BIBLIOGRAPHY

Clarence C. Anacioco, Khim Jones D. Motes And Beverly D. Joseph. Awareness Of Local Communities On Indigenous Agroforestry Practices At Naguey, Atok, Benguet. Benguet State University, La Trinidad, Benguet.

Adviser: VICENTE T. WACANGAN, Ph.D.

ABSTRACT

The study aims to identify the level of awareness of the residents of Naguey, Atok, Benguet on the different indigenous agroforestry practices, determine the benefits obtained in practicing agroforestry, identify the problems encountered by the residents and their recommendations to maintain and promote agroforestry practices.

Residents of Naguey, Atok, Benguet are very aware of the following indigenous agroforestry practices: terracing, swidden cultivation, home garden and raising cattle in forest. On the other hand, just fifty-five percent of the respondents are aware on what agroforestry is all about.

The respondents are perceptive on the different beneficial effects of applying agroforestry practices on the aspects of social, economical and environmental concerns. Conversely, the respondents‟ main problem is on lack of capital or financial assessment.

Also the respondents encountered problems such as lack of capital, lack of raw materials, lack of knowledge in implementation, lack of equipment and credit facilities, lack of guidelines on land allocation, lack of efficient marketing scheme for farm product, and deficiency in production technology.

Thus the leading recommendations of the respondents in order to maintain and promote agroforestry as a tool for forest management are the farmers will undergo on-site and off-site training on technical aspects agroforestry as well as entrepreneurial skills, support systems for the farmers such as farm to market roads, seedlings, farm inputs and health services. Extension services and technology transfer will be done, provide the farmers with a continued source of livelihood that is compatible with the principles of sustainable management and at the same serves as a tool for forest protection will be developed. Identified information and education campaign to facilitate and give knowledge, involving farmers in planning in solving problems and lastly, appropriate policies in applying agroforestry should be considered.

INTRODUCTION

This chapter presents the background of the study, conceptual framework, statement of the problem and hypothesis of study.

Background of the Study

Traditional methods are developed over many generations of trial and refinement (Oldeman, 1979) notes that indigenous agricultural traditions are combinations of bioclimatic, soil, population density and technical ability, among other factor. As soon as the evolution of one or more of such components goes beyond certain quantitative thresholds, the tradition ceases being adequate. The literature cites many examples of practical, ecologically sound highland agriculture and forestry management practices developed over generations of refinement by tribal groups in response to their environment (Olofan, 1981). Indigenous agroforestry systems, according to Lasco (1994) are those that have been in existence for generations and have thus passed the test of time.

High population growth and dwindling forest resources are two of the problems that baffle rural development efforts in the Philippines. An increasing population demands more food, healthful environment, enough water, adequate housing and other essentials of life. The population increase creates pressure to accelerate conversion of forests into agricultural lands to cause an increasing demand for goods and services from our receding forests (Castillo, 1987).

Agroforestry is a collective name for land use systems in which woody perennials (trees, shrubs, and others) are grown in association with herbaceous plants (crops, shrubs, and others) and or livestock in a spatial arrangement, a rotation, or both, and in which there are both ecological and economic interactions between the tree and non-tree components of the system (ICRAF, 1978). It is a suitable land management practice which combines the production of agricultural crops, forest trees and or livestock simultaneously or sequentially on the same land management unit which is the aim of obtaining greater output in a sustained basis (ICRAF, 1978).

Traditional methods are developed over many generations of trial and error and refinement notes that indigenous agriculture and forestry management practices are combinations of bioclimatic, soil, population density and technical ability among factors (Oldeman, 1979). Agroforestry is considered as a strategy to rehabilitate the denuded uplands and at the same time improve the socio-economic condition of upland farmers (http://www.agoforestry.htm). In the Philippines, the oldest agroforestry system studied was swidden cultivation locally termed as "kaingin". This system is believed to be ecologically sound and practiced mostly by indigenous people. However, because of population growth of the country, even the lowlanders engaged in farming activities in the uplands resulted to more pressures and upland degradation. At present, to deal with those circumstances, the indigenous people and lowlanders who depend their living on the upland areas of the country are practicing several agroforestry systems.

