CHAPTER V

5. RESULTS AND DISCUSSIONS

5.1 Introduction

The analysis of the results is presented in this chapter. The results and discussions are presented into two parts. The first is the qualitative analysis on the discussions of the focus group interviews conducted at the four communities of the Cordillera Administrative Region. The second part is the quantitative analysis under the following headings: (a) demographic profile of the respondents, (b) production aspects of the upland farming system, (d) soil and water conservation in upland farms and the watershed, (f) social support system, (g) problems encountered in their upland farming systems and their perceptions on the role and importance of the watershed resources to their upland farming system as well as the changes in land use over the last 20 years.

5.2. FOCUS GROUP DISCUSSIONS

This section presents the discussions on the results of the focus group interviews conducted at the four communities of the Cordillera. The discussion centers on: (a) land tenure system, (b) natural resource use management, (c) rules and regulations regarding the use of forest and watershed resources and (d) customs and traditions in the community.

5.2.1. Land Tenure

There are generally three forms of land tenure systems identified in the communities. These are the Torrens title and tax declaration applied to all communities and the Certificate of Stewardship Contracts (CSC) and Community Based Forest Management Agreement for those communities with CBFM interventions. Torrens titles are paper titles that have been given to individuals by the government through the national land titling system. This is the legal basis for genuine land ownership applied throughout the Philippines. Tax declarations are papers recognizing individual land ownership through the payment of taxes on the land but fall short of Torrens titles since they have limitations like non-recognition as collateral for credit in the banks. The Certificate of Stewardship Contract (CSC) and the Community Based Forest Management Agreements are land use arrangements between the Department of Environment and Natural Resources (DENR) and Peoples Organizations for the

utilization and management of their CBFM areas. The CSC's and CBFMA's are only applicable at Boyacaoan and Capinitan but not at Lesseb and Lengaoan in the study area covered.

5.2.2. Torrens Title and Tax Declaration

In 1960, a land tenure policy was adopted in the Philippines where lands 60% in slope and over cannot be titled and only flat lands below 60% can be titled. Only 43 households at Boyacaoan and 30 households at Capinitan were able to have their lands titled as of year 2004. Majority of the households in the four communities have Tax Declarations as proof of their ownership to their lands. The farmers cannot convert their tax declared lands to a titled land because their area was declared by the government as watershed and National Parks Reservation. Under the tax declaration system, the municipal treasurer accepts tax payments for the land recognizing it as their private land even though it cannot be titled under the law. This policy became an obstacle for the households to own land titles. However, the focus group members in all the communities were satisfied with the tax declarations they possess as proof of their land ownership. Given the option, however, to have their tax declared lands be converted to titled lands, they would opt for the latter. This is now a case where the law or policy of the state excludes most people from the Cordillera to own titled lands because they live within the watershed, although the people were already there even before the creation of the law.

5.2.3. Certificate of Stewardship Contract and Community Based Forest Management Agreement

The communities with CBFM intervention (Capinitan and Boyacaoan) were recipients of the Integrated Social Forestry Program (ISFP) in the past. The ISFP is an interagency national program created by Letter of Instruction No. 1260 on July 26, 1982. The objective is to promote socioeconomic conditions of forest occupants and communities dependent on forestlands for their livelihood. The program provides land tenure and at the same time protecting and improving the quality of the environment. The participants were formed into a People's Organization and are issued Certificate of Stewardship Agreements. The CSC is awarded to individuals or families actually occupying or tilling portions of forestlands. In case of married people, the CSC is awarded in the name of the couple. The duration of the CSC is twenty-five (25) years

renewable for another 25 years. The CSC's are issued only within established CBFM project areas, subject to the allocation and endorsement of the People's Organization.

After the ISFP, these areas were again given a Community Based Forestry Program. Using their previous organization and development activities therein, they were given Community Based Forest Management Agreements. Under the CBFMA, portions of forestlands are given to the People's Organization to develop, utilize and manage according to an approved Community Resource Management Program. This is a production sharing agreement to ensure that participating communities shall enjoy the benefits of sustainable utilization, management and conservation of their forestlands and natural resources. The government's share is in the form of increased natural resource protection and rehabilitation and fees as determined and agreed upon.

Apart from these land tenure instruments, the Municipalities of Sabangan, Mountain Province where Capinitan is located and the Municipality of Buguias, Benguet Province where Boyacaoan is situated were awarded by the government Ancestral Domain Claims. Ancestral Domains are areas held under claim of ownership occupied or possessed by Indigenous Cultural Communities (ICC's) by themselves or through their ancestors, communally or individually since time immemorial. This means that the government recognized the rights of the Indigenous Peoples living within these municipalities to their ancestral domain. The identification and processing of groups or individuals for the authenticity of their claims shall follow. The people are optimistic that they will soon be given titles through this process. At Boyacaoan, initial parcel survey of 38 lots with an aggregate area of 141,354 square meters of some qualified lots was already undertaken in 1996 and 1997 under the national resource agreement component of the sectoral adjustment project. At Capinitan, the National Commission on Indigenous Peoples has been conducting information and dissemination campaigns on the process of ancestral land claims procedure. Eventually, all the municipalities in the Cordillera Administrative Region will be subjected to Ancestral Domain Claims.

5.2.4. Transfer of Land Ownership/Tenure Instruments

Private and tax declared lands are commonly transferred to children by means of inheritance. The land is equally divided among the children and the husband and wife

decide this. However the members of the family are consulted and eventually transfer is made through family decision.

For the Certificate of Stewardship Contracts, Section 8 of the DENR Administrative Order No. 98-45 issued on June 22, 1998 spells out the transfer of tenure instrument. CSC's may be transferred, sold or conveyed in whole or in part to any qualified participants residing within the CBFM project; provided that the transfer shall comply with the terms and conditions in the original agreement which shall be valid for the remaining unexpired term. The instrument of transfer must be duly notarized and favorably endorsed by the concerned People's Organization. The DENR shall then cancel the original CSC and issue a new one in the name of the transferee.

In contrast, Community Based Forest Management Agreement (CBFMA) is non-transferable. However, the PO's may enter into contracts with private or government agencies for the development of portions or the entire area covered by the tenure instrument, subject to existing rules and regulations. The PO's may also sell or use the standing crops as collateral in their CBFM area.

5.2.5. Natural Resource Use and Management

Cutting of trees from the communal public forests are allowed for emergency cases like rebuilding of a burned house and community infrastructure projects. This must, however, be requested from the Barangay Chairman. Timber resource use at the CBFM area at Boyacaoan allows PO members to harvest trees in a selective manner and the income derived from the sale is reinvested for further development of the CBFM site. It is also used for capital build-up for the PO.

Water uses from the natural spring at the communities are commonly used for domestic and irrigation purposes. This is with the exception of the community at Lengaoan with no water source. The people buy water for domestic use at a water supplier and delivery company found near their community. Steel tanks are constructed to store water for home consumption and for irrigation as well. At Boyacaoan, the owner of a land has the right to own the water if it the source is found within its territory. If water spills outside the territory as in free flowing spring, the

next neighbor has the right to use the water. At Lesseb and Capinitan, water is used commonly and shared among the households.

5.2.6. Causes of Forest Degradation

The specific causes of forest degradation in the communities are: (a) expansion of terraced garden, (b) erosion, (c) illegal timber cutting, (d) forest fire and (e) quarrying. The expansions of terraced gardens are evident at Lengaoan and Boyacaoan that cause the clearing of trees in their tax declared areas. This is a threat to the existing forest areas within the communities. At Lengaoan, the expansion of gardens is massive no forest is left except for the public forest area at the fringes of the community. The reason for terracing their property is to provide livelihood through farming, as there are limited employment opportunities for them. Their dependence on the land is an outcome of the need to have a source of income for the family. People are wealthy in land so they have to earn a living through improving their land for vegetable farming.

The adoption of terracing using stonewall is an age-old practice in the Cordillera. This prevents erosion and stabilizes the soil. Soil erosion at Lengaoan and Boyacaoan is greater compared to Lesseb and Capinitan as it uses terracing without stonewalls. The grasses hold the soil in place at the slopes of the terrace. Terracing without stonewalls is a better alternative since over time the soil will stabilize compared to swidden farming or the slash-and-burn farming system.

Illegal timber cutting still exists despite the local policies on the protection of communal forest areas that also contribute to forest denudation. The main cause of forest destruction in all communities is the occurrence of fire. The pine forest of the Cordillera is susceptible to burning caused by the resin and the type of wood of the Benguet pine trees. Fire is prevalent during the summer months, caused by accident, the deliberate burning of wildlife habitat for hunters in the forest or burning the weeds on the farm.

Quarrying is also observed as a cause of forest destruction especially at Lesseb where the DENR allowed the community members to quarry along the road.

Other causes of forest denudation can also be traced to insecure land user rights for de facto users of the forest land, policy conflicts that unnecessarily restrict land-use options particularly in the Cordillera region, inadequate support to other upland farming communities like Lesseb and Lengaoan, and poverty and economic disadvantages arising from limited alternative livelihood opportunities.

5.2.7. Activities to Reduce Degradation

The major activities that the focus groups mentioned as a way to reduce forest destruction are reforestation or tree planting, fire line construction and the adoption of soil and water conservation measures like terracing. Reforestation activity is the main forest management undertaken particularly at the Community Based Forest Management areas of Capinitan and Boyacaoan. Tree planting was spearheaded by the PO at Boyacaoan followed by the community members and students at designated areas. At Capinitan, Citrus trees were planted in a 10-hectare area at their agroforestry site. A total of 4,000 *Gmelina arborea* seedlings and 2,240 citrus trees were distributed to 47 members that are CSC holders for planting in their respective lots. Lesseb and Lengaoan rely more on the natural regeneration of their forest areas.

Terracing the farm areas are also the soil and water conservation measures undertaken to reduce erosion and stabilize their farms. This is the most practical method of farming the sloping lands in the communities since this practice is indigenous to them.

5.2.8. Assistance from External Agencies for Watershed Rehabilitation

The DENR assisted the communities at Boyacaoan and Capinitan through the Integrated Social Forestry Program in the past and currently the Community Based Forest Management Program in terms of watershed rehabilitation, utilization and protection. Community organizing, training, financial and technical assistance were extended through the People's Organizations. Other livelihood and agroforesty projects were likewise provided to the community members. The Local Government Units and the Department of Agriculture collaborated by forming work teams that served as the venue for planning, monitoring and technical assistance. At the People's Organization level, implementation groups were organized to facilitate the performance of the various activities in the community such as capability building or

skills development, agroforestry development, nursery operation, and tree planting and forest protection.

In contrast, there are no definite government agencies assisting the communities of Lesseb and Lengaoan except for the local government officials that rely on the barangay officials to do planning and project activities within their community. Plans are not even implemented because of budget constraints. The levels of development in these communities are very low given the leadership capabilities of the barangay officials. There is a need for more institutional assistance at Lesseb and Lengaoan for the basic improvement of the living condition of the people living in these areas.

5.2.9. Rules and Regulations Regarding Forest/Watershed

5.2.9.1. Presidential Decree 705

The guideline for the management of the forest/watershed resources in the Philippines IS the Presidential Decree No. 705 otherwise known as the Forestry Reform Code of the Philippines. From this code emanates all other forestry policies implemented by the DENR.

5.2.9.2. DENR Administrative Order No. 121 series of 1989

An order issued by the DENR lifting the moratorium and prescribing additional guidelines governing the issuance of Private Land Timber Permit (PLTP). This recognizes the rights of landowners to the trees found within their private lands. A PLTP applicant shall submit a certified true copy of land title. Realty Tax Declarations are not acceptable proof of ownership for purposes of PLTP application. The authority to issue PLTP's for a given harvestable volume of trees are: (a) the Community Environment Officer of the DENR up to 5 cubic meters per applicant per year, (b) Provincial Environment Natural Resource Officer up to 15 cubic meters per applicant per year, (c) Regional Executive Director up to 50 cubic meters per applicant per year, and (d) the Secretary of the DENR for 1000 cubic meter and above. The Office of the Community Environment and Natural Resource Officer, DENR shall perform all actual and physical inspection, reviews, field evaluation of pertinent data and submit its findings and recommendations to the issuing authority. An environmental fee of 30 pesos per cubic meter payable prior to the issuance of the appropriate cutting timber order for the timber harvested from the PLTP area.

5.2.9.3. DENR Memo Circular Order No. 97-12 series of July 18, 1997

This provides the guidelines for the formulation of Community Resource Management Framework (CRMF) and annual work plan for Community Based Forest Management areas.

The CBFM recognizes and supports the capacities and indispensable role of local communities to protect, rehabilitate, develop, utilize and manage forestlands and related resources. This is formalized through a CBFM agreement, which is a tenure instrument that provides and ensures access by the communities to forestlands and the resources found therein. The Certificate of Ancestral Domain/Land Claims recognizes the rights of Indigenous Peoples to their ancestral domains and lands.

There are also local rules and regulations regarding resource use at the community level. The Barangay Councils headed by the Barangay Chairman in all the communities formulated barangay rules that regulates cutting of trees from communal forest for emergency needs like construction of community halls, construction of burned houses and coffins for deceased members, among others. This has to be requested through the Barangay Chairman and decided by the Barangay Council. For bigger volume of trees, the Barangay Chairman forwards the request to the Community Environment and Natural Resource Office of the DENR in their respective municipality. An inspection by the Community Environment and Natural Resource Office representatives will determine the location of trees to be cut in either private forest or communal public forest of the requesting person. For fuel wood needs, a person can informally request from owners of private forests to collect fallen branches for home use.

Sanctions for illegal cutting of trees and burning of the forest in all communities include the confiscation of illegally cut trees including the equipment used. Fines equivalent to the volume of trees cut and the damage caused by fire are also embodied in the barangay policies. For persons caught burning the forest, there are additional penalties such as planting burned areas with all expenses borne by the offender.

5.2.10. Customs and Traditions

The people in the different communities practice the age-old tradition called “ob-obo” or cooperation among the members of the community. This is a collective action where members help each other in tree planting, farm works and community work. Community members may help in the construction of terraces of one farmer and in return, the farmer helped will also do the same for other farmers. For community work, labour and food are contributed (ob-obo) to the building of public structures such as footbridges, changing roofs of churches and cutting of grasses in reforestation sites. The system is usually done with free labour where the number of days spent in a neighbor’s farm would be the same number of days contributed to work in the other’s farm. These are evident in Capinitan and Lesseb especially for social activities but are deteriorating. Currently farmers, especially at Lengaoan and Boyacaoan hire laborers and some use family labour as a result of commercial agriculture and the cash economy.

In the past, the elders are respected persons whose wisdom and decisions are sought to solve problems existing in the community. The council of elders holds meetings and ceremonies, which may be in a nature of a jury, religious, social or political in a place called “ato”. The “ato” or sometimes called “dap-ay” is an indigenous institution vested with authority and power where customary laws, rules and regulations of the village emanate. The “ato” is also a place where community members meet for an informal gathering, chatting or telling stories. It has an open area where chickens or swine are burned during ceremonies. Presently, the structures of “ato” are still in place at Capinitan and Lesseb in the Mountain Province but not at the Benguet Province. The council of elders, which are informal in nature, is now replaced by the more formal Barangay Councils that oversee the activities in the community. A customary practice for conflict resolution is still done through the elders for possible amicable settlement. This jibes with the national procedure for settling disputes first with the Barangay Chairman and his Council members. If it could not be settled in the Barangay court, it is elevated to the municipal courts for normal litigation. Another indigenous system of amicably settling conflicts among members that arise due to land boundary dispute and other conflicts is the “Ton-tong” system. Any criminal offense regardless of gravity, as classified by law is also subject to “Tong-tong”. The elder’s wisdom and decisions are sought to settle the conflict. These are still practice in all communities. However, the promulgation of Presidential

Decree No. 1508, otherwise known as the Barangay Justice Law in 1980 under the Local Government Code of the Philippines took the place of the indigenous “ton-tong” system. Under the decree, conflicts are being settled in the Barangay level by the council of elders that are now recognized by law as the “Barangay Lupon” of the Barangay Court. Under this setup, the Barangay Chairman is the presiding officer who is the principal actor in dispute settlement and mediator of the conciliation panel.

Other customary practices for agricultural activities are the “Dinet” and “Pakde”. “Dinet” is done by offering chicken to the spirits and then eaten by the members of the household and visitors before planting for good harvest. “Pakde” is done once a year after harvest for thanksgiving. Livestock like swine or chickens are butchered as an offering to the spirits and then feasted by the household members and visitors. According to the focus groups in the communities, these practices are becoming lesser since Christian teachings in the communities have changed their ways of thanksgiving through prayers.

5.3. QUANTITATIVE ANALYSIS DISCUSSIONS

5.3.1. Demographic Profile of Respondents

5.3.1.1, Gender, Age and Highest Educational Attainment

Table 3 presents the demographic profile of the respondents according to gender, age and highest educational attainment. Results showed that there are more female respondents (53.75%) than male respondents (46.25%) in the study. The educational attainment of the respondents revealed that most of them had not finished high school education with an average mean of 3.87. This indicates a low education of the respondents. The respondents are in their middle age with a mean of 45.53 years indicating that they are in the peak to perform farming activities that requires strength and stamina.

Analysis of Variance (Appendix Table 1) showed no significant result on the gender, age and highest educational attainment of respondents among the communities. The education of respondents are human assets, hence accepting the hypothesis of the study that there is no significant difference on the factors affecting upland farming systems based on human assets.

Table 3. Gender, Age and Highest Educational Attainment

LOCATION	GENDER				TOTAL	
	Male		Female			
	n	%	n	%	n	%
Lesseb	15	37.5	25	62.5	40	100
Capinitan	17	42.5	23	57.5	40	100
Boyacaoan	19	47.5	21	52.5	40	100
Lengaoan	23	57.5	17	42.5	40	100
TOTAL	74	46.25	86	53.75	160	100

LOCATION	AGE			HIGHEST EDUCATIONAL ATTAINMENT	
	Minimum	Maximum	Mean	* Mean (Level of Educ.)	
Lesseb	24	86	48.00	3.65	(Some High School Education)
Capinitan	26	76	45.00	3.65	(Some High School Education)
Boyacaoan	26	70	43.12	4.07	(Some High School Education)
Lengaoan	23	88	46.00	4.10	(Some High School Education
Overall Mean			45.53	3.87	

*****1=No Schooling; 2=Some Elementary; 3= Elementary Graduate; 4= Some High School; 5 High School Graduate

5.3.1.2. Dwelling, Ownership and Household Material Assets

Table 3a shows the type and ownership of dwelling as well as the household material assets of the farmers in the four communities. Majority (41.25%) of the farmers' houses are made of the combination of wooden and galvanized iron materials followed by semi-concrete houses (18.75%) while a few (10%) houses are made of concrete materials. The farmers have houses made from wood since it is readily available in the locality, particularly the pine trees, and this is combined with galvanized iron since it is cheaper compared to pure wood and concrete materials. Observations indicated that the farmers have durable and well-built houses that is a result of modernization as compared to the traditional "nipa hut" type that are now being replaced with modern type house structures.

Most (95%) of the farmers, houses are owned privately while only a very few are renting and staying at the owners, houses. These are the farmers who are working as sharecroppers. Regarding the household material assets, 29.62% own at least two household assets, 17.75% own more than three household assets, 16.25% own at least three while 6.87% do not own any household material asset.

