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Socio–economic and Environmental Impacts of a Conservation Farming Village (CFV) Project on Upland Farmers in General Nakar, Quezon, Philippines

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ABSTRACT

A study to compare the socio–economic status and environmental awareness of fourteen farmer volunteers (FVs) before and after participating in the Conservation Farming Village (CFV) project was conducted in General Nakar, Quezon. CFV is a modality for transformation of traditional upland farming systems into sustainable farming systems that will address upland environmental degradation and improve farmers' socio–economic conditions. The project adopted a community–based participatory approach to development, promotion and utilization of water and soil conservation agricultural practices; and a multi–level technology promotion mechanism to capacitate local extension/change agents. Research methods included gathering secondary data, farmer volunteer interviews, and a final field reconnaissance. After the CFV implementation, at least some of the farmer volunteers had taken up all but two of the thirteen introduced agricultural practices, and had adopted four new practices in particular: contour hedgerows, elimination of inorganic inputs, mulching and composting. Results showed that there was an average increase in farm income of 143%; this was backed up by the farmers' scores for farm income before and after CFV, which showed a significant increase from 'low' to 'moderate'. This increase in income was probably due to increased crop diversity and yields as a result of contour farming and intercropping; and reduced costs for chemical inputs due to adoption of mulching and composting. The skills and knowledge of the FVs about environmental issues also significantly improved based on Wilcoxon signed rank test while the attitude towards CFV based on Likert scale showed that the farmers were convinced of the benefits brought by the new practices learned through the project.

Keywords: *agroforestry, Conservation Farming Village, composting, contour hedgerows, farmer volunteers, organic farming, mulching*

INTRODUCTION

Improper technology brought by lowland migrants to the upland areas can cause harm to the fragile uplands. The upland areas are a target for cultivation by lowland migrants due to the unavailability of land in the lowland areas as well as the notion that public lands in the uplands are free for cultivation by anyone. Of the total land area of the Philippines, which is 30 M ha, 59% or 17.6 M ha are forestlands having slopes greater than 18% (DENR 2014). The degradation of these uplands through erosion facilitated by unsustainable farming practices causes substantial loss of upland ecosystem services with cascading negative consequences on the lowland, coastal and marine environments.

The National Economic and Development Authority (NEDA) under the Kennedy Round 2 (KR2) Productivity and Enhancement Project and the Philippine Council for Agriculture, Aquaculture, Forestry and Natural Resources Research and Development (PCAARRD) has funded a project on "Sustainable Upland Farming through the Establishment of Conservation Farming Villages (CFV)" in General Nakar, Quezon from 2009 to 2011. The objectives of the project were to improve human lives through better livelihoods, increased agricultural productivity, and greater environmental security for farmers living in sloping and marginal areas. General Nakar is the largest municipality of Quezon Province with a mountainous topography. The University of the Philippines Los Baños (UPLB), through the College of Forestry and Natural Resources (CFNR), implemented this project together with the Local Government of General Nakar. In order to achieve the objectives of the project, model agroforestry systems were established in three barangays in the municipality and their impact on the uptake of agroforestry practices, the socio–economic and environmental performance, and the general well–being of the farmer volunteers evaluated.

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OBJECTIVES

In general, the study sought to look at the impacts of the CFV project on farmers in three barangays in General Nakar, Quezon. Specifically, it aimed to:

1. determine the changes in the farming practices adopted by the farmer volunteers as a result of the CFV project

2. evaluate the impacts of these practices on environmental awareness and social–economic performance; and,
3. assess the general well–being of farmer volunteers after participating in the CFV project using Review of Outcomes to Impacts (ROtI).

METHODOLOGY

The project discussed here established model agroforestry systems that demonstrated the application of conservation land management technologies to address the objective of greater environmental sustainability. In the project, sloping land farming models were identified through participatory approaches, integrating the basic elements of both outside (academic/ government) and on–farm research, capacity development and technology diffusion. Environmental and socio–economic objectives were incorporated into the planning processes. A participatory and bottom–up system of selection of the most appropriate technologies in their areas is one major deliverable of the project. These would include a combination of the technologies and approaches already proven or tested for promoting land conservation and rehabilitation, amongst other environmental objectives, as well as for increasing agricultural productivity. In the local dialect, this project was dubbed, "*Dahilig na Agrikultura sa Barangay Sagip–Saka* ".

The CFV components that serve as an integrated vehicle to expand the promotion and adoption of conservation farming practices to other upland communities are presented in Figure 1. There are three active players in the implementation of CFV – the academic institution, municipal local government unit, and the farmers. The academic institution will provide the technical knowledge about sloping land management. The municipal–level government unit will downscale implementation of sloping land management into the villages/barangays under their jurisdiction. The farmers will serve as the decision makers and implementers of sloping land management system.

Incorporated in the conceptual framework for CFV is the empowerment of the farmers enabling them to become the

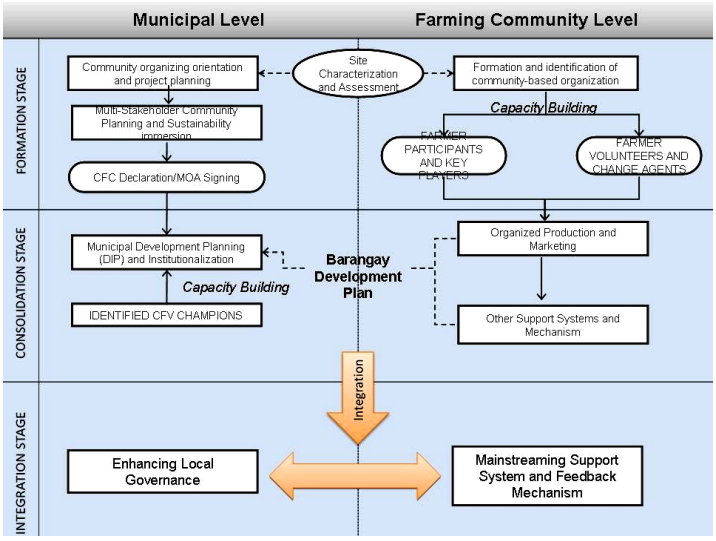

Figure 1. Conceptual framework for the establishment of CFV

vanguards of sloping land resources. Tapping the active leadership and participation of the local government and other municipal and barangay stakeholders and the community–based organizations is also an important approach towards developing a CFV. Hence, the expected output would be model Conservation Farming Villages, with science and technology (S and T) – based model farms within the villages, serving as satellite farms with several farmers' adopting around the core model. The aim in view is to provide upland farmers and other clients a wide variety of choices of models to suit their farming conditions.