Nature provides with what people need so they must be responsible in taking care of it. People migrating to the uplands brought with them diverse lowland farming practices that are most often than not applicable in the uplands. Through agroforestry, farms are utilized into various combinations of food crops, trees, animals, and other resources. Integrate production systems; soil and water conservation measures are adopted to efficiently increase food production while maintain soil fertility; improving its physiochemical and biological properties.

Since indigenous agroforestry is still practiced in every rural community, this study of the awareness of local communities on indigenous agroforestry practices as a tool of forest management at Naguey, Atok, Benguet will have a contribution to the residents and farmers. The result of the study to be conducted can be introduced to the farmers and may help as their basis in practicing indigenous agroforestry systems. This study also serves as an educational campaign in managing the forest.

LOCATOR MAP

(NAGUEY, ATOK, BENGUET)

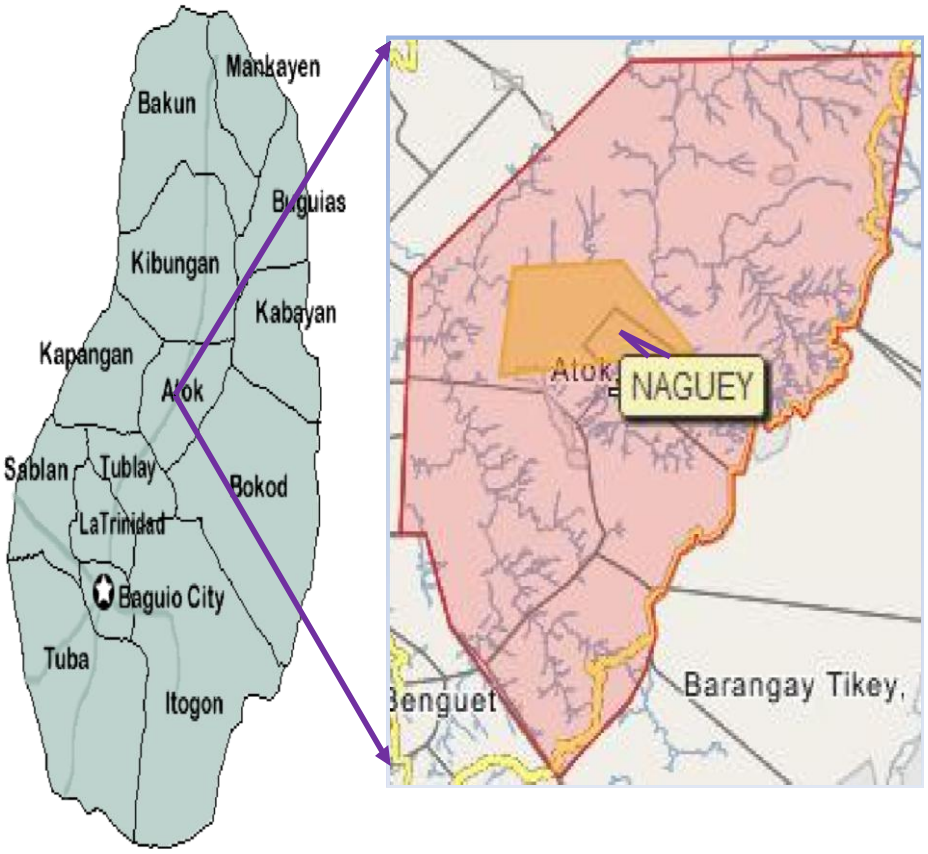

Figure. 1 Map of Naguey, Atok, Benguet

Conceptual Framework

In the locality, people are experiencing crisis that triggers them to allocate and maximize the use of our resources in order to maintain their needs. Majority of individuals mainly are dependent on the scarce resources in maintaining their biological provisions. Because of the persistent distribution of the resources, the productivity and quantity of the forests decreases. It is being converted into agricultural land, pasture land, disturbed because of extensive logging and cutting of trees.

