

Factors In Achieving Social Fencing Outcomes: The Case of Mounts Banahaw- San Cristobal Protected Landscape in the Philippines



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自然保護区とその周辺に昔から居住する人々の権利と自然環境の保護をどう両立させるか。ここではフィリピンのバナハウ・サンクリストバル自然保護区での事例研究を通じてsocial fencingの効果とその課題を検証する。

Abstract

Social fence/social fencing is recognized in the Philippines as a strategy in protected area management and biodiversity conservation which is necessary to achieve sustainable development. Internationally, the practice of social fencing can be anchored on community-based conservation which recognizes the harmonious relationship between humans and the environment. From 1994-2017, a social fencing program was operationalized to address socio-ecological issues and facilitate upland community development of fringe communities inside the buffer zone of Mounts Banahaw-San Cristobal Protected Landscape in Quezon and Laguna Provinces, Philippines. Utilizing the case study method, this research determines the social fencing outcomes from the perspective of the partner community-based associations and the factors affecting its achievement and could impact the accomplishment of sustainable development. The study revealed that improved natural capital, developed human capital, enhanced social capital, and increased financial capital were perceived outcomes of effective social fencing mechanism implementation. The Chi-square test showed that effective social fencing mechanisms and organizational characteristics such as organizational affiliation and land ownership are related to the achievement of the perceived social fencing outcomes. It implies investing in organized community associations and having tenured land resources could assist in sustaining the benefits and outcomes that social fencing programs can provide towards environmental conservation, upland community development, and accomplishment of several sustainable development goals.

Keywords

social fencing, community-based conservation, Sustainable Development Goals (SDGs), case study, chi-square test

Introduction

A prominent management model for biodiversity conservation in the Western world is the establishment of protected areas. It is a process of enclosing a specific area to protect and conserve important biological species from extraction, extinction, habitat loss, and fragmentation. Technically, a protected area is a specific piece of land or sea dedicated to the protection and preservation of biological diversity, as well as natural and associated cultural resources, and administered in legal or other effective ways (Dudley & Stolton, 2008). The enclosure of an ecosystem is also known as the fortress

or the fine and fence approach to conservation (Hutton et al., 2005; Muhumuza & Balkwill, 2013; Mutanga et al., 2017). With this initiative, approximately 20 million km² or 14.9% of the earth's land area is currently occupying the classification of protected areas which assist the sustainability of the society through its ecosystem services (de Araújo Pereira et al., 2016; Htay et al., 2022). Its establishment was observed to be a solution to many anthropogenic concerns including population growth, ecosystem degradation, changing climate, and economic pressures resulting in loss of biodiversity, habitat fragmentation, and cultural disruptions.

Following the Western concept of protected areas, different countries also employed a fortress approach by establishing physical fences to control the mobility of significant faunal species for conservation and encroachment of hunters and gatherers of wildlife flora and fauna (Hayward & Kerley, 2009; Jakes et al., 2018; Pekor et al., 2019). Similarly, this conservation approach is beneficial in the delivery of other ecosystem services including disaster mitigation, climate change adaptation, cultural and spiritual values, and many others (Hayward & Kerley, 2009; Stolton et al., 2010; Lindsey et al., 2012). Unfortunately, studies showed that the protected area establishment causes financial, political, and social problems affecting the fringe communities living in the inhabitable buffer zones (Gungor, 2007; Andrade & Rhodes, 2012; Dewu & Røskft, 2018).

A range of protected area management paradigms was developed to address the social and economic issues posed by the conventional fortress conservation or fine & fence method to the lives of fringe-dependent communities (Stolton et al., 2010). Community-based conservation (CBC) is one of these management approaches (Hutton et al., 2005; Brooks et al., 2013; Muhumuza & Balkwill, 2013). It recognized the coexistence of people and the environment in achieving economic, social, and ecological objectives. Through the active engagement and participation of stakeholders, CBC focused on integrating the local communities in the decision-making, development, management, and conservation processes of dealing with the protected areas (Andrade & Rhodes, 2012; Stone & Nyaupane, 2014; Zyambo, 2018). This highlighted the significance of decentralized resource management, integrated conservation and development projects, and local community engagement (Brooks et al., 2013). The relevance of the local community in the success of conservation initiatives for biodiversity is also recognized in studies made by Muhumuza & Balkwill, 2013; Mogomotsi et al., 2020. Hence, distinguishing the economic, and social needs of fringe-dependent communities could assist in sustaining the initiatives towards integrating conservation and development in accomplishing the ecological goal of biodiversity conservation and sustained ecosystem services.

Acknowledging the fundamental principles CBC represents the transition or paradigm shift of protected area management from fortress and highly centralized to community-based approach (Mogomotsi et al., 2020).

The Philippines is bestowed with a rich natural capital that provides ecosystem services to the entire Filipino society. This is evident in the recorded biological diversity thriving in most of the ecosystems harboring the entire archipelago. In fact, the Philippines is part of the 17 megadiverse nations in the world that hold 2/3 of the planet's total biological diversity (Biodiversity Management Bureau, 2015; von Rintelen et al., 2017). Despite this recognition, the Philippines is also known as a "*biodiversity hotspot*" where most of the plant and animal species are exposed to extinction due to several factors including economic pressure, continuous deforestation, and rampant environmental degradation (Cunningham & Beazley, 2018; Myers et al., 2000). As a signatory to the Convention on Biological Diversity (CBD), the Philippines is no stranger to protected areas and biodiversity protection efforts. The passage of RA 7586, or the National Integrated Protected Areas System (NIPAS Act) in 1992 not only recognized the importance of protected areas but also established a devolved management mechanism that included major stakeholders, like the community organizations, as members of the Protected Area Management Board (PAMB). Moreover, the ratification of RA 11038, or the Expanded NIPAS Act further strengthened the country's effort in the protection of biological resources. Similarly, the same policies favor the fringe-dependent communities by recognizing them as a "social fence" which shall serve as a partner of the government in protected area management. Department Administrative Order (DAO) 99-49 of the Department of Environment and Natural Resources enhanced this recognition by designating the buffer zones of protected areas to be a place for their livelihood operations.