Out of the four communities, farmers at Barangay Capinitan in Mountain Province have more household furniture while farmers at Barangay Lesseb in the same province had the least furniture. Analysis of Variance (Appendix Table 2) showed a significant difference among the communities on the dwelling type and household material assets but did not show a significant difference on the dwelling ownership. This implies that the farmers at Capinitan are generally well off compared to the community of Lesseb regarding household material possessions. This also indicates the need to address poverty issues since ownership of household material assets can show some degree of well being of the farmers in the Cordillera.

Table 3a. Dwelling Type, Dwelling Ownership and Household Material Assets

DWELLING	**LOCATION**									
	LESSEB		**CAPINITAN**		**BOYACAOAN**		**LENGAOAN**		**TOTAL**	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
TYPE										
Concrete	1	2.5	5	12.5	6	15.0	4	10.0	16	10
Semi-concrete	4	10.0	7	17.5	13	32.5	6	15.0	30	18.75
Wood	15	37.5	4	10.0	4	10.0	2	5.0	25	15.62
Galvanized Iron	4	10.0	4	10.0	10	25.0	5	12.5	23	14.37
Wood + G.I Sheet	16	40.0	20	50.0	7	17.5	23	57.5	66	41.25
TOTAL	40	100	40	100	40	100	40	100	160	100
OWNERSHIP										
Private	39	97.5	38	95.0	37	92.5	38	95.0	152	95
Rented	1	2.5	0	0	0	0	2	5.0	3	1.87
Supply System	0	0	2	5.0	3	7.5	0	0	5	3.12
TOTAL	40	100	40	100	40	100	40	100	160	100
HOUSEHOLD* MATERIAL ASSETS										
Television	0	0	3	7.5	0	0	0	0	3	1.70
Radio/Stereo	3	7.5	2	5.0	3	7.5	1	2.5	8	4.54
Gas Range	7	17.5	3	7.5	2	5.0	3	7.5	15	8.52
Washing Machine	0	0	1	2.5	2	5.0	0	0	3	1.70
2 of above	21	21.0	9	22.5	14	35.0	16	40.0	80	45.45
3 of above	2	5.0	9	22.5	8	20.0	8	20.0	27	15.34
More than 3	1	2.5	9	22.5	8	20.0	11	27.5	29	16.48
No asset	6	15.0	4	10.0	1	2.5	0	0	11	6.25

*Multiple Responses

The poverty incidence in the Cordillera Administrative Region is still the pressing problem faced by the region. In line with the Philippines' Kapit-Bisig Laban sa Kahirapan – Comprehensive and Integrated Delivery of Social Services (KALAHI –

CIDSS) Program, four provinces in the Cordillera Administrative Region belongs to the 44 poorest provinces in the country. These are Abra, Ifugao, Kalinga and the Mountain Province. Three of these provinces are at the bottom half of the ranking nationwide in 1997 and 2000 despite reductions in their poverty and subsistence rates. According to the report of the National Economic and Development Authority in the CAR (2002), close to half of families in these provinces still live below the poverty threshold while close to or more than a quarter live below subsistence. They are also among the provinces with the highest income and poverty gap ratios and with the most severe poverty problem. Table 3b shows the poverty incidence by province at CAR for 1997 and 2000.

Table 3 b. Poverty Incidences by Province at CAR: 1997 and 2000

POVERTY INCIDENCE	**ALL AREAS**		**URBAN**		**RURAL**	
(% of Families)	**1997**	**2000**	**1997**	**2000**	**1997**	**2000**
PROVINCE						
Abra	55.7	48.8	16.7	8.3	65.5	58.8
Apayao	27.5	26.1	27.1	16.9	27.5	27.1
Benguet	18.9	14.1	4.2	4.9	35.7	28.6
Ifugao	57.7	55.6	15.9	12.5	62.8	61.0
Kalinga	38.7	38.8	22.9	29.9	42.6	41.1
Mountain Province	56.6	49.0	20.8	16.7	58.3	50.6

Source: National Economic Development Authority; CAR Report 2003

5.3.1.3. Land Ownership and Use

The results on the total land area owned by the farmers in the four study sites showed that Barangay Lengaoan in Benguet had the largest land owned with an average size of 1.1498 hectares. Barangay Capinitan came next, in the Mountain Province, with 1.0365 hectares while the smallest landholdings are found in Lesseb, Mountain Province with an average land size of 0.3787 hectare (Table 4).

Although Analysis of Variance (Appendix Table 3) showed no significant difference on the total land area among the communities, results imply that upland farms in Barangay Lengaoan were developed extensively for vegetable production. Lengaoan is located in the municipality of Buguias, Benguet. Buguias is one of the major vegetable producing areas in Benguet Province and 90% of its people are engaged in

Table 4. Total Land Area, Number of Parcels and Number of Years Owned

LOCATION	TOTAL AREA (Has.)			NO. OF PARCELS			YEARS OWNED		
	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean
Lesseb	0.0115	7.52	0.3787	1	7	3.1	3	63	32.07
Capinitan	0.03	3.05	1.0365	1	12	5.45	0	40	14.92
Boyacaoan	0.03	3.0034	0.6765	1	30	4.4	3	53	17.52
Lengaoan	0.420	10.52	1.1498	1	15	4.25	0	60	17.05

farming over longer period compared to the other sites. On the other hand, farmers from Lesseb had the smallest land holdings which could be attributed to the nature of their land that is sloping and only slopes suitable for terrace farming as well as on low lying areas are used for agriculture purposes.

Furthermore, a significant result was obtained on the number of parcels and number of years owned. Farm areas are fragmented into an average of 3 to 5 plots or parcels at Lesseb and Capinitan in the Mountain Province and an average of 4 parcels at Boyacaoan and Lengaoan, Benguet Province. Although there are fewer parcels at Benguet Province, the lands are however, wider.

The results showed that farmers at Lesseb had significantly longer land ownership than other areas with a mean of 32.07 years. Farmers from Boyacaoan and Lengaoan followed with means of 17.52 and 17.05 years respectively while Capinitan had land ownership with a mean of 14.92 years. It is also interesting to note that most of the farmers inherited their landholdings from their forefathers. This has a bearing on the ancestral domain concept of land ownership that is an indigenous customary practice among the people of the Cordillera. A brief discussion on the ancestral domain concept can give an understanding of the indigenous land ownership systems in the Cordillera Region.

The Indigenous Ancestral Domain Concept

Long before the advent of colonization in the Philippines, ancestral domain was applied to the territory occupied and recognized by an indigenous group since time immemorial. The concept of ancestral domain includes the Indigenous Peoples' right to avail of direct benefits derived from the exploitation of resources within its

territories and the right to directly decide how land, water and other natural resources will be allocated, used and managed (Prill-Brett, 2001). These have been the customary and unwritten law among the Cordillera ethnic groups in the past.

This customary practice was changed when the Spanish colonizers introduced the Regalian Doctrine where all lands belonged to the Spanish "Crown". This was imposed in the lowlands of the Philippines that consequently removed Filipinos of their right to their ancestral lands and domains. In the Cordillera, people resisted Spanish domination, thus preserving their indigenous land tenure and natural resource management system.

Under the American rule, the Regalian Doctrine continued but instead of lands owned by the Crown, it was substituted to the State. Private lands were acquired from the state through grants, purchase or other forms of transfer recognized and covered by state laws. The rest of the lands not covered by paper titles were classified public lands and reservations. This introduced system was adopted under the Philippine Republic until the present time. This has worked against the Indigenous Peoples and contributed to the perpetuation of the intended or unintended economic marginalization, social discrimination and disenfranchisement of the members of Indigenous Cultural Communities.

In 1997, the government passed and approved a national law called the "Indigenous Peoples Right Act" otherwise known as Republic Act No. 8371. Under this law, the state shall recognize, protect and promote the rights of Indigenous Cultural Communities, Indigenous Peoples, creating a National Commission of Indigenous Peoples, establishing implementing mechanisms, appropriating funds thereof and for other purposes.

This law, therefore, is a manifestation that previous systems of governance were detrimental to the Indigenous Peoples in the Philippines including the Cordilleran and this will redress the shortcomings over the years that they had been neglected. The law underscored ancestral domain as "all areas generally belonging to ICC's / IPs comprising lands, inland waters, coastal areas and natural resources therein, held under a claim of ownership, occupied or possessed by ICC's / IP's, by themselves or

through their ancestors, communally or individually since time immemorial, continuously to the present except when interrupted by war, force majeure or displacement by force deceit, stealth or any other voluntary dealings entered into by government and private individuals/corporations, and which are necessary to insure their economic, social and cultural welfare. It shall include ancestral lands, forests, pasture, residential, agricultural and other land individually owned whether alienable and disposable or otherwise, hunting grounds, burial grounds, worship areas, bodies of water, mineral and other natural resources, and lands which may no longer be exclusively occupied by ICC's/IP's but from which they traditionally had access to for their subsistence and traditional activities, particularly the home ranges of ICC's/IP's who are still nomadic or shifting cultivators(R.A No. 8518).

Even before the IPRA law, the DENR already recognized ancestral rights of IP's through a Department Order No. 2 series of 1993. It stipulates the policy "to preserve and maintain the integrity of ancestral domains and ensure recognition of the customs and traditions of ICC's and to identify and delineate ancestral land claims, certify them as such, and formulate strategies for their effective management". The DENR had awarded 24 Certificate of Ancestral Domain Claims (CADC's) covering 417,098 hectares to over 12,000 claimants (Prill-Brett, 2001). However, with the IPRA law, the National Commission on Indigenous Peoples is now mandated and has taken over the DENR's responsibility to issue CADC's and CADT's over areas certified and delineated as such. On July 2001, the first ever Certificate of Ancestral Domain Title (CADT) in the Philippines was issued to the Kankana-ey and Bago tribes of Bakun, Benguet. The said title covers an area of 29,444.34 hectares through the concerted efforts of the NCIP, LGU's, NGO's and DENR.

In the study sites, most of the farmers surveyed have "tax declarations" as proof of their ownership to their land. Tax declarations are papers recognizing individual land ownership through the payment of taxes on the land but falls short of Torrens titles since they have limitations like non-recognition as collaterals for credit in the banks. Tax declarations are proofs of land ownership. Under the tax declaration system, the municipal treasurer accepts tax payments for the land recognizing them as private lands even though they cannot be titled under the law. The government declared most of the farmers' lands in the Cordillera as watersheds and national parks. However the

farmers find hope that with the IPRA law, they will eventually obtain a land title that they have long been aspiring for.

5.3.1.4. Land Use

Table 5 presents the land use, mode of use and mode of agreement practiced by farmers. Among the four communities, Barangay Capinitan has the largest private and public forest area with a mean of 0.2719 ha. Lengaoan had the smallest forest area with a mean of 0.0383 ha. This implies that the farmers at Barangay Capinitan had maintained their forest compared to those from Lengaoan whose forest areas were converted to upland vegetable farms. The vegetable farms from Lengaoan are wider with a mean of 0.5936 ha. This was followed by vegetable farms from Boyacaoan with a mean of 0.4336 ha. while the smallest vegetable farms are found in Lesseb with a mean of 0.1320 ha. The results confirm the previous findings regarding the total land ownership where farmers from Lengaoan had wider landholdings but the least forest areas. Majority of the farmers from the four communities privately own their vegetable gardens, rice paddies and house settlement. However, the mode of use for the forest varies wherein 56.4% of farmers from Capinitan have private forest, followed by 20%, 10% and 7.5% from Boyacaoan, Lengaoan and Lesseb, respectively.

Analysis of Variance (Appendix Table 4) revealed no significant result on the area for forest land use, house settlement and rice paddy land use except for the area for vegetable farm land use that showed a significant result. Bonferroni's comparison among means showed that farmers at Boyacaoan and Lengaoan have wider vegetable farms compared to Lesseb. Further, a significant result was obtained from forest, house settlement and rice paddy land uses, except for vegetable gardens that are privately used by most of the farmers in all the communities. Farmers at Boyacaoan and Capinitan significantly differed in the mode of use of their forest compared with the farmers from Lengaoan. Farmers at Lengaoan have no private forest compared to

Table 5. Land Use

LAND USE	LOCATION											
	LESSEB			CAPINITAN			BOYACAOAN			LENGAOAN		
	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.	Mean
A) AREA (Has.)												
Forest	0	1.228	0.558	0	2.000	0.2719	0	4.000	0.1732	0	1.000	0.3825
House Settlement	0.001	0.03	0.285	0.002	0.01	0.0151	0.0007	0.20	0.0155	0.0007	0.04	0.0095
Vegetable Garden	0.01	0.78	0.1320	0.0002	1.40	0.3465	0.03	2.00	0.4336	0.04	3.00	0.5935
Rice Paddy	0	0.25	0.0097	0	0.50	0.2358	0	0	0	0	0	0

B) MODE OF USE (%)	LESSEB				CAPINITAN				BOYACAOAN				LENGAOAN			
*	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Forest	7.5	52.5	0	40	56.4	2.6	0	41	20	17.5	0	62.5	10	0	0	90
House Settlement	97.5	0	2.5	0	95.0	2.5	2.5	0	87.5	0	7.5	5.0	100	0	0	0
Vegetable Garden	90.0	2.5	5.0	2.5	97.5	0	2.5	0	87.5	0	7.5	5.0	100	0	0	0
Rice Paddy	15.0	0	0	0	30.0	0	5.0	65	0	0	0	0	0	0	0	0

*Legend: 1= Private Land; 2= Communal Land; 3= Rented; 4= Non-use

C) MODE OF AGREEMENT

	LESSEB					CAPINITAN					BOYACAOAN					LENGAOAN				
*	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
Forest	40	7.5	0	3.5	56	41	56.4	0	0	2.6	62.5	22.2	0	0	2.5	90	0	0	0	10
House Settlement	0	97.5	0	2.5	0	2.5	95.0	0	2.5	0	0	87.5	0	12.5	0	0	0	0	0	100
Vegetable Garden	0	90.0	2.5	5.0	2.5	0	97.5	0	2.5	0	0	87.5	0	7.5	5	0	100	0	0	0
Rice Paddy	85	15.0	0	0	0	65	30.0	0	5.0	0	0	0	0	0	0	0	0	0	0	0

*Legend: 1= Owner; 2= Leasehold; 3= Sharecrop; 4= Communal: 5= Non-use

farmers at Capinitan and Boyacaoan that still maintain private forest apart from the communal forest. Farmers at Lengaoan and Lesseb rely mostly on the public forest owned by the government. Majority (90%) of the farmers at Lengaoan have no forest compared to farmers at Capinitan and Boyacaoan with 56.4 % and 20% having private forest areas.

Since a significant result was obtained from the natural assets like vegetable farm areas, mode of use of the different land uses, the number of parcels and the number of years that the land was owned, the hypothesis of the study that there is no significant difference among the farmers in the different communities on the factors affecting upland farming systems is rejected based on the natural assets owned.

The resource situation of Benguet and Mountain Province is considered a fragile ecosystem because of its mountainous terrain. Like the nationwide trend, exploitation of natural resources followed the "growth without equity" strategy pursued by the government in the past. In Benguet, the Community Environment and Natural Resource Office reported that of the estimated 250,552 forest occupants region-wide in 1989, about 25,055 are found in Benguet Province as directly encroaching on forestlands. There is an increasing pressure on forestland for agriculture and settlement purposes. The expansion of the vegetable industry is a pressing threat to forest and protected areas.

5.3.2. Productivity of Upland Farming System

5.3.2.1. Crop Yield per Hectare

The major highland vegetables grown by farmers according to area planted are cabbage, potato, carrots and Chinese cabbage (Table 6). Barangay Lengaoan and Boyacaoan at Benguet Province mostly grow these crops while the communities at Mountain Province (Lesseb and Capinitan) grow more diverse crops although in small volume like sweet peas, sweet potato and bell pepper apart from the crops mentioned earlier.

Analysis of Variance (Appendix Table 5) revealed a significant result on the yield of crops planted by farmers among the communities studied. Lengaoan and Capinitan produced the highest yield of cabbage with an average of 33,853.45 kg and 17,380.30 kg respectively. Boyacaoan obtained the highest yield from potato with an average yield of 22,890.68 kg.,

while Lesseb produced the highest yield from carrots with an average of 57,469.12 kg. The results indicate that main crops are planted in wider areas in the communities specifically where the crops are preferred. Bonferroni's comparison among means showed that farmers

Table 6. Crop Yield (kg) per Hectare

CROPS PLANTED	AVERAGE YIELD (Kg) PER HECTARE LOCATION LESSEB	CAPINITAN	BOYACAOAN	LENGAOAN
Cabbage	14,898.22	17,380.30	15,432.97	33,853.45
Potato	800.00	7,638.69	22,890.68	12,909.77
Carrots	57,469.12	7,687.50	15,502.47	2,542.50
Baguio Beans	2,364.17	4,069.90	317.45	0
Chinese Cabbage	2,083.33	1,279.17	6,002.63	5,250.00
Sweet Peas	491.67	150.00	0	7.50
Sweet Potato	504.17	5,135.00	0	0
Bell Pepper	0	6,838.51	0	0
Lettuce	100.00	0	425.00	250.00
Celery	0	242.97	725.00	0

from Lengaoan significantly planted cabbage in wider areas compared to the other communities. For farmers at Boyacaoan, potatoes and Chinese cabbage were planted in wider areas while bell pepper is the main crop planted at Capinitan.

Lesseb planted carrots as their main crop since carrots grows very well in the locality that commands higher price. Carrots require sufficient moisture throughout its growing period wherein Lesseb have abundant water for irrigating the crop compared to the other areas with insufficient water for irrigation. Besides, farmers from Lesseb are at a disadvantage position in terms of transporting their products to the market due to poor farm to market road as well as lack of transportation. Therefore, carrot production becomes economical in terms of

storage for longer time when prices are low compared to leafy vegetables. Furthermore, farmers from Lesseb cannot compete with the big volume of potatoes and cabbage grown in other areas that have greater access to the main highway and their nearness to the market.

The result confirms the findings of Pekas et al (2003) in their study on the inflow and outflow of major highland vegetables monitored from October 2000 to December 2003 in Baguio City and La Trinidad, Benguet. They found that cabbage, potato, Chinese cabbage, carrots, chayote and Baguio beans were the vegetables marketed by farmers from Benguet and Mountain Province.

The soil in both provinces is conducive for the production of highland temperate crops. The demand for new crops or the production of highland temperate-climate vegetables in the Cordillera is now driving the conversion of lands to intensive commercial vegetable gardens where the climatic condition makes cultivation possible. This is also driven by the entry of the market economy stimulating the intensive cultivation of highland vegetables.

5.3.2.2. Gross Income from Crop Production

Table 7 shows the gross income of the farmers during the crop year 2002 – 2003. The results revealed that most of them have an income of less than 10,000 pesos per crop produced in all the communities studied. The low prices of products during the cropping year were major complaints of the farmers. This was coupled by the importation and illegal smuggling of vegetables into the Philippines that flooded the market and consequently lowered prices of highland vegetables.

Analysis of Variance (Appendix Table 6) showed a significant result on the income derived from the crops. Bonferroni's comparison among means showed that farmers from Lengaoan have significantly higher income from cabbage and potato compared to the other communities while farmers from Boyacaoan have significantly higher income from Chinese cabbage as well as potato.

Farmers in the Cordillera are in peril if the country keeps its commitment to the World Trade Organization General Agreement on Tariffs and Trade. The implementation of GATT-WTO

in 2005 will open the market to imports of temperate vegetables from more developed trading partners which could trigger the collapse of the vegetable industry if support measures are not in place. Local farmers would not stand a chance against developed countries because high price of inputs with corresponding low price of vegetables competing with imported vegetables will tend to decrease income of farmers, not even obtaining a “break-even” from their farming operations.

