were not owned by the Aeta people but a private company, which created a problem of land access for the Aeta. At that time the surrounding forest was in very good condition, which was used for hunting and food gathering by local people. Work in the forest and farms (mostly shifting cultivation type farms) was facilitated by cooperation among community members, who planted mostly corn and yum. A culture of common use of resources was still deeply rooted in people's mind, thus, anything grown in the mountains was considered as common goods. At that time the main source of water was a spring in the mountains, which was fetched and transported via water tanks to the village. During this time the Aeta people also started converting from their tribal beliefs to Christianity through the work of a local Baptist church.

In Target the critical event that has marked the Aeta people was the eruption of Mt. Pinatubo in 1991. The volcanic eruption caused a temporary evacuation of the inhabitants of the area, after which people had to re-start their lives, rebuild their houses and recover farms. In the village, 50 houses were built by a private foundation. Target also gained an elementary school. Water, instead of being transported from the spring in the mountains, started to come from artesian wells perforated in the community and

then transported to the houses in water tanks (though it appears that such water occasionally caused sickness amongst residents). A new road through the place was laid, with other houses being built in the traditional way. However, the new road was not paved, making transportation difficult. In the new Target, the previous church was replaced by a Born Again church, funded by Korean donors, which became very influential in the group, bringing new facilities, and actively promoting Christianity in the community, causing a further decrease in tribal beliefs. Communal farms and the rough roads that connected them continued to be used in the same way, though in 2004, a spa resort was built in the mountains, together with a restaurant (which opened in Target itself). The spa and the restaurant became places where local residents could obtain permanent employment, reducing participation in communal and individual farming.

The CBFM Project provided support to plant trees after the volcanic eruption, and thus nowadays there are more trees than after the disaster. However, trees are still rather young compared to the natural thick forest before the disaster. Land ownership also changed from communal ownership, in which people could change their farm location in the process of shifting cultivation, to permanent occupation of specific areas. The decision to change the land ownership was taken by community elders to protect their land from outsiders, who began acquiring land titles. Despite the changed mode of land ownership, Aeta people can still lease land among themselves if needed. Also, the cultural custom of sharing crops and fruits with anybody who wants to eat is still present, and such cultural values have been passed to the younger generation, according to the participants of the workshop. In 2007 the community was awarded with CADT. CADT area did not cover the village of Target or its adjacent area, but the mountainous area where most of the Aeta's farms are located.

The outcome of the mapping exercise in Target is presented in Appendix M.

Additional comments that came from Focus Group Discussion (February 10, 2013) provide explanation of the chaos after volcano eruption and of how their land was taken: *"Migrants do not own the land but Aeta, but migrants use it if they take it. Before Pinatubo erupted these land was owned by Aeta, but after the eruption we were evacuated and when we came back after some time, what had happen, was a sort of*

chaos, where some migrants already owned some land. Eventually migrants took the land here. Aeta didn't know where the land really was [land was covered by thick layer of ash]. CDC bought land from those who took the land."

Moreover, during the discussion, respondents explained how their diet pattern has changed from tubers grown in the mountains and hunted meat, to a more mixed one, composed of purchased rice and some meat, bought with money from sales of tuber and others crops: *"We are not content with the pricing of our products. Most of the time the price is fine as long as we can sell all products. Sometimes we are able to buy enough rice to replace kamote [sweet potato] or kamote kahoy [cassava]. In the morning and evening we eat rice, at noon sweet potato or cassava. (...) Our children don't want to eat kamote anymore, but our ancestors used to eat kamote, now we rice most of the time. (...) Most of the time the food we eat is from outside, especially meat and rice. (...) We still have traditional hunting but only few men still do it"* (Focus Group Discussion, February 10, 2013).

2) Impacts and challenges in Sapang Bato – Target

Key Informant Interview with community leader conducted on August 10, 2011, revealed problems in the community. The first was the limitation of potable water; out of seven wells in the community, only two give saf water, and still occurrence of sickness was taking place. Moreover, the lack of proper roads made access to the community very limited, access to schools and clinics from the community was difficult as well. There was no ambulance, and only irregular, costly private vehicles were available. Regarding their farms, their fields were located in the mountains ata long distance from the village, , and access to there was especially difficult during rain periods.

The problems that Target is struggling with are mainly related to the malnourishment of children, sanitary and waste facilities in the houses and village, access to post-elementary education, and peace and order in the village. Since Aeta begun working together with non-Aeta residents in the resort, many of young men started drinking in the evening, causing sporadic troubles. Additional comments on the issues provided Focus Group Discussion (February 10, 2013): *"Migrant people have problems with themselves, drinking too much, too noisy at night, and some Aeta are getting in troubles with them"*.

Hierarchical list of problems

① Malnourishment
② Lack of toilet
③ Access to education
④ Solid waste management
⑤ Noise and drinking

3) Tri-capital assessment of Sapang Bato - Target

a. Economic capital

Economic capital at household level

i. Income diversity

No difference in income diversity was found in between the Project and Non-Project groups. The mean household income diversity was 0.44 on average for both groups. The distribution of income diversity of households is presented in Figure 6.20a, indicating that median values of income diversity were even lower in the CBFM Project group. Most of the income generated by individual households was sourced in the local ecotourism (spa resort) for both groups (Figure 6.21).

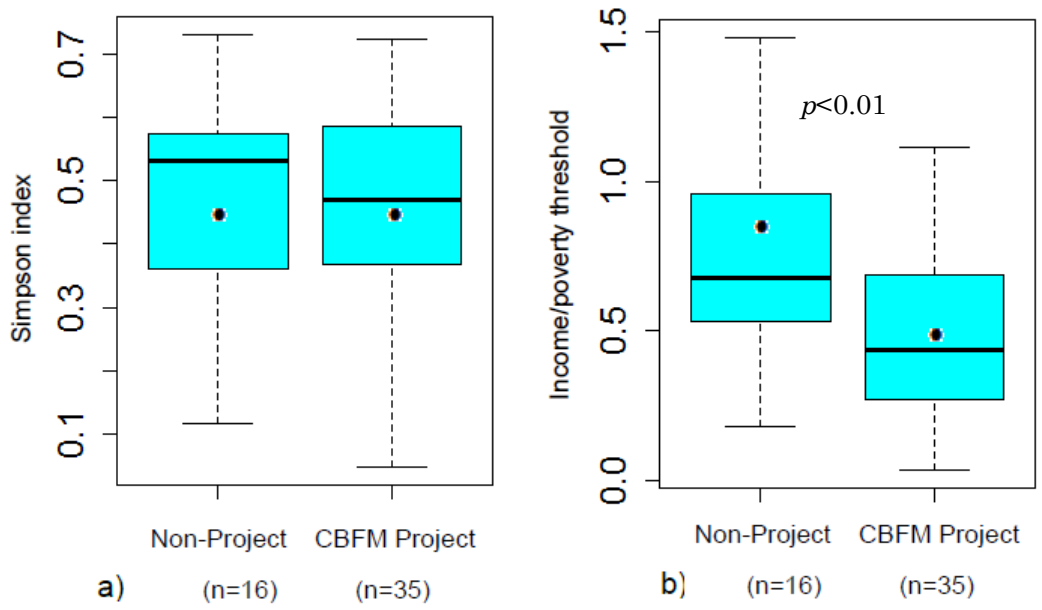


Figure 6-20. Financial capital in Target: (a) Income diversity, and (b) Income level against poverty threshold

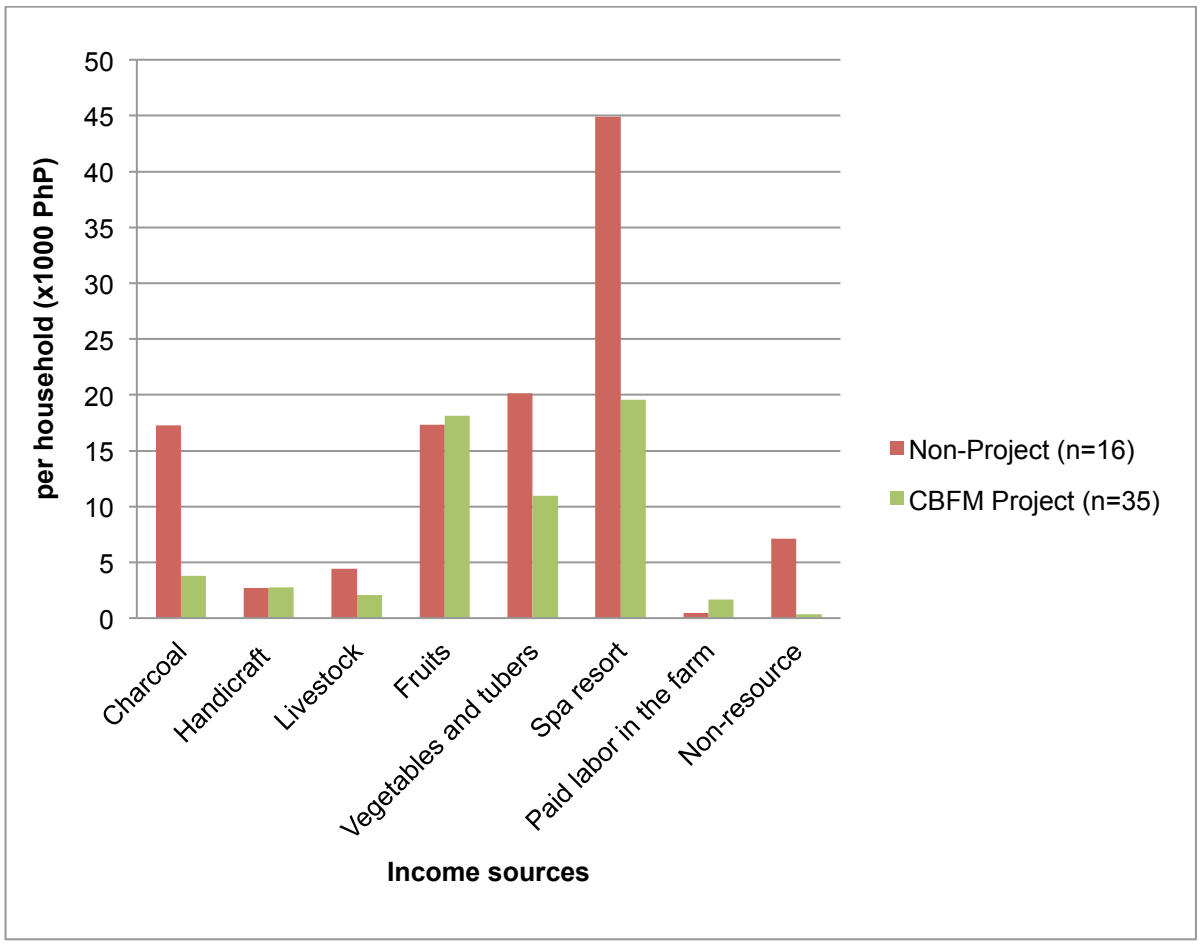


Figure 6-21. Composition of household annual income in Target

Note: 1000PHP~22.8USD in 2011 (Source: Bangko Sentral ng Pilipinas)

ii. Income dependence on local resource – withdrawn (in-farm including forest) and non-withdrawn resources (on-farm)

Non-Project and CBFM Project groups were found to be highly dependent on local resources, with mean values of 85 per cent and 98 per cent respectively; however median values of both groups were close to 100 per cent indicating more outliers in the The Non-Project group not being dependent on resource (Figure 6.22a). In terms of dependence on income from direct resource use, such as income from farm and forest product, CBFM Project groups´ reliance was at 69 per cent, as average per household, and Non-Project groups had a 43 per cent reliance on such income (Figure 6.22b). Dependence on direct resource withdrawal was found significantly different between the CBFM Project group and the Non-Project group (p=0.02). The indirect income flow coming from natural resources (ecotourism through employment in local spa resort, and labor in a farm) that was not generated from withdrawn resources, compared to total household income (percentage ratio) is presented in Figure 6.22c); on average, income of households from CBFM Project group consisted of 29 per cent, for Non-Project group 42 per cent.

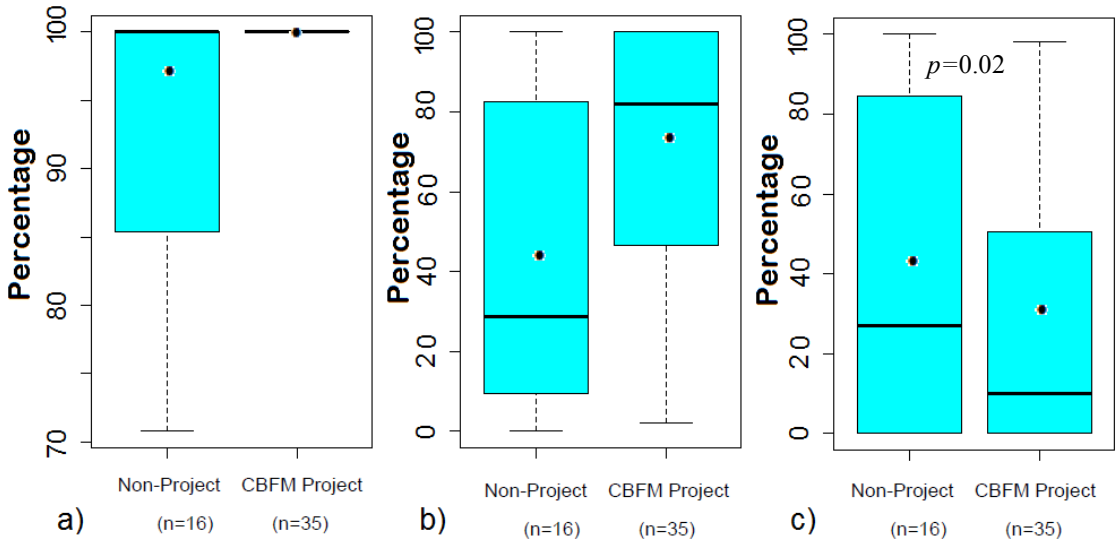


Figure 6-22. Households' financial dependence on (a) local resources; (b) directly withdrawn resources (in-farm and non-timber products), and on (c) non-withdrawn resources (on-farm), such as eco-tourism, in Target

Figure 6.23 presents the share of income from each type of source of the total accumulated income for each group of respondents (Figure 6.21 presents average

amount per source per household, in local currency unit, for reference). In the aggregated data, each group generated the highest share of their incomes from eco-tourism (spa resort), in the CBFM Project group the figure was 33 per cent, and in the Non-Project group 39 per cent. The second and third largest sources of income was sale of fruits, vegetables and tubers in the CBFM group, and sale of vegetables, fruits and charcoal in the Non-Project group. Income not related to local resources played a minor role, and the Non-Project group was able to generate more income from non-resource related income, especially through local store ownership (Figure 6.24).

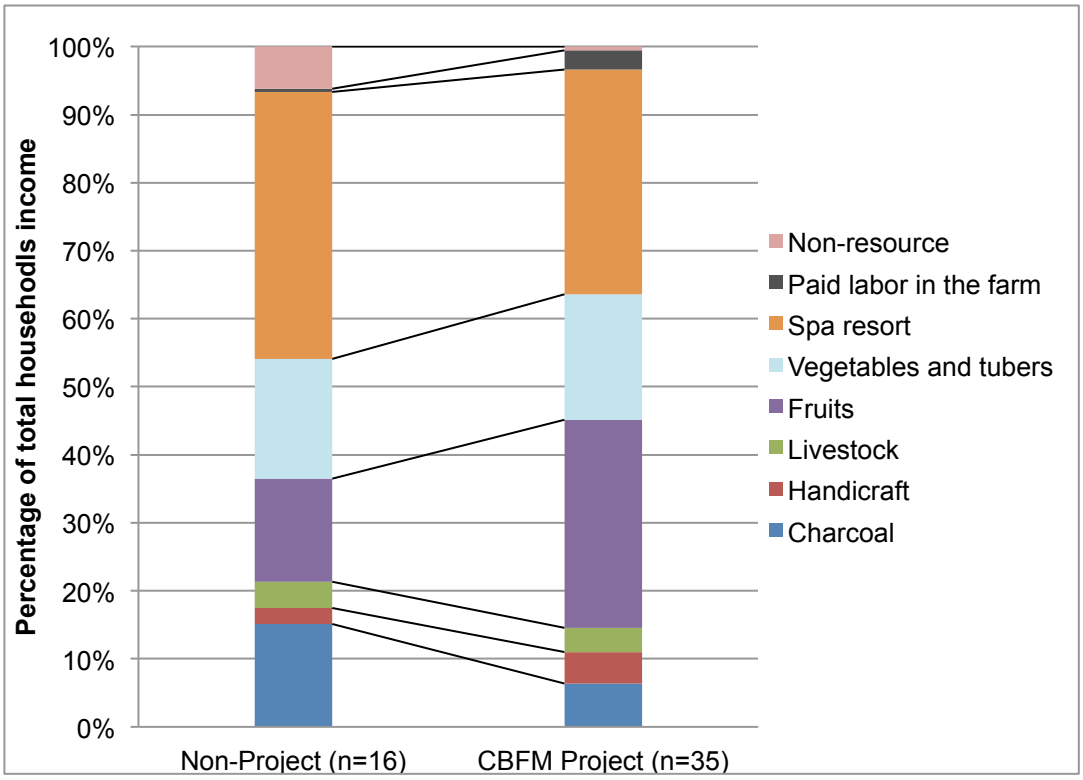


Figure 6-23. Total annual revenue per source in Target

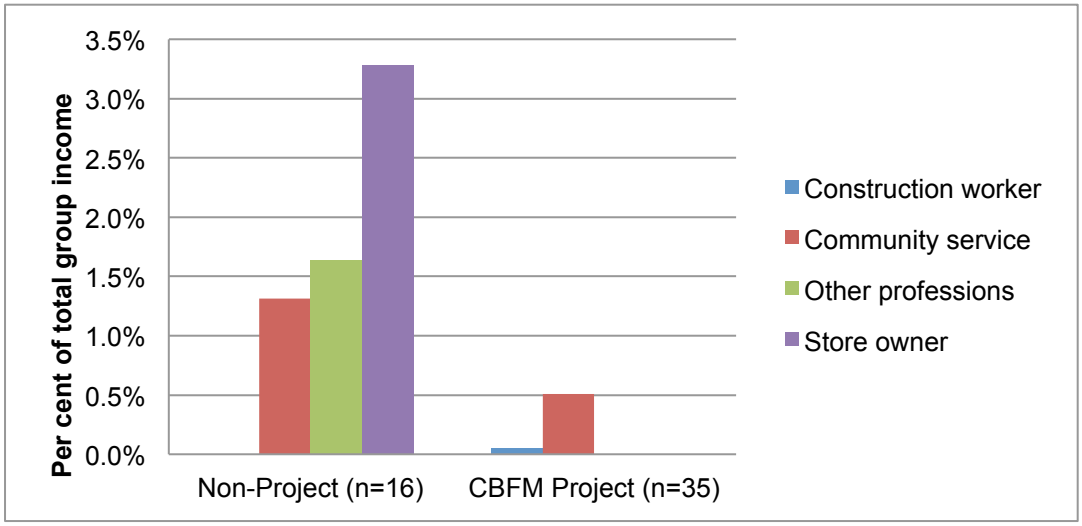


Figure 6-24. Share of revenue from non-resource related income sources to the total annual income of each group, in Target

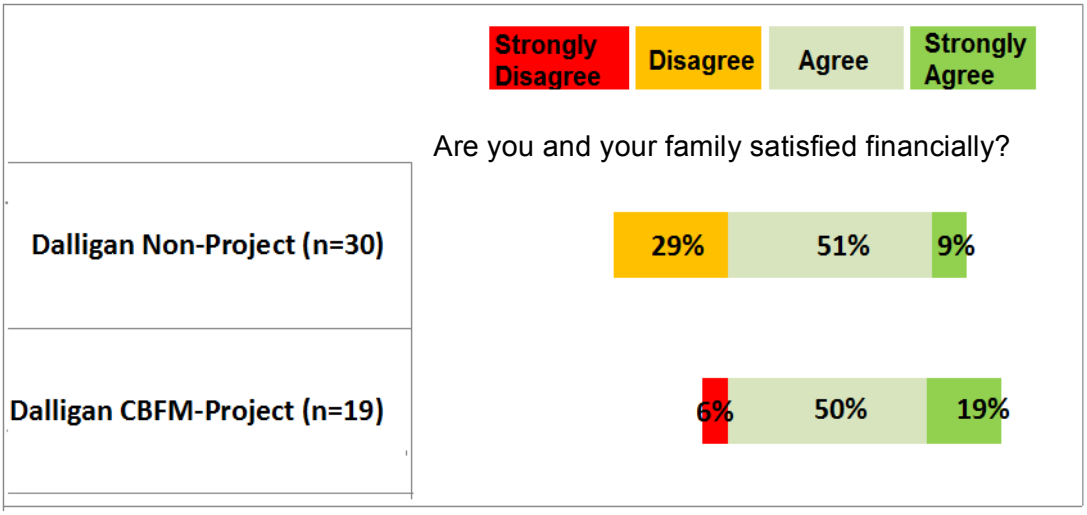


Figure 6-25. Financial satisfaction of respondents in Target

Note: Neutral answers are not projected in the graph

iii. Income level against poverty threshold and income satisfaction

On average, of the households of the CBFM Project group met 49 per cent of poverty line, and the Non-Project group households reached 80 per cent (620b), indicating a better financial situation for the Non-Project group ($p<0.01$).

In the CBFM Project group and the Non-Project group the majority of respondents were generally satisfied with their income, but 29 per cent of CBFM Project respondents felt unsatisfied, more than in the Non-Project group (Figure 6.25).

iv. Equal income distribution

Distribution of income per person in Targets was relatively equal. It was found that the Project group had more equal income distribution, than the Non-Project group, with Gini coefficient 0.33 and0.39, respectively

v. Housing quality

A greater proportion of the housing in sitio Target was modern type, one-storey concrete houses accounted for 75 per cent of houses within Non-Project groups, and 66 per cent within the CBFM group (Pictures 6.7a and 6.7b). The second most common type of housing was traditional houses, constructed by a variety of materials, in both the CBFM Project group and in the Non-Project group (Picture 6.8c and 6.8d)

vi. Electricity access

Sitio Target had good access to electricity. In the CBFM Project group 77 per cent and in the The Non-Project group 75 per cent of households had access to electricity. The provider of electricity was Angeles Electric Cooperation.

vii. Mobility (vehicle ownership)

Sitio Target had poor access to the city in where a more professional medical assistance, high school education, and market for local products could be accessed. The road was unpaved and rough. Motorcycles, jeeps and off-road vehicles can pass by the road; however, there was lack of regular transportation, and residents were dependent on vehicles coming from outside. Only a few residents possessed their own while. According to the survey 8 per cent of households in the CBFM Project group, and 13 per cent in the Non-Project group owned a vehicle.

Picture 6-7. Two most frequent type of house in Target, (a) one-storey concrete house built by the owner; (b) one-storey concrete house built by GK foundation GK; (c) traditional house with modified walls (wooden boards); (d) traditional house with modified roof (met

Economic capital at Forest Users Group level

i. Income to common budget

The CBFM group did not maintain income to the common budget.

ii. Deposits in the bank

The CBFM group in Target did not have savings on the bank account anymore.

iii. Fixed assets

The CBFM Project did not build any facilities in sitio Target, but it used to have some on the project area, such as trails across established plantations (10km), firebreaks planted with bananas (14km), three bamboo-made look-out towers, and hanging bridges of 116 meters span (PhP 8 million ~ USD 180,000). These structures were already damaged or destroyed, including the bridge. CBMF group as well as other residents had access to properties of the sitio, such as a multi-grade elementary school and a library in the village, and two daycare centers. In Target there was a Born Again

Church with additional service building, funded by Korean missionaries.

b. Socio-cultural capital

Socio-cultural capital at household level

A) Structural bridging and bonding social capital

i. Number and structure of individual cooperation networks

The number of cooperations in Target differs between groups. In the Non-Project group the average number of cooperations was 1.1 per household, and in the CBFM-Project group 1.8. The network of cooperation with distinction into CBFM Project households, Non-Project households, and Non-respondent households, mentioned by respondents as cooperating actors, is presented in Figure 6.26. The structure was found to be in the form of stars or simple chains of actors across the community. CBFM actors created centers of such networks, more frequently than in the Non-Project group. The type of cooperation was predominantly farming-related in both the CBFM Project group and the Non-Project group.

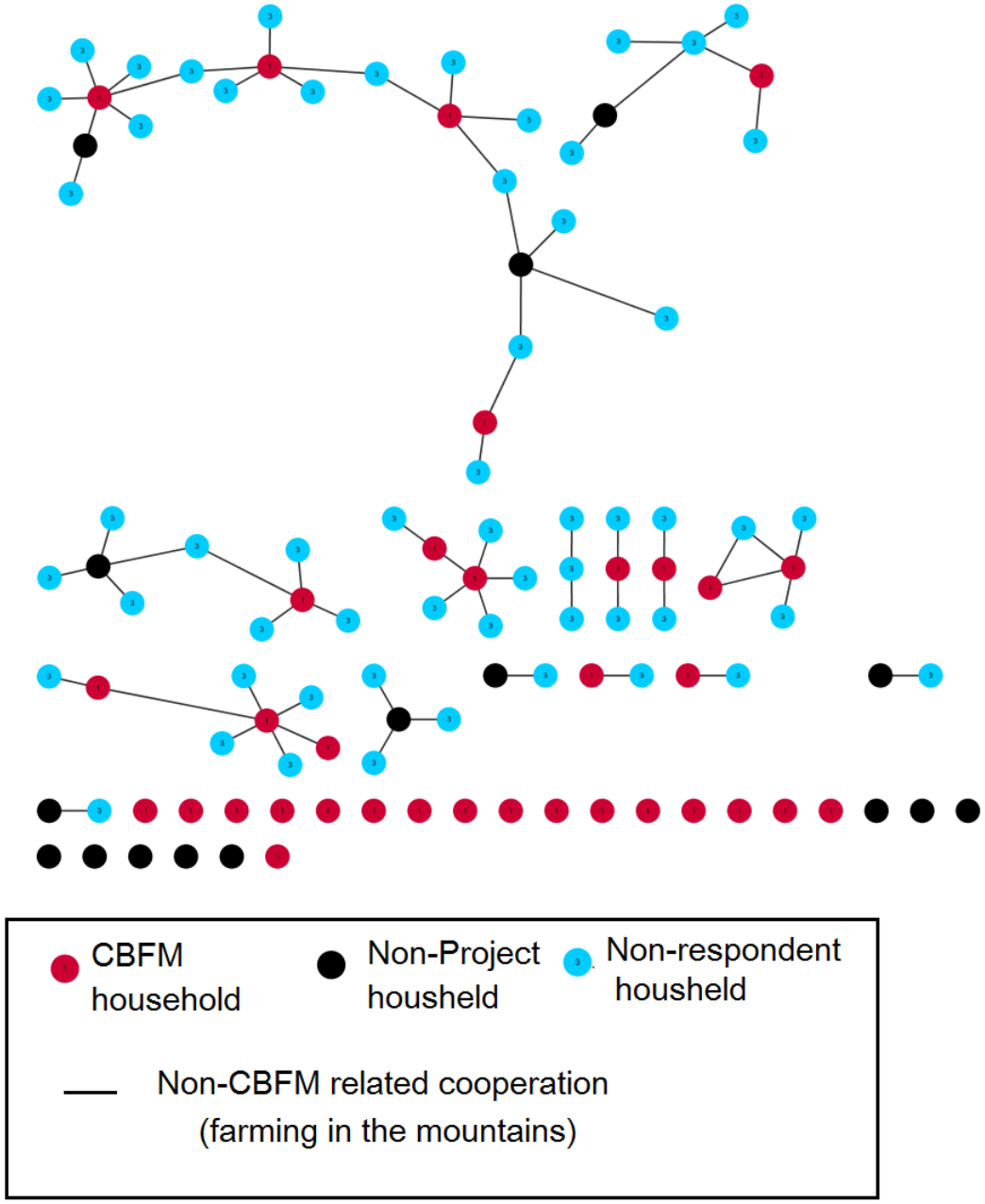


Figure 6-26. Network of cooperation between households in Target

ii. a) Reliable friends in time of need

Further variables that are representing social network in the community is a network of reliable friends and interactions in the community. For both indicators, the CBFM Project group gave more positive statements than the Non-Project group (Figure 6.27a). Respondents could express in which way they could count on their friends to call them reliable. CBFM respondents had friends who they could ask for money and

resources, to take care of children, borrow vehicles, etc. The Non-Project respondent group provided similar answers, indicating they were indifferent from the CBFM Project group in this aspect of social capital.

ii. b) Interaction in community

In terms of interaction in the community, the greatest number of Aeta respondents (CBFM Project and Non-Project) expressed having very good interactions in the community, but in Non-Project, there were some uncertain respondents as compared to the CBFM Project group (Figure 6.27b). Respondents of the CBFM Project group who disagreed were busy with raising children. Affirmative responses of the CBFM Project group were regarding eating together or having coffee, talking to neighbors to make their time pleasant, and to share their experiences. Respondents who were undecided in their statements were busy with their house errands.

In the Non-CBFM group, respondents who strongly agreed, or just agreed to having many interactions within the local community interacted with others during community events, shared experiences while talking with neighbors, etc.

B) Cognitive bridging and bonding social capital

ii. Degree of trust in:

iii. a) Local community

In terms of trust given to the entire local community, the CBFM Project group indicated higher trust, than the Non-Project group (Figure 6.27c).

In the CBFM project respondents expressing strong trust justified it by perception of close kinship in the community, peace and safety, a culture of sharing and caring for each other. People who stated "Agree" provided some reasons for limitations of trust, such as not all people keeping the peace due to abuse of alcohol, or limited trust to those who they worked with, were close to, or had been helping them. In The Non-Project group respondents expressed similar concerns on community trust and expressed the same reasons for trusting their local community.

iii. b) Forest Users Group

CBFM Project members trusted the group well (Figure 6.27e). Respondents emphasized their tribal bonds, kinship; friendship, duly performed work by co-members, and cooperation on the individual basis was still performed (***47 years old male respondent, no formal education:*** *"Until now they are still our companions who clear [fields in] the forest"*). Two members expressed that they trust the CBFM organization because they were paid for the work according to agreements. However, respondents indicated a distance/lack of belonging to the group and no active membership in the CBFM organization in their answers. One member however complained about unauthorized persons getting his fruits (**32 years old male respondent, elementary incomplete:** "Sometimes people take from my trees without my permission"), despite expressing trust to the organization, another one expressed that trust was gained thanks to the plants that were aimed for to be a common resource (***39 years old male respondent, no formal education:*** *"We knew the plants were for all of us so I trusted them to work well"; **33 years old female respondent, high school incomplete:** "We help our community against flood by planting together"*).

Less trust towards the CBFM organization was given by the Non-Project group. Those who strongly agreed expressed their appreciation to the CBFM work and effects of reforestation. Uncertain respondents did not know about the CBFM or they were criticizing the maintenance of the trees. The strongest disagreement expressed strong distrust towards the CBFM group: *"Some people receive money from DENR but they don't share it with the community. Some people are selfish and proud"* ***(22 years old female respondent, elementary incomplete)***.

iii. Feeling understood by

iv. a) Local community

A feeling of being understood by the entire community was better developed in the CBFM group (Figure 6.27d). CBFM Project respondents who felt being well understood by the community valued peace, sharing, and the ability to solve their internal issues (***33 years old female respondent, high school incomplete:*** *"When our water buffalo went loose and ate crops of neighbor we said sorry and it was fine. We didn't pay anything"; **33 years old female respondent, elementary incomplete:***

"Sometimes there are issues but we try to address and solve them"), kinship, mutual respect and help in taking care of children when going to the mountains to work; however, respondents raised the problem of alcohol in the Sitio Target. One of two respondents who disagreed with feeling understood by the community explained that he *relied on* himself as much as possible. For Non-Project respondents, conflict resolution was important for feeling understood by the community. Those respondents who disagreed with feeling understood by the community had weak bonds or poor communication with the local community.

iv. b) Forest Users Group

Project members felt understood by the other members of the project, 91 per cent strongly agreed and 9 per cent agreed to this statement (Figure 6.27f). Respondents were emphasizing harmonious collaboration during project implementation, with perspectives of benefiting from planting in the future (***47 years old male respondent, college graduate:*** *"We knew that the trees will eventually be ours so we worked together"; **37 tears old male respondent, no formal education:** "We worked well and we worked on our plots"*); however, for many members awareness of CBFM as an institution belonged to the past and was a temporary activity(***26 years old male respondent, high school incomplete:*** *"With their rules, there's more awareness in the community"; **27 years old female respondent, high school incomplete:** "We had harmonious relationships. We get to hunt when we are in the mountains, after planting"*).

C) Cognitive linking social capital

iv. Degree of trust in local government.

Trust in the local government was found to be highest in the CBFM Project group, and similarly in the Non-Project group (Figure 6.27g). In the CBFM group respondents who trusted the local government emphasized help that government provided, such as relief goods and support, conflict resolution, community management (***28 years old female respondent, high school graduate*** *"Barangay capitan [Barangay Chairperson] knows how to handle people"*), representing their interests. Respondents who were not sure if they could trust or not, or who disagreed with trusting local government, expressed their disappointment with election promises. Among those who

still agreed with trusting there were two contradictive voices about corruption in the government.

In the Non-Project group, a respondent who agreed with trusting the government, prized the government for support and provision of relief goods and the Barangay Chairperson being in the community, in close proximity to the people, but criticized slow progress of improvements and empty promises. A respondent who strongly disagreed was disappointed with governmental promises, similarly to respondents in the CBFM Project group.

v. Feeling understood by local government

The feeling of being understood by the local government was higher in the CBFM-Project than in the Non-Project group (Figure 6.27h).

In the CBFM group, in justifying why they thought the government was understanding them, respondents frequently expressed their opinion that the government was understanding their needs and fulfilling them, mentioning houses, roads and schools being provided to the community. Respondents who were uncertain stated that they were not the priority of the government. CBFM project respondents disagreed with trusting the government, explaining that the government takes an easy way to put its responsibilities to support the community on the local spa resort instead. One respondent strongly disagreed with the government understanding their needs because of an incident when a child was not attended to in the hospital in an emergency case.

D) Cultural capital

vi. Traditional knowledge in farming

During the survey respondents could to explain their way of farming and agroforestry, as to whether they used the traditional way of farming or not. Significantly higher numbers of CBFM Project participants cultivate their tradition in farming (Figure 6.27i).

In the CBFM Project group, respondents considered the traditional way for farming as the only way they know and explained how they were brought up by their parents, thus being very close to them, it was their legacy and the only way they knew how to farm, and it was a method very familiar and close to them (*e.g.* ***27 years old***

male respondent, elementary incomplete: *"I do traditional farming practices; I consider plants as being my children"*); for respondents it was believed to be the most effective way to farm and feed their families and the method most well suited to the environment (***47 years old female respondent, no formal education:*** *"Our ways don't use carabaos [water buffalo] and it maintains the healthy soil"*).

In the Non-Project group, respondents used traditional knowledge in farming for the same reason as the CBFM group respondents did. Respondents, who did not agree already did not plant in the mountains or limited their farming to planting in the backyard of the house, and one respondent did not follow planting tradition at all in his farming.

vii. Traditional practices and rituals in farming

Traditional practices were still being in used by the Aeta people, and more of them were found in the CBFM Project group than in the Non-Project group (Figure 6.27i). Respondents in the CBFM Project group who used traditional practices conducted offering to the *Apo Namalyari* and *anito* sprits, prayed for good harvest to increase the yield of their crops and to prevent calamities. Respondents, who did not agree, related their lack of traditional practice to disappearing reciprocal communal work (***58 years old male respondent, elementary incomplete:*** *"We used to help each other plant but now you have to pay people for their time"*; ***48 years old male respondent, no formal education:*** *"Prices of goods are not that cheap. No communal planting since time is money").* Another Aeta farmer stopped doing farming in the mountains thus did not continue traditional practices.

In the Non-Project group respondents who were not carrying out traditional practices considered it to be increasing their crops yield but they were less specific in their rituals. Farmers, who disagreed with the statement about following traditional practices stopped planting or stopped following traditional rituals on their farms.

viii. Importance of belief in life

In Target, most residents belonged to the Born Again church. All respondents within CBFM declared Born Again as being their main religion, in the Non-Project group 96 per cent were Born Again, and 6 per cent did not declare any religious faith at all. In the non-Aeta group 75 per cent were Born Again. In all groups respondents agreed that belief was important for their life, regardless of religion (Figure 6.27j).