Social fencing is a mechanism that values the collective decision and action of organized communities in resource protection and conservation (Chaudhuri, 2013; Bhagwat, 2012; Mensuro & Vu, 2009; Mittal & Aggarwal, 2002; Henkemans, 2001). This arises from

the idea of a “social fence,” which is defined as the engagement of social institutions and organizational structures in the enclosure of an area for the conservation and development of a specific resource (Mensuro & Vu, 2009). As a resource conservation strategy, the operationalization of social fencing is widely employed in India, Brazil, and African countries to include upland communities in the protection and conservation of resources without jeopardizing their rights to inhabit the area and assist them in achieving their community capitals through developmental processes. Available literature highlighted the concept and operationalization of social fencing as an integrated mechanism of resource conservation and community development (Chaudhuri, 2013; Henkemans, 2001). The works of Foundation for the Philippine Environment (2013) and Edwards et al., (2006), on the other hand, directly reported on “social fencing” as development initiatives toward sustainable resource management within the allowed buffer zones of protected areas in the Philippines. From these, the social fencing program in MBSCPL is equated to a community-based conservation strategy.

One of the many protected areas in the country is the Mounts Banahaw-San Cristobal Protected Landscape. In 1994, the vision to link individuals, communities, and stakeholders in guarding the protected landscape from socio-ecological issues was developed by a group of environmental enthusiasts as they formed the *Luntiang Alyansa para sa Bundok Banahaw* (LABB). Their vision metamorphosed from executing various community organizing projects to implementing a social fencing program that aimed to conserve the biologically diverse ecosystem while recognizing the relevance of fringe-dependent communities within the foothills of Mt. Banahaw. As a community-based conservation strategy, the social fencing of MBSCPL covers the social, economic, and ecological aspects of resource management. Available literature in the Philippines revealed that failed practice of social fencing on different protected areas in the country due to participation dilemma (Van Der Ploeg et al., 2011; Edwards et al., 2006). However, the Foundation for the Philippine Environment (2013) claimed the successful

implementation of the social fencing experience of MBSCPL particularly in the Quezon side that became the basis of its program expansion in the Laguna side. From this end, this study was made to determine the following research questions.

- 1) What are the perceived outcomes of a social fencing program?
- 2) What are the factors affecting the achievement of these outcomes?

Methodology

The Research Locale

This research was carried out in the Mounts Banahaw-San Cristobal Protected Landscape (MBSCPL) foothills, specifically in three villages representing Nagcarlan, Laguna, Tayabas City, Quezon and Liliw, Laguna (Figure 1). It is one of the 244 protected areas included in the National Integrated Protected Areas System (RA 7586). This protected landscape was established as a forest reserve in 1921, as a national park in 1941, as part of the NIPAS in 1992, and was designated as a protected landscape in 2009 by Republic Act 9847 (de Guia et al., 2018; Gascon et al., 2013; Heaney et al., 2013; REECS, 2011). It spans over 11,000 hectares of resource-rich land between the Philippines' Laguna and Quezon provinces (REECS, 2011). The MBSPCL is well-known for its natural beauty, recreational opportunities, and religious-related activities (de Guia et al., 2018; Heaney et al., 2013; REECS, 2011). As a protected area, MBSCPL is home to many biological species that are fundamental to biodiversity conservation and protected area management. These include 92 tree species, 30 bird species, 5 bat species, 3 amphibians, 2 reptiles (Gascon et al., 2013); 10 native small mammals (Heaney et al., 2013); 216 genera and 82 families of vascular plants, 258 terrestrial fauna, 51 species of wildlife, 6 mammals, 34 birds, 4 reptiles, 7 amphibians (REECS, 2011). Interestingly, the reported flora and fauna species show a high endemism and species variety in the area, making MBSCPL one of the 128 Key Biodiversity Areas (KBAs) in the Philippines (de Guia et al., 2018). Apart from these diverse biological species, MBSCPL is also home to almost millions of lowland and upland people inhabiting the eight

municipalities and two cities administratively covering the area. Similarly, this protected region provides a variety of services critical to the growth of the aforementioned settlements. These include the Laguna Lake River Basin's water supply, religious and pilgrimage destinations, agricultural output, and community life (Gascon et al., 2013; REECS, 2011).

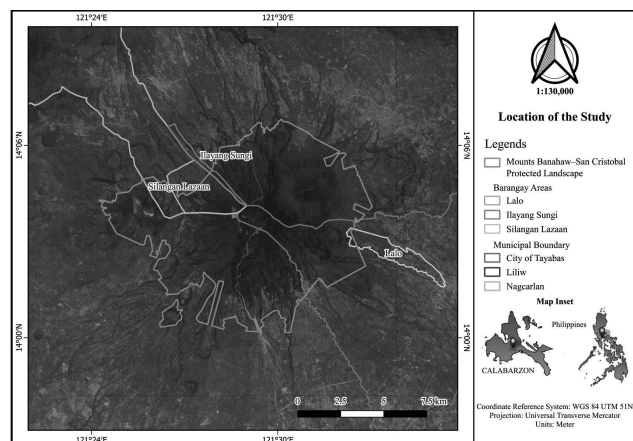


Figure 1. The location of the study.