The CAR Region’s major difficulties in 2002 were analyzed by the NEDA where the comparative advantage of the semi-temperate fruits and vegetables are being threatened and eroded. For one, it has to contend with the entry of cheap, imported vegetables from Australia, China, Taiwan, Holland and New Zealand. This rendered heavy loss to local farmers as their products were being eased out from the major markets in Metro Manila. Reactions and recommendations were swift, particularly from the officialdom of Benguet and Mountain Province, the region’s major producers of these commodities, reaching as high as the President of the Philippines. This spawned a chain of national-initiated interventions that brought tariff adjustments and the provision of safety nets. A major intervention of the Department of Agriculture was the creation of the Task Force that rigidly monitored suspicious shipments and subjected all imported farm and fishery goods coming in through piers and airports to tighten inspection and quarantine.

Dealing with tariff rates, the officials of Benguet and Mountain Province opposed the existing 7% slapped on vegetables and pushed for 40%. This representation, however, yielded 25% decided by the Cabinet-level Trade and Related Matters (TRM) Committee.

Table 7. Average Gross Income per Crop per Household (Income Range)

	AVERAGE GROSS INCOME (Mean)*			
CROPS	**LESSEB**	**CAPINITAN**	**BOYACAOAN**	**LENGAOAN**
Cabbage	5,000	5,000	15,000	25,000
Potato	5,000	5,000	15,000	25,000
Carrots	5,000	5,000	15,000	5,000
Baguio Beans	5,000	5,000	5,000	0
Chinese Cabbage	5,000	5,000	5,000	5,000
Sweet Peas	5,000	5,000	5,000	0
Carrots	5,000	5,000	0	0
Bell Pepper	0	5,000	0	0
Lettuce	5,000	0	5,000	5,000

The computed gross income based on the monthly average wholesale price (Pesos) of selected highland vegetables from January to December 2002 is shown in Table 7a. The results showed that farmers from Lesseb had a very high net income from carrots per hectare compared to the other areas. Lesseb have a comparative advantage for carrot production since the crop requires ample supply of moisture throughout its growing season and Lesseb has still abundant supply of water to irrigate the crop especially during the summer months compared to the other areas with insufficient water to irrigate the crop. For the other areas, growing carrots is not feasible during the rainy season since too much water will tend to destroy the crop by means of rotting.

Table 7a. Gross Income (Pesos) per Hectare

CROPS	GROSS INCOME (Pesos) PER HECTARE LOCATION LESSEB	BOYACAOAN	LENGAOAN	CAPINITAN
Cabbage	153,302.70	158,805.30	248,352.00	178,843.30
Potato	10,632.00	304,217.00	171,570.84	178,843.30
Carrots	695,951.10	187,734.90	30,789.68	93,095.63
Baguio Beans	33,405.68	4,485.57	0	57,507.72
Chinese Cabbage	14,333.33	41,298.12	36,120.00	8,800.67
Sweet Peas	13,520.83	0	206.25	4,125.00
Sweet Potato	1,260.42	0	0	12,837.50
Bell Pepper	0	0	0	136,770.11
Lettuce	2,775.00	11,793.75	6,937.50	0
Celery	0	41,687.50	0	13,970.77

5.3.2.3. Major Farm Inputs

The total cost for the major farm activities is presented in Table 8. During the crop year under study (2002-2003), cash was needed to obtain more than 50% of all production inputs. The households have lands and they supplied bigger part of the labour requirement through family labour. Farmers shouldered the risks as entrepreneurs and managers of the farm operation. The production therefore depends not only on the natural assets of the agro ecosystem but also on the household's ability to obtain commercial production inputs.

In terms of input cost, farmers at Barangay Lengaoan had the highest total input costs of 1,946,490 pesos while the least were those from Capinitan with 492,572 pesos. All communities have high fertilizer cost which was the major expenditure for crop production. Farmers who used organic fertilizer, specifically dried chicken manure, applied as

fertilizer was followed by the use of inorganic fertilizer for better crop growth. The farmers are heavy users of pesticides and inorganic fertilizers, which could have been the influence of many chemical companies entering the locality to conduct seminar-training schemes, then introducing their chemical fertilizers and pesticide products to farmers.

The purchase of vegetable seeds incurred the second highest cost since seeds were commercially bought that are imported from other countries like Japan and America. Potato seeds are, however, produced by local farmers with big farms and are stored in storage facilities. These are then used for the next cropping year and the excesses are sold to other farmers in the locality. In terms of irrigation cost, most farmers purchase PVC hose. These are connected to the main water source either from a river, a stream or irrigation tank going to their farms. This is the only means to irrigate their farms especially during summer months. For land preparation, simple tools like grub hoe and spade are commonly used by farmers and all agricultural activities are manually done.

The high cost of chemical fertilizers and pesticides are driving farmers' income lower since the prices of vegetables remain poor and unstable. During the cropping year (2002-2003), farmers complained of the very low prices of their products which went down to as low as 3 pesos per kilo for cabbage and 5 pesos per kilo for potato. Considering that a farmer pays 50 centavos per kilo to a baggage man or person who carries the load from the farm to the main highway and 1.50 pesos per kilo for the transport of products from the location to the market, then 2 pesos is lost for transport alone and yet the market price is 3 to 5 pesos per kilo. The cost did not yet include other cost of inputs which is why farmers are complaining about the very low price of their products. Production in terms of the ability to grow the crops is not a problem to the farmers but the price is a problem. As one farmer aptly put it when asked about their farm production *"Our yield in terms of producing vegetables are alright. We can produce them in the Cordillera but the government should set a price control so price of crops won't go down as low as 2-3 pesos per kilo. This is very low and there should be a minimum price so farmers should also be protected"*.

Table 8.Major Farm Inputs In Pesos per Cropping Per Household(Year 2002-2003)

LOCATION	TOTAL COST (Pesos Per Cropping Per Household)									
	LAND PREP.	SOWING	FERTILIZER		PESTICIDE	IRRIGATION	WEEDING	HARVESTING	TOTAL	MEAN
			organic	inorganic						
A) LESSEB										
Cabbage	16,900	23,335	23,400	41,555	17,794	18,575	9,850	21,690	173,099	21,673.37
Potato	1,650	165	1,350	2,970	1,395	475	330	5,090	13,425	1,678.12
Carrots	27,280	32,230	19,290	69,630	23,450	43,175	17,010	22,310	254,375	31,796.87
Baguio Beans	6,150	4,480	1,580	10,175	4,195	18,880	4,530	1,300	51,290	6,411.25
Chinese Cabbage	950	760	565	1,940	0	3,650	950	200	9,015	1,126.87
Sweet Peas	5,220	3,440	2,380	2,940	5,955	3,475	2,130	1,605	27,145	3,393.12
Sweet Potato	1,400	0	0	0	0	0	250	950	2,600	325.00
TOTAL	**59,550**	**64,410**	**48,565**	**129,210**	**52,789**	**88,230**	**35,050**	**53,145**	**530,949**	**9,481.23**
B) BOYACAOAN										
Cabbage	20,980	39,580	47,650	27,883	53,630	43,275	15,540	13,395	261,933	32,741.62
Potato	25,605	284,920	69,825	34,505	107,260	47,626	18,925	27,180	615,846	76,980.75
Carrots	26,840	37,870	54,150	27,888	30,660	55,420	23,970	7,680	264,478	33,059.75
Chinese Cabbage	17,850	20,800	44,035	17,189	14,070	32,046	8,320	18,715	173,025	21,628.12
Lettuce	2,200	1,300	2,400	3,560	2,800	2,085	840	1,160	16,345	2,043.12
Celery	800	990	1,000	2,730	1,500	890	600	900	9,410	1,176.25
TOTAL	**94,275**	**385,460**	**219,060**	**113,755**	**209,920**	**181,342**	**68,195**	**69,030**	**1,341,037**	**27,938.27**

Major Farm Inputs (Continuation)

LOCATION	TOTAL COST (Pesos Per Cropping Per Household)									
	LAND PREP.	SOWING	FERTILIZER		PESTICIDE	IRRIGATION	WEEDING	HARVESTING	TOTAL	MEAN
			organic	inorganic						
C) CAPINITAN										
Cabbage	13,480	15,700	14,255	13,500	8,870	16,425	6,960	4,600	93,790	11,723.75
Potato	13,030	51,300	49,115	18,235	7,790	28,431	1,350	8,950	178,201	22,275.12
Carrots	4,170	4,560	5,310	11,878	4,010	16,690	1,900	1,980	50,498	6,312.25
Baguio Beans	7,090	1,730	2,870	7,615	3,020	14,255	2,590	855	40,025	5,003.12
Chinese Cabbage	3,170	1,450	3,600	4,940	1,250	1,940	2,560	610	19,520	2,440.00
Sweet Potato	6,100	0	0	0	0	2,775	2,070	980	11,925	1,490.62
Bell Pepper	15,800	8,925	17,245	23,588	5,280	18,640	5,930	6,115	85,723	10,715.37
Celery	3,200	1,000	3,525	2,840	0	2,150	150	25	12,890	1,611.25
TOTAL	**66,040**	**84,665**	**95,890**	**82,596**	**30,220**	**101,306**	**23,510**	**24,115**	**492,572**	**7,696.43**
B) LENGAOAN										
Cabbage	39,340	124,465	218,845	137,415	142,850	12,950	31,900	17,525	725,290	90,661.25
Potato	38,230	450,400	229,560	130,680	252,185	8,225	27,990	16,985	1,154,255	144,281.87
Carrots	4,410	4,640	7,140	17,090	3,720	5,250	2,780	900	45,930	5,741.25
Chinese Cabbage	1,800	2,440	4,550	3,135	3,040	0	1,400	700	17,065	2,133.12
Lettuce	800	550	1,000	1,100	0	0	500	0	3,950	493.75
TOTAL	**84,580**	**582,495**	**461,095**	**289,420**	**401,795**	**26,425**	**64,570**	**36,110**	**1,946,490**	**48,662.25**

Table 8a. Farm Input Cost (Pesos) Per Hectare

FARM INPUT COST (Pesos) PER HECTARE				
	LOCATION			
CROPS	**LESSEB**	**BOYACAOAN**	**LENGAOAN**	**CAPINITAN**
Cabbage	135,648.11	35,457.88	54,561.02	38,819.27
Potato	8,170.00	94,205.86	59,536.61	54,170.46
Carrots	204,211.90	43,495.14	15,053.88	33,421.60
Baguio Beans	54,799.17	1,412.00	0	36,291.47
Chinese Cabbage	12,224.17	35,130.71	2,791.25	22,487.50
Sweet Peas	16,302.57	0	199.50	1,262.50
Sweet Potato	2,395.83	0	0	12,346.04
Bell Pepper	0	0	0	32,227.59
Lettuce	280.50	1,455.60	987.50	0
Celery	0	3,241.25	0	1,458.30

The farm input costs per hectare showed that farmers from Lesseb had the highest input cost of 135,648.11 pesos for cabbage and 204,211.90 pesos for carrot production. Farmers from Boyacaoan had the highest input cost of 94,205.86 pesos for potato production.

Analysis of Variance (Appendix Table 7) revealed a significant result on the farm input cost among the different communities under study. Bonferonni's comparison among means showed that farmers from Lesseb significantly had more farms input cost per hectare for the production of cabbage, carrots and sweet peas. The remoteness, poor farm to market road and lack of transportation going to Lesseb makes input cost higher compared to the other sites which are accessible to the main highway and transportation for their products. Baggage man adding to the cost carries farm inputs like sacks of fertilizers.

5.3.2.4. Labour Used in Farm Cultural Management

The labour used in farm cultural management is discussed and presented as number of days used (Table 9), and total cost of labour used (Table 9a).

Number of days used (man-day)

The different crops planted required different labour inputs that are also influenced by the size of farm and the type of labour used. The traditional way of farming was still used by preparing the farmland that is done manually using the hoe and the spade. Looking at the labour in terms of the number of days used (man-day), ploughing the field during land preparation has the greatest number of days spent in all communities ranging from 1 to 7 days. Land preparation for cabbage and potato had the highest number of days with means ranging from 0.375 to7.1 days. Comparing the sites, farmers from Lengaoan had the highest number of days spent on ploughing for the production of cabbage and potato with a mean of 7.1 and 6.6 days respectively. This was followed by the farmers from Boyacaoan with means of 3.925 days for cabbage and 3.975 days for potato. The least number of days spent on preparing the field for planting was obtained from Lesseb with a mean of 2.775 days for cabbage and 0.375 days for potato. This trend holds through for the other farm activities among the communities.

Farmers spent the lowest number of days in irrigating the crops. This is attributed to the system they used where the water hose is connected to rivers, streams or irrigation tanks and they use rain burst that is connected at the other end of the hose. This is mounted on a stick and the water will be spread through the rain burst that rotates by itself and sprinkles water at the farm. This system allows farmers to work on other farm activities. Furthermore, irrigation does not require much labour at Lengaoan since farmers operate their farms at the onset of the rainy season.

Analysis of Variance (Appendix Table 8) revealed a significant result on the labour used in farm cultural management among the communities. The different farm activities required different number of days to perform the activities.

Table 9. Labour Used in Farm Cultural Management (Mean Number of Days)

LOCATION	AVERAGE NUMBER OF DAYS PER CROPPING PER HOUSEHOLD(Mean) PLOUGHING	SOWING	FERTILIZING	IRRIGATING	WEEDING	HARVESTING
LESSEB						
Cabbage	2.775	1.325	1.425	2.050	1.625	1.600
Potato	0.375	0.125	0.225	0.100	0.325	0.150
Carrots	4.300	2.625	2.300	2.975	3.154	4.425
Baguio Beans	1.150	0.900	0.925	0.425	1.75	1.550
Chinese Cabbage	0.150	0.150	0.150	0.100	0.150	0.350
Sweet Peas	0.475	0.350	0.425	0.150	0.650	0.450
Sweet Potato	0.005	0.007	0.002	0.002	0.002	0.400
Lettuce	0.005	0.002	0.002	0.002	0.002	0.002
A) BOYACAOAN						
Cabbage	3.925	2.200	2.675	1.075	2.675	2.235
Potato	3.975	2.450	2.650	1.350	2.925	3.450
Carrots	3.975	1.774	2.375	1.450	4.025	2.050
Baguio Beans	0.525	0.225	0.525	0	0.325	0.225
Chinese Cabbage	2.950	1.000	1.375	0.450	2.225	1.100
Lettuce	0.675	0.300	0.300	0.125	0.500	0.
Celery	0.175	0.100	0.175	0.175	0.225	0.175

Table 9. Continuation

LOCATION	AVERAGE NUMBER OF DAYS PER CROPPING PER HOUSEHOLD(Mean) PLOUGHING	SOWING	FERTILIZING	IRRIGATING	WEEDING	HARVESTING
B) LENGAOAN						
Cabbage	7.100	3.075	3.250	0.225	2.800	6.500
Potato	6.600	2.550	2.825	0.200	2.525	4.825
Carrots	0.500	0.450	0.425	0.005	0.237	0.900
Chinese Cabbage	0.275	0.225	0.200	0	0.225	0.275
Sweet Peas	0.100	0.100	0.100	0	0.100	0.250
Lettuce	0.005	0.005	0.005	0	0.002	0.125
C) CAPINITAN						
Cabbage	3.275	1.475	2.025	0.700	1.950	2.475
Potato	3.525	1.425	1.800	0.750	1.900	2.625
Carrots	0.575	0.350	0.400	0.550	0.425	0.800
Baguio Beans	1.275	0.587	0.675	1.225	1.200	1.500
Chinese Cabbage	0.475	0.325	0.400	0.175	0.200	0.225
Sweet Peas	0.125	0.125	0.150	0	0.250	0.100
Sweet Potato	0.950	0.425	0.175	0.550	0.475	0.675
Bell Pepper	3.25	1.350	1.725	1.300	2.975	1.720
Celery	0.35	0.100	0.125	0.175	0.675	0.100

Type of Labour Used

Farmers in all the communities relied mostly on family labour. This was usually the combination of male and female family labour sharing the work in farm activities. Male head or member of the household usually did installation of irrigation materials since they are stronger to carry the rolls of hose and to climb steep slopes to connect to sources of water which are usually located at the upper slopes of the mountain. Other farmers with large farms hire paid labourers to assist them at a rate of 100 to 150 pesos per day.

5.3.2.5. Labour Cost (Pesos) Per Hectare in Farm Cultural Management

The total labour costs are the costs incurred by all farmers who hired labourers to assist them in either any of the farm activities. It can be seen from Table 10 that farmers from Lengaoan incurred more expenses for paid labour for the production of cabbage and potato with a total cost of 9,436.45 pesos and 5,002.36 pesos respectively. Farmers from Capinitan came next with expenses of 5,709.56 pesos for cabbage and Boyacaoan farmers spent 2,907.59 pesos for potato production respectively. The highest cost for hiring labourers for carrot production was incurred by the farmers from Lesseb with 24,045.15 pesos per hectare.

Analysis of Variance (Appendix Table 9) showed significant results. Farmers from Lengaoan spent significantly more for labour compared to farmers from Lesseb but did not differ significantly with the other communities.

This again confirms the position of Lengaoan and Boyacaoan as geared toward a more commercial type of agriculture. According to the Barangay Captain of Lengaoan, commercial agriculture in their place could be attributed to their past history. Chinese immigrants who earlier went to Lengaoan and Boyacaoan at Buguias, Benguet rented farmlands and engaged in farming and introduced commercial agriculture by teaching the local residents to plant crops for the market instead of the subsistence type of farming. This eventually led to the creation of more farms for vegetable production as a result of the market economy.

In the Cordillera, the livelihood remains principally agriculture with 54% of Benguet's labour force engaged in agriculture while for the rest of the rural areas, 64% of employment is agriculture (Local Dev't. Plan, 1999-2004). Agriculture labour productivity lags very far

behind non-agriculture labour. For every one (1) peso earned by agriculture workers, a non-agriculture worker earns seven (7) pesos. If labour productivity or output per worker is translated to income, agriculture-based families, especially with small hold farms, have meager income; hence rural poverty becomes inevitable in the Cordillera.

Table 10. Labour Cost (Pesos) Per Hectare

	LABOUR COST (Pesos) PER HECTARE LOCATION			
CROPS	**LESSEB**	**BOYACAOAN**	**LENGAOAN**	**CAPINITAN**
Cabbage	5,106.82	4,370.79	9,436.45	5,709.56
Potato	0	2,907.59	5,002.36	2,262.17
Carrots	24,045.15	9,869.06	3,246.00	1,895.83
Baguio Beans	300.00	120.00	0	525.00
Chinese Cabbage	2,500.00	1,469.00	625.00	25,000.00
Sweet Peas	250.00	0	195.00	0
Sweet Potato	0	0	0	0
Bell Pepper	0	0	0	26,203.50
Lettuce	0	120.00	150.00	0
Celery	0	152.50	0	0

Analysis of Variance (Appendix Table 6) showed a significant result on the labour cost among the farmers in the different communities regarding the production of carrots and cabbage. Bonferonni's comparison of means revealed that for carrot production, farmers from Lesseb incurred significantly more labour cost compared to Boyacaoan but did not differ significantly with the rest of the communities. On the other hand, farmers from Lengaoan had significantly higher labour cost for cabbage production compared to the rest of the communities.

