Investing in the land: agricultural transition towards sustainable land use in the Philippines forest fringe

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3 Four villages in agricultural transition

'…The barangay (*village*) serves 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 maybe expressed, crystallized and considered, and where disputes maybe amicably settled. '

Local Government Code of 1991, Book III, Chapter I, Sec 384

3.1 Overview

This chapter presents the villages that are undergoing agricultural transition. It is intended to familiarize the reader with my study sites and to provide an overview of factors on a larger scale that also stimulate agricultural transition. For example, increased access to markets or new technologies due to construction of roads and other infrastructure or the implementation of government policies and projects may induce agricultural intensification which may lead to farming systems that are sustainable. These factors are external motivations that bring changes in a given village endowed with site-specific natural resources, human capital and social capital. The chapter discusses the physical and human resources of the villages, historical events that occurred in each village, economic activities, markets and land institutions, soil and water conservation practices, social capital, infrastructures, and the manner of information dissemination. In this way, the wider context of agricultural transition can be understood and serve as a background study for the succeeding chapters.

3.2 Balete, Sta. Fe, Nueva Vizcaya

Barangay Balete is located in the Municipality of Sta. Fe northeast of Nueva Vizcaya province. Sta. Fe is the southernmost municipality of Nueva Vizcaya where more than 60 percent of the total land area has slopes of 18 percent and above (considered as forest zone in the Philippines). From Manila to the north (Cagayan Valley) following the *Maharlika* national highway, the municipality can be reached passing through the memorable Dalton Pass, the so-called 'Gateway to Cagayan Valley'. Balete is a model site of the Integrated Social Forestry Project (ISFP) established by the Philippine government in 1988 but converted into the Center for People Empowerment in the Uplands (CPEU) in 1992. The delineated area of the project is about 240 hectares within the *barangay* with 80 households participating in the project.

Although the *barangay* is situated only about one kilometre from the major artery to Manila (*Maharlika* national highway), it can be reached only by walking because it is bisected by the Sta. Fe River. Crossing this river in order to reach the area is through the hanging footbridge constructed through the financial assistance of the Office of the Northern Cultural Communities (ONCC) based in the capital town of Nueva Vizcaya. Once the river is crossed, graded *barangay* roads are used to reach several groups of households located within the *barangay*. These roads are usually destroyed during the rainy season, hence accessibility within the *barangay* during this period is very difficult.

The *barangay* was once a part of a logging concession but migrants from the Kalanguya tribes of Ifugao province settled in the area in 1976. During their early years of settlement, this group of people depended much on slash-and-burn farming as their source of livelihood and as a way of opening up forestlands. In 1984, tomato cultivation and vegetable gardening initiated the practice of contour bunding while agroforestry and tree farming were later introduced through government extension services.

The timeline for Balete in Table 3.2 shows the major events that took place in the village.

3.2.1 Resources

Physical characteristics

The *barangay* has a total land area of the about 4,740 hectares bounded by *Barangays* Buyasyas and Bacneng on the northwest. *Barangays* Baliling and Sinapaoan on the southwest, *Barangays* Bantinan and Canabuan on the southeast and the municipality of Aritao on the northeast.

Table 3.1 – Land use distribution of Balete, Nueva Vizcaya

Land use Category	Area (ha)
Barangay infrastructures/Residential area	15
School site	1
Agricultural area:	
• Rice	230
• Vegetables	384
Agroforestry	223
Tree plantation	110
Brushland/Grassland	1,906
Forestland	1,871
Total area	4,740

Table 3.2 – Major changes in *Barangay* Balete, Sta. Fe, Nueva Vizcaya for a period of 37 years (1960 -1997)

	1976	1984	1988	1990	1992	1994 - 96	1997
1 Settlement period and/ or major events	Settlement of migrants (Kalanguya-speaking Igorots) from the Cordilleras and nearby provinces who started slash-and-burn farming in logged-over forests.	Started planting of tomatoes and other vegetables	Implemented the Integrated Social Forestry Project (ISFP) of DENR; settlement of migrants continued; Organized the Balete Upland Farmers Multipurpose Cooperative, Inc. (BUFAMCO); Planting of crops; upland rice and corn were the main crop of the settlers.	Balete ISFP was selected as an ISFP model site; Started implementing agroforestry and other livelihood activities; Conducted meetings, seminars and cross-farm visits	Balete ISFP was converted to Center for People Empowerment in the Uplands (CPEU) Served as a labouratory/ research area of both the DENR and LGU in community development	Received regional and national awards as Best CPEU	DENR's support to the project is now reduced but supports from LGU and other NGOs still continue; Long drought started October.
2 Total households	Group of Ifugaos	Ilocano migrants settled	Group of Ifugaos/ Ilocano	83 Hh with 398 people		101 Hh with 484 people	128 Hh with 600 people
3 Vegetative cover	Initially, the village is a combination of little grassland and more of virgin and logged-over forests.	Increased cultivated area for slash-and-burn and vegetable farming.	Increased area of brushland/ grassland;all forestlands are logged.	Reforestation and agroforestry areas are established.	Irrigated rice terraces are established as sources of water are found.		Establishment of more tree plantation and agroforestry farms.

Table 3.3 – Slope range distributions in *Barangay* Balete, Sta. Fe, Nueva Vizcaya

Slope Category (%)	Description	Area (ha)	Percent Distribution (%)
0 – 3	Level to nearly level	232	4.9
3 – 5	Gently sloping to undulating	142	3.0
5 – 18	Undulating to rolling	839	17.7
18 – 30	Rolling to moderately steep	2270	47.9
30 – 50	Steep	797	36.4
> 50	Very steep	460	9.7
Total		4740	100.0

Table 3.1 shows the land use distribution of the *barangay*. It is interesting to note that the village still has a large proportion of brushland and grassland and forestland.

The type of agroforestry in the village is mostly mango-based which was established three to five years ago although other fruits, such as citrus and avocado, are also planted. In some individual plots, *Gmelina* trees are grown in land boundaries but mostly in steep slopes or along small streams.

About 96 percent of the *barangay* has a loamy soil type in the agricultural, agroforestry and forestry areas while the remaining 6 percent is clay loam. The lowest elevation in the *barangay* is 420 meters above sea level (masl) near the Sta. Fe River while the highest is 1,270 masl in the mountainous areas.

In terms of slope distribution (Table 3.3), about 48 percent of the *barangay* has rolling to moderately steep slopes, 18 percent has undulating to rolling slopes, 17 percent has steep slopes, 10 percent has very steep slopes, 5 percent has level to nearly level slopes, and 3 percent has gently sloping to undulating slopes. Lowland rice farming takes place on areas with level slopes up to gently sloping while vegetables farming, agroforestry and reforestation takes place on the lands with gently sloping up to steep slopes. On areas with steep to very steep slopes, the residents are protecting the forest resources because they are considered as watershed areas. Figure 3.1 shows the simplified east-west transect of the village.

There is no rainfall data observed in the *barangay* for the previous years. However, observations from an Agrometeorological Station established in Sta. Fe, Nueva Vizcaya can be taken as having similar rainfall regimes since it is located only about 5 km away from *Barangay* Balete.

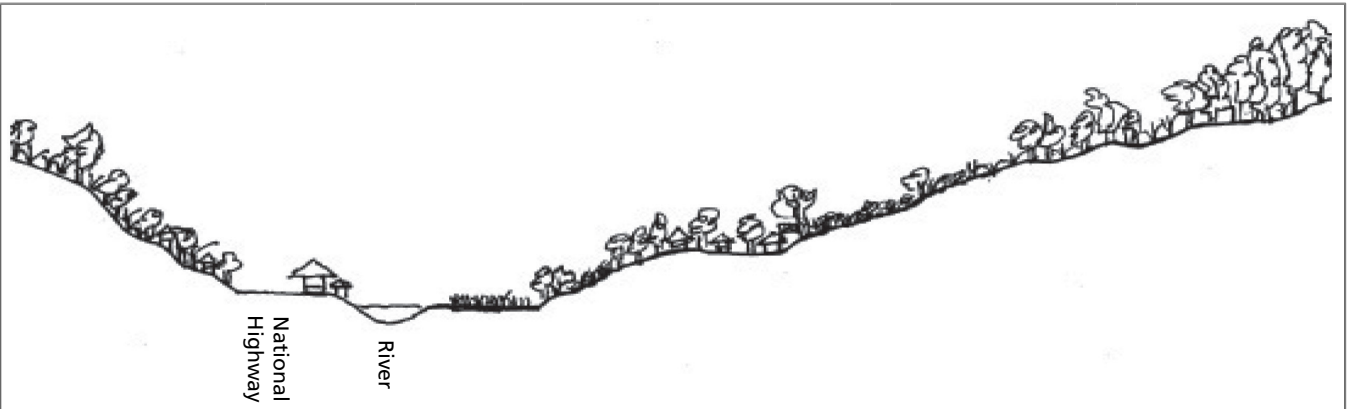
East- West transect line							
Land classification	Forestland			Alienable and dispo-sable land (A & D)	Forestland		
Land use	Grassland/upland farming/settlement	Public domain/ Settlement	Public domain	Lowland farming	Vegetable farming, agroforestry and reforestation, and settlement		Logged-over/ secondary forest
Slope class	30-50% (mountainous)	0-5% (flat lands)			18-30% (mod. steep slopes)	9-18% rolling	30-50% (mountainous)
Elevation(m)	400-500	300-400	200-250		300-400	400-500	500 - 700
Remarks	The main crops planted in cultvated lands are vegetable crops and lowland rice; the most common fruit trees planted in agroforestry are mango and oranges while forest rees species are gmelina and mahogany.						

Figure 3.1 – East-West transect line of Balete, Sta. Fe, Nueva Vizcaya.

Figure 3.2 shows the amount of rainfall received in the area as observed in the Agrometeorological Station, Sta. Fe, Nueva Vizcaya

The highest mean monthly rainfall is observed on the month of July while the lowest is in February. In general, the period from May through November is wet due to the predominance of the moist southwest monsoons and the occurrence of tropical cyclones over the area. The period from January through March is quite dry. The total annual rainfall received by the *barangay* is about 2,149 mm.

Population

The total population (as of December, 1998) of the *barangay* is 600 persons with total households of 128 (Table 3.2). In 1990, the total population is 398 with total households of 83 and it increased to a population of 484 in 1995 with a total households of 101. In terms of sex distribution, there are 318 males compared to 282 females.

The average household size is 5. With 600 people on its area of 4740 ha, *Barangay* Balete is the most sparsely populated *barangay* of Sta. Fe municipality having a population density of about 12.7 persons per square kilometre. The literacy rate of the *barangay* is about 88 percent in 1995 which increased from a value of 71 percent in 1980. This increased might be due to the establishment of complete elementary school in the *barangay* which was supported by the village officials and the local government of Sta. Fe.

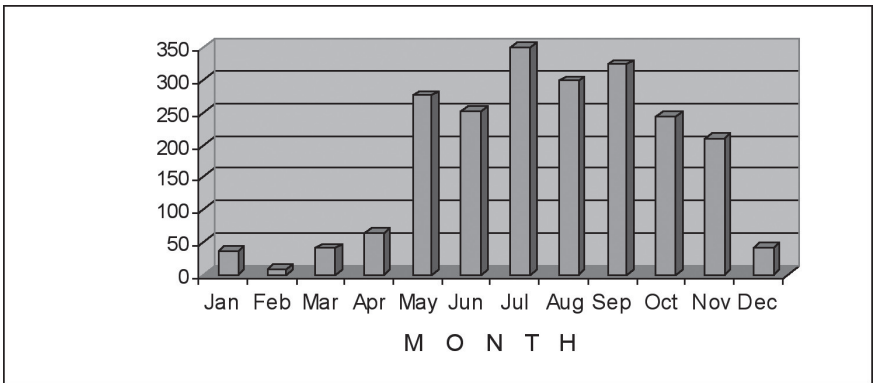


Figure 3.2 – Monthly rainfall distribution observed at the Agrometeorological Station Sta. Fe, Nueva Vizcaya, 1975-1984.

Households

The people of *Barangay* Balete are monogamous society. As in most Philippine society, a household in *Barangay* Balete consists of persons who are related by kinship ties, like parents (husband and wife) and their children sleeping in the same housing unit. The husband is the head of the household and with the help

of the wife, makes the major decisions affecting the family. Each decision made is expectedly respected by the members of the household. If the husband dies, the wife takes over the management and financial needs of the household with the elder son or daughter helping her.

Each household or family has an average number of children of about 3. The working children (usually at age 12) are expected to participate in all activities in the farm (i.e. land preparation, planting, weeding and harvesting) and at home. Female-headed households (about 2 in the *barangay*) are only those whose husband died due to sickness and old age.

3.2.2 Economics

Livestock

Farmers in *Barangay* Balete presently grow various livestock which they consider as very important in their farming either as a source of draft power or income. The livestock raised are as follows:

1 Carabaos (water buffalo) – About 50 percent of the total households own from 1 to 2 carabaos. These animals are used by farmers in preparing the land for planting (i.e. plowing and harrowing) and making furrows during planting period. They are also used for hauling of agricultural products during harvest from the farm to their residents (distance ranges from 500m to 4 km). Farmers graze their carabaos on vacant lots available in the area. Carabao manure is not yet use in the farm because according to them the quantity of manure is too small to be used as fertilizer.

2 Cattle – There are only about 1 percent of the total households in the *barangay* owning an average of about 1 cow per household. These are kept by farmers for about 1 or 2 years after which they sell to the markets in the municipalities of Sta. Fe and Aritao, Nueva Vizcaya. Cow manure, like carabao manure, is not normally used in the farm.

3 Pigs – Almost all of the households in *Barangay* Balete are growing pigs in anticipation for future expenses like education of their children, farm inputs and other farm expenses. Pigs are mostly sold on a per head basis after 6 months to 1 year of caring, usually to outside buyers (about 2 buyers) who come to the *barangay Bagsakan* Center, a place along the national highway where marketing of the farmers' products are being done.

4 Ducks – About 30 percent of the households are growing ducks. These are only used for home consumption.

5 Chicken – All of the households in the *barangay* have, on the average, about 5 chicken per households. These are grown originally for home consumption

but these are also sold out as the need for cash in the family arises. Sold in whole, the price depends on the size or weight which ranges from Php 80 to Php 100 per chicken.

6 Goats – On the average, 2 goats per households are owned by about 1 percent of the total households. These are sold within or outside of the *barangay* at a price ranging from Php 600 to Php 1,000 per head.

7 Dogs and cats – These are kept as pets for the family. Dogs are expected to guard the house during the night while others used them for hunting in the forests. Cats usually do the job of catching rats.

Carabaos, cows, and goats are grazed by the farmers in their lands under fallow. They are also kept in grassland areas not under cultivation yet by farmers.

Trees

Some indigenous forest species (i.e. *dipterocarp*) such as *narra, guijo, tanguile*, red and white *lauan, dau, kalantas* and *balete*, can still be found in the remaining forest areas of the *barangay*. These trees species are mainly used in the Philippines for building, house and bridge construction. Native guava are also growing in the brushland areas in which the fruits are sold in the market centers of Tarlac and Pangasinan provinces.

Logging is banned in the area since the implementation of the ISFP. Some trees, however are cut for private house construction and monitoring is done by the *barangay* and cooperative officials. The penalty being imposed by the *barangay* officials and DENR to those who are caught logging illegally in the forestlands within the village boundary are confiscation of the chainsaws used in logging as well as legal charges in government courts. Up to the time of this study, no incident of confiscation has yet been made.

The exotic forest trees species found in the *barangay* are giant *ipil-ipil*, *Gmelina*, mahogany, mulberry and *kakawate*. Giant ipil-ipil trees are fast-growing species which can be utilized for fuelwood and house post after 3 to 5 years after planting. Together with mulberry and *kakawate*, they are also used as hedgerows by the farmers. *Gmelina* and mahogany trees are also fast-growing species that have been planted in 1989 by the cooperative and some individual households. Farmers planted them also in stony and steep areas not suitable for crop production while others planted the *Gmelina* trees in their land boundaries. Farmers know the market potential (i.e. lumber for furnitures and house construction) of the trees, thus many are planting trees in their land boundaries, vacant lots or any lots not suitable for crop production.

Likewise, the farmers planted fruit trees such as: mango, avocado, *santol, caimito, guyabano*, papaya, guavaple (a cross-breed between native guava and apple), and jackfruit.

Mango, avocado, *santol, guyabano* and *caimito* had been planted in the *barangay* since they arrived in the area in mid-70's. They start bearing fruit after 5 to 7 years of planting and will live up to 50 years.

Farmers who have planted mango, avocado and guyabano 10 to 20 years ago already selling the fruits of the trees at prices ranging from Php 12 to Php 15 per kg. Fruits of *santol* are also priced at Php 2 per piece while that of papaya are priced at Php 2-Php 3 per kilogram. Buyers from nearby provinces of Region 03 (i.e. Tarlac and Pangasinan) are coming to the *Bagsakan* Center in the *barangay* to purchase these fruits.

Timber from mango, avocado, *santol guyabano* and *caimito* can be utilized for construction purposes while the small branches can be used as fuelwood. Except for papaya, all the other fruit trees bear fruit after 3 to 5 years of planting and they can live up to 25 years. Their timber can only be used for fuelwood.

Flowering and thus fruiting ability of the fruit trees above are greatly influenced by typhoons and droughts.

Crops
The major crops planted by individual households in the *barangay* are:

1 Vegetables
Vegetables provide the major cash income for the households. The vegetables planted are tomato, carrot, *Baguio* beans, cabbage, and taro (local name is *gabi*). Land area planted with these crops are usually measured in terms of ' *luangan* ' such that 1 *luangan* measures 25m x 25m and 16 *luangans* is equivalent to 1 hectare.

Tomato
Tomato is the main vegetable crop in *Barangay* Balete which is planted by all of the households. For tomato cultivation, farmers usually prepare a minimum land area of 1,250 sq m (2 *luangans*) to a maximum of 2 ha (32 *luangans*). Among the vegetable crops, tomato occupies the largest cultivated area that farmers maintain in the *barangay*. Planting of this crop starts as early as April to May which is significantly influenced by the availability of water. Farmers who have plastic water pipes connected to water sources that are available throughout the year can plant early, while those who do not have water pipes will wait for early rainfall which usually starts mid-April or May. Harvesting is undertaken 2 months after planting and occurs for a period of 3 months at weekly, twice

weekly or thrice weekly interval. The average yield is about 12,600 to 20,000 kg per hectare.

Prices of tomato fluctuate significantly from Php 12 per kilogram at the start of the harvesting season (end of May to June) to as high as Php 22 per kilogram (end of July to August).

Carrot
Carrot is planted immediately after tomato (i.e. end of July) and to be harvested end of September up to mid-October. The area of carrots planted by about 50 percent of the farmers ranges from 625 sq m (*luangan*) to 1,250 sq m producing 150 to 300 kg, respectively. On a per hectare basis, the average yield is about 2400 kg.

Prices of carrots fluctuates from Php 10 at the start of the harvesting season (end of September) to Php 15 per kilogram.

Baguio beans
This crop is planted twice per year in small plots usually with an area of 1,250 sq m. For the first cropping season, planting starts on the month of May while while the second cropping starts on the month of September or October. Harvesting occurs 45 days after planting over a period of 6 weeks at 2 times per week. With an area of 1,250 sq m, the farmers (about 50 percent of the households) produce about 350 kg to 500 kg. This is equivalent to an average crop yield of 3400 kg per hectare

Prices of *Baguio* beans fluctuate from Php 8 per kilogram to Php 12 per kilogram.

Cabbage
Cabbage is grown once per year during the cold months of September to December with an area ranging from 625 sq m to 1,250 sq m (1 to 2 *luangans*) yielding crop outputs of 500 kg to 1,000 kg, respectively. There are only about 3 percent of the total households who are cultivating this crop.

The price of this crop is almost stable at Php 5 per kilogram.

Taro
Taro is cultivated once per year in small plots with an area ranging from 625 sq m to 1,875 sq m with yields of 50 kg to 300 kg, respectively. Harvesting starts in December and ends in March. There are 3 varieties of taro planted by about 30 percent of the households in the *barangay*, namely: *pitik, lampakan* and *galiang*. *Pitik* variety has higher prices than the other varieties which ranges from Php 20 per kilogram to Php 22 per kilogram. The prices of *lampakan* and *galiang* varieties ranges from Php 5 to Php 7 per kilogram.

No fertilizers and pesticides are applied for this crop indicating a minimum management regime.

2 Lowland rice
The total area planted with lowland rice is about 200 ha mainly located on the flood plain along the Sta. Fe River and in rice terraces constructed by the farmers in higher elevation areas. The rice output of farmers with rice paddies developed along the river averages about 80 to 100 bags (i.e. 3,440 to 4,300 kg at 43 kg per bag) per hectare while that of farmers with rice terraces at higher elevation averages about 70 to 80 bags (i.e. 3,010 to 3,440 kg at 43 kg per bag) per hectare. The rice fields for both locations are irrigated enabling the farmers to cultivate their lands for two croppings per year.

Prices of rice fluctuates slightly from Php 8.50 per kg during the harvesting season (September to October of every year for the first cropping and January to February of the following year for the second cropping) to Php 9 per kg outside of the harvesting season. Price of premium rice is higher by Php 1.0 per kg on the indicated fluctuation pattern above. However, these prices decrease to as low as Php 6 per kg if the quality of rice grains deteriorate especially when a typhoon or long and heavy rainfall occur during harvesting.