Sources: United Nations Office for the Coordination of Humanitarian Affairs. (2020). Philippines - Subnational Administrative Boundaries and Google Earth (2023)

Data Collection

The study utilized the case study research design where a triangulation method was employed to minimize the bias of a particular method. The study used focus group discussions, key informant interviews, and survey instrument in data gathering.

To systematically identify the community-based associations (CBA) included in the study, the following were the inclusion criteria: a) CBAs involved with the Social Fencing Program of the assisting non-government organization from 2012 to this date, b) existing and functioning CBA with no less than 15 active members, and c) willingness of the CBA to be part of the study. In a coordination meeting with LABB, three (3) CBAs met the set criteria among the 10 partner CBAs. These were Tapat Kalikasan-Brgy. Lalo (TK-Lalo), Liliw Upland Farmers' Marketing Cooperative (LUFAMCO), Brgy. Silangang Lazan Upland Vegetable Farmers' Association (BSLUVFA).

Stratified random sampling was employed based on the number of active members of the selected community-based associations. A total of 134 active members were the study respondents. On the other hand, key informants were the CBA Presidents, and the LABB personnel, while the focus group included 8-10 members of each selected CBA.

The Survey Instrument

A researcher-made survey questionnaire was developed to collect the respondents' perspectives on the process of social fencing execution in the study area. This instrument aids the study in gathering the individual characteristics of the respondents as identified in the sampling procedure. It also covers the participants' knowledge and perceptions about how social fence mechanisms work in the study sites. Similarly, a survey questionnaire in Filipino was designed to characterize the CBAs and their involvement in social fencing the Mounts Banahaw-San Cristobal Protected Landscape. This questionnaire had a 5-point Likert Scale perception assessment of the respondents. This covers the various acts, events, and situations that describe the social fencing mechanism, and its outcomes as viewed by the participants. These scaled statements were subjected to reliability testing. For the scaled items of the survey questionnaire, a Cronbach alpha of 0.973 was calculated. According to Taber (2018), a Cronbach alpha of 0.70 is the least acceptable number for the instrument's internal consistency.

Analytical Techniques

The collected data was recorded using Statistical Package for Social Sciences (SPSS) version 24. Narrative method and descriptive statistics, like frequencies, mean and percentage, were used to describe the attributes of individual respondents, and the characteristics of each community-based association engaged with social fencing initiatives. Utilizing the data and information gathered from the 134 survey respondents, five key informants, three focus groups, and available pertinent documents, the perceived social fencing outcomes were recorded. Inferential statistics, specifically the Pearson

Chi-Square Test was used to analyze the relationship of the individual member attributes, organizational characteristics, and social fencing mechanisms to social fencing outcomes. Similarly, key informant interviews and focus group discussions were utilized to gather the narratives of the participants to substantiate the findings of the study.

Results and Discussion

Socio-Economic Characteristics of Respondents

The average age of the respondents is 49.76 years old or approximately 50 years old, while the mean age of respondents from TK-Lalo, BSLUVFA, and LUFAMCO were 45, 52, and 56 years old, respectively. Almost 50% of the respondents belong to the age brackets of 49-55 and 56-62 years old, respectively. From the categorization set by the Philippine Statistics Authority, these age groups belong to the working age in the Philippines. Likewise, these numbers corroborate the studies of I. Manigo (2021) and Palis (2020) that the average age of Filipino farmers is 57 years old. The study also noted that upland farmers in MBSCPL were as young as 14 years old and as old as 77 years old. The involvement of 14-year-old respondents suggests the growing concern of the youth in biodiversity conservation, protected area management, and community development as they gradually engaged themselves in different conservation and development activities for the communities living within the allowable buffer zones of the protected area.

In terms of respondents' sex, the study observed that males dominate among the respondents in the study representing 53.73%, while female respondents represent 46.27%. In the context of TK-Lalo, females dominate with 55% while male members occupied 45% of the total respondents. While, for BSLUVFA and LUFAMCO, male members represent 60% of the respondents while females constitute the remaining 40%, respectively.

Many of the study respondents had achieved primary education (28.36%), followed by high school graduates (24.63%) and high school undergraduates (14.18%). The same status is observed with TK-Lalo and LUFAMCO where member-respondents are mostly graduates of the primary and secondary levels of education. However, in

the case of BSLUVFA, many are college graduates (35.71%), followed by elementary graduates (21.43%), and high school graduates (16.67%). Having a formal education among members of the upland communities could help them to be empowered and get more opportunities for them to develop professionally, and personally. However, in the case of this study, living in the foothills of Mount Banahaw restricts them from having access to formal education facilities particularly the higher education institutions, specifically in the cases of TK-Lalo and LUFAMCO.

On the other hand, the study observed that across the three cases, many of the respondents had 3-4 members and 5-6 members within their households. It represents 38.81% and 35.82%, respectively. The mean household size for this study is 6 which is the same as the observation with TK-Lalo, while the mean household size of BSLUVFA is 4, and LUFAMCO is 5. The results denote that the greater size of the household implies the availability of labor in upland farming activities and in securing non-farm economic activities for the household members (Landicho & Dizon, 2020).

The study also observed that the estimated monthly income of all of the respondents lies within the income range of PHP 7700-10400. The monthly income average of all the respondents is PHP 8,589.60 which is lower than the monthly average income of TK-Lalo (PHP 9,008.50) and LUFAMCO (PHP 9250.00) but a little bit higher than the mean monthly income of BSLUVFA (PHP 7,703.40). Unfortunately, the reported average monthly income of member-respondents across the three sites is less than the official poverty threshold of PHP 12,030.00 per month for a family of five members in CALABARZON Region (PSA, 2021). This only indicates that the farmers inhabiting the foothills of MBSCPL are classified as those living below the poverty threshold for the CALABARZON Region. The analysis is consistent with the finding of the Philippine Statistics Authority that farmers are the poorest among the poor sectors in the country based on the poverty incidence report among the basic sectors in the country.