5.3.2.6 Net Income (Pesos) Per Hectare

The net income per hectare from crop production was computed by deducting the gross income per hectare to the total cost of farm production that included the farm input cost per hectare and labor cost per hectare. Table 10a presents the net income per crop per hectare from the four communities understudy.

The results revealed that farmers from Lengaoan obtained the highest net income from cabbage with an average of 284,354.53 pesos per hectare while farmers from Boyacaoan obtained the highest net income from potatoes with an average of 207,103 pesos per hectare. The farmers from Lesseb obtained the highest net income from carrots with an average of 467,693.95 pesos per hectare. The farmers at Lengaoan and Boyacaoan grow cabbage during the onset of the rainy season and after harvesting cabbage, potatoes are planted after the rainy months where moisture is still available for potato. However at Lesseb, the production of carrots is a comparative advantage since the crop requires sufficient moisture wherein water is still abundant at Lesseb for irrigation especially during the summer months compared to the other sites that lack irrigation water. Carrots cannot also be planted during rainy season at the other sites since too much water will cause rotting of carrots.

Table 10a. Net Income (Pesos) Per Hectare from Crops

	NET INCOME (Pesos) PER HECTARE LOCATION			
CROPS	**LESSEB**	**BOYACAOAN**	**LENGAOAN**	**CAPINITAN**
Cabbage	12,547.77	118,976.63	284,354.53	134,314.47
Potato	2,462.00	207,103.55	107,031.87	45,085.57
Carrots	467,693.95	135,370.70	12,489.80	57,778.20
Baguio Beans	(21,693.49)	2,953.57	0	20,691.25
Chinese Cabbage	(390.84)	4,698.41	32,703.75	(38,686.83)
Sweet Peas	(3,031.84)	0	(188.25)	2,862.50
Sweet Potato	(1,135.41)	0	0	491.46
Bell Pepper	0	0	0	78,339.01
Lettuce	2,494.50	10,218.15	5,800.00	0
Celery	0	38,293.75	0	12,512.47

5.3.3. Marketing and Pricing of Products

5.3.3.1. Marketing of Products

The vegetables produced were sold at the Regional market located at the capital town of Benguet at La Trinidad and the City of Baguio. The trading post is found at La Trinidad where most of the vegetables were sold. La Trinidad and Baguio City are centers of growth and development where major commercial and business establishments are found. Baguio is about 120 km away from Capinitan and Lesseb, Mountain Province. The distance in transporting products to the regional market entails added cost for the farmers. Most (76.25%) farmers transported their products through hired vehicles while a few (18.12%) have their own vehicles for transporting their products. A small fraction (3.12%) sells their products to buyers who buy directly from their farms (Table 11).

From the situation of the upland farmers in marketing their products, majority (63.75%) are at the mercy of middlemen. A farmer loses competitive edge when dealing with middlemen. At the regional market, middlemen are operating as a network and are dictating the price of vegetables. These middlemen transport vegetables to the national market in Manila. The lack of transport system and an organized market for credit in the Cordillera are structural problems wherein the middlemen can isolate the farmers from other potential buyers. The middlemen can then enjoy monopolistic advantage in terms of setting prices.

Policies on price regulations are set in place by the Department of Trade and Industry but the fluctuation in prices caused by the volume of products makes prices of vegetables very unstable. The relative importance of markets as well as national policies operating through them is conditioning influences over farmers' decisions on land area farmed. This is aggravated by the remoteness and poor infrastructure quality in the sites that are taken to indicate that market links to the rest of the economy are tenuous at best.

Table 11. Marketing of Products

MARKETING ACTIVITIES	LOCATION							
	LESSEB		CAPINITAN		BOYACAOAN		LENGAOAN	
	n	%	n	%	n	%	n	.
A) MARKET OUTLET								
Local	12	30.0	5	12.5	-	-	-	-
Municipal	-	-	1	2.5	5	12.5	-	-
Regional	28	70.0	32	80.0	33	82.5	40	100
National	-	-	-	-	2	5.0	-	-
Not Marketed	-	-	2	5.0	-	-	-	-
B) MARKETING METHODS								
Direct to Market	8	20.0	30	70.0	5	12.5	5	12.5
Middlemen	28	70.0	7	17.5	34	85.0	33	82.5
Buy from Farm	4	10.0	-	-	1	2.5	2	5.0
Not Marketed	-	-	3	7.5	1	2.5	-	-
C) MODE OF TRANSPORT								
Own Vehicle	2	5.0	6	15.0	8	20.0	13	32.5
Hired Vehicle	36	90.0	30	75.0	30	75.0	26	65.0
Buy from Farm	2	5.0	1	2.5	1	2.5	1	2.5
Not Marketed	-	-	3	7.5	1	2.5	-	-

5.3.3.2. Pricing of Products

The buyers (74.87%) set prices of vegetable products in the Cordillera Region. In this case, these are the middlemen, who often get the volume of products from the Trading Post in the regional market. Those few (5.62%) farmers who set their prices happened to have relatives in the market who have market stalls or who are selling vegetables either by retail or wholesale.

The uncertainties of prices are problems encountered by the farmers. Farmers who produce the same products cause the increase in local supply that drives prices down. Most farmers

produce potatoes and cabbage in the Region that floods the market and thereby lowered its price.

If markets are integrated but prices are influenced by local production, then supply and price in upland agriculture will tend to move in the opposite direction. However, the situation for the upland farmers in the Cordillera is regarded as dismal considering the high cost of agricultural inputs relative to the price of their products. This is aggravated by the importation and smuggling of temperate vegetables into the country that compete with the local vegetables. The Agricultural Tariffication Act of 1996 brought the Philippine agricultural policy into compliance with the Uruguay Round of General Agreement on Tariff and Trade. Quantitative restrictions on corn and vegetables were replaced by tariffs and minimum access volumes (MAV's) were specified for each product. The minimum access volume is the volume of a product that is allowed to be imported at a lower rate of duty than the maximum bound rate under the GATT. This put the prices of vegetables in the Cordillera at a lower price with similar imported vegetables.

Table 12. Pricing of Products

	LOCATION							
	LESSEB		CAPINITAN		BOYACAOAN		LENGAOAN	
PRICING	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Prevailing Market Price	4	10.0	18	45.0	3	7.5	2	5.0
Set Own Price	3	7.5	2	5.0	1	2.5	3	7.5
Buyer Set Price	33	82.5	17	42.0	36	90.0	34	85.0
Not Marketed	-	-	2	5.0	-	-	-	-

5.3.4. Comparison of Intervention and Non- Intervention

5.3.4.1. Forest/Watershed Inputs

The forest/watershed inputs focused mainly on the areas with Community-Based Forest Management Program (CBFM). These are Capinitan at Sabangan, Mountain Province and Boyacaoan, Buguias, Benguet. The other sites, Lesseb and Lengaoan were not recipients of the CBFM and hence their forestry activities relied more on the natural regeneration of the Benguet pine trees in their locality. A discussion on the forest/watershed inputs concentrated at the communities of Capinitan and Boyacaoan.

The CBFM is a government intervention through the Department of Environment and Natural Resources (DENR). This is pursuant to Executive Order No. 263 entitled "Adopting Community-Based Forest Management as the national strategy to ensure the sustainable development of the country's forestland resources and providing mechanisms for its implementation". The President of the Republic of the Philippines issued the order on July 19, 1995. The CBFM became the site development strategy adopted by the DENR in their programs and projects.

It can be seen from Table 13 that the forest activities at Capinitan included reforestation, nursery establishment and fire line construction while the activities at Boyacaoan were reforestation and fire line construction. The costs of forestry activities came from the DENR funds and the counterpart of the community members who joined the program were in the form of labour and materials, hence the cost reflects the materials used by members in their forestry activities.

Table 13. Cost for Forest/Watershed Input

LOCATION/ACTIVITIES	FOREST/WATERSHED INPUT (Pesos) PER HOUSEHOLD LAND PREPARATION	PLANTING	MAINTENANCE
A) CAPINITAN			
Reforestation	3,625	3,790	3,265
Nursery Establishment	4,575	3,940	1,725
Fire Line Construction	1,290	750	390
B) BOYACAOAN			
Reforestation	5,750	4,685	5,660
Fire Line Construction	5,495	0	2,325

The Community Based Forest Management Program at Capinitan

The Community Based Forest Management Program at Capinitan forms part of the upper Chico River watershed. The increasing demand to support subsistence of community members threatens the natural resource base of the community leading to deterioration of their livelihood source. The area was established by the DENR as an Integrated Social Forestry Project Site (ISFP) in 1989. The ISFP was designed to maximize the use of forestlands, improve ecological stability and uplift the socio-economic condition of upland communities. As a policy of the ISFP, program participants were provided with security of tenure through the Certificate of Stewardship Contract (CSC) over the lands classified as forestlands, which they continuously occupied, possessed and/or cultivated.

In 1993, the area was identified as a Center for Peoples Empowerment in the Uplands (CPEU) at the municipality of Sabangan, Mountain Province. As such, the CSC holders under the ISFP were organized into the CARP-ISF Association (CACIFA). The CACIFA is a Peoples Organization within the community of Capinitan dependent on upland farming for their livelihood. Eventually in 2001, the Peoples Organization was a recipient of the CBFM program of the DENR as partners in development through the adoption of forest management practices. Activities included the introduction of soil and water conservation measures such as terracing using stonewall, establishment of farm forest, introduction of agriculture perennial crops in cultivated lands and agroforestry. A total of 125 hectares were under the CBFM at Capinitan broken down into the following land uses:

LAND USE	AREA (Ha)
Natural Pine Forest	53.5
Established Farm Forest	7.0
Agroforestry	12.0
Open Grasslands	2.0
Gardens	30.0
Build Up Areas	9.0
Rock Formations	12.0
TOTAL	125.0

Natural pine forests and established pine plantations with other tree species are located at the higher portion of the area while agroforestry and garden areas were established at the lower portion of the site. Agroforestry areas were mostly planted with citrus species in small individual lots and along borderlines of small cultivations.

The activities to reduce degradation were reforestation, nursery establishment and fire line construction. Under the reforestation activity, the members of the Peoples Organization planted *Gmelina arborea trees* at the upper portion of the area. Citrus trees were planted in a 10-hectare area in their agroforestry site and planted as hedgerows at the terraced gardens to prevent erosion. A total of 4,000 *Gmelina arborea* trees and 2,240 citrus trees were distributed to 47 members that are holders of Certificates of Stewardship Contracts. A nursery for the production of tree seedlings was constructed under the ISFP purposely for planting within the community. The nursery was constructed through the funds from the ISFP while the members of the Peoples Organization provided labour. In 1997, there were 40,000 seedlings propagated with 10,000 forest trees and 30,000 fruit trees. Procurement of seeds, gathering and bagging of soil, piling of bagged soil and sowing of seeds as well as care and maintenance were done by the women while the construction of nursery shade was done by the men. More recently, however, the nursery was destroyed during a typhoon that hit the area causing a boulder of rock that hit the nursery structure.

Regarding the soil and water conservation activities, the indigenous system of terracing was utilized as a technique to stabilize the soil and minimize silt and sedimentation going to the Chico River that is located below the community. Terracing was readily adopted since it was familiar and indigenous to the community members.

The Community Based Forest Management at Boyacaoan

The Boyacaoan Agroforestry Association Incorporated (BAFAI) was created in 1983-1986 under the former Integrated Social Forestry Program of the DENR, as in the case of Capinitan. The members of the Peoples Organization were awarded with a Certificate of Stewardship Contract (CSC). In 1992, it was also awarded a project on Environment and Natural Resource Sectoral Adjustment Loan Program by the DENR. This is a reforestation

project to rehabilitate denuded forest areas in the community. The BAFAI Peoples Organization was duly registered under the Securities and Exchange Commission of the government. This gives the organization legal status to enter into contract with the DENR and engage in livelihood activities to generate income for their organization. The CBFM area at Boyacaoan consists of 33.544 hectares broken down as follows:

LAND USE	AREA (Ha)	Percent
Forest Plantation	11.027	32.90
Agricultural Farms	5.305	15.80
Natural Forest	8.391	25.01
Production Forest	7.620	21.22
TOTAL	33.544	100.00

The beneficiaries of the CBFM are Peoples Organization members who depended on agriculture as their primary source of income since majority are full time vegetable farmers. Other livelihoods at Boyacaoan included ‘sari-sari” store business and backyard piggery. There is also a multi-purpose cooperative for collective action and assistance to members. The PO members were given technical assistance by the DENR for livelihood activities.

5.3.4.2. Labour Use for Forest Management Strategies

The labour used for forest management strategies is discussed in terms of the type of labour that was used in the CBFM project areas (Table 14) and the number of days spent on forest management activities performed (Table 14a).

Type of Labour Used

Mobilizing the people through community cooperation and participation was the main action in terms of labour used for forest management at the CBFM sites at Capinitan and Boyacaoan. This was done through the initiatives of the members of the Peoples Organization. Although community action was the main type of labour used for forest management activities, the males in the household usually participated. In reforestation activities for instance, male and female family labour join the work. This means that during occasions when the male is not available to render cooperative work, then the female member

of the household, usually the wife pitches in for the husband. Table 14 shows that the male and female types of labour were commonly used at Capinitan followed closely by the male type of labour. Farmers performed both reforestation activities in their respective Certificate of Stewardship Contract lots as well as the community forest areas. There was no nursery establishment activity at Boyacaoan CBFM since the reforestation project awarded by the DENR provided tree seedlings to the members of the Peoples Organization to plant in the denuded forest areas in their community.

The establishment of fire lines is a forest protection activity by clearing grasses on a strip 6 meters wide around the surroundings or boundary of a newly established plantation or existing forest area. This prevents the spread of fire to the newly planted seedlings or established forest. This is an important forest protection strategy since the pine trees are readily combustible especially with the pine needles deposited at the surface of the ground. Forest fire is a common problem in the Cordillera. The construction of fire lines at Capinitan and Boyacaoan was done through community action spearheaded by the Peoples Organization.

Analysis of Variance showed a significant result on the type of labour used for forest/watershed management. Farmers from Capinitan and Boyacaoan participated more in the activities compared to Lengaoan and Lesseb because of the CBFM program intervention.

Table 14. Type of Labour Used for Forest/Watershed Management

TYPE OF LABOUR	FOREST/WATERSHED MANAGEMENT ACTIVITY (%)								
	Reforestation			Nursery Establishment			Fire line Construction		
	LP*	P*	M*	LP	P	M	LP	P	M
A) CAPINITAN									
Male Family Labour	30.0	25.0	12.5	7.5	5.0	0	5.0	0	5.0
Female Family Labour	17.5	17.5	10.0	7.5	2.5	0	2.5	0	2.5
Male & Female	32.5	32.5	30.0	7.5	5.0	5.0	5.0	7.5	5.0
Paid Labour	2.5	2.5	0	0	5.0	0	0	0	0
Contract Labour	0	0	2.5	0	0	0	0	0	0
Community Action	2.5	2.5	27.5	42.5	42.5	60.0	67.5	42.5	75.0
None Participation	15.0	20.0	17.5	35.0	0	0	20.0	50.0	12.5
B) BOYACAOAN									
Male Family Labour	27.5	27.5	27.5	0	0	0	10.0	0	12.5
Female Family Labour	5.0	5.0	5.0	0	0	0	0	0	0
Male & Female	5.0	7.5	5.0	0	0	0	5.0	2.5	2.5
Paid Labour	10.0	12.5	0	0	0	0	2.5	2.5	0
Contract Labour	7.5	5.0	2.5	0	0	0	5.0	0	7.5
Community Action	20.0	15.0	35.0	0	0	0	42.5	5.0	42.5
None Participation	25.0	27.5	25.0	0	0	0	35.0	90.0	35.0

* LEGEND: LP= Land Preparation: P= Planting; M= Maintenance

Number of Days Used for Labour for Forest management Activities

The average number of days spent participating in forest management activities was greater for farmers at Boyacaoan than Capinitan (Table 14a). Farmers spent an average of 6.05 days for land preparation, 5.70 days for planting the seedlings and 5.95 days for maintenance under the reforestation activity. Comparing the same activity at Capintan, farmers spent an average of 1.975 days for land preparation, 1.725 for planting seedlings and 1.75 days for maintenance work. This trend is also similar with fire line construction activities.

The results imply that the reforestation area established at Boyacaoan was wider with 11.027 hectares compared to Capinitan with 7.0 hectares. There were also individual lots or gardens at Capinitan where citrus trees were planted in an agroforestry system in the form of hedgerow species to prevent erosion in their terraced lots.

Table 14a. Number of Days Spent in Forest/Watershed Management Activities

LOCATION	AVERAGE NUMBER OF DAYS		
	LAND PREPARATION	PLANTING	MAINTENANCE
A) LESSEB	Natural Regeneration Process		
B) LENGAOAN	Natural Regeneration Process		
C) CAPINITAN			
Reforestation	1.97	1.72	1.75
Nursery Establishment	1.52	1.27	1.40
Fire Line Construction	1.80	0.97	1.95
D) BOYACAOAN			
Reforestation	6.05	5.70	5.95
Fire Line Establishment	5.45	1.10	2.75

The Peoples Organizations at Boyacaoan and Capinitan are the social capital that plays a vital role in accomplishing an objective or work within the community. The Peoples Organizations became a moving force that led to forest management actions like reforestation and conservation of soil while doing upland farming systems for their livelihood. These organizations became the prime movers of forest protection and conservation while at the same time influencing other community members to become aware and protect their environment. Apart from forest management, the members of the Peoples Organization were also trained and given opportunities to venture into other livelihood activities like swine fattening and knitting for income generation. Credit assistance was also extended to members through their organization. In these cases, the CBFM in these communities has given the government, through the DENR, some basis for empowering the local residents as stewards of their natural assets. This included both the public communal forest as well as their private upland farms that can be managed complementarily and compatible within the watershed area. The identification of the needs of the stakeholders for multiple use of the watershed, and the activities which stakeholders can undertake must be determined so that upland farming becomes compatible with the conservation of the natural resources. This requires concerted efforts of the users of the forest to take proactive action so both their agriculture livelihood and the forest can be harmoniously utilized for the benefit of everybody. This can be accomplished as manifested by the CBFM program at Capinitan and Boyacaoan, where the DENR found an ally and partner in forest management through empowering the people in these communities.

The CBFM program enhanced the people's awareness on the conservation of their forest resources by rehabilitating their denuded forest through planting of trees at their communal and private forests. The protection of their watershed was a major effect of the CBFM program wherein timber poaching and was minimized. This was made possible through the active involvement of the Peoples Organizations in making local policies on forest protection in cooperation with the barangay officials.

5.3.5. OTHER ASSETS

5.3.5.1. Livestock Ownership and Income Derived

The livestock owned by farmers are presented in Table 15. It can be seen that very few farmers own livestock. Those who own livestock are generally raising swine and chicken mainly for meat production. The chickens are mostly used for home consumption although some are sold but not on a commercial scale. The swine when matured are sold as an additional income for the family. Very few farmers own cows, carabaos and goats.