The CFV project adopted a multi–level technology promotion mechanism that capacitated local extension/change agents. Making Farmer Volunteers or FVs into an effective arm for technology promotion is a strategy to ensure sustainability of efforts to promote new upland farming technologies. Such farmer –to–farmer linkages can strengthen the "multiplier effect" of existing technology diffusion processes at the local level. In this project, the experiences of participating farmers were documented and used in encouraging other farmers to duplicate their practices. Farmers' trainings, cross–farm visits, and field days were among the activities that allowed farmers to observe and experience the new technologies.

Conservation Farming Villages (CFVs) were chosen based on the following criteria: the village 1) is an upland barangay, 2) has a reliable source of water, 3) has a problem with soil erosion, 4) is within a critical watershed, 5) has active agricultural production, 6) is accessible to land transportation, 7) is within the covered areas of operation of respective universities, 8) has LGU that is supportive of the proposed technological interventions and is willing to support and assist in the implementation of CFV project, and 9) has experienced the implementation of few or no national programs of this type.

Farmer volunteers (FVs) were selected based on consultation with either the village captain, LGU personnel assigned to the area or members of the village council. Criteria for selection of FVs is a combination of the following: the farmer volunteer should 1) have a relatively large farm that is generally sloping, accessible, and easy for other farmers to view; 2) have strong leadership skills; 3) be willing to have his/her farm developed using conservation farming technology during and after the project duration; 4) be eager to learn; 5) be committed to receive training and thereafter, train other farmers in the farm technology learned and 6) have good moral character.

Study Area

The site is located in the Municipality of General Nakar in the Province of Quezon. It has a total land area of 113,486 ha (Figure 2). Eighty percent of this is considered to be forestland while the remaining is alienable and disposable land. Forty percent (40%) of the area has an elevation greater than 500 meters above sea level (masl) while sixty percent (60%) is below 500 masl. According to the Modified Corona classification, two climatic conditions prevail in General Nakar, the Type II (no pronounced dry season with a very pronounced maximum rain period from December to February) and Type IV (rainfall is more or less evenly distributed in a year). Type IV climatic condition prevails in the three barangays covered by the Conservation Farming Village (CFV) project with an average annual rainfall of 3,782 mm and an average temperature of 26.8^{o} C.

According to the Comprehensive Land Use Plan of General Nakar in 2009, Quinga silt loam covers barangay Magsikap, and

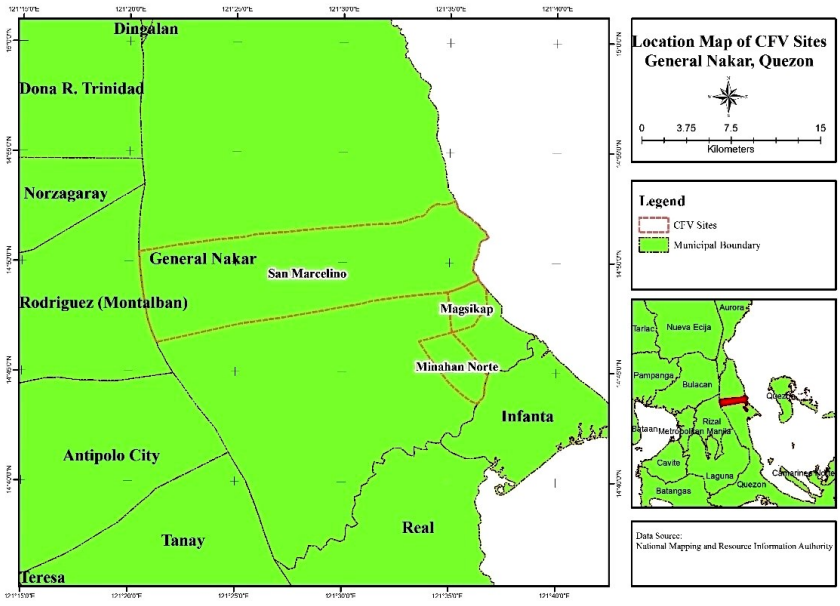

Figure 2. Location map of the three CFV sites

mountain soil covers San Marcelino, while Antipolo sandy clay covers Minahan Norte, with a total land area of 3,063 ha, 576 ha and 3,121 ha, respectively. Model farms from these three barangays were selected based on the necessity to rehabilitate upland farming localities and the urgency of improving their agricultural economies.

Data Gathering

The Barangay Profiles of the three barangays obtained from the office of Planning and Development of the Municipality of General Nakar were used as references for socio–demographic characteristics like population, source and amount of income and education (Comprehensive Land–Use Plan of General Nakar: 2009–2018, 2009). Furthermore, other secondary information from recent studies and projects were used to give an overview of what was in the area before and during the implementation of the project. This set of data was used as a baseline.

A field–based Review of Outcomes to Impacts (ROtI) was used in determining the environmental and socio–economic impacts of the project (The ROtI Handbook, August 2009). This method determined the changes that happened after the implementation of the project. The ROtI involved examination of all available and relevant documents about the CFV project as well as interviews with all the farmer volunteers to crosscheck gathered information.

Interview questions covered any changes that were observed or experienced since the adoption of CFV. These changes were measured in terms of on–farm and off–farm income, farming time, leisure time, and crop yield. The interviews in the three barangays were conducted from December 2013 to January 2014.

The last stage in the ROtI was the field investigation. It was done to cross check the results of the literature search and interviews on the project. A reconnaissance survey was performed in 2014 to record any observable physical changes that occurred in the place since the implementation of the project.

Respondents

Overall, there were fifteen farmer volunteers, five from each of the three participating barangays who had been identified by the project management team and barangay officials at the start of the project in 2009. However, one farmer volunteer from Barangay Magsikap dropped out later to a heart ailment at the end of the first year of the project. These farmer volunteers were also interviewed to assess the socio–economic and environmental impacts of the CFV project.