The study found that almost 87% of the respondents declared farming or on-farm activities as their major

economic source to provide the needs and wants of their respective households. On-farm activities in this study refer to the production of upland vegetables and rice, and the production of the native tree species seedlings using rainforestation farming. These on-farm activities are the major source of livelihood among members of TK-Lalo (71.67%), BSLUVFA (97.62%), and LUFAMCO (100%). According to the key informants and focus groups, among these on-farm activities, many of the member-respondents were engaged in upland vegetable production while the production of native tree species seedlings were just a supplementary source of income.

Perceived Social Fencing Outcomes

The establishment of a social fence in the Mounts Banahaw-San Cristobal Protected Landscape was a multi-year effort that required different integrated conservation and development projects to achieve the desired outputs, outcomes, and impacts. Its execution necessitates the participation of other parties in regulating the protected landscape, including the public sector, civil society organizations, and development agencies, in addition to community organizations. LABB, the implementing non-governmental organization, capitalized and invested resources to operationalize its goals and objectives. Aside from the assistance provided by LABB, the resources spent on the program by other partner agencies such as FPE, FFP, USAID, DENR, and local government units are noteworthy and recognized. From 1994 to 2017, these institutions funded the majority of community-based resource management/community-based conservation projects aimed at establishing social fences around the foothills of the MBSCPL to protect the protected area from forest destruction, habitat degradation, environmental abuse, biodiversity loss, and upland community development.

Documentary evidence showed that project management was effective during its implementation in terms of project deliverables but limited in terms of identified outcomes as claimed by Foundation for the Philippine Environment (2013). To substantiate these findings, the study asked the respondents about their perceptions of the social fence outcomes as a strategy for conserving the

MBSCPL and fostering upland community development.

Environment and Biodiversity Conservation (Natural Capital)

According to the survey, the majority of member-respondents from all community-based groups considered that implementing social fencing mechanisms in the area resulted in a high level of environmental and biodiversity conservation (mean=4.54) (Table 1). It demonstrates, in particular, that social fencing facilitated the reduction of illicit activities within MBSCPL, leading to stable and healthy natural resources as well as a very good forest ecosystem state. The healthy and stable environment is reflected in several biodiversity assessment studies conducted within the MBSCPL by various scholars and researchers between 2010 and 2020 (de Guia et al., 2018; Atienza & Pabico, 2015; Santiago & Buot, Jr., 2015; Gascon et al., 2013; Heaney et al., 2013). These reports highlighted the newly discovered species and their conservation status, indicating the program's effectiveness in biodiversity and environmental protection. According to the focus group and key informants, the endemism and diversity of wildlife species found within the MBSCPL can be attributed to the social fencing initiative itself; however, they also recognized the collaborative efforts of various stakeholders, such as local government units, the private sector, and the DENR, in guarding the sacred mountain of Banahaw for the period.

The "high level" of environmental and biodiversity conservation outcome of social fencing as experienced by CBAs can be attributed to the groups' active participation in various forest patrolling and protection activities in collaboration with the local government and the DENR since their partnership with LABB until today. The voluntary involvement of member-respondents was an expression of their allegiance to MBSCPL as *Banahawin* or sons of Banahaw. As a result, the DENR CENRO Tayabas City reported that forest patrolling with the support of community organizations, particularly the volunteer *bantay gubat* of TK-Lalo, resulted in zero reports of unlawful activities in MBSCPL over the past years.

Table 1. Level of environment and biodiversity conservation as a perceived outcome of social fencing in MBSCPL.

STATEMENT	COMMUNITY-BASED ASSOCIATIONS							
	TK-LALO		LUFAMCO		BSLUVFA		TOTAL	
	F	%	F	%	F	%	F	%
<i>There was a reduction in the illegal activities inside the Mounts Banahaw-San Cristobal Protected Landscape.</i>								
Strongly Disagree	-	-	-	-	-	-	-	-
Disagree	-	-	-	-	-	-	-	-
Undecided	4	6.67	7	21.88	1	2.38	12	8.96
Agree	11	18.33	16	50.00	10	23.81	37	27.61
Strongly Agree	45	75.00	9	28.13	31	73.81	85	63.43
Total	60	100.00	32	100.00	42	100.00	134	100.00
Mean	4.68		4.06		4.71		4.54	
SD	0.60		0.72		0.51		0.66	
Descriptive Interpretation	High		High		High		High	
<i>The forest ecosystem and biodiversity are in good condition.</i>								
Strongly Disagree	-	-	-	-	-	-	-	-
Disagree	-	-	-	-	-	-	-	-
Undecided	2	3.33	2	6.25	1	2.38	5.00	3.73
Agree	9	15.00	21	65.63	4	9.52	34.00	25.37
Strongly Agree	49	81.67	9	28.13	37	88.10	95.00	70.90
Total	60	100.00	32	100.00	42	100.00	134	100.00
Mean	4.78		4.28		4.86		4.69	
SD	0.50		0.58		0.42		0.54	
Descriptive Interpretation	High		High		High		High	
<i>The natural resources and their environment remain stable and healthy.</i>								
Strongly Disagree	-	-	-	-	-	-	-	-
Disagree	-	-	-	-	-	-	-	-
Undecided	-	-	-	-	1	2.38	1	0.75
Agree	12	20.00	13	40.63	2	4.76	27	20.15
Strongly Agree	48	80.00	19	59.38	39	92.86	106	79.10
Total	60	100.00	32	100.00	42	100.00	134	100.00
Mean	4.80		4.56		4.90		4.77	
SD	0.40		0.50		0.37		0.44	
Descriptive Interpretation	High		High		High		High	
<i>*Legend: 1.00-2.33 – Low 2.34- 3.66—Moderate 3.67- 5.00- High</i>								