Some of the households in the village are practicing diversified farming systems growing vegetables in one plot and lowland rice in another plot if rice terraces have been constructed.

Crop inputs and cultivation practices (per major crop)

1 Lowland rice
Farmers with lowland rice fields use certified seeds commonly bought in Aritao or Bambang, Nueva Vizcaya at a price of about Php 15 to Php 20 per kilogram. Sometimes, they keep a certain amount of seeds of the previous harvest to be used solely for planting for the next growing season. One hectare requires about 60 kg of seeds.

Cultivation of this crop starts with seedbed preparation and soaking of seeds for 1-2 days. When seeds start to germinate, they are sown on the seedbed. Immediately after sowing of seeds, land preparation on the rice fields is undertaken through plowing and twice puddling to level the soil. Before this is done, rice paddies should be supplied with adequate water and farmers have to make sure that the paddy dikes are free of holes so that a certain water level is maintained within the paddies. Transplanting on the rice paddies occurs 25 - 30 days after sowing. Weedicide is applied immediately or a day after transplanting while spraying of pesticides is done once after 2 - 4 weeks and during the grain formation stage of rice. Depending on the varieties, rice matures within 90 to 110 days in which harvesting is done.

Farm labour is needed during land preparation (ploughing and puddling), transplanting, and harvesting. One hectare of lowland ricefield needs about 7 man-animal days of ploughing, 3 man-animal days of puddling, 7 to 8 man-days transplanting and 15 man-days harvesting. Done at various intervals during the growing season of rice, the cumulative number of days of labour needed for fertilizing and spraying of insecticides and weedicides are about 3 man-days.

In some cases, land preparation is done through the use of small hand tractors with a contract cost of about Php 1,800 to Php 2,000 per hectare. The cost of 1 man-day labour is Php 80 and 1 man-animal day is Php 150 with lunch and 2 snacks.

Commercial fertilizers are also used at a rate of 1 to 2 bags per hectare. Pesticides (with brand name of Cymbush EC and Lannate) and weedicide (brand name Machete) are also applied by farmers in their farms at a rate of 1 liter per hectare for 3 to 4 applications. Cymbush EC is a systemic insecticide while Lannate is a contact. The prices of commercial fertilizers and pesticides are presented in Table 4.

2 Vegetable crops
Almost all of the farmers use the complete fertilizer for their vegetable gardens at a rate of 2 to 3 bags per hectare which is based on the soil analysis made in the area. Land preparation is done through the use of a hoe with 1 man-day labour costing Php 80 with lunch and 2 snacks. Many farmers allow their lands to be prepared on a contract basis at a rate of Php 350 to Php 550 per *luangan* (equal to 625 sq m or dimension of 25m x 25m) depending on the condition of the lands to be prepared and ready for planting. Accordingly, transplanting of seedlings is undertaken 1 month after sowing of seeds in a seedbed. Prices of vegetable seeds are also shown in Table 3.4.

Plastic water tubes are also needed for vegetable production which costs the farmers about Php 275 to Php 300 per roll (1 roll has a length of 75 m). Farmers reported that some of them had laid out a total length of up to 1,000 m of irrigation water tubes.

Hauling cost of vegetables during harvest ranges from Php 1.50 per kg to Php 2.00 per kg depending on the distance of the farm to the national highway (where the *Bagsakan* center is located).

Cymbush EC is usually applied during the vegetative growth of vegetables due to its systemic characteristics at a rate of ¼ liter per hectare while Lannate is applied during the flowering and fruiting stages of vegetables at a rate of ½ liter per hectare.

Table 3.4 – Farm inputs used by farmers with their unit prices.

Type of fertilizer	Quantity	Unit Price (Php)
Fertilizers		
Urea (46-0-0)	Bag (50 kg)	360
Complete fertilizer (14-14-14)	Bag (50 kg)	400
Ammonium sulphate (21-0-0)	Bag (50 kg)	260
Pesticides/Weedicides		
Cymbush EC	Liter	720
Lannate	Liter	400
Machete	Liter	600
Seeds		
Tomato	Bag (25 gr)	180 – 250
Baguio beans	Ganta (2.2 kg)	150 – 170
Carrots	Bag (40 gr)	300
Cabbage	Bag (25 gr)	250

Farmers observed that generally their crop yields are lower than the expected yield when they apply small amount of fertilizer and even lower when none at all. Pesticides improve crop output quality especially for vegetables.

Non-farm activities

The farmers in the *barangay* wakes-up as early as 4 o'clock in the morning in order to have time prepare for the day's activities in the farm. Normally, women start cooking, fetch water to be consumed for the day or at least up to a volume needed until noon. After one hour, their children are expected to get up also so that they be prepared to go to school. Men, likewise, prepare the tools and feed the animals to be used in the farm. In some households, the women help the men in all farming activities if the women are not constrained of frequent pregnancy or the need to take care of small children, especially when the children are going to school.

Normal working time in the farm is from 6 o'clock to 11 o'clock in the morning and 1 o'clock to 4 o'clock in the afternoon. A noon break from 11 o'clock in the morning to 1 o'clock in the afternoon (breaktime of 2 hours) is practiced in all types of agricultural labour whether men and women. This breaktime, however is usually spent in their farms when working need to be extended in the afternoon in which working stops as early as 1600 pm due to walking time consumed in going home and preparing of foods for dinner.

During the noonbreaks, fuelwood is gathered which they carry upon returning to their respective homes in the afternoon. Men and women alike help each other

in all activities in the farm although men do the heavier work (i.e., plowing and cutting larger trees) while the women do the lighter ones (such as weeding)

Some households do basket-making from rattan and bamboo during times when they are not working in the farms. If not sold in the market, they used these in the farms especially during planting and harvesting seasons.

Off-farm and seasonal migration
Farming activities in the *barangay* slow down from January to March. During this period, many of the farmers start to remove tall grasses in their farms, make repairs on their houses and prepare seedbeds. Some of the farmers gather and prepare materials needed in the next cropping seasons while others (about 5 percent of the total households) operate small stores (the local name is 'sari-sari ' store) and engage in trading vegetables taken in some *barangay*s.

Some of the women (about 3 percent of the households) are also engaged in small-scale buying and selling of vegetables in adjacent *barangay*s.

According to key informants, income from these off-farm activities are used to buy foods for home consumption, education of their children and inputs to their farms like fertilizers, insecticides and herbicides. Money is also needed for wages in farm labour especially during the peak season.

Expenditures
Like many households in the Philippines, the major categories of expenditures of the households are: food, education of the children, farm inputs and medical expenses in that order. Whatever is left can now be used by the spouse in buying clothes for the family or to be used for the improvement of their farms.

Upon consulting the members of the household (wife and adult son or daughter), the male head of the family usually gives the final decision on how to spend money from farm incomes. Extra incomes of the households are often used for clothing and improvement of their houses, buying new and improved seeds for the next cropping season, buying few seedlings of fruit trees or used for payment of hired labour for the establishment or improvement of farms.

Few farmers have savings account in the bank. Most of them keep their extra money by themselves expecting that they can use it for improving their houses, buy new and improved varieties of their crops, for mortgaging to expand their cultivated area, or maybe invest in establishing their agroforestry and tree farms.

3.2.3 Markets and land institutions

Access to land and communal resources

The major portion of the *barangay* is a former logging area with slopes of 18 percent and above. Thus, the land ownership instruments that the government was issuing at the time of settlement were not appropriate. Initial claims to the lands people were cultivating (about 1 or 2 large plots) then were established through their clearings and their practice of the slash-and-burn farming system. However, the Certificates of Stewardship Contracts (CSC) were issued to individual households in 1988 when the ISFP was implemented. Before the issuance of CSCs, households had to show to have adopted technologies promoted by the ISFP, such as; hedgerows and agroforestry. Households were being paid at Php 6 per linear meter in the establishment of hedgerows. At present, these hedgerows are not maintained but people increasingly practice contour bunding in their plots.

On the average, each household in the *barangay* is cultivating 1 to 2 plots with areas ranging from 2 to 3 ha. Large plots are subdivided into smaller plots (with area ranging from 1,000 to 2,500 sq m). There is now a decreasing trend in the landholdings due to natural increase in the number of households in the *barangay*. While there are still public lands not occupied, the government, through DENR and with the cooperation of local officials of the *barangay*, are able to discourage the people to occupy these lands under the public domain.

Lands for cultivation can be acquired by households through the payment of a mortgage fee of Php 1,500 per *luangan* (i.e. 625 sq m) or Php 5,000 to Php 10,000 per ½ ha. The mortgage agreement has a duration of 1 year in which the mortgagee can re-acquire the mortgaged land upon returning the money to the mortgagor at the end of 1 year or 2 cropping seasons. If the mortgagee could not repay the mortgage amount, the agreement will stay for another year.

Due to prohibitions by the government of expanding the lands they are cultivating, the households in the *barangay* have allowed their friends and relatives migrating to the *barangay* to occupy and cultivate part of their landholdings. The CSC holder and the cultivator usually agree on a sharing scheme of 25:75 percent and will share whatever output from the land at the end of the cropping season. This is based on trust since there is no official document covering this agreement since the CSC only allows the land to be subdivided or inherited by immediate members of the households.

The *barangay* covers a wide area of brushlands or grasslands and secondary forests (about 3,500 ha) including watersheds which the farmers protect because of their importance to their crop production. They perceived that these areas must be protected so that the water needed for cultivating vegetables and lowland rice will be continuously available especially during the dry season.

The local officials prohibit settlements in these areas, established the communal forests and also prohibit the cutting of trees and continuously discouraging households on burning which effectively prevented the occurrence of fire.

Land tenure

About 76 percent of the *barangay* is within the forest zone classification of the DENR. Land claims that are covered by ISFP (now CPEU) were awarded the CSC. Through the CSC, the households are provided leases on the lands they are occupying giving them the right to use and benefit from the land for a period of 25 years and renewable for another 25 years. Other conditions of this land tenure instrument are discussed in Chapter 2.

Rice lands on the flood plains along the Sta. Fe River are privately titled.

As indicated in the above sub-section, a form of share tenancy on the lands households' cultivate also exists in the *barangay*. Under this scheme, the land-owner or CSC holder and the tenant share whatever agricultural outputs are generated from the lands. The sharing scheme is; one-fourth of the crop output is for the landowner while the remaining three-fourth is for the tenant with the tenant shouldering all the expenses. Share tenancy is prohibited in lands covered by ISFP so that households involved in this form of land tenure employed verbal agreements. In most cases, the period by which tenants can cultivate the lands they 'borrowed' from CSC holders depends on their verbal agreement which usually covers a period of 2 croppings or equivalent to one year.

Another form of access to productive lands in the *barangay* is through mort-gaging, known in the local dialect as, *salda.* Once payment is made, the mortgagor has the right to cultivate the land until the mortgagee can return the mortgage amount without any interests. The usual mortgage duration is 2 cropping seasons or 1 year. If the mortgage amount is not being repaid within this period, the mortgagor can continue cultivating the land. There is no maintenance to be made by the mortgagor to the land due to the usually short duration of the mortgage period.

Although selling of plots is against ISF policy, some farmers are able to acquire lands by paying a certain amount (ranging from Php 10,000 to Php 15,000 per 4 *luangans*) to the original CSC holder-owner. The local term for this is paying the '*posisyon* ' on the land.

Agricultural labour

The daily wage in making contour bunds, planting or transplanting, weeding, fertilizing, spraying of insecticides and harvesting is Php 80 per man-day with lunch and 2 *meriendas* (snacks once for morning and afternoon). If a carabao is included especially during plowing, harrowing and making furrows during planting, the daily wage is Php 150 per man-animal-day with lunch and 2

meriendas. The working time is from 7:00 to 11:00 in the morning and 1:00 to 5:00 in the afternoon. Lunch break is between 1100 to 1300.

For hauling of agricultural products, the amount is Php 1.50 to Php 2.00 per kilogram depending on the distance of the farms to the national highway where the *Bagsakan* center is located. This is fairly much as compared to the value of the crop, for example, tomato.

Agricultural labour is coming from within and outside of the *barangay*. Young members of the households with ages from 10-12 years old participate also in hauling activities especially hauling of tomato fruits placed in 2 baskets (local name is *alula*) each tied at both ends of a pole and the middle of the pole is carried on the shoulder.

Mutual exchange of agricultural labour (particularly for plowing, planting weeding, and harvesting) is also practiced by small group of farmers in the *barangay*. This small group usually 5 to 6 members are relatives or friends.

As in most agricultural communities, plowing, harrowing, making furrows, hauling (these need carabaos) and spraying are the agricultural labour that are being handled mainly by male while planting, weeding and harvesting can be undertaken both by male and female.

Communal labour in the *barangay* is organized by the *barangay* officials who set the date of the activities. *Barangay* assembly meetings, cleaning the school surroundings, repairing school buildings and hanging bridge, constructing waiting sheds and trails and road maintenance are the most common type of communal works participated in by all households in the *barangay*. Each household is required to provide one man-member to participate in the communal works and *barangay* meetings. If the male head of the household can not go, other members of the household (with age 15 years old and up) can attend as a substitute.

The penalty imposed by the *barangay* officials for non-attendance of communal work is Php 50 per day.

Credit market

Loans are extended to members of the Balete Upland Farmers Multi-purpose Cooperative, Inc. (BUFAMCO) with an interest rate of 5 percent per cropping. These loans are usually used for the purchase of farm inputs, such as; seeds, fertilizers and pesticides.

Informal credits also exist which are offered by vegetable traders and some households in the *barangay* with interest of around 10 percent per cropping. Payments are usually in cash with a duration of 1 cropping season. Credit

from vegetable traders is based on trust and long time established buyer-seller relationship known locally as *suki*. While a farmer seems obligated to sell his produce to the trader who gives credits, he can still sell his produce to other traders who can offer higher price as long as he will immediately repay his credit. If the creditor-trader can match the price prevailing in the market, the farmer who obtained credit is obliged to sell his produce to the creditor-trader.

The only document used in informal credits is an agreement, known as *kasuratan*, signed by both involved parties and their 2 witnesses. This agreement indicate the amount of the credit and the terms of payment but does not indicate that the farmer is obliged to sell his crop produced.

Market for crops or agricultural products

Marketing of agricultural products is concentrated in the *Bagsakan* Center established by the farmers in the national highway that traversed the northwest side of the *barangay*. The volumes for each kind of agricultural products marketed are shown in Table 3.5.

Except for sweet potato (*camote*) and taro (*gabi*), the volume of marketed agricultural products in the *barangay* increased in 1996 as compared to 1988. This shows the preference of the farmers to plant more vegetable crops and reduce cultivating long maturing crops. Likewise, vegetable crops like cabbage, carrot, Chinese *pechay* and papaya are marketed only in 1996. According to the farmers, planting of tomato started in 1984 and since then became the major vegetable crop marketed by the households in *Barangay* Balete.

Markets for inputs

The most commonly used farm inputs in *Barangay* Balete are seeds, fertilizers and insecticides/pesticides (Table 5). These farm inputs can be purchased in the municipalities of Sta. Fe and Aritao of Nueva Vizcaya province with a distance of 5 km and 15 km, respectively, from the *barangay*. Vegetable seeds can also be bought from Bambang, Nueva Vizcaya which is considered as having bigger markets than Sta. Fe and Aritao.

Prices of farm inputs in the towns of Sta. Fe and Aritao are the same but differ only in transport costs. Although Sta. Fe is nearer, the majority of the farmers buy their farm inputs in Aritao because it has a bigger market for dry goods and other services. During the harvesting period, many farmers set aside good seeds already for the next planting season which will somehow reduce their production costs.

Table 3.5 – Volume and type of agricultural products marketed in the *Bagsakan* Center of *Barangay* Balete, Sta. Fe, Nueva Vizcaya

	1988			1996		
Type of Product	**Volume (kg)**	**Unit Price/ kg (Php)**	**Total Amount (Php)**	**Volume (kg)**	**Unit Price/ kg (Php)**	**Total Amount (Php)**
Vegetable Crops						
Tomato	15,000	2.00	30,000	700,000	5.00	3.5 million
Cabbage				30,000	5.00	150,000
Beans	1,500	4.00	6,000	20,000	5.00	100,000
Chinese pechay				15,000	5.00	75,000
Gabi (taro)	12,000	2.00	24,000	10,000	8.00	80,000
Ginger	1,000	4.00	4,000	5,000	50.00	250,000
Eggplant	500	2.00	1,000	5,000	5.00	25,000
Carrot				5,000	7.00	35,000
Chayote	1,500	1.00	1,500	3,000	4.00	12,000
Fruit Trees						
Mango	2,520	1.50	3,780	3,500	10.00	35,000
Citrus	500	1.50	750	2,000	15.00	30,000
Avocado	500	1.50	750	1,500	3.00	4,000
Papaya				1,500	5.00	7,500
Banana (per bunch)	200	10.00	2,000	500	30.00	15,000
Jackfruit	100	2.00	200	200	5.00	1,000

Source: *Inventory of Harvestable/Marketable Farm Products of Balete CPEU*, 1996. CENRO, Aritao, Nueva Vizcaya.

3.2.4 Transition

Perceptions of environmental problems

The environmental problems mentioned by the people in the *barangay* are: soil erosion, declining soil fertility of some portions of their lands and long drought and climatic change.

1 Soil erosion

This is the most serious environmental problem in the *barangay*. Most of the lands cultivated by the farmers have rolling to very steep slopes that are prone to soil erosion. The roads going to the *barangay* are destroyed by severe soil erosion as big gullies are formed on the roadside and sometimes cross the roads. Small gullies are usually seen by the farmers in their farms but they can still remove the gullies through the use of hoe or carabao plow. According to them, contour

bunds or '*gen-gen* ' (local name) are as effective as hedgerows in reducing soil erosion.

Farmers allow 1 to 3 years of fallowing period for their fields depending on how fast the land can recover its fertility. Their indicator for increased fertility is the growth of grasses on the fallow lands. To ensure for continuous farming activity, the individual households subdivided their lands into several plots (usually consisting of 2 -3 farmlots) and cultivate them in rotation.

Through meetings, seminars, trainings and visits to model farms, conducted by the DENR through the CPEU and local government unit (LGU) of Sta. Fe, Nueva Vizcaya, the *barangay* officials and farmer-leaders have acquired knowledge on soil and water conservation techniques, such as contour plowing, bench terracing, multi-storey farming, compartmentalized farming, crop rotation, agroforestry and reforestation. Their participation in the CPEU activities, radio, newsletters and other means of communication encouraged some farmers to start adopting the said techniques.

2 Declining soil fertility
According to farmers, this problem occurs as a consequence of soil erosion and continues planting on the same land. The immediate effect of this problem is the declining yields in their farms which correspondingly reduce their income. This is also one of the reasons why farmers practice a fallow period of 1 to 3 years interval depending on the condition of cultivated lands as indicated by the growth of grasses.

Some farmers, especially those who have enough capital, apply more fertilizers in order to increase their farm yields. They still let their farms to lie fallow after a longer cultivation period than those who are not applying fertilizer.

3 Long drought and climatic change
The long drought, popularly known as El Niño phenomenon occurred not only in the *barangay* but also in the entire country at the end of 1997 up to June, 1998. Few farmers were able to plant vegetables, particularly tomato, on the month of April using water pipes connected to springs located upstream of the *barangay.*

The people of the *barangay* also observed the recurring changes of climatic conditions such as irregular occurrence of heavy rainfall and drought.

Due to these environmental problems, the farmers often experience crop failures which led them to increase their cultivation of various crops. According to them, planting of fruit trees may augment their income and resilience against crop failures due to droughts and irregular climatic changes and price fluctuations.

Investments in land quality

There are about 6 types of land investments in *Barangay* Balete, namely: contour bunds, rice terracing, agroforestry establishment, tree planting, irrigation through water tubes or pipes, and hedgerows.

1 Contour bunds

All of the farmers in the *barangay* practice this technique of reducing soil erosion. Contour bunds are formed with the use of the hoe and undertaken every cropping season but less intensive during the second cropping which starts on the month of September or October of every year. According to them, this technique is more effective in reducing soil erosion than bench terracing because of the close spacing of the contour bunds. Besides, this technique leaves no idle land spaces and has a low investment cost although establishing the contour bunds is done every year.

2 Rice terracing

Rice terraces are constructed in areas where farmers can find sources of water to irrigate the rice paddies. The terraces are made of soil taken by a farmer from adjacent part of his farm. There are about 15 percent of the total households who have constructed their rice terrraces and the numbers who are planning to construct their own farm are increasing. Most of them are constructing the rice terraces by themselves utilizing household labour such that 6 man-days are required to terrace a 700 to 1000-sq m farm. One farmer was able to construct his three-fourth hectare farm in 8 years working on it only during the rainy season.

Aside from the availability of water for irrigation, carabao and other farm implements are needed in establishing rice terraces. Thus, a farmer needs about Php 10,000 - Php 15,000 to buy for carabao and another Php 1,000 - Php 2,000 for farm implements.

3 Agroforestry

The project management office (PMO) of the DENR-CENRO, Aritao, Nueva Vizcaya had introduced this technique as part of the activities under the CPEU project through *barangay* meetings, seminars, trainings and farm visits. In *barangay* meetings, *barangay* officials usually include in their agenda a call for the residents to practice this farming technique. Extension workers or experts are also invited in these meetings to talk on agroforestry and other livelihood activities as a means of convincing people about the need to conserve their remaining forest resources. Seminars, trainings and on-farm visits were conducted through the CPEU which the farmers claimed that they were educated in all aspects of their lives through these activities. Although definition of agroforestry varies, fruit and forest trees species have been planted by the farmers at locations within their farms not utilized for cultivating vegetables or on boundaries.