Data Analysis

Data given by the respondents during the interviews about gender, educational attainment, religious affiliation, marital status, and land tenure were summarized using the frequency count. The relationships between farm income and household size and farm size were tested using the Chi Squared test for independence.

The Likert scale was used to measure the level of agreement and disagreement of interviewees related to the impacts of the Conservation Farming Village projector *Barangay Sagip–Saka* . Parametric data like the adoption of new knowledge and or some perceived socio–economic changes were analyzed using the Wilcoxon Signed Rank Test to determine the median difference between the data pairs (before and after CFV) is significant or not.

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Information gathered through secondary data research, interviews, and field reconnaissance were used to generate the ROtI. The ROtI uses a Theory of Change (TOC) framework to evaluate the overall performance of the project giving an in–depth analysis of the project activity, output and outcome that led to certain socio–economic impacts (Figure 3).

RESULTS AND DISCUSSION

General Nakar is the largest municipality in Quezon Province having a total land area of 113,486 ha. It is situated geographically between 121^0 8' and 121^0 42' east longitudes, and 14^0 45' and 15^0 20' north latitudes (http:// www.generalnakar.gov.ph/). Despite its large land area, the people of General Nakar were unable to maximize the use of its land resources because of its hilly and mountainous topography. Sloping areas have been left idle and not cultivated. Aside from the difficulty of planting, this kind of topography is also prone to soil erosion causing lower crop yield. Those that were able to cultivate and plant in their land have practiced monocropping, planting only a single crop year after year on the same land. It is a practice more prone to pest infestation and causes diseases to spread quickly. According to the accomplishment report of CFV in 2009, coconut plantation, rice and ornamental plants were the crops grown through monocropping (PCAARRD 2009). Ecologically destructive human activities like cutting trees for charcoal making are also being practiced in the area. Also, farmers in barangays Magsikap, Minahan Norte, and San Marcelino practiced burning during site preparation for disposal of farm wastes.

Demographic Information of the FVs

As described earlier, 14 FVs were included in the study, five farmer volunteers each from Barangays Minahan Norte and San Marcelino and four from Barangay Magsikap.

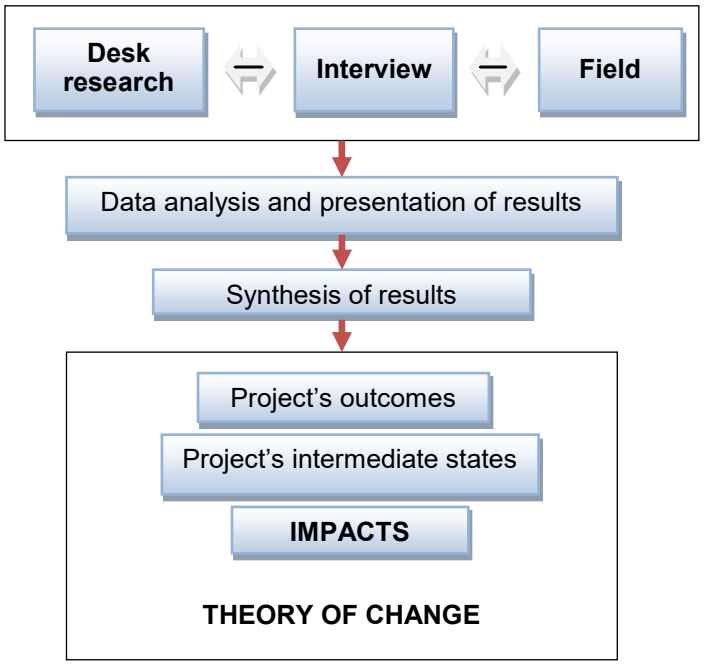

Figure 3. Flowchart of the process in generating the Theory of Change model

Table 1 showed that six out of 14 FVs interviewed were women, which represents 36% of the total respondents. The dominant religious affiliation was Roman Catholic with 64.3%. In terms of educational attainment, eight FVs were elementary graduates but only three FVs were able to pursue high school and only one FV finished high school.

In addition, two FVs were able to finish a vocational course. In general, all FVs were literate and capable of participating in skilled labor on farms. Moderate literacy enabled them to understand extension messages from other farmers and the project management team.

Eleven FVs had their own farm to cultivate while three FVs were tenants. Owned farms were mostly inherited from close relatives. Each farmer volunteers owned 1.0 to 8.0 has of land.
In the three CFV barangays, household size ranged from 3–16 members occupying one house. Based on the interview, it appeared that children starting their own families tended to stay at the same house as their parents, who were farmer volunteers.

Assessment of Farm Income
One of the objectives of CFV is improving the economic status of farmers by increasing their farm income. National and published data generated by the National Statistics Coordinating Board in 2012 showed that the annual per capita poverty threshold for the Philippines was PhP13,357, PhP16,871 and PhP 18,935 in 2006, 2009, and 2012, respectively; while for the Quezon Province it was PhP12,784, PhP16,181 and PhP18,081 in 2006, 2009, and 2012, respectively.

Percent poverty incidence in the province of Quezon is higher than the national average which is 24.7%, 22.1% and 20.3% for 2006, 2009 and 2012, respectively compared with the national average of 21%, 20.5% and 19.7% for 2006, 2009 and 2012, respectively (Table 2).

In the 2007 barangay profile of barangays Magsikap, Minahan Norte and San Marcelino, 85%, 90% and 84% of the households, respectively, were earning less than the poverty threshold of PhP 15,128 (NSCB 2007).These barangays thus have a high percent poverty incidence, although, as with the nation and stage more generally, the level has been dropping between 2006 and 2012.

Table 1. Frequency count for the basic information of fourteen FVs.