Reasons provided by respondents in two Aeta groups, CBFM Project and Non-Project, could be divided into two characters: 1) Christian-existential, and 2) ancestral & nature (*Apo Namalyari* god). The traditional religion that respondents had, related to the natural forest and mountains and was expressing a set of values, that was inherited within the community, therefore their distinguishment was important to recognize the persistence of indigenous wisdom and social memory of the group.

ix. Feeling spiritual in the forest

For the question whether respondents feel spiritual in the forest, more of non-CBFM participants agreed than CBFM Project participants, but both groups expressed high spirituality while experiencing co-existence with nature (Figure 6.27k).

In the CBFM group positive responses were referring to the forest as a place of spirits (e.g. ***27 years old female respondent, no formal education:*** *"We remember our dead relatives and in the forest, we feel calm"*; ***26 years old male respondent, high school incomplete:*** *"Spirits don't want Aeta killing animals, it's prohibited, 'lubuyo' chicken is especially cursed. Engkantos [spirits] will have revenge, and take life"*), forest as a peaceful place and place where they grew up, and forest as a source of livelihood (*e.g.* ***27 years old female respondent, high school incomplete:*** *"I don't look for money nor feel hungry in the forest, I don't need anything"*). Respondents who disagreed or strongly disagreed were denying the existence of traditional spirits.

In the non-Project group, respondents who agreed or strongly agreed with the statement of feeling spiritual in the forest believed it was a place of spiritual existence, place of calm and peace, and source of their life subsistence, similarly to CBFM Project group respondents. Respondents who strongly disagreed, denied the existence of spirits.

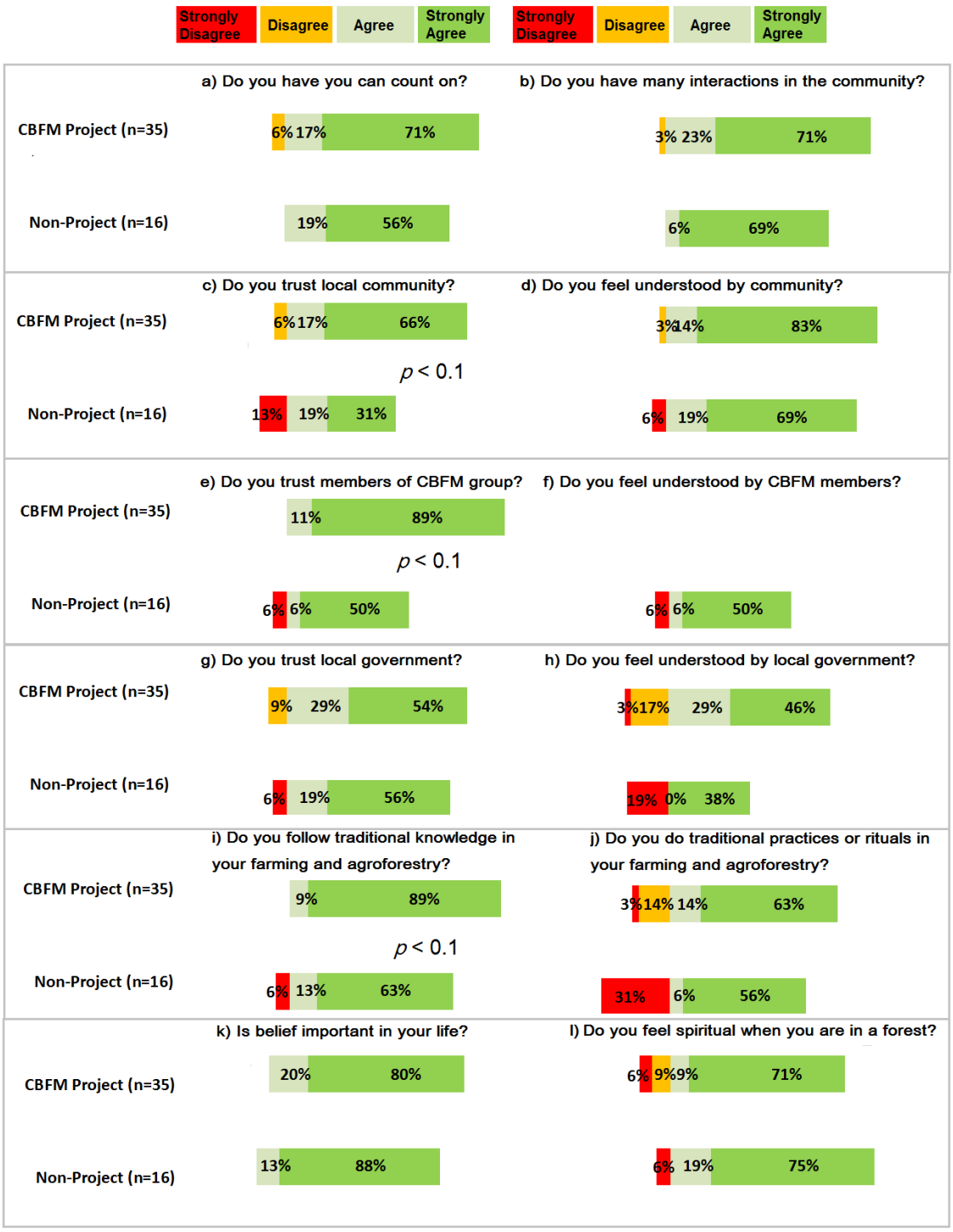


Figure 6-27. Socio-cultural capital in Target

Note: Neutral answers are not projected in the graph

x. *Formal education level*

Regarding education in Target there as a tendency of increasing education levels with the younger generation, for both the CBFM and Non-Project groups, yet all levels of education were still commonly represented by the younger generation, indicating that formal education was still at slow progress (Figure 6.28). Elementary level education was easily accessible, as the primary school was located within Sitio Target. Yet, the nearest high school was located in the Sapang Bato, outside Sitio Target, which increased the difficulty in accessing it in terms of financial burden and distance to the school. Some scholarships were available for high school and college level students, according to interviews in the community. Yet, the CBFM group and the Non-CBFM groups' households had similar structures of education represented and approximately one third of households' members were illiterate (Figure 6.29).

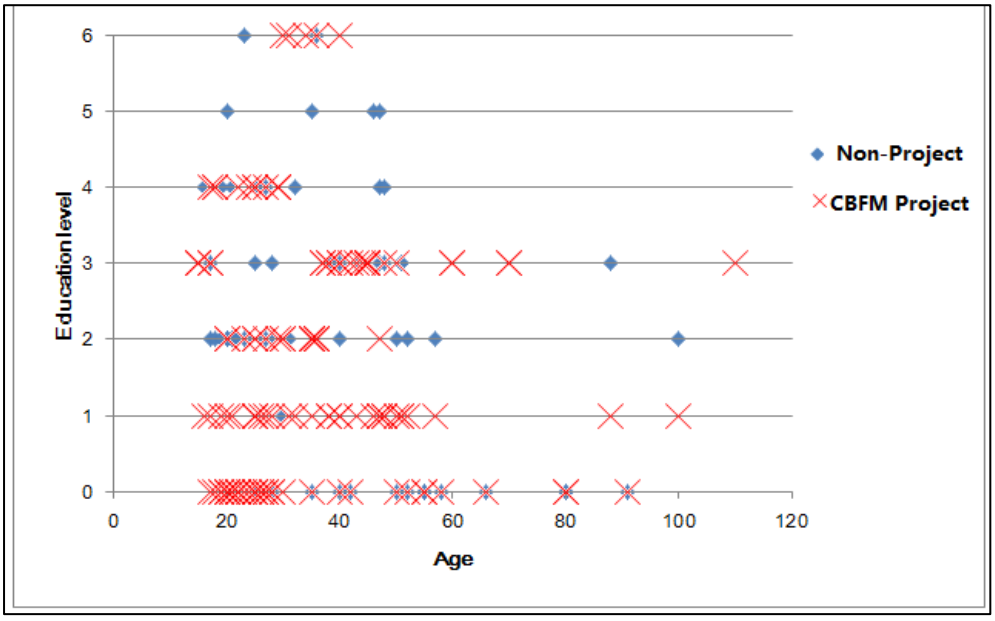
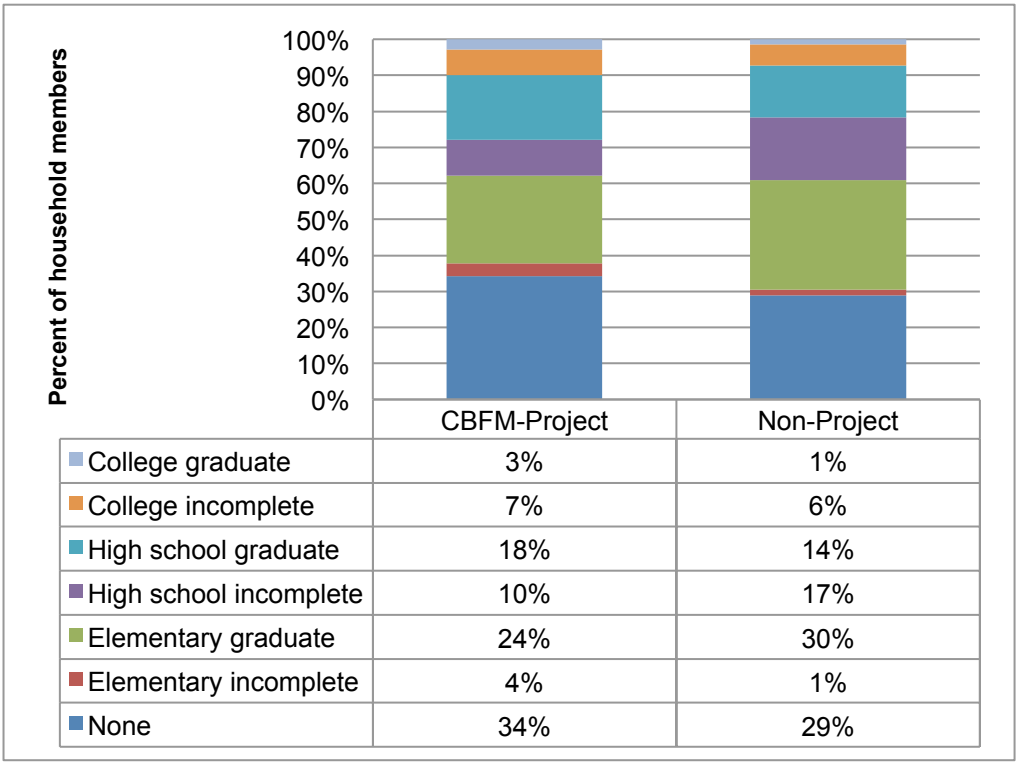


Figure 6-28. Trend in education by age in Target (age 15 and above)

Note: Each household member marked by age and education; Education levels (y-axis): 0 – no education, 1- elementary incomplete, 2 – elementary graduate, 3 – high school incomplete, 4 – high school graduate, 5 – college incomplete, 6 – college graduate



	CBFM-Project	Non-Project
College graduate	3%	1%
College incomplete	7%	6%
High school graduate	18%	14%
High school incomplete	10%	17%
Elementary graduate	24%	30%
Elementary incomplete	4%	1%
None	34%	29%

Figure 6-29. Completed formal education in Target

Socio-cultural capital at Forest Users Group level

A) Cognitive bonding social capital

i. Conflict resolution within the group

The Aeta people conducted strong and independent conflict resolution within their own group with their own tribal court constituted of elders. In February 2014 there was an incident where a pig traumatized by a dog bit a woman, and as a consequence she passed away on the way to the hospital. My visit took place on the same day, right after the accident. To seek justice for the victim's family, a tribal court consisted of tribal elders from Sapang Bato, not only from Sito Target, gathered immediately. According to the explanation of the customary law provided by the community leader, the sense of justice would require the death of person who caused the death, in this case for the owner of the pig. The community leader, who is also a Born Again church priest said that from his position as a Christian priest he should contempt killing, and he would try to mediate for woman's life, but the highest voice belonged to the elderly. After a week of tribal elderly's heated debate, the woman, owner of the pig, was

exempted from death penalty due to a fact that the victim and the pig owner were closely related by blood. The pig owner had to take care of the orphaned child of the victim and to cover the cost of the funeral. The community leader recalled another incident that took place a year before, and another one from a decade before. In the first one, a child asked another child to go play in the field. Unfortunately, the one who was asked to accompany the first one was killed by a water buffalo. As a cause, the boy who invited the victim to play with in the field together was sentenced to death by the tribe. In second case, a decade ago, two men got into an argument about money, related to the CBFM project. One of the men killed the other. The tribal court executed the murderer according to the tribal sense of justice.

ii. Monitoring and rules violation protection

CBFM rules of monitoring and violation protection were not implemented, however, the Aeta people had their own set of rules for the communal land. There was no conflict in between Aeta people for communal resource use. Despite changed ownership of land, the Aeta people could still borrow the land among themselves if they needed it. Also there was still a value of sharing the crops and fruits with anybody who wanted to eat them in the mountains present, and this value was transferred to the younger generation (Described in section 6.3.4.1.). Minor felonies like taking someone's fruit were not considered as serious violation of rules, yet, while the value of common sharing of the mountain is still alive, it is becoming weaker and some people already had negative opinion about it, considering it as stealing. The Aeta however must protect their land from outsiders, and temporary conflicts between Aeta and non-Aeta people also occurred according to focus group discussions.

B) Structural Linking

iii. Cooperation with external institutions and companies

The CBFM organization assessment indicated that the CBFM project was only temporarily connected to the organization and to external funds, e.g. JICA, and DENR were the key stakeholder in all actions. The Department of Tourism also participated in the development, initiating foreign investment in the Aeta village, building the spa resort in which local villagers has become employees since 2005. Since 2007, when the

Aeta people received CADT via application through National Commission on Indigenous Peoples, DENR and JICA have stopped working with the Aeta group in Target. The process of transformation of the land into CADT was conducted without prior knowledge of DENR and JICA. A relative of a National Commission on Indigenous People officer in Sapang Bato was the manager of the spa resort raising concerns on the National Commission on Indigenous Peoples' objectivity on the spa resort investment and land allocation; moreover, the presence of the spa was already causing fear of losing land under the Target settlement. The Korean Born Again church provided funds for church reconstruction after the volcano eruption and for the house of the priest. Gawad Kalin Gawad Kalinga Community Development Foundation (GK) mediated Canadian funds to Target for construction of 50 houses in the community.

C) Cultural capital

iv. Trainings

The CBFM group´s last training on farming was given in 2007, on farming and planting. But there was no training that could increase entrepreneurship and leadership in the group.

c Natural capital

Natural capital at household level

i. Land area

Farmers in Target had rather fixed plots they regularly cultivated, using shifting cultivation. According to the survey, the average land area per household in the CBFM Project was 5.46 hectares, and 1.57 hectares in The Non-Project group (Figure 6.30a). Per person land area was estimated to 0.92 hectares in the CBFM Project group, and 0.29 hectares in the Non-Project group. Soil however, being composed of recent volcanic ash, was poor in organic matter, had low capacity to hold water, and was prone to erosion. On the land use pattern, presence of swidden farm was found; in the area of CBFM overlapped by CADT, there was higher area covered by swidden farms, approximately 2.5 per cent, than in the CBFM area outside of CADT, approximately 1 per cent (Table 6.10, p. 203).

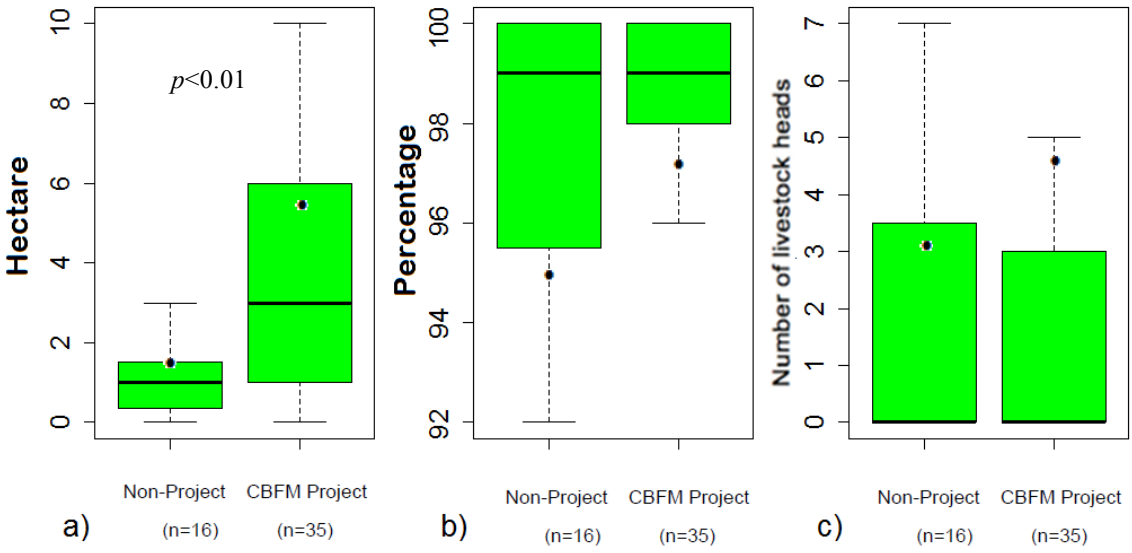


Figure 6-30. Natural capital: a) Household farm size; (b) Renewable energy use; and (c) livestock count

ii. Renewable energy use

Use of renewable energy in the community was mostly related to use of firewood collected in the forest. On average, households belonging to the CBFM Project group used renewabls for 97 per cent of their energy, and Non-Project households used renewables for 95 per cent of their energy (Figure 6.30b).

iii. Livestock

In the CBFM Project group, 40 per cent of households were keeping livestock with an average number of livestock at approximately 4.54 head per household. In the Non-Project group, 37.50 per cent of households had livestock, with 3.06 head per household on average. The distribution of heads per household is presented in Figure 6.30c. In the CBFM Project group the dominating type of livestock was chicken, second most common type was pig. In the Non-Project group the second most common livestock type was pig, and chicken. The CBFM group did not have working animals that could potentially enhance their farm production efficiency. The number of pigs per average household was lower in the CBMF Project group, indicating lower potential for income generation (Table 6.4).

Table 6-4. Livestock specification and average number per household in Target

	Non-Project (n=16)		CBFM Project (n=35)	
	Number of head per year	**Average number of head per year per all households**	**Number of head per year**	**Average number of head per year per all households**
Water buffalo	5	0	0	0
Pig	21	1	28	1
Goat	7	0	14	0
Chicken	16	1	117	3
Duck	0	0	0	0
Total livestock	49	3	159	5

Natural capital at household level at Forest User Group level

i. Forest cover and health

Forest cove of the CBFM area was relatively high, this was determined by satellite image analysis (Table 6.5 and Figure 6.31). Area covered by forest within CBFM boundaries but outside of CADT was estimated as 83 per cent, and forest cover of CBFM inside CADT was lower, 78 per cent. However, the forest cover was not consisting of thick tree vegetation; thus, lower values of NDVI were approximated (Table 6.5). The vegetation of the mountain is regenerating naturally and by CBFM plantation, with many fruit trees inter-planted, such as mangos, bananas, and coconut trees. There were few remaining tree stands of Dipterocarp species, and newly grown *Gmelina arborea*. Many bushes were composed of rapidly growing bamboo and acacias. Low vegetation was predominantly dominated by cogon grass (*Imperata cylindrical*).

Table 6-5. Land use and NDVI of CBFM and CADT area in Sapang Bato

	CBFM outside CADT	CBFM inside CADT	CADT area (incl. overlapped CBFM; limited to image area)
Land use			
Forest	83.22%	77.94%	74.80%
Lower vegetation	15.84%	19.61%	22.09%
Swidden Farm	0.95%	2.46%	3.11%
NDVI	0.44 (std. deviation 0.24)	0.43 (std. deviation 0.21)	0.42 (std. deviation 0.21)

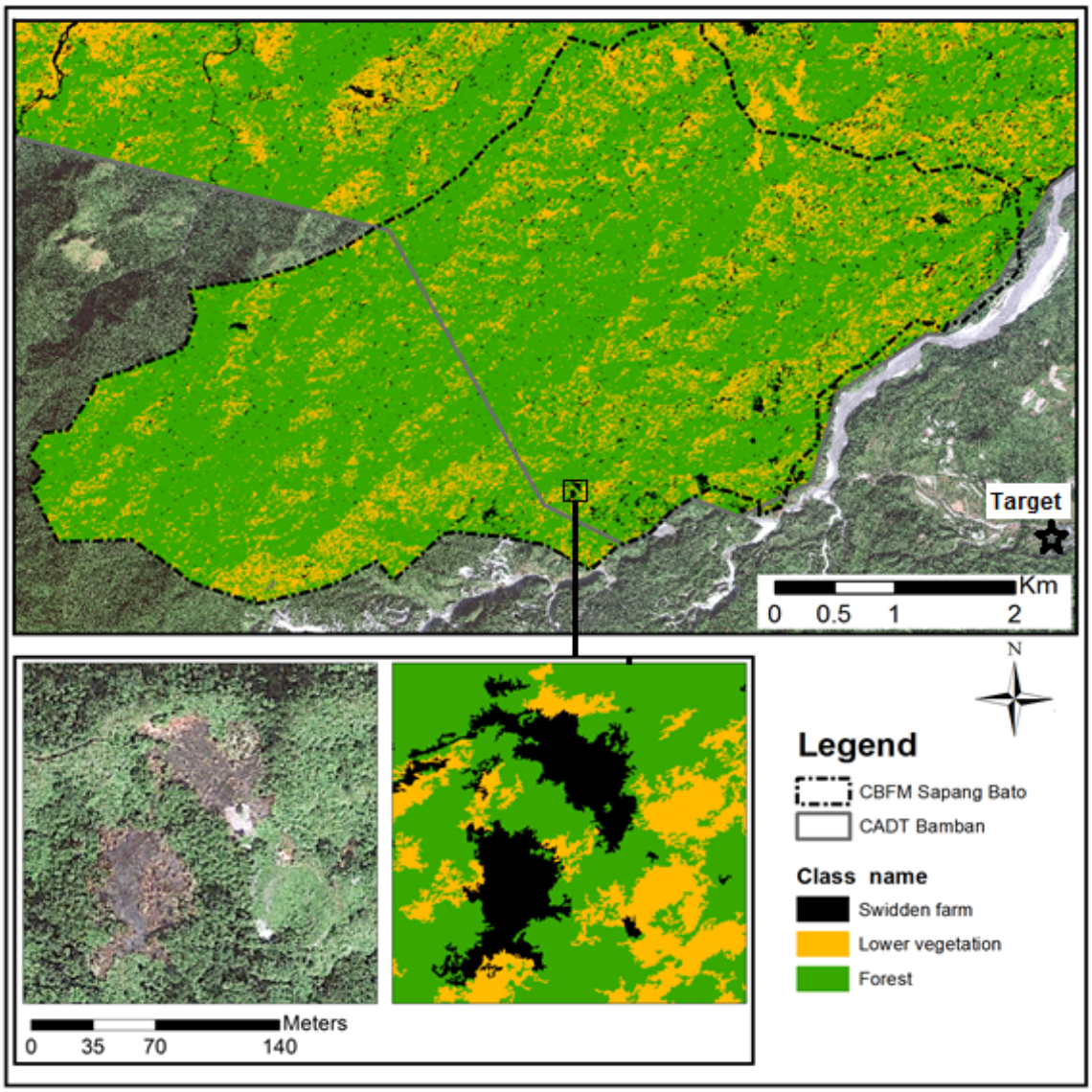


Figure 6-31 . Land-use classification in Sapang Bato, based on GeoEye-1 image (2009)

ii. Forest resource use rights

Forest use rights did not increase with the CBFM project, but it provided an initial legal framework for legally occuping and use the forest, together with CADC. On the other hand, it was a regulatory move by which the FUG had to implement a resource use plan. Such a plan was however not found to be in use. Transformation through CADT increased rights to use the forest, according to customary law.

iii. Clearly defined boundaries of the forest

The boundaries were defined through a process not very clear to all stakeholders. CBFM was delineated by DENR, but it partially covered the area of the CDC company, and a revision of the CBFM contract, was made with CADC approval, however the contract was signed for 25 years, and the area allegedly belonging to the private company would not be returned to the Aeta people. The Aeta people filed an application to NCIP to convert the CADC area into CADT, which in 2008 covered an area larger than the former CADC and 61 per cent of the CBFM area. The process took place without the acknowledgement of DENR. The most certain boundary for the community was the CADT area. CADT, although covering a large area, did however not cover the entire land under Aeta people use.

4) Capital interaction

Correlation of significantly different variables (Appendix N) indicated that trust in CBFM and in the community was a factor differentiating both groups (Figure 6.32). Traditional farming in the CBFM group was positively correlated with farm income, but negatively correlated with trust in the general community (bridging social capital). The situation in the Non-Project group was reversed; not trusting the CBFM group was correlated with increasing income from farms (bridging social capital). For the CBFM, trusting in ones own group (bonding social capital) was raising with income. It indicates stratification of the community, with lack of bridging social capital yielding economic capital from selling farm products (natural capital yielding economic capital), and it is likely people organize harvest and sell within the CBFM group or within the Non-Project group, based on prior community organization into working groups, in which CBFM efficiently use traditional practices in raising income. Land size was

found to be an interesting factor in the process, suggesting the Non-Project group, which had a smaller area of land, was efficiently using it to raise the income proportionally to land area, whereas for the CBFM group, those who trusted less inthe CBFM gathered more land for their own lots, whereas those who trusted more did not occupy larger areas as they could borrow land from others or shift to other areas.

The *r* values of the correlation are summarized in Appendix O.

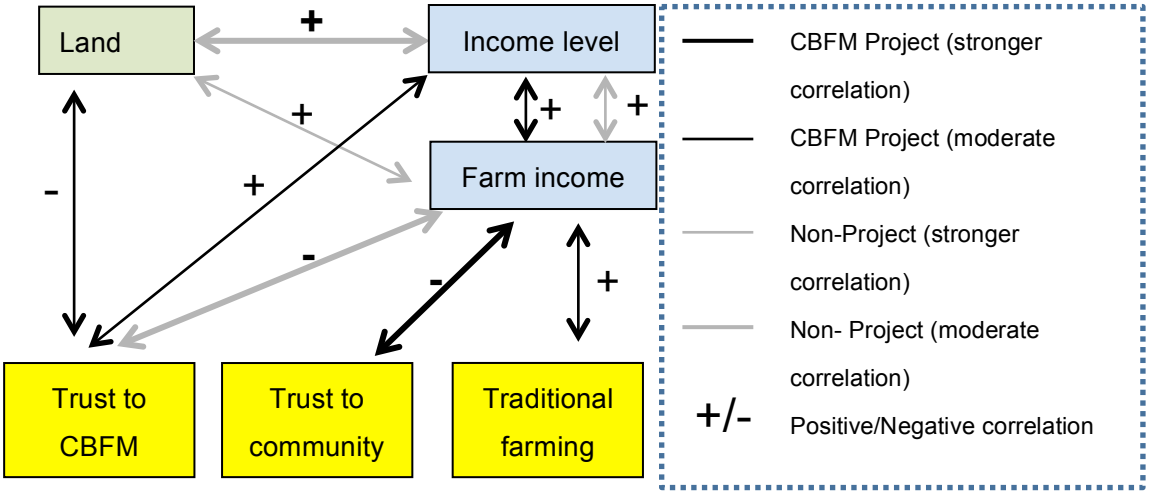


Figure 6-32. Correlation of significant variables in Target

6.5 Summary

This chapter presented results from two indigenous cultural communities, the Ifugao and Aeta people, who were participating in the CBFM program. Projects in each community were aiming reforesting and livelihood improvement through agroforestry and non-timber forest products. Socio-cultural capital was related to kinship and tribal bonds, yielding natural but not economic capital. Socio-cultural capital was decreasing (e.g. cooperation to maintain irrigation and reciprocal work on the farm, trust due to conflicts related to CBFM) and economic functions of the community were desired but yet to be developed. Reforms through CBFM were not able to efficiently commodify local resources, resulting in low incomes that did not increase with farm size. The CBFM Project was unable to fully address key obstacles, and low prices as well as lack of markets for products made communities more vulnerable, resulting in no incentive to continue organizing CBFM. A detailed summary is presented in Table 6.6

Table 6-6. Comparison of Case A with Case B

Case A. Kiangan	Case B. Sapang Bato
Past trajectories	
Overpopulation, over carrying capacity of ecological system, decreased with outmigration and creation of some sources of income (introducing economic capital) to purchase food instead of swidden farms, including former CF program, and CBFM	Losing land over centuries, survived disaster and returned to the original place, become more a cluster settlement in recent two decades, community jointed economic market. Had to face completion over their land
Current issues	
Discontinued irrigation and water pipes, rice terraces deteriorating, no income and no road	Malnourishment and problems of a settlement
Economic capital	
Household level	
(-) Very low income diversity (+) Higher income equality (-) Very low income/poverty threshold** and not much satisfying (+) High dependence on natural resource for income but most as on-farm (labor) No vehicles and Low infrastructure	Income diverse but indifferent with Non-Project (-) Equality of income distribution high (-) Very low income/poverty threshold** and not much satisfying (+) Hi withdrawn resource dependency * No vehicles and low infrastructure
Forest Users' Group level (CBFM group)	
No or unused financial assets, not transparent Some fixed assets left	No financial assets No fixed assets (deteriorated)
Socio-cultural capital	
Household level	
(-) Structural social capital lower: cooperation network smaller and different than CBFM; but quite well interacting thus maintaining the capital (-) High cognitive bonding (within group) and bridging (between group) social capital, essential for cooperation, but CBFM introduced conflicts to the community; (+) Cognitive linking social capital relatively high, CBFM group trusted the local government, and felt being understood by the government, which was a good ground for cooperation (-/+) Cultural capital moderately strong, (+) traditional	(+) Stronger structural social capital, with denser network, but not equal to CBFM cooperation, good community ties and social network building (+) Cognitive bonding and bridging social capital relatively high, essential for cooperation, but CBFM introduced conflicts to the community; stronger trust to local community, trust to CBFM group stronger** than from outside the group (project unknown or money issues); group well understood themselves (+) Higher cognitive linking capital, good ground

faming was the only way to farm. But reduction of traditional practices** was found, especially in the CBFM groups, due to high cost and lack of shamans, but dependent on farm size and cooperation as well (correlated); Formal education and moderate level	for the project Very high cultural capital, especially (+) traditional way of farming * and (+) practices, belief, and (-) spirituality in the forest; (-) low formal education makes group more vulnerable to outside impacts
Forest Users' Group level (CBFM group)	
CBFM group , same as non-participants, had good indigenous conflict resolution system, but not well fitting money issues (new to the group) The monitoring was not necessary, it was based on trust, and land marks Group had very weak links to outside stakeholders, and very few trainings building capacity of the group	CBFM group , same as non-participants, had good indigenous conflict resolution system, not well adapted to money issues The monitoring was not necessary, it was based communal use value, some people decided to delineated own farm land Moderate links to external stakeholders Few tannings and little capacity building
Natural capital	
Household level	
(-) Low farm size per household** and per person ** but reduced swidden farm use (+) High Livestock** (+/-) High dependency on renewable energy	(+) Higher farm size per household ** and per person ** (+) Lower swidden farm use (+) High dependency on renewable energy
Forest Users' Group level (CBFM group)	
(+) Forest cover (+/-) Forest use rights formalized, but rather governmental regulation emphasis but low enforcement (+/-) Boundary not clearly delineated, nor explained to people, thus not farm are increase	(+) Higher forest cover (+/-) Forest use rights formalized, but rather governmental regulation emphasis; lower than by CADT, but no timber was extracted (+/-) Boundary of CBFM was clearly delineated, nor explained to people it means (also not matching local context of ownership)

Note: *Statistically different at confidence level 0.05; ** Statistical difference at confidence level 0.01
(-) Lower than the Non-Project group (weaker capital); (+) Higher than the Non-Project group (stronger capital)

7 COMMUNITY FORESTRY IN NON-INDIGENOUS CULTURAL COMMUNITIES UNDER CBFM PROGRAM

7.1 Objective of the chapter

The objective of this chapter is to respond to ii) sub-research question. Two cases represented CBFM that were introduced to non-indigenous communities, formalizing resource use rights through the CBFM project.

7.2 Case C. Ayala, Orchard village

7.2.1 Barangay Ayala, Orchard village

Barangay Ayala is located in Magalang city, Pampanga Province, Region 3, approximately 100 km from the capital, Manila (Figure 7.1). Barangay Ayala is located on the slope of Mt. Araya, an extinct volcano (Figure 7.2). Barangay Ayala is divided into sitios: Orchard Village, Livestock Village and Rice Village. The population of each Village was 903 (177 households), 586 (117 households), and 1,106 (216 households) respectively as of 2011 (Ayala, 2012). Total population of barangay Ayala was 2,595 (597 households, 510 houses). People living in the barangay belonged mostly to Kapampangan group, a native group to the province, and one of the main groups in the country. It does not constitute an Indigenous Cultural Community because it was not able to maintain indigenous traditions and land domain[29]. Barangay Ayala and its one sitio, the Orchard Village, located on the boundary of Mt. Arayat National Park (Protected Area Mt. Arayat), were contracting CBFM (Figure 7.2). Mt. Arayat is one of the first protected areas in the Philippines and Southeast Asia, established in 1933 (Protected Areas and Wildlife Bureau, 2004; McNeely et al., 1994).