*Legend: 1.00-2.33 – Low 2.34- 3.66—Moderate 3.67- 5.00- High

Community Trust (Social Capital)

As a community-based conservation strategy, social fencing entails development interventions to effect changes in the social relationship of the involved community-based associations toward building an upland community. One of the perceived outcomes of social fencing was the enhancement of trust in the community. Results of the study revealed that the implementation of social fencing in Tayabas City, Liliw, and Nagcarlan, Laguna produced a high level of community trust mainly due to the homogenous characteristic of each group, and the Gemeinschaft type of community in the study sites. On the other hand, the various activities and projects of social fencing further enhanced the social

interaction and social relationships which also helped them improve the community trust as they all collectively worked towards accomplishing the targets to produce native tree seedlings and the regular conduct of the *bantay-gubat* operation, and biodiversity monitoring within the forested area of MBSCPL (Table 2).

The association's involvement in different projects and activities like reforestation farming, forest patrolling, biodiversity monitoring, tree planting, regular monthly meetings, eco-tour guiding, native tree nursery operation, and many others enabled them to strengthen the existing social relationship and interaction within the group. As a result, most of the member-respondents strongly agreed on the capacity of the group (60%) and their leadership (80%) in the execution of different projects even after they participated in social fencing.

Similarly, with the high level of trust in the community, the members are widely accepted to share their thoughts and criticism for the improvement of the operation of the association.

Table 2. Level of community trust as a perceived outcome of social fencing in MBSCPL.

STATEMENTS	COMMUNITY-BASED ASSOCIATIONS							
	TK-LALO		LUFAMCO		BSLUVFA		TOTAL	
	F	%	F	%	F	%	F	%
<i>The community trusts the community-based association in the implementation of conservation and development programs.</i>								
Strongly Disagree	-	-	-	-	-	-	-	-
Disagree	-	-	-	-	-	-	-	-
Undecided	2	3.33	1	3.13	0	0.00	3	2.24
Agree	22	36.67	14	43.75	16	38.10	52	38.81
Strongly Agree	36	60.00	17	53.13	26	61.90	79	58.96
Total	60	100.00	32	100.00	42	100.00	134	100.00
Mean	4.73		4.50		4.62		4.63	
SD	0.52		0.57		0.49		0.53	
Descriptive Interpretation	High		High		High		High	
<i>Members of the community association have high respect and trust for its officers in the program management of the association.</i>								
Strongly Disagree	-	-	-	-	-	-	-	-
Disagree	-	-	2	6.25	-	-	2	1.49
Undecided	-	-	3	9.38	-	-	3	2.24
Agree	12	20.00	13	40.63	13	30.95	38	28.36
Strongly Agree	48	80.00	14	43.75	29	69.05	91	67.91
Total	60	100.00	32	100.00	42	100.00	134	100.00
Mean	4.80		4.22		4.69		4.61	
SD	0.40		0.87		0.47		0.62	
Descriptive Interpretation	High		High		High		High	
<i>Members of the Association and the community intervene in matters that affect them.</i>								
Strongly Disagree	1	1.67	-	-	-	-	1	0.75
Disagree	1	1.67	1	3.13	-	-	2	1.49
Undecided	3	5.00	2	6.25	-	-	5	3.73
Agree	14	23.33	13	40.63	3	7.14	30	22.39
Strongly Agree	41	68.33	16	50.00	39	92.86	96	71.64
Total	60	100.00	32	100.00	42	100.00	134	100.00
Mean	4.55		4.38		4.93		4.69	
SD	0.81		0.75		0.26		0.65	
Descriptive Interpretation	High		High		High		High	
<i>*Legend:</i>	1.00-2.33 – Low		2.34- 3.66—Moderate		3.67- 5.00- High			

*Legend: 1.00-2.33 – Low 2.34- 3.66—Moderate 3.67- 5.00- High

Improved Knowledge and Skills (Human Capital)

Another perceived outcome of social fencing is the enhanced knowledge and skills of the respondents. As a community-based conservation/community-based resource management strategy for MBSCPL, the use of the community adult education method is intensified to inform the community members about the issues surrounding MBSCPL that need to be addressed to prevent the species and habitat loss, and terrestrial ecosystem degradation. A study recognizes the significance of community adult education in rural development as it focuses on changing the political, economic, cultural, and social dimensions of individuals and communities

(Kapur, 2019). Table 3 exhibits the perceived level of increase in the knowledge and skills of respondents from their participation in social fencing programs/projects/activities.

Results of the study indicate that all three community-based associations perceived their engagement in social fencing resulted in a “high” improvement of their knowledge and skills. This perception is manifested in the continuous application of their learned knowledge and skills even in today’s context. Similarly, their participation in different activities and projects facilitated their additional learning from the various capacity-building activities the respondents had attended during the course of social fencing project implementation. This corroborates the findings of Islam et al (2013) that participation of Bangladeshi people in forest conservation programs resulted in improved capacities of forest-dependent families and encroachers towards better and secured livelihood assets of their community. Similarly, the perceived outcome of the increase in knowledge and skills of community members supports the findings of Galvin et al (2018) that community-based conservation projects in Africa yielded positive social outcomes such as access to education and training and extension support.

Table 3. Level of increase in knowledge and skills as a perceived outcome of social fencing in MBSCPL.