Basic Information	Count	Percent (%)
SEX		
Male	9	64
Female	5	36
RELIGION		
Roman Catholic	9	64.3
Born–Again	1	7.1
Rizalista	1	7.1
Mystica	2	14.3
Iglesia ni Cristo	1	7.1
EDUCATIONAL ATTAINMENT		
Elementary undergraduate	2	14.3
Elementary graduate	6	42.9
HS undergraduate	3	21.4
HS graduate	1	7.1
Vocational Graduate	2	14.3
LANDHOLDINGS		
Owner	11	78.6
Tenants	3	21.4
HOUSEHOLD SIZE		
3	2	14.3
4	1	7.1
5	4	28.6
6	3	21.4
7	1	7.1
8	1	7.1
9	1	7.1
16	1	7.1

The results in Table 3 show that 2009 average income per hectare was PhP 14,069, PhP 9787, and PhP 4,053 for Barangays Minahan Norte, Magsikap and San Marcelino, respectively. After adoption of CFV technologies, 2013 average income per hectare, which was deflated to 2009 consumer price index (CPI), was PhP 6,549, PhP 35,698 and PhP19,800 for Barangays Minahan Norte, Magsikap and San Marcelino, respectively. Comparing the 2013 and 2009 average income, there was a 53% decrease for Barangay Minahan Norte and increase for Barangays Magsikap and San Marcelino at 264% and 388%, respectively. Thus, as a result of implementing CFV and its allied sloping land management technologies, an average increase of 143% in farm income was realized by the 14 farmer volunteers in 2014 compared to their income in 2009.

Cost of labor and capital had almost no effect on farmers' income because they practice the so–called '*saknungan*'. '*Saknungan*' is their own version of '*bayanihan*' where the villagers work on other farmers' farms and their service is being paid off with service also on their own farm by the other farmers in the scheme. The capital for seedlings did not greatly

Table 2. Annual per capita poverty threshold, poverty incidence and magnitude of poor families in Quezon province in 2006, 2009 and 2012.

Parameters	2006		2009		2012	
	Philippines	Quezon Province	Philippines	Quezon Province	Philippines	Quezon Province
Annual per capita poverty threshold, PhP	13,357	12,784	16,871	16,181	18,935	18,081
Poverty incidence, %	21.0	24.7	20.5	22.1	19.7	20.3
Magnitude of poor families	3,554,878	98,511	4,036,915	94,988	4,214,921	94,123

Source: http://www.nscb.gov.ph/poverty/data/fullterm2012/Report%20on%20the%202012%20Full%20Year%20Poverty%20Statistics.pdf, 2013

affect the total income of each farmer volunteers because most of the seedlings and other planting materials were given to them for free by the local government unit (LGU) of General Nakar and various non–government organizations. Another reason some of the new practices may have increased income is that the new knowledge about organic farming (elimination of chemical inputs), mulching and composting may have given farmers the opportunity to reduce the cost of capital for chemical inputs.

The average increase in income was attributed by the farmers to an increase in knowledge about intercropping. Unlike monocropping, intercropping is a practice wherein two or more crops are planted on the same land at the same time. Intercropping provided a wide range of products for sale and for personal consumption. Farmers adopted the practice of intercropping coconut with cut–foliage and cash crops after they had learned how to plant secondary crops on sloping areas. During the interview, the farmers stated that before CFV they used monocropping. This meant that during the times when their crops were not yet ready for harvest, farmers did not have enough income. This production system was not profitable for the farmer volunteers so they resorted to looking for other sources of income like being employed as hired laborers and in some non–farming related–works. However, due to lack of opportunities in the area, some had to wait for the harvest season in order to obtain an income while others had to leave the area.

Annual income from the farm did not include forest products and fruit trees since these slow–maturing tree products not ready for harvest yet by the end of the study. This was the case for SMFV3 whose CFV improvement was purely due to the introduction of fruit trees to his farm. Obviously, in 2014, these fruit trees were not yet bearing fruits. However, in the future, mature timber and fruit yield will lead to an increase in farm revenue.

Coconut *(Cocos nucifera)* was the common major crop planted in the farms of all farmer volunteers. Most of the time, coconut was converted to copra. Farmers were able to earn a minimum of PhP 6,000 per harvest on average, from their coconut plantations. Since the implementation of CFV, farmer volunteers learned and were able to intercrop different vegetables like sitaw *(Phaseolus vulgaris)*, okra *(Abelmoschus esculentus)*, ampalaya *(Momordica charantia)*, squash *(Cucurbita moschata)* and gabi *(Colocasia esculenta)* under the shade of the coconut trees. Harvested vegetables were for household consumption, but were also sold when the harvest was abundant. White corn and yellow corn (*Dracaena sp.*), which are ornamental crops, were also evident in all of the model farms. Farmers were able to sell 100 bundles of cut foliage of yellow corn and white corn per harvest. Harvested yellow corn and white corn were bought by middlemen at PhP3/bundle and were being sold at Dangwa in Manila for PhP5/bundle. In barangay Magsikap, MGFV4, one of the farmer volunteers served as a middleman. She transports 1200 bundles every delivery with a fare of PhP50.00 for every 300 pieces.

Aside from intercropping, the increase in income can also be attributed to contour farming. Rosal (*Gardenia jasminoides*) and kakauate (*Gliricidia sepium*) are used as hedgerows in the agroforestry systems adopted by the farmers. *G. jasminoides* cuttings were also sold at Dangwa at PhP3/bundle. *G. sepium* has a multiple effect on soil for it is a nitrogen–fixing tree and is known to reduce topsoil erosion (Tacio as cited by Rabena 2011). According to Agus *et. al*. in 1999, hedgerow facilitates terrace formation on sloping areas as soil coming from high elevation was transported and deposited at the base of the hedges. In this kind of agroforestry practice, nutrients from the soil will not wear away because sediments are deposited at base of the hedgerows.

Before CFV, farmers were not able to cultivate the sloping area of their farms because they were prone to erosion and resulted in low crop yield. Nonetheless, during the implementation of

White corn (Dracaena sp.) as hedgerows and rosal (Gardenia jasminoides) planted in in CFV farms in General Nakar, Quezon.

Table 3. Annual income of FVs from farming, 2009 and 2014 .