[29] These attributes were lost due to colonization period

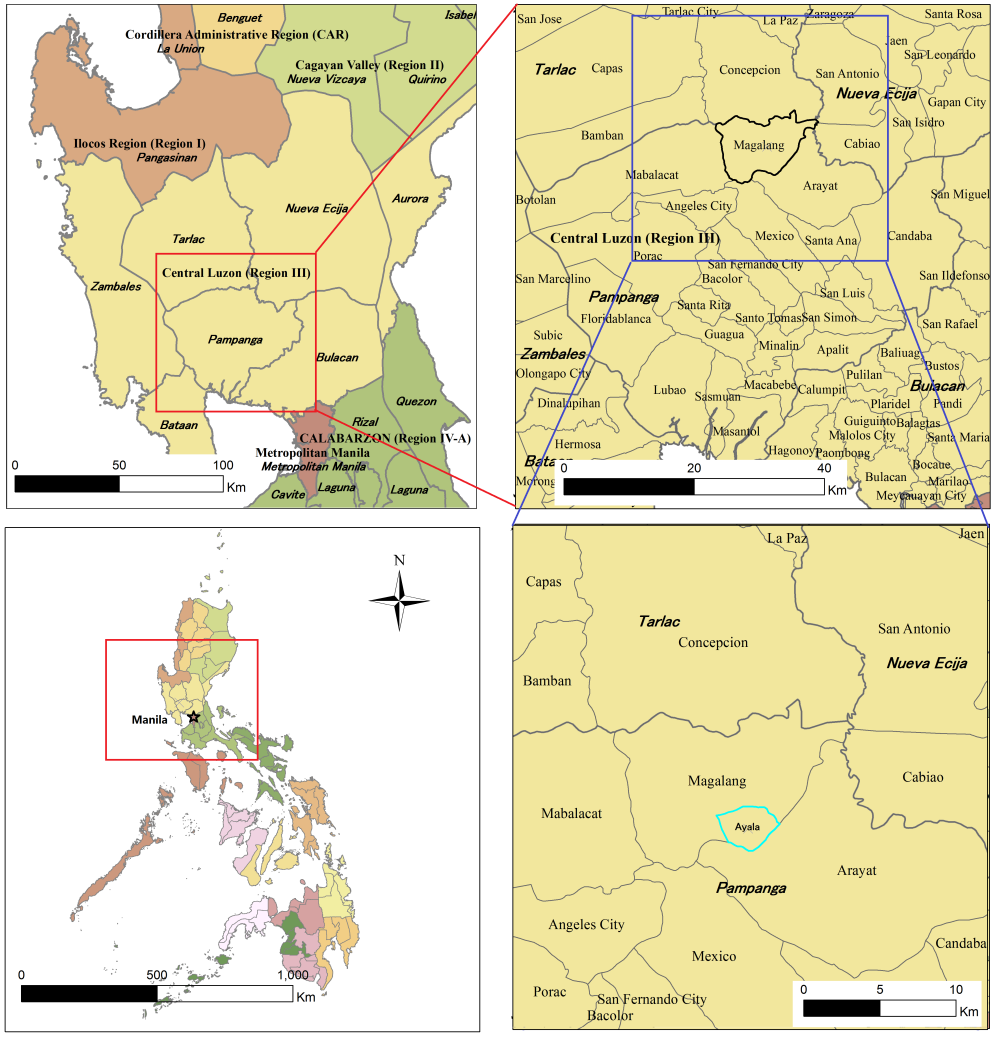


Figure 7-1. Location of barangay Ayala

Source: Based on shapfiles sourced from http://philgis.org/)

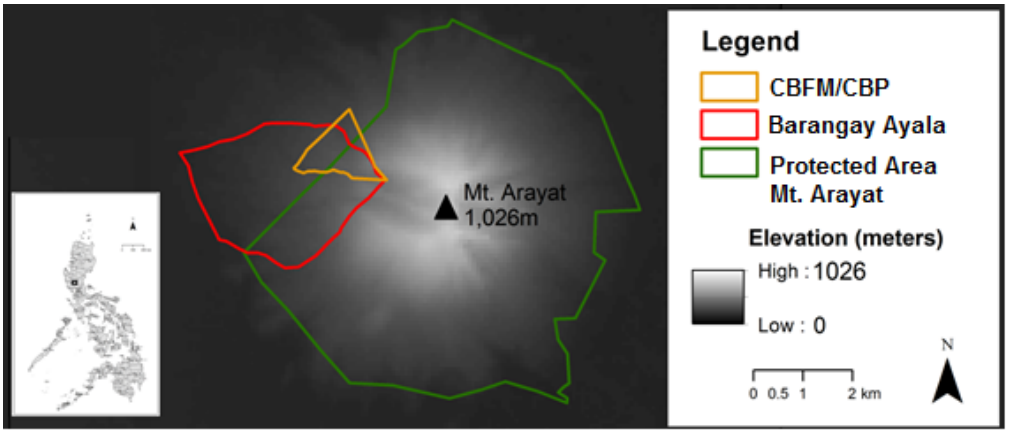


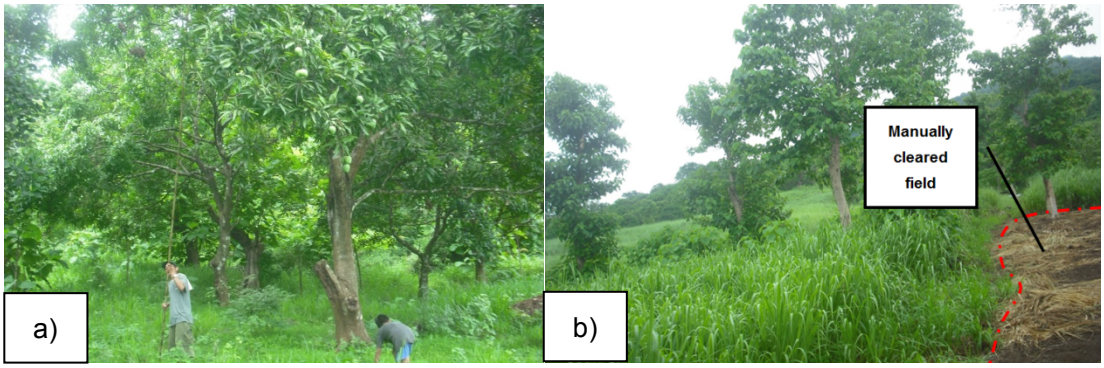
Figure 7-2. Location of CBFM/PACBRMA in Ayala, Orchard village

Source: http://philgis.org/; Digital Elevation Model by NASA; and DENR

7.2.2 Social-ecological context of Ayala, Orchard village

The upper part of Ayala, currently Orchard village, in 1950s were grasslands, and some species of the grass, such as cogon (*Umperata cylindrica*l), talahib (*Saccharum spontaneum*), were gathered to be sold for roof thatching, broom-making, and other handicraft weaving businesses. The cash crop opportunities from gathering grass were viable forms of livelihood for the farmers. It attracted more people to migrate to the upland area of Mt. Arayat. The surge in population caused deforestation and land clearing for cash crop planting. This issue became a threat to Mt Arayat National Park, which was known for a number of rare species in the region. The encroachment on the land became alarming. In response, the Department of Natural Resources (current DENR) took action to regulate the occupancy and started community oriented forestry programs. In 1979, a year after the land was divided between 37 households, a Communal Tree Farms program was started, which comprised of 30 farms. In 1989, the community entered a new program of Integrated Social Forestry with 50 hectares in total. The program excluded the commercial use of timber. (CTF and ISF programs are described in Chapter 2, section 5.2 *Forest history and community forestry origin*).

Current activities in the mountain were limited to grass gathering, farming, and fruit growing (Picture 7.1a). Clearing in the mountains had to be conducted manually (Picture 7.1b). Climate seasonality (described in Chapter 2, section 5.1.3 *Natural environment*) in Orchard was unfeasible for yearlong faming, limiting planting to rainy periods from May to November.



Picture 7-1. Orchard village activities (a) mango orchard; and (b) manual land cleaning

7.2.3 CBFM in Ayala, Orchard village

In 1996, the community was awarded with CBFMA[30]. The area was located partially within buffer zone of Mt. Arayat National Park (Mt. Arayat Protected Area). In 2004, CBFMA was changed into Community-Based Program (CBP) with Protected Area Community Based Resource Management Agreement (PACBRMA). It was a result of the revised guidelines in CBFM on protected areas[31] (Figure 7.2). PACBRMA was almost identical with CBFM, except for the prohibition of any natural wood resource extraction. CBFMA/PACBRMA collaborated (?) with the People's Organization, which is *Samahan ng mga Magsasaka ng Ayala sa Mataas na Lupa Inc.* (SMAMLI) that has 38 members and covers 56.8 hectares. In 2008, the association was covered by Project for Enhancement of Community-Based Forest Management Program (E-CBFMP), established by DENR together with JICA. Five (5) types of plantation were established: timber, agro-forestry, bamboo-plantation, fuel wood plantation and fruit tree production. In late 2012, community joined National Greening Program and Comprehensive Agricultural Reform.

Former forms of community forestry were more top-down initiated in order to resolve land occupancy problem. In contrast, recent CBFM projects were formed between top-down and grassroots organizations in order for the members to maintain the land, while the government could still manage the land use and protect the national park. In 2010, 70 new applicants filed to extend the CBFM for about 100 hectares, but it was declined by the government due to the status of the area.

During Focus Group Discussion conducted in May 5th, 2013, ten participants shared their reasons why they joined the CBFM Project. The main reasons were the problem of water scarcity for agriculture and fire outbreaks. The problem was outside of current CBFM area where people practiced slash-and-burn agriculture for cleaning their areas, often causing fire to reach CBFM areas. Protecting the area is paramount to the concerns of the participants because there was the incentive of seedlings distributed by DENR. At the same time, the participants had been already occupying the land and cultivating on it. DENR just provided land tenure through CBFM and regulated the occupancy.

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30 CBFMA No. 030402099

31 Administrative Order 32 of 2004

Due to the vicinity of protected area, the role of CBFM in Ayala was especially important in preventing illegal activities and protecting against fire in the forest. Moreover, increasing eco-tourism to the national park was an opportunity that can be beneficial for the future. It is a chance to increase the income of the local community; that is dependent on external jobs and seasonal farming that is largely limited because of the rainy season.

7.2.4 Resilience assessment

1) Past to present – changes of Ayala, Orchard village

In the early 1990's, Orchard Village lacked an electric grid and the roads in the area was largely undeveloped. People frequently used slash and burn practices to clean the land before planting. The sitio then had a low population density, had few houses in the lowlands, and entirely no houses on the forested hills. The lot served as evacuation area. The lower part of Orchard village also had no land titles that were owned by the government. It served as a resettlement area after the eruption of Mt. Pinatubo volcano in 1991.

At present, the sitio is already powered by an electric utility and has concrete road that reaches up to the upper part of the Orchard village. Water supply in the sitio is sourced from the protected area. The forested hills is now occupied by facilities such as information center, water tank, toilet, and the Barangay Chairperson's house that's situated at the former evacuation area. As a result of the developments, there were fewer trees in the occupied land, but the 50 hectares under the CBFM above Orchard village had more trees than before. Other developments in the area include: a church and tourist attractions, like the Stations of the Cross and the White Rock on top of Mt. Arayat. Most of the residents in Orchard were from other provinces, especially in the newly developed areas of Orchard, while the others are descendants of previous residents.

The maps created during workshop on community mapping are located in Appendix P.

2) Impacts and challenges in Ayala, Orchard village

During workshop on problem ranking participants from Orchard village listed four problems.

Hierarchical list of problems:

① Work (low income and few jobs)

② Education access

③ Climate change and disease frequency (flu)

④ Noise from the neighborhood

The shortage of jobs and relatively low income in the village is considered to be the first and urgent concern. Access to education was ranked second among the problems in the community. This was also seen as a factor impeding in getting better-paying jobs and a more prosperous life. The third problem was climate change, which the workshop participants attributed to the prevalence of diseases such as persistent flus. Finally, the fourth problem was noise pollution in the neighborhood, mostly rooted in karaokes.

During Key Informant Interview with the president of the organization, conducted in December 21, 2010 and Focus Group Discussion conducted in May 5th, 2013, there were few more problems related to farming recognized by CBFM members. Crops were facing drought during dry season and it reduced income. CBFM farmers complained that they did not know where to market their products. CBFM Farmers preferred wholesaling over direct selling in wet market because of the limited transportation available and the lack of organize cooperatives which could be beneficial for their sales. The middleman's price for mangoes was reported to be low. In the case of farmers who had no financial resources to purchase farming inputs such as pesticides, they used a sharing system. In this system, the one who invested in farming inputs receives 60 per cent of the income from the sales of farm and orchard products, while the grower receives 40 per cent of the income. Some of the farmers, including CBFM members, to supplement their income often have to look for jobs outside the village, e.g. construction job, during dry season, which covers the period between November and April. Moreover, the high population density in the area contributes to shortage in lands and jobs. Fire outbreaks in the forest are also still prevalent in the area.

3) Tri-capital assessment of Ayala, Orchard village

a Economic capital

Economic capital at household level

i. Income diversity

Income diversity in Orchard was relatively low, but was higher within CBFM Project group, 0.39, than in Non-Project group, 0.31. Figure 7.3a presents distribution of the income diversity, expressed by Simposon's index.

ii. Income dependence on local resource – withdrawn (on-farm including forest) and non-withdrawn resources (on-farm)

In terms of income dependence on local resource, CBFM group was more dependent. The total income of CBFM households generated by local resources averaged at 41.36 per cent, while only 25.63 per cent of the Non-project group's total income is dependent on local resources. Most of the resource related income were generated by in-farm resources (withdrawn resources). On an average, household in CBFM-Project group generated 40.44 per cent of the income from withdrawn resource, and in Non-Project household, 18.43 per cent (Figure 7.3b).

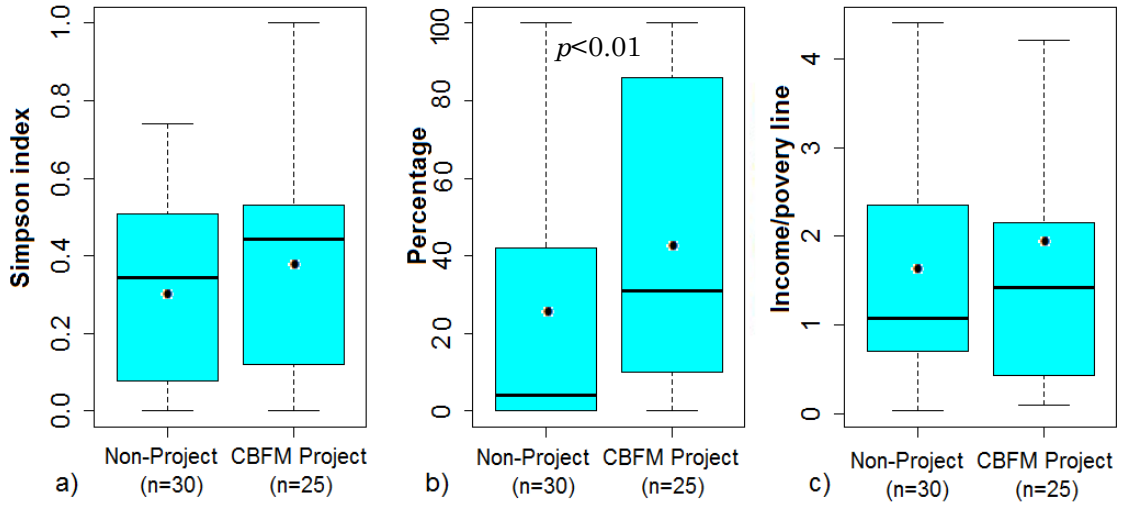


Figure 7-3. Economic capital (a) Income diversity; and (b) Dependence on withdrawn resource, and (c) Income versus poverty line

The composition of household income is presented in local currency unit, which can be found in Figure 7.4. It shows that individual households gained most of the income

from non-resource related sources. To the Non-Project group, fruits sale, livestock keeping, and vegetable growing composed the largest input among resource-related income. The Non-Project group income was mainly sourced in non-resource related income, which is from outside of the farms. In terms of resource related income, it was consisted of non-withdrawn resources: re-selling farmers' products covers the largest fraction of the resource related income, followed by fruits, livestock, charcoal, and vegetables respectively. Figure 7.5 presents the share of different sources of accumulated household income per group, showing the percentage share of each type of source, per respondents group.

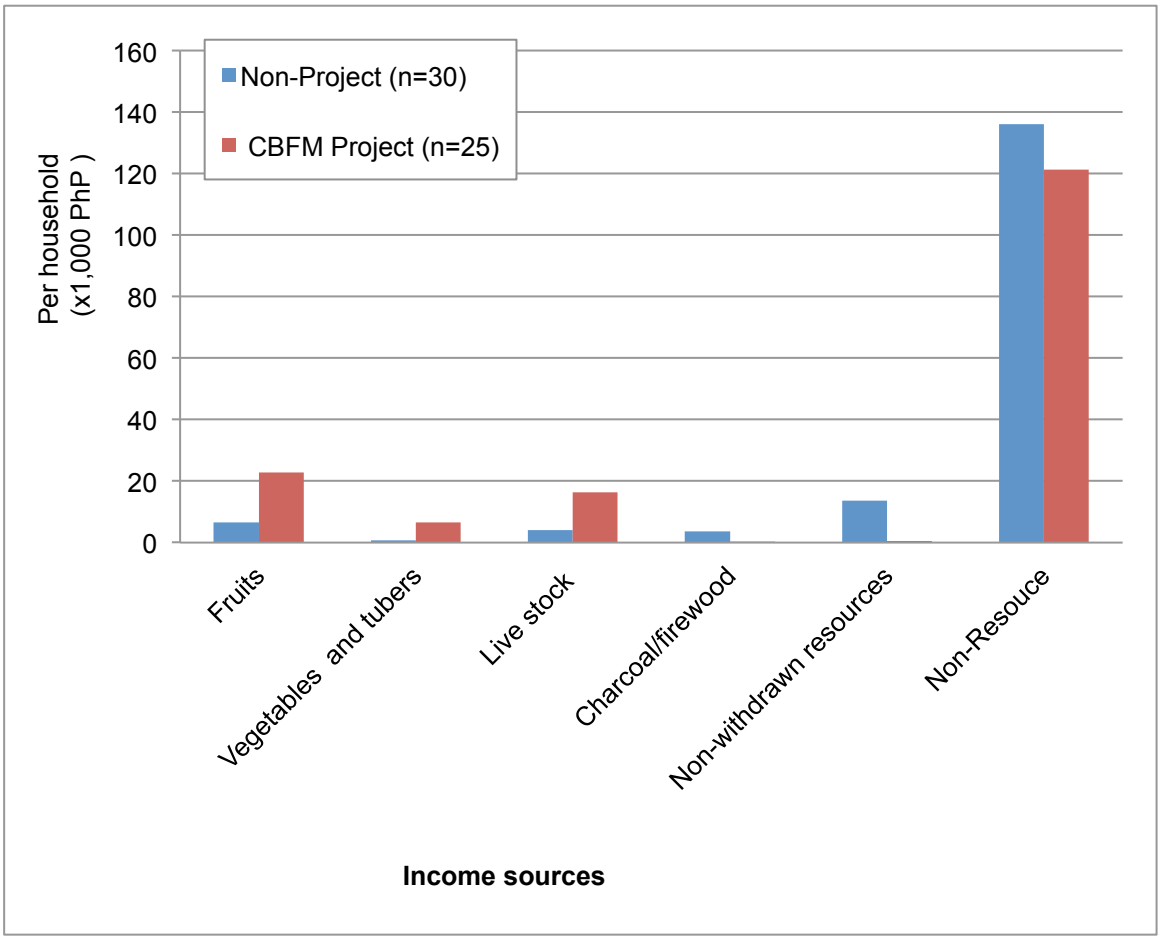


Figure 7-4. Composition of household annual income in Orchard village, Ayala

Note. 1000PHP~22.8USD in 2011 (Bangko Sentral ng Pilipinas)

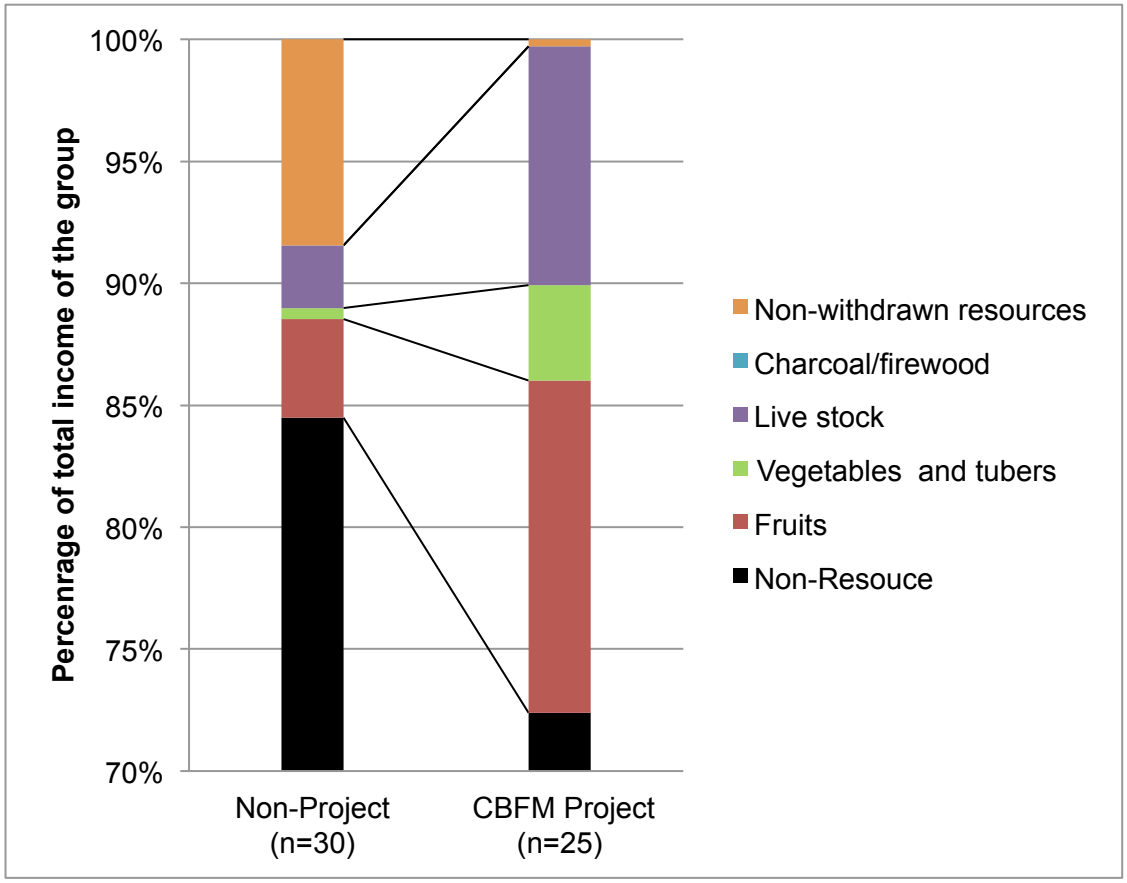


Figure 7-5. Total annual revenue per source in Orchard village, Ayala

Note. The y-axis starts at 70 per cent value

iii. Income level against poverty threshold and income satisfaction

The Income of a person per poverty threshold in Orchard was higher in CBFM Project group. On an average, the income per person was 1.75 times higher than the recommended provincial minimum, and in the Non-Project group, the income was 1.58 times higher than the poverty threshold. The distribution of values is presented in Figure 7.3c.

Income satisfaction in both groups was divided into respondents who are satisfied and unsatisfied (Figure 7.6). In CBFM group there were more satisfied households than unsatisfied, in Non-Project group the situation was in opposite.

There were three types of responses justifying their dissatisfaction from income recognized in Non-Project group and two types of reasons in CBFM groups). In both groups, the most frequent reason (78 per cent of negative responses among CBFM respondents, and 47 per cent of among Non-Project respondents) was financial

dissatisfaction (e.g. *"I considers himself financially unsatisfied because I often have to rely on loans"* ***CBFM 44 years old female respondent, elementary incomplete;*** *"What we're earning is not enough for our day to daily expenses"* ***Non-Project 46 years old male respondent***).

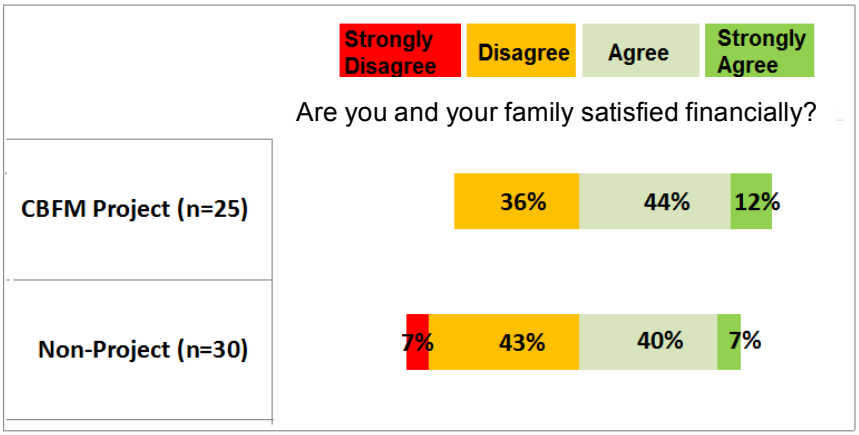


Figure 7-6. Financial satisfaction of respondents in Orchard, Ayala

Note: Neutral answers are not projected in the graph

iv. Equal income distribution

In terms of income distribution, Non-Project group has a better equal distribution of income per person compared to CBFM Project group, 0.43 and 0.48 by Gini coefficient respectively.

v. Housing quality

Majority of the houses in Orchard are one-story concrete houses. 84 per cent of houses in the CBGM group and 77 per cent in Non-Project group were one-story concrete houses. In the Non-Project group, 17 per cent of the houses were two-story concrete ones, while in the CBFM Project group, only 4 per cent of houses were two-story concrete houses, indicating lower produced capital and accumulated wealth.

vi. Electricity access

Orchard village is generally well connected to the electric grid, and 93 per cent of Non-Project household and 96 per cent of CBFM Project household were using electricity.

vii. Mobility (vehicle ownership)

Among CBFM Project households, 44 per cent of them own a car, while in Non-Project group, 60 per cent of the households had a vehicle.

Economic capital at Forest User Group level

i. Income to common budget

The CBFM group was collecting money based on monthly dues. Budget was also generated from income from growing seedlings and conducting plantations, which was redistributed later to members actually working on such duties. There was income contribution coming from activities of group members, such as guiding.

ii. Deposits in the bank

The group had their own bank account, which came from conducted projects and income from the members. The group had also cash on hand.

iii. Fixed assets

CBFM had an information center at the entrance of the national park, a multi-purpose hall, and a bamboo house, which is mainly was used as the CBFM group meeting hall, but afterwards it was occupied by former CBFM chairperson. The Group had also water tanks and established nursery.

b Socio-cultural capital

Socio-cultural capital at household level

A) Structural bridging and bonding social capital

i. Number and structure of individual cooperation networks

The number of cooperations in Orchard differs between groups. In Non-Project group, the average number of cooperation was 2.1 per household, while it was 3.12 in CBFM-Project group. The difference was found to be significant at a confidence level of 0.01. The graphical distribution of cooperation, divided into CBFM Project households, Non-Project households, and not surveyed households, is presented in Figure 7.7. Cooperation related to CBFM were tree planting and farming on CBFM area.

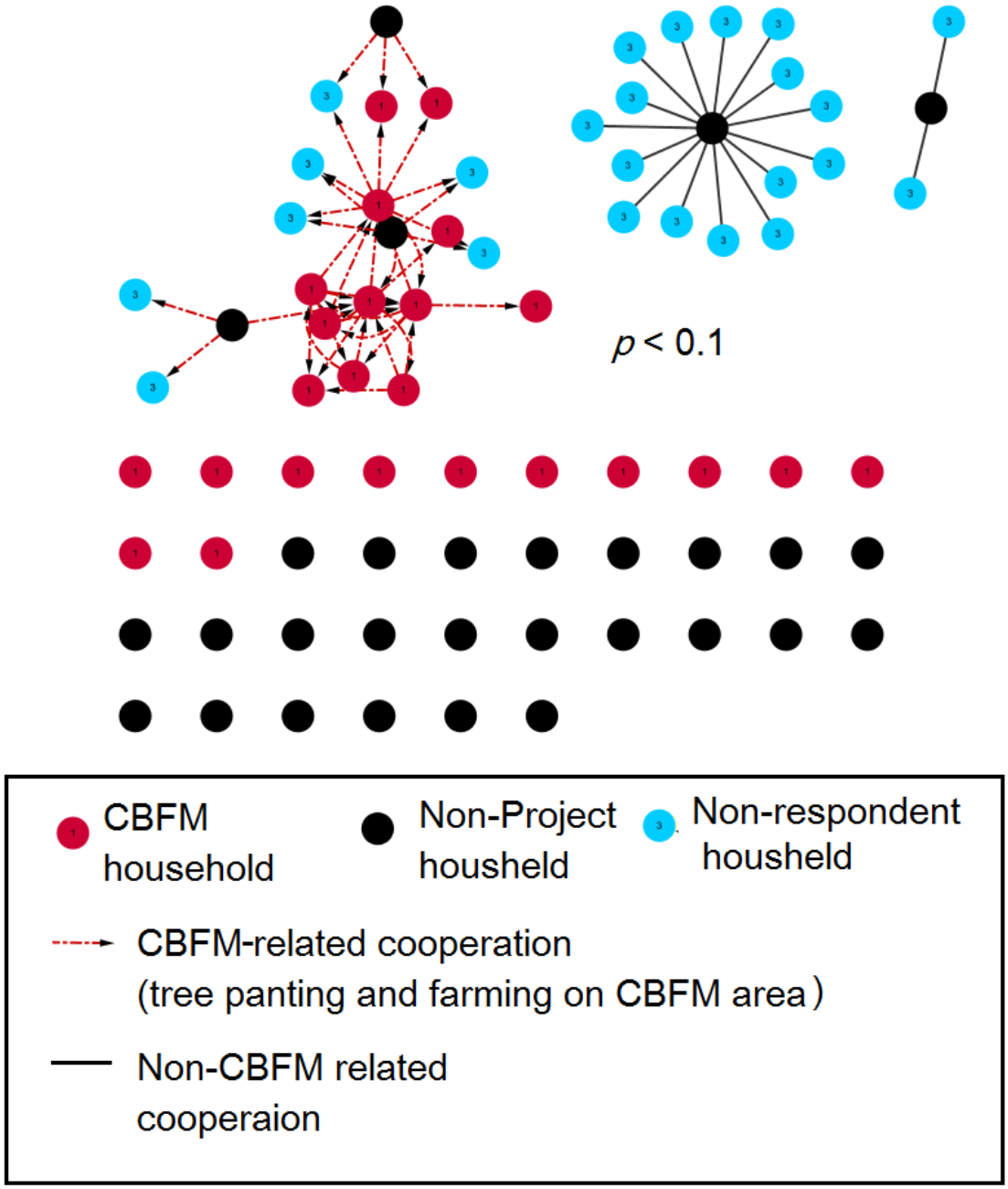


Figure 7-7. Network of cooperation between households in Orchard, Ayala

Among 48 per cent of CBFM Project members had a more complete network because of cooperations, whereas majority was unconnected to any cooperation. CBFM Project members also had cooperations with Non-Project members. Among Non-Project households, 17 per cent of respondents are cooperation member. Farming and agroforestry comprises 79 per cent of the CBFM cooperation, while 21 per cent can be attributed to tree planting.

ii. Social network in the community

ii. a) Reliable friends in time of need

Following the results on the cooperation in Orchard village, another proxy of structural social capital was a network of reliable friends.

Majority of what was disclosed by CBFM Project members reveal that they are more certain to have friends in comparison to the Non-Project members' responses (Figure 7.8a). CBFM members could rely on friends for financial help, food supply, advice, emergency assistance and help in work in the farm (e.g. *"I can rely on them when I have problems and with my work. They're also very generous with their poultry and vegetables"* ***50 years old male respondent, high school graduate****; "They help me clean my area in the forest and they also help me out financially"* ***36 years old male respondent, high school graduate****; "They help me financially. When we have emergencies, they help bring me to the hospital"* ***19 years old female respondent, elementary graduate***).

Majority of the non-Project members agreed or strongly agreed (but in lesser certainity than CBFM Project group) that they had reliable friends; however, there were also signs of isolation, 3 per cent were not sure whether they could state that they had or did not have such friends, and 17 per cent gave negative response. The answers were dependent on the availability of money to be borrowed in times of need, help provided during times of emergencies and food shortage, and close kinship. Respondents, who don't consider themselves to have reliable friends were focused on their own household rather than expanding their network in Orchard.

ii. b) Interaction in community

In terms of interaction in the community, a significant number of respondents among CBFM members expressed to have good and very good interaction in the community. In the Non-Project group, despite the fact that the majority admitted to engaging the community, there was still a group of respondent who was found to be isolated, and did not interact with the local community (Figure 7.8b). The interaction in the CBFM Project group as well as Non-Project group can be attributed attending various gathering, while those who did not engage the community, focused on own

family and work.

B) Cognitive bridging and bonding social capital

iii. Degree of trust in:

iii. a) Local community

In terms of trust given to entire local community, CBFM Project group indicated higher trust than Non-Project group (Figure 7.8c).

CBFM group indicated to have a lower level of degree of trust, compared to social network of friends. Lack of trust among CBFM Project respondents was caused by the occurrence of theft and gambling and individualism (e.g. *"They don't follow regulations. They gamble a lot with cockfighting unlike me, who only sells cocks commercially"* ***50 years old male respondent, high school graduate***). Positive answers were related to the availability of help and cooperation in the community.

In Non-Project group, compared to social network, there was less trust given to the community. Reasons why people did not trust the community were as follows: preferred to stay and rely on themselves, occurrence of theft, and gossips *(e.g. "We just rely on ourselves. I don't get too involved with other people's lives"* ***30 years old male respondent, high school graduate****)*. Those respondents who expressed their trust, similarly to social network, could count on their neighbors for help and cooperate with them, giving each other mutual understanding.

iii. b) Forest User Group

CBFM organization in Ayala did not gain the trust of entire community (Figure 7.8e). Only one third of Non-Project respondents expressed trust to CBFM organization, justifying by saying that the CBFM program will benefit the community and develop communal work in Orchard village. However, those respondents who did not trust the CBFM organization, expressed either lack of any involvement or awareness of their activities. This is rooted on the following: distrust on the actions of the group, the group membership exhibited nepotism (e.g. *"They and their relatives are the only ones benefit from it"* ***30 years old male respondent, high school graduate***), or they lacked involvement in the community life (Inaction within the group, failed to implement

projects, and still used salsh and burn agriculture). One former member also did not trust the group.

CBFM Project members trust themselves moderately, 64 per cent of respondents stated that they trust the organization. This is rooted on the financial and livelihood support provided by the group, they identified as having their own priorities as a group, and the camaraderie and support amongst members. However, one third of respondents did not share the same opinion, pinpointing the group's dysfunctional dynamics, failure to set meetings regularly, inactive membership and leadership, members' disregard for the rules, and biases in the group (*"We don't have regular meetings. The last meeting, we had was last year and that was because you arranged one [meaning survey and group discussion for this research]"* ***50 years old male respondent, high school graduate****; "Chairman is not effective, he relies on himself"* ***56 years old male respondent, elementary graduate****; "There are only 8 active members. I don't blame the others who aren't active though because they're focused on their jobs"* ***44 years old male respondent, elementary incomplete***).

iv. Feeling understood by

iv. a) Local community

Most of CBFM Project group members felt understood by the community, and only 16 per cent did not have such feeling. However, in the Non-Project group, 70 per cent responded that they felt understood by the community, and 30 per cent did not (Figure 7.8d).

In CBFM Project group, reasons for feeling well understood by the community were shared goals and bonds and being able to rely for help and advice. Respondents with no sense of feeling understood by the community were cautious with trusting their neighbors as some were believed to be stealing, or they did not feel their lifestyle match. In Non-Project group, the respondents who strongly agreed to feel understood by the community is rooted on friendship, sense of understanding, and being able to rely for help in farms. However, respondents who just agreed indicated already weaker perception on feeling understood. Respondents who did not feel understood felt isolated, indicated conflicts, different views, and limited reciprocal exchange and trust.

iv. b) Forest User Group

Only 28 per cent of members strongly agreed to feel understood by the community, and 32 per cent just agreed (Figure 7.8f). These responses were attributed to common project meetings and goals that the group shared. However, those members who did not feel understood by the group expressed concern on very passive character of the organization, lack of cooperation, unity, and effects of the work, and often performed on the individual basis (e.g. **44 years old make *respondent, elementary incomplete*** *"Since there's a lack of cooperation from inactive members, I feel like there should be a change in the members. Start a new organization*")

C) Cognitive linking social capital

v. Degree of trust in local government.

Majority of the CBFM Project respondents trusted the local government (Figure 7.8g), while in Non-Project group there was less trust given to the local government. CBFM Project group members' responses were based on the government's implementation and policies on peace and order, livelihood, and facilities, such as road. The strongly disagreeing voice was emphasizing a need for land reform.

Non-Project trust to government was attributed to appreciation of recent development in Orchard village, such as road and water supply. However, among with lower trust level, failed to recognize the role and importance of local government in their lives.

vi. Feeling understood by the local government

In terms of feeling understood by local government, CBFM Project group felt more critical about actions of local government in terms of improving life quality (Figure 7.8h) than their trust for local government. Although steps have been taken by the government to improve different areas of life, it did not meet respondents' expectations. Positive responses were related to satisfaction with currently accomplished programs.