STATEMENTS	COMMUNITY-BASED ASSOCIATIONS						TOTAL	
	TK-LALO		LUFAMCO		BSLUVFA			
	F	%	F	%	F	%	F	%
<i>Knowledge and awareness of the conservation and development of natural resources, forest resources, and biodiversity increased among community members.</i>								
Strongly Disagree	-	-	-	-	-	-	-	-
Disagree	-	-	-	-	-	-	-	-
Undecided	-	-	-	-	-	-	-	-
Agree	16	26.67	15	46.88	2	4.76	33	24.63
Strongly Agree	44	73.33	17	53.13	40	95.24	101	75.37
	<i>Total</i>	<i>60</i>	<i>100.00</i>	<i>32</i>	<i>100.00</i>	<i>42</i>	<i>100.00</i>	<i>134</i>
	Mean	4.73		4.53		4.95		4.62
	SD	0.45		0.51		0.22		0.70
Descriptive Interpretation	High		High		High		High	
<i>Knowledge and skills have been developed in the existence and management of a sustainable livelihood.</i>								
Strongly Disagree	-	-	-	-	-	-	-	-
Disagree	-	-	-	-	-	-	-	-
Undecided	-	-	-	-	-	-	-	-
Agree	16	26.67	16	50.00	5	11.90	37	27.61
Strongly Agree	44	73.33	16	50.00	37	88.10	97	72.39
	<i>Total</i>	<i>60</i>	<i>100.00</i>	<i>32</i>	<i>100.00</i>	<i>42</i>	<i>100.00</i>	<i>134</i>
	Mean	4.73		4.50		4.88		4.72
	SD	0.45		0.51		0.38		0.45
Descriptive Interpretation	High		High		High		High	
<i>*Legend:</i>	1.00-2.33 – Low		2.34- 3.66—Moderate			3.67- 5.00- High		

Enhanced Networks and Linkages (Social Capital)

Table 4 illustrates the level of increase in networks and linkages as a perceived outcome of the implementation of the social fencing program in MBSCPL. Social fencing as a community-based conservation strategy involves a variety of players and institutions that have their responsibilities to act in the governance of MBSCPL, making trust, social relationships, social networks, and social capital significant. Based on the survey conducted, the social fencing program execution in the area resulted in “high” social capital. Specifically, the result showed that with the social fencing program implementation member-respondents of the community-based associations believed they have increased their number of allies and acquaintances (mean = 4.65) and increased social cohesion among members resulting in helping each other during times of crisis (mean = 4.62).

Moreover, the respondents perceived that during the implementation of social fencing in their respective areas, their respective associations had experienced

“high” social capital as manifested in the increase in bonding, bridging, and linking capitals. According to the key informants, the partnership among CBAs brought by social fencing further strengthened the operationalization of “*buhay na bakod*” (*social fence*) which safeguards the protected landscape from illegal logging, wildlife poaching, and other destructive activities. The improvement in their linking capital helped them to connect their associations with national government agencies, national non-government organizations, and international funding agencies and provided more opportunities for integrated conservation and development projects. The increase in social capital motivated them to continue their work and initiatives in the protection and conservation of biologically diverse resources of MBSCPL. These results corroborate the study findings of Galvin et al (2018) that the implementation of community-based conservation projects in Africa yielded positive social capital such as enhancement of networks, and relationships of trust, reciprocity, and exchange. These experiences and perceived outcomes facilitated the continuous engagement of the three community-based associations as social fences in MBSCPL.

Table 4. Level of increased networks and linkages as a perceived outcome of social fencing in MBSCPL.

STATEMENT	COMMUNITY-BASED ASSOCIATIONS						TOTAL	
	TK-LALO		LUFAMCO		BSLUVFA			
	F	%	F	%	F	%	F	%
<i>In times of crisis, members of the community-based association help each other.</i>								
Strongly Disagree	-	-	-	-	-	-	-	-
Disagree	-	-	-	-	-	-	-	-
Undecided	2	3.33	-	-	-	-	2	1.49
Agree	17	28.33	13	40.63	19	45.24	49	36.57
Strongly Agree	41	68.33	19	59.38	23	54.76	83	61.94
Total	60	100.00	32	100.00	42	100.00	134	100.00
Mean	4.66		4.59		4.55		4.62	
SD	0.54		0.50		0.50		0.52	
Descriptive Interpretation	High		High		High		High	
<i>The number of our acquaintances and allies has increased.</i>								
Strongly Disagree	-	-	-	-	-	-	-	-
Disagree	-	-	-	-	-	-	-	-
Undecided	2	3.33	4	12.50	1	2.38	7	5.22
Agree	10	16.67	15	46.88	8	19.05	33	24.63
Strongly Agree	48	80.00	13	40.63	33	78.57	94	70.15
Total	60	100.00	32	100.00	42	100.00	134	100.00
Mean	4.77		4.28		4.76		4.65	
SD	0.50		0.68		0.48		0.58	
Descriptive Interpretation	High		High		High		High	
<i>*Legend: 1.00-2.33 – Low 2.34- 3.66—Moderate 3.67- 5.00- High</i>								

Income Enhancement (Financial Capital)

The study found that the practice of rainforestation farming assisted the community-based associations in increasing their net income from the various livelihood sources they are engaged in (Table 5). The rainforestation farming (RF) technology was introduced by LABB to the three community-based associations to optimize the land resources they had. RF is an agroforestry that utilizes native tree species in forest restoration. As a form of income generation, seedlings raised in the nurseries were used in the reforestation activities of the National Greening Program of the Department of Environment and Natural Resources (DENR) inside the MBSCPL and within the identified reforestation sites in CALABARZON Region. The three CBAs were contracted to produce the native tree seedlings and were paid according to the contract. Income generated from this initiative was utilized to benefit its members through the institutionalized lending/microfinancing project of the association. Interestingly, among the three cases, the study observed that LUFAMCO benefitted a lot from this alternative livelihood option as their income was used to purchase the approximately 102 m² of land where their Cooperative's Office was built located in Brgy. Kanlurang Bukal, Liliw, Laguna. The construction of their office building was also funded from their income with NGP contract seedling production.