The fruit trees planted by most farmers are mango, avocado, citrus, jackfruit and papaya. Mango seedlings are, however more expensive (Php 50 - Php 100 per seedling) than the other fruit tree seedlings (Php 5 - Php 20 per seedling) although some have been given free by DENR.

Agroforestry fields are expanding in the *barangay.*

4 Tree plantation
The exotic forest trees species planted by farmers are *Gmelina*, mahogany and Japanese acacia but *Gmelina* is the most preferred species due to its market potential. These species have been introduced by the CPEU and the farmers were taught the techniques of seed gathering, seedling production and planting of the trees. The farmers said that these activities are done during their slack time or after farming. Tree planting activities are expanding in areas not suitable for vegetable farming or in areas that are highly degraded and need rehabilitation.

5 Irrigation (water tubes)
Plastic water tubes are purchased and used by the farmers to irrigate their vegetable crops as well as for domestic purposes. The tubes are laid out by constructing tree supports along the length of the route from the water source to the farms. They believe that irrigation through the plastic tubes lessen the tendency of the soils to be eroded since water is applied in small amounts. Investing in this type of irrigation is expanding.

6 Hedgerows
This technique has been introduced through the CPEU but adoption by farmers had stopped. According to them, planting materials for hedgerows are not available in the *barangay* and that other techniques to reduce soil erosion are available and as effective as hedgerows. Thus, farmers' adoption of this technique is not expanding.

3.2.5 Social capital

Social organization of the village

1 *Barangay* local government unit
In the Philippines, the *barangay* is the smallest local government unit (LGU) and thus all activities and decisions concerning the affairs of the households are undertaken or resolved within this level. It is headed by the*barangay* Chairman with 7 members of the *barangay* council, a representative of the youth group known as Sangguniang Kabataan Chairman, a Secretary and Treasurer. The *barangay* leadership is responsible for the delivery of social services, peace and order and the conduct of various activities of the government. They are the first link of the people to the government and thus responsible directly to the town or municipal leadership. Except for Secretary and Treasurer, the*barangay*

officials are elected by the registered voters within the *barangay* who serve for 3 year-term and limited for 3 terms.

As said previously, the most common type of communal activities participated in by all households in the *barangay* are: *barangay* assembly meetings, cleaning the school surroundings, repairing school buildings, constructing waiting sheds and road maintenance. During *barangay* meetings (once every 3 months), topics related but not limited to the following are discussed: livelihood projects, ordinances, *barangay* festival, peace and order and health. Plans and programs and other information on a national scale are also presented during these meetings.

The *barangay* officials who set the date of the activities organize communal works in the *barangay*. Each household is required to provide one man-member to participate in the communal works and *barangay* meetings. If the male head of the household cannot go, other members of the household (with age 15 years old and up) can attend as a substitute. The penalty imposed by the *barangay* officials (which is provided in an ordinance) for not attending in any of the communal activities or meetings is the payment of Php 50 per day. This amount is significantly lower than what the farmer could earn by not attending, e.g. Php 80 plus food if he would go out for hired labour. Yet, not many choose for this option. The 'social cost' of not attending is obviously higher than Php 80 plus food.

2 Balete Upland Farmers Multi-purpose Cooperative, Inc. (BUFAMCO)
This cooperative had been organized by DENR through CPEU in 1988 and was subsequently registered in the Cooperative Development Authority (CDA) in Region 02. The cooperative has total members of 80 households who are all CSC holders.

The cooperative received various citations and monetary awards for its accomplishments, such as sustainable farming and other livelihood projects, reforestation and other tree planting activities and agroforestry establishment. Infrastructures are also constructed by the members with the assistance of the local government of Sta. Fe and DENR like impounding dams, the *Bagsakan* Center, a multi-purpose nursery shed, a solar dryer, the hanging bridge and the graded trails.

The cooperative is headed by a chairman and assisted by the vice-chairman, secretary, treasurer, press relations officer and 6 directors. This set of officers run the operation and management of the cooperative on a part-time basis providing the link to DENR through the assigned Project Management Officer (PMO).

3 Rural Improvement Club (RIC)
This is an organization of the women which is usually headed by the wife of the *barangay* chairman. This group is, however not active in the *barangay* although it is organized with a corresponding set of officers

There is no dominant family in the *barangay* although most of them are Kalanguya-speaking Ifugaos.

3.2.6 Information dissemination

The farmers acknowledge that their technological knowledge on soil conservation, sustainable farming systems, tree planting and other livelihood activities are derived from the seminars, trainings and cross-farm visits conducted by DENR through the CPEU. Also, extension workers from both the municipal government of and multinational companies of vegetable seeds, insecticides and fertilizers are invited to talk during *barangay* meetings. Radio stations also have regular extension programs in which environmental conservation, agroforestry and other potential livelihood activities are discussed. Information in the *barangay* comes also through word of mouth from friends and neighbours.

Many households in the*barangay* are willing to experiment with new techniques that are introduced to them and only few of them are still hesitant to adopt these techniques for fear of crop failure and the inputs required. When seeds and other planting materials are made available to them, the households eagerly adopt the techniques of their relatives, neighbours and friends.

3.2.7 Infrastructure

Balete is crossed by the national highway, which is concreted, but going into the *barangay* center where houses are mostly located can be done by walking. The *barangay* center is located 1 km away from the national highway and can be reached by crossing the Sta. Fe River using the hanging bridge constructed through the financial assistance of the Office of the Northern Cultural Communities (ONCC) and walking through the unpaved*barangay* road. The road is not passable by any type of vehicle during the rainy season due to large gullies that sometimes cross the roads. The other areas (or *purok*) of the *barangay* can be reached also through unpaved roads and trails which cannot be used by vehicles during heavy rains or any day during the rainy season. The table below (Table 3.6) shows the travel time and fare per person at various destinations from the *barangay* center:

Table 3.6 – Travel time and costs at different destinations in Balete, Sta. Fe, Nueva Vizcaya

Destination	Distance (km)	Time of Travel	Fare (Php)
Barangay center from farthest purok	5	45 min – 1 hour (walking up) 30 min – 45 min (walking down	— —
National highway (*Bagsakan* center)	1	30 min fr. *Barangay* center	—
Sta. Fe, Nueva Vizcaya	5	20 min. fr. national highway	2.00
Aritao, Nueva Vizcaya	15	30 min. fr. national highway	6.00
Metro Manila	223 (approx)	5 hours fr. *Bagsakan* center	165.00

Electricity is not yet available in the*barangay*, hence most of the households use kerosene put in a bottle, known as ' *gasera* ', as lighting system. During special occasions, a kerosene-fueled Petromax is being utilized due to its lighting quality which is as bright as that of electric light. Table 3.7 below shows the various infrastructures constructed in the *barangay* with the assistance of government and non-government agencies.

A provincial hospital is located in the capital town of Bayombong, Nueva Vizcaya (about 50 km distance) while a municipal health center is available for general health services in Sta. Fe. Privately owned hospitals and clinics can be found in Aritao and Bayombong, Nueva Vizcaya.

Other infrastructures and services, such as recreational centers and telecommunication facilities are located in the municipalities of Aritao, Bambang and Bayombong, province of Nueva Vizcaya.

Table 3.7 – Infrastructures established in *Barangay* Balete

Type of Infrastructure	Quantity	Agency Involved
1 Small water impounding dam	2 units	DENR/LGU
2 Graded trail	12 km	DENR/LGU
3 *Bagsakan* center	1 unit	DENR/LGU
4 Multi-purpose nursery shed	1 unit	DENR
5 Solar multipurpose drier	1 unit	LGU
6 Water tank	1unit	ERP*
7 Hanging bridge	1 unit	ONCC*
8 2-classroom school building	1 unit	DECS*

*Earthquake Rehabilitation Programme (ERP), Office of the Northern Cultural Communities (ONCC), Department of Education, Culture and Sports (DECS).

3.3 Barangay Kapatalan, Siniloan, Laguna

Barangay Kapatalan is formerly known as 'Nursery ', because it was the site of tree nursery activities of the Philippine government while reforesting the area which was heavily damaged during the Second World War. It occupies a flat land with an approximate area of 65 ha where the people in nearby areas migrated and settled. The migrants then called their newly formed village, '*Kapatagan*', a Tagalog or Filipino term for level ground surface. However, it was officially proclaimed as *Barangay Kapatalan* in 1954 by the then President Ramon Magsaysay in honor of an Australian missionary who pronounced the word *kapatagan* to *kapatalan*. The timeline that affected Kapatalan is shown in Table 3.8.

The *barangay* is located in the Municipality of Siniloan, Province of Laguna in the Southern Luzon south of Manila, Philippines. With a total area of about 800 ha, it is one of the 20 *barangay*s of Siniloan. Almost 90% of the total area have slopes of 18% and above which are classified as forest zone and the rest are flat areas which can be privately owned.

Barangay Kapatalan is about 10 km from the Siniloan town proper (center). It is accessible through the asphalted Siniloan-Infanta, Quezon road by all kinds of land vehicles. The *barangay* is about 120 km (4 to 5 hours travel) from Manila via the South Luzon Expressway-Laguna area or 88 km (2 to 2½ hours travel) via the Tanay-Antipolo road passing through the province of Rizal.

3.3.1 Resources

Physical characteristics

The total land area of *Barangay* Kapatalan is about 800 hectares, the smallest among the four study sites, and bounded by *Barangay* Magsaysay, Siniloan, Laguna and UP Land Grant on the northeast; Municipality of Famy, Laguna on the northwest; *Barangay* Liyang on the southwest; and UP Land Grant on the southeast. The land use distribution of the *barangay* is shown in Table 3.9 indicating that the forest area is still the largest land component of the village.

About 75 percent of the *barangay* has a clayey soil type in the agricultural and some agroforestry areas while the remaining 25 percent is loam mostly in the forests and agroforestry areas. The soil is acidic with pH values ranging from 4 to 6. The lowest elevation in the *barangay* is 300 meters above sea level (masl) at the *barangay* center while the highest is 450 masl in the mountainous areas.

In terms of slope distribution (Table 3.10), about 50 percent of the *barangay* has rolling to moderately steep slopes, 25 percent has steep slopes, 18 percent has very steep slopes, 4 percent has undulating to rolling slopes, and 3 percent has level to gently sloping slopes.

Table 3.8 – Major changes in *Barangay* Kapatalan, Siniloan, Laguna for a period of 45 years (1954 -1999)

	1954	Late 50s to 60s	1970s-early 80s	1988	1990	1992	1996	1997-1998
1 Settlement period and/ or major events	– Settlement of migrants from the nearby towns of Siniloan, Calauan and San Pablo, Province of Laguna and nearby province of Batangas.	– Started planting coconut, fruit trees and upland crops such as upland rice, vegetables ginger and root crops.	– Logging operations are made for the remaining forest lands; – Early 1980s, the forest resources in the UP Land Grant (having an area of about 6,000 ha) are logged by a concessionaire permitted by the UP System authorities.	– Implemented the Integrated Social Forestry Project (ISFP) of the DENR in the Sierra Madre forest areas within the boundary of Famy, Laguna; settlement of migrants continued. – Organized the Minayutan ISF Multipurpose Cooperative, Inc. – Upland rice, corn and tomato were the main crops of the settlers.	– Started the construction of the Manila-Infanta, Quezon road passing through *Barangay* Kapatalan, Siniloan, Laguna. – Charcoal making and gathering of leaves of ferns are some of the income generating activities of Hh which started in the early 80's.	– Asphalt construction of the Manila-Infanta, Quezon road was completed opening *Barangay* Kapatalan for more migration; – Hh started selling their landholdings especially along the highway to Manila businessman which led to the conversion of agroforestry farms to poultry/piggery and growing of ornamental plants.	– UP Land grant officials became strict in implementing forest laws on illegal logging reducing charcoal making activities but allowed the gathering of ferns in forest areas covered in the land grant.	– Farmers who have land claims in UP land grants and who have no claims in other forest areas were encouraged to participate in the ISFP implemented by UP (UP style). – Long drought started October.
2 Total Household	Group of lowland farmers	Tagalog and Visayan migrants settled	Uncontrolled settlement of migrants continued	About 150 households with 500 people			341 households with 1824 people	386 households with 1880 people
3 Vegetative cover	*Barangay* is a combination of virgin, loggedover forests reforestation.	Cultivated area for slash-and-burn and vegetable farming; .Started planting coconut and other fruit trees.	Logged-over area dominated the vegetative cover.	Increased area of brushland/ grassland and all forestlands are logged-over.	Reforestation and agroforestry farms are encouraged.	.Agroforestry farms near the asphalted highway were sold and converted to piggery/ poultry and ornamental farms; lowland rice and vegetable growing in vacant lots were undertaken by Hh.	Organic (chicken and pig) manure application is commonly practice by many households in the *barangay* (even started since 1992) led to vigorous vegetative cover.	Establishment of more agrofo., individual tree farms and other livelihood activities (vegetable gardening, poultry and pig raising).

The rolling to level slopes are where most of the activities of the *barangay* households are taking place such as residential and infrastructural development, lowland rice farming, backyard gardening, fishpond and ornamental farming, and agroforestry. Most of the agroforestry and reforestation takes place on the lands with moderately steep up to very steep slopes. These characteristics are shown in Figure 3.3 in the north-south transect line of the village.

Table 3.9 – Land use distribution of *Barangay* Kapatalan, Siniloan, Laguna.

Land use category	Area (hectares)
Barangay infrastructures/Residential area	60
School/Church site	4.5
Agricultural area	—
• Rice	5
• Vegetables	5
• Fishponds	2
Pasture land	10
Agroforestry	545.5
Grassland	15
Forestland	53
Total	**800**

The amount of rainfall received by *Barangay* Kapatalan has been recorded by the office of the UP Land Grant located about 3 km away. However, its rainfall record started only in 1994. The amount of rainfall received in the area as observed in the UP Land Grant is shown in Figure 3.4.

Table 3.10 – Slope range distributions in *Barangay* Kapatalan, Siniloan, Laguna

Slope category (%)	Description	Area (hectares)	Percent
0 – 5	Level to gently sloping	25	3.1
5 – 18	Undulating to rolling	35	4.4
18 – 30	Rolling to moderately steep	400	50.0
30 – 50	Steep	200	25.0
> 50	Very steep	140	17.5
Total		**800**	**100.0**

The lowest mean monthly rainfall were observed on the month of March and April which are considered as the driest but still more than 150 mm of rainfall. The highest mean monthly rainfall was in December. Rainy season starts on the month of May and ends on the month of January. Typhoons usually occur during this period.

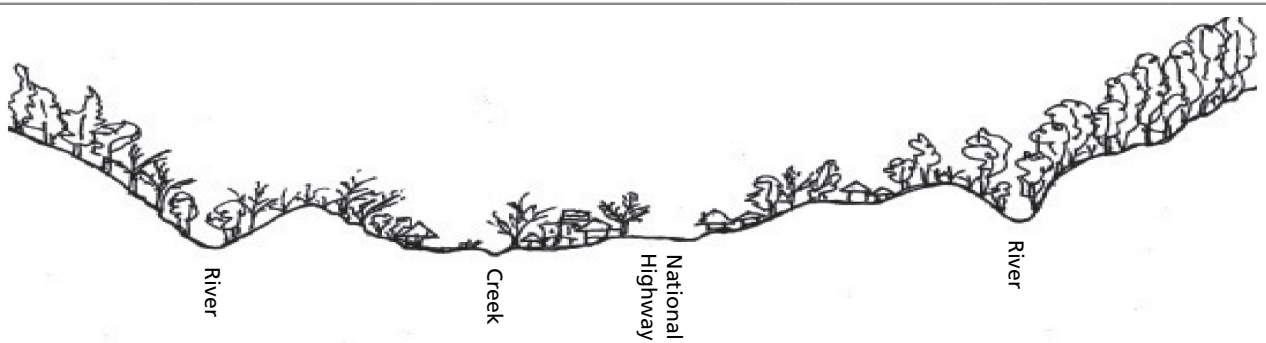
North- South transect line									
Land classification	Forestland		Alienable and Disposable land (A & D)		Forestland				
Land use	Forestland	Agroforestry	Agroforestry/Settlement/Lowland farming		Settlement, agroforestry and reforestation	Logged-over/secondary forest			
Slope class	30-50% (mountainous)	18-30% (moderately steep slopes)	0-5% (flat lands)		9-18% rolling	30-50% (mountainous)			
Elevation (m)	400-500		250-300		300-400	400-500	500- 600		
Remarks	Agro-industrial business enterprises like poultry and piggery are established about 150 m from the national highway. The main crops planted in cultivated lands are vegetable crops and lowland rice; the most common fruit trees planted in agroforestry areas are mango and oranges while forest trees species are gmelina and mahogany.								

Figure 3.3 – North-South transect line of Kapatalan, Siniloan, Laguna

On an annual basis covering a 5-year period from 1994-1998, the year 1998 is considered as the wettest year with a total rainfall of about 5,429 mm while 1997 is the drought year with a total rainfall of about 2,994 mm. It was in 1997 when the El Niño phenomenon occurred affecting the whole Philippines. On the average, the annual rainfall received by Kapatalan is about 4,389 mm, the highest amount of annual rainfall among the four research sites.

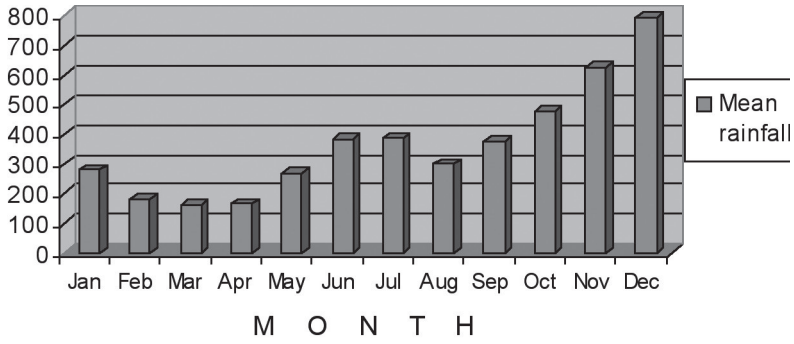


Figure 3.4 – Monthly rainfall distribution observed at the UPLB Land Grant Field Office, Siniloan, Laguna (1994–1998).

For the period 1994-1998, the highest number of rainy days was in the month of December while the lowest was in April. The annual number of rainy days averages 225 with the year 1998 getting the highest annual number of rainy days (Table 3.11).

Table 3.11 – Monthly and annual number of days of rainfall observed at the UP Land Grant Field Office for a period of 5 years, 1994-1998.

Month	YEAR					
	1994	1995	1996	1997	1998	Mean
January	22	25	27	20	19	22.6
February	15	10	23	21	12	16.2
March	19	9	21	11	14	14.8
April	10	6	18	7	17	11.6
May	12	5	16	16	24	14.6
June	22	15	27	9	18	18.2
July	26	17	24	27	12	21.2
August	12	20	10	14	21	15.4
September	21	24	20	22	21	21.6
October	18	22	17	18	25	20.0
November	24	21	27	20	25	23.4
December	24	30	27	20	26	25.4
Total	**225**	**204**	**257**	**205**	**234**	**225**

Population

The total population (as of December, 1998) of the *barangay* is 1880 persons with 386 households (latest count this February, 1999, however give 2,181 persons with a total households of 450) with extended families living within each household. In 1995, the total population is 1717 with a total household of 334 and it increased to a population of 1824 in 1996 with a total households of 341. In terms of sex distribution, the village is male-dominated with 990 males compared to 890 females or a male-female ratio of 112 per 100 individuals.

Kapatalan is considered densely populated having a population density of about 235 persons per square kilometer. Table 3.8 shows the major changes in the *barangay* in terms of population and vegetative cover.

The literacy rate of the *barangay* is about 95 percent in 1995 which increased from a value of 80 percent in 1980. This high value is attributed to the accessibility of the village which makes the delivery of health and social services, especially educational facilities, available to the growing and young population

As in most Philippine society, a household in Kapatalan consists of persons who are related by kinship ties, like parents (husband and wife) and their children sleeping in the same housing unit. Some newly married sons or daughters, however are still living within their parents' house. The husband is the head of the household or family and with the help of the wife, makes the major decisions affecting the family. Each decision made is expectedly respected by members of the household. If the husband dies, the wife takes over the management and financial needs of the household.

Each household or family has an average number of children of about 4. At the age 12 years old, children are expected to participate in all activities in the farm such as land preparation, planting, weeding and harvesting aside from helping their parents in domestic activities at home.

There are about 5 female-headed households in the *barangay* caused by the death of their husband due to sickness and old-age as well as those who are legally separated. In cases like this, the eldest son or daughter assists the household female-head in most decision-making of the family.

Like the other villages, the people of Kapatalan are monogamous society. A man with more than one wife, if there is one, is ridiculed and considered to be illegal.

3.3.2 Economics

Livestock
Farmers in Kapatalan presently grow various livestock which they consider very important in their farming either as a source of draft power or income. The livestock grown are as follows:

1 Carabao (water buffalo)
About 25 percent of the total households own from 1 to 2 carabaos. The farmers use these animals in preparing the land for planting (i.e. plowing and harrowing) and making furrows during planting period. They are also used for hauling of logs and agricultural products during harvest from the farm to their residents (distance ranges from 500 m to 7 km).

Farmers graze their carabaos on vacant lots available in the area. Carabao manure is not yet use in the farm because, according to the farmers, the quantity of manure is too small to be used for fertilizer but they used them in their vegetable gardens located in their backyards.