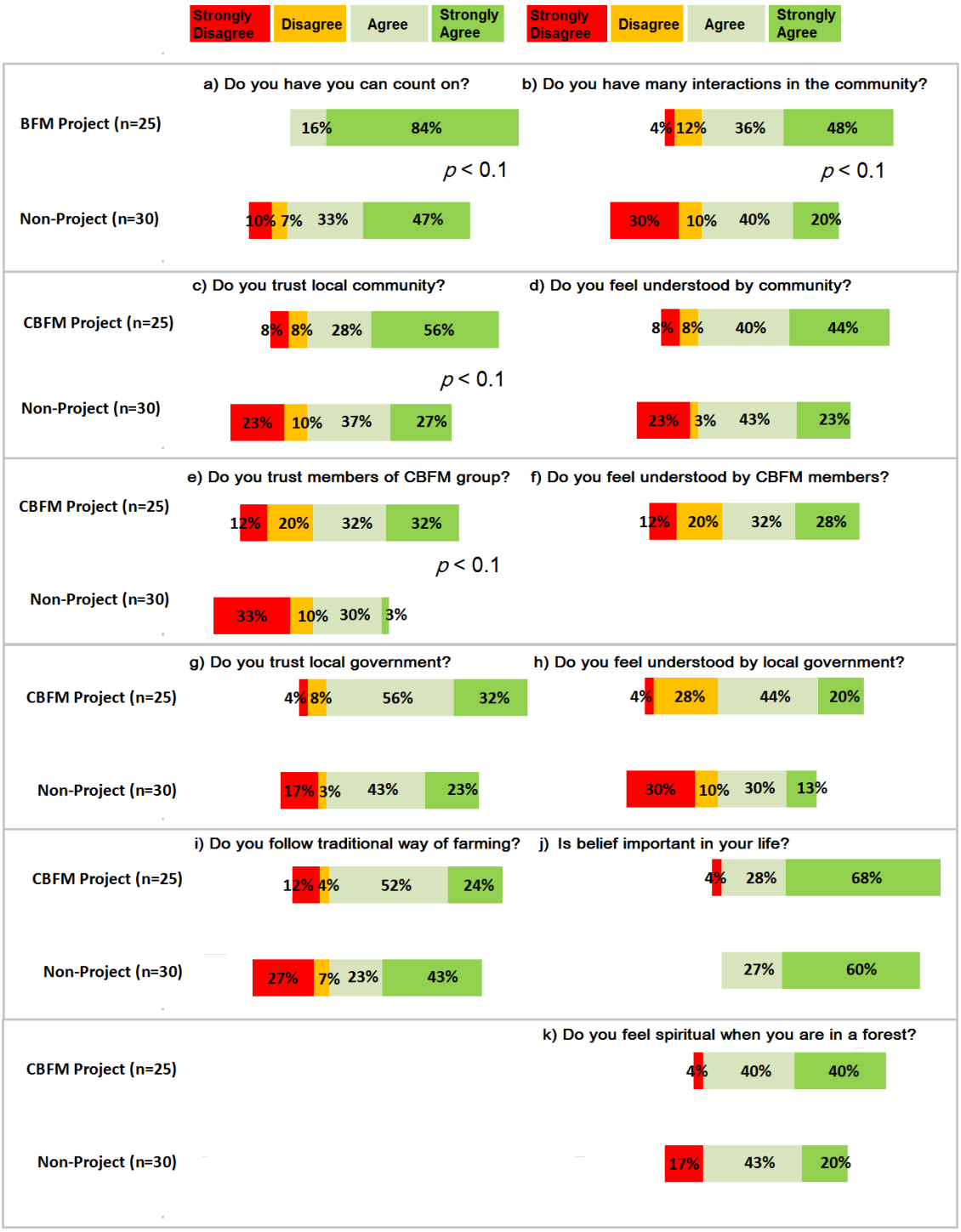


Figure 7-8. Socio-cultural capital in Orchard

Note: Neutral answers are not projected in the graph

D) Cultural capital

vii. Traditional methods in farming or modern farming

In terms of farming methods, 24 per cent of CBFM Project group respondents strongly agreed with using traditional way of farming, finding it as more efficient. 52 per cent of respondents, and this group used method learned from CBFM seminars, but also used pesticides to supplement traditional way of farming learned from parents (Figure 7.8i). Respondents, who disagreed, practiced method learned from college or seminars. One respondent was self-taught. In the Non-Project group, 43 per cent of respondents did not advance their way of farming. 23 per cent of farmers used traditional methods, but they mixed it with modern technologies, like pesticide usage and advanced methods learned at school. Respondents who strongly disagreed did not do farming, carried out modern farming, nor used pesticides extensively.

viii. Importance of belief in life

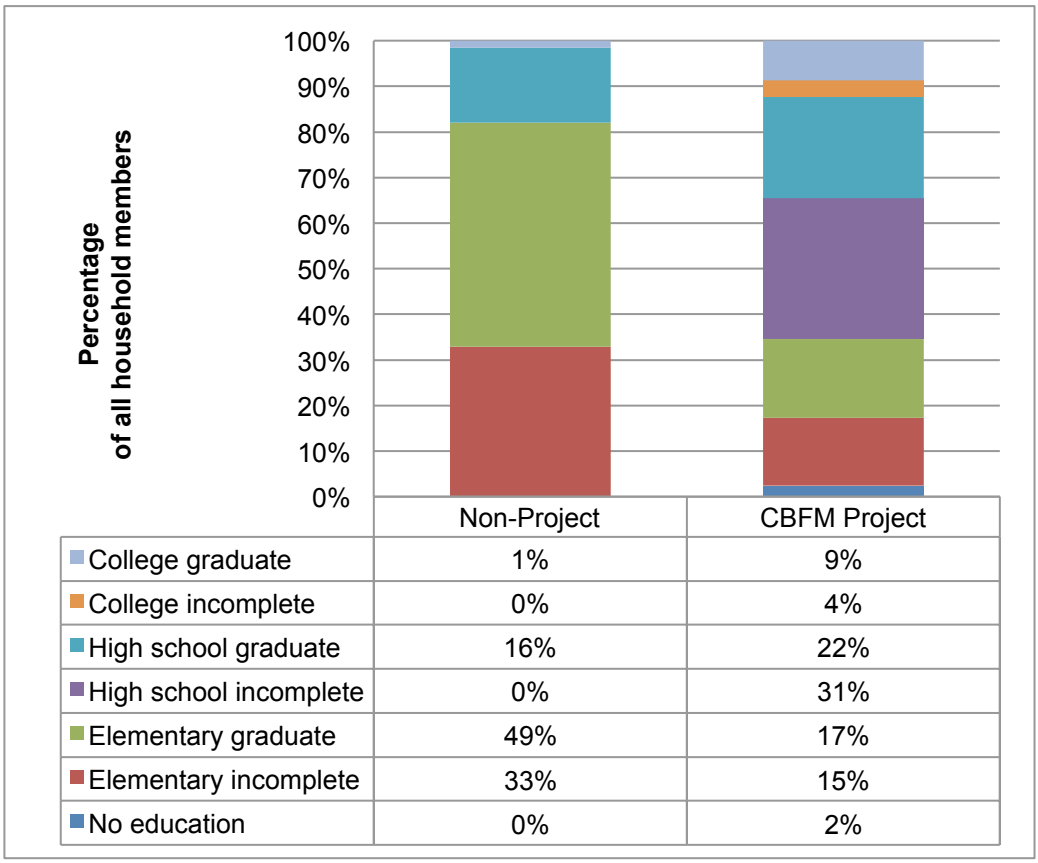
Belief in higher life of Orchard residents was found important, for 87 per cent of respondents in Non-Project group, and even greater number of 96 per cent of respondents in CBFM Project group respondents (Figure 7.8j). All respondents were Christians. Respondents who strongly agreed believed that it gave them a purpose to live and strength to carry on their everyday life. CBFM Project group was found to have stronger priorities put into religion.

ix. Feeling spiritual in the forest

Spirituality in the forest was more developed within CBFM Project group (Figure 7.8k. It was related to respect for nature, God, and the influence of supernatural forces in their life (e.g. "*It manifests through mother nature. Working with mother nature is part of cultivation"* ***54 years old male respondent, high school incomplete****; "I have encountered the supernatural in the forest"* ***42 years old high school male respondent, high school incomplete;*** *"People should have respect for the environment. I don't do crimes against nature"* ***45 years old male respondent, elementary graduate***)

x. Formal education level

Education in both groups was at literate level, where most of the family members above 15 years old attended elementary school. CBFM group households' members had higher education level compared to Non-Project group (Figure 7.9) and this trend was observed regardless of age, indicating higher capacity to manage the project. Most household members ages 30-40 also had college graduate education, and commonly high school level education in older age (Figure 7.10).



	Non-Project	CBFM Project
College graduate	1%	9%
College incomplete	0%	4%
High school graduate	16%	22%
High school incomplete	0%	31%
Elementary graduate	49%	17%
Elementary incomplete	33%	15%
No education	0%	2%

Figure 7-9. Education of all household members (age 15 and above) in Orchard village

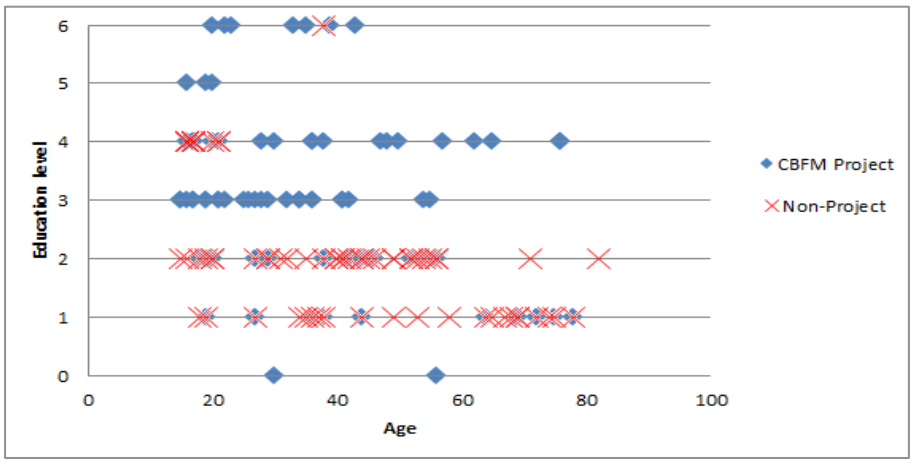


Figure 7-10. Trend in education by age in families of CBFM Project households in Orchard village, age 15 and above

Note: Each household member marked by age and education; Education levels (y-axis): 0 – no education, 1- elementary incomplete, 2 – elementary graduate, 3 – high school incomplete, 4 – high school graduate, 5 – college incomplete, 6 – college graduate

Socio-cultural capital at Forest User Group level

A) Cognitive Bonding

i. Conflict resolution in the group

The group had bylaws established but conflicts of interest that occurred within the group were not discussed by the group, thus not well managed. There were no conflicts regarding resources. However, land distribution was raising some doubts of fairness.

ii. Monitoring and rules violation protection

The group constantly monitored the national park area to prevent from fire occurrence, illegal intrusion in the park, and vandalism of tourist attractions, such as "White rock" on the top of the mountain.

B) Structural Linking

iii. Cooperation with external institutions and companies

The Project group in Orchard village, Ayala was awarded with JICA training

program for project enhancement with NGP contract. These networking was facilitated by DENR. President of the organization and as well as the Barangay Chairperson, a member of CBFM group, were part of Protected Areas Management Board who manages the Mt. Arayat Protected Area. Group leader expressed a hope to find more donors supporting the group in their project.

C) Cultural capital

iv. Trainings

The group received trainings on cultivation of mushrooms (although it did not succeed), and agroforestry, especially fruit production, which was successfully implemented into practice. However, last training took place in 2007.

c Natural capital

Natural capital at household level

i. Land area

Land farm size in Orchard village per CBFM Project household was estimated to be 1.36 hectares and 0.34 hectares per person on an average. In Non-Project group, the average household occupy 0.67 hectares, and 0.15 hectares per person. There was significant difference found between the two groups. Figures 7.11a presents the distribution of land, indicating that land in the CBFM group was limited to the one hectare received through CBFM participation. Moreover, the practice of slash and burn was eradicated from CBFM project area due to manual cleaning of their land.

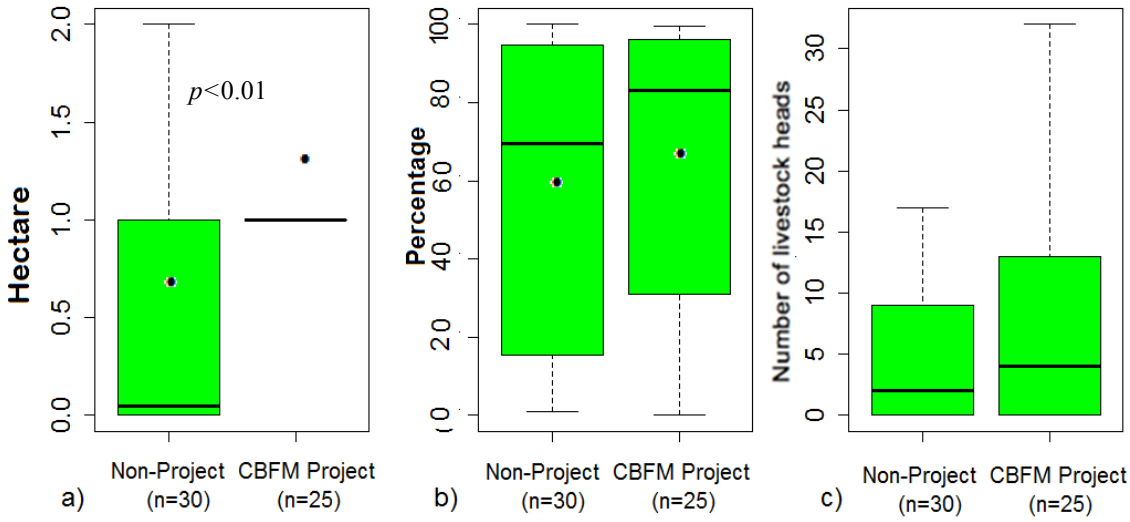


Figure 7-11. Natural capital (a) Farm of household, (b) Renewable energy use, and (c) Livestock

ii. Renewable energy use

In Orchard village, people energy consumption come from different sources, such as firewood, liquefied petroleum gas, gasoline and electricity. In the CBFM Project group 66 per cent of energy was acquired from renewable energy on an average, while in the Non-CBFM Project group, 60 per cent of energy was acquired from renewable energy, mostly from firewood. Distribution indicates those households differ in terms of energy source use (Figure 7.11b).

iii. Livestock

In Orchard village, 68 per cent of CBFM Project households and 60 per cent of Non-Project households keept livestock. On an average, 13 animals for CBFM household and 10 heads of livestock for Non-Project households were kept (Figure 7.11c). CBFM-Project members mostly kept poultry: chickens, ducks, while goats accounted for the third most popular livestock (Table 7.1). In CBFM Project group, chickens, cattle and goats were most common type of livestock.

Table 7-1. Livestock specification and average number per household

	Non-Project (n=30)		CBFM Project (n=25)	
	Total for group	Average per household	Total for group	Average per household
Cattle	11	0	77	3
Pig	2	0	1	0
Goat	28	1	15	1
Chicken	171	6	213	9
Duck	68	2	6	0
Turkey	10	0	0	0
Goose	0	0	1	0
Dove	0	0	11	0
Total livestock	290	10	324	13

Natural capital at household level at Forest User Group level

i. Forest cover and health

The project area was located on the buffer zone of protected area, on the fringes of the forest. It was very important to prevent any threats to the protected ecological system, such as forest fire and expansion of agriculture. Images from Google Earth[32] from 2002 and 2014 demonstrated changes that took place in the project area. In 2002 (Figure 7.13a) an extensive use of fire was captured by the NASA satellite, during the clearing period in April, a timewhen mango and other tree species plantation are not well developed yet. A Google image from 2014 already presented a vast area covered by mango and other trees (Figure 7.13b). Analyzed image from World View 2 (Figure 7.13) showed that 28 per cent of the CBFM project area were covered by trees, regardless of the type (forest or orchard), and lower vegetation, such as grass, covered 72 per cent of the CBFM Area (Table 7.2). The barangay Ayala however was characterized by wider tree canopy than CBFM Project, indicating more farming character of the CBFM area. The part of the Protected Area captured by the image had highest tree cover. The NDVI value of CBFM area was relatively low, reflecting thin

[32] Images not digitized not translated due to copy rights of Google, all rights reserved to Google

vegetation type and cleared arable land for planting.

Table 7-2. Simplified land use and NDVI of CBFM

	CBFM Project	Protected Area Mt. Arayat (limited to the image cover)	Barangay Ayala (excl. CBFM Project area)
Land use			
Trees (inlc. fruit trees)	28%	49%	37%
Lower vegetation (incl. farm)	72%	51%	63%
NDVI	0.21 (0.08 std. deviation)	0.27 (std. 0.13deviation)	0.21 (std. 0.11 deviation)

Note: Image from World View-2 0.46m multispectral imagery, from 2010/2/16.

ii. Forest resource use rights

Members had right to occupy the protected area buffer zone and in the areas where resources are used, they were obliged to implement Community Resource Management Framework. Members could manually till the land and harvest the trees they planted on the CBFM area, but under the issue permits from the government. Respondents however reported that inefficiency in processing permits, which usually takes a few months. For example, trees affected by the typhoon will decay first before the group could get a permit to collect the tree trunks.

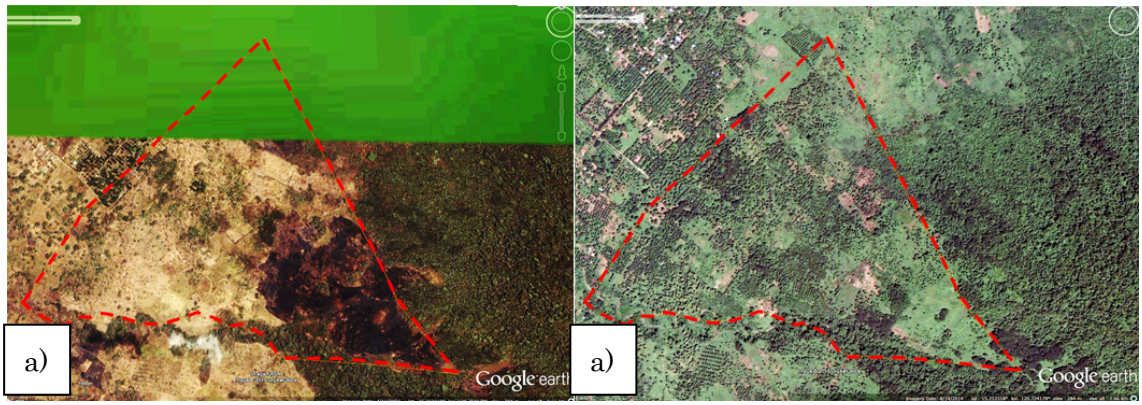


Figure 7-12. Image presenting CBFM project area (a) April 2002) and (b) Augusta 2014

Note: CBFM delineated by dotted line (© Google Earth)

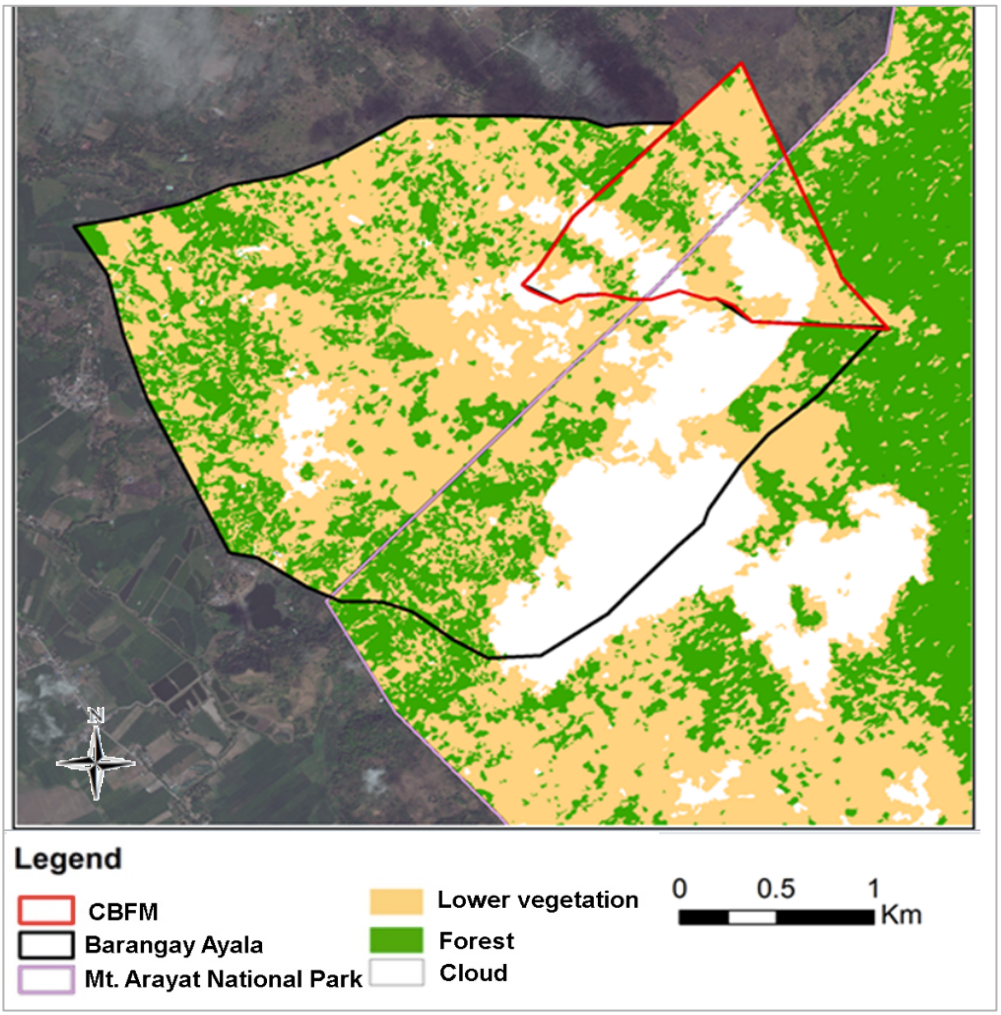


Figure 7-13. Land use classification in Ayala

Note: Image: World View-2 0.46m multispectral imagery, from 2010/2/16.

iii. Clearly defined boundaries of the forest

Boundaries were clearly delineated for the project area, 1 ha of land was distributed per household of a member, and there was no conflict over land. However, redistribution of and membership changes caused some issues with transparency and clarity of land redistribution.

4) Capital interaction

A correlation test of significantly different variables differentiating CBFM Project group from Non-Project group (Appendix R) was conducted (Figure 7.14 and

Appendix S).

In the CBFM project group, income increased for households that trusted the CBFM group, while the farm size increased with the number of friends, indicating that those with better connection were able to gain larger land from the project. Interactions helped in building trust to the CBFM group.

For the Non-Project group, interactions revolved around building trust within the community, which is correlated to the increasing number of cooperation. Those who were building cooperation had lower number of reliable friends however. Their farm income also increased proportionally with their farm area, unlike in the CBFM project group, in which income from the farm was not proportional to the farm size, indicating lesser production efficiency of the group.

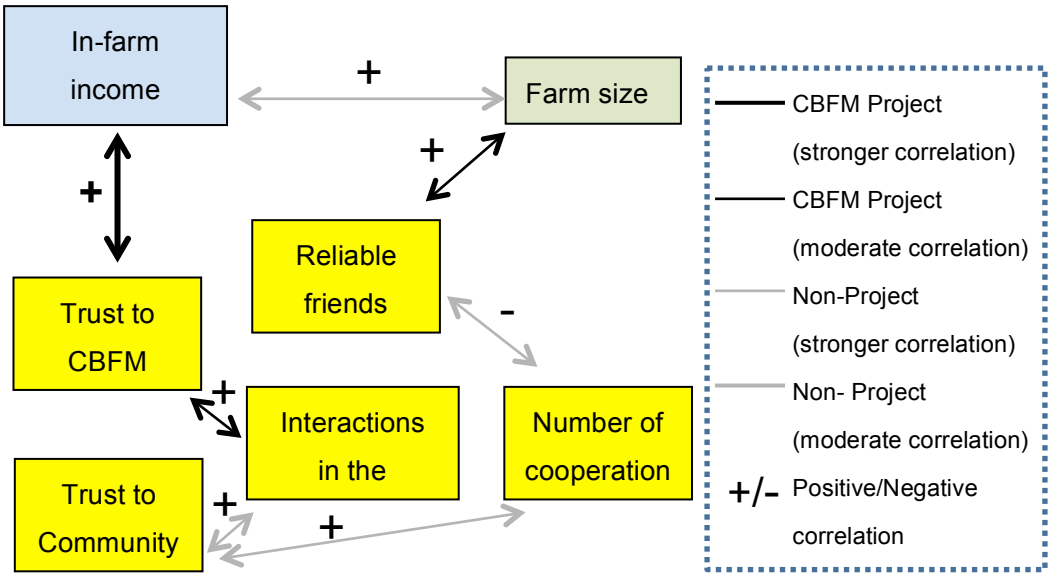


Figure 7-14. Correlation of significant variables in Orchard village

7.3 Case D. Alangan

7.3.1 Barangay Alangan

Barangay Alangan is in the administration of Limay city, Bataan Province (Figure 7.15). Population of Alangan in 2011 was 5626 people, with 1173 houses (Alangan, 2012). The total area of barangay is 890 hectares.

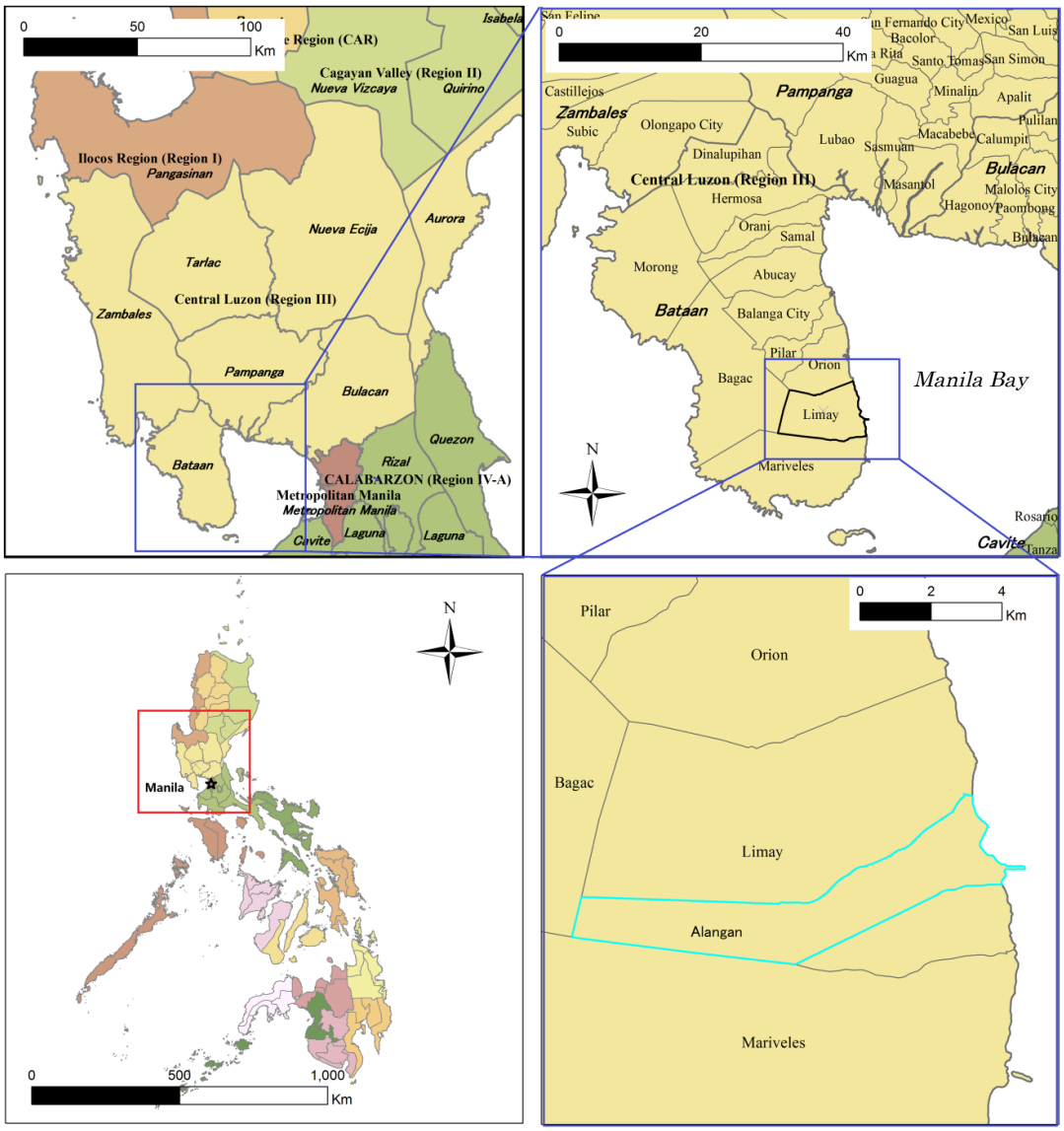


Figure 7-15. Location of barangay Alangan

Source: Author's figure, based on shapfiles sourced from http://philgis.org/

The barangay is ethnically mixed, composed of Ilocanos, Tagalogs, Visayans/Cebuanos, Kapampangans, Caviteños/Batangueños, and marginalized group of Aetas, but mostly

Tagalog people, a native group to the province, but not considered as the indigenous cultural community.

7.3.2 Social-ecological context of Alangan

Livelihood in Alangan under recent changes became more employment-based, compared to former agrarian profile of the barangay. Main means of livelihood were factory employment, construction, fishing, farming, and vendor sale, tricycle operation, and other private or governmental employment (Alangan, 2012). According to the Barangay Profile (Alangan, 2012), the land use patterns was a mix of agricultural land (30%), forest land (20%), residential land (20%), industrial land (10%) and aqua resources (10%). Lowest area, with access to the water (Manila Bay) was occupied by refinery and power construction company, and in the neighbor barangay, a power station. Most of the residential areas were located in the lower part of barangay, around industrial complex of refinery. Further into the mountains, there were less residents and more agricultural landscape was located.

7.3.3 CBFM in Alangan

Community Based Forest Management started in 1996[33] covering 100ha, by Alangan Farmers-Producers Association Inc. (AFPA, Inc.). The project was located in central part of barangay Alanganon, lower slope of Mt. Mariveles (Figure 7.16). Northern part of the project covers barangay Alnagay boundary to Kitang 2 & Luz barangay, but it is within the administration of the same city of Limay. The group s initially consisted of 46 members who decided to develop abandoned and denuded land in the upland part of barangay Alangan. The CBFM project aimed to conduct reforestation in abandoned areas through assisted natural regeneration (ANR), protect existing forest, and provide farm and livelihood to participants of the reforestation. The participants of CBFM started planting fruit trees such as coconuts palm, bananas, and vegetables for their livelihood. They formerly planted fast-growing Gemelina trees, which had commercial viability, but under regional DENR office permits.

[33] CBFMA No. 030102046

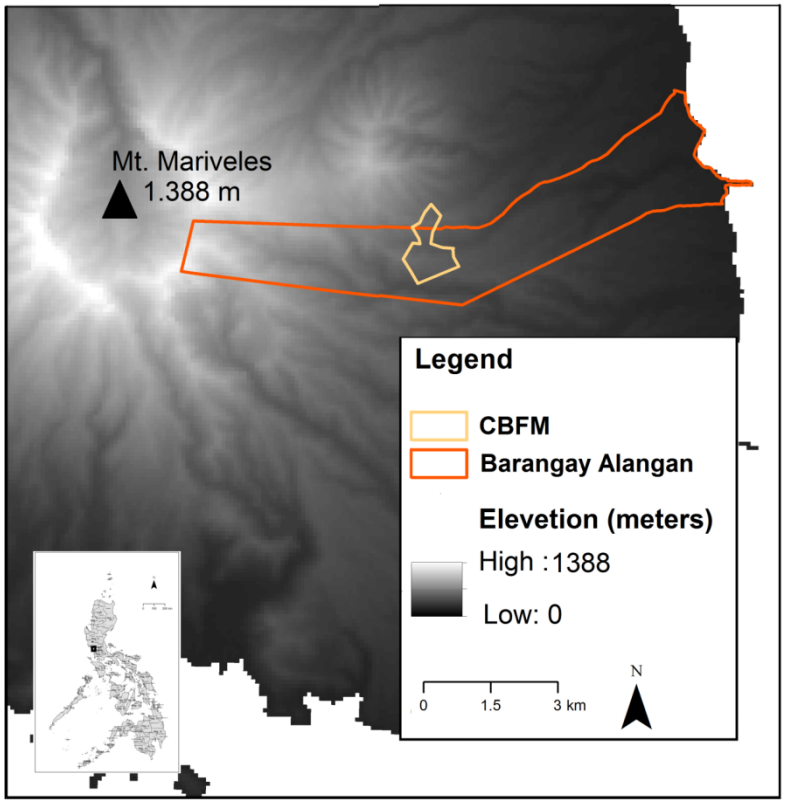


Figure 7-16. Location of Barangay Alangan and CBFM area

Source: PhilGIS, DENR and Digital Elevation Model 90m by NASA.

As of 2013, the association accounted for 87 members. The new members joined the association in 2006. In 2007, project was enhanced by DENR and JICA join project for livelihood with training on basket weaving (Pictures 7.2a and 7.2b) and broom making. The organization received the FAO Edouard Saouma Award in 2011 for Excellence for successfully implementing a low-cost forest restoration project, thanks to their persistent work in the forest work and successful skills training. In 2012, community joined Comprehensive Agricultural Reform (CARP) for agricultural development and reforestation and contracted National Greening Program for reforestation.

According to Focus Group Discussion conducted in May 6 and September 3rd, 2013, the origin of project in Alangan was more grassroots, in which the first members of CBFM brought the idea of developing the upland area, which was originally covered by bush land and grasses, and small portion of the forest.

Picture 7-2. Handicraft produced by Alangan Farmers-Producers Association Inc., learned from JICA training: (a) Baskets (height~ 45cm , Ø~30cm) and (b) trays (Ø10-30cm)

Land provision was already a sufficient incentive to collaborate with government in resource management: "*Being awarded even with one hectare from DENR is a help for the individuals in the community, we don't need to go to the city instead to look for work." (**37 years old female respondent, high school graduate**). "Before CBFM project we did not come here to the mountains, and did not plant forest, and we had little environmental awareness on forest value and importance" (**54 years old female respondent, high school incomplete**),* which was changed by the CBFM project, when they started working, carrying out assisted natural forest regeneration. When the group started learning handicraft, they obliged themselves to learn how to make baskets and brooms as a source of additional income. They became known for it even though it was hard time for the group to gain that skill. The group had *"unity in cooperation, self-esteem, enjoying working together, friendly atmosphere, laughing together, or crying, or being angry, eating, traveling for trainings and fairs" (**49 years old female respondent, high school graduate**)*. They went together to Baguio, Nueva Vizcaya, Los Banos, having a chance to stay in hotels, while the chairwoman had a chance to give a lecture on their enterprise. They also promoted their handicrafts.

7.3.4 Resilience assessment

1) Past to present – changes of Alangan

Barangay Alangan over the past 20 years has changed drastically, from more

farm-based subsistence with little employment, into a more industrialized and urbanized place. Outcome of workshop below presents the changes that took place.

In the past, people used to work on farm, selling vegetables and fruits, also producing charcoal illegally. Working in rice farm was bringing about 150 pesos a day. Labor work in the rice farm was the only work in Alangan. There was no irrigation, only a pre-flow. The industry was only consisted of local employers, small enterprises only. There was no electric power yet. Houses before were fewer, and were made of wood and bamboo. There were no houses on the highway. Barangay hall was a small building at that time. Alangan had one elementary school. Road from Alangan to highway was rough, for water buffalo, horses, and walking only. In the mountain, there were only forests. No concrete bridge in the barangay was constructed yet.

At present, a number of changes took place transforming image of the place. People had employment in industries; people of the barangay were hired in different industries. However, there were still people working in the farm. Main farm to marker road was already concreted. People could have business, farm, butchery, plantation of vegetables. They could also sell as much as they want. Apart from planting rice, there were already multiple ways to earn. Some international businessman, such as Korean investors, started businesses – refinery and power construction company, and in the neighboring barangay a power station. Local industry, promoting their good image, also appeared to be funding small reforestation projects in the barangay, especially reforesting local mangrove areas. However, the local industry raised some health concerns of local residents, e.g. air pollution and the business trying to compensate with free health check-ups for residents. People in present barangay became more mobile, changing their life style: *"Transportation is available in Alangan, people always shop. People changed, and became richer, well known, civilized; they can bring their children to school, also to private schools. Social relations improved because they can communicate by cellphone, even children can afford it" (**49 years old female respondent, high school graduate**)*. Other improvements that were made in the barangay were new barangay hall of much larger size, health center, two schools, and a bridge.

The map drafted during workshop in Alangan are presented in Appendix T.

2) Impacts and challenges in Alangan

During the workshop conducted on February 24th, 2015, a problem ranking was carried out in order to list issues that community needed to face, and what kind of livelihood shortcomings the barangay had. Ranked by community problems were:

Hierarchical list of problems is as follows:

① Farm to market road (improvement)

② Lack of skilled people

③ Irrigation

④ Medical support

The main problem in the community undeveloped farm to market road. This comes from the farmers' perspective, especially from the CBFM members. From the perspective of people who sought for jobs outside the farm, fast industrialization was disproportionate to the rising number of skilled workers. Thus, the lack of skilled people capable to take up jobs in the local industry was found to be insufficient. Less skilled citizens worked as drivers. Farmers were also lacked a developed irrigation system, which was listed as problem ranked as third most important. The last problem was related to the insufficient health care in the barangay, lacking a professional and affordable medical support.

3) Tri-capital assessment of Alangan

a Economic capital

Economic capital at household level

i. Income diversity

Income diversity in Orchard was relatively low, but it was found to be higher within CBFM Project group, 0.30, than in Non-Project group, 0.27. Figure 7.17a presents distribution of the income diversity, expressed by Simposon's index.