It was also observed that among the three CBAs, it was LUFAMCO which has a variety of responses or perceptions about the social fencing outcomes in terms of income. This only reflects the liberty of its members to answer. Likewise, such different answers are attributed to the fact that almost 40% of the respondents belong to junior members who have been members of the association for less than 10 years and most of them became affiliated with LUFAMCO during this COVID-19 pandemic period.

Table 5. Level of increase in income as a perceived outcome of social fencing program in MBSCPL.

STATEMENTS	COMMUNITY-BASED ASSOCIATIONS						TOTAL	
	TK-LALO		LUFAMCO		BSLUVFA			
	F	%	F	%	F	%	F	%
<i>Our income increased.</i>								
Strongly Disagree	0	0	0	0	0	0	0	0
Disagree	0	0	10	31.25	0	0	10	7.46
Undecided	14	23.33	8	25.00	1	2.38	23	17.16
Agree	18	30.00	4	12.50	11	26.19	33	24.63
Strongly Agree	28	46.67	10	31.25	30	71.43	68	50.75
Total	60	100.00	32	100.00	42	100.00	134	100.00
Mean	4.27		3.53		4.69		4.22	
SD	0.8		1.27		0.52		0.96	
Descriptive Interpretation	High		Moderate		High		High	
*Legend:	1.00-2.33 – Low		2.34- 3.66—Moderate		3.67- 5.00- High			

Factors Affecting Social Fencing Outcomes

Individual Characteristics

Table 6 indicates the analysis made in determining the association between social fencing outcomes with the individual profiles of the respondents. The results show that the individual characteristics of the respondents such as household size, livelihood source, and estimated monthly income have a significant association with perceived social fencing outcomes. Specifically, estimated monthly income has an association with environment and biodiversity conservation ($p=0.031$), household size with social capital ($p=0.026$) and enhanced income ($p=0.041$), and livelihood source with enhanced income ($p<0.001$). On the other hand, no statistics or association was computed to the homogeneity of one of the variables among individual profiles and the improved knowledge and skills.

The association between estimated monthly income and social fencing outcome (specifically environment and biodiversity conservation) suggests that farmers' monthly income affects the way they utilize the natural resources within their community. Farmers that derive their income from farm-based sources tend to protect their resources for the continuity of their economic activities. In this sense, farmers do participate in conservation and development programs like social fencing. Aside from this, the farmers with a variety of sources of income reduce their dependency on forest

resources as revealed in the study of Rahman et al (2017), where the provision of alternative livelihood projects recorded a significant increase in the household income of the farmer-participants in the survey. This condition is observed in the cases of LUFAMCO, TK-Lalo, and BSLUVFA, whose livelihoods, upland vegetable and rainforestation farming, assisted them to get revenue from their on-farm products.

In terms of household size and social capital, the analysis found a significant association with $p=0.026$. It suggests that as the household size of the respondents becomes bigger, the social capital also increases. This means that the greater the number of family members engaged in social fencing programs, the more social interaction occurs, and networks and partnerships are built. Similarly, members' participation during their conservation and development activities provided a venue to establish bridging and bonding capitals. The cases of TK-Lalo and LUFAMCO exhibit this observation where involvement in the social fencing program is mostly attended by community-based association members that came from homogeneous families. Kinship and strong ties help them connect with other members of the community and with other institutions present.

On the other hand, with a p -value of 0.041 ($p<0.05$), the association between household size and improved income in this study is found to be significant. This reflects that the greater the number of family members involved in social fencing, the bigger the quantity of the labor force can assist in generating better income. This is observed particularly in their involvement in rainforestation and upland vegetable farming, whose family members' participation in its operation lessens the labor expenses compared to hiring of external workforce. The experiences of all three community-based associations (TK-Lalo, BSLUVFA, LUFAMCO) in rainforestation farming helped fulfill the demand for native trees for the National Greening Program in CALABARZON Region. The division of roles and responsibilities in reforestation farming facilitated the group to supply seedlings beyond the required production, hence extra income is generated.

Similarly, the significant association between livelihood source and enhanced income with a p -value of

<0.001 reflects that respondents' livelihood source (farm-based source) enhances household income. The characterization of respondents shows that the majority are dependent on farm-based livelihood, specifically practicing upland vegetable and rainforestation farming. It reflects that performing farm-based livelihood can provide increased income. The cases of TK-Lalo, LUFAMCO, and BSLUVFA exhibit that the practice of rainforestation farming, being an additional farm-based livelihood with their traditional vegetable farming, contributed a lot to their individual and organizational income enhancement. This only indicates that rainforestation farming as an agroforestry system confirms the claim of Milan (2020) that this farming practice can provide additional income to the farmer-practitioners aside from its main contribution to forest landscape restoration.

Table 6. Association of individual characteristics and social fencing outcomes.

INDIVIDUAL CHARACTERISTICS	PERCEIVED SOCIAL FENCING OUTCOMES (p-value)				
	Environment/ Biodiversity Conservation	Community Trust	Improved Knowledge & Skills	Enhanced Networks/ Linkages	Income Enhancement
Age	0.287	0.809	-	0.719	0.236
Sex	0.623	0.887	-	0.530	0.562
Educational Attainment	0.971	0.960	-	0.913	0.470
Household Size	0.486	0.891	-	0.026*	0.041*
Livelihood Source	0.199	0.355	-	0.524	<0.001*
Estimated Monthly Income	0.031*	0.131	-	0.346	0.137

*- Correlation is significant at the 0.05 level (2- tailed)