Due to the incessant destruction of natural resources, experts introduced to the local communities the practice of agroforestry. This practice is the combination of cash crops and trees in a certain area. This system increases production while maintaining the outlook of the natural resources not only for economic value but also promote ecological sustainability.

The independent variable comprises the different indigenous agroforestry practices. These practices are in varied technique but have common purpose, it is to increase stable production of food, raw materials and the basic necessities of an individual, it conserves natural resources and the existing flora and fauna. The intervening variable affects the practice on different indigenous agroforestry practices. Moreover, the local residents encounter problems in applying these practices. Based on the effect of intervening variables on the different variables, actions and initiations will be recommended to promote the practice of the indigenous practices. Motivation on the respondents and teaching strategies should be an alternative or other way promoting these practices. Thus, dependent variables

wherein benefits from this agroforestry practices will be acquired or attained such as the sustainable social,

Agroforestry Practices

Currently, a new system of land use called agroforestry is being espoused as an alternative to swidden farming. Agroforestry is seen as a strategy in social forestry, which is a new name for an old practice. Burch and Parker (1992), characterized agroforestry as a process of combining trees and food crops with animals to meet human needs. Scientists and developers were challenged to solve a range of problems that reflect complex and interrelated biophysical and socio-economic factors in order to improve on and promote new variations of this ancient strategy of farming practices.

The concept of agroforestry is new, but the rudimentary practice of agroforestry is quiet old. It was only in the recent years that concerted studies have focused attention on this old practice with the view of rationalizing it, thus the scientific principles were injected into the old, and in the process the term "agroforestry" is coined. Agroforestry normally involves two to more species of plants (or plants and animals) at least one is woody perennial; it always has two or more outputs; the cycle is always longer than one year and even the most simple agroforestry system is more complex, ecologically, and economically than monocropping system.

Combe (1992) classified agroforestry systems with the following criteria: (1) based on the kind of associated agricultural products. This refers to the combination of crops and or livestock and can be of the following: (a) Agrisilvicultural system, in which agricultural crops and trees are raised together such as alley cropping, sloping agricultural land technology (SALT) and multistory cropping; (b) Silvipastory system, where, livestock animals are raised with forest trees; and (c) Agrisilvipastoral system, which involves the production of forest trees, agricultural crops and raising of domesticated animals; (2) based on the function of forest component like for protection, production on both; and (3) based on spatial distribution of trees such as regular or irregular.

Major agroforestry in the tropics were described by Nair et al. (1993) as follows: (1) improved fallow involves the planting of fast growing, preferably leguminous woody species that are left to grow during the fallow period of shifting cultivation. Woody species cause site improvement and may yield economic products; (2) taungya is the growing of agricultural crops during the initial establishment of forestry plantation; (3) alley cropping includes the planting of fast growing trees, preferably leguminous woody species, in crop production field; (4) plantation of crop combination is an integrated multistory tree crops such as coconut, cacao, coffee and rubber with other shade trees and or herbaceous crops; (5) Multi-purpose Tree Species (MPTS) is a strategy where fruit trees and other multi-purpose trees are scattered on farm and arrange haphazardly or according to systemic planting arrangement in crop or animal production fields; (6) trees in soil conservation is a process of planting trees on bunds, terraces, risers and

reclamation sites; and (7) home gardens are intimate multistory combination of a large number of various trees and crops in a homestead.

In the Philippines, agroforestry is practiced in different forms and variants. The practice is now accepted throughout the archipelago although it varies in terms of method of field implementation such as the kind of tree and agricultural crop combination used, method of planting and maintenance practiced (Calanog and Reyes,

1989). Agroforestry servers as an acceptable alternative not only in the rehabilitation of denuded forest land but also in developing the countryside through the participation of the upland communities, which are the direct beneficiaries of this farming system.