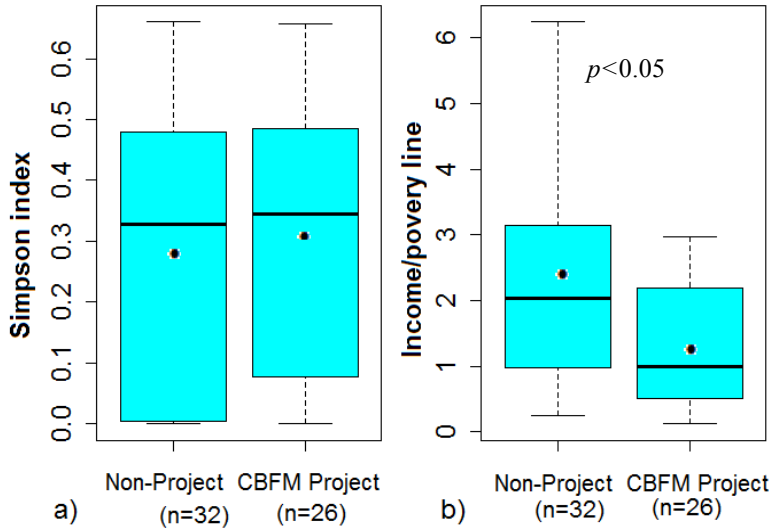


Figure 7-17 Economic capital a) Income diversity; b) Income versus poverty line

ii. Income dependence on local resource – withdrawn (in-farm including forest) and non-withdrawn resources (on-farm)

In terms of income dependence on local resource, CBFM group was found to be more dependent on such source. On an average, 28.81 per cent of the total income of a household was generated by local resources, and 9.46 per cent of income of Non-Project group household was generated by the local resource (Figure 7.18a). The composition of household income is presented in Figure 7.19.

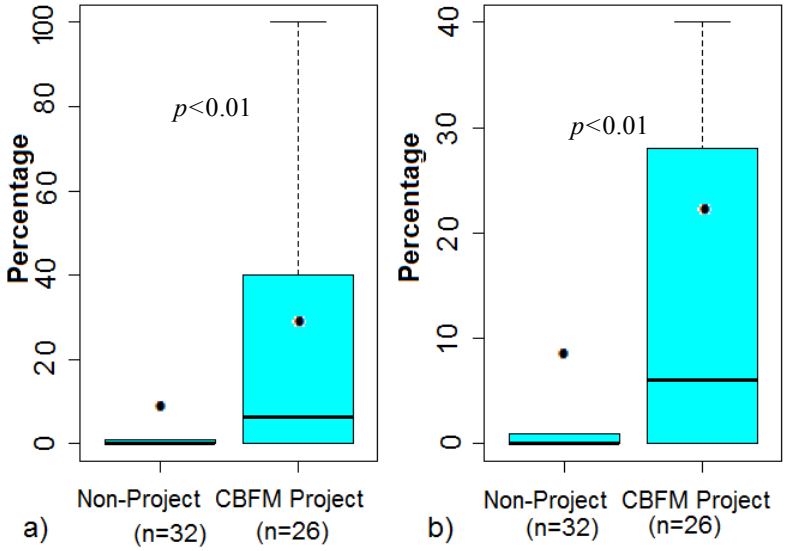


Figure 7-18. Dependence on a) withdrawn, and b) and non-withdrawn resources in Alangan

Note: Per household; both variables significantly different between CBFM and Non-Project group

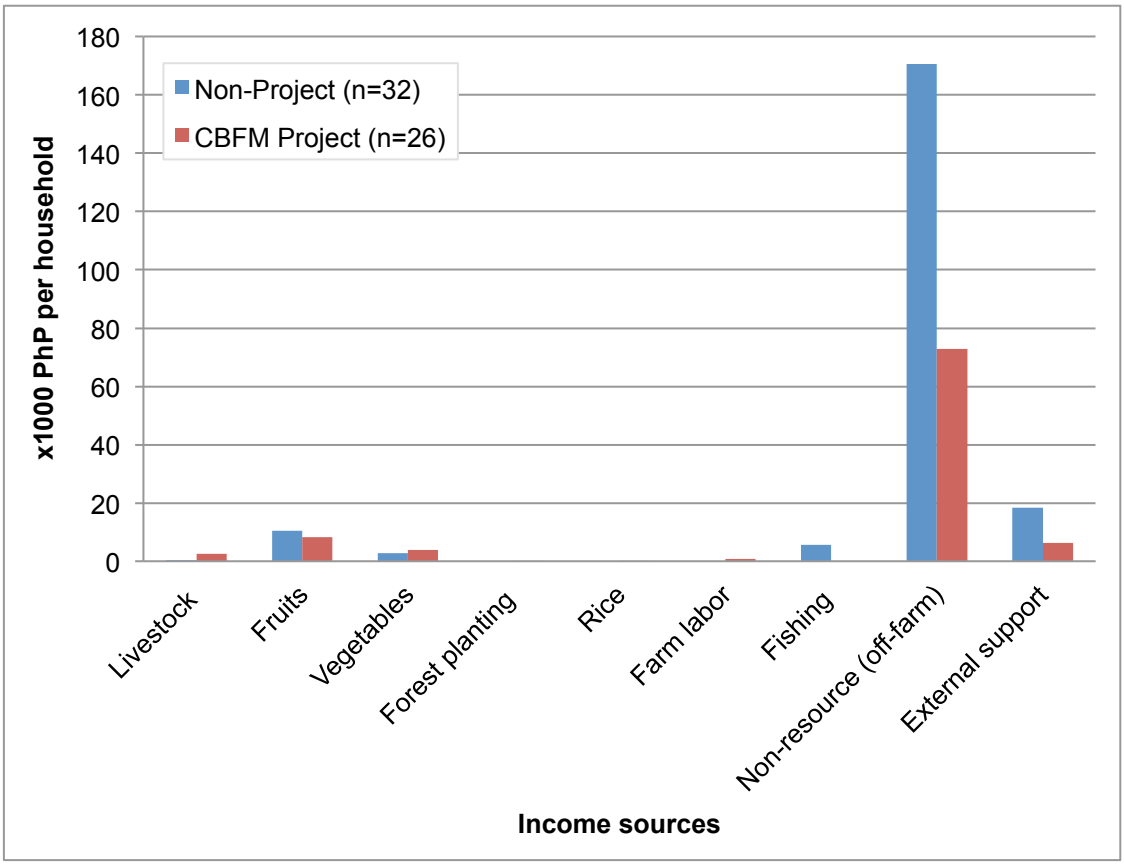


Figure 7-19. Composition of household annual income

Note. 1000PHP~24.4USD in 2013 (Bangko Sentral ng Pilipinas)

On an average, household in CBFM-Project group generated 21.81 per cent of the income from withdrawn resource, and in Non-Project household, 5.30 per cent ($p<0.01$) (Figure 7.18b).

Figure 7.20 presents share of different sources of income in accumulated household income per group. The main source of income in in CBFM Project was from non-farming jobs, normally coming from a breadwinner, second income come from natural resources, then financial support from outside – remittance from abroad or from working children in the country. From natural resource, the most profitable were fruit production, vegetables, and livestock.

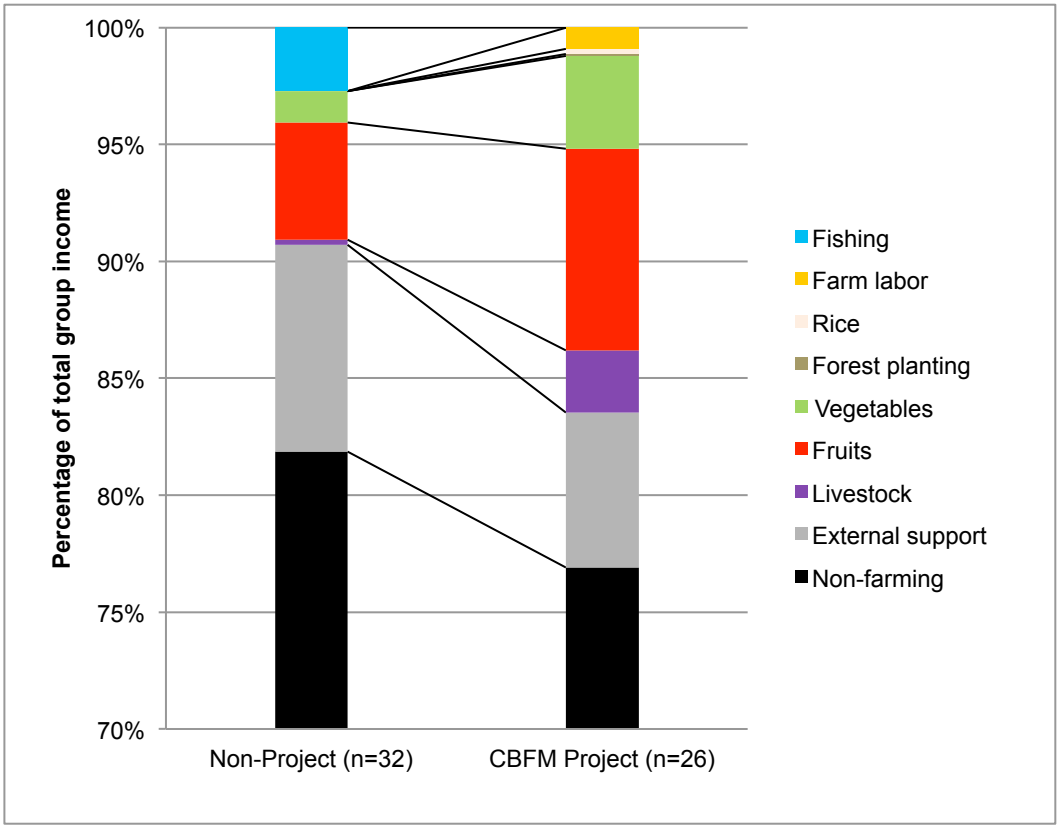


Figure 7-20. Total annual revenue per source in Alangan

Note. The y-axis starts at 70 per cent value

Similarly to CBFM Project group, the income of Non-Project was sourced mainly from non-resource jobs, such as construction workers, drivers, official employees. Still, significant incomes came from outside, especially foreign remittance and support form children. In terms of resource withdrawn income, important sources were fruit selling, fishing, vegetables production.

iii.Income level against poverty threshold and income satisfaction

The income of a person per poverty threshold was found to be higher in Non-Project group, indicating wealthier status of the group ($p=0.01$). On an average, the income per person was 2.39 times more than the recommended provincial minimum income per person. In the CBFM Project group the income was 1.36 times of the poverty threshold. The distribution of values is presented in Figure 7.17b

In the CBFM group, there were more satisfied households than unsatisfied. In Non-Project group the situation was the complete opposite (Figure 7.21). The main

reason of financial dissatisfaction of respondents in both groups was insufficient earning. In the Non-Project group, two other causes were listed: high living of cost in Alangan and unstable job market. In the CBFM group, second cause of income dissatisfaction was reliance on support from family and relatives; and third one was decrease of income.

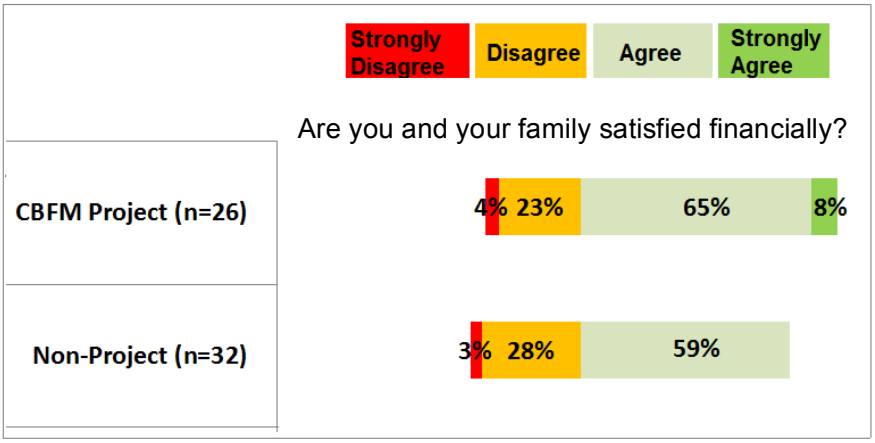


Figure 7-21. Financial satisfaction of respondents in Alangan

iv. Equal income distribution

In terms of income distribution, Non-Project group indicated more equal distribution of income per person, compared to CBFM Project group. They had rated 0.44 and 0.41 by Gini coefficient respectively.

v. Housing quality

In both groups, majority of the correspondents lived in one-story concrete houses. 46 per cent in the CBFM group and 84 per cent in the Non-Project group live in one-story concrete houses. However, CBFM Project group had less capital production in housing than the Non-Project group. They had less concrete housing compared to the Non-Project group. In the CBFM group, bamboo-wooden houses and mix-material houses constituted 38 per cent of total houses, whereas in the Non-Project group these houses accounted for 6 per cent while 3 per cent rented houses.

vi. Electricity access

Orchard village has access to electricity. 94 per cent of Non-Project household

and 77 per cent of CBFM Project households had electricity.

vii. Mobility (vehicle ownership)

In terms of vehicle ownership, 50 per cent of the CBFM project household and 44 per cent of the Non-project household owned a vehicle. Moreover, the highway passing Alangan, increased the mobility of residents. Public transportation and buses passing by Alangan makes transportation to major cities in the region and the country's capital, Metro Manila more accessible. Local transportation by tricycle and jeeps were also available, especially for transporting to local cities, such as Limay city. However, the road leading CBFM Project area is still an undeveloped rough road.

Economic capital at Forest User Group level

i. Income to common budget

The group was found to have regular income coming from their budget. The budget is comprised of the monthly duties of the members, income from projects, and income for resources from common CBFM area, such as bamboo sticks. Incomes and costs from the budget were recorded in their accounting logbook/.

ii. Deposits in the bank

The group had bank account with money deposited on it. They also have cash in hand.

iii.Fixed assets

In barangay Alangan, CBFM group had a tractor (Picture 7.3a) that was acquired using the organization's income from contracted reforestation. The construction and renovation of the multipurpose hall (Picture 7.3b) were also coming from organization's revenues. They also have wood that came from the CBFM area and local forest. They often get trees that feel during typhoons. The group also purchased jeep in the past, but it was sold due to its technical problems. The group had two nurseries for project development (Pictures7.4a and 7.4b). They have plans to use them commercially for reforestation projects of other groups.

Barangay Alangan offered facilities to residents as well, such as a healthcare center. The barangay hall that could be used by residents for various purposes. There are two schools in the area as well.

Picture 7-3. Fixed assets of Alangan CBFM group: (a) – tractor; and (b) multipurpose hall as fixed assets of the CBFM group

Picture 7-4. Nurseries of the Alangan Farmers-Producers Association, Inc. (a) Nara trees nursery on the project area, and (b) nursery

b Socio-cultural capital

Socio-cultural capital at household level

A) Structural bridging and bonding social capital

i. Number and structure of individual cooperation networks

Number of cooperation in Alangan differs between groups. In Non-Project group, the average number of cooperation was 1.06 per household, and 6.81 in CBFM-Project group. The difference was found to be significant (p<0.01). The network

of cooperation was divided into CBFM Project households, Non-Project households, and not surveyed households (Figure 7.22). It showed that CBFM Project members were creating a large network with many households cooperating. It allowed CBFM household members to integrate with other residents. Several types of CBFM-related cooperation were found, such as basket and plate weaving, planting of fruit trees, cocoa trees, bamboo, forest trees, and maintenance of nursery.

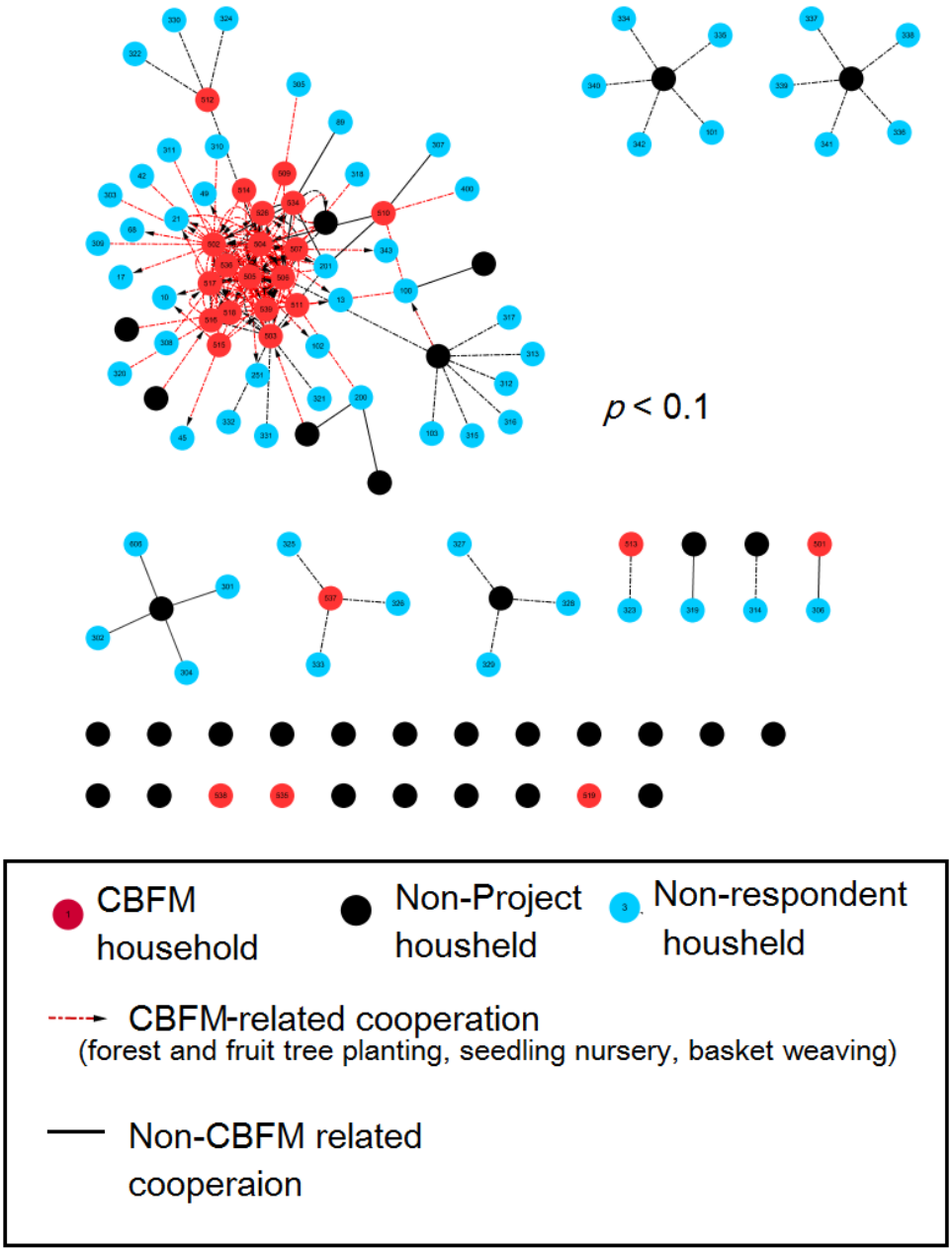


Figure 7-22. Network of cooperation between households in Alangan

CBFM project groups had a more diverse range of cooperation activities. 33.90 per cent were related to basket weaving, 23.73 per cent to tree planting, and 15.82 per cent to farming. For the Non-Project group, on the other hand, most prevalent cooperation types were cooperatives at 29.41 per cent, tree planting at 20.59 per cent, and mangrove planting at 23.53 per cent (Appendix U).

ii. Social network in the community

ii. a) Reliable friends in time of need

Following the results on the cooperation in Orchard village, another proxy of structural social capital was the network of reliable friends (Figure 7.23a). CBFM Project members admitted that they have friends to count on. 42 per cent of the respondents strongly agreed, and 54 per cent agreed that they had friends to rely on. The CBFM Project respondents considered themselves to have friends they could rely on for advice and help. Respondents also emphasized long-term friendship as a key factor. The Non-Project members in majority agreed (41 per cent) or strongly agreed (52 per cent) that they had reliable friends. In the Non Project group, those they considered friends were reliable in terms of financial and other support, such giving advice.

ii. b) Interaction in community

In terms of interaction in the community, a significant number of respondents among CBFM members expressed to have good and very good interaction in the community, indicating socially active people and a good social network, whereas in the Non-Project group, number of interactions was significantly lower (Figure 7.23b). The interactions in the CBFM Project group were attributed to active participation in the project and in the life of barangay Alangan, The Non-Project group respondents who agreed with the statement attributed interaction in the community to meetings and gathering.

The CBFM Project group respondents who weren't actively engaged with the community focused on their job. Non-Project respondents who wasn't active in the local community were either busy with their life or not interested in being active in the community.

B) Cognitive bridging and bonding social capital

iii. Degree of trust in:

iii. a) Local community

In terms of trust given to entire local community, CBFM Project group indicated lower trust to their community than the Non-Project group (Figure 7.23c). However, in CBFM Project group there were more respondents who strongly agreed with trusting the community, compared to the Non-Project group.

The reasons why respondents of CBFM Project group did not trust neighbors and local community were the disparity in personal goals, unfamiliarity with neighbors, or insecurity with their property. The respondents who could not decide whether they were trusting or not, reported misunderstandings, and insecurity due to burglary that was prevalent in the past (e.g. *"There used to be robberies but thanks to the barangy, everything is going well (fast response)"* ***57 years old female respondents, college graduate***).

In the Non-Project group, the reason why respondents did not trust the community were dishonesty, gossiping, and unpaid debts. The reason why respondents were not able to decide whether they trusted the community or not, was unfamiliarity with the community.

iii. b) Forest Users Group

CBFM organization in Alangan was generally trusted by the CBFM and Non-Project respondents (Figure 7.23e).

The CBFM group s was found to be not trusted by other households not participating in the project, and 34 per cent of respondent did not know about the group. Respondents who agreed with trusting the organization had general knowledge about the CBFM existence in the Alangan community and their activities. Those respondents who strongly agreed to trust the community understood the role of CBFM (e.g. *"They provide livelihood programs and protect our forests from fire use"* ***42 years old female graduate, college graduate****; "The efforts they do are important especially for the future generations"* ***37 years old male respondent, college incomplete****; "They protect our forests"* ***50 years old female graduate, elementary graduate***).

CBFM members themselves trusted each other (69 per cent of respondents). Those respondents who did not agree that they trusted the CBFM group complained about lthe lack of participation by some members, particularly those who only participated in meetings but not in the actual work. The second reason of not trusting was the corruption, mostly with the misuse of the organizational budget (e.g. *"I can't trust everyone especially those who only go to meetings and don't join us in our programs [activities]"**53 years old female respondent, high school graduate**; "Some yes [I do trust], but some take advantage of the organization's fiscal budget" **40 years old male respondent, elementary incomplete**; "Corruption exists within the organization" **56 years old female respondent, high school graduate**)*. Respondents who neither trusted nor not trusted, attributed it to uncooperative character of some members (e.g. *"Not all, they have different goals and others seems to be driven by their individualistic goals, might be rooted in poor income for some" **54 years old male respondent, elementary incomplete**; "There are so*me members who aren't cooperative" ***58 years old male respondent, elementary incomplete***). Respondents who trusted the group attributed it to the group's hard work, camaraderie, the reputation established by the group, and effective conflict resolution. However, despite trusting the group, there was the issue with the chairperson misusing the funds (*"Not all. There is a problem with the chairman. We are looking into it now" **74 years old male respondent, elementary incomplete***).

iv. Feeling understood by

iv. a) Local community

Most of CBFM Project group members felt understood by the community, and only 15 per cent did not have opinion. For the Non-Project group, 16 per cent did not have an opinion, while 6 per cent felt that they were not understood by the community (Figure 7.23d).

In the CBFM group, those respondents who were not certain about feeling understood by the community were focused on their own business, but also put emphasis on different priorities in the community. For the Non-Project group respondents, those who did not trust the community had doubts about the community intentions or felt a sense of disparity with the community's values.

Higher share of the CBFM group respondents strongly agreed on feeling understood by community compared to the Non-Project group respondents. The CBFM respondents found more involvement in the community, through their participation in the CBFM project *("We have a lot of activities like livelihood seminars and reforestations that allow our bonds and understanding to grow stronger"* ***58 years old female respondent, elementary graduate****; "There is now a synergy within the community, we are now much more organized"* ***57 years old female respondent, college graduate****).*

iv. b) Forest Users Group

CBFM group respondents in 65 per cent felt understood by their organization, according to the survey (Figure 7.23f). Respondents who did not feel understood justified it by saying that inactive members caused certain the failure of project implementation (*"There is one project that we weren't able to implement because there are a lot of inactive members lately, we, however, maintain a close bond as members"* ***58 years old female respondent, elementary graduate;*** *"I feel that everyone should be more honest, address the problems directly"* ***40 years old male respondent, elementary incomplete***). Respondents who were uncertain had doubts about the inactive member, limited trust, and weak relationship within the group. Respondents, who agreed with feeling understood by the groups were also affected by inactive members and the need to improve the capacities of the organization. Those respondents who strongly agreed with feeling understood by the organization emphasized shared goals, and ability to consolidate problems through discussion.

C) Cognitive linking social capital

v. Degree of trust in local government.

Majority of the CBFM Project members trusted the local government, and compared to Non-Project group, more respondents strongly agreed with the statement (Figure 7.23g).

In CBFM Project group. respondents who neither agreed nor disagreed, were not interested in the issue. They would rather focus on farming since they believe the local government has different development priorities from CBFM.

The CBFM Project group respondents who strongly agreed with trusting local

government were attributed it to the help and support provided by the government to the community and to the CBFM project. The Non-CBFM Project participants who had strong trust to the local government justified it by saying the government provides emergency support (during typhoons), advice, and peace and order implementation. As for the Non-Project group respondents who did not agree with trusting the local government, pointed ongoing corruption, biases, individual goals, and inefficient work as their reasons.

vi. Feeling understood by the local government

In terms of feeling understood by local government, CBFM Project group respondents perceived the government to understand their needs and situation. They have more positive and stronger statements compared to the Non-Project group (Figure 7.23h). However, those respondents who felt not well understood by the local government had problems with cronyism, such as the need to be allied with the officials to get benefits, and corruption. In the Non-Project group, respondents who did not feel understood by the local government had similar allegations: questions on fairness, corruption, and general lack of understanding of the community. Respondents of the group who did agree with the statement had an opposite opinion. For them, the government understood their situation and thought some programs were beneficial to residents. However, they issued concerns about the government failing to adequately address their problems because the programs cater to limited demographics, e.g. preferring only youth as target group.

D) Cultural capital

vii. Traditional knowledge/way of farming or modern farming

Among the two groups, CBFM and Non-Project, all CBFM Project group were still farming, although they have different approaches, while 31 per cent of the Non Project group respondents did not farm anymore (Figure 7.23i). In the CBFM group, 54 percent strongly disagreed with continuing traditional farming. It was replaced by modern techniques, with most taught in CBFM seminars. 19 per cent of the group practiced mix methods, traditional more organic way together with new methods with use of fertilizer and pesticides, while 8 per cent of respondents continued implementing traditional methods learned from ancestors. In the Non-Project group, 56 per cent of the

respondents still use traditional farming methods, either self-taught or learned from their parents, whereas 13 per cent are already using modern methods learned from their school.

viii. Importance of belief in life

Alangan residents are mostly Christian and considered beliefs as important. 85 per cent of respondents in CBFM Project group considered religion to be strongly important, while 12 per cent found it to be just adequately important. For the Non-Project group, the weight of life's importance was lower compared to CBFM Project group. 50 per cent of respondents strongly agreed and 44 per cent just agreed with the importance of belief in life (Figure 7.23j).

ix. Feeling spiritual in the forest

Spirituality in the forest was higher within CBFM Project member group than in Non-Project group (Figure 7.23k). The spirituality in the CBFM Project group was related to their belief in God, its presence in nature, and its protective character. However, respondents of the group who did not feel the same, somehow still experienced spiritual presence in the forest. For the Non-Project group, the feeling of spirituality in the forest was related to God's creation of the nature and to supernatural power in the forest. They strongly related their beliefs to the effects of deforestation. For those who disagreed with the spiritual presence in the forest simply didn't believe.

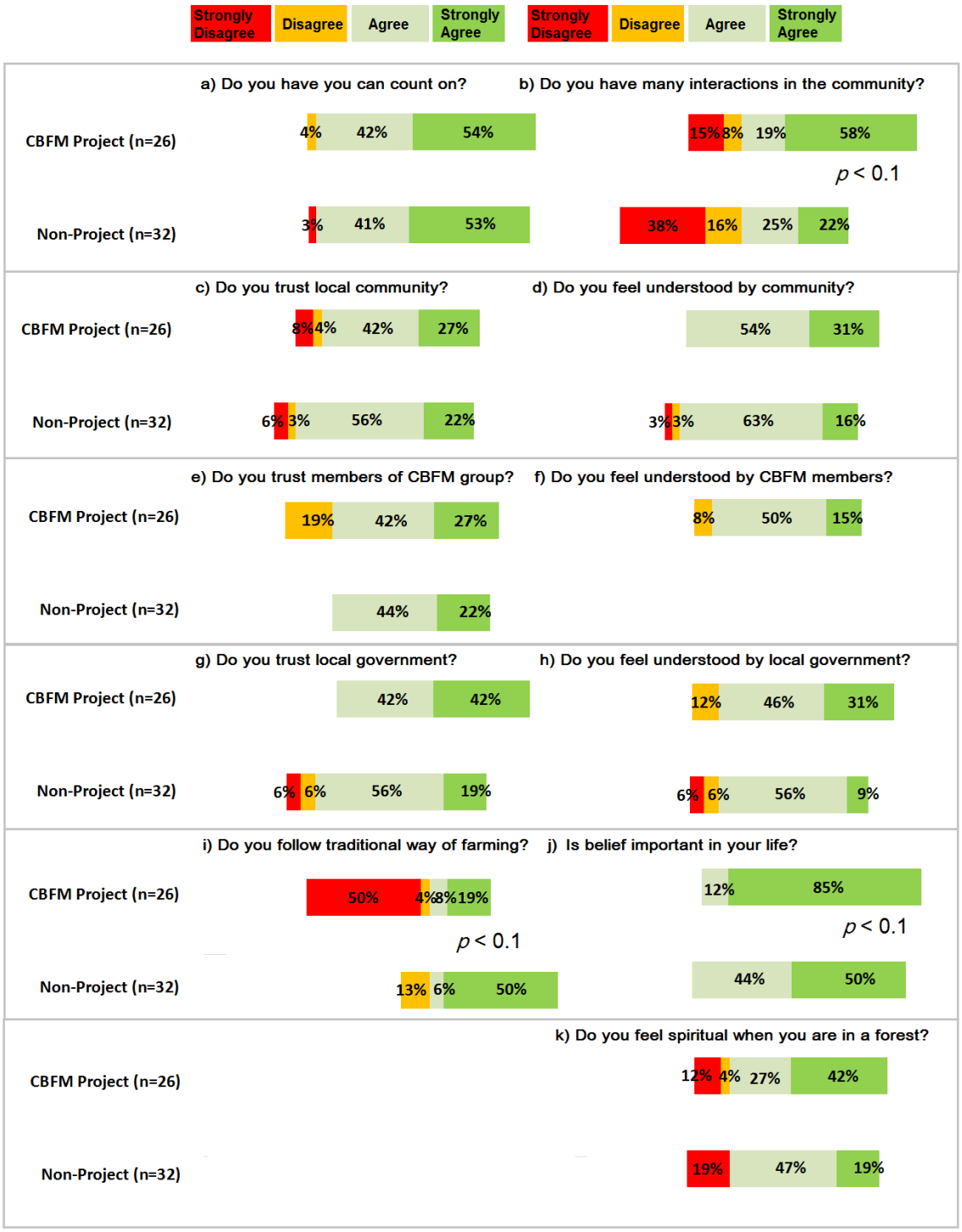
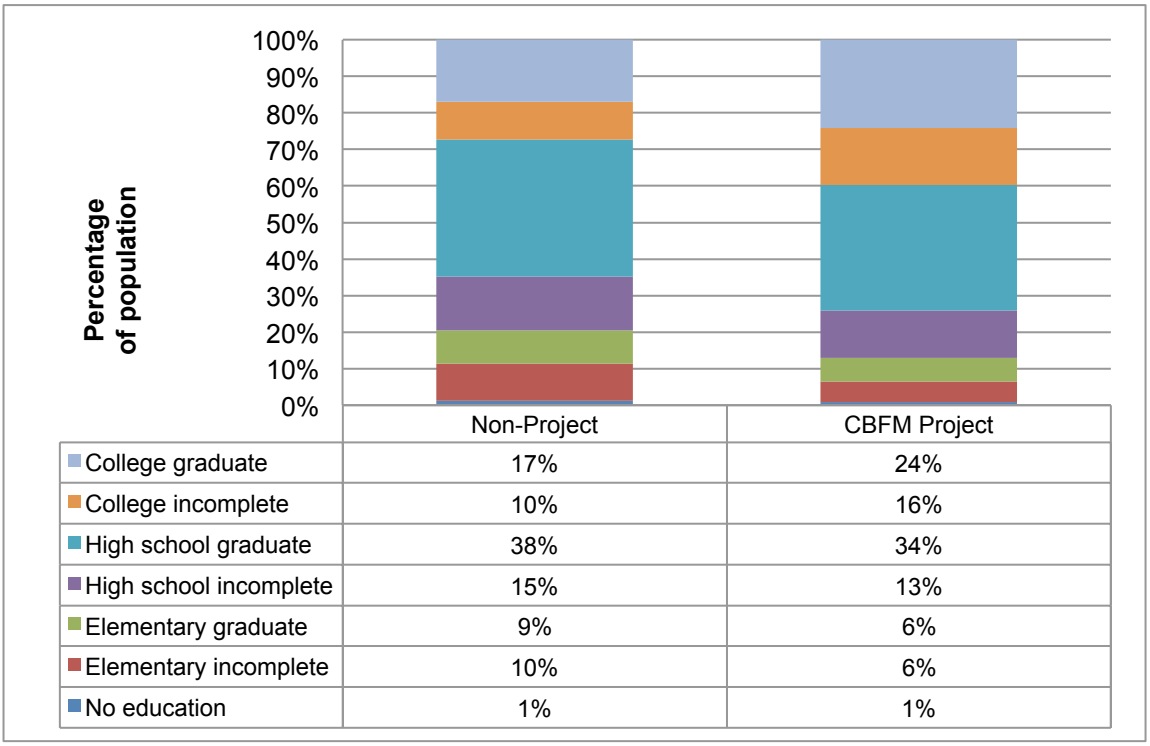


Figure 7-23. Socio-cultural capital in Alangan

Note: Neutral answers are not projected in the graph

x. Formal education level

Education in both groups was at a literate level, with the majority of them finished education above elementary level. The CBFM group had higher education level compared to Non-Project group (Figure 7.24). Comparing education at different age brackets in Alagan education of both group was relatively high regardless of generation; however more of CBFM Project group household members attended college, compared to the Non Project group (Figure 7.25).



	Non-Project	CBFM Project
College graduate	17%	24%
College incomplete	10%	16%
High school graduate	38%	34%
High school incomplete	15%	13%
Elementary graduate	9%	6%
Elementary incomplete	10%	6%
No education	1%	1%

Figure 7-24. Education of all household members in Alagan (age 15 and above)

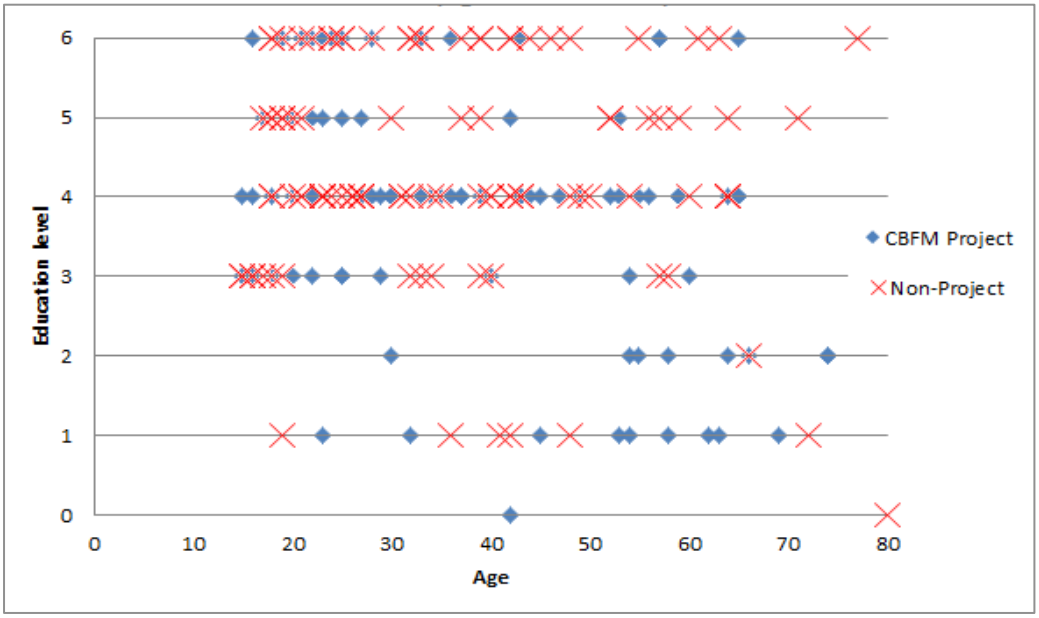


Figure 7-25. Trend in education by age in families of CBFM Project households in Alangan, age 15 and above

Note: Each household member marked by age and education; Education levels (y-axis): 0 – no education, 1- elementary incomplete, 2 – elementary graduate, 3 – high school incomplete, 4 – high school graduate, 5 – college incomplete, 6 – college graduate

Socio-cultural capital at Forest Users' Group level

A) Cognitive Bonding

i. Conflict resolution in the group

CBFM group had their own democratic system of resolving the problem, that is commonly practiced by the group. Group was able to resolve internal problems regarding abuse of power by the chairperson without assistance of the DENR. This was prevent damage to the reputation of their association.

ii. Monitoring and rules violation protection

The group set the rules violation system through bylaw. They have internal dialogue and system on monitoring the resources and members' behavior within the group. The group has their own constitution and also have bylaws enacted.