Analysis of Variance (Appendix Table 12) revealed no significant result. Capinitan and Boyacaoan have relatively more livestock raised compared to Lesseb and Lengaoan. This could be attributed to the program intervention of the DENR on Community-Based Forest Management wherein trainings and seminars on livelihood opportunities particularly poultry and piggery production were conducted as part of the CBFM activities. The Integrated Social Forestry Program (ISFP) at Capinitan in 1989 initiated training on swine fattening as part of the agroforestry development activities in the area. This is a form of an income-generating project for the Peoples Organization. The women were mostly involved with the project. For the communities at Lengaoan and Lesseb with no program interventions introduced, very few farmers were engaged in livestock production as a form of backyard raising activity for home consumption. Livestock and swine are also considered as a source of food in times of scarcity of money for the farmers. Swine production is also a form of savings where income derived can be used for emergency needs of the family such as payment for tuition fees for the children.

Table 15.Livestock Ownership and Income Derived

LOCATION/ LIVESTOCK	NO. OF HEADS		MAIN USE	NO.OF ANIMAL PRODUCTION	NO. OF CONSUMP	INCOME (Sale from Livestock in Pesos)	
	n	%				Mean	Std. Deviation
A. LESSEB							
Cow	3	2.5	1	3	0	0	0
Swine	29	20.0	2	21	3	5725.00	28539.66
Poultry	55	72.0	2	65	55	6.25	39.53
Goat	1	2.5	2	1	0	0	0
B. CAPINITAN							
Cow	1	5.0	1	1	0	0	0
Carabao	1	5.0	1	1	0	0	0
Swine	59	55.0	2	59	1	9503.00	13559.68
Poultry	110	64.1	2	110	52	510.26	1900.94
C. BOYACAOAN							
Cow	3	2.5	1&2	3	0	0	0
Swine	62	12.5	2	62	1	7000	28094.6
Poultry	65	32.5	2&5	44	14	70.62	291.39
D. LENGAOAN							
Swine	10	15.0	2	10	0	1276.25	3530.10
Poultry	33	27.5	2	33	25	35.00	161.01

*Legend: Main use: 1= Plowing; 2= meat production

Farmers at Capinitan obtained the highest gross income from swine production with a mean of 9,503 pesos. This was followed by farmers from Lengaoan with a mean of 7,000 pesos while farmers obtained the least from Lengaoan with a mean of 1,276.25 pesos. For poultry production, farmers from Capinitan and Boyacaoan have average gross incomes of 510.26 pesos and 70.62 pesos respectively. However, most of the farmers raised chickens for home consumption.

5.3.5.2. Other Productive Assets

The other productive assets owned by the farmers, in relation to their farm operation, are shown in Table 16. The knapsack sprayer is a common productive asset owned by farmers (94.3%) in the four communities. Other assets owned by a very few are Jeep (9.4) and truck

(7.5%). Knapsack sprayers are mainly used for spraying insecticides/fungicides to the crops planted for greater production while jeeps and trucks are mainly used to transport products from their farm to the market.

Analysis of Variance (Appendix Table 13) showed a significant result on the number, mode of use and average cost of the different productive assets. Farmers from Lengaoan have more knapsack sprayers and a few farmers who own jeeps and trucks are from this community. This could be attributed to the bigger farms, intensive use of farm inputs and higher income that entails more sprayers. There are also wealthy farmers who need a vehicle to transport their higher volume of products compared to farmers at Lesseb and Capinitan with small farms.

Table 16. Other Productive Assets

ASSETS	NUMBER		MAIN USE		AVERAGE COST
	n	%	n	%	(Pesos)
Knapsack Sprayer	272	94.3	1	72.2	1,290.62
Jeep	3	9.4	2	75.0	136,114.29
Truck	3	7.5	1	6.0	625,100.00

5.3.5.3. Source of Capital

Table 17 presents the farmer's source of capital to operate their farms. Most (43.8%) comes from credit obtained from their relatives and friends. There are only 33.8% who have capital from their own savings to operate their farms while 20% borrow from a cooperative that is found in their area as a result of the Peoples Organization being formed. These are limited to Capinitan and Boyacaoan with the program intervention of the DENR while Lesseb and Lengaoan tend to borrow from nearby barangays with credit cooperatives. Analysis of Variance (Appendix Table 14) showed no significant differences in source of capital.

Table 17. Source of Capital

	LOCATION							
	LESSEB		BOYACAOAN		LENGAOAN		CAPINITAN	
	n	%	n	%	n	%	n	% .
SOURCE OF CAPITAL								
Own Savings	7	17.5	13	32.5	17	42.5	17	42.5
Credit from Bank	2	5.0	2	5.0	6	15.0	1	2.5
Credit from Relatives	28	70.0	18	45.0	15	37.5	9	22.5
Provided by Owner	2	5.0	3	7.5	-	-	-	-
Cooperative	1	2.5	4	10.0	2	5.0	13	32.5 .
REPAYMENT								
None	7	17.5	13	32.5	17	42.5	16	40.0
After Harvest	31	77.5	19	47.5	17	42.5	19	47.5
Monthly	1	2.5	-	-	1	2.5	-	-
Weekly	1	2.5	-	-	-	-	-	-
After 4 Months		-	8	20.0	3	7.5	5	12.5
After 6 Months	-	-	-	-	2	5.0	-	- .

It is a common practice to borrow from relatives and friends since there are fewer conditions, it is easier, faster, and the interest and repayment mode are more affordable and flexible to the farmers. The results imply that the farmers generally have low incomes that they could barely have capital of their own.

5.3.5.4. Off-farm Activities

The major off-farm activity engaged in by farmers is baggage man with 34 or 21.25% of the farmers engaged in the activity. The Baggage man hauls products of other farmers from the field going to the nearest road or to the loading area for marketing the products. They also haul farm inputs like sacks of chicken manure from the road going to the farms. This is evident at Lesseb with 45% of farmers engaged in the activity since the terrain at Lesseb is steep and hauling of products from the garden plots is difficult. Other farmers are engaged in carpentry works (11.875%) especially during the summer months when the farmers have already finished the major farm activities. This was followed by drivers (10%), and selling products at the local market (10%). Selling of products in the market was, usually, done by the females. A few teachers were also involved in vegetable production either directly or are assisted by family members. A few are also involved in jobs such as shoe mending, electrician, vegetable dealers, government employees and welders. Analysis of Variance (Appendix Table 15) showed a significant result wherein farmers from Lesseb are significantly engaged as baggage men compared to the other communities while farmers from Capinitan are more engaged in carpentry.

Table 18. Off-Farm Activities

INCOME	LESSEB		CAPINITAN		BOYACAOAN		LENGAOAN		TOTAL	
SOURCE	n	%	n	%	n	%	n	%	n	%
Carpenter	3	7.5	11	27.5	3	7.5	2	5.0	19	11.87
Driver	2	5.0	5	12.5	2	5.0	7	17.5	16	10.00
Baggage Man	18	45.0	6	15.0	3	7.5	7	17.5	34	21.25
Storekeeper	-	-	4	10.0	3	7.5	2	5.0	9	5.62
Market Vendor	5	12.5	4	10.0	1	2.5	-	-	10	6.25
Teacher	2	5.0	-	-	1	2.5	2	5.0	5	3.12
Others:										
Shoe Mender	1	2.5	-	-	-	-	-	-	1	0.62
Government Employee	2	5.0	1	2.5	1	2.5	1	2.5	5	3.12
Vegetable Dealer	-	-	-	-	1	2.5	-	-	1	0.62
Other Farm Labour	-	-	1	2.5	6	15.0	4	10.0	11	6.87
Electrician	-	-	-	-	-	-	1	2.5	1	0.62
Welder	1	2.5	-	-	-	-	-	-	1	0.62

5.3.6. Soil and Water Conservation in Upland Farms and Watershed Areas

5.3.6.1. Upland Farming Systems

The Upland Farming Systems practiced by the communities are vegetable farming, rice farming and intercropping (Table 19a). Most (98.1%) adopted vegetable farming compared to a few who adopted rice farming (1.9%) and intercropping (20.6%).

This could be attributed to the Cordillera Administrative Region's temperate climate that is conducive for growing temperate vegetables. This is a comparative advantage from other regions in the Philippines. This climatic factor made vegetable production the leading livelihood of people in the Cordillera and Benguet Province as the "Salad Bowl of the Philippines". Farmers from Benguet and Mountain Province rely on the vegetable industry as

Table 19a. Upland Farming Systems

	UPLAND FARMING SYSTEMS					
	VEGETABLE FARMING		RICE FARMING		INTERCROPPING	
	n	%	n	%	n	%
A) ADOPTED STRATEGIES						
Family Labour	124	77.5	2	1.3	21	13.1
Paid Labour	21	13.1	1	0.6	1	0.6
Collective Action	12	7.5	-	-	11	6.9
None Adoption	3	1.9	157	98.1	127	78.4
B) REASON FOR ADOPTION						
Reduce Erosion	32	20.0	-	-	3	1.9
Increase Production	122	76.3	3	1.9	24	15.0
Others (CBFM)	4	2.5	-	-	6	3.8
None Adoption	2	1.3	157	98.1	127	79.4
C) AREA OF ESTABLISHMENT						
Private Land	124	77.5	3	1.9	33	20.6
Public Land	29	18.1	-	-	-	-
CBFM Site	5	3.1	-	-	-	-
None Adoption	2	1.3	157	98.1	127	79.4
D) PERCEPTION ON EFFECTIVENESS						
Highly Effective	29	18.1	1	0.6	8	5.0
Moderately Effective	124	77.5	2	1.3	25	15.6
Not Effective	5	3.1	-	-	-	-
None Adoption	2	1.3	157	98.1	127	79.4

their source of income. While they have aggressively produced highland vegetables using appropriate technology coupled with the favorable climate that makes vegetable production a profitable venture, farmers have not been able to fully realize expected profits because of the unstable market brought about by sharp fluctuations in prices and supplies of the different vegetables (Pekas et al, 2003).

The major reasons for adopting the upland farming systems were to increase production (76.3%) and reduce erosion (20%). These farming systems were mostly established in private lands that are perceived by majority to be moderately effective.

5.3.6.2. Soil and Water Conservation in Upland Farms

Table 19b presents the soil and water conservation techniques adopted by the farmers. Majority (66.9%) of the upland farmers in the four communities adopted terracing using stonewall. This was followed by terracing without stonewalls (45.6%), contour farming with hedgerow species (20%), contour farming without the use of hedgerow species (5%) and construction of irrigation canal to divert the flow of water (16.9%).

Analysis of Variance (Appendix Table 16b) showed significant differences among the communities in terms of the soil and water conservation adopted in their upland farms. Bonferroni's comparison among means showed that terracing with the use of stonewalls are practiced by farmers at Lesseb and Capinitan in the Mountain Province while majority of farmers at Boyacaoan and Lengaoan at Benguet Province adopted terracing without the use of stonewalls. This suggests that the farmers in the Mountain Province are more conservation-conscious since the use of stonewalls for terracing is more effective in reducing erosion and more durable compared to terracing without stonewalls. Furthermore, only farmers from Capinitan adopted contour farming using hedgerows.

Family labour was the adopted strategy by most of the farmers while a few resorted to paid labour and collective action. Most of the farmers inherited their vegetable gardens and the terraces were already in place. They only performed maintenance work on the terraces.

Farms at Lengaoan and Boyacaoan are more commercialized agricultural farms that are larger and located in relatively flat mountain areas and plains. Agriculture has been going on longer in these communities where the soil needs high fertilizer inputs to compensate for the loss of its original fertility compared to Lesseb and Capinitan in the Mountain Province that seems to have richer soil.

The reason given for all the farmers who adopted terracing using stonewall was to reduce soil erosion while those who adopted terracing without stonewalls also claimed to reduce erosion (23.8%) as well as to increase production (17.5%). In terms of the effectiveness of the soil and water conservation measures adopted, majority claimed that terracing with stonewall was highly effective (72%) in reducing soil erosion. 34% perceived it to be moderately effective, while only 1 farmer or (0.6%) claimed it was effective. For terracing without using stonewalls, 35% perceived it to be highly effective and 35% moderately effective. Very few adopted contour farming with hedgerows (17.5%) and without hedgerows (5%) while only 16.3% adopted irrigation canal establishment.

With regards to the soil and water conservation techniques, the farmers were interested in the productivity and at the same time sustainability of the farming livelihood. Terracing, in fact, is an indigenous way of stabilizing the soil in sloping lands in the Cordillera. There are three types of terracing recognized in the Cordillera that are based on the area where it is practiced and who practices it.

Types of Terracing in the Cordillera

The ethnic groups from the Mountain Province practice the Bontoc terracing type. It is characterized as having vertical stonewalls or faces so as to utilize the enclosed field space to the maximum extent possible. Animal manure and vegetable materials are added to the field as organic fertilizers. The field could be used for dry cropping of sweet potato or vegetables in between rice cycles.

The Kalinga type terrace resembles those of the Bontoc type but have a low wall that is usually capped by an inward lean of earth reducing the enclosed spaces. The Kalinga ethnic group is practicing this.

Table 19b. Soil and Water Conservation in Upland Farms

	UPLAND FARM SOIL AND WATER CONSERVATION									
	TERRACING WITH STONEWALL		TERRACING WITHOUT STONEWALL		CONTOUR FARMING WITH HEDGEROW		CONTOUR FARMING W/O HEDGEROW		IRRIGATION CANAL	
	n	%	n	%	n	%	n	%	n	%
A) ADOPTED STRATEGIES										
Family Labour	98	61.3	64	40.0	28	17.5	8	5.0	26	16.3
Paid Labour	5	3.1	4	2.5	3	1.9	-	-	-	-
Collective Action	4	2.4	5	3.1	1	0.6	-	-	1	0.6
None Adoption	53	33.1	91	56.9	128	80.0	152	95.0	133	83.1
B) REASON FOR ADOPTION										
Reduce Erosion	86	53.8	38	23.8	19	11.9	4	2.5	10	6.3
Increase Production	-	-	28	17.5	10	6.3	4	2.5	1	0.6
Increase Fertility	-	-	2	1.3	2	1.3	2	1.3	-	-
Others (CBFM)	4	2.5	1	0.6	-	-	-	-	1	0.6
None Adoption	53	33.1	91	56.9	128	80.0	152	95.0	133	83.1
C) AREA OF ESTABLISHMENT										
Private Land	102	63.8	68	42.5	30	18.8	8	5.0	25	15.6
Public Land	1	0.6	-	-	1	0.6	-	-	2	1.3
CBFM	4	2.5	1	0.6	1	0.6	-	-	-	-
No Adoption	53	33.1	91	56.9	128	80.0	152	95.0	133	83.1
D) PERCEPTION OF EFFECTIVENESS										
Highly Effective	72	45.0	35	21.9	15	9.4	4	2.5	19	11.9
Moderately Effective	34	21.3	34	21.3	16	10.0	4	2.5	8	5.0
Not Effective	1	0.6	-	-	-	-	-	-	-	-
None Adoption	53	33.1	91	56.9	128	80.0	152	95.0	133	83.1

The third type of terrace is the Ifugao terrace practiced by the people from Ifugao province. The famous Banaue rice terraces of the Philippines exemplify this. The Ifugao terrace walls have somewhat greater slope and are more carefully sculptured to the terrain. The terraces are usually kept flooded throughout the year though rice straws and soil are heaped up in the mounds.

In Benguet, terracing is adopted from the Mountain Province. They usually practice an indigenous terracing by plowing the topsoil with grasses still attached to the soil. The balls of earth plowed are still intact and are placed one on top of the other at the edge of the embankment of the field in place of stones. This is locally termed “dinat-dat” that resembles a terraced area over time.

5.3.6.3. Soil and Water Conservation in the Watershed

There are two major forestry activities in the study sites. These are the reforestation or tree planting activity and fire line construction (Table 19c). Reforestation is the planting of tree seedlings in the forest areas within the community while the construction of fire lines consists of the removal of grasses with 6 meters strip at the surrounding of new plantations and forest areas to prevent the spread of forest fires.

In connection with the forest management activities, the Local Government Units are now given the responsibility to protect and maintain forest areas found within their jurisdiction in cooperation with the DENR. As such, the barangays under the Barangay Chairman exercise control over community resources through the initiation of local policies regarding the protection and use of forest resources. This is in line with the forest laws and regulation promulgated by the DENR. Under the CBFM, management rights are granted to the Local Government Units and communities. The increased user’s rights to upland communities, however, go hand in hand with acceptance of the responsibilities to exert due care to manage and use the resources wisely.

Reforestation activities have been the standard approach in the rehabilitation of degraded watersheds in the Philippines. Comparing the four communities under study, Boyacaoan and Capinitan had embarked on tree planting activities as a part of their CBFM strategy. For the

CBFM site at Capinitan, individual lots were planted through family labour while at Lengaoan and Lesseb tree planting was done through collective action or as a community activity. However, the natural regeneration method of maintaining the growth of trees in the forest was resorted to in public forests. The main reason for undertaking reforestation was to reduce erosion: it is done in both public lands (24.1%) and private lands (3.8%). Majority of the farmers perceived reforestation to be highly effective (22.88%) to moderately effective (5%) in reducing soil erosion.

For the construction of fire lines, it was mostly done collectively by the community residents in public and CBFM sites, and is also perceived by the majority of farmers to be highly effective in protecting newly established plantations from forest fires. Fire line construction was done since the needles of the Benguet pine trees are readily combustible since pines contain resins that are easily burned especially when they are dried.

Analysis of Variance (Appendix Table16c) revealed a significant difference among communities on the adoption of reforestation and fire line construction. Bonferroni's comparison showed that farmers from Capinitan and Boyacaoan conducted reforestation more compared to Lesseb and Lengaoan who relied on natural regeneration of the forest with minimal reforestation. In terms of fire line construction, farmers at Capinitan constructed more fire lines compared to the rest of the communities.

Communities at Capinitan and Boyacaoan still have second growth forest stands that regenerated naturally. These forests are augmented through artificial plantations as a result of the DENR's project intervention in the area. Although there are no project interventions in the communities of Lesseb and Lengaoan, there are still communal forests in the vicinity that are also maintained and regenerated naturally. However, barangay Lengaoan was observed to be devoid of forest vegetation compared to the other sites. Private lands at Lengaoan were converted to gardens. Water is scarce for domestic use and irrigation. This could partly be the result of deforestation but the absence of spring water might also be related to deforestation. The people at Lengaoan buy water from a private water supplier and farmers are dependent on the onset of the rainy season to operate their farms.

On the Regional scale, a total area of 16,348.75 hectares of plantation was established by the government sector from 1999 to 2002. The private sector augmented 6,158 hectares reforested (CENRO Benguet Report, 2003).

Table 19 c. Soil and Water Conservation in the Watershed

	WATERSHED SOIL AND WATER CONSERVATION			
	REFORESTATION		FIRELINE ESTABLISHMENT	
	n	%	n	%
A) ADOPTED STRATEGIES				
Family Labour	12	7.5	4	2.5
Paid Labour	4	2.5	-	-
Collective Action	28	17.6	26	16.3
None Adoption	114	71.3	130	81.3
B) REASON FOR ADOPTION				
Reduce Erosion	13	8.1	4	2.5
Increase Production	1	0.6	1	0.6
Increase Fertility	6	3.8	1	0.6
Water for Domestic Use	3	1.9	1	0.6
Water for Irrigation	3	1.9	-	-
Others (CBFM)	18	11.3	22	13.8
None Adoption	114	72.2	131	81.9
C) AREA OF ESTABLISHMENT				
Private Land	6	3.8	1	0.6
Public Land	36	22.8	29	18.1
CBFM	2	1.3	-	-
None Adoption	114	71.3	130	81.3
D) PERCEPTION OF EFFECTIVENESS				
Highly Effective	36	22.8	24	15.0
Moderately Effective	8	5.0	4	2.5
Not Effective	-	-	1	0.6
None Adoption	114	72.2	130	81.3

5.3.7. SOCIAL SUPPORT SYSTEM

5.3.7.1. Introduction

The social support systems are vital in any community development activity. These are the social institutions that enable community members to cooperate and link together to meet common goals and objectives. The government agencies are primarily mandated to provide support services to communities such as health services, infrastructure' education and the like. Social institutions can either be formal or informal that can be harnessed to for community action to manage effectively their livelihood and natural resource base. This section presents the organizations present in the study sites, the membership and participation in organizations as well as their reasons for joining the organizations.