Alley cropping, which is becoming popular in sloping lands, involves the establishment of hedgerows along the contour of mountain slopes. A variant alley cropping called sloping agricultural land technology (SALT) was developed by the

Mindanao Baptist Rural Life Center (MBRLC), a non-government organization based in Kinuskusan, Bansalan, Davao del Sur (ICRAF, 2000). Multi-story system of

agroforestry is similar to the structures (multi-layer) and composition (diverse species) of a tropical rainforest and can also be adapted by interplanting shade-tolerant species under established trees and coconut plantation multi-story system can also be integrated with animals that can graze under trees.

Aside from these modified and research–based agroforestry technologies, there are existing indigenous agroforestry systems practiced by upland farmers in the Philippines but they are not aware that it is agroforestry. The practice of the cultural communities in the Cordillera to terrace with the use of stones is an example. Terracing, done even in the present in places with elevations ranging from, 1,500 to 5,000 ft. above sea level, is called "wet-rice-terraces" by Keesing (1962). It is agroforestry practiced as a way of life, an existence of indigenous upland technological expertise worth preserving and emulating. It is irrigated rice terraces constructed on steep mountainside. The system has been in existence for more than 2000 years, it is the most important factor responsible for its sustainability. The forest stands serve as watershed from which springs forth water needed to irrigate the terraces as well as prevent land slippage.

Another indigenous agroforestry practice is the "balabag" of the Naalad upland farmers in Naga, Cebu, Philippines. The balabag system is considered as indigenous agroforestry, combining agricultural and forestry crops in the same unit area. It is the same as the modern cyclical agroforestry wherein, land is cleared of perennial crops by cutting, cropped, fallowed then cleared again (Pulhin, 1983). Fallowing is done to restore soil fertility. The area is compartmentalized to allow rotational cropping and fallowing, so that when one-half of the farms are under fallow, the other half produces corn as the main crop followed by tobacco.

Home gardens occur in some form in almost every ecological zone and farming system. Agroforestry practices in home gardens can range from few trees and shrubs in small vegetable and herb gardens to a dense multi-story plot of fruit trees, vegetables, herbs and cash crops with trees planted for timber, fuel wood, and fodder (Rochelan, 1988). It is a major source of food or cash income, especially for poor families with little arable land. This is very common in rural scene both upland and lowland areas.

Raising cattles in forest plays an important role in the traditional agroforestry practices. They are used for ploughing, weeding and transport (PCARRD, 1991). The animals help to keep the land clear of weeds, used to play an indirect but important role in protecting the growth of forest tree seedlings by reducing fire hazard. Cattle may reduce labor requirements as well as contributing to production via fertility enhancement and the control of competing weeds. Cattle may play a role in seed germination of some forest trees species by eating their fruit and breaking the dormancy of the seed.

Swidden agriculture or shifting cultivation has been and still is practiced to manage soil fertility. Shifting cultivation involves an alternation between crops and longterm forest fallow (Conklin, 1987). In typical sequence, forest is cut and burned to clear the land and provide ash „fertilizer" or „lime" for the soil. Crop yields are typically for the first few years but then fall on account of declining soil fertility or invasion of weeds or pests. The fields are then abandoned and a farmer clears another piece of forests. The abandoned field is left to fallow for several years or decades and thus has a chance to rebuild fertility before the farmer returns to it to start the process again. Shifting cultivation is often characterized by seasons-to-season progression of different crops, which differ in soil nutrient requirements, and susceptibility to weeds and pests.

Benefits of Agroforestry

The degree to which agroforestry can contribute to solving global environmental problems remains uncertain, not least because the problems themselves are still

poorly understood. Moreover, the agroforestry can contribute to local and regional economies in many ways. An analysis by the Food and Agriculture Organization of the United Nations (FAN) and ICRAF (Raintue and Hoskins, 1988) listed a total of 32