B) Structural Linking

iii. Cooperation with external institutions and companies

The group was found to be highly cooperative and active in seeking business partners. Most of the links were established with the support of DENR, JICA, and LGUs, such as the Philippine Commission on Women. The group is also connected with other CBFM groups. The CBFM group is capable of searching potential contractors on their own, e.g. buyers of their future products such as chopsticks.

C) Cultural capital

iv. Trainings

Group through the number of links benefited from various trainings offered, e.g. DENR-FAO Environment and Natural Recourses Enterprise Development Training; Enterprise Planning & Implementation Training; Training of Forest Resource Inventory in support of the Enhancing Resources Management Through Enterprise Development Project; Skills Training on Bamboo Basket and Boom Making; Entrepreneurship Mindset and E-Marketing; Basic Costing and Pricing; Training of Trainers on Gender-Responsive ENR Enterprises Development and Consultation on the Institutionalization; off-season vegetable production technology; Entrepreneurial Mindset Seminar for SME Roving Academy. Group was also able to attend conferences in 2009, 2010, 2011, and 2012.

c Natural capital

Natural capital at household level

i. *Land area*

On and average, land farm size per per CBFM Project household in Alangan was estimated to be at 4.30 hectares (Figures 7.26a), and 1.81 hectares per person. In the Non-Project group, each household have 1.16 hectares of land, and 0.29 hectare per person. There was significant difference found between groups.

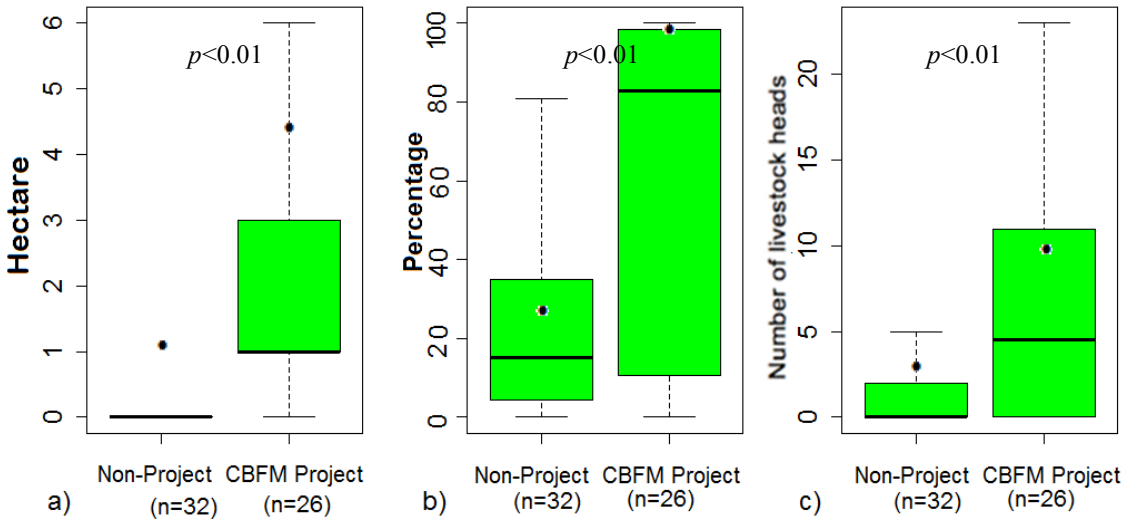


Figure 7-26. Trend in education by age in families of CBFM Project households in Alangan, age 15 and above

. Natural capital a) Household farm, b) Renewable energy use, c) Livestock

ii. *Renewable energy use*

In Alangan residents consume energy from different sources, such as firewood, charcoal, liquefied petroleum gas, gasoline and electricity. On an average, Non- Project group acquired 26.96 per cent of energy from renewable energy. As for the CBFM Project group respondents, 98.17 per cent of energy was acquired from renewable energy, mostly from firewood and charcoal (Figure 7.26b)

iii. Livestock

In Alangan, 69.23 per cent of CBFM Project group household and 31.25 per cent of Non-Project households were keeping livestock. On an average per household, 9.04 and 2.88 animals respectively were kept. In Non-Project members kept mostly poultry: chickens, ducks, and a number of goats (Figure 7.26c). For CBFM Project group member, chickens, fish, cows, water buffalos, ducks, goats, pigs and horses were the most common type of livestock (Table 7.3). The CBFM group kept more valuable animals, such buffalo, cows, horses and pigs.

Table 7-3. Livestock number

	Non-Project (n=32)		CBFM Project (n=26)	
	Total for group	Average per household	Total for group	Average per household
Water buffalo	0	0	11	0
Cow	0	0	17	7
Goat	9	0	8	0
Chicken	38	1	147	6
Duck	45	1	12	0
Pig	0	0	6	0
Horse	0	0	4	0
Tilapia fish	0	0	30	1
Total livestock	92	3	235	9

Natural capital at household level at Forest Users' Group level

i. Forest cover and health

Based on the analysis of high resolution GeoEye-1 multispectral imagery, the forest cover in the Alangan Project was found to be approximately 55 per cent of the area, that is a lower value than the central part of barangay Alangan covered by the iage, 68 per cent (Figure 7.27 and Table 7.4), but it is higher than for the entire Alangan area – 20 per cent (Alangan, 2011). Project area itself is multipurpose, which was dedicated not only to the forest plating but also as a farm field to members of CBFM group. Thus, 22 per cent for the project area was found under agricultural use. According to the barangay Alangan profile (Alangan, 2012), the forest for entire barangay is roughly 20 per cent of the barangay area. Similarly, the land use results for central part of the barangay showed that the vegetation index to be lower for CBFM Project area due to the mosaic characteristic of land use types (Table 7.4 and Figure 7.50). Most of contracted reforestation by the group however was not ongoing on their CBFM project land, but on surrounding denuded land. This was stipulated by DENR to be strictly for reforestation and not for economic use by the CBFM group.

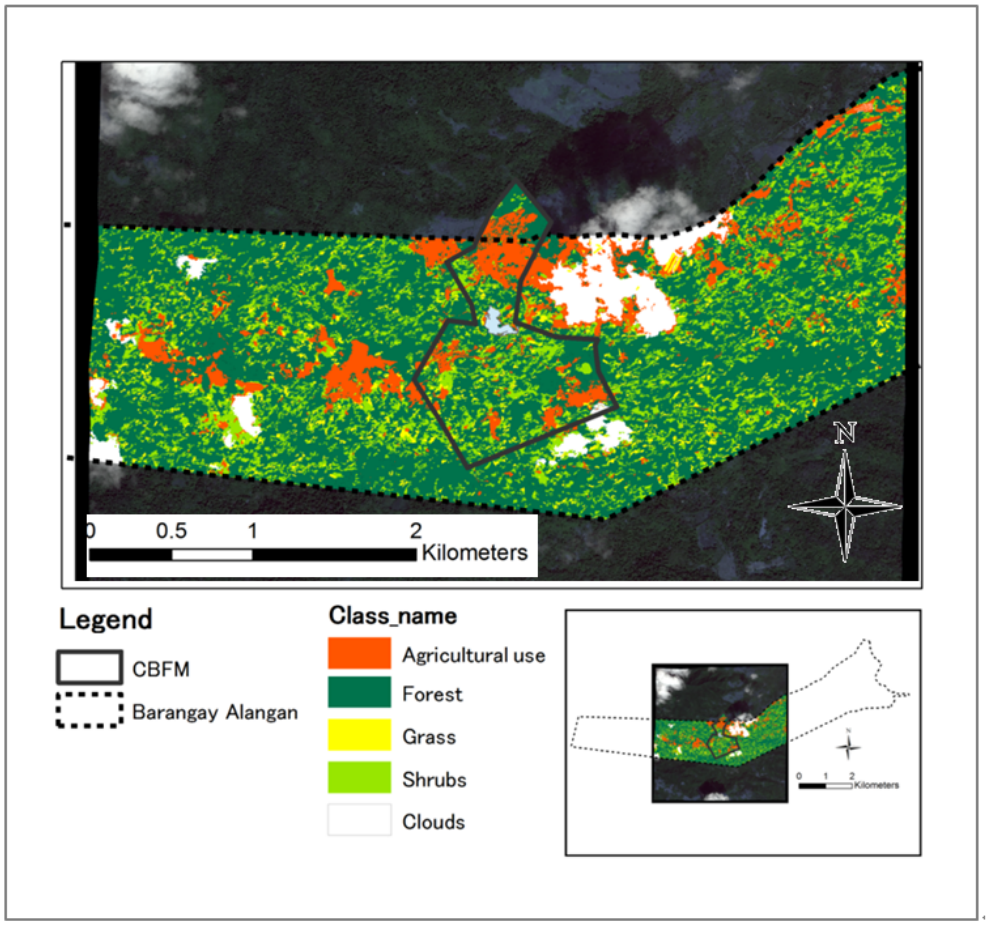


Figure 7-27. Land use classification in Alangan (central part)

Note: Analyzed image: GeoEye-1 0.46m multispectral imagery, from 2013/12/19

Table 7-4. Simplified land use classification and NDVI of CBFM in Alangan

	CBFM Project area	Barangay Alangan (central part)
Land use		
Tree cover	55%	68%
Shrubs	19%	18%
Grass	4%	4%
Agriculture	22%	10%
NDVI	0.33	0.39
(std. deviation)	0.12	0.10

Note: Analyzed based on GeoEye-1 Image (2013/12/19)

ii. *Forest resource use rights*

CBFM group had rights to the forest prescribed in the Prepare and implement Community Resource Management Framework, Recourse Use Plan, and Annual Work Plan. The group has the right to acquire wood from their lots, upon obtaining permits prior to tree cutting. Another form of rights important to the group was land tenure, and redistribution of individual lots under CBFM to the group members.

iii. Clearly defined boundaries of the forest

Boundaries of CBFM area were very clearly defined.

4) Capital interaction

Correlation between significant variables (Appendix R) had number of correlations that depicted interactions of the capital form (Figure 7.28; *r* values listed in Appendix W)

For the CBFM Project group, farm income was positively correlated to livestock heads kept by households. The use of renewable energy was a strategy for maximizing income. Interactions in the community were found to be important factor in the rise of farm size, farm income, and cooperation.

In the Non-Project group, on the other hand, farm size was important to raise farm income for those who still had land. For this group, the use of renewable energy, although not very common, was important to maximize income. Increasing income was correlated with decreasing interactions in the community, while cooperation is linked to religious life, and to “traditional” farming methods.

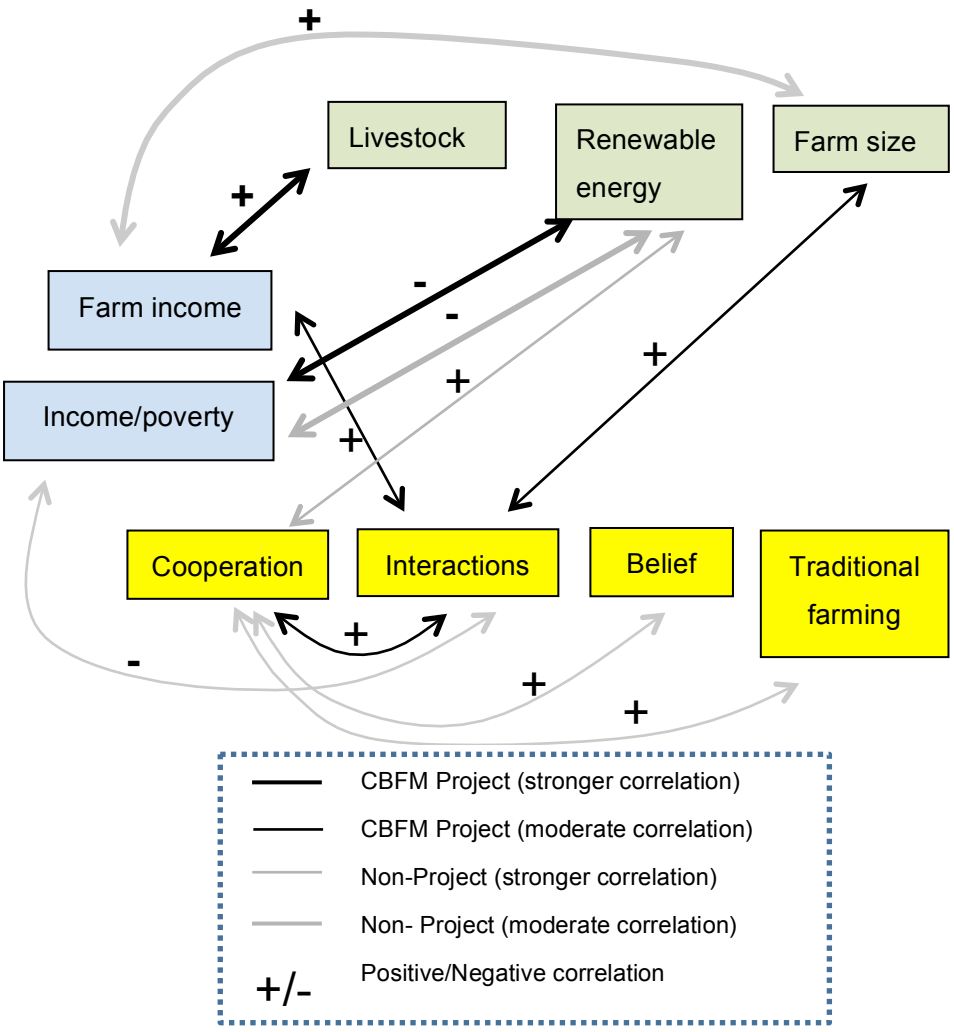


Figure 7-28. Correlation of significant variables in Alangan

7.4 Summary

For non-indigenous people, CF holds considerable potential for delivering higher resilience through facilitating access to natural capital, increasing sociocultural and economic capital forms and creating space for yields from the capitals through their interactions. CBFM was an effective instrument to distribute land to individual households. Participants were more responsive to the programs and maintained their organizational functions. However, this responsiveness was limited to those CBFM members actively taking part in collective actions, or to those holding power. Inactive members remained project land tenants and did not contribute to the collective efforts. This disproportion in participation and power distribution was affecting the socio-cultural capital. In terms of land distribution, participants were larger farm holders

compared to non-participants (p<0.01). Moreover, FUGs' consolidated strategy yielded more economic capital from the resources, sourcing an average of 29 to 41 percent of their income in natural resources (significantly more than non-participants of the program, p<0.01). The CBFM farm and orchard, rather than forest, were the major sources of this income. Local fuelwood was another, more common strategy to supplement low incomes (income level and renewable energy use were strongly and negatively correlated, r=-0.5). The summary of findings is presented in Table 7.5.

Table 7-5. Comparison of Case C with Case D

Case C. Ayala, Orchard village	**Case D. Alangan**
Past trajectories	
Encroachment of the farmers into National Park area, collection of grass for sale; forest clearance with use of fire for farm expansion; control was undertaken by early forms of CF program; Nowadays, Orchard village is more populated, more developed but rural area, but encroachment of farmers to the upper part of the mountain was reduced	More farming-substance community, with small local employment; mountain was deforested, and encroachment of farmers and use of fire was one of the threat to the remaining forest patches; community became industrialized, with shift of farm-based and small-scale enterprises employment into large industry employment; with good road access and mobility of people; but reduced security
Current issues	
Community had problems with access to job market, and to education; with peace and order problems within community; and more prevalent flue	Community had lack of skilled people, farm to market road (from the mountain to highway); lack of sufficient irrigation; insufficient medical support
Economic capital	
Household level	
(+) Higher income diversity (0.39) (-) Low income equality (+) Income above poverty threshold** (1.75) but not much satisfied (+) High dependence on natural resource** for about 40% (-) Good vehicle ownership and good housing, (+) high electricity access	(-) Income diversity was low (0.27) (-) Equality of income distribution low (-) Income above poverty threshold* (1.36) and satisfying (+) High withdrawn resource dependency ** for about 30% (+)Higher vehicle ownership (-) good access to electricity, (-) good housing
Forest Users' Group level (CBFM group)	
Cash flow (bank, no income from resource, monthly dues of members, project money)	Cash flow (bank, income from resource, monthly dues of members, project money)

Some fixed asset, some taken by former officials	High investment into fixed assets
Socio-cultural capital	
Household level	
(+) Structural social capital lower: complete but limited to active members* with CBFM and non-CBFM households (+) Good social network ** (-) Moderate/low cognitive bonding (within group) and low bridging (between group)* social capital, CBFM not trusted by local community of Orchard (+) Cognitive linking social capital was moderate, CBFM group trusted the local government, but felt less understood by the government (-/+) Cultural capital moderately strong, but knowledge on the farming was not updated due (+) Higher education	(+) Stronger structural social capital, with denser cooperation** with CBFM and non-CBFM households (+) Good social network, with many interactions in the community** (-) Low/moderate cognitive bonding (within group) and moderate bridging (between group)* (trust to CBFM affected by low participation, trust to the community affected by theft occurrence in the past (+) Moderate cognitive linking capital, good ground for the project (+) Progressive farming**, (+) Religious**, (+) Educated
Forest Users' Group level (CBFM group)	
Low capacity to handle conflicts Monitoring was enforced Few external cooperation Low number of trainings, and not all knowledge was successfully implemented in the group	Higher capacity to solve conflicts Monitoring resources and group Multiple cooperation Many trainings participated in, and knowledge applied in the group
Natural capital	
Household level	
(+)High farm size per household** and per person ** but reduced swidden farm use (+)High Livestock (+) Higher dependency on renewable energy	(+) Higher farm size per household ** and per person ** (+) High livestock number ** (+) Very high dependency on renewable energy, strategy for substitute lower income
Forest Users' Group level (CBFM group)	
(-) Lower forest cover – area of CBFM mostly devoted to farming (+) Forest use rights highly regulated with more restrictions; permits were difficult to obtain Boundary clearly delineated, but land distribution within boundaries was ruled by chairperson	(+) Forest cover (+) Forest use rights formalized, restricted by permits but people planted trees on own farm with perspective of future harvest Boundary clearly delineated

Note: *Statistically different at confidence level 0.05; ** Statistical difference at confidence level 0.01

(-)Lower than Non-Project group (weaker capital); (+) Higher than Non-Project group (stronger capital

8 COMPARATIVE ANALYSIS OF THE CASE STUDIES AND CONCLUDING DISCUSSION

8.1 Objective of the chapter

This chapter aims to respond to the second and third research sub-questions, as well as the main research question stated in Chapter 1. The first part of the chapter provides a compacted comparison of the case studies presented in earlier sections of this paper, and furthers the discussion on the resilience of FUGs in indigenous and non-indigenous cultural communities. In the latter part of the chapter, various strategies from each case study will be explained briefly in order to demonstrate resilience building through CF. The main research question will be explained based on a comparison of the case studies that represent the CF program. Subsequently, it will be followed by an academic contribution and conclusion, explaining the implications of the research for increased resilience of FUGs.

8.2 Resilience of CF under indigenous cultural communities

This section addresses the second research sub-question: *What are the factors that enhance or constrain CF resilience in indigenous communities?* Through the lessons learned in the cases of CBFM in indigenous cultural communities in the Philippines, in which the program created functional groups with formalized resource use rights, it becomes clear that resilience was not formed through participation in the program. Community forestry could have positively influenced the resilience and sustainability of these communities if it had been carefully considered within the local context. The resilience was formed by socio-cultural and natural capita and their interaction, which existed prior to the creation of the FUGs. Economic capital was the main constraint for these groups, nascent but failing to develop. The commodification of local products without proper market access inadequately addressed the development of economic capital. In this case, the strong resilient state persisted despite a willingness to transform, and such a state could be called an undesirable one (Berkes and Ross, 2013). Socio-cultural capital was nearly unchanged by their participation in CF projects, the existing structure of cooperation was not utilized and the new structure of FUGs did not last. The CF project caused trust issues within the FUGs.

The CF program is important for building the resilience of FUGs. Resilience, in the context of the social structure of each community, has been experiencing declines. Moreover, local subsistence on the forest was threatened as the forest was damaged, and economic capital, although weak, was supposed to be integrated to add to the resilience of these communities.

In Case A, resilience and capacity were necessary for increasing the functionality of the communities, raising their income, and restoring the forest. Culturally and ecologically valuable but vulnerable rice terraces were omitted in the sustainability plan for building these communities. In the past, especially until the 1970s, extensive deforestation was caused through transformation of the forest into swidden farms. It was also likely one of the reasons for the water shortage. At present, swidden farms were no longer a common practice for the production of staple foods, due to the minimal income sources available that allow the purchase of rice. The strategy of supplying necessary food when there were shortages on farms was to purchase rice. However, the amount of money needed might increase, due to the abandonment of rice terraces and discontinued irrigation. The rice fields which became abandoned, were affecting other the rice fields below them by discontinued irrigation. The resilience of the FUGs through participation in CF was supposed to be achieved by establishing new agroforestry practices or enhancing existing ones in order to meet the basic needs of the people such as food and income generation. However, preserving and utilizing the existing cooperative structures in order to continue maintenance work for irrigation or reforestation were not set as the goals of the CF project.

In Case B, resilience was necessary in order for the FUGs to maintain their capacity to manage the recovery of the forests upon which they depended and to secure their gradual integration into an economy-driven system, that was already imminent to take place.

Originally, the people were dependent on the forest for their livelihood. The villagers used to be a semi-nomadic tribe, occupying mountains and sheltering in the forest. The CF program aimed to enforce the livelihood dependence on the forest, developing income streams from agroforestry products and from reforesting the mountains. With a settled lifestyle, they became geographically distant from the forest, and only took trips to the forest during the time of land cleaning, planting and harvesting, and for collecting firewood. This new lifestyle also brought problems from settlement and a new society.

Moreover, after a volcano eruption a thick layer of volcanic ash damaged the land, and more outsiders were encroaching their land.

8.2.1 Socio-cultural capital driven resilience

The socio-cultural capital of ingenious people, regardless of their participation in the CF, was found to be relatively strong, based on existing capital that was in place prior the CF implementation, related to tribal bonds and kinship. Cooperation was lower in Case A, indicating that the group was not capable of cooperating under the CF structure; in Case B, the FUG maintained more cooperation. However, all FUGs within indigenous communities that already had cooperation were created spontaneously, and this was different than the CF-based cooperation. The social capital component of the community was manifested by communal work, their justice system, and placing value on sharing and following the rules of the communities. However, in both groups, CF project implementation caused conflicts and distrust about whether the indigenous system was capable of dealing with such issues. The cultural capital component of the groups was maintained through an unchanged traditional way of farming practices. The two FUGs in Case A reduced their traditional practices due to less cooperation, smaller land size and low income. The FUG in the Case B, on the other hand, continued to preserve their traditional ways.

8.2.2 Natural capital as the source of subsistence for indigenous people

Research on indigenous cultural communities was originally highly dependent on natural capital, using firewood, and obtaining most of the food from their farms, regardless participation in CF, but CF had various impacts on the natural capital of FUGs, such as increased or unchanged farm size or increased levels of livestock keeping. The forest managed under CF indicated higher cover and reduced use of swidden farming, but the CF program was not clearly increasing rights to forest resource use, and delineation of the areas had customary or political boundary issues. Rather than the type of CF program, the ancestral domain title form of ownership was a more secure and strategic option for protecting the land.

In Case A, the natural capital of FUGs was found lagging behind households that did not participate in the CF project. The land area held by two FUGs' households were found to be smaller when compared to non-participants. The abandonment of rice

terraces threatened other rice fields was not addressed by CF as the CF project did not include the distribution of rice terraces distribution, which was regulated by customary law and participants did not actually expand the amount of cultivated land. The local customary ownership system and the concept of a cultural landscape that does not differentiate forest as a separate land-use form, was not considered by the CF project. Community forestry did not increase the actual rights to use the forest, but emphasized the regulatory role of the central or local government and introduced management plans, land titles, and legal procedures for acquiring wood, even for the purpose of construction. The communities, regardless of the CF, were highly dependent on the forest as a source of energy, and occasionally as a source of wood for house construction or renovation. Forest user groups were more commonly keeping livestock. The forest cover area under CF was found to be higher than outside of the CF area, however the introduced tree species were not very suitable for the local environment. Smaller areas of swidden farms were also identified within the CF area.

In Case B, natural capital was found to be higher for FUGs under the CF project than for non-participants, with a larger area of forest and farm land. However, the use of swidden farms was small, and less than what was found outside of the project area. The FUGs under CF had wider farms and were keeping more livestock, as was promoted by CF as an alternative source of livelihood. Similarly to non-participants, FUGs in the CF project greatly depended on the forest as their source of firewood.

8.2.3 Underdeveloped economic capital in the indigenous groups

In the indigenous cultural communities, economic capital was found to be weak, with households' income below the poverty line and lower than average income of non-participants. Community forestry failed to significantly diversify the sources of income and did not consider the local constraints, such as lack of access to markets, thus income generation through farm production was failing. The economic capital of the organizations was not sustained after the project ended. The common assets of the groups were either not present or had already deteriorated.

In Case A, the income diversity among the FUGs, despite intervention and diversification of income through new varieties of plants, fast growing trees, and livestock, was very low, and lower than among non-participants. Income from farm and forest constituted only a small share of their total income, ranging from six to 15 per

cent, with other income generated through labor on rice terraces outside the farm. There was no access to the market. The low income made the groups more vulnerable to unpredictable situations. Community forestry boosted the households' economic capital only during the implementation stage when income was generated by participation in planting trees.

In Case B, FUGs generated income levels below the poverty line and the income was from local resources. Farm products were sold to intermediary buyers or directly to the market, but access to the market was poor. Part of their income was generated by employment at the local spa resort, but this occurred less often than with non-participants.

8.2.4 Interaction of natural and socio-cultural capital

Correlations demonstrated that FUGs had two forms of capital, socio-cultural capital and natural capital, and that these were interacting and complimenting one another. Economic capital was not yet a strong input to their resilience, as was already discussed in the section above.

In Case A, natural capital such as farm area was interrelated with socio-cultural capital, such as cooperation, practices and rituals, indicating that a larger farm enabled the farmer to continue in an unchanged way of farming. There was partial integration with economic capital, as the larger farms did not generate more income. The introduction of livestock enabled some increases in income. Payment for labor was introduced, and this reduced the socio-cultural capital by replacing reciprocal work in the farm.

In Case B, the FUGs were able to cultivate larger permanent areas of land, and income was generated from local resources, but the increase of land area did not increase their revenue proportionally. Land increase was related to a reduction in trust and cooperation, originating likely from the transition to permanent individual land ownership instead of common ownership. Moreover, CF participants who trusted their own group less occupied larger farms which enabled them to shift cultivation within their own area, instead of using common land.

8.3 Resilience of CF under non-indigenous cultural communities

This section addresses the second research sub-question: *What are the factors are enhancing or constraining CF resilience in non-indigenous communities?* From the

example of CBFM in the Philippines, which represented the most typical type of CF in which collaborative management between a central government and local groups takes place, the functional groups created by CF were rewarded with new opportunities. It opened a new possibility of raising the functionality within these communities, which were already using local functions from ongoing globalization. The CF brought potential change at various levels, maneuvering their resilience towards a stronger one, with moderate use of tri-capital. In this case, CBFM was an effective instrument to distribute land to individual households. Participants were more responsive to the programs, maintaining their organizational functioning, but it was limited to those CBFM members who were actively taking part in the collective actions, or to those who were holding the power. The use, development and maintenance of socio-cultural capital were the major differences, advancing or restraining resilience development.

8.3.1 Importance of CF resilience in the non-indigenous cultural communities

For non-indigenous people the CF had a more regulatory and top-down character, aiming to regain power over threatened resources. However, there was also a "grassroots" component in these projects, in which FUGs had interests in gaining or maintaining their occupancy in forest fringe areas. For these communities, the CF type of occupation was not the competitive type, but it was important to provide occupations for those people who have insufficient skills to meet job requirements driven by rapid development, and to maintain local farming. Moreover, CF activities were necessary to reforest and protect the local forests from fire, including national parks. Moreover, in non-indigenous groups CF provided an important countermeasure to fast globalization that was reducing functions within communities.

8.3.2 Socio-cultural capital as the key capital of resilience

The FUGs had more socio-cultural capital compared to those who did not participate in the CF. The FUGs had well-structured cooperation and social networks, but inactive members were staying outside of the cooperation network. O group of inactive members, the free riders' type, can cause a potential threat of overexploitation of resources (Ostrom, 1999). Inappropriate use of power use by the leaders, and such power captured by elites, was a second type of members who restrained others from active participation; benefit capturing by elites is one of the setbacks to CF resilience (Akamani, et al., 2015). Such distortion of participation diminishes the feeling of

belonging and group identity (Coleman, 1990). However, a situation in which members divide themselves into different levels of responsibilities, a so-called 'gradual membership', is more sustainable for collaborative management and action (Shivakoti et al., 2015). Thus, the inactive members should participate in the collective actions, but not necessarily hold most of the responsibilities. Moreover, these issues were affecting trust within and of the group. Trust is necessary for collective action, cooperation, driving change, and avoiding conflicts (Poortinga, 2012; Pretty, 2003). An ability to handle internal conflicts was necessary in order to maintain trust given from the outside, in a way that Case D was able to do. Forest user groups in Case D had a significantly higher number of reliable friends and interactions with their neighbors, which led to various gatherings, cooperation, and access to help available in the form of food and money sharing. Relatively good trust in the local government was creating a better ground for cooperation between local governments and for co-management of natural resources (e.g., Derek et al., 2009). The CF program was delivering new knowledge about farming and other higher skills to FUGs, but the effect was varying. In one case (Case D) FUGs were able to progress in their knowledge on farming, production from local resources, and entrepreneurship, and liked the number of stakeholders within their groups.

8.3.3 Natural capital's re- input to subsistence

Forest user groups allocated approximately one hectare of land to the FUG members, thus the participants were able to gain a farm lot or extend their existing one. They had larger farms than the non-participants. The CF project areas were clearly delineated and in the form of mosaic farm and forest use. For example, the area of land per person, 0.34 hectares, is capable of providing a diverse, healthy, nutritious diet for a half year, according to Lal (1989). Agroforestry was argued to be capable of enhancing social resilience through improved food security and income, and climate (Ofori et al., 2014) and ecological resilience through soil quality improvements (Schwab et al., 2015). The FUG members had the right to acquire their own timber, but the process of acquiring permits was discouraging and not yet practiced. Access to timber was reported as the most valuable and controlled resources elsewhere (Anderson et al., 2015). However, these rights were still offered to FUGs, unlike to non-participants living in the same village but being de-coupled from forest resource use, making them

more dependent on non-renewable energy sources. Moreover, households of FUGs utilized more local renewable energy compared to other households, and it helped to supplement low incomes, making a more resilient mix of energy and increasing local sufficiency (e.g., the recommended strategy by León-Camacho et al., 2014 and Sikka et al., 2013). In case D, keeping livestock was one of the promoted CF livelihood programs which was also successful among a majority of FUG households, as nearly 70 per cent were practicing this. Households within FUGs kept working animals, such as water buffalo, horses, as well as other valuable livestock, such as pigs, cows, goats, poultry, and fish.

8.3.4 Sufficient economic capital

The FUGs were able to meet more than their basic needs with their income, but only group in Case C further diversified and increased their level of income even more, exceeding that of non-participants. The income of FUG households from resource-related income constituted 30-40 per cent, demonstrating a mixed and significantly higher dependence on allocated farms and other types of income, compared to non-participants. In both groups, development of on-farm incomes, such as other eco-services still needs to be developed. The relation between community and local resources is one of the requirements for a resilient system (Cabell and Oelofse, 2012). Transportation means are important for delivering products to a market (Sunderlin et al. 2005, Buikstra et. al., 2010). Approximately 40-50 per cent of FUG members had group-owned vehicles, thus enabling a higher income from natural resources. The FUGs' economic capital was also operational; Case D was excelling with fixed assets and had regular income from multiple sources that contributed to the common budget.

8.3.5 Interaction of two to three forms of capital

There were either two or three forms of capital interacting in the non-indigenous communities, denoting a different level of advancement in resilience, based on the tri-capital framework. For example, in Case C the natural capital was yielding economic capital and while the socio-cultural capital was yielding economic and natural capital, this also caused a distortion of power in the group causing adverse effects on the resilience of the group. Overall, a better connection within the group was positively related to larger farms. In contrast, Case D showed multiple connections

among the three forms of capital. Natural capital, such as farm size and livestock, yielded moderate income and an increase in use of renewable energy sources offset lower economic capital of households. Socio-cultural capital supported increases in economic and natural capital, and was also strengthened in the process. According to many experts in the field of sociology, social capital is seen as necessary in order to develop cohesive group that is able to form connections with outside groups, which in turn facilitates an increased resilience of the group (e.g. Magis, 2010). Although socio-cultural capital is often considered as symbolic, as opposed to material capital, it can also be derived from economic and natural capital, as depicted in Case D; however, this was not true in Case C, as socio-cultural capital was effectively constrained by imbalances in the distribution of local power. Similar processes of contesting local power and privilege by elite groups were acknowledged by Allen (2003) and Christoforou and Davis (2014).

8.4 Different resilience paths of FUGs

In this section, the research sub-question: *How do CF programs build resilience paths for FUGs?* will be elaborated, based on the resilience paths depicted by the case studies A through D. Here it is argued that CF reshapes the strategies employed by FUGs under several conditions. The differences were clear between indigenous and non-indigenous communities and the forms of capital present and interacting within each community. The indigenous cultural communities employed a localization strategy based on socio-cultural and natural capital present prior to participation in the CF project. This form or resilience is strong, representing an uneasiness about change, despite the fact that integration of economic capital has become a necessity for these groups. In this case, community resilience was too strong to allow for the desired changes (similar to the argument made by Berkes and Ross, 2013; UIanowicz, et al., 2009). This inability to change is explained by a maintenance of *status quo* or a reduction of *de jure* opportunities through incomplete and inadequate decentralization of forest rights to the FUG level (Hartter and Ryan, 2010; Larson et al.; 2010). The FUGs in non-indigenous communities, on the other hand, were more flexible and able to access new opportunities through CF, and CF allowed to "soften" the effects of globalization, or "bounce back" from the effects of the process.

8.4.1 Localization and strong resilience of indigenous people

The localization strategy is one of strong resilience built on socio-cultural capital interacting with natural capital instead of on Wilson's multifunctionality (Wilson 2010, 2012). Similar observations were found in Abel et al., (2006). The two case studies of CBFM in the Philippines, Case A and Case B, represented that CF programs were not effective instruments for increasing tri-capital resilience or alternative resilience sources within socio-cultural and natural capital. The FUGs under CF had similar resilience paths of localization as the non-participants (Figure 8.1). However, it was clear that the resilience of these groups needed to be restructured as there were already reductions in these two forms of capital, and there was an increasing need to incorporate economic capital into their resilience structure. Already, weak economic capital was emerging in these groups and substituting or replacing the declining socio-cultural or natural capital. Community forestry was able to boost resilience during the initial stage of the program through income generation, but after the funds allocated for implementation ran out the group returned to their previous forms of livelihood; their resilience strategy was only insignificantly adjusted or disturbed.