Villages	FVs	Size of HH	Farm Area 2014	Farm Area 2009	Before CFV (recall through interview in 2013)	Bench mark (2009)[1]	After CFV (2013)	After CFV (deflated to 2009 CPI[2])	Income per hectare before CFV (2009)	Income per hectare after CFV (deflated to 2009 CPI)	Increase/ (Decrease), %
Minahan Norte	MNFV1	5	4.5	1	7,545	41,310	17,680	15,305.07	41,310.00	3,401.13	(91.77)
	MNFV2	8	5	8	10,770	62,205	12,000	11,123.63	7,775.63	2,224.73	(71.39)
	MNFV3	6	2	1	21,220	4,075	39,840	34,488.36	4,075.00	17,244.18	323.17
	MNFV4	9	4	1	23,050	96,600	68,950	59,688.06	96,600.00	14,922.02	(84.55)
	MNFV5	3	2	3	15,275	6,850	12,000	10,388.06	2,283.33	5,194.03	127.48
	Average	6	4	3	15,572	42,208	30,094	26,199	14,069.33	6,549.75	(53.45)ê
Magsikap	MGFV1	6	1	1	15,200	48,000	3.699	3,116.42	48,000.00	3,116.42	(93.51)
	MGFV2	5	7	12	3,400	56,000	215,000	186,119.40	4,666.67	26,588.49	469.75
	MGFV3	5	0.5	0.75	18,900	5,600	15,902	13,765.91	7,466.67	27,531.82	268.73
	MGFV4	6	1	1	17,250	47,000	95,400	82,585.07	47,000.00	82,585.07	75.71
	Average	6	2	4	13,688	39,150	81,576	71,397	9,787.50	35,698.50	264.74é
San Marcelino	SMFV1	16	2	2	21,000	600	32,970	28,541.19	300.00	14,270.60	4656.87
	SMFV2	5	1.5	4	49,700	42,000	79,520	68,838.21	10,500.00	45,892.14	337.07
	SMFV3	7	3	1	2,130	12,000	2,780	2,406.57	12,000.00	802.19	(93.32)
	SMFV4	4	1.25	10	6,690	2,520	7,600	6,579.10	252.00	5,263.28	1988.60
	SMFV5	3	3	1.5	21,00	23,950	105,860	91,640.00	15,966.67	30,546.67	91.32
	Average	7	2	4	19,880	16,214	45,746	39,601	4,053.50	19,800.50	388.48é

[1]PCAARRD, 2009
[2]CPI – consumer price index

Table 4. Perceived socio–economic changes before and after CFV.

Before CFV (%)				CATEGORY	After CFV (%)				Wilcoxon Signed rank test
1	2	3	4		1	2	3	4	
	78.6	21.4		Income from farm		14.3	78.6	7.1	Significant
42.9	28.6	21.4	7.1	Income from off farm sources	42.9	14.3	35.7	7.1	Not significant
	28.6	28.6	42.9	Time spent in farm		42.9	50	7.1	Significant
	71.4	28.6		Crop yield		28.6	57.1	14.3	Significant
7.1	42.9	50		Leisure time	7.1	28.6	64.3		Not significant

**1–none, 2–low, 3– moderate, 4–high, a=0.05*

CFV, farmers learned that even sloping areas can be planted and used and therefore, will give additional yield and profit. Moreover, through contour farming, soil erosion was minimized. Despite the ability of these improved agricultural practices to increase farm income overall, its can be seen in Table 3 that the farm income of five farmer volunteers, namely MNFV1, MNFV2, MNFV4, MGFV1, and SMFV3, decreased by up to 91%, 71%, 84%, 93% and 93%, respectively, after they have joined CFV. MNFV5 mentioned that the 2013 income from coconut plantation diminished because his brother who is the owner of the farm that he is cultivating took the money. MGFV1, on the other hand, admits that he has no time going to his farm and plant. He said that instead of planting on his farm, he decided to work as hired laborer because of the increasing needs of his family. MGFV3 also admitted that she has no time maintaining her farm because she is busy with her application to go abroad. The SMFV5 household also became inactive to focus on their sari–sari store and the studies of their children. Some farms were also left idle for a while because of illness, death in the family, and household labor shortages.

Assessment of General Well–Being

Table 4 shows the different socio–economic components that have increased, decreased or showed no change. Using the Wilcoxon signed rank test, the changes observed by comparing the before and after CFV implementation were statistically not zero, thus construed the considerable positive impacts of the project. On the other hand, the rankings for income from off farm sources, and leisure time showed no change based on the Wilcoxon test. The significant increase in crop yield (most claimed crop yield was 'low' before and 'moderate' after CFV) is reflective of the adoption of farming technologies such as contour farming, intercropping, composting and mulching.

The time spent on the farm following their participation in CFV (from 'high' to 'moderate') changed significantly as well. Before CFV, 42.9% of the farmer volunteers said that they spent a 'high' amount of time on their farm, compared to after CFV, when 7.1% said they spent a 'high' amount of time on the farm. The change in time spent on the farm after CFV was because of the lower maintenance that their farm requires compared to their first years of establishment. Farmers also state that since the introduction of contour farming, they have become more efficient in preparing and cleaning their farm.

On the other hand, income from off farm sources showed no difference before and after the implementation of CFV. The farmers were still highly dependent in both time periods on farming or farm–related work. It could be observed that there were no businesses established by the farmer volunteers. Leisure time showed no significant change also. Though time spent in their farm decreased, the farmers' leisure time did not increase significantly because they were involved in other income generating activities as hired laborers or were involved in '*saknungan*' on other farms. Based on the Wilcoxon signed rank test, access to health facilities did not improve significantly also. Farmer volunteers have identified that there were still no health facilities and personnel available on their respective barangay. Others said that they have not experienced any major sickness for the past four years, which is the reason why they did not need to use any health facilities.

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Environmental Assessment

Aside from socio–economic changes brought by CFV, the farmers' self–assessment of the changes in their skills and knowledge related to soil conservation, biodiversity loss and upland degradation increased as well. Table 5 summarizes the fourteen farmers volunteers' scoring of their own skills and knowledge development. Based on the Wilcoxon signed rank test, the difference in skills and knowledge before and after CFV was significant in all of the above three aspects.

The study also included the determination of agroforestry practices adopted by the farmer volunteers. After the implementation of *Sagip–Saka* (Conservation Farming Villages) in the three sites, farmers were introduced to new soil and water conservation practices through trainings conducted at Barangays Magsikap, San Marcelino and UPLB and cross–farm visits to Albay, Bukidnon and Laguna.

At the beginning of implementation of the soil and water conservation practices, some of the farmer volunteers were not yet convinced of their benefits.

Skills training for contour establishment in the CFV site in General Nakar, Quezon.

Table 5. Average ranking for skills and knowledge improvement.