contributions of agroforestry to eight basic human needs. The main contributions are the following: (1) increased and more stable food production, resulting either directly from the introduction of trees (fodder, fruit) or indirectly through the contribution of tree to soil fertility and the sustainability of agriculture, (2) higher incomes for small-scale farmers and other land users, resulting from the scale of the products. (3) more products and services provided by small-farms, with associated benefits to rural and national economies in terms of increased small-scale industry, reduced dependence on external sources for key agricultural inputs (fertilizer) and subsistence products (fuelwood, building materials), (4)improved soil structure and fertility, whose importance effects on crop yield; (5) enhanced microclimates through increased standing biomass, with benefits to crops, animals and people; (6) reduced pressure on remaining forests, achieved by raising the productivity of existing agricultural land by increasing the supply of fuel wood and other products from non-forested areas; (7) reduced soil erosion and siltation of water ways, achieved through the prevention of run-off on sloping land; (8) reduced pressure on grazing lands through the intersification of fodder of animal production; and (9) source of employment, raw materials, for handicraft/cottage industries, food, energy, feeds for livestock and materials for housing, farm implements; for soil and water conservation, microclimatic amelioration.

Management of Agroforestry Practices

Interest in agroforestry as a means of improving rural livelihood has led to development of a number of "improved" agroforestry practices. Efforts to improve or rationalize traditional practices have generally made little impact on traditional agroforestry, perhaps because improved practices often fail to offer farmers increased production and income or reduced risks. Yet improved management and enhanced practices offer great potential for increased production and profit from agroforestry practices.

Raintree (1983) suggests three general criteria for the design of successful agforestry practices:

- Productivity – Introduced practices should be at least as productive in economic terms are existing practices. Short-term economic incentives are often critical to farmer acceptance and adoption of new practices.
- Sustainability – It is often reluctant to adopt conservation practices that require additional investment the sustainability of agroforestry practices is critical to long-term productivity. Sustainability maybe more critical in agroforestry practices than in annual cropping for two reasons: (1) chemical and power inputs such as fertilizer and mechanization are not practical in many agroforestry situations, and (2) Agroforestry is often practiced on slopes that are subject to severe soil erosion risks.

- Adoptability – The best-designed agroforestry practices is worthless unless farmers adopt it. To insure adoption, the farmers should be involved directly in planning and designing agroforestry systems.

Management decisions to use inputs such as fertilizer, pesticides and so on in agroforestry are critical for farmers who have access to the resources to evaluate and select cultural practices from a wide range of alternatives. All farmers who practice agroforestry make decisions, consciously or otherwise, about the following: species to plant and the proportions of each type and timing of land preparation, plant spacing and arrangement, planting times for each of the system components, labor allocations to each components, labor allocations to each component, particularly for labor-intensive operations such as weeding and harvesting and postharvest arrangements for each crop. Farmers do indeed make such decisions on regular basis but are generally unable to maximize production because of a lack of management information and input.

Statement of the Problems

The study deals with the awareness of the local communities on indigenous agroforestry practices as a tool of forest management. Specifically, it sought to answer the following:

1. What is the awareness of residents of Naguey, Atok, Benguet on the different indigenous agroforestry practices?

2. What are the benefits obtained by the resident in practicing agroforestry?

3. What are the problems encountered by the residents in practicing agroforestry?

4. What are the recommendations of the residents to maintain and promote indigenous agroforestry practices?

Hypotheses of the Study

The following hypotheses are put forward to testing:

1. The local residents of Naguey, Atok, Benguet are aware on the different indigenous agroforestry practices.

2. The residents know the benefits obtain from the different indigenous agroforestry practices and the problems they encountered in practicing the said system.

METHODOLOGY

This chapter presents the research design, population and locale of the study, data collection instruments, data collection procedure and statistical treatment of data.

Research Design

Descriptive method of research was used in this study. This method was used to determine and describe the awareness of local communities on the importance of the different agroforestry practices. In this study, the gathering of data was done through survey questionnaire, personal interview to the respondents and making use of observations.