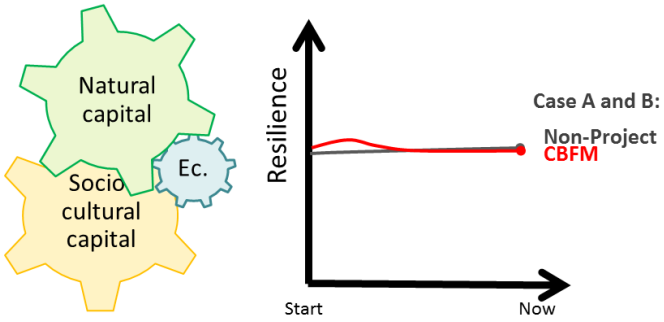


Table 8-1 Resilience paths of FUGs of indigenous people

8.4.2 Relocalization and glocalziation - moderate resilience

Participation in CF provided new opportunities for non-indigenous communities by opening access to resources; this led to more flexible resilience paths that "softened" the globalization process that was already affecting the village. Two case studies of CBFM in the Philippines, Cases C and D, illustrated the effectiveness of CF in resilience building by changing their paths from globalization to glocalization or

re-localization strategies (Figure 8.2).

In Case C, the resilience of the village had been declining and heading towards a globalization strategy, manifested through a low range services flowing from local resources and community. On the other hand, within the FUGs there were a number of household in the village that were able to gain legal access to previously restricted land, and were able use it to drive positive growth of economic capital. Socio-cultural capital was moderately developed during the project, which had net adverse effects on the community due to a group that captured a disproportionate amount of power resulting in a loss of cognitive bridging and bonding social capital, namely trust within the group and from outsiders was eroded. The FUGs glocalization strategy was expressed through measurable benefits from local resources and the global economy which enabled a mixed and diverse income. Inoue et al. (2015) argued that a glocalized strategy supports collaborative management of forests. The lessons learned from this case showed that indeed the group was able to collaborate with local government in order to manage the forest, but it was still incapable of self-organizing to the extent that a stronger resilience could be established.

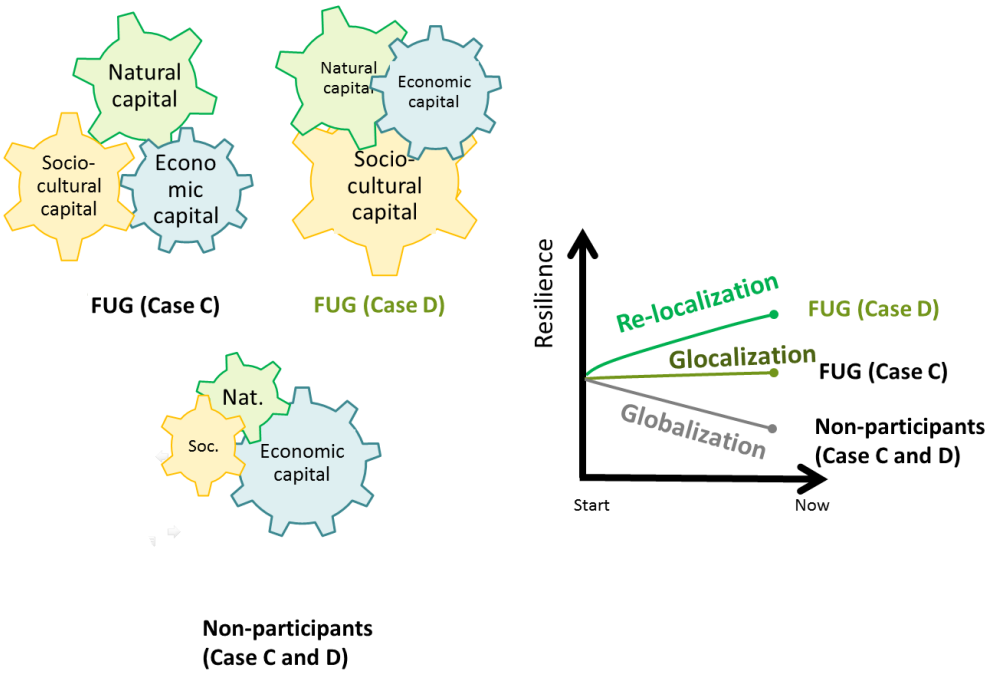


Table 8-2. Resilience paths of FUGs of non- indigenous people

In Case D, the FUG was able to increase their resilience by driving moderate natural and economic capital while continuing to strengthen their socio-cultural capital. The three capital forms were interacting sufficiently to move the group towards a re-localization, whereby the community was, in a sense, rediscovered by the group. Rediscovery of resilient paths, attributed to developed nations by Wilson (2012), is therefore also a viable strategy, even before a country reaches the level of wealth shown in the example of the non-indigenous communities.

8.5 Key characteristics of CF resilience

This section addresses the main research question: *What are key characteristics determining resilience of FUGs?* based on a comparison of the generalized outcomes of resilience building described in the case studies in non-indigenous cultural communities.

A small set of three to five key variables that enabled advanced resilient strategies within FUGs is determine by using the "rule of hand" (Kinzig et al., 2006). Based on studied example of CF, the CBFM program in the Philippines, a set of criteria was determined for identifying FUGs that could potentially develop resilient strategies (Table 8.1). Fulfilling the criteria of having three forms of capital, and securing an interaction among these forms, would secure a higher level of resilience (Wilson, 2012). In the indigenous communities, resilience based on only two interacting forms of capital, natural and socio-cultural, proved to be too strong to allow a change in the strategy employed by the groups participating in CF, as was shown in cases A and B of the CBFM Program in the Philippines. These groups were not able to operate within an FUG system as organized by the CF program because these organizations were not well crafted or suited to the local context. These FUGs did not continue after the implementation stage, and the involved households benefited merely from the participation but overall experienced negative impacts, especially on their socio-cultural capital. By the end of the project, these groups could not be differentiated from the non-participating households in the community, who continued to derive their local subsistence from the farm and forest, and maintained strong socio-cultural properties. Economic capital was still emerging at this stage and, although weak, their income was able to support the purchase of food in times of shortage.

Resilience capacity can be increased within FUGs in non-indigenous communities. The

socio-cultural properties were well established, and became the key difference among the studied groups, alongside of the interactions of the three capital forms. These key features were driving the re-localized strategy of FUGs. Indeed, the highest resilience state found by this study was exemplified by Case D, which had the most active and flourishing group that successfully applied their knowledge learned through CF. The key variables that were different from the non-participating households were trust in the group's ability to resolve conflicts (cognitive bonding social capital), positive interactions within the community, and of the extent of cooperation displayed (structural social capital). These features were not observed among the non-participants in the non-indigenous communities. No such gap of socio-cultural capital between FUGs and non-participants was present in the indigenous communities. In the case of a glocalized strategy (Case C), these characteristics were found only in the FUG group and with adverse effect, the CF project acted as a disturbance to the group rather than a platform enabling increased resilience. Moreover, socio-cultural capital did not yield economic capital nor increase equal access to natural capital. In this case, the study showed that the FUGs were functioning, but incapable of achieving more sustainable progress.

Development of economic capital was found to be the required step, without which an increase in resilience was difficult to achieve. The non-indigenous groups had advanced economic capital, especially from a mixed dependence on natural resources, and their income level was above the poverty line. Group mobility, displayed by vehicle ownership, was also necessary in order to enable the sale of local products; this factor was absent in the indigenous communities.

Natural capital was present in all FUGs, but access and development of a new source of capital was evident only for the non-indigenous communities; this was not apparent for the indigenous communities, where access to natural capital was nearly indistinguishable between the FUGs and non-participants of the CF project.

Table 8-3 Key characteristics of resilient FUGs.

Group	***Indigenous***				***Non-Indigenous***			
Case	***A***		***B***		***C***		***D***	
Functionality of the CBFM organization	Failed after implementation stage, group inactive		Failed after implementation funds over; group dissolved		Functioning group but with few initiatives , trainings failed;		Active and well prospering group, new knowledge applied,	
Interactions of capital forms	**Socio-cultural with natural and emerging economic**		**Natural to socio-cultural with weak economic**		**Natural to economic**		**Tri-capital interactions**	
Key characteristics	***Not-Project***	**FUG**	***Not-Project***	**FUG**	***Not-Project***	**FUG**	***Not-Project***	**FUG**
Socio-cultural capital								
Trust to CBFM			✓	✓		Δ*	✓	✓
Interactions in the community	✓	✓	✓	✓		Δ*		✓*
Cooperation	✓	✓	✓	✓		Δ*		✓*
Economic capital								
Mobility (vehicles)					✓	✓	✓	✓
Income above poverty line					✓	✓	✓*	✓
Economic dependence on resources				✓		✓	✓	✓
Natural capital								
Farm size per household	✓*			✓*		✓*		✓*
Livestock		✓*			✓	✓		✓*
Renewable energy use	✓	✓	✓	✓	✓	✓		✓*
Strategy	LOC	LOC	LOC	LOC	GLOB	GLOC	GLOB	ReLOC

Note: ✓- present; * Significantly higher; Δ – adverse values; LOC – localization; GLOB – globalization, GLOC – glocalization; ReLOC – Re-localization

8.6 Academic contribution

8.6.1 Empirical application of the community resilience concept

This research demonstrated the empirical application of the resilience concept to CF by operationalizing methodology based on existing resilience theories, thus determining the possible resilience paths of FUGs. When applied to research, the tri-capital framework elaborates the importance of interaction among economic, socio-cultural, and natural forms of capital as the source of multiple functions within the group. Data gathered from the five projects within these four CF case studies in the Philippines indicate that different resilience paths can be developed by FUGs within the CBFM program. Based on the set of primary data it was determined that presence of the three forms of capital was still insufficient and that robust socio-cultural capital and interaction among the three forms of capital were the keys in developing the more resilient strategies. Until now, the importance of interaction among types of capital for the potential of resilience development was considered very statically, and this research was able to explain the more dynamic process that occurs among capital forms.

8.6.2 Resilience of community forestry in indigenous and non-indigenous communities

Resilience, as a western science concept, was overlooked in relation to indigenous communities, as it was considered to be a concept based on the neo-liberal economy, in which economic capital plays important role. In this research, two indigenous cultural communities showed that tri-capital-based resilience can be integrated to their strategy and that their resilience was developed based on the interactions between pre-existing socio-cultural and natural capital, denoting the localized strategy of these groups. However, economic capital is still emerging and will need to be integrated into their system as a source of new functions within the respective groups. In order to maintain existing socio-cultural capital while developing economic capital, it was necessary to consider the local context. Thus, it is necessary to differentiate the types of CF policies recommended for indigenous and non-indigenous communities, as one common policy of CF did not work equally for indigenous and non-indigenous communities. The studies of CF in non-indigenous communities

showed an ability to alter their resilience paths into glocalized and re-localized, thereby enhancing their resilience. However, even in these cases it is evident that the potential of socio-cultural capital can be constrained by inactive or over-powerful members, thus it is necessary to develop a fair verification process for actors within the FUGs.

8.6.3 Resilience-based community forestry implementation

This study outlines the key characteristics that were found based on empirical results. Implementation of CF models that facilitate the development and interaction of the three forms of capital, with an overarching importance given to socio-cultural capital, enables CF to become a key strategy for developing sustainable, resilient groups. Natural capital, such as the use of renewable local energy source to augment lower income, keeping livestock, and increasing/awarding farm land, was especially important when more economically valuable natural capital, such as timber, is not available as a stable source of income. A significant contribution of revenue from natural resources was necessary in order to develop economic capital, represented by income above the poverty line, for groups interested in CF. Moreover, mobility, such as vehicle ownership, was important for enabling access to markets where more reasonable prices for local products could be obtained. The most central form of capital affecting the development of resilience was socio-cultural capital, which provided a functioning structure of cooperation and interactions in the community, trust both within and towards the FUGs, allowing for members to bond and bridge with other groups.

8.6.4 Limitations of the study and recommendations for future research

The first limitation of this study is the focus on the local level of community and FUGs resilience paths, which does not consider the bigger picture of socio-economic development or national government policies in the other areas. Therefore, the scale of this debate needs to be extended with regards to dimensions of CF above the local level in order to allow further assessment and policy recommendations for resilience development. Exploring the following in future research can facilitate the attainment of this wider goal:

i. Analysis of the effect of regional and national economies on local development, as they may enable or limit the resilient strategies of (local-level) FUGs.

ii. Exploration of other socio-economic developments and policy interventions occurring in parallel to CF, within the same community and region, as possible attracting points for study groups.

Secondly, there is still a need for further exploration of capital interaction and the role that each individual form of capital plays, especially socio-cultural, which is symbolic and not material. In some cases, socio-cultural capital could be considered as a platform for enabling the development of natural and economic capital, or increasing the interactions of these two, but in the elaborated tri-capital framework the socio-cultural capital is presented as equal to natural and economic capital, despite its different nature.

Thirdly, the different natures of the capital forms and the lack of standardization in capital measurement point to a limitation of the tri-capital framework in providing standardized resilience levels that could be comparable among groups. Comparison within only one group, and within its own context, is more appropriate when using this framework. Addressing this limitation is a challenge for future research and a more robust framework is yet to be developed.

Fourthly, an assessment of socio-cultural capital that relies heavily on responses from heads of households is seen as a limitation in the original data used in this research. However, it is difficult to ensure the accuracy of this type of data as responses rely on a subjective understanding of the questions by individual respondents, regardless of how the questions were explained to them while conducting the questionnaire. Moreover, further subjectivity may arise among different groups of people, such as the two different ethnic groups of indigenous people and the two groups of non-indigenous groups that were part of the case studies analyzed. Such limitations have to be taken into account while interpreting and discussing the results.

8.7 Conclusion

This study suggests that the tri-capital support resilience-oriented implementation of CF project, and that yielding one form of capital from another would lead to ensuring resilient and multifunctional FUGs. The three, interacting forms of capital present can differentiate community forestry projects groups that are more likely to succeed. The tri-capital framework of CF resilience can be considered a tool for

operationalizing CF resilience, with the limitation that economic capital must be substituted in the case of indigenous people. However, shifts in the relative proportions of the capitals are imminent for these people, and these shifts must be driven by multifunctionality for strong resilience. Further, the tri-capital framework requires further explorations of interactions between the capitals. There are also difficulties in evaluating the strength of capitals and their implication for resilience levels. Thus, resilience is comparable within specific contexts but not across contexts.

Community forestry policies must be differentiated between indigenous and non-indigenous peoples (consider e.g. the limited development of capacity for resilience of indigenous people through CBFM in the Philippines).

Indigenous people have yet to integrate to the multifunctional strategy of resilience that was based on localization. The commodification of natural resources should not become the primary approach for developing economic capital. The approach for preventing the degradation of socio-cultural capital should maintain and utilize existing cooperation rather than a new, "community-based" organization.

For non-indigenous people, CF holds considerable potential for delivering higher resilience through facilitating access to natural capital, increasing sociocultural and economic capital forms and creating space for yields from the capitals through their interactions. Tri-capital access in FUGs is capable of developing resilient strategies to resist or "soften" societal transitions towards globalization and of creating more re-localized or glocalzied sustainability. Thus, tri-capital access has the potential to merge interrelated benefits from economic and natural resources and to re-activate socio-cultural functions. The policy should enact an instrument for the objective validation of active membership in CF to prevent resilience decline.

This research contributed to i) enhancing the discussion on community forestry resilience which was underdeveloped and had shortcomings in methodology; ii) advancing the understanding of the concept of resilience which was previously unformed in the context of indigenous communities; and to iii) understanding of properties and their internal interactions that build and characterize resilient community forestry project groups.

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APPENDIXES

Appendix A

Forest Resource Group level assessment.

CBFM - assessment of Peoples Organization

Date of assessment ……

Full name of PO and acronym ……..……

Consisted of IPs? ☐ Yes ☐ No, If yes please specify: ……..

Dominant mother tongue of PO members: ☐ Tagalog ☐ other ……..

I. CBFM Area/Project Profile

1. Name of the Project
2. Size of the area …….. ha
3. Administrational area coverage

- Province……
- Municipalities ……
- Barangays……

4. Tenure/Land ownership tools:

☐ Community-Based Forest-Management, awarded in ……

☐ Certificate of Ancestral Domain Claim (CADCI), awarded in ……..

☐ Certificate of Stewardship Contract (CSC) and number of members, awarded in

☐ Community Forest Management Agreement (CFMA), when awarded ……..

☐ Forest Land Management Agreement, when awarded ……

☐ Community Based Project (CBP), when awarded ……

☐ Other ……

5. Approved Development Plan in the Project

☐ Site Development Plan

☐ Forest Management Plan

☐ Community Resource Management Development Plan

☐ Community Resource Management Framework

☐ Annual Work Plan

☐ Resource Use Plan (RUP) issuance

☐ Not yet

☐ Under preparation

☐ For approval

I.I General Profile of PO

1. Type of PO:

☐ Cooperative (specify……..……)

☐ Spectral Association: Farmers Association, Fisherfolk Association, Women

Association, other (specify……..)

☐ Self-help Group

☐ Other (specify……..……..…..)

2. Services offered by PO

☐ Co-operative store

☐ Trading/Marketing

☐ Education and Training

☐ Processing/Manufacturing

☐ Eco-Tourism

☐ Livestock growing

☐ Production of vegetables and fruits

☐ Other, (specify……..)

3. How PO started? (Origin of PO)……

4. Number of founding members (initial number): ……

5. Initial Capital (at the time of registration) ……PHP

6. How contributed to fund?

   ☐ Members

   ☐ Financial assistance?

   6.1 Source of Financial Assistance (from beginning till now)

	Source	Amount (PHP)	Year granted	Funded Activities	How obtained the fund?
Grant					
Loans					

7. Assets of the PO

☐ Livestock and number of head

   ☐ Cattle……

   ☐ Goat……..

- ☐ Pig……
- ☐ Poultry……..

☐ Training center

☐ Office building

☐ Multi-purpose building

☐ Vehicle

☐ Equipments please specify kind and number

☐ Co-op store

☐ Accounts receivable

☐ Cash and Hand

☐ Cash in Bank

8. Members Profile

When established			2013		
Men	Women	Total	Men	Women	Total

9. Number of household in the PO's CBFM assessment ……..

10. Residence of PO members:

Place of residents: Number

☐ Residing within and with cultivation

☐ Residing within but without cultivation

☐ Residing outside and with cultivation

☐ Residing outside in but without cultivation

☐ People lived within project area before project was awarded?

II. Vision, mission, goal

1. Does the PO have vision/mission/goals statements?
   - ☐ Yes
   - ☐ No
   - ☐ Don't know
   - ☐ No answer
2. In what document(s) are the statements contained?
   - ☐ CRMF
   - ☐ Constitution & Bylaws
   - ☐ Resource Use Plan (RUP)
   - ☐ Annual Work Plan (AWP)
   - ☐ Others……

3. What are vision/mission/goal of the PO
    - Vision……
    ……
    - Mission……
    ……
    - Goal……
    ……

Appendix C (Continued)

4. Does vision/mission/goals consider your tradition and knowledge?
    - ☐ Yes
    - ☐ No
    - ☐ Don't know
    - ☐ No answer

5. Did members participated in are vision/mission/goal formulation?
    - ☐ Yes
    - ☐ No
    - ☐ Don't know
    - ☐ No answer

    5.1 How did members participated in vision/mission/goal formulation?
    - ☐ Attending Meeting
    - ☐ Active Discussion
    - ☐ Voted on issued delivered and discussed
    - ☐ Other……
    - ☐ No answer

    5.2 Dissemination of vision/mission/goal to other members:
    - ☐ Posters/Brochures
    - ☐ Pre-membership meeting
    - ☐ General assembly
    - ☐ Other……
    ……
    - ☐ No answer

5.3 Is vision/mission/goal revised regularly?

- ☐ Yes
- ☐ No
- ☐ Don't know
- ☐ No answer

Appendix C (Continued)

5.3.1 How regular is the review?

- Vision……
- Mission……
- Goal……

III. Organizational Structure:

1. Does the PO have an organized chart/graph? What is the PO's organizational structure?

……

……

……

2. What are the function roles and responsibilities associated with different parts/positions in the organizational structure

……

……

3. What is the gender of PO leaders?

The present leadership of the PO			
	Men	Women	Total
Board of Directors			
Audit and Supervisory Committee			
Credit Committee			
Education and Training Committee			
Election Committee			
Others, please specify			
Total			

4. Does the PO have and Educational and Training Program for the Development of knowledge, and skills?

   ☐ Yes

   ☐ No

   ☐ Don't know

   ☐ No answer

   4.1 What are the Program's objectives, contents and methods? How many woman – and men – leaders has undertaken the different modules of the training program? When? Who were the resource program?

Title of training	No of attended		Date	Resource Person, Sponsoring agency	Who initiated the program?	Knowledge &skills
	men	women				

4.2. Did any of these training programs considered Indigenous Knowledge?

Please list the programs and which aspect of your traditional knowledge was incorporated?.

Program	Element of your traditional knowledge

5. How often Board/Officers/Committee meetings are held in a year?

   5.1.1 When, were and for how long are the meeting held? Indicate the date of last meeting.....

   5.1.2 Is a quorum present? ☐ Yes ☐ No ☐ Don't know ☐ No answer

   5.1.3 Are meeting documented? ☐ Yes ☐ No ☐ Don't know ☐ No answer

   5.1.4 Who sets the agenda?.....

6. Are members informed of the PO's plans?

- ☐ Yes
- ☐ No
- ☐ Don't know
- ☐ No answer

7. Aside from the PO, what other organizations/agencies/groups participated in the designing CBFM? Indicate if it was active or not active participation
   - ☐ Barangay Council
     - ☐ active ☐ not active ☐ Don't know ☐ No answer
   - ☐ Municipal Government
     - ☐ active ☐ not active ☐ Don't know ☐ No answer
   - ☐ Other PO's, specify ……
     - ☐ active ☐ not active ☐ Don't know ☐ No answer
   - ☐ Other interested groups (such as NGOs, etc), please specify …….
     - ☐ active ☐ not active ☐ Don't know ☐ No answer
   - ☐ DENR, please specify if ☐ CENRO, ☐PENRO
   - ☐ Other……
     - ☐ active ☐ not active ☐ Don't know ☐ No answer

III. Projects implementation after CBFMA was concluded with PO

1. List projects implemented after CBFM program

Plan/Programs/Projects/Services	Specify the Project and years
☐ Increased income	
☐ Access to credit	
☐ Training in the farm technology	
☐ Access to marketing facilities	
☐ Access to information	
☐ Values formation and relationship enhancement	
☐ Other…..	

☐ Increased income	
☐ Access to credit	
☐ other	

1.1 If IP group, was your traditional knowledge considered in any of above mention program?

Please list the programs and which aspect of your traditional knowledge was incorporated?.

Program	Element of your traditional knowledge

2. How capable are the PO's members and officers to implement plants, programs, projects and services?

- ☐ Adequate enough to handle and implement projects
- ☐ Support/additional training needed to implement projects
- ☐ No capacity to handle and implement projects
- ☐ Other……
- ☐ Don't know
- ☐ No answer

3. Aside from the PO, what other organizations/group/agencies collaborated in the implementation of programs which came after CBFM (not only CBFM-related)?

- ☐ Barangay Council
- ☐ Municipal Government
- ☐ Other POs, specify……
- ☐ Other interests group (such as NGOs,etc)……..
- ☐ DENR, please specify if CENRO, PENRO. Etc….
- ☐ Others, please specify
- ☐ Don't know
- ☐ No answer

IV. Monitoring and Evaluation System

1. Does the PO have its own monitoring and evaluation (M&I) system?
   - ☐ Yes
   - ☐ No
   - ☐ Don't know
   - ☐ No answer

If NO

   a. Who then conducts M&E of the PO?
      - ☐ None
      - ☐ Other, please specify ……

2. What activities of PO are monitored and evaluated? What type of M&E report is done, for what purpose and who use? How frequently is the M&E conducted? Who are involved in conducting the M&E?

Activities	Type of M&E report	Purpose	User of reports	Frequency of M&E	Persons involved in M&E

3. Do other stakeholders participate in the M&E of CBFM plans?

☐ Yes: Who are the stakeholders? ....

☐ No

☐ Don't know

☐ No answer

4. Are the results of the M&E of CBFM-related activities documented?

☐ Yes: How? .....

☐ No

☐ Don't know

☐ No answer

V. Record management

1. Where are the initial/business related documents and records maintained and kept by the PO? Are these documents regularly updated?

Non-financial business-related documents and records maintained and kept	Regularly updated?	
	yes	no
Member list		
Contracts/Agreements		
Accounting Records		
Minutes from the meetings		
Other, please specify		

VI. Networking

1. What are the partner-organizations of the PO? What is the nature of their partnership established, such as by project/services, by issues advocacy, funds, principles, etc?

Name of Organization	Nature of Partnership	Reason for partnership	Was it related somehow to CBFM?	How partnership was established?	Is partnership useful?
			☐ Yes ☐ No ☐ I don't Know		☐ Yes ☐ No ☐ I don't Know
			☐ Yes ☐ No ☐ I don't Know		☐ Yes ☐ No ☐ I don't Know
			☐ Yes ☐ No ☐ I don't Know		☐ Yes ☐ No ☐ I don't Know
			☐ Yes ☐ No ☐ I don't Know		☐ Yes ☐ No ☐ I don't Know

2. What is the responsibility of each of the parties in every partnership in every partnership?

Nature of partnership	Parties involved (specify)	Responsibilities (specify)

VI. Additional development benefits after CBFM

1. What kind of additional benefits brought to you

☐ National conferences

☐ International conferences

☐ Educational trips

☐ Others, please specify……

Appendix B

Questionnaire Section I

Place……… Date……………..

1 Name……………………………..

2 House number…………………….

3 PO: ……………………………………………………..

4 Member of (CBFM): yes // no

5 No of people in the family (actually sharing your household) ………………………………

6 Religion………………………….

7 Average monthly income per house per month……………………………… (estimated based on

Name* (Family name - first name, *if confidential no need to give a name,) Only who is actually sharing your household	Gender (woman - w, man -m)	Age	Education none, kindergarten, elementary incomplete, elementary graduate, high school incomplete, high school graduate, college incomplete and graduate

(8)………………………………. (9)m/w (10)…………..(11)<none>, <kindergarten>, <elementary incomplete>, <elementary graduate>, <high school incomplete>, <high school graduate>, <college incomplete> <college graduate>

(8)………………………………. (9)m/w (10)…………..(11)<none>, <kindergarten>, <elementary incomplete>, <elementary graduate>, <high school incomplete>, <high school graduate>, <college incomplete> <college graduate>

(8)………………………………. (9)m/w (10)…………..(11)<none>, <kindergarten>, <elementary incomplete>, <elementary graduate>, <high school incomplete>, <high school graduate>, <college incomplete> <college graduate>

(8)………………………………. (9)m/w (10)…………..(11)<none>, <kindergarten>, <elementary incomplete>, <elementary graduate>, <high school incomplete>, <high school graduate>, <college incomplete> <college graduate>

(8)………………………………. (9)m/w (10)…………..(11)<none>, <kindergarten>, <elementary incomplete>, <elementary graduate>, <high school incomplete>, <high school graduate>, <college incomplete> <college graduate>

(8)………………………………. (9)m/w (10)…………..(11)<none>, <kindergarten>, <elementary incomplete>, <elementary graduate>, <high school incomplete>, <high school graduate>, <college incomplete> <college graduate>

(8)………………………………. (9)m/w (10)…………..(11)<none>, <kindergarten>, <elementary incomplete>, <elementary graduate>, <high school incomplete>, <high school graduate>, <college incomplete> <college graduate>

Number of children attending school…………

8 What is your vision for the future?

……

9 What shall be changed?

……

……

10 Area of land (ha):…….. (owner // land tenure // both)

11 Material from which the house is constructed: ……..

12 Electricity - kWh/month or PHP/month: …….. (No access)

13 Gasoline L/month or PHP/month: ……..

14 LPG Gas kg/month or peso per month: ……..

15 No of vehicles if type: ……..

16 Live stock sell: animal-kg(Head)-peso-year-%sold inside village-%sold outside

……

……

17 Livestock sell income/year……..

18 Fruit/month: how many kg/PhP per KG /%sold inside the village : % sold outside the village/no of trees - covered area / how many months per year harvest

19 ……

20 ……

21 Fruit sell income per month……

22 Vegetables, mushrooms, flowers and medical plants /how many kg per month /PhP per KG /%sold inside the village : % sold outside the village%sold inside the village/covered area / how many months

……

……

……

……

……

23 Input for plant production per year: kg - PhP (fertilizer- F, seeds - S, Pesticides - P, Others..)

……

……

24 Input for animal production per year (feedstuff - F, medicines - M, Fry - FR, others..) in Php - Kg

……

……

25 Market where you sell your products……

26 Medical plants : picked up from the forest (FO), from your farm (FA), other natural area (NA) or bought (BU)

…..……..……

……..……..……

27 Other source of income you and your family members have : i.e. guide – 6000php a year; re-seller -20000php, making baskets – 2000peso

…..……..……

……..……

28 What do you pick up from the forest (I.e. fire wood)? Please specify with units of volume or mass per time

…..……..

……..……..……

…..……..

29 Forest planting, member - h/year - income and how many members of family

…..……..

……..……

……..……

30 Money spent for education per year……

31 Health services: money spent per year……..

32 Money spent for medicines per month or year…….

33 Money spent for toiletries, detergents and other hygienic stuff per month

……

34 Money spent for food per month ……..

35 Money spent for textiles per year……..

36 Mobile phone expenses per year per family……..

37 Mobile phone (number per family) ……..

38 Number of TV receiver……..

39 Number of radio receivers……..

40 Other electric ,

appliances……

41 Other comments and memos:

Appendix C

Questionnaire Section II

Place: Target Date……..

Name…….. Sex……Age……

1.1 Are you and your family satisfied financially?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree

Why?.....

1.2 [For ICC:] Do you follow traditional knowledge in your farming and agroforestry (or modern way of farming)? For Non-ICC used wording "traditional way of farming"

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree

Why?.....

1.3 Do you do traditional practices or rituals in your farming and agroforestry? (only for ICCs)

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree

Why?.....

1.4 Is belief important in your life?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree

Why?.....

1.5 Do you feel spiritual when you are in a forest?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree

Why?.....

1.6 Do you trust local government?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree Why?.....

1.7 Do you feel understood by local government?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree Why?.....

1.8 Do you trust members of CBFM group?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree Why?.....

1.9 Do you feel understood by CBFM members (only for members)?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree Why?.....

1.10 Do you trust local community (of barangay)?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree Why?.....

1.11 Do you feel understood by community (of barangay)?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree Why?.....

1.12 Do you have friends you can count on?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree Why?.....

1.13 Do you have many interactions in the community of barangay?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree Why?.....

1.14 Does your household work together with others (individual or household) in planting/farming or other activities (more than just belonging to same organization, actual work together): Yes / No

If yes express type and number of households you are closely linked with?

(i.e. work with Mr. X in planting coffee and work with house of Mr. Y in cropping plants, and work with household of Ms. Z in weaving baskets = 3). Total Number……..

……

……

……

1.15 Did CBFM improve your livelihood?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree

1.16 Do you consider abandoning CBFM? [Only to CBFM]

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree

Why?.....

1.17 Do you plan to move (out) outside barangay where you currently live?

Strongly disagree// Disagree // Neither Disagree nor Agree // Agree // Strongly agree

Why and if you consider to, then

where? .....