5.3.7.2. Types of Organizations Present in the Communities

The main organizations supporting the communities are the Local Government Units (LGU's) particularly the Department of Environment and Natural Resources, Department of Agriculture, Department of Health, and the Department of Trade and Industry (Table 20). There are a few local informal organizations found within the communities such as the Parent's-Teachers Association, Women's Organization and for the communities with program intervention, the Peoples Organization.

Analysis of Variance (Appendix Table 19) revealed a significant result. Bonferroni's comparison of means showed a strong presence of the Department of Environment and Natural Resources and the Department of Agriculture at Capinitan and Boyacaoan that can be attributed to the CBFM program. The presence of bank is also evident at Boyacaoan and Lengaoan that is attributed to the proximity of the communities to the bank found at the municipality of Buguias, Benguet. The presence of chemical companies selling their products is evident at Lengaoan and Lesseb.

The Local Government Units are mandated to assist communities in term of their basic needs. This is attributed to the Local Government Code of the Philippines or the Republic Act 7160 where the powers are devolved to the local government agencies. The code provides for the decentralization of power to the local government in partnership with the citizens or residents to decide their own development plans and programs according to their

needs and aspirations. Partnership between the LGU's and community is the strategy in the CBFM and this seems to be the cornerstone for empowering the local people to take control of their livelihood and resources. The Local Government Code gives management rights to local governments over forestlands as it mandates municipalities to implement Community-Based Forestry projects to manage and control communal forests with an area not exceeding 50 square kilometers or 5000 hectares. The Provinces are also given the responsibility to enforce forestry laws limited to community-based forestry projects, pollution control law, small-scale mining law and the protection of the environment and mini-hydro electric projects for local purposes.

The Local Government Code also mandates the barangay as the primary planning and implementing unit of government policies, plans, programs, projects and activities in the community, and as a forum wherein the collective views of the people may be expressed, crystallized and considered.

Despite this mandate, the state and its instrumentalities had not been able to satisfactorily exercise effective control over natural resources. There is a need to strengthen partnership between the communities and other institutions, either government, Non-Government, private sectors and other donor agencies for the promotion of improved watershed management because the DENR does not have adequate resources in terms of personnel and fund. A multi-sectoral approach in watershed management is also being undertaken in the Philippines wherein other agencies share institutional responsibility.

Table 20. Type of Organizations Present in the Communities

ORGANIZATION	TYPE	LOCATION															
		LESSEB				CAPINITAN				BOYACAOAN				LENGAOAN			
		Yes		No		Yes		No		Yes		No		Yes		No	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
DENR	LGU	9	22.5	31	77.5	39	97.5	1	1.25	30	75.0	10	25.0	6	15.0	34	85.0
DA	LGU	16	40.0	24	60.0	33	82.5	7	17.50	20	50.0	20	50.0	37	92.5	3	7.5
DOH	LGU	29	72.5	11	27.5	31	77.5	9	22.5	29	72.5	11	27.5	34	85.0	6	15.0
BANK	LGU/PRIVATE	-	-	40	100.0	1	2.5	39	97.5	7	17.5	30	75.0	10	25.0	25	62.5
CHEMICAL COMPANY	PRIVATE	21	52.5	19	47.5	1	2.5	39	97.5	1	2.5	39	97.5	22	55.0	18	45.0
DTI/COOP	LGU	-	-	40	100.0	7	17.5	33	82.5	8	20.0	32	80.0	-	-	40	100.0
PTA	LOCAL/INFORMAL	10	25.0	30	75.0	-	-	40	100.0	-	-	40	100.0	4	10.0	36	90.0
WOMEN	LOCAL/INFORMAL	-	-	40	100.0	-	-	40	100.0	-	-	40	100.0	8	20.0	32	80.0
PO'S	LOCAL/FORMAL	-	-	40	100.0	20	50.0	20	50.0	11	27.5	29	72.5	-	-	40	100.0

5.3.7.3. Membership in Organizations

Membership in organizations can be seen as a mechanism for the farmers to participate in the community and serve as a network to depend on in times of need and when a problem arises. Analysis of Variance (Appendix Table 19a) showed significant differences among the communities in terms of their membership in organizations. Majority (60) of the farmers at Lesseb and 30% at Lengaoan have no membership in organizations with 24 farmers or 60% at Lesseb and 12 farmers or 30% at Lengaoan (Table 20a). This is in contrast with those from Capinitan and Boyacaoan where most (82%) of the farmers at Capinitan and 40% at Boyacaoan are members of the Peoples Organizations. This was followed by membership in Women's Organization with 7.5% and 27.5% respectively. The results suggest that the intervention through the CBFM enhanced community organizations through the formation of Peoples Organizations in these communities. This is a means of collective action by the community members in the CBFM activities.

Table 20a. Membership in Organizations

NAME OF ORGANIZATION	MEMBERSHIP							
	LESSEB		CAPINTAN		BOYACAOAN		LENGAOAN	
	n	%	n	%	n	%	n	
Farmer's Organization	2	5.0	-	-	1	2.5	1	2.5
Christian Organization	2	5.0	-	-	-	-	3	7.5
Cooperative	1	2.5	1	2.5	10	25.0	4	10.0
Parents-Teachers	7	17.5	2	5.0	-	-	11	27.5
Women's Organization	4	10.0	3	7.5	11	27.5	6	15.0
People's Organization	-	-	33	82.5	16	40.0	-	-
4-H Club	-	-	-	-	-	-	1	2.5
Youth Organization	-	-	-	-	-	-	1	2.5
Barangay Council	-	-	-	-	-	-	1	2.5
No Membership	24	60.0	1	2.5	2	5.0	12	30.0
TOTAL	40	100.0	40	100.0	40	100.0	40	100.0

The results imply a strong network of community members in the two sites with program intervention, which they can draw upon to solve common problems within the community. The Peoples Organization promotes collaborative behavior in the CBFM activities compared to the communities without community organizations. This membership in organization is a form of a social capital that enhances cooperation in inter-organizational relations. It was observed that the organization at Capinitan and Boyacaoan are considered as having a high social capital and when social capital is high, the level of cooperation and reciprocity is similarly high. Strengthening the capacities of communities will tend to produce self-help and empowerment for community action. Through the CBFM, specific concerns were addressed on strengthening LGU and Peoples Organization partnership in forestry endeavor. This was done through the acquisition of suitable skills and technology. Consequently, active community involvement in the implementation of forestry projects had realized positive results in Boyacaoan and Capinitan exemplified by the active members and functional Peoples Organization. Capability learning process through experiential learning took place as the project progressed. The PO's need to be further harnessed, as they will eventually assume the role of forest managers.

5.3.7.4. Participation in Organizations

Table 20b presents the participation of farmers in either formal or informal organizations. Communities at Capinitan and Boyacaoan have more formal organizations while Lesseb and Lengaoan have more informal organizations with the greater number of farmers who do not have membership in organizations. There are 60% of farmers at Lesseb and 30% at Lengaoan who did not join any organizations compared to only 2.5% and 5% at Capinitan and Boyacaoan, respectively.

With regards to the membership, most of the farmers joined the organizations, as members while a few are officers of organizations.

Table 20b. Participation in Organizations

PARTICIPATION/ TYPE OF ORGANIZATION	LOCATION							
	LESSEB		CAPINITAN		BOYACAOAN		LENGAOAN	
	n	%	n	%	n	%	n	%
A) **PARTICIPATION**								
Officer	2	5.0	9	22.5	14	35.0	2	5.0
Member	14	35.0	30	75.0	24	60.0	26	6.5
B) **TYPE OF ORGANIZATION**								
Formal	8	20.0	20	50.0	20	50.0	3	7.5
Informal	8	20.0	19	47.5	18	45.0	25	62.5
None Participation	24	60.0	1	2.5	2	5.0	12	30.0

5.3.7.5. Reason for Joining the Organizations

The farmers have various reasons for joining organizations in their respective communities as shown in Table 20c.Out of those who joined organizations, most (32.5%) of the farmers from Lesseb joined organizations for greater cooperation in the community. At Lengaoan, farmers joined Parent's-Teacher's Association for the improvement of the quality of education for their children since there is a problem on lack of teachers. There are at least three volunteer teachers in the elementary grade. Farmers at Boyacaoan (22.5%) and Capinitan (16%) joined the Peoples Organization and other organizations to have livelihood/income opportunities.

Analysis of Variance (Appendix Table 19c) showed a significant result. It can be noted that farmers from Capinitan and Boyacaoan have similar reasons for joining organizations since the CBFM intervention in these areas had the objective of introducing community livelihood projects apart from environmental concerns. On the whole, the reasons why farmers joined organizations are to obtain livelihood opportunities/income, foster cooperation among the members of the community, avail of credit and improvement of the community while the least is for education improvement.

Table 20c. Reasons for Joining Organizations

	LOCATION							
	LESSEB		CAPINITAN		BOYACAOAN		LENGAOAN	
REASON	n	%	n	%	n	%	n	%
Cooperation	13	32.5	2	5.0	6	15.0	8	20.0
Credit	1	2.5	8	20.0	6	15.0	4	10.0
Livelihood/Income	1	2.5	16	40.0	9	22.5	1	2.5
Community Improvement	1	2.5	4	10.0	7	17.5	3	7.5
Peace and Order	-	-	3	7.5	7	17.5	-	-
Training	-	-	6	15.0	3	7.5	2	5.0
Education Improvement	-	-	-	-	-	-	9	22.5
No Reason	24	60.0	1	2.5	2	5.0	13	32.5

5.3.8. USE AND ROLE OF WATERSHED RESOURCES

5.3.8.1. Main Use of Watershed Resources

The major watershed resources used by the upland farmers in the communities are forest, water, forest products and products from the grassland areas. The forest areas provide fuel wood (26.9%) and a major source for house construction (19.4%). Water is mainly used for domestic (23.1%) and irrigation (11.3%) while 56.9% responded using water for both domestic and irrigation purposes. The forest products obtained from the upland communities are primarily fuel wood (20.6%) followed by timber for construction (13.1%) as well as food from the forest (7.5%). The grassland areas are mainly utilized for grazing livestock (6.9%) and grasses and sticks are used for thatch as well as trellis for climbing agricultural crops like Baguio Beans and sweet peas.

Analysis of Variance (Appendix Table 20) revealed a significant result on the main use of watershed resources among the communities. Communities with program intervention such as Capinitan and Boyacaoan preserved their forest for its water value compared to the other communities using their forest for timber for house construction. Lengaoan significantly differed in terms of water use since they have no source of water for irrigation as well as domestic use compared to the other communities.

Table 21. Main Use of Watershed Resource

MAIN USE	WATER RESOURCES							
	FOREST		WATER		FOREST PRODUCTS		GRASSES	
	n	%	n	%	n	%	n	%
Timber for Construction	31	19.4	1	0.6	22	13.7	2	1.3
Fuel Wood	43	26.9	-	-	33	20.6	-	-
Food	2	1.3	-	-	12	7.5	-	-
Medicinal Value	1	0.6	1	0.6	5	3.1	1	0.6
Grazing	-	-	-	-	1	0.6	11	6.9
Grasses/Sticks	1	0.6	-	-	7	4.4	3	1.9
Irrigation Water	9	5.6	18	11.3	-	-	-	-
Domestic Use	5	3.1	37	23.1	-	-	-	-
Irrigation and Domestic Use	-	-	91	56.9	-	-	-	-
None Use	68	42.5	12	7.5	80	50.0	143	89.4

5.3.8.2. Household Member Responsible for the Utilization of Watershed Resources

Table 21a presents the household members responsible for the utilization of watershed resources. Generally, the male head of the household is responsible for the work for utilizing watershed resources for the family. However, all household members are also involved in the work in helping the head of the family. The results indicate that the male head is responsible in working for the welfare of the family.

Table 21a. Household Member Responsible for the Utilization of Watershed Resources

HOUSEHOLD MEMBER	WATERSHED RESOURCES							
	FOREST		WATER		FOREST PRODUCTS		GRASSLAND	
	n	%	n	%	n	%	n	%
Male Head	66	42.5	89	55.6	41	25.6	1	0.6
Wife	3	1.9	12	7.5	3	1.9	3	1.9
Grownup Children	9	5.6	1	0.6	5	3.1	-	-
Young Children	1	0.6	-	-	-	-	-	-
All Household Members	13	8.1	46	28.8	30	18.8	12	7.5
None Use	68	42.5	12	7.5	81	50.0	143	89.4

5.3.8.3. Perceived Role and Importance of Watershed Resources

The forest, water source and grassland areas are perceived to be important for common use by the upland farmers in all communities while the forest products are important for the individual household use (Table 21b). In terms of the role of the watershed resources, the forest, forest products and grasslands are perceived for their production role (23.8%, 38.1% and 6.9%) while the water resource is perceived for its water value (75%) for domestic and irrigation purposes.

Analysis of Variance (Appendix Table 20b) showed significant difference on the perceived role and importance of the watershed resources among the communities. Farmers from Capinitan and Boyacaoan perceived the forest for its protection role while farmers from Lesseb and Lengaoan perceived the forest for its production role.

The results imply that farmers value the importance of watershed resources for common use of the members of the community except for the forest products that have different individual purposes for household use. Furthermore, the results indicate that the farmers are aware of the benefits derived from the watershed resources in relation to their livelihood and community. Too often upland farmers or local people are perceived to have no knowledge of the importance of the watershed and it is stated that they need to be educated about such things as deforestation, soil erosion and how combating this is important to them, their children, grandchildren and the country. In reality, most rural households with a tradition of small-scale farming or forest management activities are often well aware of the causes, the process and the result of watershed degradation, but are constrained by more pressing concerns from doing anything about it. They may have anxieties about the future for their children and grandchildren but cannot be sidetracked away from the immediate problem of meeting their welfare needs at the moment.

Table 21b. Perceived Role and Importance of Watershed Resources

IMPORTANCE AND ROLE	WATERSHED RESOURCES							
	FOREST		WATER		FOREST PRODUCTS		GRASSLAND	
	n	%	n	%	n	%	n	%
A) IMPORTANCE								
Own Use	21	13.1	24	15.0	50	31.1	2	1.3
Common Use	70	43.8	123	76.9	29	18.1	15	9.4
Own & Common Use	1	0.6	1	0.6	-	-	-	-
None Use	68	42.5	12	7.5	81	50.6	143	89.4
B) ROLE								
Production	38	23.8	15	9.4	61	38.1	11	6.9
Protection	32	20.0	12	7.5	8	5.0	3	1.9
Environmental	6	3.8	1	0.6	1	0.6	3	1.9
Water Value	16	10.0	120	75.0	-	-	-	-
All of the Above	-	-	-	-	5	3.1	-	-
None Use	68	42.5	12	7.5	81	50.6	143	89.4

5.3.8.4. RISKS AND PROBLEMS ENCOUNTERED

Analysis of Variance (Appendix Table 21) showed no significant difference in the problems encountered by the farmers in their upland farming systems except for lack of irrigation water. However, it can be seen from Table 22 that the communities have different priorities in terms of the problems that they encountered. Barangay Lesseb ranked low price of vegetable products as their most pressing problem encountered in their farming activities. This was followed by the occurrence of pests and disease attacking their crops, typhoon that destroyed their crops while lack of irrigation water was their least problem encountered. The low price of products reduces the farmer's income. This can be gleaned from the previous data on income of farmers from Lesseb with an average of less than 10,000 pesos. On the other hand lack of irrigation water is their least problem since Lesseb still has abundant water supply coming from their spring

Table 22. Risks and Problems Encountered

LOCATION / PROBLEMS	RANK 0	1	2	3	4	5	6
A) LESSEB							
Pests and Diseases	1	6	11	8	11	1	2
Typhoon	1	1	8	10	7	7	6
Lack of Irrigation Water	1	1	5	7	2	5	19
Lack of Capital	-	10	10	5	12	3	-
Lack of Labour	1	1	3	1	5	20	9
Low Price of Products	1	27	3	8	2	3	3
B) CAPINITAN							
Pests and Diseases	2	8	3	7	10	8	2
Typhoon	2	2	6	4	8	8	10
Lack of Irrigation water	-	10	6	5	4	10	5
Lack of Capital	2	6	13	11	6	2	-
Lack of Labour	-	2	2	5	8	6	17
Low Price of Products	2	9	10	10	2	3	4
C) BOYACAOAN							
Pests and Diseases	1	10	10	4	8	4	3
Typhoon	1	3	3	6	11	10	6
Lack of Irrigation Water	1	1	6	6	10	8	8
Lack of Capital	-	3	13	16	4	4	4
Lack of Labour	1	-	-	4	4	11	20
Low Price of Products	-	23	8	4	3	2	-
D) LENGAOAN							
Pests and Diseases	-	5	5	11	11	7	1
Typhoon	-	2	9	9	4	5	10
Lack of Irrigation Water	-	14	6	6	3	9	1
Lack of Capital	-	8	7	5	11	6	3
Lack of Labour	-	-	-	4	4	12	20
Low Price of Products	-	11	11	5	7	1	5

Besides, Lesseb is located at lower elevation and the water from the upper portion of the community flows through a river going to Barangay Lesseb.

For Barangay Boyacaoan, low price of agricultural products also ranked first as their main problem encountered, followed by lack of capital and the destruction of crops due to typhoon, while lack of labour is their least problem encountered. Looking at Barangay Lengaoan and Capinitan, the farmers in the community ranked lack of irrigation water as their priority problem while lack of labour is the least problem that they encountered. This indicates a scarcity of water at Lengaoan that confirms the findings that their forest areas have been converted to terraced gardens and hence the expansion of gardens and the dwindling forest areas had contributed to the scarcity of water supply for the community. The lack of water at Lengaoan is the main reason for the farmers to schedule their farming activities at the onset of the rainy season. At Capinitan, the supply of water from a natural spring is insufficient to irrigate the expanding terraced vegetable gardens since the households in the community prioritize the water for domestic use. Water scheduling for irrigation is resorted to as a means to have equal access to irrigation water.

5.3.8.5. Coping Strategies

There is no significant difference in the coping strategies of farmers among the communities. Comparing the coping strategies of the farmers in the four communities revealed a similar strategy adopted as a response to the problems and risks that they encountered. The farmers tend to borrow from their relatives and friends when faced with crop failure, which was ranked first by most of them. The second alternative is to seek employment within the community if there are any available jobs for them to do. Third, is to seek employment outside the community particularly in other municipalities within the Cordillera and their last resort is to borrow from banks.

The farmers commonly resort to borrowing from relatives and friends since the culture of the Cordilleran is to help family members and relatives that are in dire need.