Population and Locale of the Study

This study was conducted at Naguey, Atok, Benguet which is about 44 kilometers away from Benguet State University, La Trinidad, Benguet The area of the study is bounded by Tublay in the south and Kabayan in the east, west of Bokod, south of

Kibungan and in the south-west of Buguias. This study was conducted on November, 2011.The respondents of this study are the residents of the said area whose age is 18 years old and above. There were 78 respondents in the barangay. The number of respondents was determined using the Slovian formula below: $n = N/1+N(e)^2$

Where: N = total number of households

e = level of probability for the allowance error

n = sample size/respondents

10% = chosen margin for error

Data Collection Instruments

The researchers administered a questionnaire, conducted a personal interview and use direct observation in gathering data. As a primary data, the questions in the questionnaire were used. Camera was used to document structures and status of the forest in the study site. Also the collected references was set as a secondary data. The information gathered from the interview was analyzed and summarized by the researchers. It was collated to the collected information‟s from books, magazines, newspapers and journals.

Data Collection Procedure

The researchers used a structured questionnaire, personal interviews, and observations and through library works in gathering data. Other source of information comes from the different references used like books, newspapers, magazines,

encyclopedias, dictionaries and others. In gathering of data, the researchers forwarded a communication letter to the Municipal Mayor of Atok and to the Barangay Captain of Naguey, Atok, Benguet for the permission to conduct a study in their locale.

Statistical Treatment of Data

The collected data were tabulated, analyze, categorized, and entered in appropriate tables. Descriptive statistics like percentage, rating and ranking were used in analyzing the socio-demographic profile. The T-test was used in determining the level of awareness of the respondents on the different agroforestry

practices, the benefits obtained from it and the problems encountered by framers in applying agroforestry systems.

RESULTS AND DISCUSSION

This chapter presents the results and discussion of the study.

Socio-demographic Profile

Table 1 presents the socio-demographic profile of the respondents. As to gender, majority of the respondents are females, which is 69.23 %, and the remaining 30.77% are males.

Table 1. Socio-demographic profile of the respondents

PROFILE	FREQUENCY	PERCENTAGE
Gender		
Female	**54**	**69.23**
Male	**24**	**30.77**

Awareness of Respondents on the Different Indigenous Agroforestry Practices

Table 2 shows the awareness of respondents on the different agroforestry practices. Majority of the respondents are aware of agroforestry with 55.13

% and 44.87% are not aware. This indicates that majority of the respondents are responsive on the knowledge about agroforestry. Some are unaware on indigenous

agroforestry practices because they do not still have the knowledge about agroforestry.

Table 2. Awareness of the respondents on Agroforestry.

AWARENESS	FREQUENCY	PERCENTAGE
Yes	**43**	**55.13**
No	**35**	**44.87**

Plate no. 1 Valley of Naguey, Atok, Benguet

Plate no. 2 Using of visual aid during the interviews

Plate no. 3 Presentation of the questionnaire to the respondents

Respondents Degree of Awareness on the Different Indigenous Agroforestry. Table 3 shows the level of awareness on the different indigenous agroforestry practices by the respondents. Almost all the respondents are very aware on the different indigenous agroforestry practices. This implies that indigenous agroforestry practices are important to the respondents as source of food, income and source of raw materials. Based on the computed mean, the respondents are very aware on terracing, swidden cultivation, raising cattle in forest and home garden, while some of the respondents are aware on the intercropping, alley cropping and multi-story. The hypothesis that the respondents are aware on the different indigenous agroforestry practices is accepted as indicated by the computed t-value of 8.38 with a 0.00 probability, which is highly significant. In addition, some of the respondents apply other practices like coppicing and pruning.