Total score before CFV	ASPECTS	Total score after CFV	Wilcoxon signed rank test
	Skills improvement		
14	Terracing	38	significant
18	Contour farming (fascine/balabag, rockwalls)	54	significant
14	Mulching	48	significant
24	Composting	55	significant
23	Vermiculture	48	significant
23	Multistorey cropping (boundary planting)	41	significant
23	Organic farming	50	significant
19	Livestock raising	34	significant
	Knowledge improvement		
16	Integrated Pest Management	39	significant
19	Global warming	41	significant
19	Climate change	48	significant
18	Temperature is rising	41	significant
19	Rainfall is changing	41	significant
20	Typhoons intensifying	34	significant
19	Soil and water conservation in the uplands	44	significant
18	Soil erosion	47	significant
22	Causes of soil erosion	47	significant
26	Man causes the above changes	47	significant
22	SWC increases the land productivity	50	significant
27	Upland erosion and degradation cause problem in the low-land	49	significant
22	Forest destruction causes erosion and siltation	46	significant
23	Forest destruction leads to loss of biodiversity	39	significant
21	Many small and unknown organisms become extinct with forest degradation	39	significant
24	Upland degradation through erosive practices lead to in-come losses	46	significant
21	SWC practices can help minimize adverse impacts of cli-mate change	47	significant
21	SWC practices are costly at the start but in the long run it will be more profitable	51	significant

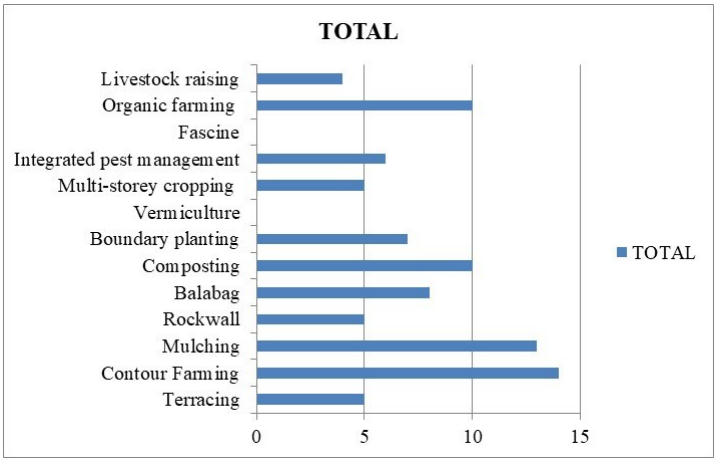

Figure 4. Number of farmer volunteers who adopted different agroforestry practices.

Figure 4 shows that the technologies most commonly adopted by most of the farmer volunteers were contour farming, organic farming (*i.e.* elimination of chemical inputs), mulching, and composting. Contour farming is a well–known agroforestry technology that reduces erosion and run–off by trapping sediments on hedgerows that are planted at right angles (perpendicular) to the direction of the slope. An A–frame is used to locate contours, which were then planted with either *G. sepium* or *G. jasminoides* to create the hedgerows. All of the farmer volunteers adopted contour farming. Their reason for adopting contour farming was in order to minimize soil erosion and maximize soil fertility as well as the amount of land available for planting. However, they recognized that contour farming is more laborious than their traditional practice and is also difficult to establish.

Organic farming practice through elimination of chemical fertilizers and pesticide was also observed. According to the farmers, organic farming was a useful practice because it did not make the soil acidic, thus making the fruits healthier.

With mulching, on the other hand, farm wastes are added to top of the soil. These wastes decompose, adding organic matter, which helps to increase the nutrients in the soil. Mulching also cools soil temperature and conserves the moisture of the land. With mulching, farmers need not buy additional fertilizer for their crops, resulting into fewer farm inputs. Although the inputs were lessened, the crops were still healthy and at the same time soil fertility and structure were improved.

These reasons also govern the adoption of composting. Farmers identified that composting has no side effects on human and plants, making this practice less dangerous compared the application of chemical fertilizers. However, according to the farmers, if compost is applied when it is not yet fully cured, may cause plants to die.

Overall, of all the soil and water conservation practices that were introduced, including terracing, contour farming, mulching, rockwall, establishment of barriers like fascine or *balabag*, composting, boundary planting, vermiculture, multi–storey cropping, integrated pest management, organic farming and livestock raising, none have any identified disadvantages. However, the farmers did not apply two of these practices, vermiculture and fascine, because they still lacked knowledge on how to implement said practices. The investment of capital necessary to start some of these practices, especially vermiculture, also limited the farmers' capability to employ these practices.

Though farmer volunteers were convinced of the benefits of the different agroforestry practices, they need to be more assured that these practices would result into high economic and social advantages in order to continue adopting soil and water conservation practices even after CFV is terminated in the future. Some low–income farmers can be so preoccupied with the short–term benefits such as raising yields, that the long–term benefits of soil and water conservation are overlooked, resulting into unsustained adoption of these technologies (Cramb & Saguiguit 2001).

The adoption of different agroforestry practices was encouraged by trainings, cross–farm visits, provision of free planting materials and education on the problems caused by soil erosion. However, the way in which land is owned (*i.e.* land tenure) can limit some farmer volunteers from further adopting introduced agroforestry technologies. In a study conducted by Franzel *et. al*.in 2001, there were three factors identified to explain why farmers plant and maintain agroforestry practices: 1) The availability of resources such as land, labor and capital; 2) The necessary information and skills; and 3) Farmers' ability to cope when problems arise on the farms. Through trainings provided by the CFV, these three factors were continually addressed in order to make agroforestry more sustainable in the long term.

Survey results showed that farmer volunteers were very aware of the importance of natural resources especially forestlands and how they were affected by climate change, intense typhoons, and severe soil erosion. Realization of the importance of forests causes them to preserve and protect them more, and attempt to reduce their dependence on forest resources for fuelwood and timber (Table 5).

Review of Outcomes to Impacts (ROtI)

After examining the CFV's objectives and impacts through desk research and field investigation, a tabular form of CFV's Theory of Change was created (Table 6). There were three main strategies for achieving the four main project' outcomes. These strategies were: 1) environmental awareness;2) skills and knowledge improvement; and 3) intensified adoption of soil and water conservation technologies. These three strategies were employed in order to achieve the objectives of the project, which were: 1) environmental security; 2) agricultural productivity; and 3) better livelihoods. Outcomes, on the other hand, include awareness on how environmental issues affect their farm and income, capacity–building activities provided, establishment and maintenance of farm models and number of farmer volunteers and adopters. Outcomes were designed to achieve the project's impacts of poverty eradication, climate change adaptation and attainment of environmental security in the Philippine uplands. Furthermore, impact drivers and assumptions were the factors that may be beyond or within the power of the project to influence while the intermediate state is the transitional stage that needed to be achieved to fully deliver the desired impacts.