In times of need, the farmers sell their carabaos at a price of Php 15,000 to Php 18,000.

2 Cow
Only about 18 percent of the total households in the *barangay* owned an average of about 1 cow per households. These are kept by farmers for about 1 or 2 years afterwhich they sell to the Siniloan market. Cow manure, like carabao manure is not normally used in the farm but used in backyard gardening.

Cows are grown by farmers in the *barangay* for meat production at a price of Php 78 per kilogram live weight.

One family residing in the *barangay* is maintaining a cattle ranch within the *barangay* boundary. There are about 50 heads kept in the ranch having an area of about 100 ha. The cattle are sometimes fed with rice straws and corn straws taken free from nearby farms.

3 Pigs
Almost all of the households in Kapatalan are growing pigs in anticipation for future expenses like education of their children, farm inputs and other household expenses. Some households are growing pigs on a commercial scale (as their main livelihood activity) usually from 10 to 20 heads while other households maintain only about 2 to 5 heads at a time. Pigs are mostly sold on a per head basis after 6 months to 1 year of growing usually to buyers (about 2 buyers) who live in the *barangay.*

The price is Php 80 per kilogram for pork or Php 60 per kilogram if sold on a liveweight basis.

4 Horses
About 8 percent of the total households have horses which are mainly used by farmers for transporting agricultural products.

5 Chicken
All of the households in the *barangay* have, on the average, about 4 chicken per households. These are grown originally for home consumption but these are also sold out as the need for cash in the family arises.

Sold in whole, the price depends on the size or weight which ranges from Php 100 to Php 150 per chicken.

There are 2 large-scale poultry raising operations in the *barangay* which are managed by people residing in Metro Manila under the contract-growing scheme of San Miguel Corporation (SMC), a multi-national company engaged in agro-industrial activities. Under this scheme, SMC provides all inputs (chicks, feeds and medicine) in broiler production including marketing while the poultry house, other facilities and labour are the counterparts of the contract grower. In total, the industry in the *barangay* is growing about 20,000 chicken per year. Today, the contract-growing scheme is taken over by Purefoods, a subsidiary of SMC.

The price of the broiler chicken sold in this scheme fluctuates from Php 60 per kilogram to Php 80 per kilogram.

Chicken manure from the poultry is bought by farmers in the *barangay* at a price of Php 18 per bag.

6 Ducks
About 8 percent of the households are growing ducks. According to them, these are only used for home consumption but the households also sell some heads when there is a need for money. Usually sold on a live weight basis, the price of ducks is Php 80 per kilogram.

7 Goats
On the average, 2 goats per households are owned by about 9 percent of the total households. These are sold within or outside of the *barangay* at a price ranging from Php 600 to Php 900 per head.

8 Dogs and cats
These are kept as pets for the family. Dogs are expected to guard the house during the night while others used them for hunting in the forests. Cats usually do the job of catching rats.

Carabaos, cows, and goats are grazed by the farmers in their lands under fallow. They are also kept in grassland areas not under cultivation yet by farmers.

About 2 households in the *barangay* are raising tilapia (*Tilapia nilotica)* in fishponds with good sources of water. Fingerlings are bought from Marikina fishponds (about 70 km away) near Manila at Php 4 per fingerling.

Trees
Indigenous forest species under the dipterocarps species (such as narra, *malaruhat*, red and white *lauan*, Philippine oak and mahogany, and *balete*) can still be found in the remaining forest areas of the *barangay* usually along the Sierra Madre mountain range. These trees species are mainly used in the Philippines for building, house and bridge construction, and fuelwood. They are also good raw materials for charcoal-making which can produce high quality charcoal.

Although logging is banned in the area since the implementation of the ISFP, some households are still engaged in small scale logging supplying the needs of private house construction in the *barangay*. These are done in a manner that they are not detected by government authorities such as the DENR or UP security guards if taken within the UP Land Grant. The penalty for logging illegally within the forest areas are confiscation of the chainsaws and carabaos used in cutting trees and hauling logs, respectively, as well as legal charges in government courts.

The exotic forest trees species found in the *barangay* are giant *ipil-ipil* and *kakawate*. Giant ipil-ipil trees are fast-growing species which can be utilized for lumber, fuelwood and house post after 3 to 5 years of planting. As in Giant ipil-ipil, *Kakawate* is utilized primarily for fencing or planted along land boundaries by the farmers. The main trunks (after 10 -15 years reaching a size of 10 -12 cm each) of *kakawate* can be utilized for decorations in flower gardens.

Likewise, the farmers planted fruit trees such as: coconut, citrus (*dalanghita*), coffee, pineapple, lansones, avocado, cacao, guyabano, caimito, papaya, and jackfruit.

Coconut had been planted in the *barangay* since they arrived in the area in the 50's. They start bearing fruit after 5 to 7 years of planting and will live up to 50 years. Coconut fruits are sold at prices ranging from Php 3.50 to Php 4.50 per piece. Fruits of citrus (*dalanghita*), coffee, lansones and pineapple are also priced (in the *barangay* center) at Php 7-10 per kilogram, Php 13-20 per

kilogram (unshelled), Php 20- 23 per kilogram and Php 2.50-3.50 per kilogram, respectively. According to the farmers, fruits of avocado, cacao, guyabano, caimito, papaya, and jackfruit are for home consumption only.

Due to the inadequate supply of logs, coconut trees are now cut and processed into lumber by some farmers which are subsequently sold for construction purposes at Php 15-20 per board foot. Timber from avocado, guyabano and caimito can be utilized as fuelwood. Except for papaya, all the other fruit trees bear fruit after 3 to 5 years of planting and they can live up to 25 years. Flowering and thus fruiting ability of the fruit trees above are greatly influenced by typhoons and droughts.

Crops output
The major crops planted by individual households in the *barangay* are:

1 Coconut
Farmers were already harvesting coconut fruits about 40 years ago. They sell at Php 3.50 to 4.50 per piece. The yield per hectare ranges from 1,000 to 1,500 pieces per year or 400 to 500 kilograms if processed into copra. The price of copra ranges from Php 10-20 per kilogram This is a major source of income of the farmers but many coconut farms along the Laguna-Quezon national highway are being converted to agro-industrial and residential uses due to influx of urban migrants from the urban centers of Siniloan and Metro Manila. Land prices along the highway have increased considerably since 1990 which influenced the conversion phenomenon in the area. Although some coconut farms are maintained along the national highway, coconut-based agroforestry farms are now being concentrated in the more outlying areas of the *barangay*.

2 Citrus (Mandarin orange or *dalanghita*)
Planted by about 5 percent of the households, citrus yield per hectare ranges from 200 to 300 kilograms per hectare. Some farmers are planning to expand their citrus plantation with preferences on the *calamansi* variety due to lower price and handling problems of *dalanghita*. The price per kilogram of *dalanghita* is Php 7 at the *barangay* center.

3 Ginger
About 2 percent of the households in the *barangay* are planting ginger under the coconut plantation. The yield per hectare is about 800 to 1000 kg per hectare. At the *barangay* center, the price of ginger is about Php 50 per kilogram but when sold at the Siniloan market the price is about Php 65 per kilogram.

4 Coffee
About 10 percent of the households have a coffee plantation but only few have large areas engaging in selling their output. The yield per hectare varies largely from 600 to 1,200 kg per hectare mainly because the coffee plants are sensitive

to weather changes. As stated above, the price of unshelled coffee is Php 13-20 per kilogram at the *barangay* center or at Siniloan market.

5 *Lanzones*
This fruit tree is planted by about 5 percent of the total households. The yield per hectare is 200 kg per hectare with a price of Php 20-25 per kilogram at the *barangay* center.

6 Taro (local name is *gabi*)
This is cultivated once per year in small plots under the coconut trees with an area ranging from 1000 sq m to 2,500 sq m and with yields of 250 kg to 300 kg. There are no fertilizers and pesticides applied for this crop hence, management is minimal. There are 3 varieties of taro planted by about 1 percent of the households in the *barangay*, namely: *pitik, lampakan* and *galiang. Pitik* variety has higher prices than the other varieties which range from Php 25 per kilogram to Php 27 per kilogram. The prices of *lampakan* and *galiang* varieties range from Php 7 to Php 10 per kilogram.

Crops inputs and cultivation practices
Fruit trees are usually planted at a density of 200 plants per hectare. This requires about 10 man-days of labour in transplanting and about 2 man-animal days of hauling and distributing the seedlings to the holes. Hauling of manure requires about 2 man-animal days as well as 2 man-days in putting the manure to the holes.

For citrus, *lanzones* and coffee, pesticides (with brand name of Cymbush EC, Lannate, etc.) are also applied by farmers in their farms at a rate of 1 liter per hectare for 1 to 2 applications. The prices of pesticides are presented in Table 3.12.

Most of the farmers claim that family labour is used in establishing their agro-forestry farms such as for hauling and transplanting of seedlings and hauling of manure. For others, the costs of 1 man-day and 1 man-animal day are Php 150 and Php 200 without meal, respectively. Agro-industrial workers hired in poultry projects and ornamental gardens however, have lower pay of about Php 80 per day.

Coconut seedlings cost from Php 15 to Php 20 per seedling while citrus seedlings cost from Php 40 to Php 50. Due to high seedling costs, the farmers produced their own seedlings. During the implementation of the ISFP, some seedlings were distributed free to the farmers which they subsequently planted in their farms. Seeds are also given to the farmers by DENR through the ISFP in order for them to grow their own planting materials.

Chicken manure is available in poultry houses operating within the*barangay* at a price of Php 18 per bag. The farmers prefer to buy and apply organic manure in their farms rather than the commercial fertilizers. The farmers observe that the soil become more fertile and generally their crop yields are higher than the expected yield when they apply organic manure to their farms. Output quantity and quality of fruit trees also increases with the application of pesticides.

Table 3.12 – Farm inputs used by farmers with their unit prices

Farm inputs	Unit	Amount (Php)
Pesticides/Weedicides:		
Cymbush EC	1 litre	700
Lannate	1 litre	380
Seedlings:		
Coconut	1 piece	15–20
Citrus	1 piece	40–50

Non-farm activities (domestic, i.e., on-farm)
The farmers in the *barangay* wake up as early as five o'clock in the morning in order to have time for them to prepare for the days activities in the farm. They start cooking, fetch water to be consumed for the day or at least up to a volume needed until noon. After one hour, their children are expected to get up also so that they too will be assisted in preparing them for school.

Normal working time in the farm is from six o'clock to eleven o'clock in the morning and one o'clock to four o'clock in the afternoon. A noon break from eleven o'clock in the morning to one o'clock in the afternoon (breaktime of 2 hours) is practiced by the farmers. This breaktime, however is usually spent in their farms when working need to be extended in the afternoon in which working stops as early as four o'clock in the afternoon due to walking time consumed in going home. The wife usually does the cooking while the husband does the tending of livestock if raised by them.

Likewise, fruits, fuelwood and other things needed at home are gathered during noon breaks, to be carried by the farmers when they go home in the afternoon.

Off-farm and seasonal migration
During the period from January to March, farming activities in the *barangay* slow down so that many of the farmers devote most of their time in repairing their houses and prepare planting materials needed for the first cropping season or even the second cropping of the year. Still, some farmers occasionally visit their farms to see if they can harvest whatever is available and needed for home consumption. Many of the households also are engaged in carpentry work as well as hired labour in urban centers of Laguna, Metro Manila and in the

agro-industrial projects and ornamental gardens operating in the *barangay*. Furniture-making using 'driftwoods' (or trunks and roots of hardwoods left behind after logging) by some households are also very active in the *barangay*.

Many farmers and their household members are involved in carabao logging and fern gathering. Leaves of ferns are sold in bundles (about 10-20 cm diameter) at a price of Php 5 in the *barangay,* to be transported in Metro Manila for the cut-flower business establishments. Some individuals are also engaged in operating and driving of tricycles and jeepneys bringing people to government offices, schools and market centers or transporting agricultural products of the farmers. Many households are operating small stores established in their respective houses.

According to key informants, income from these off-farm activities is used to buy foods for home consumption, to support the education of their children and inputs to their farms like seeds and seedlings, and insecticides. Money is also needed for wages in farm labour especially during the peak season.

Expenditures

The major categories of household expenditures in the *barangay* are: foods, education of their children, farm inputs and medical expenses in that order. Whatever is left can now be used by the spouse in buying clothes and appliances for the family or to be used for the improvement of their farms. This is the common expenditures by households in the Philippines especially in the rural areas.

Upon consulting the members of the household (wife and adult son or daughter), the male head of the family usually gives the final decision on how to spend money from farm incomes. Extra incomes of the households are often used for clothing, appliances and improvement of their houses, buying new and improved seeds for the next cropping season, buying few seedlings of fruit trees or used for payment of hired labour for the establishment or improvement of farms.

Few farmers have savings account in the bank maybe only those who are considered rich. The farmers usually keep their extra money by themselves expecting that they can used them for improving their houses, buy new and improved varieties of their crops, used for mortgaging to expand their cultivated area or maybe invested in establishing their piggery, poultry, agroforestry and tree farms.

3.3.3 Markets and land institutions

Access to land and communal resources
The major portions of Kapatalan are already privately owned and titled, even some areas officially not available for private ownership and covered by forestry regulations. Only those areas covered by the ISFP are not privately titled but already claimed and managed by the farmers (through the Certificate of Stewardship Contract or CSC issued by the government) with government supervision.

On the average, each household in the *barangay* is cultivating 1 to 2 plots with total areas ranging from 2 to 5 ha but cultivating only about 1 to 3 hectares from the total plots. Some portions of their landholdings are maintained by them as secondary forests expecting that they will be given rights of cutting the trees when the trees reach a marketable size. This is also a speculative behaviour on the part of the households considering the increase of importance and thus the market value of the lands they occupy.

In general, there is now a decreasing trend in the landholdings due to migration from neighbouring towns and cities and natural increase in the number of households in the *barangay*.

Lands for cultivation can be acquired in the *barangay* through direct purchase with cost ranging from Php 100,000 to 150,000 per hectare or payment of a mortgage fee of Php 10,000 to Php 15,000.

The *barangay* covers a small area of secondary forests (about 53 ha) including watersheds which the farmers protect as their counterpart obligation to the ISFP.

Adjacent to Kapatalan is the UP Land Grant which covers large forest lands of about 5,000 ha. Although the UP System is granted authority to manage the area for research, development and instructional purposes (since early 1950s), people from the *barangay* are free to gather ferns and other minor (non-wood) forest products that are abundantly growing in the forests. These are subsequently sold to buyers in the *barangay* and brought to flower shops in Manila.

Land tenure
As said, almost all of the lands within the *barangay* are privately owned or titled, even though some of them are generally classified as forest zone by the government. Since mid-1980s when the government became strict in implementing forest laws, the remaining forest areas are declared watersheds and thus not available for private ownership.

Land claims that are covered by ISFP were awarded the CSC. Through the CSC, upland cultivators are provided leases on the lands they are occupying giving them the right to use and benefit from the land for a period of 25 years and renewable for another 25 years.

Land hiring also exists in the*barangay* since early 1990s. A Korean businessman engaged in growing ornamental plants hired land from some landowners adjacent to the national highway for an annual fee of Php 10,000 to Php 15,000.

Agricultural labour
Agricultural labour needed in the farms is usually provided by each household member who has an assigned tasked to perform during the year. It is seldom that a farmer hire labourer for his farm. But in extreme cases where hiring is inevitable, the daily wage for agricultural labour (planting or transplanting up to harvesting) is Php 150 per man-day (without meals). If a carabao is included especially during ploughing, harrowing and hauling of agricultural products, the daily wage is Php 200 per man-animal-day (without meals). For hired labour, the working time is from seven to eleven in the morning and one to five in the afternoon while lunch break is between eleven o'clock in the morning to one o'clock in the afternoon.

Exchange of agricultural labour (particularly planting and harvesting) is also practiced by small groups of farmers in the *barangay*. This small groups of usually 5 to 6 members are relatives or friends.

As in most agricultural communities, ploughing, harrowing, making furrows, hauling (these need carabaos) and spraying are the agricultural labour that are being handled mainly by men while planting, weeding and harvesting can be undertaken both by men and women. Communal labour in the *barangay* is organized by the *barangay* officials who set the date of the activities. *Barangay* assembly meetings, cleaning the school surroundings and repairing school buildings, constructing waiting shed, and road maintenance are the most common type of communal works participated by all households in the *barangay*. Each household is required to provide one man-member to participate in the communal works and *barangay* meetings. If the male head of the household can not go, other members of the household (with age 15 years old and up) can attend as a substitute. There is no penalty imposed by the *barangay* officials for non-attendance of communal work but reminders of obligations by the people are posted in strategic places within the *barangay*.

Credit market
Assisted by the Land Bank of the Philippines and the Office of the Provincial Governor, loans are extended to members of the Siniloan Upland Farmers Multi-purpose Cooperative, Inc. (SUFMC) with an interest rate of 5 percent per cropping. These loans are usually used for domestic purposes (medicines,

education, etc.) as well as for the purchase of farm inputs, such as; seeds, fertilizers and pesticides. Informal credits also exist which are offered by *sari-sari* store owners and some households in the *barangay* with interest of about 10 percent per cropping. Payments are made in cash with a duration of 1 cropping season. Under this scheme, credit is based on trust and long time established buyer-customer relationship known locally as *suki*. Documents are not needed for small credit but if large amount is involved, a written *kasulatan* is prepared and signed by both involved parties and their 2 witnesses.

Markets for crops or agricultural products

Coconut, citrus (particularly *dalanghita*) coffee and lanzones are the marketed agroforestry products in the *barangay*. At present, there is no trading center operating within the *barangay* but middlemen who are living in the *barangay* are active providing the necessary marketing connections. These products are brought to Siniloan Market or to Manila.

There is an established buyer-seller relationship in all the transactions cited above. That is, the buyer who had done business and trusted for so long a time can easily buy the farmers' products. In most cases, a newcomer-buyer approaches someone in the *barangay* who introduces him to local traders residing in the *barangay* or he can go directly to the local traders. The newcomer-buyer should offer a higher price than the old buyer just to start the relationship.

Vegetables such as beans and eggplants; are sold directly to individual buyers in the Siniloan market center because selling is done in small quantities.

Markets for inputs

The most commonly used farm inputs in Kapatalan are seeds, organic manure and insecticides/pesticides (Table 3.12). Seeds and pesticides can be purchased from Siniloan market with a distance of 10 km while chicken manure is purchased from poultry farms operating in the *barangay*.

In most cases, farmers set aside good seeds already during harvesting season for the next planting season which will somehow reduce their production costs.

For fruit tree seedlings, most households in the *barangay* produce their own planting materials. The government, through the DENR and local government unit (LGU) of Siniloan, Laguna, are also distributing seeds of fruit and forest trees.

3.3.4 Transition

Perceptions of environmental problems
The environmental problems mentioned by the people in the *barangay* are: soil erosion, acidity and declining soil fertility of some portions of their lands, and pollution.

1 Soil erosion
Most of the farmers considered soil erosion as an important problem in the *barangay* because most of the lands have rolling to steep slopes. The degree of soil erosion increased from the highway going to the forest areas. This is indicated by small gullies and eroded soil surfaces with little grass vegetation. The farmers expressed the need for the application of more manure in these areas than in the agroforestry farms. According to them, fertility of the land may have been carried away during the rainy season when heavy rainfall occurs.

In their ISFP farms, farmers allow 1 cropping season (about 4–5 months) to 1 year of fallowing period for their farms by cultivating their lots (usually consists of 2–3 subplots) in rotation.

Through meetings, seminars, trainings and visits to model farms, conducted by the DENR through the ISFP and local government unit (LGU) of Siniloan, Laguna, the *barangay* officials and farmer-leaders of *Barangay* Kapatalan have acquired knowledge on soil and water conservation techniques, such as contour farming, bench terracing, multi-storey farming, crop rotation, agroforestry and reforestation. Their participation in the ISFP activities, TV, radio, newsletters and other means of communication encouraged some farmers to experiment the said techniques and finally adopted them in the *barangay*.

2 Acidity and declining soil fertility
Most of the soils in the*barangay*, especially within and near the*barangay* center, are acidic with pH ranging from 4.5 to 6. Farms in these areas are allowed to fallow by the farmers but recovery is very long (usually 3-5 years) due to constant grazing by privately-owned cattle (cow and carabaos). The problem of declining soil fertility is noticed by the farmers as consequences of heavy rainfall and soil erosion. The immediate effects of this problem are the declining yields of the crops planted in these lands. This is also one of the reasons why farmers practiced a fallow period of 1 year to 3 years interval on cultivated lands. Some farmers, especially those who have enough money, apply more manure in order to increase their farm yields.

The farmers plant fruit trees and other perennials like papaya in areas where soil fertility is declining until they will be able to establish an agroforestry farms.

3 Pollution
Although the people of the *barangay* acknowledged the importance of piggery and poultry raising in generating income as well as the production of manure which they can use in their farms, they are also worrying about the possible occurrence of air and water pollution in the area. Flies from the poultry houses could also be vectors for the spread of human diseases in the village, they think.

Investments in land quality
There are about 3 types of land investments in Kapatalan, namely: organic manure application, agroforestry establishment and tree planting.

1 Application of organic manure
Almost all of the households in the *barangay* applied organic manure in their home gardens and in their farms where they observed low soil fertility. Organic manure is always available at low cost from piggery and poultry projects operating in the *barangay*.