Table 3. Respondents Degree of Awareness on the Different Indigenous Agroforestry

AGROFORESTRY PRACTICES	MEAN	DESCRIPTIONE QUIVALENT	
Terracing	**4.00**	**VA**	**Very Aware**
Swidden cultivation	**4.00**	**VA**	**Very Aware**
Raising cattle in forest	**3.72**	**VA**	**Very Aware**
Intercopping	**2.96**	**A**	**Aware**
Homegarden	**3.96**	**VA**	**Very Aware**
Alley cropping	**2.96**	**A**	**Aware**

Multi-story Aware	**2.91**	**A**	
Grand Mean Aware	**3.5**	**VA**	**Very**

** -- Highly significant at 95% Conf. Interval t-value = 8.38** P =

0.00 Limit Rating	Interval Rating	Percentage
3.50 – 4.00	Very Aware (VA)	76% - 100% knowledgeable
2.50 – 3.49	Aware (A)	51% - 75% knowledgeable
1.50 – 2.49	Moderately Aware (MA)	50% and below knowledgeable
0.50 – 1.49	Not Aware (NA)	Not knowledgeable

Plate no. 4 The rice terraces

Plate no. 5 Grazing animal (goat) in the home garden

Plate no. 6 Raising cattle in the forest

Plate no. 7 The multi -story practice

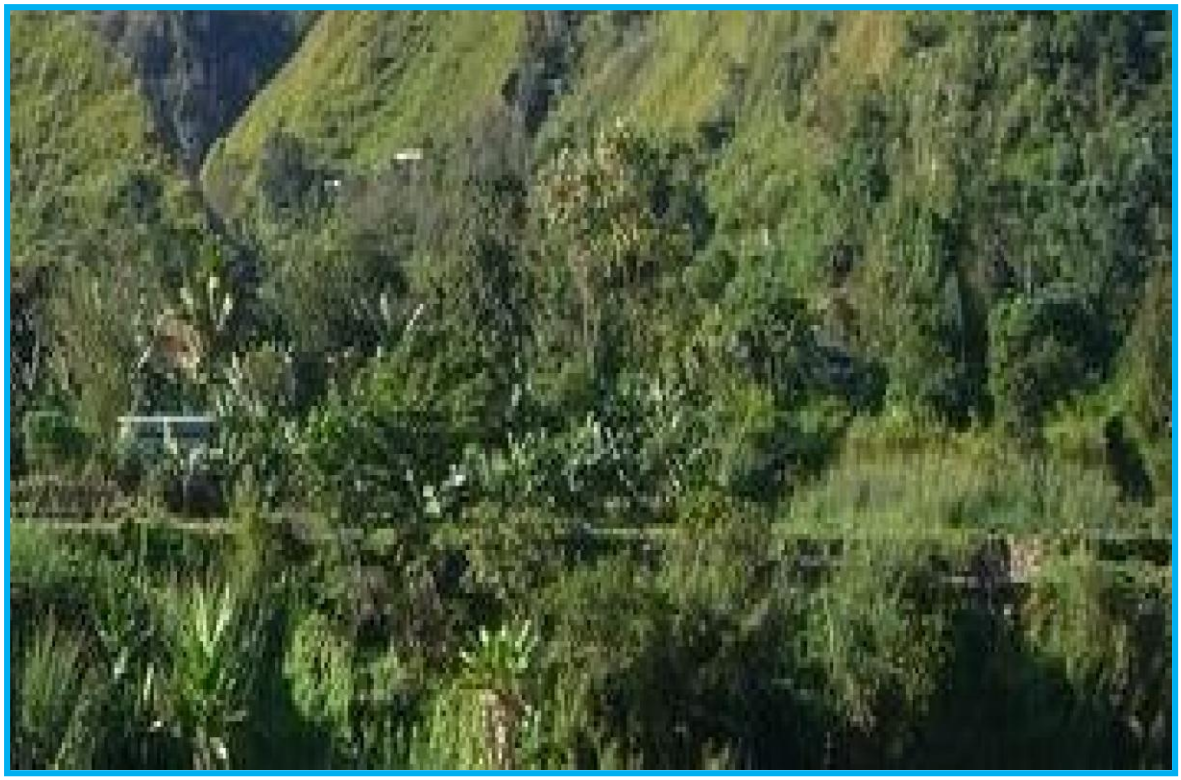

Plate no. 8 The home gardens

Benefits Obtained from Agroforestry Practices

Table 4 presents the benefits obtained from applying indigenous agroforestry practices. Almost all the respondents agreed that the beneficial aspects are very much important in their community. This implies that the beneficial aspects are sustained through the application of the different indigenous agroforestry practices. The hypothesis that the residents know the different beneficial aspects obtain from different indigenous agroforestry practices is accepted as indicated by the grand mean of 3.75.