Tables 7 to 9 provide a simple score for the quick assessment of different hierarchical levels of Theory of Change (TOC) for the implementation of CFV in the three barangays of General Nakar. The ratings provided were based on the author's evaluation

Table 6. The CFV project outcomes–impacts Theory of Change.

Strategy	Outcomes	Impact Drivers and Assumptions	Intermediate States	Impacts
Strategy # 1 Environmental awareness	Outcome 1: Awareness raised on how environ-mental issues affect their farm and income	ID: Facilitated trainings discussing the effects of different farming practices and the benefits of agroforestry for the environment	IS: Successful implementation of agroforestry practices learned during trainings	Environmental security ↓ Change in farming system
Strategy # 2 Skills and knowledge improvement	Outcome 1: Capacity–building activities provided	ID: CFV team visitation from time to time ID: Modules on training courses within the reach of farmer volun-teers	IS: Newly learned skills and knowledge are imparted to other farmers and implemented on their respective farms	↓ Soil erosion diminished
Strategy #3 Intensified adoption of soil and water Conservation technologies	Outcome 1: Establishment and maintenance of farm models	ID: Intercropping to maximize use of space and contour farming to cultivate even sloping areas	IS: Maximization of farm productivity through wide adoption of the agroforestry technologies for soil and water conservation	↓ Change in household income, food security, health and education
	Outcome 2: Number of farmer volunteers and adopters	ID: Intensified Invitation and participation ID: Sufficient incentive (free planting materials) for the participants		

Table 7. Reporting outcomes–impacts assessment finding for strategy 1 of the CFV Project.

TOC COMPONENT	QUALITATIVE ASSESSMENT	RATING
Outcome 1: Awareness raised on how environmental issues affect farmers' farms and income	Outcome 1 was well achieved after trainings conducted. Wilcoxon signed rank test indicates that the difference in overall ranking of the farmer volunteers before and after the CFV significantly increased	**3**
Impact Driver: Facilitated trainings discussing the effect of planting on issue about climate change	There was increased improvement in the knowledge of farmers on climate change and that adoption of soil and water conservation measures will help minimize adverse impacts of climate change	**2**
Intermediate State: Successful implementation of agroforestry practices learned during training	Sharing of skills and knowledge on the negative impacts of upland erosion and degradation led to adoption of contour farming, mulching, composting and elimination of inorganic inputs	**2**

**0–Not achieved, 1– Poorly achieved, 2– Partially achieved, 3– Fully achieved*

Table 8.Reporting outcomes–impacts assessment finding for strategy 2 of the CFV Project.

TOC COMPONENT	QUALITATIVE ASSESSMENT	RATING
Outcome 2: Capacity–building activities provided	Aside from trainings, farmer volunteers were also exposed to cross visits and workshop	**3**
Impact Driver: CFV team visitation from time to time	Regular visit of project staff every two weeks allowed farmers to refine and adjust implementation of soil and water conservation technologies.	**2**
Impact Driver: Modules on training course are within the reach of farmer volunteers	Books and audio visual materials were provided to the office of MENRO, however, during trainings farmer volunteers were given handouts that were translated into Filipino (as much as possible)	**2**
Intermediate State: Newly learned skills and knowledge are imparted to other farmers and was implemented on respective farms	The willingness of farmer volunteers to develop other farmers' farms through '*saknungan*' paved the way for more agroforestry farms developed with minimal labor cost incurred	**3**

**0–Not achieved, 1– Poorly achieved, 2– Partially achieved, 3– Fully achieved*

Table 9.Reporting outcomes–impacts assessment finding for strategy 3 of the CFV Project.

TOC COMPONENT	QUALITATIVE ASSESSMENT	RATING
Outcome 3: Establishment and maintenance of model farms	Farmer volunteers in each CFV barangay have established their model farms and are practicing alley cropping/contour farming based on farm plans prepared during the March 29–30, 2010 training	**3**
Outcome 4: Number of farmer volunteers becoming adopters	During the first few years of CFV, there were only 15 farmer volunteer. On December 2010, 21 farmer adopters were added. Adopters are facilitated by the FVs by inviting them to trainings and establishing their farms are made possible through saknungan	**3**
Impact Driver: Intercropping to maximize use of space and contour farming to cultivate even sloping areas, establishment of balabag, mulching and composting to eliminate use of inorganic inputs	Crop diversification is one of the major product of CFV. Farm that were used for monocultures were already planted with vegetables and cut foliage. Mulching and composting were also practiced to conserve water and reduce cost for inorganic inputs	**3**
Impact Driver: Intensified invitations to training activities and increased participation levels	Each farmer volunteer invites a farmer who will adopt the same technology and provided with free seedlings of fruit trees for his farm. These adopters were also invited to training activities and cross visits and the experience to travel and observe successful CFV farms encouraged participation	
Impact Driver: Sufficient incentives (*i.e.* free planting materials) for the participants	Technical and material assistance were provided. Tools and planting material were also provided though not all FVs were able to receive all of the given tools.	**2**
Intermediate State: Maximization of farm productivity through wide adoption of the agroforestry technologies for soil and water conservation	Crop diversification and planting parallel to the slope is evident. Wider adoption of agroforestry technologies were facilitated by farmers inviting more participation thereby increasing the areas established	**3**

**0–Not achieved, 1– Poorly achieved, 2– Partially achieved, 3– Fully achieved*

during the interview and in the farm visits. There were three strategies in order to fully achieve durable and fundamental change in the condition of the people and the environment in the project area. The first strategy was raising environmental awareness that would lead to better farm productivity and yield and ultimately income. Since environmental phenomena like El Niño and La Niña were naturally occurring and were experienced frequently in the three barangays, the FVs should be ready with their adaptation strategy so that the effects of such phenomena would be minimized.