2 Establishment of agroforestry
Due to decreasing crop yields, farmers started planting coconut, fruit trees and other perennial crops in some portions of their farms while the other portions can be planted with annual crops. While waiting for the trees to bear fruits, they plant annual crops between the trees. They can also grow other crops under the shade of trees such as *taro* and *yam* after several years.

3 Tree planting
Individual tree farms (planting dipterocarp species) are established by the farmers. This is encouraged by DENR and UP officials in farmers' lots not suitable for annual crop cultivation and in lands with steep slopes. This scheme requires the issuance of certificate of ownership to those people who plant trees as basis for them to get permit to cut when these trees will reach marketable volume.

In addition to tree planting, farmers allow indigenous species of trees to grow in some portions of their ISF farms. According to them, they can use the trees in the future when the trees reached a marketable volume.

In *barangay* meetings, *barangay* officials usually include in their agenda a call for the residents to practice these conservation techniques. Extension workers or experts are also invited in these meetings to talk on agroforestry and other livelihood activities as a means of convincing people about the need to conserve their remaining forest resources. Seminars, trainings and on-farm visits were conducted through the ISFP and the Department of Agriculture (DA) which the farmers claimed that they were educated in all aspects of their lives through these activities. Although definition of agroforestry varies, fruit and forest trees

species have been planted by the farmers at locations within their farms not utilized for crop cultivation.

Although agroforestry farms are coconut-based, other fruit trees planted by most farmers are *lanzones*, pomelo, avocado, citrus, jackfruit and papaya. Citrus and *lanzones* (scientific name, *Lansium domesticum*) plantations are increasing in the *barangay*.

3.3.5 Social capital

Social organization of the village

1 *Barangay* local government unit
In the Philippines, the *barangay* is the smallest local government unit (LGU) in the Philippines and thus all activities and decisions concerning the affairs of the households are undertaken or resolved within this level. It is headed by the *barangay* Chairman with 7 members of the *barangay* council, a representative of the youth group known as Sangguniang Kabataan Chairman, a Secretary and Treasurer. The *barangay* leadership is responsible for the delivery of social services, peace and order and the conduct of various activities of the government. They are the first link of the people to the government and thus responsible directly to the town or municipal leadership. Except for Secretary and Treasurer, the *barangay* officials are elected by the registered voters within the *barangay* who serve for 3 year-term and limited for 3 terms.

The most common type of communal activities participated by all households in the *barangay* are: *barangay* assembly meetings, cleaning the school surroundings, repairing school buildings, constructing waiting sheds and road maintenance. During *barangay* meetings, topics related but not limited to the following are discussed: livelihood projects, ordinances, *barangay* festival, peace and order and health. Plans and programs and other information on a national scale are also being presented during these meetings.

As said previously, communal works in the *barangay* are organized by the *barangay* officials who set the date of the activities. Each household is required to provide one male member to participate in the communal works and *barangay* meetings. If the male head of the household can not go, other members of the household (with age 15 years old and up) can attend as a substitute. There is no penalty imposed by the *barangay* officials, however for not attending in any of the communal activities or meetings.

2 Siniloan Upland Farmers Multi-purpose Cooperative, Inc. (SUFMC)
This cooperative is financially assisted by the Land Bank of the Philippines (LBP) and guaranteed by the Office of the Provincial Governor. Its operation is,

however under scrutiny due to the non-payment of loans granted to members through the cooperative.

Due to problems in the cooperative, other households in the *barangay* are organizing for a new cooperative with different set of members. While the LBP will still be responsible for financial matters of the cooperative to be organized, UP System will be the cooperating agency since most of the possible members are claiming some lands in the UP Land Grant.

There are two dominant families, namely; Ortega and Ponce, in the *barangay.* Social interactions in the *barangay* evolved around relatives and friends.

In honour of their patron saint, the Roman Catholic religious group, comprising about 93 percent of the village population, conducts a *barangay* fiesta every May 14 to 15 of every year. The event consists of sports, beauty contest and parade. Most of the households consider this affair also as a chance of reuniting with other household members who have been away for a long time. Village elders are collecting financial contributions from village members and asking for solicitations from well-to-do families living within and outside the village and politicians to finance village events. Committees are also formed to oversee the different events being conducted during the festivities.

3.3.6 Information and dissemination

Most of the farmers have knowledge on coconut-based agroforestry which was taken from their point of origin and friends. They also acknowledged that their technological knowledge on soil conservation, sustainable farming systems, tree planting and other livelihood activities are derived from the seminars, trainings and cross-farm visits conducted by DENR through the ISFP and DA. Radio stations also have regular extension programs in which environmental conservation, agroforestry and other potential livelihood activities are discussed. Information in the *barangay* comes also through word of mouth from friends and neighbours.

Many households in the *barangay* are willing to experiment new techniques that are introduced to them and only few of them are still hesitant to adopt these techniques for fear of crop failure and the inputs required. When seeds and other planting materials are made available to them, the households eagerly adopt the techniques of their relatives, neighbours and friends.

3.3.7 Infrastructure

Kapatalan is bisected by the Laguna-Quezon national highway which is asphalted. Travelling into some areas of the *barangay* can be done by walking or

riding on horses or carabao. Table 3.13 below shows the travel time and fare per person at various destinations from the *barangay* center.

About 50 percent of the total households in the *barangay* have been provided with electricity, hence the other households used kerosene put in a bottle, known as '*lampara*', as lighting system. During special occasions, a kerosene-fueled Petromax is utilized due to its lighting quality which is as bright as that of electric light. The various infrastructures constructed in the *barangay* are shown in Table 3.14.

Table 3.13 – Travel time and fare (Php) for various destinations at *Barangay* Kapatalan, Siniloan, Laguna

Destination	Distance (km)	Time of travel	Fare (Php)
Barangay center or national highway from farthest farm	7	2 hours (walking up) 1 ½ hour (walking down)	— —
Siniloan junction	8	20 min fr. *barangay* center	8
Siniloan Market	10	25 min fr. *barangay* center	9
Manila (via Rizal)	88	2 hrs fr. *barangay* center	48
Manila (via Laguna)	120	4 hrs fr. *barangay* center	84

Hospitals can be found in the municipality of Sta. Cruz, Laguna (about 25 km distance) while a municipal health center is available for general health services in Siniloan. Likewise, privately owned hospitals and clinics can be found in Siniloan and nearby towns.

Table 3.14 – Infrastructures established in *Barangay* Kapatalan, Siniloan, Laguna

Type of Infrastructure	Quantity	Agency Involved
Multi-purpose solar drier	1 unit	*Barangay*/LGU
Barangay center and office	1 unit each	*Barangay*/LGU
Water pipes	100 m	*Barangay*/LGU
School buildings (Elementary and secondary)	6 units	DECS*/*Barangay*

A state college, the Laguna State Polytechnic College (LSPC) offering Bachelors (4 years) and Masters degrees, is located in the municipality of Siniloan, Laguna.

Other infrastructures and services, such as recreational centers and telecommunication facilities are located in Siniloan and nearby municipalities of Laguna province.

3.4 Quibal, Peñablanca

Barangay Quibal is located in the Municipality of Peñablanca southeast of Cagayan province. It is one of the *barangay*s covered by the Community Forestry Project (CFP) of the Department of Environment and Natural Resources (DENR) which includes *Barangay* Nanguilattan on the northeast, *Barangay*s Buyun and Nabbabalayan on the east. The CFP started in October, 1991 with an area of 1,000 ha with the implementing activities (such as, reforestation, agroforestry, etc.) contracted by a non-government organization (NGO). Through the Community Forestry Management Agreement (CFMA) issued to them in August 1994, it provides the *barangay*s 'the right to manage, develop and protect an area of about 4,170 ha and utilize the forest resources in a sustainable manner'. It is within the cancelled area of a logging concessionaire but carabao logging and fuelwood gathering continued the deforestation process of the forest resources of the area. During the logging boom in Quibal, farming was almost abandoned because the people were involved in the lucrative business of carabao logging and fuelwood gathering.

Quibal is named after tall straight trees growing abundantly in the area. It covers also some portions of the Callao Forest Reserve, declared as protected landscape of the Department of Environment and Natural Resources (DENR). The reserve is operated and maintained as a tourist spot by the provincial and municipal government and Department of Tourism. Table 3.16 shows the timeline describing the major events that affected the village.

3.4.1 Resources

Physical characteristics

Quibal has a total area of the about 2,190 hectares bounded by *Barangay* Nanguilattan on the northeast, *Barangay*s Buyun and Nabbabalayan on the east Peñablanca Pinacanauan River on the south and the Municipality of Iguig on the west. The land use distribution of the *barangay* is shown in Table 3.15 below while the transect line on an east-west orientation is shown in Figure 3.5.

About 51 percent of the *barangay* has a soil type of clay loam in the agricultural, agroforestry and forestry areas, 37 percent has rocky land mostly in the forest reserve while about 12 percent has sandy loam in the valley plains. Traces of erosion can be observed in the agricultural areas within the *barangay* especially in elevated portions or ridges.

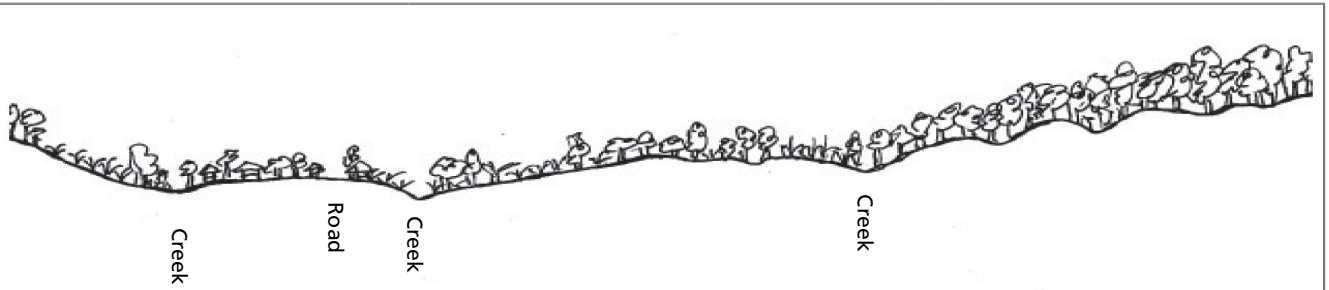
East- West transect line				
Land classification	Alienable and Disposable land (A & D)		Forestland	
Land use	Grassland/upland farming	Settlement	Upland farming, agroforestry and reforestation	Logged-over/secondary forest
Slope class	18-30% (rolling)			30-50% (mountainous)
Elevation (m)	50-75			75-300
Remarks	The main crops planted in cultivated lands are corn, rice, mungbeans and peanuts; the most common fruit trees planted in agroforestry areas are mango and coffee while forest trees species are gmelina and mahogany.			

Figure 3.5 – East-West transect line of Quibal, Peñablanca, Cagayan

Table 3.15 – Land use distribution of *Barangay* Quibal, Peñablanca, Cagayan

Land use category	Area (hectares)
Barangay infrastructures/residential area	20
School site	5
Agricultural area	
• Corn	298
• Peanut and vegetables	12
Agroforestry	152
Brushland/grassland	105
Forestland	1,598
Total	**2,190**

In terms of slope distribution, about 44 percent of the *barangay* has undulating to rolling slopes, 36 percent has steep slopes, 14 percent has level to nearly level slopes and 2 percent each has gently sloping to undulating, rolling to moderately steep and very steep slopes. Farming takes place on areas with level up to undulating slopes while agroforestry and reforestation takes place on the lands with undulating up to moderately steep slopes. On areas with steep slopes, the residents of the barangay undertake forest resources extraction such as logging and fuelwood gathering. Table 3.16 shows the slope distribution of the *barangay.*

Table 3.17 – Slope range distributions in *Barangay* Quibal, Peñablanca, Cagayan

Slope category (%)	Description	Area (hectares)	Percent
0 – 3	Level to nearly level	298	13.6
3 – 5	Gently sloping to undulating	46	2.1
5 – 18	Undulating to rolling	965	44.1
18 – 30	Rolling to moderately steep	47	2.1
30 – 50	Steep	797	36.4
> 50	Very steep	37	1.7
Total		**2,190**	**100.0**

At present, there is no rainfall data observed in the *barangay.* However, the PAG-ASA Meteorological Surface Observation Station at Tuguegarao, Cagayan can be taken as having similar rainfall regimes since it is located only about 10 km away from the *barangay.* Figure 3.6 below shows the amount of rainfall received in the area as observed in the PAG-ASA Meteorological Surface Observation Station. The highest mean monthly rainfall was observed on the month of October while the lowest was in February. Rainy season starts on the month of May and ends on the month of December. On an annual basis covering a 10-year period from 1987-1996, Quibal received the highest rainfall in 1996 with a

Table 3.16 – Major changes in *Barangay* Quibal, Peñablanca, Cagayan for a period of 37 years (1960-1997)

	1960	1970	1991	1992	1994	1997
1 – Settlement period and/or major events	– Settlement of migrants (Itawes) from nearby *barangays* who started slash-and-burn farming in logged-over forests	– Recognition of Quibal as a *barangay*; settlement of other migrants continued – Planting of crops (upland rice, corn and vegetables) almost abandoned due to massive logging (carabao) and fuelwood gathering	– Implemented the Community Forestry Project (CFP) by the Department of Environment and Natural Resources (DENR) which includes adjacent *Barangay* Nanguilattan – Conducted meetings and seminars	– Organized the Quibal Multipurpose Cooperative, Inc. (QMPCI) with 55 members as a requirement of the CFP implementation. – Poultry and bakery projects and other livelihood activities were introduced	– Change in the leadership of the CFP QMPCI due to organizational problems.	– DENR is now ready to issue permit to cut on reforestation area – Long drought started October
2 – Total households	Group of Itawes	Group of Itawes and Ibanag	Same cultural group	Same cultural group	362 Hh with 1,850 total population	418 Hh with 2,046 total population
3 – Vegetative cover	*Barangay* is a combination of a little brushland/ grassland and more of virgin and logged-over forests	Increased area of brushland/ grassland and all forestlands are logged-over	– Reduction of vegetative cover minimized	Reforestation and agroforestry areas are established in brushland/ grassland		– *Gmelina* trees planted in 1991-1992 are now ready for cutting and processing.

total rainfall of about 1,973 mm and 1989 as the second highest year with a total rainfall of about 1,862 mm. The lowest rainfall received in the area is in 1994 with a total rainfall of about 1,110 mm. Based on a 10-year average, the annual rainfall received by *Barangay* Quibal is about 1,503 mm, the lowest among the villages studied.

For the period 1987–1996, the highest number of rainy days was in the month of October while the lowest was in March (Table 3.18). The average annual number of rainy days for the same period is about 133. Likewise, the number of typhoons occurred in the area ranges from 15 to 32 bringing much rain and causing damage to property and agricultural crops during the rainfall period.

Table 3.18 – Monthly and annual number of days of rainfall observed at the Tuguegarao, Cagayan PAG-ASA Meteorological Surface Observation Station, 1987-1996.

Month	Year										
	1987	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**Mean**
Jan	5	11	9	7	6	12	8	13	8	6	8.5
Feb	1	13	7	6	10	4	8	1	5	5	6.0
March	3	5	8	5	3	0	5	8	0	1	3.8
April	5	10	2	5	6	1	5	8	1	7	5.0
May	7	10	15	13	5	14	3	7	14	20	10.8
June	17	13	13	22	5	12	8	12	6	9	11.7
July	11	17	15	19	17	18	10	23	18	10	15.8
Aug	9	10	17	15	20	18	10	13	16	11	13.9
Sept	14	11	20	9	11	16	13	16	19	15	14.4
Oct	8	18	20	18	9	21	20	12	18	19	16.3
Nov	10	16	11	16	17	16	14	12	15	20	14.7
Dec	19	9	10	17	9	10	23	3	12	8	12.0
Total	**109**	**143**	**147**	**152**	**118**	**142**	**127**	**128**	**132**	**131**	**132.9**

Population

As of June, 1998 the total population of the *barangay* is 2,046 persons with a total households of 418. In 1994, the total population is 1,850 with a total households of 362. In terms of sex distribution, there are 1064 males compared to 982 females with a population density of 93 people per square kilometer. The average household size is 7.

About 96 percent of the population in the *barangay* are considered literate.

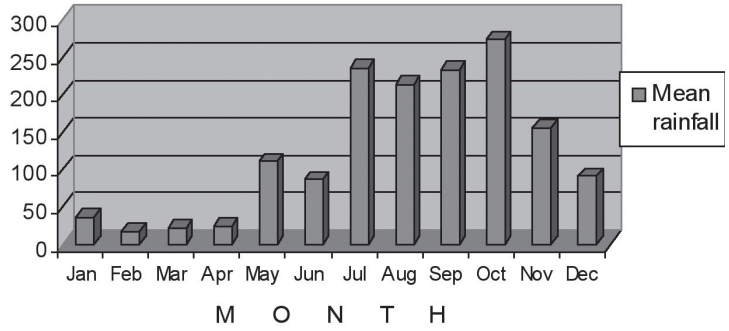


Figure 3.6 – Mean monthly rainfall (mm) observed at the Tuguegarao, Cagayan PAG-ASA Meteorological Surface Observation Station, 1987-1996.

Household

In Quibal, the husband is the head of the households who does most of the decisions concerning the affairs of the household unit although assistance is also sought from the wife. If the husband dies, the wife takes over the management of the household which also compose of their children (married and unmarried) who slept with them in the same housing unit. In some households, grandparents are also living with them indicating the extended family type that occurs in a typical Filipino family.

The average number of children per family is about 5.

The working children (usually at age 12 and up) are expected to participate in all activities in the farm (i.e. land preparation, planting, weeding and harvesting). In some cases, they are left behind at home to take care of their small brothers or sisters and do the household chores, like fetching water, cleaning the house and washing the dishes. This can only be done during week-ends (Saturdays and Sundays) or holidays because children with the age starting from 6 years old are encouraged to go to school. During peak period of labour in the farm, some parents asked their children to be absent from their classes to perform the activities as cited above.

There are about 3 female-headed households in the *barangay* caused by the death of their husband due to sickness. In this case, the eldest son or daughter is expected to help the mother in all aspects of decision-making that affect the households. They are also forced to stop going to school not only due to the lack of financial needs of the family but also of the rigorous work needed in the absence of the husband.

As in any *barangay* in the Philippines, the people of *Barangay* Quibal are monogamous society.

3.4.2 Economics

Livestock
The livestocks presently grown by farmers in the *barangay* are described below:

1 Carabao (water buffalo)
This animal is the most important in relation to the livelihood activities of the households so that about 80 percent of the total households have carabaos with each household owning about 1 to 10 carabaos. Farmers use them in preparing the land for planting (i.e. plowing and harrowing), making furrows during planting period and hauling of agricultural products during harvest from the farm to their residents (about 1 km away). They are also used for hauling of logs for lumber or fuelwood from the forest to strategic points within the *barangay.*

Farmers graze their carabaos on vacant lots available in the area or being placed in small private ranches. Some of the farmers with more than 2 carabaos are selling them as the need arises with a price per carabao ranging from Php 9,000 to Php 18,000 which depends on the size of the animals.

Carabao manure is not use in the farm but many times used in farmers' home gardens devoted to vegetables for home consumption.

2 Cow
There are about 30 percent of the total households in the *barangay* owning an average of about 2 cows per households. Farmers keep these for about 1 or 2 years afterwhich they sell to a major market, usually in Tuguegarao, Cagayan. Cow manure, like carabao manure is not normally used in the farm but rather used in homegardens. Cows have almost the same price as that of carabaos.

3 Pigs
An average of 1 pig per household, all of the households in Quibal are growing pigs in anticipation for future expenses like education of their children, farm inputs and other farm expenses. Pigs are mostly sold on a per head basis after 6 months to 1 year of caring usually to outside buyers (about 2 buyers) who come to the *barangay* or sold to Peñablanca and Tuguegarao, Cagayan at a price from Php 4,000 to Php 8,000 depending on the size of the pig.

4 Chicken
These are grown originally for home consumption but these are also sold out as the need for cash in the family arises. Sold in whole, the price depends on the size or weight which ranges from Php 100 to Php 150 per chicken. The households in the *barangay* have, on the average, about 5 chickens per households.

5 Goats
On the average, 3 goats per households are owned by about 5 percent of the total households. These are sold within or outside of the *barangay* at a price ranging from Php 1,000 to Php 1,800 per head.

6 Horses
This animal is used for transportation of the farmers themselves by about 2 percent of the total households.

7 Dogs and cats
These are kept as pets for the family. Dogs are expected to guard the house during the night while others used them for hunting in the forests. Cats usually do the job of catching rats.

Farmers allow their carabaos, cows, horses, and goats to graze in lands under fallow. During the corn-growing season, farmers cut some young and unhealthy stand of corn and feed them to the carabaos, cows and goats. Cornhusks that are available during the harvesting season are also utilized as feeding materials.

Trees
The remaining forest areas in Quibal still contain indigenous forest species (i.e. dipterocarp) such as *narra, guijo, tanguile*, red and white *lauan, dau, kalantas* and *balete*. These tree species are mainly used in the Philippines for building, house and bridge construction. Since the CFP is implemented in 1991, logging is banned in the area thus trees are cut only for private house construction through the monitoring of the *barangay* officials with the assistance of the DENR. The penalty being imposed by the *barangay* officials and DENR to those who are caught logging illegally within the forest areas are confiscation of the logs chainsaws used in logging as well as legal charges in government courts.