Table 23. Coping Strategies

LOCATION / COPING STRATEGY	RANK 0		1		2		3		4		5	
	n	%	n	%	n	%	n	%	n	%	n	%
A) LESSEB												
Borrow from Banks	20	50.0	6	15.0	-	-	4	10.0	10	25.0	-	-
Employment Within Community	1	2.5	11	27.5	21	52.5	6	15.0	1	2.5	-	-
Employment Outside Community	1	2.5	4	10.0	14	35.0	21	52.5	-	-	-	-
Borrow from Relatives	4	10.0	22	55.0	4	10.0	6	15.0	4	10.0	-	-
B) CAPINITAN												
Borrow from Banks	18	45.0	4	10.0	1	2.5	2	5.0	14	35.0	1	2.5
Employment Within Community	1	2.5	10	25.0	18	45.0	8	20.0	2	5.0	1	2.5
Employment Outside Community	3	7.5	8	20.0	9	22.5	16	40.0	4	10.0	-	-
Borrow from Relatives	1	2.5	17	42.5	11	27.5	9	22.5	2	5.0	-	-
C) BOYACAOAN												
Borrow from Banks	12	30.0	8	20.0	9	22.5	3	7.5	8	20.0	-	-
Employment Within Community	5	12.5	6	15.0	14	35.0	12	30.0	3	7.5	-	-
Employment Outside Community	5	12.5	4	10.0	5	12.5	17	42.5	9	22.5	-	-
Borrow from Relatives	1	2.5	23	57.5	9	22.5	2	5.0	5	12.5	-	-
D) LENGAOAN												
Borrow from Banks	10	25.0	7	17.5	6	15.0	6	15.0	9	22.5	2	5.0
Employment Within Community	4	10.0	5	12.5	11	27.5	16	40.0	4	10.0	-	-
Employment Outside Community	7	17.5	3	7.5	9	22.5	11	27.5	10	25.0	-	-
Borrow from Relatives	1	2.5	24	60.0	13	32.5	2	5.0	-	-	-	-

This is also attributed to the culture of Filipinos where the Filipino family has closely-knit ties with each other. Besides, borrowing from relatives and friends entails fewer requirements and is easier compared to the requirements in borrowing from banks that need collaterals such as titles of land titles most of the farmers do not have titles to their land but only tax declarations that are not recognized by banks coupled with high interests.

Seeking other jobs within or outside the community is also a coping strategy but considering the scarcity of available employment opportunities, only a few can land a job. The ultimate coping mechanism of farmers is to borrow from banks, especially for those with collaterals. Most farmers consider borrowing from banks as very risky especially so if they only rely on the income derived from farming to repay their loans. Another crop failure could mean a farmer being driven deeper in debt or the loss of a property that was used as a collateral from the bank.

5.3.8.6. Food Sufficiency

Table 24 shows the food sufficiency of the households in the upland farming communities. Analysis of Variance (Appendix Table 23) revealed a significant result. All the farmers surveyed at Capinitan have enough food for the family while a few from Lesseb (20%), Boyacaoan (20%) and Lengaoan (5%) claimed to have insufficient food for the family. The few who do not have enough food for the family implies that poverty still exists in these communities.

Table 24. Food Sufficiency

FOOD SUFFICIENCY	LOCATION							
	LESSEB		CAPINITAN		BOYACAOAN		LENGAOAN	
	n	%	n	%	n	%	n	%
YES	32	80	40	100	32	80	38	95
NO	8	20	-	-	8	20	2	5
TOTAL	40	100	40	100	40	100	40	100

5.3.8.7. Source of Food Supply

Comparative analysis on the source of food supply for the households revealed that all farmers ranked farm produce as the main source of their food supply. The food supply bought out of the salaries and wages came next while food supply from relatives ranked third. The results showed that crops raised by the farmers are marketed and the income derived was used to buy food for the family. Farmers also consumed some of the crops they raise. Results further indicated that the farmers relied on the income from their crops for their food needs, hence low income derived from farming activities means spreading their budget to provide food for the family as a priority over other needs of the household.

Table 25. Source of Food supply

LOCATION / FOOD SOURCE	RANK 0		1		2		3		4	
	n	%	n	%	n	%	n	%	n	%
A) LESSEB										
Farm Produce	-	-	32	80.0	8	20.0	-	-	-	-
Salary/Wages	-	-	8	20.0	19	47.5	13	32.5	-	-
Supplied by Relatives	5	12.5	-	-	12	30.0	23	57.5	-	-
B) BOYACAOAN										
Farm Produce	-	-	32	80.0	6	15.0	2	5.0	-	-
Salary/ Wages	4	10.0	5	12.5	22	55.0	8	20.0	1	2.5
Supplied by Relatives	10	25.0	1	2.5	11	27.5	18	45.0	-	-
Others	34	85.0	-	-	-	-	1	2.5	5	12.5
C) CAPINITAN										
Farm Produce	-	-	35	87.5	5	12.5	-	-	-	-
Salary/Wages	-	-	4	10.0	29	72.5	7	17.5	-	-
Supplied by Relatives	16	40.0	-	-	6	15.0	18	45.0	-	-
Others	38	95.0	-	-	-	-	-	-	2	5.0
D) LENGAOAN										
Farm Produce	-	-	33	82.5	5	12.5	2	5.0	-	-
Salary/ Wages	1	4.0	4	10.0	22	55.0	11	27.5	2	5.0
Supplied by Relatives	3	7.5	2	5.0	11	27.5	24	60.0	-	-
Others	35	87.5	5	12.5	-	-	-	-	-	-

5.3.8.8. Perception on Change in Land Use

Table 25a presents the farmer's perception on the change in land use in their respective communities for the last 20 years. Farmers perceived a high increase in the establishment of upland farms in the communities of Lengaoan (77.5%) and Boyacaoan (65%) with a corresponding high decrease in forest areas with 82% and 42.5% respectively. The result means that the decrease in forest areas in these communities is a consequence of the expansion of upland farms through the conversion of forest areas into terraced farms for vegetable production. Boyacaoan and Lengaoan are located at the municipality of Buguias, Benguet Province that is a major producer of upland vegetables. The entrance of the market economy in Benguet ushered the way for farmers to venture into vegetable production as a source of livelihood compared to Lesseb and Capinitan in the Mountain province.

Farmers at Capinitan and Lesseb perceived a moderate increase in the establishment of upland farms in their communities with a corresponding moderate decrease in forest areas at Lesseb while there was a moderate increase of forest areas at Capinitan. Farmers in Mountain Province seem to have conserved their forest areas better compared to Benguet Province. When we look at Capinitan, there is a very strong awareness on forest rehabilitation and protection among the members of the Peoples Organization and farmers interviewed. This could be attributed to the CBFM program that emphasized conservation and reforestation activities. Among the communities, Capinitan had indicated a moderate increase in forest areas. This could also imply that since the logging company ceased operation at the adjacent forest area at Capinitan, natural regeneration of Benguet pine trees occurred allowing for a second growth forest over the logged-over area, hence a moderate increase in the forest. The tree planting activities of the community members at Capinitan contributed to the increased forest vegetation.

In terms of water and grassland resources, farmers at Lesseb, Capinitan and Boyacaoan perceived a moderate decrease while barangay Lengaoan perceived a high decrease. This confirms the findings of this study that at Lengaoan, conversion of forest to upland farms resulted in cutting down of trees which eventually led to the decreased water retention capacity of the soil, thereby causing a decrease in water supply. Furthermore, the results also

imply that the moderate increase in the establishment of upland farms in all study sites tends to increase the use of water for irrigation, hence decreasing water supply.

Table 25a. Perception on Change in Land Use over the Last 20 Years

LOCATION / CHANGE	LAND USE							
	UPLAND FARM		FOREST AREA		WATER SOURCE		GRASSLAND	
	n	%	n	%	n	%	n	%
A) LESSEB								
Moderate Increase	21	52.5	1	2.5	-	-	1	2.5
High Increase	15	37.5	2	5.0	1	2.5	3	7.5
Moderate Decrease	2	5.0	23	57.5	28	70.0	30	75.0
High Decrease	-	-	14	35.0	11	27.5	6	15.0
No Change	2	5.0	-	-	-	-	-	-
B) CAPINITAN								
Moderate Increase	22	55.0	21	52.5	13	32.5	14	35.0
High Increase	10	25.0	1	2.5	1	2.5	1	2.5
Moderate Decrease	3	7.5	10	25.0	17	42.5	18	45.0
High Decrease	-	-	6	15.0	8	20.0	4	10.0
No Change	5	12.5	1	2.5	1	2.5	2	5.0
No Answer	-	-	-	-	-	-	1	2.5
C) BOYACAOAN								
Moderate Increase	6	15.0	6	15.0	1	2.5	1	2.5
High Increase	26	65.0	3	7.5	3	7.5	2	5.0
Moderate Decrease	8	20.0	14	35.0	20	50.0	19	47.5
High Decrease	-	-	17	42.5	15	37.5	15	37.5
No Change	-	-	-	-	1	2.5	1	2.5
No Answer	-	-	-	-	-	-	2	5.0
D) LENGAOAN								
Moderate Increase	5	12.5	-	-	-	-	-	-
High Increase	31	77.5	-	-	2	5.0	2	5.0
Moderate Decrease	1	2.5	7	17.5	5	12.5	10	25.0
High Decrease	3	7.5	33	82.5	33	82.5	27	67.5
No Answer	-	-	-	-	-	-	1	2.5

CHAPTER VI

6. MULTIPLE LINEAR REGRESSION ANALYSIS ON SUSTAINABILITY CRITERION OF UPLAND FARMING SYSTEMS IN THE CORDILLERA

6.1. Introduction

This chapter comprises a quantitative analysis of factors determining the sustainability of upland farming systems in relation to economic productivity, ecological soundness and socio-cultural acceptability. The relationships of the assets with the upland farming systems as well as the areas with and without programme interventions are presented.

The multiple regression analysis attempts to see if the upland vegetable farming systems are related in a linear fashion, whether the relationships are statistically significant, and determine the strengths of the relationships. In the multiple regression used, there were several predictor variables or many X's for one Y variable. Model equations were developed to predict upland vegetable farming systems with these several variables (X's). The model equations derived was based on the following:

$$Y' = BO + B1t1 + B2t2 + B3t3 + \ldots Bktk$$

Where ; BO = Constant

B1 = Regression coefficient for variable t1

t1 = First predictor variable

B2t2 = Coefficient and variable for the 2nd predictor variable t2

Bktk = Coefficient and variable for the kth predictor variable tk

The strength of the relationship was determined through the multiple R statistics, The statistics is just the Pearson's Correlation (r) coefficient between the subject's real values and the Y' predictor based on the equation cited above. If the multiple R or R square is high, then the equation predicts the real relationship well. If R square is equal to 1, it means that there is a very high relationship. If R square approaches 0, there is a weak relationship.

6.2. Upland Farming System and Economic Productivity

The upland farming system of the study area was analyzed using multiple linear regression analysis to determine the sustainability in relation to economic productivity, ecological soundness and socio-cultural acceptability. The indicators to determine relationships for economic productivity are yield, income, marketing and pricing of agricultural products. The model summary for the regression on yield, income, marketing and pricing of the different crops is presented.

There is a very weak relationship between upland vegetables farming system and the yield of crops per hectare as show by the regression model summary with an R square of 0.008.

TABLE 26. Model Summary on Yield Per Hectare[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.088[a]	.008	-.059	.1147

a. Predictors: (Constant), Celery, Carrots, Baguio Beans, Sweet Potato, Lettuce, Chinese Cabbage, Potato, Sweet Peas, Bell Pepper, Cabbage

b. Dependent Variable: Upland Vegetable Farming

The derived regression equation for vegetable farming system and the yield of crops per hectare is as follows:

Yield of Crops per Hectare

$$Y = 0.977 + (1.933E\text{-}07)\ t1 + (1.368E\text{-}07)\ t2 + (7.648E\text{-}08)\ t3 + (8.325E\text{-}07)\ t4 + (9.412E\text{-}08)\ t5 + (3.485E\text{-}06)\ t6 + (-9.18E08)\ t7 + (6.132E\text{-}07)\ t8 + (2.420E\text{-}06)\ t9 + (5.630E\text{-}07)\ t10 \text{ (Not Significant)}$$

The model between vegetable farming and income is presented as:

TABLE 27. Model Summary on Gross Income Per Hectare[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.090[a]	.008	-.059	.1147

a. Predictors: (Constant), Celery, Bell Pepper, Lettuce, Sweet Peas, Chinese Cabbage, Carrots, Potato, Baguio Beans, Sweet Potato, Cabbage

b. Dependent Variable: Upland Vegetable Farming

Gross Income per Hectare Regression Equation

Y = 0.977 + (1.879E-08) t1 + (1.029E-08) t2 + (6.316E-09) t3 + (5.891E-08) t4 + (1.368E-08) t5 + (1.267E-07) t6 + (-3.67E-08) t7 + (3.066E-08) t8 + (8.72E-08) t9
+ ((9.791E-09) t10 (Not Significant)

A very weak relationship existed between vegetable farming system and gross income per hectare derived from the vegetable crops with an R square of 0.008. For the marketing and pricing of products the model is presented below.

TABLE 28. Model Summary on Pricing and Marketing of Products[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.626[a]	.392	.377	8.799E-02

a. Predictors: (Constant), Pricing, Mode of Transport, Market Source, Marketing Method

b. Dependent Variable: UplandFarming System

A significant relationship exists between vegetable farming system and marketing and pricing of agricultural products. This indicates that marketing and pricing of products for the community is directly related to the sustainability of farming systems in the uplands of the Cordillera. This implies that a strong market and price positively influence decisions for farmers to venture on vegetable farming production while a weak market and low price of agricultural products makes vegetable farming unsustainable. The regression equation model derived for upland vegetable farming and the price and marketing of products is as follows:

Y = 0.600 + (1.879E-08) t1 + (2.799E-02) t2 + (7.589E-02) t3 + (2.049E-02) t4

6.3. Upland Farming System and Environmental Soundness

The indicators used for sustainability in terms of environmental soundness are the soil and water conservation measures adopted in the vegetable farms and the perceived effectiveness in reducing erosion and increasing farm productivity. The model summary showed a very strong relationship between the uses of terracing with stonewalls and vegetable farms with an

R square of 0.826. ANOVA also showed a significant result. This implies that terracing with stonewall stabilizes upland farms over a long period of time. Furthermore this indigenous soil and water conservation measure adopted was perceived by farmers to be very effective; hence sustainable for the upland farming systems. The regression equation model derived is:

Y= - 1.80E-16 + (0.107) t1 + (0.190) t2 + (8.024^{E}-03) t3 + (0.315) t4 + (0.206) t5

TABLE 29. Model Summary on Terracing[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.909[a]	.826	.820	.2001

a. Predictors: (Constant), Vegetable Farming System, Effectiveness, Reason for Adoption, Area Estab., Adopted Strategies

b. Dependent Variable: Terracing With Stone Walls

Another system used was terracing without the use of stonewalls. The results showed a very strong and significant relationship between terracing without stonewalls and the upland farming system. This is particularly evident at the Benguet side of the Cordillera practiced by the upland farmers. The regression equation model derived is as follows:

Y = 0.122 + (-0.103) t1 + (0.142) t2 + (5.632E-02) t3 + (0.170) t4 + (0.453) t5

TABLE 30. Model Summary on Terracing With No Stone Wall[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.977[a]	.955	.953	.1074

a. Predictors: (Constant), Vegetable Farming System, Effectiveness, Reason for Adoption, Adopted Strategy, Area Estab.

b. Dependent Variable: Terracing Without Stone Wall

Terracing With No Stone Walls Regression Equation

Y = 0.122 + (-0.103) t1 + (0.142) t2 + (5.632E-02) t3 + (0.17) t4 + (0.453) t5
(Significant)

6.4. Upland Farming System and Socio-Cultural Acceptability

The sustainability indicators for socio-cultural acceptability included the farmer's adoption strategy, reasons for adoption, area of establishment and perceived effectiveness of the upland vegetable farming system. The membership and participation of farmers in organizations as well as the organizations present in the area are likewise indicators that were related to vegetable farming system used. Regression ANOVA revealed no significant result on the upland vegetable farming system and socio-cultural acceptability indicators. However, a moderate relationship existed between the acceptance of upland vegetable farming in relation to adoption and perceived effectiveness of the system with an R square value of 0.305. This could be partly influenced by the high input costs and low prices of vegetable products during the year under study.

TABLE 31. Model Summary Vegetable farming System Acceptability[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.552[a]	.305	.287	9.411E-02

a. Predictors: (Constant), Effectiveness, Reason for Adoption, Area Estab., Adopted Strategy

b. Dependent Variable: Upland Vegetable Farming System

Acceptability of Upland Vegetable Farming Regression Equation

$$Y = 0.686 + (8.1E\text{-}02)\ t1 + (2.337E02)\ t2 + (7.763E\text{-}02)\ t3 + (2.097E\text{-}02)\ t4$$

(Not Significant)

In terms of the opinions of farmers on the services rendered by the organizations present in their area and their participation and reasons for joining organizations, there is a weak relationship between upland farming systems practiced and the presence of organizations and their joining the organizations in the community. This implies that there is not much impact in terms of the services rendered by the organizations in their upland farming systems. Most of the organizations are Local Government Units who are constrained by budget and other logistics to deliver basic services to the community, hence a very weak relationship on the opinion of the people on the services of these organizations.

TABLE32. Model Summary on Opinion of Organizations Present[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.169[a]	.029	-.010	.1120

a. Predictors: (Constant), Dept. Of Envi. and Nat. Res, Bank, Chem. Co. Rep., Dept. of Health, Dept. of Agriculture, Others

b. Dependent Variable: Upland Vegetable Farming System

Opinions of Organizations Present in Communities Regression Equation

Y = 0.961 + (-4.76E-03) t1 + (1.244E-02) t2 + (3.167E-03) t3 + (1.008E-02) t4 + (8.039E-03) t5 + (1.268E-02) t6 (Not Significant)

The Analysis of Variance on the participation of farmers in community organizations showed no significant result on vegetable farming system. However, there is a weak relationship as shown by the model summary with an R square value of 0.041. This means that the social assets of farmers being members in organizations have no significant relationship on the vegetable farming system.

6.5. RELATIONSHIP OF ASSETS TO VEGETABLE FARMING SYSTEM IN THE CORDILLERA

6.5.1. Human Assets and Upland Vegetable Farming System

The human assets in the form of farmer's education, age, gender and civil status did not have significant relation with the vegetable farming system but there exists a weak relationship with R square of 0.011.

Human Assets and Upland Vegetable Farming Regression Equation

Y = 0.958 + (4.179E-03) t1 + (5.446E-03) t2 + (-1.11E-02) t3 + (4.676E-04) t4 (Not Significant)

TABLE 33. Model Summary on Human Assets[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.107[a]	.011	-.014	.1122

a. Predictors: (Constant), CIVSTAT, EDUC, GENDER, RESPOAGE

b. Dependent Variable: Upland Vegetable Farming System

6.5.2. Financial Assets and Upland Vegetable Farming System

TABLE 34. Model Summary on Financial Assets[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.133[a]	.018	.005	.1112

a. Predictors: (Constant), Capital Source, Repayment Mode

b. Dependent Variable: Upland Vegetable Farming System

The financial assets include the source of capital and the repayment mode. There is no significant result but a weak relationship exists between the vegetable farming system and the source of capital and repayment mode. This implies that the source of capital does not significantly influence the farming systems used.

6.5.3. Natural Assets and Vegetable Farming System

There was no significant result that existed between natural assets of farmers and the upland farming system used, although there is a weak relationship between them with an R square of 0.022.