**_-Correlation is significant at the 0.01 level (2-tailed)

Organizational Characteristics

The analysis presented in Table 7 shows the association of organizational characteristics with the perceived social fencing outcomes in the context of MBSCPL. It can be viewed from the table that most organizational characteristics exhibit a highly significant association with enhanced income, while land ownership, specifically, affects the achievement of all the social fencing outcomes identified in the study. This only means that collective action as an organization is necessary for the achievement of the desired income from the livelihood projects being implemented. Similarly, the table also indicates the significance of having tenured land resources for the community-based association to

achieve the desired social fencing outcomes such as environmental and biodiversity conservation, community trust, social capital, and income enhancement. This only means that the government should intensify its support to implement community-based forestry/conservation programs, particularly in the provision of land tenurial agreements with community organizations, like the CBFMA, CLOA, and others. From this endeavor, the community organizations will be more motivated and continue to do their part as stakeholders in the protection and conservation of MBSCPL. The act of supporting the needs of the community organization recognizes the significance of the social dimension of biodiversity conservation. This argument corroborates the study of Muhumuza & Balkwill (2013) and Andrade & Rhodes, (2012) which emphasized the prioritization of the social and human aspects of biodiversity conservation and protected area management could lead to the achievement of protected area management and biodiversity conservation through a community-based conservation approach. On the other hand, no association was computed in the analysis of one of the variables among the organizational characteristics, and the improved knowledge and skills are homogenous or constant.

Table 7. Association of organizational characteristics and social fencing outcomes.

ORGANIZATIONAL CHARACTERISTICS	PERCEIVED SOCIAL FENCING OUTCOMES (p-value)				
	Environment/Biodiversity Conservation	Community Trust	Improved Knowledge & Skills	Enhanced Networks/Linkages	Income Enhancement
Membership Type	0.903	0.629	-	0.286	0.115
Active Membership	0.634	0.151	-	0.226	0.022*
Seminars	0.554	0.806	-	0.284	<0.001*
Participation					
Organizational Affiliation	0.162	0.237	-	0.106	<0.001*
Part of Social Fencing Implementation	0.047*	0.150	-	0.289	<0.001*
Land Ownership	<0.001*	0.003*	-	<0.001*	<0.001*

*- Correlation is significant at the 0.05 level (2- tailed)

**-.Correlation is significant at the 0.01 level (2-tailed)

components of social fencing mechanisms are significantly associated with the four major social fencing outcomes identified in the study. The results show that the presence of land tenurial security is associated with environmental conservation ($p=0.003$), community trust ($p=0.048$), and enhanced income ($p=0.023$). Similarly, the provision of alternative livelihood is significantly associated with environmental conservation and enhanced income. On the other hand, the formulation and execution of community policies are associated with community trust, social capital, and enhanced income. The provision of capacity-building activities is significantly associated with environmental/biodiversity conservation, community trust, social capital, and income enhancement.

The significant relationship among these variables means that the community-based associations and the implementing development organization (NGO) properly executed the social fencing mechanism. These results also affirmed the claims of Andrade & Rhodes, (2012) that the participation of community organizations and incorporating them in the management decision-making process could facilitate effective biodiversity conservation and protected area management, following the pastoralist philosophy of conservation based on the concept of Berkes et al. (2009) as cited by Kelboro et al. (2013). The social fencing mechanism execution in the settings of MBSCPL reflects on how social fencing was conceived and practiced in some parts of the world, in terms of a volunteer group effort, community policing/enforcement, alternative livelihood management, and shared decision in land tenure arrangement and resource management that resulted to improved community trust, social cohesion, and environmental conservation (Bhagwat, 2012; Chaudhuri, 2013; Saxena et al., 2002; Shrestha, 2020)

Social Fencing Mechanism

The results of the analysis for the association of social fencing mechanisms, and social fencing outcomes are shown in Table 8. The analysis indicates that the four

Table 8. Association of social fencing mechanisms and social fencing outcomes.

SOCIAL FENCING MECHANISMS	PERCEIVED SOCIAL FENCING OUTCOMES (p-value)				
	Environment/ Biodiversity Conservation	Community Trust	Improved Knowledge and Skills	Enhanced Networks/ Linkages	Income Enhancement
Social Fencing Mechanisms					
Presence of Land Tenurial Security	0.003*	0.048*	-	0.952	0.023*
Provision of Alternative Livelihood	0.033*	0.150	-	0.428	<0.001*
Formulation and Execution of Community Policy	0.224	<0.001*	-	0.020*	<0.001*
Provision of Capacity Building Activities	<0.001*	<0.001*	-	0.003*	<0.001*

*- Correlation is significant at the 0.05 level (2- tailed)

**-.Correlation is significant at the 0.01 level (2-tailed)

Conclusion

Employing both qualitative and quantitative approaches, this case study was made to understand the factors affecting the social fencing outcomes in the context of Mounts Banahaw-San Cristobal Protected Landscape. Social fencing as a community-based conservation strategy was implemented through its mechanism that includes four dimensions: land tenurial arrangement, formulated community policies, provision of alternative livelihoods, and capacity-building activities. The implementation of social fencing from the perspectives of community-based associations was assessed to determine their perceived outcomes. Results of the study showed that social fencing program implementation in the three community-based associations resulted in improved natural capital, enhanced social capital, developed human capital, and increased financial capital. Notable outcomes observed in the study were the improved status of the environment and human capital which reflects the social fencing program highly invested in environmental conservation and community development processes. These are evident in the performance of the community-based associations included in the study.

Using the Pearson Chi-square test, the study found that organizational characteristics and effective social fencing mechanism implementation are significantly associated with the achievement of the perceived social fencing outcomes. This finding strengthens the concept

and principle of social fencing that it entails collective action rather than individual contribution. Specifically, the study recognized that having organizational affiliation and land ownership could facilitate the achievement of social fencing outcomes as these shall motivate the members to perform well in the different activities of social fencing implementation.

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