The exotic forest trees species found in the *barangay* are *Gmelina* and mahogany. *Gmelina* trees have been planted in 1991 by the cooperative and they are now ready for cutting since they are fast-growing species. Some farmers planted them in stony and steep areas located within their farms while others planted the *Gmelina* trees in their land boundaries. Since farmers know of the marketability of the trees, many are planting trees in their land boundaries, vacant lots or any lots not suitable for corn cultivation.

Likewise, the farmers planted fruit trees such as: mango, coconut, papaya, coffee, citrus (*pomelo* and *calamansi*), guavaple (a cross-breed between native guava and apple), jackfruit, avocado, *santol*, *caimito*, guyabano, tamarind and guava.

Mango and coconut had been planted in the *barangay* since the 1970's. They start bearing fruit after 5 to 7 years of planting and will live up to 50 years. Some farmers are selling the fruits ranging from Php 35 to Php 90 per 100 pieces for

Indian mangoes while Php 20 per kg for carabao mangoes at Tuguegarao or to the town of Peñablanca. Coconuts are sold at Php 3 per piece. Timber from these fruit trees can be utilized for building construction while the small branches can be used as fuelwood. Coconut leaves are processed into brooms sold in Peñablanca and Tuguegarao. Except for papaya, all the other fruit trees bear fruit after 3 to 5 years of planting and they can live up to 25 years. Their timber can only be used for fuelwood. Flowering and thus fruiting ability of the fruit trees above are greatly influenced by strong typhoons and severe droughts.

Crops output
The major crops planted by farmers are:

1 Corn
There are 2 kinds of corn planted by the farmers. The hybrid yellow corn is mainly for commercial production and grown twice a year; first cropping starts April or May and ends on August or September of every year while second cropping starts September or October and ends on January or February of the following year. The other kind of corn is the native or traditional species which is used for home consumption. The total area planted to corn in the *barangay* is about 298 ha. On a per hectare basis, hybrid yellow corn yield averages about 3,850 to 4,000 kg while that of the traditional variety yield an average of 1,500 to 2,000 kg.

Price of corn fluctuates from as low as Php 5.50 per kg during the harvesting season (end of August to end of September of every year for the first cropping and January to February of the following yeas for the second cropping) up to Php 9 per kg outside of the harvesting season. It may be noted that the prices quoted above occurred when the country was experiencing the El Niño phenomenon or severe drought period in which low corn production throughout the country is expected.

The common problems influencing corn production are control of insects and diseases such as corn borer and downy mildew, availability of labour during weeding and harvesting and occasional occurrence of typhoon and drought. Moulds and grain pests during storage usually decreased quality of corn grains.

Although corn husks can be utilized for fodder for carabaos and cows, many farmers just burn the husks during harvests and only few are left for feeding purposes.

2 Banana
Few farmers in Quibal (about 2 or 3) have established banana plantations but some planted in their backyard for home consumption. For one hectare, a farmer can harvest about 5,000 to 6,000 pieces per month after one year of

planting. The farmgate price is Php 50 per 100 pieces. Many farmers are also now planting bananas in vacant lots or in their land boundaries. According to them, they can still plant corn or vegetables in between the banana plants while waiting for the bananas to bear fruit.

3 Peanut
This crop is also grown by few farmers in small scale usually covering only about ¼ ha per farmer yielding 10 to 15 bags per ha (or about 300 to 450 kg per ha at 30 kg per bag). Although planted for home consumption, some excess production is sold to the market as processed food.

4 Vegetables (mungo, eggplant, ampalaya, etc.)
Vegetables provide cash income for the households. Mungo is usually planted for selling purposes while the other vegetable crops are only sold if there are excess production. For one hectare planted with mungo, a farmer can harvest about 160 to 180 kg having a price of about Php 25 per kilogram.

Crops inputs and cultivation practices

1 Corn
Farm labour is needed during land preparation (ploughing and harrowing), planting, weeding and harvesting. One hectare of cornland needs about 6 man-animal-days of ploughing, 3 man-animal-days of harrowing, 3 man-animal-days and 10 man-days of planting and fertilizing, 3 man-animal-days of hilling-up, 10 man-days of weeding and 10 man-days of harvesting. One man-day cost about Php 80 and 1 man-animal-day is about Php 150.

Commercial fertilizers are also used at a rate of 3 to 4 bags per ha. Due to rising costs, however, farmers apply minimal amount of fertilizer in their cornfields at a rate of 1 to 2 bags per hectare especially during second cropping. The prices of commercial fertilizers are presented in Table 3.19 below.

Table 3.19 – Prices of farm inputs in the Tuguegarao City, Cagayan

Farm inputs	Unit price (Php per bag/bottle)
Type of commercial fertilizers, in bag:	
• Urea (46-0-0)	380
• Complete fertilizer (14-14-14)	420
• Ammonium sulfate (21-0-0)	280
Pesticides, in bottle:	
• Cymbush EC	700
• Lannate	380

In cornfields, farmers in the *barangay* practice monocropping of corn with April-May to August-September of every year for the first cropping and October to January of the following year for the second cropping. Fallow period in cornfields starts immediately after the second cropping (i.e. February) up to March. Thus, labour peaks during the growing season of corn and a slack period only of about 2 months throughout the year.

Farmers observed that generally their corn yields are lower than the expected yield when they apply small amount of fertilizer and even lower when none at all.

2 Banana
One hectare of land requires about 625 banana plants at a distance of 4 m x 4 m. Family labour is utilized in the establishment of banana plantation.

3 Peanut
This crop is planted in the river flood plains where the soil is sandy. One-fourth of a hectare can be prepared by 2 man-animal days ploughing, ½ man-animal day furrowing and 2 man-days planting. Weeding is usually undertaken one month after planting by about 5 man-days. Fertilizers are not applied in peanut farms.

4 Vegetables
Mungo beans are usually planted in an area of ¼ ha per farmer. Although planted in different land characteristics, land preparation, planting and other cultural requirements are similar to that of peanut. Almost all of the households in the village grow this crop as a risk management strategy against low rainfall or drought because of its short growing period.

Non-farm activities (domestic, i.e. on-farm)
The farmers in the *barangay* wake up as early as 0400 in the morning in order to have time them to prepare for the day's activities in the farm. They start cooking, fetch water to be consumed for the day or at least up to a volume needed until noon. After one hour, their children are expected to get-up also so that they too are prepared to go to school. Normal working time in the farm is from 6 o'clock to 10 o'clock in the morning and 2 o'clock to 5 o'clock in the afternoon. A noon break from 10 o'clock in the morning to 2 o'clock in the afternoon (break time of 4 hours) is practiced by the farmers due to hot weather condition in the area. This break time however, is usually spent in their farms when working hours need to be extended in the afternoon.

Fetching water from manually operated pumps located at some distance is done by both men and women early morning before going to the farm or late in the afternoon. In some cases, the children in the *barangay* do the fetching of water before going to or after coming from school. But during holidays and weekends,

the children stay at home and do all the household chores including the caring of a small brother or sister. Fuelwood gathering is shared by both spouses.

Members of some households do backyard gardening. They are also engaged in basket making during times when they are not working in the farms with rattan and bamboo as the raw materials. These locally made baskets are for home use but they are also sold in the local market when the households need cash.

Off-farm and seasonal migration

Many farmers are involved in carabao logging and fuelwood gathering and sell the fuelwood in bundles (about 20-30 cm diameter and 40-50 cm long) in Tuguegarao City. But this activity requires a permit from the*barangay* officials, the local government unit of Peñablanca and DENR. Some households prevail in doing these activities even without permit but operating through 'good luck of not being caught' because it is done during the night. Or if caught, they always reason out that they need money for their survival.

Some individuals are also engaged in operating and driving of tricycles and jeepneys bringing people to government offices, schools and market centers or transporting agricultural products of the farmers. Other farmers also operate small stores (i.e. local name is 'sari-sari ' store) and rice and corn mills.

Income from these off-farm activities is used to buy food for home consumption, education of their children and inputs to their farms like fertilizers, insecticides and herbicides. Money is also needed for wages in farm labour especially during the peak season.

Expenditures

Like many households in the Philippines, the major categories of expenditures of the households are: foods, education of their children, farm inputs and medical expenses in that order. Whatever is left can now be used by the spouse in buying clothes for the family or to be used for the improvement of their farms.

Upon consulting the members of the household, the household head of the family (i.e. the husband) usually gives the final decision on how to spend money from farm incomes. Members of the households have the final decision on how to spend the money generated from working outside of their own farms. Extra incomes of the households are often used for clothing and improvement of their farms (i.e. buying seedlings, farm inputs, etc.).

3.4.3 Markets and land institutions

Access to land and communal resources
On the average, each household in the *barangay* has a farm size of 1.5 ha (ranging from 1 ha to 2 ha). There is a decrease in the landholdings due to the natural increase in the number of households in the *barangay*. Access to the forestlands is not anymore possible because of the CFP and the open pronouncement of both DENR and the local government of Peñablanca discouraging households to expand their agricultural lands to the forest. There are about 1 to 3 lots per household usually located adjacent or near (i.e. 10 m to 1 km) to their houses. The *barangay* covers a wide area of forests (about 1,500 ha) including a protected landscape as classified by DENR.

Land tenure
Most of the lands occupied by the farmers are privately titled. Some farmers hold a Certificate of Stewardship Contract (CSC) issued by DENR on the lands they are cultivating within the CFP. Through the CFP, lands occupied by some households in the *barangay* within the project have been awarded the Certificate of Stewardship Contract (CSC) issued by the DENR. This is the only available ownership instrument applicable to areas classified as forest zone.

Tenant farming on some of the privately owned lands exist in the *barangay*. In this type of land tenure, both the owner and the tenant share whatever agricultural outputs from the lands. The sharing scheme is one-fourth of the crop output is for the owner of the land while three-fourths is for the tenant with the tenant shouldering all the expenses. The tenant can till the lands he is occupying depending on the verbal agreements between him and the owner. However, the agrarian reform law in the Philippines provides that tenants cannot be removed or ejected from the lands they are cultivating as long as they are duly fulfilling their obligations (i.e. giving the crop share of the owners after harvest).

Another form of access to productive lands in the *barangay* is through mortgaging, known in the local dialect as *salda*. The amount of *salda* is from Php 10,000 to Php 20,000 per hectare which a mortgagee pays. Once payment is made, the mortgagee has the right to cultivate the land until the mortgagor can return the mortgage amount (without any interests).

Agricultural labour
All agricultural labour is coming from the *barangay* itself. The daily wage for planting, weeding, fertilizing, spraying of insecticides and harvesting is Php 80 per man-day with *merienda* (snacks) or Php 100 per man-day without *merienda*. If a carabao is included especially during ploughing, harrowing and making furrows during planting, the daily wage is Php 150 per man-animal-day with *merienda* or Php 180 per man-animal-day without *merienda*. These agricultural

activities provide alternative sources of income for households cultivating only a small area.

Exchange of agricultural labour (particularly ploughing, planting weeding, and harvesting) is also practiced by a small group of farmers in the *barangay*. This small group, usually 5 to 6 members, are relatives or friends.

Communal labour in the *barangay* is organized by the *barangay* officials who set the date of the activities. *Barangay* assembly meetings, cleaning the school surroundings, repairing school buildings, constructing waiting sheds and road maintenance are the most common type of communal works participated by all households in the *barangay*. Each household is required to provide one male member to participate in the communal work and *barangay* meetings. If the male head of the household can not go, other members of the household (with age 15 years old and up) can attend as a substitute. The penalty imposed by the *barangay* officials for non-attendance of communal work is Php 50 per day.

Ploughing, harrowing, making furrows, hauling (these need carabaos) and spraying are the agricultural labour that are being handled mainly by men. Planting, weeding and harvesting can be undertaken both by men and women although these are dominantly done by female labour.

Credit market
Rich households in the *barangay* are offering informal credits with interest of 10 to 15 percent per cropping. Payments are usually in cash but the credits can also be repaid from the crop harvests with duration from one cropping season to one year. This payment schedule can be extended when there are crop failures due to strong typhoons or severe droughts. The only document used in credits is an agreement, known as, 'kasulatan ', signed by both involved parties and their 2 witnesses.

Market for crops or agricultural products
Corn, vegetables (mungo, *ampalaya* or bitter gourd, eggplants and other beans) and banana are the marketed crops in the *barangay*. There is no trading center operating within the *barangay* but middlemen who are living in the *barangay* are active supplying the necessary marketing connections especially for corn. Vegetables are brought directly by the farmers to market centers in Peñablanca and Tuguegarao City.

The price of rice and corn in the *barangay* is usually lower than in the market centers by Php 0.10 to Php 0.20 per kilogram. At a distance of 15 km from the *barangay* to Tuguegarao City, the transportation cost is Php 0.10 per kg of corn being sold.

There is an established buyer-seller relationship in all the transactions cited above. That is, a buyer who had done business and trusted for so long a time can easily buy the farmers' products. For corn trading, a newcomer-buyer has to approach someone in the *barangay* who may introduce him to local traders residing in the*barangay* or he may go directly to the local traders. The newcomer-buyer should offer a higher price than the old buyer just to start the relationship. The trader-businessman who earlier sold farm inputs for a low price or gave credits to a farmer usually buys the corn at prevailing prices from that farmer.

Markets for inputs
Seeds, fertilizers and insecticides/pesticides are the main farm inputs marketed from either Peñablanca and Tuguegarao City. If these farm inputs are not available in Peñablanca, the farmers can always find a businessman selling them in Tuguegarao City.

Prices of farm inputs in the town of Peñablanca are higher than in Tuguegarao City by Php 20 to Php 30 per unit inputs. Due to problems of cash availability, farmers usually apply minimal farm inputs especially fertilizers and insecticides in their fields. Many farmers, especially the poor ones, set aside good seeds already for the next planting season during the harvesting period.

As stated above, the trader-businessman who give credits in cash or in the form of farm inputs maybe the one who gets the farm produced. Thus, giving credits on the part of the trader-businessman establishes the bond of friendship between him and the farmer. In some cases, however farmers have to sell most of their products to trader-businessman who give higher price and then part of their products – an amount just enough to pay their credits – to the one they owed credits.

3.4.4 Transition

Perceptions of environmental problems
The environmental problems mentioned by the people of Quibal are: soil erosion, declining soil fertility of some of their lands and long drought and climatic change.

1 Soil erosion
Small gullies are often seen by the people in the *barangay* in their farms but they can still remove the gullies by ploughing. They also observe that their farm outputs are declining so that they acknowledge the need for the application of more fertilizers. According to them, fertility of the land may have been carried away during strong rains or may have been used up by crops during cultivation.

Farmers allow 1 cropping season (about 4–5 months) to 1 year of fallowing period for their fields by cultivating their fields (one farm usually consists of 2-3 farmlots) in rotation.

Through meetings, seminars, trainings and visits to model farms, conducted by the DENR through the CFP and local government unit (LGU) of Peñablanca, the *barangay* officials and farmer-leaders have acquired knowledge on soil and water conservation techniques, such as contour plowing, hedgerows, agroforestry and reforestation. Their participation in the CFP activities, radio, newsletters and other means of communication encouraged some farmers to start adopting the said techniques.

2 Declining soil fertility
This problem is happening especially in elevated or upstream portion of the farms which the farmers noticed as a consequence of soil erosion. The immediate effects of this problem are the declining yields of the crops planted in these lands. This is also one of the reasons why farmers practice a fallow period of 1 cropping season (about 4 – 5 months) to 1 year interval on cultivated lands. Some farmers, especially those who have enough money, apply more fertilizers in order to increase their farm yields.

3 Long drought and climatic change
The farmers felt the effects of the long drought popularly known as El Niño phenomenon that occurred at the end of 1997 up to August of this year (1998). They planted upland rice and corn late (end of May to first week of June instead of mid-April to mid-May) so that their corn and mungo beans outputs are lower than the average. The people of the*barangay* also observe the recurring changes of climatic conditions such as irregular occurrence of heavy rainfall and drought and high temperature or warm weather.

Due to these environmental problems, the farmers often experience crop failures which lead them to illegal logging and fuelwood gathering in the nearby forests.

Investments in land quality
The farmers in Quibal are engaged in only 3 types of land investments, namely contour ploughing, agroforestry establishment and tree planting.

1 Contour ploughing
Many farmers in the*barangay* practice this technique of reducing soil erosion but some portions of their farms can not be ploughed along the contours when they plough in a straight lines because their farms have level to rolling or undulating slopes (that is, the contours are too vague or too complex to follow). In these cases, some parts of their farms are contour ploughed while other portions are

not. They acknowledge, however that contour ploughing significantly reduced surface erosion and gully formation in their farms.

Moreover, this technique requires low investment on maintaining land quality needing to hire carabao only for those farmers who do not have carabaos to do contour ploughing.

2 Agroforestry
This technique has been learned and adopted by the farmers through *barangay* meetings, seminars, trainings and farm visits. In *barangay* meetings, *barangay* officials usually include in their agenda a call for the residents to practice this farming technique. Extension workers or experts are also invited in these meetings to talk on agroforestry and other livelihood activities as a means of convincing people about the need to conserve their remaining forest resources. Seminars, trainings and on-farm visits were also conducted through the CFP. The farmers who practice this technique acknowledge that these activities encouraged them to adopt this technique. Although definition of agroforestry varies, fruit and forest trees species have been planted by the farmers at locations within their farms or on field boundaries.

The types of agroforestry each household dominantly established in the village are: boundary planting, live fenceposts and mango-based agroforestry. In boundary planting, fruit and multipurpose trees species are planted in land boundaries. The fruit trees species usually planted are mangoes and coconut while multipurpose trees species are *madre de cacao* , *Gmelina*, and *ipil-ipil*. These multipurpose trees species are also used in live fenceposts to support barbed wire fencing. The fenceposts are also managed for timber in furniture-making as well as for fuelwood. These two types of agroforestry are favourably adopted in the village because farmers can still cultivate the wider portion of the farm without interruption which is the case if trees are planted within the farm. Likewise, land boundaries and crops planted within the plots are secured from astray animals if the plots are fenced.

Mango-based agroforestry, with the *taungya* style of cultivation, is adopted mainly on economic considerations. Grafted mangoes usually bear fruit in four to five years after transplanting. Since mango trees have long lifespan even up to 100 years, households are expected to generate income annually with minimum maintenance and annual inputs.

3 Tree plantation
The exotic forest trees species planted by farmers on some portions or on boundaries of their farms are *Gmelina*, mahogany and Japanese acacia. These species have been introduced by the CFP and the farmers were able to learn the techniques of seed gathering, seedling production and planting of the trees.

The farmers said that these activities are done during their slack time or after farming.

Households who are members in the Quibal Multipurpose Cooperative, Inc. (QMPCI) also established a communal tree plantation in the forestlands within the village. As in tree farms of the individual households, the forest trees species are *Gmelina*, mahogany, and Japanese acacia. These species can be used both for furniture-making and construction materials. Once the trees attain their marketable timber volume, the cooperative members, however expect to use the timber from the communal tree farm for furniture-making.

3.4.5 Social capital

Social organization of village

1 *Barangay* local government unit

The *barangay* is the smallest local government unit (LGU) in the Philippines and thus all activities and decisions concerning the affairs of the households are undertaken or resolved within this level. It is headed by the *barangay* Chairman with 7 members of the *barangay* council, a representative of the youth group known as Sangguniang Kabataan Chairman, a Secretary and Treasurer. The *barangay* leadership is responsible for the delivery of social services, peace and order and the conduct of various activities of the government. They are the first link of the people to the government and thus responsible directly to the municipal leadership. Except for Secretary and Treasurer, the *barangay* officials are elected by the registered voters within the *barangay* who serve for 3 year-terms at a maximum of 3 terms.

The most common type of communal activities participated in by all households in the *barangay* are: *barangay* assembly meetings, cleaning the school surroundings, repairing school buildings, constructing waiting sheds and road maintenance. During *barangay* meetings, topics related but not limited to the following are discussed: livelihood projects, ordinances, *barangay* festival, peace and order and health. Plans and programs and other information on a national scale are also being presented during these meetings.

As stated above, communal works in the *barangay* are organized by the *barangay* officials who set the date of the activities. Each household is required to provide one man-member to participate in the communal works and *barangay* meetings. If the male head of the household can not go, other members of the household (with age 15 years old and up) can attend as a substitute. The penalty imposed by the *barangay* officials (which is provided in an ordinance) for not attending in any of the communal activities or meetings is the payment of Php 50 per day.

2 Quibal Multi-purpose Cooperative, Inc. (QMPCI)
This cooperative had been organized by DENR through CFP in 1992 which was subsequently registered in the Cooperative Development Authority (CDA) in Region 02. The cooperative also covers 3 other adjacent *barangays* (Nanguilattan, Buyun and Nabbabalayan) having a total membership of 502. The total number of members from *Barangay* Quibal alone is about 150 from an initial number of 55. The registered members are the heads of the households only who became a member after paying a membership fee of Php 500. According to some farmers who are not members of the cooperative, the membership fee is too high which is difficult for them to pay.

Members in the cooperative are encouraged to participate in the 'pump-priming activities ' of the CFP, such as; reforestation, timber stand improvement of the forests and assisted natural regeneration. Through these activities, the cooperative was able to generate funds which are used for the construction of a bunkhouse and office in Quibal, a bakery, a poultry project and other livelihood projects.

The cooperative is headed by a chairman and assisted by the vice-chairman, secretary, treasurer, press relations officer and 6 members of the board of directors (BOD). The BOD serves as the policy-making body of the cooperative while the set of officers run the operation and management of the cooperative on a part-time basis providing the link to the DENR through the assigned Project Management Officer (PMO).