TABLE 35. Model Summary on Natural Assets

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.150[a]	.022	-.043	.1138

a. Predictors: (Constant), Land Total, Land Parcels,Years Owned , Vegetable Area, Forest Area, House Settlement,Rice Paddy, Dwelling Type, Dwelling Ownership, Househols Material Assets

Natural Assets and Upland Vegetable Farming Regression Equation

Y = 1.013 + (2.002E-03) t1 + (9.28E-04) t2 + (-1.41E-04) t3 + (5.599E-03) t4 + (1.138E-02) t5 + (3.821E-02) t6 + (-8.65E-03)t7 + (9.115E-03) t8 + (-2.02E-03) t9 + (1.798E-03) t10 (Not Significant)

6.5.4. Social Assets and Vegetable Farming System

There was no significant result between the social assets of farmers and upland vegetable farming system used. However, a slight relationship between social assets and upland farming system is shown by the regression model summary with an R square value of 0.103. This means that the presence of organizations and the membership of farmers in organizations have a slight influence on the upland farming system by way of cooperation and reliance in times of problems.

TABLE 36. Model Summary on Social Assets[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.321[a]	.103	.050	.1087

a. Predictors: (Constant), Dept. of Env. and Nat. Res.,Dept. of Agric., Bank, Dept. of Health, Chem. Co. Reps., Membership in Org., REason for Joining

b. Dependent Variable: Upland Vegetable Farming System

Social Assets and Upland Vegetable Farming Regression Equation

Y = 1.003 + (-4.17E-02) t1 + 5.208E-02) t2 + (-2.69E-02) t3 + (1.902E-03) t4 + (2.307E-03) t5 + (1.126E-02) t6 + (-3.93E-02) t7 + (4.226E-03) t8 + (1.804E-02) t9 (Not Significant)

6.5.5. Physical Assets (Farm Inputs) and Upland Farming Systems

There is a significant difference and a very strong relationship between physical assets and vegetable farming system as shown from the regression model summary with R square value of 0.990. This implies that the farming inputs like equipment and tools, organic and inorganic fertilizers, pesticides, insecticides, weedicides and other farm supplies have a direct relationship with the upland farming system used by farmers.

TABLE 37. Model Summary on Physical Assets (Farm Inputs)[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.995[a]	.990	.970	1.964E-02

a. Predictors: (Constant), Equipment and Tools, Seeds, Organic and Inorganic Fertilizers, Pesticides, Insecticides, Weedicides

b. Dependent Variable: Upland Vegetable Farming System

TABLE 38. ANOVA on Physical Assets (Farm Inputs)[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.954	104	1.879E-02	48.737	.000[a]
	Residual	2.005E-02	52	3.856E-04		
	Total	1.975	156			

a. Predictors: (Constant), Equipment and Tools, Seeds, Organic and Inorganic Fertilizers, Pesticides, Insecticides, Weedicides

b. Dependent Variable: Upland vegetable Farming System

6.6. RELATIONSHIP OF AREAS WITH PROGRAM INTERVENTION AND WITHOUT PROGRAM INTERVENTION

6.6.1. Program Intervention and Upland Farming Systems

There is a significant relationship between areas with CBFM and areas without CBFM in their intercropping system adopted. Intercropping was adopted more in areas with CBFM compared to areas without CBFM but they did not differ significantly in terms of vegetable farming and rice production systems. The relationship is shown in the model summary with an R square value of 0.197. This implies that intercropping was a system introduced through CBFM but is not adopted in areas without CBFM. The derived regression equation model for programme intervention and upland farming system is:

$$Y = 1.00 + (0.612)\ t1 + (0.23)\ t2 + (-0.528)\ t3$$

TABLE 39. Model Summary on Intervention[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.443[a]	.197	.181	.4539

a. Predictors: (Constant), Vegetable Farming, Rice Farming, Intercropping

b. Dependent Variable: With and Without CBFM Intervention

TABLE 40. ANOVA on Intervention[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.861	3	2.620	12.718	.000[a]
	Residual	32.139	156	.206		
	Total	40.000	159			

a. Predictors: (Constant), Vegetable Farming, Rice Farming, Intercropping

b. Dependent Variable: With and Without CBFM Intervention

6.6.2. Program Intervention and Soil and Water Conservation in Upland Farms

Analysis of Variance showed a significant relationship between areas with CBFM and without CBFM in the adoption of soil and water conservation practices in their upland farms. Contour farming using hedgerows and the construction of irrigation canal were practiced more in areas with CBFM intervention. This indicates that the CBFM program had introduced these soil and water conservation practices as part of their activities. There is no significant difference, however, on the use of terracing in the areas with and without CBFM intervention. This suggests that people adopt the indigenous way of conserving soil rather than the introduced systems. The regression equation model between areas with and without CBFM and soil and water conservation in upland farms was derived as:

$$Y = 1.722 + (-9.83E\text{-}02)\ t1 + (-4.47E\text{-}02)\ t2 + (-0.356)\ t3 + (-0.426)\ t4 + (-0.265)\ t5$$

TABLE 41. Model Summary on Intervention and Soil and Water Conservation in UpLand Farms[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.452[a]	.204	.178	.4546

a. Predictors: (Constant), Terrace with Stone Walls, Terrace with No Stone Walls, Contour Farming with Hedgerow, Contour Farming Without Hedgerow, Irrigation Canal Establishment

b. Dependent Variable: With and Without CBFM Intervention

TABLE 42. ANOVA on Intervention and Soil and Water Conservation in Upland Farms[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.171	5	1.634	7.907	.000[a]
	Residual	31.829	154	.207		
	Total	40.000	159			

a. Predictors: (Constant), Irrig. Canal Establishment, Terracing With No Stone Walls, Terracing With Stone Walls, Contour Farming With Hedgerows, Contour Farming With Hedgerows

b. Dependent Variable: With and Without CBFM Intervention

6.6.3. Program Intervention and Soil and Water Conservation in Watershed Area

There is a significant relationship between areas with and without CBFM intervention and the soil and water conservation practiced in watershed areas. Reforestation and fire line construction were the main watershed/forest management activities that were practiced more for communities with CBFM, while those without CBFM intervention relied more on natural regeneration of the forest/watershed areas found within their communities. The regression equation model between areas with and without CBFM intervention and soil and water conservation in forest/watershed areas was derived as:

$$Y = 1.574 + (-0.508)\ t1 + (-0.183)\ t2$$

Table 43. Model Summary on Intervention and Soi land Water Conservation in Watershed Areas

Model	R	R Square	Adj. R Square	St. Error of the Est.
1	.568	.323	.314	.415

a. Predictors : (Constatnt) Fire Line Estab., Reforestattion

b. Dependent Variable : With and without CBFM Intervention

Table 44. ANOVA on Intervention ans Soi land water Conservation in Watershed Areas

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.903	2	6.452	37.382	.000
	Residual	27.097	157	.173		
	Total	40.000	159			

a. Predictors: (Constant), Fire Line construction, Reforestation

b. Dependent Variable: With and without CBFM Intervention

CHAPTER VII

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusions

This research aimed to determine the sustainability of upland farming systems in the Cordillera Administrative Region (CAR), Philippines as it relates to watershed management. The study based the analysis of sustainability on the DFID's livelihood framework, and also the Philippines Strategy for Improved Watershed Management (1998) that spells out the indicators for sustainable watershed resource management in the Philippines based on the guiding principles of ecological sustainability, socio and cultural sustainability, economic sustainability and institutional sustainability. Upland farmers' perceptions on the role and importance of watershed resources were determined to understand their attitude towards the farming system used and their dependence on the resources. Indigenous soil and water conservation practices were identified. The customs and traditions were examined to assess whether they are still viable and are practiced. The assets owned by the upland farmers were related to the upland farming strategy adopted while the areas with Community Based Management Programs (CBFM) were compared with those without program intervention. The following conclusions were derived based on the objectives of the study:

7.1.1. Assessment of farmer's perception on the role and importance of watershed and their dependence on it.

The watershed resources such as forest, water and grassland areas are considered important for common or community use for their production role as well as water value for domestic and irrigation use. There was a significant difference on the perceived role and importance of the watershed resources among the upland farmers in the communities studied and therefore, the hypothesis of the study that there is no significant difference on the local upland farming systems is rejected. The upland farmers value the importance of watershed resources for common use except for the forest products derived with different individual household use. The upland farmers are aware of the benefits derived from the watershed resources in relation to their livelihood and the community at large. The immediate welfare needs at the moment are, however, the priority over combating deforestation although they are involved in community forestry activities.

7.1.2. Factors (assets) influencing upland farming system strategy

Human Asset

The education of the upland farmers showed no significant result in relation to the upland farming strategy adopted. Most of the farmers had not finished high school education but this did not influence their upland farming strategies.

Financial Asset

There is no significant difference among the farmers in the communities as to their source of capital for upland farming. Most of the farmers borrowed from relatives and friends for their capital in farm operations and the repayment mode is usually after harvesting their crops. It is a common practice among the upland farmers in the communities to borrow from relatives and friends. This could be attributed to fewer requirements, which are also easier, faster, and the interest and repayment mode are more affordable rather than borrowing from the banks.

Natural Asset

The farmer's natural assets such as dwelling type, household material assets, number of land parcels, numbers of years that land is owned and the vegetable area showed a significant difference among the farmers in the communities. However, in terms of total land area, forest area, and rice paddy area, there was no significant result obtained. Farmers from Lengaoan had larger vegetable farms since farming activities started longer ago compared to the other communities. Farms at Lengaoan were developed extensively since it is located in a major vegetable producing municipality of Benguet Province where 90% of its people are engaged in farming for a longer period over the other communities.

Social Assets

The presence of organizations, either formal or informal, had a profound effect on the upland farming system and watershed management strategies. There was a significant result on the presence of organizations in the communities as well as the membership and participation of farmers in community organizations. The management and utilization of watershed resources in the study area took place at two levels of social

organization. These are the household level and the communal or community level. At the household level, upland farms, including private forests, are managed by family members. At the community level, forest / watershed areas are managed collectively by the People's Organizations, in the case of areas with CBFM intervention, and the Barangay officials, in the case of areas with no CBFM intervention. Farmers seem to prefer the use of indigenous methods for soil and water conservation in their upland farms rather than the introduced contour farming with hedgerow species.

The organizations assisting the upland communities are mainly the Local Government Units (LGU's) such as the Department of Environment and Natural Resources, Department of Agriculture, Department of Health and the Department of Trade and Industry. These Local Government Units are mandated to assist communities in terms of providing basic social services under the Local Government Code of the Philippines where the powers and authority are devolved to these agencies. However, these government agencies can not do much to fulfill their mandate due to budget constraints and lack of logistics. The CBFM is a strategy toward this end. The local organization of people with their own community rules and policies can bring better access or control of their watershed resources. It is only when the people participate in all the program activities that a relative success can be attained. Comparing the communities, majority of the farmers from Lesseb and Lengaoan have no membership in organizations while majority of farmers from Capinitan and Boyacaoan are members of People's Organizations. This implies that the CBFM created People's Organization as a strategy for collective watershed activities. Strong community collaboration is evident in areas with CBFM through their cooperation. People's Organization in areas with CBFM has high social capital as evidenced by high level of cooperation and reciprocity among the members of the community.

Physical Asset

Farming inputs directly influence the farmers' decisions in upland farm operations. There is a significant difference on the physical assets and the upland farming system among the communities. The high cost of farm inputs and heavy dependence on chemical fertilizers are factors that affect sustainability of farming systems. Results revealed that farmers from Lengaoan and Boyacaoan are geared towards commercial

type of agriculture where higher input costs are needed to produce more crops for the market. Greater labour is also needed for their larger farms compared to communities with smaller farms.

Comparing the communities in terms of assets, Analysis of Variance showed a significant result on the natural assets, social assets and physical assets but showed no significant result on the human and financial assets of farmers in relation to their vegetable farming strategies. With respect to the regression analysis on the relationship of farmer's assets and upland vegetable farming system, there is a weak relationship that existed between human, natural, social and financial assets but a very strong and significant relationship was found between physical asset and upland vegetable farming system.

7.1.3. Soil and Water Conservation in Upland Farms

Vegetable farming system is practiced by most (98.1%) of the upland farmers in the study sites. The temperate climate of the Cordillera is a comparative advantage in growing temperate vegetables compared to other regions in the Philippines with a hot and humid climate. Farmers from Mountain Province and Benguet rely on the vegetable industry as their major livelihood. Vegetable farming system is perceived by majority as moderately effective. The soil and water conservation measures adopted in upland farms are terracing using stone walls (66.9%) and without use of stone walls (45.6%). A significant difference in the soil and water conservation practices in the communities was found, hence, rejecting the hypothesis of the study that there is no significant difference in the soil and water conservation practiced. Farmers from the communities in Mountain Province practice terracing with stone walls while those from the Benguet Province practice terracing without stone walls. These soil and water conservation practices are perceived by the farmers to be highly effective in reducing soil erosion; they have been used over the years and hence are seen as being sustainable. One sustainability criterion for judging the worthiness of the upland farming system is the conservation aspect that can serve its purpose over a period of time. Terracing with and without use of stone walls has been practiced by the upland farmers in the Cordillera for a long time, tracing back to their forefathers (40 years and back) and remained functional and stable through all these years. The

farming system with its conservation structures stood the test of times and is therefore sustainable.

7.1.4. Risks and Problems Encountered and Coping Mechanisms

There are different priority problems of the farmers in the communities under study. The low price of vegetable products is the priority problem for farmers at the communities of Lesseb and Boyacaoan, while lack of irrigation water is the priority problem for farmers at Lengaoan and Capinitan. A significant result was found concerning the problem of lack of irrigation water among the communities in the study, hence, rejecting the hypothesis that there is no significant difference in the problems encountered. However on the other problems encountered such as occurrence of pests and diseases, typhoon, lack of capital, lack of labour and low price of products, there was no significant result observed.

The coping strategies of farmers in the four communities are similar as a response to the problem encountered. When the farmers are faced with crop failure, they borrow from their relatives and friends. Other option is to find jobs within and outside the community and their last option is to borrow from banks. There is no significant difference on the means to cope with problems, hence, accepting the hypothesis of the study.

7.1.5. Relationship Between Assets and Upland Vegetable Farming System

Regression analysis showed a weak relationship between natural assets, social assets, human assets and financial assets of upland farmers with vegetable farming system adopted. However, a significantly strong relationship was found between the physical assets and upland vegetable farming system. This indicates that the physical assets have a direct relationship with the sustainability of the farming system adopted.

7.1.6. Relationship Between Areas With CBFM and Areas Without CBFM

There is a significant relationship between areas with CBFM and areas without CBFM in connection with upland farming systems, soil and water conservation adopted in upland farms and in the watershed / forest areas. The hypothesis of the study that there is no significant difference in areas with and without program intervention is rejected. Areas with CBFM practice intercropping, contour farming using hedgerow species and the construction of irrigation canal to divert flow of water

compared to non-adoption in areas without CBFM. These are innovative practices that were incorporated with the indigenous terracing practices under the CBFM program. Based on the soil and water conservation in watershed / forest areas, there is also a significant relationship that was observed. Reforestation and the construction of fire line were adopted more in areas with CBFM compared to areas without CBFM.

7.2. RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations are derived:

7.2.1. Fast track implementation of the Indigenous People's Right Act (IPRA Law)

The implementation of the Indigenous People's Right Act (IPRA LAW) giving long-term security of tenure to genuine claimants of communal ancestral lands can address the conflict on land ownership issues of the Indigenous People's in the Cordillera Administrative Region. The implementation provides a definitive boundary on areas for private development and watershed / forest protection zones. Insecurity of land tenure creates confusion on the conservation of the watershed resources and the adoption of very short planning horizons, therefore, introducing a bias for short-term land uses. This suggestion conforms with the findings of the Philippine Strategy for Improved Watershed Resource Management that suboptimal use and management of watershed natural resources can be largely explained by tenure regimes under which the user operates. The more insecure the user feels with regards to long-term rights to use a particular resource, the more incentive there is to exploit it to the maximum over the short term without considering its long term sustainability. Land users require long term secure rights to use a particular land and to harvest the produce from it before they will invest time and effort in sustaining its long term productivity. Large parts of forest lands in the public domain have become open access resources. As the people using them had no legal or customary rights, there had been no incentive to conserve the productive potential of their natural resources. Therefore, the Indigenous People's Right Act should be fast tracked in the Cordillera Administrative Region.

7.2.2. Formation of a farmer's cooperative for more effective price and market system.

For areas with CBFM, the People's Organizations can be the entry point for cooperatives within the community and expanding membership to non-PO members. For areas without CBFM, the Barangay Chairman can mobilize community members to form a farmer's cooperative. These cooperatives can be assisted by the Local Government Units within the area. The cooperatives can then be federated within the Cordillera Administrative Region for stronger lobby or bargaining power for a price control regulation of their products. Purchase of farm supplies and materials can also be done through the cooperative for lesser cost on inputs as "bulk buying" can reduce purchase cost. The federated farmer's cooperative can work on the market access as a component of sustainable upland farming system to incorporate the improvement of trails in their community farms and farm to market roads to reduce the difficulty of transporting products from the farms. The development of a local market information system is necessary to inform upland farmers of the likely demand in order for them to have informed decision on what crops to plant and what the existing market prices of products are. Cooperatives can also be a potent force to counteract the price manipulation of middlemen.

7.2.3. Inclusion of terracing as a strategy for watershed management in the Cordillera Administrative Region

The indigenous terracing techniques of the farmers from the communities in the study site are effective for soil conservation in reducing erosion and stabilizing the soil. These can be incorporated as a component strategy for watershed management strategies of the DENR's programs in the Cordillera Administrative Region. The easiest way to encourage the participation of farmers in watershed resource management is to incorporate their practice that is already well-known to them and enhance the farming system by introducing techniques with lesser dependence on chemical fertilizers. A strong extension service by the Local Government Units, NGO's and private agencies is again necessary to shift farmer's dependence on chemical fertilizer inputs to organic materials. The technologies to increase farm productivity without necessarily expanding farm size become a necessary strategy to

minimize the expansion of farmer's areas at the forest fringes of their tax declared lands.

7.2.4. Interventions for development in the communities without project assistance.

The findings of this research revealed that areas with CBFM had better watershed management strategies compared to areas without CBFM, therefore, the need for more interventions to assist farmers cope with their farming livelihood and at the same time manage their forest in a sustainable manner. The farmers can be a potent group to protect and rehabilitate the forest areas as they are aware that water for irrigation comes from the watershed areas. As users of the local resource, they understand that large farms are useless without water to irrigate their crops. Watershed management should focus more on the local resource interest groups such as farmers which represent the major users of watershed resources. By working directly with farmers at the Barangay level with their traditional knowledge, the development prospects are more clearly articulated by the group. The process becomes more need specific, such as need for irrigation water and hence, more appropriate to local circumstances. Their collective actions, as exemplified by the farmers with CBFM interventions, become stronger for a common goal to rehabilitate their forest for water production. The effect may be felt later but the awareness to protect and conserve the remaining forest areas becomes meaningful.

7.2.5. Recommended further study

A further study on the comparative analysis on the sustainability of upland farming systems in relation to watershed management in all Provinces of the Cordillera Administrative Region needs to be done to find out the total situation of watershed use. This study can find out how the different ethnic groups in the other provinces of the Cordillera Administrative Region practice their upland farming systems and how degradation or conservation aspects of their system can be assessed. The different ethnic groups in the provinces of the Cordillera have different culture; hence variations in their systems can complement this research work, and help to identify a wider range of sustainable practices which could inform policies and programs for sustainable watershed management.

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