Appendix E

Convergent and Discriminant Validity of Construct

	Degree of trust to local community and feeling understood by the local community	*Degree of trust to government and feeling understood by the local government*	*Degree of trust to CBFM and feeling understood by CBFM*	*Friends to rely on and interaction in the community*	*Traditional knowledge and traditional practices*	*Feeling spiritual in the forest and importance of belief*
Expected	**Convergence**	**Convergence**	**Convergence**	**Moderate convergence**	**Divergence**	**Convergence**
A. Kiangan	0.55	0.57	0.52	0.26	0.01	-0.20
Validity	valid	valid	valid	valid	valid	valid
B Target	0.41	0.52	0.53	0.39	0.56	0.32
Validity	valid	valid	valid	valid	invalid (needs further qualitative analysis)	invalid (needs further qualitative analysis)
Expected	**Convergence**	**Convergence**	**Convergence**	**Moderate convergence**	**NA**	**Divergence**
C Ayala	0.64	0.4	0.80	0.20	x	0.03
Validity	valid	valid	valid	invalid (needs further qualitative analysis)		valid
D Alangan	0.16	0.51	0.15	-0.21	x	0.16
Validity	invalid	valid	Invalid (needs further qualitative analysis)	invalid (needs further qualitative analysis)		valid

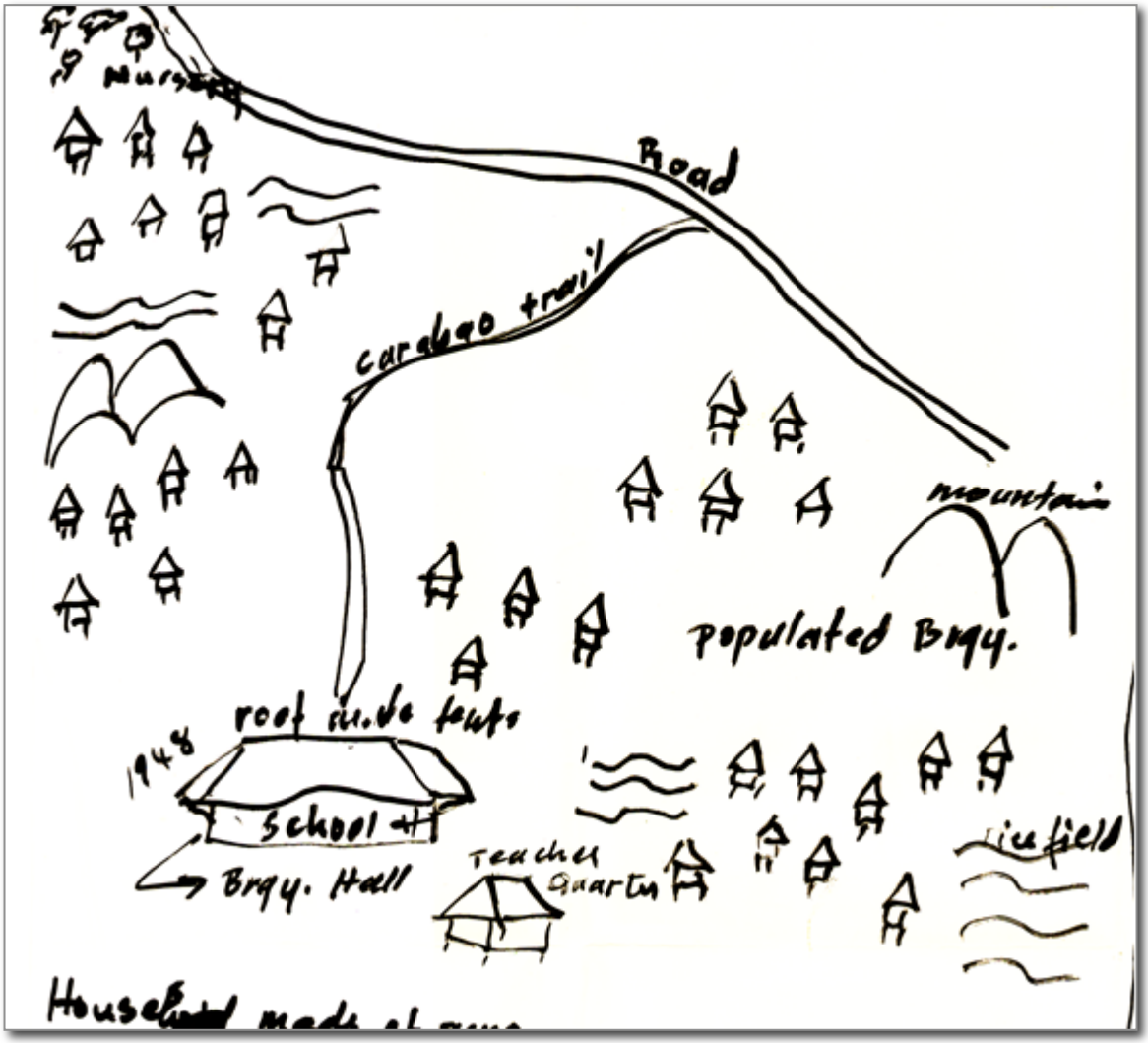
Appendix D

Descriptive statistic of quantitative data

Case A: Kiangan: Dalligan	CBFM						Non-Project					
	n	mean	sd	median	min	max	n	mean	sd	median	min	max
Income.diversity	19	0.20	0.24	0.10	0.00	0.75	30	0.25	0.24	0.25	0.00	0.64
Income.versus.Poverty.line	19	0.27	0.17	0.21	0.08	0.67	30	0.67	0.56	0.54	0.06	2.41
Dependence.on.local.resource....	19	0.84	0.33	1.00	0.00	1.00	30	0.75	0.36	1.00	0.00	1.00
Dependence.on.withdrawn.resource....	19	0.06	0.09	0.00	0.00	0.28	30	0.15	0.30	0.00	0.00	1.00
Dependence.on.non.withdrawn.resource.	19	0.78	0.33	0.95	0.00	1.00	30	0.60	0.41	0.82	0.00	1.00
Vehicle.ownership..Number.	19	0.00	0.00	0.00	0.00	0.00	30	0.00	0.00	0.00	0.00	0.00
Household.farm..ha.	19	0.82	0.61	0.63	0.20	2.00	30	2.26	1.59	2.00	0.00	5.00
Renewable.energy.use....	19	0.97	0.04	0.98	0.86	1.00	30	0.92	0.12	0.98	0.52	1.00
Livestock.number	19	13.00	11.59	13.00	0.00	47.00	30	2.80	7.21	0.00	0.00	31.00
Case A: Kiangan: Lingay	**CBFM**						**Non-Project**					
	n	mean	sd	median	min	max	n	mean	sd	median	min	max
Income.diversity	9	0.17	0.20	0.08	0.00	0.50	33	0.22	0.24	0.13	0.00	0.60
Income.versus.Poverty.line	9	0.35	0.30	0.24	0.04	1.02	33	0.81	1.26	0.40	0.05	5.94
Dependence.on.local.resource....	9	0.76	0.43	1.00	0.00	1.00	33	0.68	0.40	1.00	0.00	1.00
Dependence.on.withdrawn.resource....	9	0.17	0.34	0.00	0.00	1.00	33	0.06	0.19	0.00	0.00	1.00
Dependence.on.non.withdrawn.resource.	9	0.59	0.46	0.80	0.00	1.00	33	0.62	0.40	0.72	0.00	1.00
Vehicle.ownership..Number.	9	2.00	0.87	2.00	1.00	3.00	33	0.09	0.29	0.00	0.00	1.00
Household.farm..ha.	9	0.52	0.40	0.25	0.00	1.00	33	2.39	1.84	1.50	0.00	5.00
Renewable.energy.use....	9	0.93	0.12	0.98	0.62	0.99	33	0.96	0.09	0.99	0.55	1.00
Livestock.number	9	9.11	6.01	7.00	1.00	18.00	33	2.27	5.82	0.00	0.00	29.00
Case B: Sapang Bato : Target	**CBFM**						**Non-Project**					
	n	mean	sd	median	min	max	n	mean	sd	median	min	max
Income.diversity	35	0.44	0.18	0.47	0.03	0.72	16	0.44	0.23	0.53	0.00	0.73
Income.versus.Poverty.line	35	0.49	0.29	0.44	0.04	1.12	16	0.80	0.46	0.68	0.18	2.08
Dependence.on.local.resource....	35	0.98	0.06	1.00	0.74	1.00	16	0.85	0.28	1.00	0.24	1.00
Dependence.on.withdrawn.resource....	35	0.70	0.34	0.82	0.02	1.00	16	0.43	0.38	0.29	0.00	1.00
Dependence.on.non.withdrawn.resource.	35	0.29	0.34	0.10	0.00	0.98	16	0.42	0.41	0.27	0.00	1.00
Vehicle.ownership..Number.	35	0.09	0.28	0.00	0.00	1.00	16	0.19	0.54	0.00	0.00	2.00
Household.farm..ha.	35	5.46	7.57	3.00	0.00	32.00	16	1.57	2.43	1.00	0.00	10.00
Renewable.energy.use....	35	0.97	0.06	0.99	0.69	1.00	16	0.95	0.10	0.99	0.61	1.00
Livestock.number	35	4.60	12.62	0.00	0.00	56.00	16	1.75	2.52	0.00	0.00	7.00
Case C: Ayala: Orchard	**CBFM**						**Non-Project**					
	n	mean	sd	median	min	max	n	mean	sd	median	min	max
Income.diversity	25	0.39	0.28	0.44	0.0	1.00	30	0.31	0.24	0.34	0.00	0.74
Income.versus.Poverty.line	25	1.75	1.90	1.42	0.1	9.27	30	1.58	1.26	1.08	0.03	4.40
Dependence.on.local.resource....	25	0.41	0.38	0.31	0.0	1.00	30	0.26	0.38	0.04	0.00	1.00
Dependence.on.withdrawn.resource....	25	0.40	0.37	0.31	0.0	1.00	30	0.18	0.34	0.02	0.00	1.00
Dependence.on.non.withdrawn.resource.	25	0.01	0.04	0.00	0.0	0.19	30	0.07	0.23	0.00	0.00	0.95
Vehicle.ownership..Number.	25	0.96	1.17	0.00	0.0	3.00	30	0.77	0.77	1.00	0.00	3.00
Household.farm..ha.	25	1.36	1.10	1.00	0.5	6.00	30	0.67	0.89	0.05	0.00	3.00
Renewable.energy.use....	25	0.66	0.36	0.83	0.0	1.00	30	0.60	0.38	0.69	0.01	1.00
Livestock.number	25	12.96	23.22	4.00	0.0	100.00	30	9.67	23.39	2.00	0.00	120.00
Case D: Alangan	**CBFM**						**Non-Project**					
	n	mean	sd	median	min	max	n	mean	sd	median	min	max
Income.diversity	26	0.30	0.22	0.34	0.00	0.66	32	0.27	0.24	0.33	0.00	0.66
Income.versus.Poverty.line	26	1.36	1.14	0.99	0.12	4.89	32	2.39	1.99	2.04	0.24	9.47
Dependence.on.local.resource....	26	0.29	0.38	0.06	0.00	1.00	32	0.08	0.21	0.00	0.00	1.00
Dependence.on.withdrawn.resource....	26	0.22	0.32	0.06	0.00	1.00	32	0.05	0.13	0.00	0.00	0.41
Dependence.on.non.withdrawn.resource.	26	0.07	0.23	0.00	0.00	0.88	32	0.02	0.12	0.00	0.00	0.69
Vehicle.ownership..Number.	25	0.88	1.24	1.00	0.00	5.00	32	0.53	0.67	0.00	0.00	2.00
Household.farm..ha.	26	4.29	12.53	1.00	0.00	65.00	32	1.16	4.64	0.00	0.00	26.00
Renewable.energy.use....	26	0.63	0.41	0.83	0.00	1.00	32	0.27	0.30	0.15	0.00	1.00
Livestock.number	26	9.04	12.62	4.50	0.00	50.00	32	2.88	8.21	0.00	0.00	45.00

Appendix F

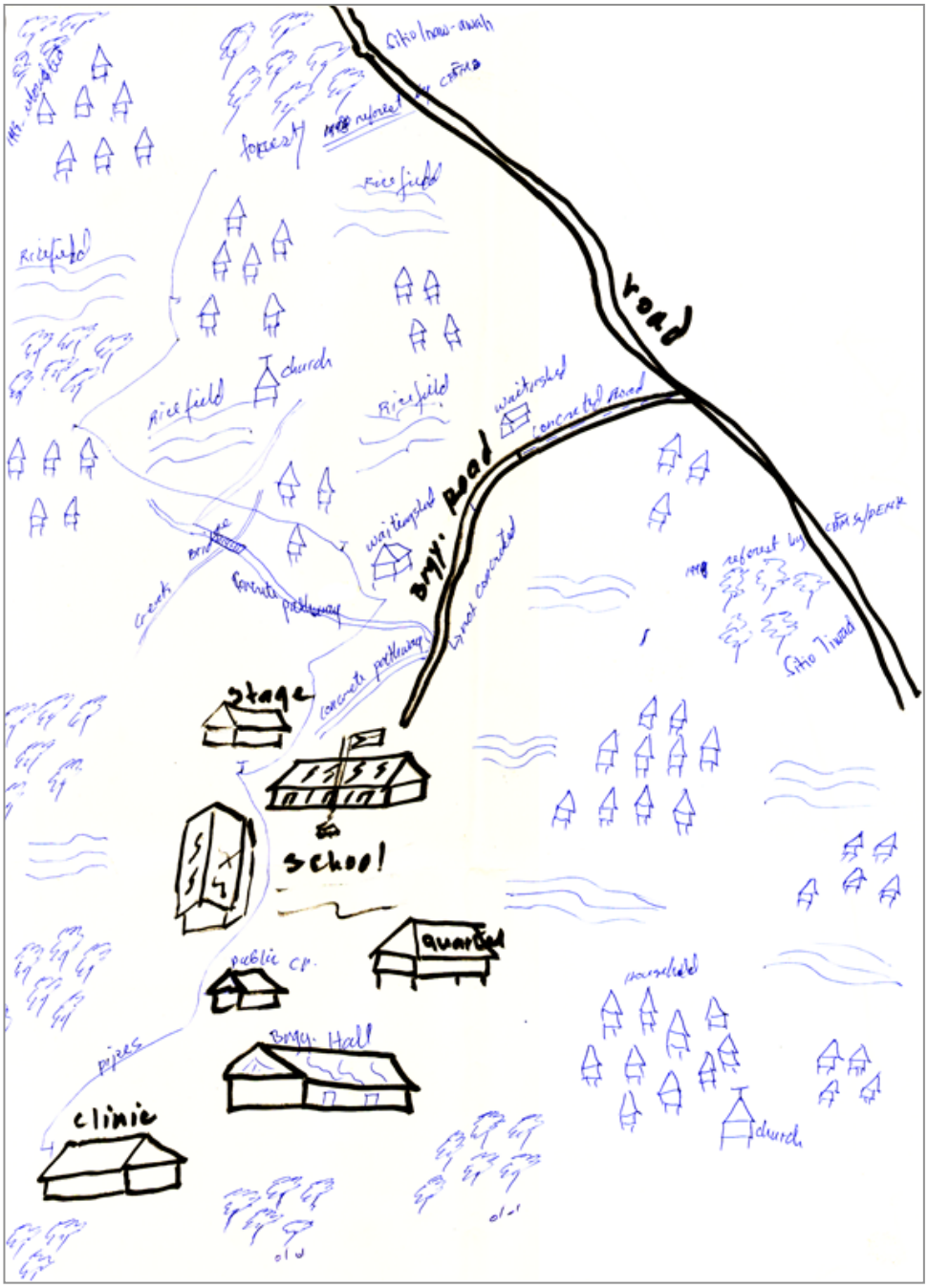
Lingay – past settings



Note: Community mapping's output – barangay Lingay in the late 1980s. Outcome of Community Mapping workshop, credits to participants

Appendix G

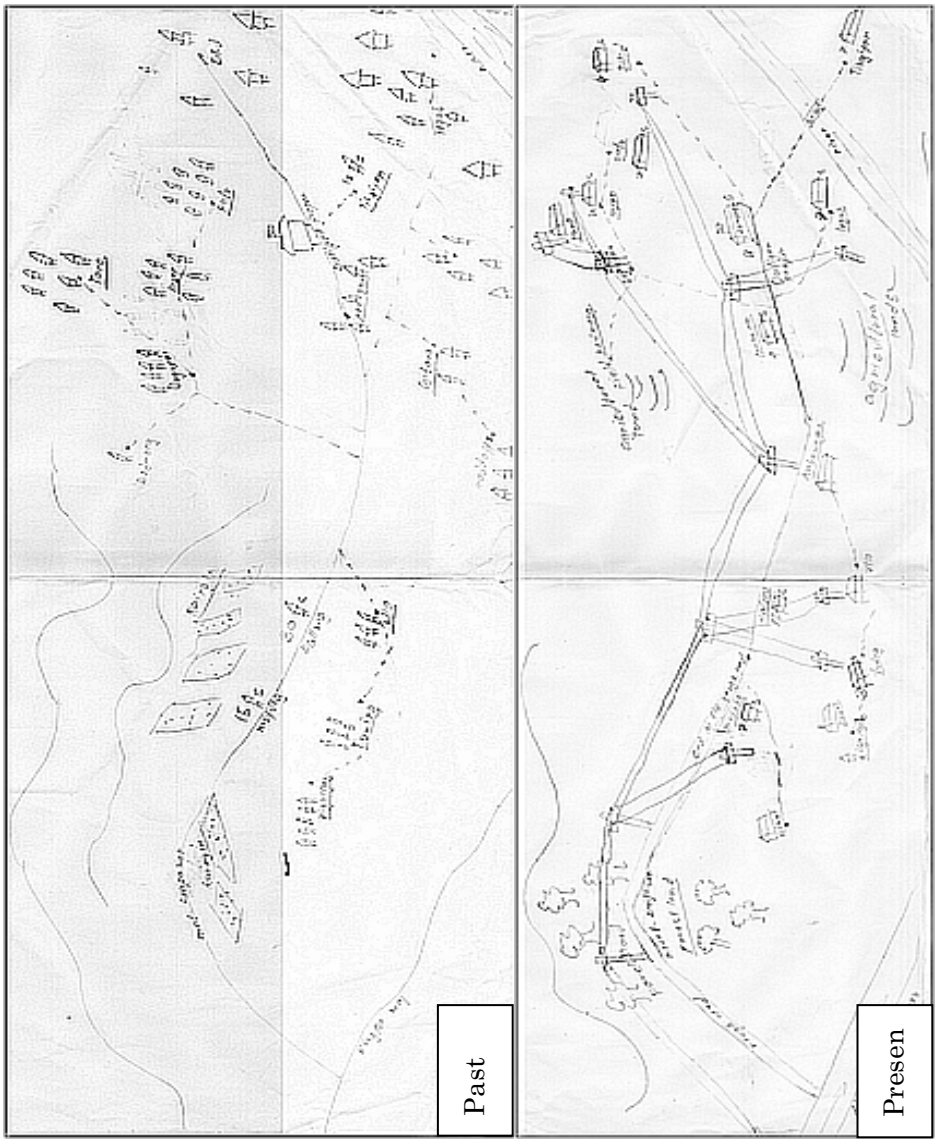
Lingay– current settings



Note. Community mapping's output – barangay Lingay at present. Outcome of Community Mapping workshop, credits to participants

Appendix H

Dalligan– past and present settings



Appendix I

Cooperation types in Dalligan and Lingay

Location / Cooperation	Dalligan				Lingay			
	Non-Project		CBFM Project		Non-Project		CBFM Project	
	No of cooperatio	Per cent	No of cooperatio	Per cent	No of cooperatio	Per cent	No of cooperatio	Per cent
Bridge construction	0	0%	0	0%	6	4.00%	0	0%
Carrying to hospital, Cleaning road, tree planting	5	3.52%	0	0%	0		0	0%
Carrying firewood for funeral and tree planting	7	4.93%	0	0%	0		0	0%
Carrying rice, pigs, and sick persons		0%	0	0%	6	4.00%	0	0%
Clearing road	13	9.15%	0	0%	5	3.33%	0	0%
Farming (rice and corn), Riprapping rice fields, and Work in the forest	0	0%	0	0%	0		2	10.53%
Farming (rice)	42	29.58%	55	82.09%	76	50.67%	6	31.58%
Farming (rice) and Cleaning school ground	0	0%	0	0%	6	4.00%	0	0%
Farming (rice) and Firewood collection in the forest	7	4.93%	0	0%	0	0	3	15.79%
Farming (rice) and House construction	0	0%	0	0%	0	0	3	15.79%
Farming (rice) and House reperation	0	0%	0	0%	0	0	1	5.26%
Farming (rice) and Riprapping rice fields	0	0%	0	0%	12	8.00%	2	10.53%
Farming (rice), Riprapping rice fields and Forest work	0	0%	0	0%	0	0	2	10.53%
Farming (rice) and Tree planting	5	3.52%	0	0%	11	7.33%	0	0%
Farming (rice) and Wood carrying	7	4.93%	0	0%	0	0	0	0%
House renovation	0	0%	0	0%	8	5.33%	0	0%
Pathway cleaning and Tree planting	3	2.11%	0	0%	0	0	0	0%
Riprapping rice fields	6	4.23%	0	0%	0	0	0	0%
Riprapping rice fields, Tree planting, Farming (rice)	0	0%	1	1.49%	4	2.67%	0	0%
Riprapping road	5	3.52%	0	0%	0		0	0%
School group	8	5.63%	0	0%	0		0	0%
Tree planting	15	10.56%	9	13.43%	16	10.67%	0	0%
Tree planting and Riprapping road	4	2.82%	0	0%	0		0	0%
Wood carrying	8	5.63%	1	1.49%	0		0	0%
Woodcarving	7	4.93%	1	1.49%	0		0	0%
Total	**142**	**100%**	**67**	**100%**	**150**	**100%**	**19**	**100%**

Appendix J

Statistical differences between CBFM and Non-Project groups in Dalligan and Lingay,

	Dalligan	Lingay:
Economic capital		
Income diversity	0.5556	0.8469
Resource dependency	0.4164	0.6581
Withdrawn resource dependency	0.6888	0.1715
Non-withdrawn dependency	0.1804	0.648
Income/poverty threshold	0.001943*	0.2439
Income satisfaction	0.5261	0.4066
Housing	0.2286	0.2777
Electricity	0.2706	0.4635
Mobility	N/A	0.8802
Socio-cultural capital		
Number of Cooperation	0.4324	0.1501
Reliable friends	0.1279	0.5327
Interactions in the community	0.6924	0.7068
Trust to local community	0.5618	0.6861
Trust to CBFM group	0.8647	0.9213
Understood by Community	0.7947	0.9323
Feeling understood by CBFM group	N/A	N/A
Trust to local government	0.4448	0.2843
Understood by local government	0.7894	0.6532
Traditional way of farming	0.3775	0.152
Traditional practices	0.5859	0.009756**
Belief	0.1783	0.6233
Spirituality in the forest	0.5137	0.3694
Natural capital		
Farm size per household	0.00145**	0.001799**
Farm size per person	0.0002539**	0.004386**
Renewable energy	0.8938	0.1107
Livestock	2.88e-05**	5.414e-05**

Note: * Statistical difference at confidence level 0.05

** Statistical difference at confidence level 0.01

Appendix K

Results of Spearman correlations between significant variables in Dalligan

CBFM Project group (n=19) (r coefficient)							
	Withdrawn resource dependence	Income /poverty threshold	Number of Cooperation	Traditional practices	Household land	Land size per person	Livestock
Withdrawn resource dependence		0.2173219	0.1195256	0.1036091	0.2386155	0.4398801	0.3507867
Income /poverty threshold			-0.1505751	-0.1191157	-0.1843877	0.185495	0.4848241
Number of Cooperation				0.4452338	0.159506	0.3143139	-0.3391686
Traditional practices					0.4221778	0.5247847	-0.09558648
Household land						0.8275914	-0.2008857
Land per person							-0.0485009
Non-Project group (n=30) (r coefficient)							
Withdrawn resource dependence		0.09076692	-0.07753639	0.1463165	0.1718891	0.200063	0.207698
Income /poverty threshold			-0.2346912	0.5320181	0.161899	0.3351648	-0.3847944
Number of Cooperation				-0.08645629	0.5245178	0.4631618	-0.2772434
Traditional practices					0.3787242	0.4128383	-0.3290592
Household land						0.9180301	-0.5266542
Land size per person							-0.5813852

Appendix L

Results of Spearman correlations between significant variables in Lingay

	Income /poverty threshold	Number of Cooperation	Traditional practices	Household land	Land size per person	Livestock
CBFM Project group (n=9) (r coefficient)						
Withdrawn resource dependence	0	-0.6736097	-0.3	0.1119006	0.1643168	0.3834058
Income /poverty threshold		-0.186339	0.4107919	0.33199	0.7666667	0.8166667
Number of Cooperation			-0.1530931	0	-0.0372678	-0.4285797
Traditional practices				0.1398757	0.1369306	0.4107919
Household land					0.7491057	0.255377
Land size per person						0.7
Non-Project group (n=33) (r coefficient)						
Withdrawn resource dependence	0.1488016	-0.210212	-0.1758716	0.32759	0.435625	-0.1275135
Income /poverty threshold		0.3915635	0.03642223	0.3466604	0.3953717	-0.4905872
Number of Cooperation			0.4853944	0.3985036	0.2114652	-0.529666
Traditional practices				0.21513	0.2379889	-0.5475366
Household land					0.8516526	-0.5791462
Land size per person						-0.6182973

Appendix M

Sapang Bato Target - past and present settings

Note: Community mapping's output – Sitio Tatget in the past (before 1991) and at present (2015). Outcome of Community Mapping workshop, credits to participants

Appendix N

Statistical differences between groups in Target, p-values received by non-parametric Wilcoxon rank sum test in R-Project

Non-CBFM/CBFM Project group				
Economic capital			*Socio-cultural capital*	
Income diversity	0.863		Number of Cooperation	0.4932
Resource Dependency	0.08056		Reliable friends	0.2433
Withdrawn resource dependency	0.02331*		Interactions in the community	0.5775
Non-withdrawn dependency	0.2326		Trust to local community	0.003837**
Income/poverty threshold	0.008633**		Trust to CBFM group	0.0008861**
Income satisfaction	0.4032		Understood by Community	0.2233
Housing	0.7845		Trust to local government	0.8839
Electricity	0.8792		Understood by local government	0.1046
Mobility	0.6791		Traditional way of farming	0.02057*
Natural capital				Traditional practices
Farm size per household	0.002191**		Belief	0.5286
Farm size per person	0.009008**		Spirituality in the forest	0.6791
Renewable energy	0.6458			
Livestock	0.82			

Note: * Statistical difference at confidence level 0.05

** Statistical difference at confidence level 0.01

Appendix O

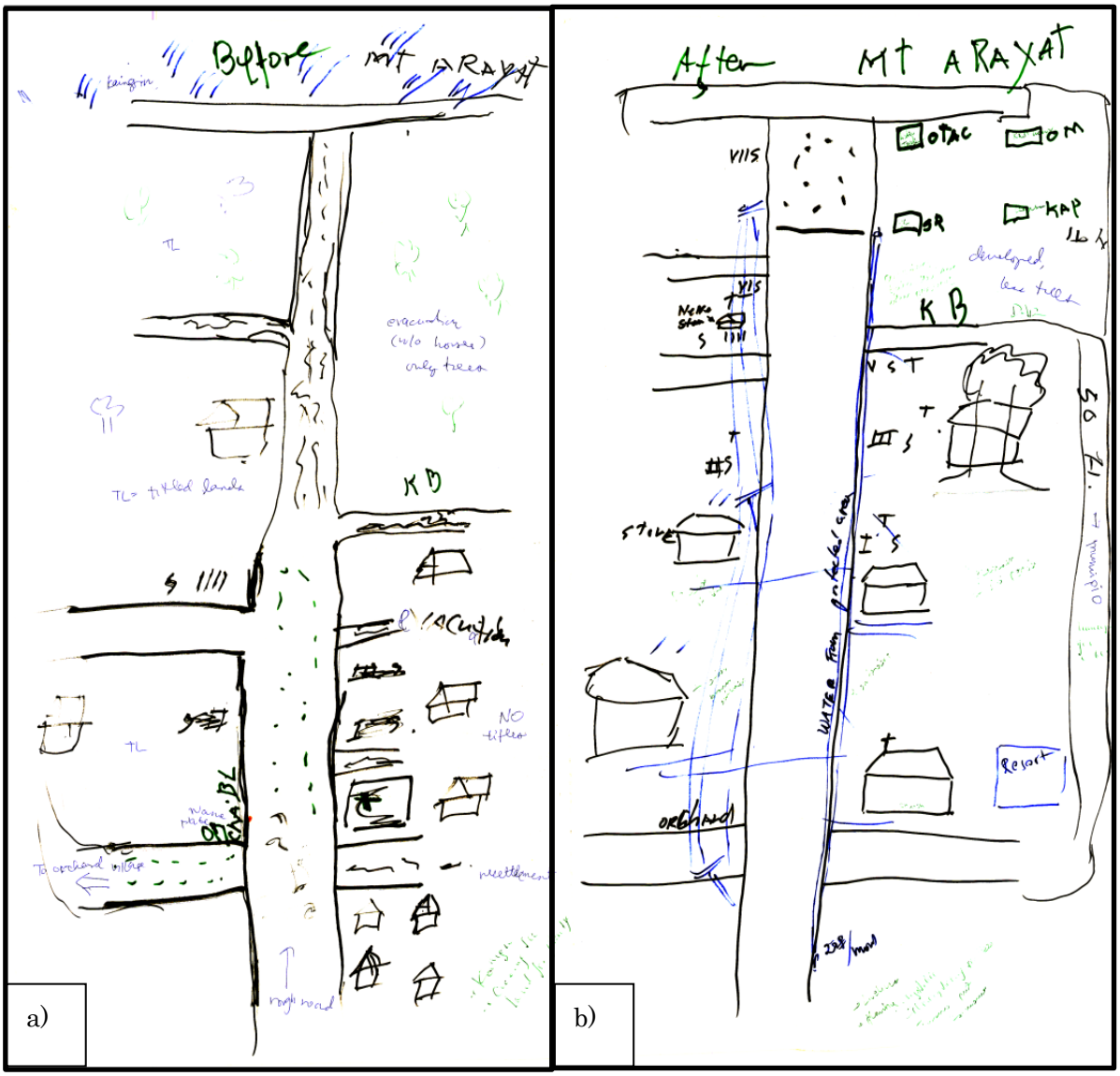
Results of correlations between significant variables in Sapang Bato-Target

	Income /poverty threshold	Withdrawn resource dependence	Trust to community	Trust to CBFM	Traditional farming	Household farm size	Farm size per person
Non-Project group (n=16) (r coefficient)							
Income /poverty threshold		0.313466	-0.10704	-0.238	-0.11683	0.5035	0.569324
Withdrawn resource dependence			0.23838	-0.59139	0.23838	0.453484	0.2893
Trust to community				0.21163	0.177047	0.192605	0.074848
Trust to CBFM					0.232076	-0.06536	0.020298
Traditional farming						0.212841	0.089151
Household farm size							0.934605
CBFM Project group (n=35) (r coefficient)							
Income /poverty threshold		0.336695	0.23478	0.302321	0.086766	0.10801	0.156068
Withdrawn resource dependence			-0.51189	-0.02668	0.407951	0.218298	0.11961
Trust to community				0.131861	-0.0012	0.124763	0.174257
Trust to CBFM					-0.12885	-0.3117	-0.24927
Traditional farming						0.085324	0.056897
Household farm size							0.959361

Note: Spearman correlation in R Project, Package 'pspearman'

Appendix P

Ayala - Orchard village - past and present settings



Note: Community mapping's output – Orchard village (a) before and (b) at present. Outcome of Community Mapping workshop (2015), credits to participants

Appendix R

Statistical differences between groups in Ayala – Orchard village, and in Alangan, p-values received by non-parametric Wilcoxon rank sum test in R-Project

	Ayala, Orchard village Non-CBFM/CBFM Project	**Alangan Non-CBFM/CBFM Project**
Economic capital		
Income diversity	0.3524	0.7591
Resource Dependence	0.05587	0.001439**
Withdrawn resource dependence	0.008844**	0.003655**
Non-withdrawn dependence	0.7347	0.02433*
Income/poverty threshold	0.9798	0.0141*
Income satisfaction	0.2668	0.2496
Housing	0.1394	0.1981
Electricity	0.6831	0.06889
Mobility	0.2449	0.6445
Socio-cultural capital		
Number of Cooperation	0.02685*	2.186e-05**
Reliable friends	0.002649**	0.9012
Interactions in the community	0.009135**	0.005651**
Trust to local community	0.02228*	0.8592
Trust to CBFM group	0.0115*	0.9802
Understood by Community	0.06459	0.1824
Trust to local government	0.1398	0.05388
Understood by local government	0.1021	0.09302
Traditional way of farming	0.7623	0.0003774**
Importance of Belief	0.4556	0.008823**
Spirituality in the forest	0.06318	0.185
Natural capital		
Farm size per household	0.001725*	1.611e-06**
Farm size per person	0.0003449*	1.214e-06**
Renewable energy	0.4936	0.003117**
Livestock	0.2862	0.001723**

Note: * Statistical difference at confidence level 0.05

* *Statistical difference at confidence level 0.01

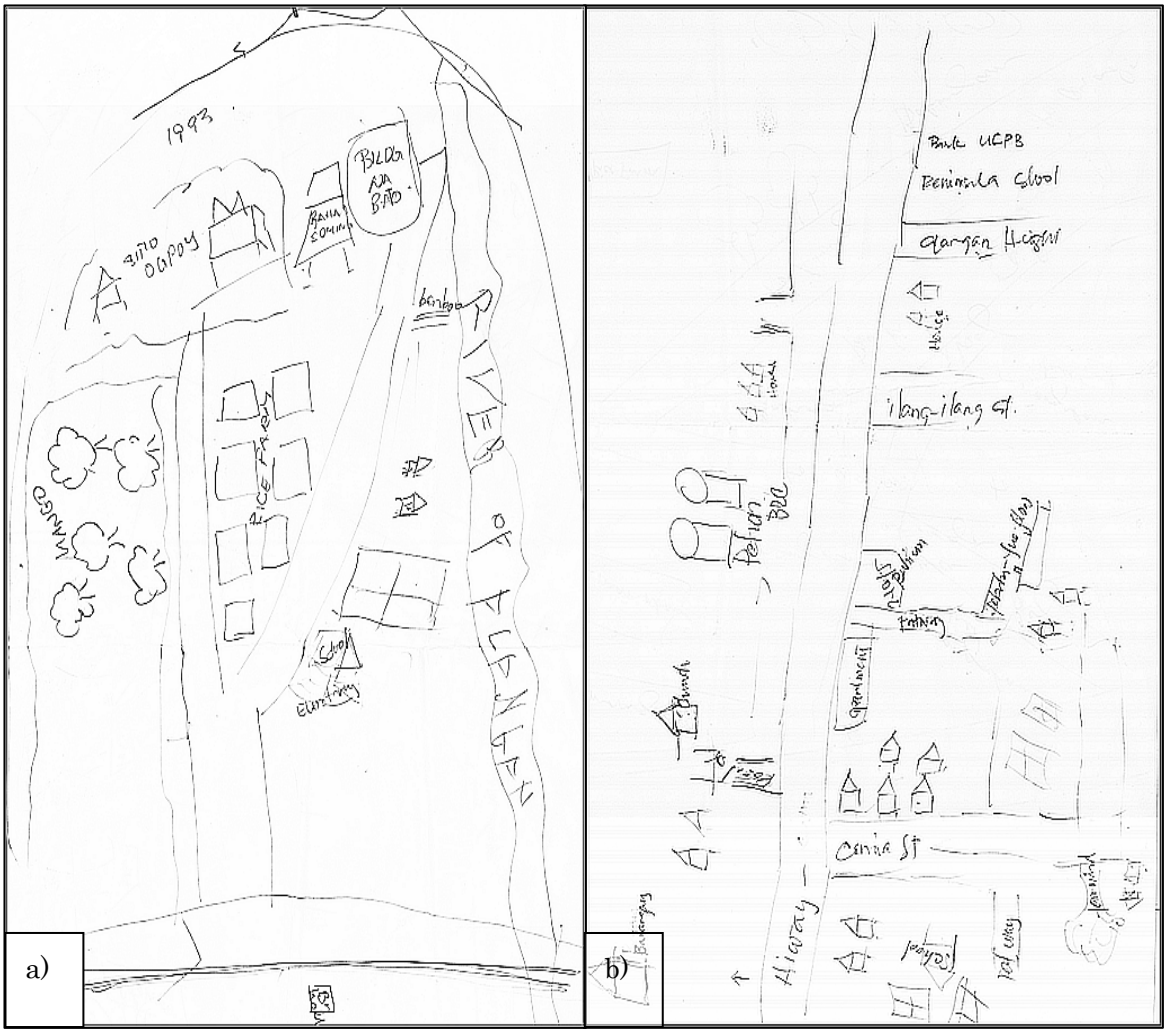
Appendix S

Results of correlations between significant variables in Ayala – Orchard village

	Number of Cooperation	Reliable friends	Interactions in the community	Trust to local community	Trust to CBFM	Household Farm	Farm/ person
CBFM Project group (n=25) (r coefficient)							
Withdrawn resource dependence	0.156736	0.14421	0.2072825	0.00323026	0.5325	-0.15497	0.04570
Number of Cooperation		-0.06671	0.3988719	0.2259463	0.2458	0.071915	0.29379
Reliable friends			-0.2555377	0.2364352	0.2123	0.328008	0.04575
Interactions in the community				0.03110558	0.2983	-0.02158	0.15862
Trust to local community					0.1274	0.158618	0.21268
Trust to CBFM						-0.05653	0.17624
Farm/ person							-0.05358
Non-Project group (n=30) (r coefficient)							
Withdrawn resource dependence	0.254212	0.05832	-0.1038306	-0.1509505	0.0960	0.483945	0.49072
Number of Cooperation		-0.30428	0.2837203	0.3127345	0.1790	0.149821	0.12694
Reliable friends			0.2527168	0.2527168	0.2210	0.008885	0.04492
Interactions in the community				0.4033934	0.2310	-0.04429	0.03748
Trust to local community					0.1769	-0.20565	0.19252
Trust to CBFM						0.107369	0.04985
Household Farm							0.96968

Appendix T

Alangan village - past and present settings



Note: Community mapping's output: (a) Alangan 20 years ago and (b) at present. Outcome of Community Mapping workshop (2015), credits to participants

Appendix U

Cooperation types in Alangan

Cooperation	Non-Project (n=32)		CBFM Project (n=26)	
	No of cooperation	Per cent	No of cooperation	Per cent
Bamboo nursery	0	0%	1	0.56%
Basket weaving	3	8.82%	60	**33.90%**
Cocoa planting	0	0%	6	3.39%
Coconut plate manufacture	0	0%	15	8.47%
Farming	5	14.71%	28	**15.82%**
Fruit trees planting	0	0%	6	3.39%
Nursery	0	0%	10	5.65%
Tree planting	7	**20.59%**	42	**23.73%**
Rice and vegetable	0	0%	3	1.69%
Transportation	0	0%	1	0.56%
Vegetable production	0	0%	5	2.82%
Cooperative	10	**29.41%**	0	0%
Costal cleaning	0	0%	0	0%
Mangrove planting	8	**23.53%**	0	0%
Project grants	1	2.94%	0	0%
Total	34	100%	177	100%

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Results of correlations between significant variables in Alangan

	Withdrawn resource dependence in income	Non-withdrawn dependence	Income/poverty threshold	Number of Cooperation	Interactions in the community	Traditional way of farming	Importance of belief	Farm size per household	Farm size per person	Renewable energy	Livestock
CBFM Project group (n=26) (r coefficient)											
Resource Dependence	0.916	0.311	-0.015	-0.062	0.007	-0.152	-0.147	-0.061	-0.095	0.111	0.498
Withdrawn resource dependence in income		-0.001	-0.088	-0.1	-0.139	-0.04	-0.196	-0.077	-0.157	0.129	0.55
Non-withdrawn dependency			0.203	0.044	0.336	-0.233	0.006	0.086	0.154	0.042	-0.095
Income/poverty threshold				-0.2	-0.089	-0.172	-0.02	0.058	0.157	-0.499	-0.274
Number of Cooperation					0.326	0.139	0.021	0.083	-0.142	-0.142	-0.223
Interactions in the community						0.027	0.24	0.364	0.406	0.254	-0.22
Traditional way of farming							-0.245	-0.173	-0.241	0.073	-0.244
Importance of belief								0.03	0.139	-0.14	-0.237
Farm size per household									0.847	0.13	-0.051
Farm size per person										0.161	-0.215
Renewable energy											0.134
Non-Project group (n=32) (r coefficient)											
Resource Dependence	0.996	0.38	0.189	0.079	-0.079	0.021	0.014	0.761	0.779	0.074	0.229
Withdrawn resource dependence in income		0.307	0.216	0.068	-0.077	0.022	0.037	0.754	0.767	0.06	0.213
Non-withdrawn dependency			-0.204	0.196	-0.03	-0.053	-0.153	0.282	0.345	0.185	0.249
Income/poverty threshold				-0.206	-0.323	-0.185	-0.058	0.075	0.073	-0.53	-0.079
Number of Cooperation					0.181	0.412	0.345	0.209	0.196	0.444	-0.077
Interactions in the community						0.21	0.14	-0.159	-0.174	0.216	0.173
Traditional way of farming							0.14	0.004	-0.009	0.215	-0.054
Importance of belief								0.059	0.031	0.34	-0.138
Farm size per household									0.996	0.159	0.084
Farm size per person										0.147	0.096
Renewable energy											0.181