Other organizations in the *barangay* include the following: Senior Citizens' Association and Rural Improvement Club. The Senior Citizens' Association looks after the welfare of old-age citizens in the *barangay,* like burial services and other benefits. This association is also organized in other parts of the country. The Rural Improvement Club (RIC) is an organization of the women which is usually headed by the wife of the *barangay* chairman.

Most of the families or households are relatives of the Taguinods and Lopezes. The mayor of the municipality of Peñablanca, Mayor Washington Taguinod, comes from Quibal.

A village-wide *barangay* fiesta or festivities is conducted on April 28-29 of every year. This is spearheaded by the Roman Catholic religious group in which every household within the village is requested to contribute a certain amount in order to finance the various activities being conducted during the fiesta. Voluntary contributions are also solicited from well-to-do families living within and outside the village. The different activities are; sports competitions, beauty contest and parade. Local politicians are also invited during the events of the village while individual households also invite their relatives or other household members who have been working at a distant place. The local leaders in the

village usually organize themselves into committees to assure the successful conduct of the festivities. Individual households do a lot of food preparations during the annual fiesta while others also conduct various occasions, such as, baptism, family reunion, and anniversaries.

3.4.6 Information and dissemination

The farmers acknowledged that their technological knowledge on soil conservation, sustainable farming systems, tree planting and other livelihood activities are derived from the seminars, trainings and cross-farm visits conducted by DENR through the CFP. Also, extension workers from the municipal government of Peñablanca and other national government agencies are invited to talk during *barangay* meetings. Extension workers of multinational companies of corn seeds, insecticides and fertilizers are permitted to present their agricultural products and other new agricultural technologies during special meetings. Radio stations also have regular extension programs in which environmental conservation, agroforestry and other potential livelihood activities are discussed. Information in the *barangay* comes also through word of mouth from friends and neighbours.

While households in the *barangay* are willing to experiment new techniques that are introduced, many of them are still hesitant to adopt these techniques for fear of crop failure and the inputs required. Households are also eagerly following the techniques of their relatives, neighbours and friends who are willing to share their experiences, seeds and other planting materials.

3.4.7 Infrastructure

The road going to Quibal is concreted. In some cases, however the road is not passable for few days due to landslides during heavy rainfall or typhoons which block or destroy the roadsides. The other areas (or*purok*) of the *barangay* can be reached through all-weather roads which can be used by all types of vehicles. Table 3.20 below shows the travel time and fare per person at various destinations from the *barangay* center:

Table 3.20 – Travel time to various destinations from *barangay* center of Quibal

Destination	Distance (km)	Time of travel	Fare (Php)
Barangay center from farthest *purok*	5	30–45 minutes	2.50
Peñablanca, Cagayan	10	25 min fr. *barangay* center	5.00
Junction national highway	12	30 min fr. *barangay* center	6.00
Tuguegarao, Cagayan	15	45 min fr. *barangay* center	10.00

Electricity is not yet available in the *barangay* but the municipal government and the Cagayan Electric Cooperative, Inc. (CAGELCO) promised to install electricity in the *barangay* this December 1998 (electricity is installed January 1999 in the village center but not yet available in remote *puroks* of the village). There are about 5 manually operated water pumps constructed in the *barangay* used for domestic purposes. The local officials believe that they still need more.

Two multi-purpose pavements (which serve also as solar driers) and a *Barangay* Center have been constructed at strategic points within the *barangay*.

There are 2 public elementary schools established under the Department of Education, Culture and Sports (DECS) and one day-care center which is supported by the *barangay* and LGU of Peñablanca. This is way above the national standard of one elementary school per village. The government offers free education to these levels but some other fees are being paid. Secondary and tertiary schools are located in the municipalities of Peñablanca and Tuguegarao City. The presence of good roads and vehicles make these facilities accessible to most households in the village. Hence, households have more options and opportunities with regard to the educational choices of their children.

Regional and provincial hospitals are located in the capital town of Tuguegarao City while a municipal health center is available for general health services in Peñablanca. Privately owned hospitals and clinics can be found in the municipalities mentioned.

Other infrastructure and services, such as recreational centers, airport and telecommunication facilities are located in Tuguegarao City.

3.5 Villa Florentino, Diadi, Nueva Vizcaya

Barangay Villa Florentino was originally a forest area covered by a logging concession in the late 1960's. After logging, portions of the area were occupied by Ifugaos in 1973, followed by Igorots in 1974 (see Table 3.22). These two groups of people have their roots in the Cordillera Mountains. Since the area could be accessed by anyone (open access condition), outsiders logged the area indiscriminately paving the way for the settlers to practice slash-and-burn farming which rapidly degraded the remaining forest. Presently, some portions of the area are developed into rice terraces and agroforestry by the two settler groups. The *barangay*, originally known as 'Campos ', was recognized as Villa Florentino in 1980 under the administrative jurisdiction of Diadi, Nueva Vizcaya.

For the last 5 years, no government or non-government agency ever intervened for the conservation of the remaining forests within the *barangay*.

3.5.1 Resources

Physical characteristics

The total area of the *barangay* is about 1,800 hectares (as claimed by the *barangay* officials) bordered by adjacent *barangays* (northeast by Diffun, Quirino; north by *Barangay* Kakilingan, Cordon, Isabela; south by *Barangay* Villa Aurora, Diadi, Nueva Vizcaya) with natural boundaries such as creeks and ridges. Table 3.21 shows the land use distribution of the *barangay* while Figure 3.7 shows the northeast-southwest transect of the village.

Table 3.21 – Land use distribution of Villa Florentino, Diadi, Nueva Vizcaya

Land use category	Area (hectares)
• *Barangay* infrastructure/residential area	12
• School site	5
• Agricultural area	
Rice	101
Corn	92
Banana	69
Vegetables and other crops	37
• Agroforestry	33
• Brushland/grassland/fallow	1,169
• Forestland	282
Total	**1,800**

The *barangay* is characterized by rolling to steep slopes in mountainous areas in the direction from the national highway entering the junction to the *barangay* center. The major soil type of the agricultural areas is clay loam with less organic matter in ridges or in exposed parts of the lands cultivated by the farmers. Rocky areas are found everywhere within the *barangay* which the farmers started planting with forest trees.

At present, there are no rainfall data observed in the *barangay*. The nearest weather station, the PAG-ASA Agrometeorological Station, is located in Diffun, Quirino which is about 5 km away from the *barangay*. Although separated by small watershed divide, this can be taken as having similar rainfall regimes with that of the village. Figure 3.4 shows the monthly rainfall pattern as observed in the PAG-ASA station. The lowest mean monthly rainfall was observed in the month of February while the highest was in May. Rainy season starts in the month of May and ends in the month of December. This weather conditions do not differ much from the general climate of the Cagayan Valley region.

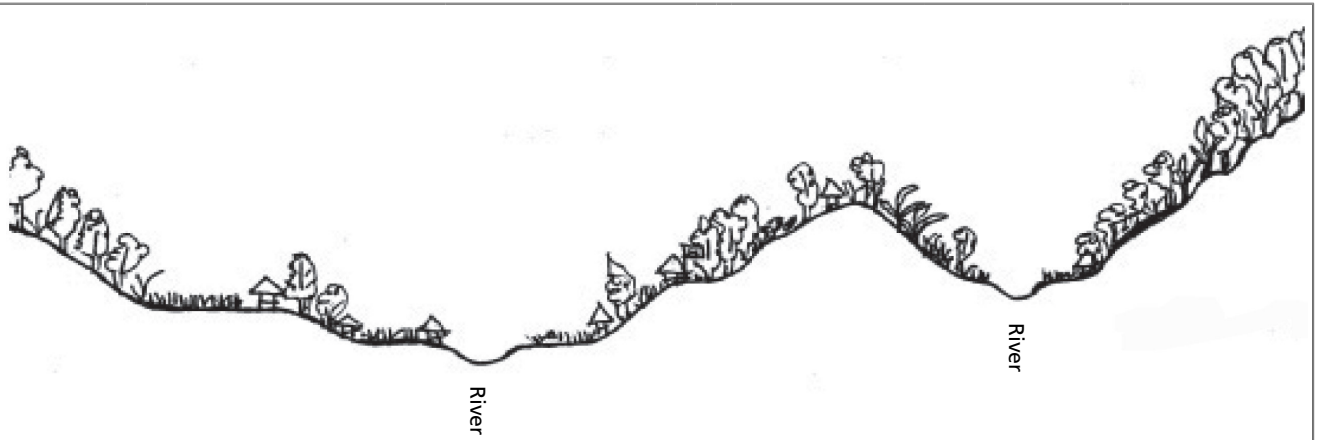
Northeast-Southwest transect line						
Land classification	Forestland					
Land use	Forestland/ Agroforestry	Lowland farming Agroforestry/Settlement		Settlement, agroforestry and reforestation/ lowland farming		Logged-over/ secondary forest
Slope class	30-50% (mount.)	9-18% rolling		18-30% (moderately steep slopes)		30-50% (mountainous)
Elevation(m)	300-400	200-250	75-100	400-500	300-400	500-600
Remarks	The *barangay* road follows the river line from the junction highway but later moves parallel to the transect line as one enters the village. The security of tenure in the village is mostly CSC. The main crops planted in cultivated lands are lowland rice in the valleys and vegetable crops in upper portions; the most common fruit trees planted in agroforestry areas are mangos and oranges while forest trees species are gmelina and mahogany.					

Figure 3.7 – Northeast-Southwest transect line of Villa Florentino, Diadi, Nueva Vizcaya

Table 3.22 – Major changes in *Barangay* Villa Florentino, Diadi, Nueva Vizcaya for a period of 37 years (1960-1997)

Items	Year							
	1973	**1974**	**1975**	**1980**	**1990**	**1993**	**1995**	**1997**
1 – Settlement period and/or major events	Settlement of Ifugaos.	Settlement of Igorots.	Increased banana plantation.	Indiscriminate logging and slash-and-burn farming decreased forest cover; Some farmers built their rice terraces.	Shifted earlier (1983) to corn production due to banana disease; Planted tiger grass for soft broom making; Building of rice terraces continue with some farmers practicing contour bunding.	Many farmers planted vegetable crops with contour bunds aside from continually building rice terraces.	LGU officials intensify information and technology dissemination campaign in the village specifically on soil and water conservation technologies and on the production of high value crops like vegetables.	The Economic Relief Project (ERP) of the Provincial government of Nueva Vizcaya and financially supported by the Europian Union held planning seminars for the local leaders of the village.
2 – Total households	Group of Ifugaos	Group of Igorots	76 = total households		90 = total households	120 = total households	145 households	144 households
3 – Vegetative cover	All of area is secondary forest with Ifugaos occupying valley portions.	90 % of area is secondary forest with Igorots occupying higher elevations.	Indiscriminate logging and slash-and-burn farming decreased forest cover.	25 % of area is secondary forest.	Some farmers established their agroforestry and tree farms.	Agroforestry and tree farming are continuously established.	*Gmelina* trees are preferred in tree farms due to its marketability.	282 ha of forest remains for the total *barangay* area of 1,800 ha.

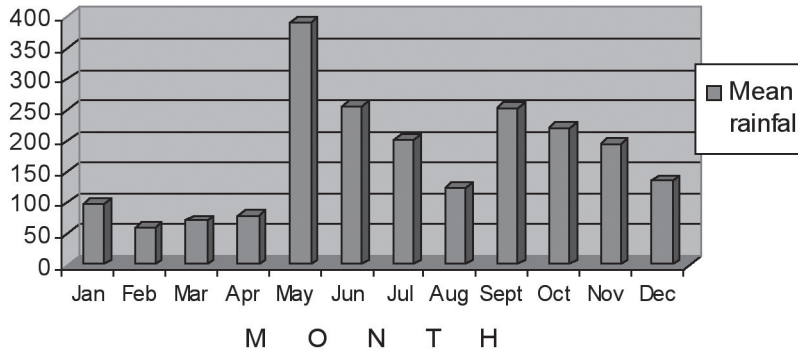


Figure 3.8 – Monthly rainfall (mm) observed at the Diffun, Quirino PAG-ASA Agrometeorological Station, 1993-1997.

On an annual basis covering a 5-year period from 1993-1997, the year 1993 is considered as the wettest year with a total rainfall of about 3,960 mm, while 1997 was a drought year with a total rainfall of about 1,287 mm, caused by the El Niño phenomenon which affected the whole Philippines. On the average, the annual rainfall received by *Barangay* Villa Florentino is about 2,088 mm.

For the period 1993 to 1997, the highest number of rainy days was in the month of November while the lowest was in April (Table 3.23).

Population

In 1997, the total population of the *barangay* was 699 persons in 144 households. (*Barangay* Profile, January 1998). In 1990, the total population was 450 in 90 households and this increased to 600 people in 120 households 1993 (Table 3.22). In terms of sex distribution, there were 356 males compared to 343 females in 1997. The average household size is 5.

About 80 percent of the population has completed secondary level of education, 15 percent has finished elementary and the remaining 5 percent reached or even finished college. These values are high, considering that the village is inaccessible for any motor vehicle during the rainy season.

Table 3.23 – Monthly and annual number of days of rainfall observed at the Diffun, Quirino PAG-ASA Agrometeorological Station, 1993-1997.

Month	Year					
	1993	1994	1995	1996	1997	Mean
January	16	20	17	12	8	14.6
February	7	12	8	10	9	9.2
March	10	13	1	4	9	7.4
April	5	2	1	9	11	5.6
May	7	16	15	17	13	13.6
June	8	10	8	10	14	10.0
July	12	22	18	16	20	17.6
August	19	14	18	9	16	15.2
September	20	17	19	11	18	17.0
October	22	14	24	20	18	17.6
November	18	18	21	21	20	19.6
December	29	12	25	8	12	17.6
Total	**173**	**170**	**175**	**147**	**158**	**165**

Household

As in any village in the Philippines, a household in Villa Florentino consists of persons who are related by kinship ties, like parents (husband and wife) and their children living together in the same housing unit. About three households in the village have grandparents residing with the other members of the households. The average number of children per household is about 3. There are about 16 female-headed households in the *barangay*, the highest among the four sites. The husbands of 15 female-headed households died due to sickness, while one wife got separated from her husband.

The husband is the head of the household and with the help of the wife, makes the major decisions affecting the family. Each decision made is expectedly respected by the members of the household. The working children (usually at age 12 and up) are expected to participate in all activities in the farm (i.e. land preparation, planting, weeding and harvesting) and at home.

3.5.2 Economics

Livestock

The livestock presently raised by farmers in the *barangay* are as follows:

1 Carabao (water buffalo)

About 70 percent of the total households own one or two carabaos or, according to many households, they are aiming to acquire one once money may become

available. Because of the multiple use of the carabao, households in the village consider this animal as a treasured possession. It is used mostly in hauling agricultural products from plots to their residences and finally into the place (usually on the national highway about 5 km) where four-wheel vehicles can be accessed. The farmers use these animals also in various agricultural activities such as preparing the land for planting (i.e. plowing and harrowing) and making furrows during planting period.

Households do not usually use carabao manure in the farms but just left behind to decompose in the place where individual carabaos are grazed. Carabaos are allowed to graze in lands under fallow even if these lands are occupied or owned by other households.

2 Cattle

There are about 30 percent of the total households in the *barangay* owning an average of about three cattles per households. This animal is second to the carabao in terms of their importance in the lives of the households in the village. It is usually taken care of or fattened for about one to two years and then sold to major markets (usually Santiago City, Isabela and Solano, Nueva Vizcaya) of Region 02. Thus, the main aim in keeping this animal is to serve as an alternative source of income or a strategy to generate money during emergencies like severe illness or schooling of the children. Cattle manure, like carabao manure is not normally used in the farm.

3 Pigs

All of the households in Villa Florentino are growing pigs in anticipation of future expenses like education of the children, farm inputs and other farm expenses. Because of this functional relationship to the households, it is often called as the, *bangko ng pamilya* (family bank). Pigs are mostly sold on a per head basis (locally known as *bulto*) after six months to one year of caring usually to outside buyers. There are about two animal buyers who occasionally visit the *barangay*. In some cases, pigs are slaughtered in the *barangay* and sold to residents at a pork price of Php 85 per kilogram or divided among households who can provide labour time equivalent to the value of the meat taken.

4 Chicken

It is the intention of the households to grow chicken for home consumption and to be served during peak labour times to feed helpers. In times of emergencies or need for cash in the family, chickens may also be sold to well-to-do families in the village, or given as gift showing their gratitude to close friends who visit. If sold, the price depends on the size or weight (but estimated only due to inavailability of weighing scale) ranging from Php 100 to Php 150 per chicken. On the average, those households owning chicken in the village have about eight chickens per household.

5 Ducks
This animal is newly introduced in the village so that only about three percent of the total households in the *barangay* tending about two ducks each. As with chicken, they are usually grown by the farmers for home consumption but it is possible that they will also be sold in the long run.

6 Goats
This is also a new kind of fattening animal primarily for the market or to be slaughtered during special occasions like birthdays, weddings or local *fiestas*. Based on available estimate, there are only about two percent of the total households in the village owning, on the average, two goats per households. The price ranges from Php 500 to Php 700 per head depending on the size of the animal.

There are other animals in the village such as dogs and cats that are kept as pets for the family. Dogs are considered as the household's best pets because they serve as guards of the house during the night while others use them for hunting in the forests. Cats usually do the job of catching rats which the households consider as destructive to their agricultural products stored in the house.

Traditionally, carabaos, cows and goats are grazed by the farmers on fallow lands. According to the households, there is no problem yet with the availability of grazing lands, although they are also utilizing young corn stalks and unhealthy stands of corn as feeding materials. During the harvesting season, plenty of corn husks are also being utilized or stored for feeding materials.

Trees
The village still contains indigenous dipterocarp forest species such as *guijo, tanguile, balite*, red and white *lauan*, *mara-mani* and *lapteng* in the remaining forest and agroforestry areas. These are mostly cut and sold outside the village which are used mainly for construction of industrial or commercial buildings, houses and bridges. Since late in the 1980's, logging is banned in the area; trees can be cut legally only for private house construction through the monitoring of the *barangay* officials. There is no penalty imposed by the *barangay* officials to those who are caught logging illegally within the forest areas of the*barangay*. Incidents are just reported to the local government unit in Diadi.

The only exotic tree species found in the *barangay* is *gmelina*. The trees were only about three to four years old in 1998. Farmers planted them in stony and steep areas located within their farms while others planted the *gmelina* trees in their land boundaries. According to the farmers, they had little knowledge on the marketability of the trees but they knew very well that they could use them for house construction.

Likewise, the farmers have planted fruit trees such as: mango, coconut, papaya, coffee, citrus, jackfruit, avocado, santol, caimito, guyabano, tamarind and gua-

va. Mango and coconut starts bearing fruit after 5 to 7 years of planting and will live up to 50 years. Timber from these fruit trees can be utilized for building construction while the small branches can be used as fuelwood. Except for papaya, all the other fruit trees bear fruit after three to five years of planting and they can live up to 25 years. Their timber can only be used for fuelwood.

Flowering and thus fruiting ability of the fruit trees above are greatly influenced by strong typhoons and severe droughts. During typhoons, the branches of the trees may be broken, making the plants unproductive for about a year, or even uprooted.

The farmers in Villa Florentino are selling the fruits in major market centers in Santiago City, Isabela and Solano, Nueva Vizcaya while others are also brought to the nearby town of Cordon, Isabela.

Crops output
The major crops planted by farmers are:

1 Lowland rice
The total area planted with lowland rice is about 30 ha mainly located in rice terraces. The rice terraces are irrigated with average rice yield per hectare of 78 bags. At 45 kg per sack, this amounted to 3,510 kg per hectare.

2 Upland rice
About 70.5 ha of lands are planted with upland rice. The lands have been left fallow for two to three years then cleared for planting of upland rice. The average rice yield is about 40 bags per ha or about 1,800 kg per ha at 45 kg per bag.

Prices of rice (both lowland and upland) fluctuate slightly from Php 9 per kg during the harvesting season (September to October of every year for the first cropping and January to February of the following year for the second cropping) to Php 10.20 per kg outside of the harvesting season. Price of premium rice is higher by Php 1.0 per kg on the indicated fluctuation pattern above.

3 Corn (Yellow or hybrid)
This crop is mainly for commercial production and grown twice a year; the first cropping starts April or May and ends on August or September of every year while the second cropping starts September or October and ends on January or February of the following year. The total area planted to corn in the *barangay* is about 92 ha. Corn production averages about 2,500 kg per hectare. The price of corn fluctuates from as low as Php 5.50 per kg during the harvesting season (end of August to end of September of every year for the first cropping and January to February of the following yeas for the second cropping) up to Php 9 per kg outside of the harvesting season. It must be noted that the prices given

above occurred when the country was experiencing a severe drought due to the El Niño phenomenon with low corn production throughout the country.

The common problems influencing corn production are control of insects and diseases such as corn borer and downy mildew, availability of labour during weeding and harvesting and occasional occurrence of typhoon and drought. Molds and grain pests during storage usually reduce the quality of corn grains. Corn husks can also be utilized for fodder of carabaos when there is little available grazing area, which occurs especially during the growing period of the crops.

4 Vegetables (beans, chayote, carrot, pechay, etc)
Vegetables provide cash income for the households. Planting of these crops is increasing in the *barangay* although people complain about the need for capital needed to buy water pipes for irrigating the vegetable plants during their critical growing stages. Since its a new endeavour for some farmers, the output per unit area is still variable and not available.