The second strategy, which was the skill and knowledge improvement, was an intervention to conserve soil and water resources and other conservation farming practices. It was achieved through providing trainings, seminars and technical support for the FVs. Such activities were used to address the lack of knowledge of the FVs about the impact of their farming practices on the rate of soils erosion. At the peak of the adoption of conservation farming, skill and knowledge about contour hedgerows was evident in the farms of the FVs. However, not all contour hedgerows established were maintained by the FVs because of their personal circumstances. Although one outcome of this strategy was the established capacity–building activities, some FVs said that the irregular visit of the project management team could be a reason as well why the contour hedgerows were not maintained. Nonetheless, intercropping was sustained and continually practiced up to now by the FVs.

The third strategy was intensified adoption of soil and water conservation technologies. It was designed to improve the general well–being of the farmer volunteers. Crop diversification and intercropping were highly practiced in the three barangays and was notably the result of CFV. These practices increased the farm income of FVs. Because of these changes in the model farms of the FVs, more people were enticed and eventually adopted the practice as well. Among the three strategies, the third one was the most evident.

SUMMARY AND CONCLUSION

This study evaluates the changes brought by the project *Barangay Sagip–Saka* (Conservation Farming Village) on the lives of 14 farmer volunteers in Barangays Magsikap, Minahan Norte and San Marcelino in General Nakar, Quezon. These 14 farmer volunteers belonged to the first batch of farmer collaborators of the project in the three barangays. Aside from the interviews that focused on the physical and biological conditions of their model farms and on their socio–economic conditions before and after CFV, the barangay profile was also used as a benchmark.

The study of the changes that took place before and after the CFV project dwelt on environmental and socio–economic assessments. It included changes in on– and off–farm income, crop yield, general well–being, number of agroforestry practices applied, and the skills and knowledge learned through trainings, seminars and cross farm visits.

After the CFV implementation, at least some of the farmer volunteers had taken up all but two of the thirteen introduced agricultural practices, and had adopted four new practices in particular: contour hedgerows, elimination of inorganic inputs, mulching and composting. Since the farms of these farmer volunteers were located on sloping areas, farmers learned to apply contour farming. According to the farmer volunteers, the establishment of contour hedgerows has reduced soil erosion. However, there is no quantitative data available to support this contention. Soil and water conservation practices like composting, organic farming (*i.e.* elimination of chemical inputs) and mulching were the some of the other practices applied by most of the FVs. Farmers' attitude toward CFV based on the Likert scale showed that they are convinced of the benefits brought by agroforestry technologies and CFV as an organization.

Based on the interviews, crop diversification as a result of the CFV project, has resulted in an average increase in the farmer volunteers' farm income per hectare of 143%. This was backed up by the farmers' scores for farm income before and after CFV, which showed a significant increase from 'low' to 'moderate'. This increase in income is very much reflective of the increased crop diversity and yields as a result of contour farming and intercropping; and reduced costs for chemical inputs, mulching and composting.

Based on the Wilcoxon signed rank test, the skills and knowledge of the 14 farmer volunteers about environmental issues significantly improved after implementation of the CFV. The newly acquired knowledge and skills also paved the way for the continued application of a number of important soil and water conservation practices in the CFV farms.

The results of the study indicated that the CFV project led to improvements in the lives of many of the farmer volunteers. However, not all farmer volunteers were able to sustain the practices. Some became inactive and their new agricultural practices were not maintained. Though farmer volunteers were receptive to new technologies, in order to make all the skills and knowledge sustainable, there should be high economic and social benefits from it.

RECOMMENDATION

It was observed that the project *Barangay Sagip–Saka* (Conservation Farming Village (CFV) was effective in uplifting the socio–economic lives and environmental awareness of the fourteen farmer volunteers. In order for the CFV project to become sustainable and durable, farmer volunteers should be more empowered to sustain their participation and train other farmers. In order to further improve this study, primary data about the barangays' socio –economic level should be more up–to–date than the data used in this study. Double–checking of farm income before and after CFV would also be advised because there were inconsistencies in this study regarding these data during the interviews.

LITERATURE CITED

Agus, F., D. P. Garrity, & D. K. Cassel. 1999. Soil fertility in contour hedgerow systems on sloping oxisols in Mindanao, Philippines. *Soil and Tillage Research, 50,* 159–167.

Bugayong, L. A. 2003. Socio–economic and environmental benefits of Agroforestry practices in a community–based forest management site in the Philippines. Ph.D. dissertation. UPLB, College, Laguna.

Comprehensive Land–Use Plan of General Nakar, Quezon:

Rice farming adjacent to a forest in one of the CFV sites in La Libertad, Negros Oriental

2009–2018

Cramb, R. A. 2001. (Eds.) Soil conservation technologies for smallholder farming systems in the Philippine uplands: a socioeconomic evaluation [online]. ACIAR [Cunberra Australia]

Department of Environment and Natural Resources. 2014. *Forest Resources.* Retrieved from http://www.denr.gov.ph/index.php/component/content/article/10.html

Franzel, S., R. Coe, P. Cooper, F. Place, & S.J. Scherr. 2001. Assessing the adoption potential of agroforestry practices in Sub-Saharan Africa. *Agricultural Systems* 69 (1), 37-62.

National Statistics Office. 2007. Annual Poverty Indicators Survey.

PCAARRD (Philippine Council for Agriculture and Natural Resources Research and Development). 2009. "The National Program on Sustainable Upland Farming through the Establishment of Barangay Sagip–Saka or Conservation Farming Villages (CFV)." Unpublished PCAARRD program report. Laguna, Philippines: PCAARRD.

Poudel, D. D., Midmore, D. J. & L.T. West. 2000. Farmer participatory research to minimize soil erosion on steepland vegetable systems in the Philippines. *Agriculture, Ecosystems and Environment, 79*, 113–127.

Quinkestein, A. *et.al*.2009. Ecological benefits of the alley cropping agroforestry system in sensitive regions of Europe. *Environmental Science & Policy, 12,* 1112–1121.

Rabena, Alfredo R. &Rabena, Karen F. 2011. The effect of Kakawate *(Gliricidia sepium)* Jacq. Kunt ex Walph. Leaves on the Growth of Onions *(Allium Cepa)*. *UNP Research Journal, 20, 1–9*.

Review of Outcomes to Impacts. 2009. ROtI Handbook: towards enhancing the impacts of environmental projects. Report retrieved October 21, 2013 from http://www.thegef.org/gef/sites/thegef.org/files/documents/M2_ROtI%20Handbook.pdf