5 Banana
This is a major cash crop of farmers in *Barangay* Villa Florentino although it has been greatly affected by a banana disease which started since 1980. Farmers with remaining banana plants can harvest fruits of about 2,000 pieces per ha per month. They sell at a price of Php 45 per 100 pcs at the *barangay* center.

6 Tiger grass
This type of grass is a raw material for making soft brooms. Farmers in the *barangay* planted them in their lands when banana plants were infected with a disease in 1980. One hectare of tiger grass can yield 500 bundles of flower stems producing about 1,500 soft brooms when processed.

7 Fruit trees and Gmelina
Mangoes of the Indian variety bears fruit once a year for about 1000 to 2000 pieces annually. Households in the *barangay* who had planted these trees five or more years ago sell the mango fruits at a price of Php 10 per 100 pieces. The lumber from gmelina trees are mostly used for making furniture and other house furnishings so that one tree can produce about 50 board feet. The price per board foot is about Php 10.

Crop inputs and cultivation practices

1 Lowland rice
All farmers with lowland rice fields use certified seeds commonly bought in Santiago City or in Cordon at a price of about Php10 to Php 12 per kilogram. Sometimes, they keep a certain amount of seeds of the previous harvest to be used for planting for the next growing season. One hectare requires about 60

kg of seeds. Commercial fertilizers are also used at a rate of 1 to 3 bags at 50 kg per bag per ha. The prices of commercial fertilizers at the market center of Santiago City, Isabela are shown in Table 3.24. The farm labour required for one hectare is about 2.5 days of seedbed preparation and sowing of seeds, 8 man-animal-days of ploughing, 7 man-animal days harrowing, 9 man-days of pulling of seedlings, 17.5 man-days of transplanting, 4 man-days fertilizer and pesticide application within the duration of the cropping period, 29 man-days weeding and 36.5 man-days harvesting. Threshing is done through mechanical threshing machine with about 6.5 percent of total harvest to be taken by the owner of the threshing machine as payment for the threshing services.

Table 3.24 – Prices of farm inputs used in Villa Florentino, Diadi, Nueva Vizcaya

Farm inputs	Unit price (Php per bag)
Type of fertilizers	
• Urea (46-0-0)	375.00
• Complete fertilizer (14-14-14)	410.00
Ammonium sulfate (21-0-0)	265.00

2 Upland rice
Farmers planting upland rice keep their seeds of the previous harvest to be used for the next growing season. Farm labour is required only during clearing of new fields, weeding and harvesting. During clearing, a hectare of land needs 30 man-days, 10 man-days of planting, 10 man-days of weeding and 15 man-days of harvesting. Fertilizers are not normally applied for upland rice. Prevailing labour rates ranges from Php 80 - Php 100 per man-day.

3 Corn
Farm labour is needed during land preparation (ploughing and harrowing), planting, weeding and harvesting. One hectare of cornland needs about 7 man-animal-days of plowing, 3 man-animal-days of harrowing, 3 man-animal-days and 10 man-days of planting and fertilizing, 3 man-animal-days of hilling-up, 10 man-days of weeding and 10 man-days of harvesting. One man-day cost about Php 80 and 1 man-animal-day is about Php150. In cornfields, farmers in the *barangay* practiced monocropping of corn with April-May to August-September of every year for the first cropping and October to January of the following year for the second cropping. Fallow period in cornfields starts immediately after the second cropping (i.e. February) up to March. Thus, labour peaks during the growing season of corn and a slack period only of about 2 months throughout the year.

Farmers apply minimal amount of commercial fertilizer in their cornfields at a rate of 1 to 2 bags at 50 kg per bag per hectare. Farmers observed that generally

their corn yields are lower than the expected yield when they do not apply any fertilizer.

4 Banana
One hectare of land requires about 500 banana plants at a distance of 4 m x 5 m. The cost of planting banana is Php 5 per planted banana tree if the owner provides the planting material but the cost is Php 10 per planted banana tree if the labourer himself provides the planting material. Family labour was utilized in the establishment of banana plantation.

5 Fruit trees and Gmelina
The total area planted by each household in the *barangay* ranges from one-fourth hectare to about one and one-half hectares. The average family labour needed especially during the transplanting of seedlings is about 17 man-days and another 16 man-days of outside labour. Seeds of these trees are easily acquired from friends and from the DENR without any cost to the households.

Non-farm activities (domestic, i.e. on-farm)
Almost all of the residents in the *barangay* wake up at about four o'clock in the morning and starts cooking for one hour, fetch water to be consumed for the day or at least up to a volume needed until noon and prepare themselves and their children to get ready for school. Normal working time in the field is from seven to eleven o'clock in the morning and one o'clock to 4 o'clock in the afternoon. A noon break from eleven o'clock in the morning to one o'clock in the afternoon (breaktime of 2 hours) is practiced by the farmers but this noon break is spent in their fields when they are located far from their residences.

Fuelwood gathering and fetching water from springs or water pipes needed for the rest of the day are usually undertaken during the noon break or immediately coming from work in the afternoon. In most cases, women in the *barangay* do the fetching of water while fuelwood gathering is shared by the spouse. Children are expected also to fetch water after coming from school.

Soft broom-making is an important source of cash income of the households in Villa Florentino. Husband and wife usually share in the burdens of making soft brooms usually during the period when work in rice and corn fields has been finished.

Off-farm and seasonal migration
According to interviews of key informants, there are only few households who are engaged in off-farm activities like the operation of small stores (i.e. 'sari-sari ' stores) in the *barangay* or driving of jeepneys used for bringing people and crops from the *barangay* to market centers or government offices. Some individuals are engaged in hired labour for making soft brooms. The contract amount to be paid for making 1 piece of soft broom ranges from Php 3 to

Php 5. Income from these off-farm activities are used to buy foods for home consumption, education of the children and inputs to the farms like fertilizers, insecticides and herbicides. Money is also needed to pay wages of farm labour especially during the peak season.

Expenditures
Like many households in the Philippines, the major categories of expenditures of the households are: food, education of the children, farm inputs and medical expenses in that order. Whatever is left can be used by the spouse for buying clothes for the family, or be used for the improvement of the farm such as terracing or making irrigation canals.

Upon consulting the members of the household, the head of the family usually gives the final decision on how to spend money from farm income. Members of the households have the final decision on how to spend the money generated by working outside of the farms.

3.5.3 Markets and land institutions

Access to land and communal resources
The average farm size of each household in the*barangay* is 5 ha (ranging from 3 ha to 12 ha) with the first settlers occupying larger lands and with good terrain. Other farmers who settled later but with larger farms were able to buy lands from farmers who outmigrated to other provinces. There is small decrease in the landholdings due to natural increase in the number of households in the *barangay.*

There are about 1 to 3 lots per household usually located adjacent or near (up to 2 km) their houses. Sometimes one lot consists of subplots which are planted with different kinds of crops such as rice, corn, vegetables, tiger grass, fruit trees and *Gmelina.*

In the upstream portion of the *barangay* is a watershed with an area ranging from 300 to 600 ha. It is where an abundant source of water supply is coming from which is being utilized by the farmers downstream for irrigating their rice terraces and vegetable farms. Although it has been logged before, this area has good canopy of natural forest trees remaining. The *barangay* officials, with the cooperation of the residents, were given the responsibility for its protection by the DENR and LGU of Diadi since the area is within the *barangay*'s land boundary and therefore ownership is vested upon the local community. The major rules and regulations imposed by the barangay officials for the protection of the watershed are the prohibition of cutting of forest trees and doing slash-and-burn farming in the area. Also, within its boundary is a waterfall, known as 'Minanga Falls ', presently used as picnic and recreational site of the community.

Groups of people from outside of the *barangay* and town also visit the area. However, no significant improvements have been undertaken yet of the site.

Land tenure

The *barangay* is within the forest zone classification of the Department of Environment and Natural Resources (DENR). Some portions of the area had been declared as a watershed which needed rehabilitation by DENR. With financial assistance from the Department of Public Works and Highways (DPWH), the DENR established a reforestation area within the boundaries of the *barangay*. Most of the lands claimed by each households in the *barangay* have been awarded the Certificate of Stewardship Contract (CSC) issued by the DENR. This is the only available ownership instrument applicable to areas classified as forest zone. Few farmers who have farms with less than 18 percent slope and located in lower elevation have acquired individual private titles or ownerships.

Some of the lands occupied by the households in the *barangay* are inherited from their parents who settled in the area in 1973 while the others are still the original settlers. It is important to note that the CSC can only be transferred through inheritance so that selling of their lands under this instrument is prohibited.

Agricultural labour

Agricultural labour is coming from the *barangay* itself. The daily wage in planting, weeding, fertilizing, spraying of insecticides and harvesting is Php 80 per man-day with *merienda* (snacks) or Php 100 per man-day without *merienda.* If a carabao is included especially during ploughing, harrowing and making furrows during planting, the daily wage is Php 120 per man-animal-day with *merienda* or Php 150 per man-animal-day without *merienda.* In the construction of terraces, payments are made on a contract basis which ranges from Php 1,500 to 3,000. Channel construction can also reached a contract price up to Php 10,000 with total length of 9 to 10 meters and depending on the bulk and difficulty of work to be done.

Exchange of agricultural labour (particularly ploughing, planting weeding, and harvesting) is also practiced by small group of farmers in the *barangay*. This small group of usually seven to ten members are relatives or friends.

Communal labour in the *barangay* is organized by the *barangay* officials who set the date of the activities. *Barangay* assembly meetings, cleaning the school surroundings, repairing school buildings, constructing waiting sheds and road maintenance are the most common type of communal works participated by all households in the *barangay*. Each household is required to provide one man-member to participate in the communal works and *barangay* meetings. If the male head of the household can not go, other members of the household (with age 15 years old and up) can attend as a substitute. There is no penalty

imposed by the *barangay* officials for those households who can not fulfil their community obligations.

Credit market

About four individuals residing in the *barangay* are offering informal credits with interest of ten to twenty percent. The credits can also be repaid from the harvest of banana or crops with duration from one cropping season to one year. This payment schedule can be extended when there are crop failures due to strong typhoons or severe droughts. The only document used in credits is an agreement, known as, 'kasuratan', signed by both involved parties and two witnesses.

Market for crops and agricultural products

Rice, corn, vegetables (beans, chayote, tomato, pechay, etc.) and banana are the marketed crops in the *barangay.* There is no trading center operating within the *barangay* but middlemen who are living in the *barangay* are active doing the necessary marketing connections especially for rice, corn and banana. Vegetables are brought directly by farmers to market centers in Cordon, Isabela; Solano, Nueva Vizcaya and Santiago City, Isabela. The price of rice and corn in the *barangay* is usually lower than in the market centers by Php 0.20 to Php 0.30 per kilogram. At a distance of 15 km from the *barangay* to Santiago City, the transportation cost is Php 0.20 per kg of rice or corn being sold. The hauling cost for banana using the carabao from*barangay* center to the national highway is Php 100 for about 1000 pieces but if a jeepney is used, the transport cost is Php 50 per 1000 pieces.

There is an established buyer-seller relationship in all the transactions cited above. That is, the buyer who had done business and trusted for so long a time can easily buy the farmers' products. Most often specifically for banana trading, a newcomer-buyer approaches someone in the *barangay* who introduce him to local traders residing in the *barangay* or can go directly to the local traders. The newcomer-buyer should offer a higher price than the old buyer just to start the relationship. For rice and corn, the trader-businessman who earlier sold farm inputs at a low price or gave credits usually bought the corn products. Sold in smaller quantities than rice and corn, vegetables are sold directly to individual buyers in the market centers.

Markets for inputs

Seeds, fertilizers and insecticides/pesticides are the main farm inputs marketed from either Cordon or Santiago City, both located in the province of Isabela. Due to problems on accessibility, farmers apply minimal farm inputs, particularly chemical inputs.

3.5.4 Transition

Perceptions of environmental problems
The following are the environmental problems mentioned:

1 Soil erosion
The people in the *barangay* observe the appearance of gullies and the decline of their yields in their *'kaingin* ' (slash-and burn farms). According to them, fertility of the land may have been carried away during strong rains or may have been used up by crops during cultivation.

Upon clearing the land, the farmers plant upland rice, continuously cultivating for two to three years. During this period, they observe a decrease of their rice yields. Due to this situation, they let the land to fallow for three years which according to them is an appropriate time for the land to recover its fertility. Through seminars, trainings and meetings conducted by the local government unit (LGU) of Diadi Nueva Vizcaya, the *barangay* officials and farmer-leaders have acquired knowledge on soil and water conservation techniques, such as contour ploughing, terracing, agroforestry and reforestation. Radio and other means of communication encouraged them to adopt the said techniques.

2 Declining soil fertility
This problem is happening in elevated or upstream portions of the farms which the farmers notice as a consequence of soil erosion. The immediate effect of this problem is the declining yields of the crops planted in these lands. This is also one of the reasons why farmers practiced a fallow period of two to three years interval on cultivated lands. To ensure for continuous farm works, they divided their whole lot into subplots such that each subplot will be cultivated in rotation according to the fallow period. Each subplot is also planted with different crops during each cultivation period.

3 Long drought
The farmers felt the effects of the long drought popularly known as El Niño phenomenon that occurred at the end of 1997 up to August of this year (1998). They planted upland rice and corn late (end of May to first week of June instead of mid-April to mid-May) so that their upland rice and corn yields are lower than the average. Also, the area received inadequate rainfall due to the occurrence of this phenomenon. The sale from the banana fruits and soft brooms made from tiger grass planted by the farmers saved them from starvation. Although bananas are affected by a disease, some farmers are still able to generate sufficient income from selling banana fruits to cover domestic expenditure. Other farmers are able to learn making of soft brooms from one of their relatives who once visited the *barangay* and thus provided them with extra income from this new endeavour.

4 Occurrence of banana disease
This mysterious disease, known locally as, 'tungro ', has occurred since 1980 and significantly reduced the quantity of banana fruits harvested which correspondingly decreased household income from this *barangay*. Banana plants of varieties locally called, 'turdan and lacatan ', are almost wiped out by the disease. Some farmers shifted to a variety of banana known as, 'damilig ', observed to have more resistance to the disease but lately they again observed that the 'damilig ' variety is now slightly affected. Almost all of the farmers shifted to planting of white (glutinous) and yellow corn on the lands where banana plantations are destroyed. Others planted tiger grass to be made to soft brooms and sold the soft brooms to the major market centers.

Investments in land quality
There are five types of land investment that households in *Barangay* Villa Florentino are engaged in, namely: contour ploughing, bench terracing, contour bunds, agroforestry establishment and tree planting.

1 Contour ploughing
All farmers in the *barangay* practice this technique of reducing soil erosion. According to them, surface erosion which develops into gullies is significantly prevented through this technique. Moreover, this technique requires low investment in maintaining land quality, needing only to hire carabao for those farmers who do not have carabaos to do contour ploughing. This technique, however is more difficult to do than the usual technique of ploughing up-and-down the slope.

2 Terracing
There are 2 types of terraces constructed by the farmers in Villa Florentino, namely: rockwall terraces and soil terraces. Rockwall terraces are made up of rocks put on top of the other to form rockwalls popularly known as 'tuping '. The farmers utilize rocks found within or adjacent to their lands. In soil terraces, the materials used for walling the terraces are purely soil with clayey characteristics so that the terrace walls cannot be eroded easily.

3 Contour bunds
These are usually constructed in steep slopes where small areas are cultivated. The land consists of hilled-up embankments on the plant hills lined along the contour thereby controlling soil erosion.

4 Agroforestry
This technique has been learned and adopted by the farmers through seminars, trainings and meetings conducted by the LGU of Diadi, Nueva Vizcaya. Although definition of this technique varies, fruit and forest trees species have been planted by the farmers at locations within their farms or on boundaries.

5 Tree plantation
The only exotic forest tree species planted by farmers on some portions or on boundaries of their farms is *Gmelina* because the seeds are easily found. According to the farmers, seed gathering, seedling production and planting of the trees are done during their slack times.

3.5.5 Social capital

Social organization of village
The most dominant form of leadership influencing the lives of the households is the formal political leadership of the local government unit (LGU), headed by the *barangay* Chairman with seven members of the *Barangay* Council, a representative of the youth group known as the Sangguniang Kabataan Chairman, a Secretary and Treasurer. The *barangay* leadership is responsible for the delivery of social services, peace and order and the conduct of various activities of the government. They are the first link of the people to the government and responsible directly to the town or municipal leadership. Except for Secretary and Treasurer, the *barangay* officials are elected by the registered voters within the *barangay* who serve for three year-terms, and limited tor three terms.

The most common type of communal activities participated in by all households in the *barangay* are: *barangay* assembly meetings, cleaning the school surroundings, repairing school buildings, constructing waiting sheds and road maintenance. During *barangay* meetings, topics related but not limited to the following issues are discussed: livelihood projects, ordinances*barangay* festival, peace and order and health. Plans and programs and other information on a national scale are being presented during these meetings.

Communal works in the *barangay* are organized by the *barangay* officials who set the date of the activities. Each household is required to provide one man-member to participate in the communal works and *barangay* meetings. If the male head of the household can not go, other members of the household (with age 15 years old and up) can attend as a substitute.

Information and dissemination
Information in the*barangay* comes from various sources: through the municipal government employees who come during*barangay* meetings, through seminars and workshops conducted by the LGU of Diadi, Nueva Vizcaya, through the radio stations which carry regular extension programs and through their friends and neighbours.

The households in the *barangay* are open to information. Many of them are willing to experiment with new techniques that are introduced to them and adopt those techniques which they think can improve their standard of living. Other households are also eagerly following the techniques of their relatives,

neighbours and friends who are willing to share their experiences, some of the seeds and other planting materials.

3.5.6 Infrastructure

There are two *barangay* roads leading to *Barangay* Villa Florentino, namely: the road going to *Barangay* Aurora, Diadi, Nueva Vizcaya and road going to Cordon, Isabela. These roads are dirt roads which are usually closed during the rainy season because road sections become too slippery and muddy. During this condition, the *barangay* can only be reached through hiking or walking on the roads or on foot trails.

Table 3.25 shows the travel time and fare per person at various destinations from the *barangay* center. The table shows, for instance, that the total travel time from the highway junction where one can take bus ride to Manila, the capital city of the Philippines, is about 525 minutes. In some cases, travelling takes more time than this especially during day time and busy hours.

Electricity is not yet available in the *barangay*. Water supply for domestic use can be taken from plastic water pipes originating from the mountain foothills about 800 m to 1000 m away. Two multi-purpose pavement and solar drier and *Barangay* Monitoring Centers have been constructed at strategic points within the *barangay*. There is one public elementary school under the Department of Education, Culture and Sports (DECS) and one day-care center under the LGU of Diadi, Nueva Vizcaya. The government offers free education to these levels.

A provincial hospital is located in the capital town of Bayombong, Nueva Vizcaya while a municipal health center is available for general health services in Diadi, Nueva Vizcaya. Privately owned hospitals and clinics are located in adjacent towns of Nueva Vizcaya and the province of Isabela.

Table 3.25 – Travel time to different destinations from Villa Florentino, Diadi, Nueva Vizcaya.

Destination	Distance (km)	Time of travel	Fare (Php)
Maharlika national highway	5	45 min to 1 hour	2.50
Cordon, Isabela	7	20 min from highway junction	3.50
Santiago City, Isabela	15	45 min from highway junction	15.00
Diadi, Nueva Vizcaya	9	30 min from highway junction	10.00
Metro Manila	312	480 min from highway junction	198.00

3.6 Summary

In Table 3.26, it shows that Kapatalan is the oldest and the most accessible to Manila among the study sites but with the least number of soil and water conservation techniques. Agroforestry and reforestation is the most widely practice techniques in this village. Although Balete is the youngest village established, it has the highest number of soil and water conservation techniques which maybe due to the presence of government project and the strong support of government and non-government agencies.

Villa Florentino is the most difficult to access and with minimal presence of government agencies. The village however, has a high number of soil and water conservation techniques, primarily terraces and agroforestry with diverse crops and various off-farm income sources like handicraft-making. Land tenure in the village is dominated by CSC particularly in lands bounded by the DENR adjacent to the village.

Kapatalan, the oldest among the village, has the highest population density while Balete has the lowest population density of 13 persons per square kilometre.

In general, the villages are undergoing transition with different intensities and being affected by several forces as discussed above. In the following chapter, household-level analysis is undertaken in preparation for the econometric analysis in Chapter 5 and technology analysis in Chapter 6.

Table 3.26 – General characteristics of the selected villages

General characteristics	Balete	Kapatalan	Quibal	Villa Florentino
Year of settlement	1976	1954	1960	1973
SWC technique*	T, A, CR, HR, I, C, H, FE, F	A, HR, F, M	A, CR, HR, F, FE	T, A, HR, I, F
Role of outside agencies	strong	moderate	strong	minimal
Accessibility	difficult	all-weather road	all-weather road	difficult
Travel time, center-outskirt (minutes)	30-60	15-20	30-45	90
Travel time to local market (minutes)	30	20	25	65
Travel time to major market (minutes)	50	45	45	65
Travel time to Manila (minutes)	225	120	780	525
Off-farm income	moderately important	important	important	unimportant or moderately important
Land tenure	titled/CSC	titled/CSC	titled/CSC	CSC
Population density	13/km^2	235/km^2	93/km^2	38/km^2

**Soil and water conservation techniques:*

T = terracing (rock and soil)	A = agroforestry	CR = communal reforestation	FE = fertilizer application
HR = household reforestation	I = irrigation	C = contour bunds	M = manure
H = hedgerows	F = fallow	Land tenure: CSC = certificate of stewardship contract	