Table 4. Beneficial Aspects of the Different Indigenous Agroforestry Practices

BENEFICIAL ASPECTS	MEAN	T-VALUE	DESCRIPTION EQUIVALENT	
Social Aspects Beneficial	**3.63**	**25.45****	**VB**	**Very**
Economic Aspects Beneficial	**3.8**	**41.83****	**VB**	**Very**
Environmental Aspects Beneficial	**3.83**	**46.11****	**VB**	**Very**
Grand Mean Beneficial	**3.75**		**VB**	**Very**

** -- Highly significant at 95% Conf. Interval P = 0.00

Social Benefits. Table 4a presents the social benefits provided by applying indigenous agroforestry practices. The computed mean shows that the benefits on better health condition are very much beneficial. It is followed by the benefits on: strengthens the family bonding, improves camaraderie within the community and improves public relations respectively. Furthermore, the hypothesis that the respondents are being socially benefited on the different indigenous agroforestry practices is accepted supported by computed t-value 25.45 with an associated probability of 0.00 which is highly significant.

Plate no. 9 The river system at the area, serves as irrigation to the farms

Plate no. 10 Agroforestry products

Table 4a. Degree of beneficial effect of the indigenous Agroforestry practices on social benefits.

BENEFITS	MEAN	DESCRIPTION EQUIVALENT
Better health condition	3.96	VB Very Beneficial
Strengthens the family bonding	3.53	B Beneficial
Improves camaraderie within the community	3.55	B Beneficial
Improves public relations	3.47	B Beneficial
Grand Mean	3.63	VB Very Beneficial

** -- Highly significant at 95% Conf. Interval t-value = 25.45** P = 0.00

Economic Benefits. Table 4b presents the economic benefits to improve the living condition of upland and feeds for livestock are rated as very much beneficial. Based on the computed mean, very beneficial were the source of employment, raw materials for handicraft, source of food, fuel wood, raw materials for housing, farm implements and to maximize and for beneficial sustain overall production for food, tree crops including animals. Furthermore, the hypothesis that the respondents are being economically benefited in practicing different indigenous agroforestry practices is accepted as the supported by the computed t-value of 41.83** with an associated at 0.00 probability is highly significant.

Table 4b. Degree of beneficial effect of the indigenous Agroforestry practices on economic benefits

BENEFITS	MEAN	DESCRIPTION EQUIVALENT
To improve the living condition	3.96	VB Very Beneficial
of the upland farmers	3.87	VB Very Beneficial
Source of employment	3.82	VB Very Beneficial
Source of raw materials for handicraft	3.96	VB Very Beneficial
Source of food, energy (fuel wood), Feeds for livestock and others	3.73	VB Very Beneficial
Source of raw materials for housing, farm implements and others	3.79	VB Very Beneficial
To minimize and sustain overall land production for food, tree crops, including animals.	3.46	B Beneficial
Grand Mean	3.8	VB Very Beneficial
** -- Highly significant at 95% Conf. Interval	t-value = 41.83**	P = 0.00

Environmental Benefits. Table 4c presents the of indigenous agroforestry practices in environmental condition. Based on the computed mean, very beneficial is the water, soil and other natural resources conservation. It is followed by the maximize soil erosion, nutrient lose, pest and diseases; soil conservation and amelioration, improvement of microclimatic condition and soil fertility and enhance environmental rehabilitation respectively. Furthermore, the hypothesis that the respondents are being environmentally benefited on practicing different

indigenous agroforestry practices is accepted as supported by computed t-value of 46.11 at 0.00 probability which is highly significant.

Table 4c. Degree of beneficial effect of the indigenous Agroforestry practices on environmental benefits

BENEFITS	MEAN	DESCRIPTION EQUIVALENT
Environmental Benefits		
Water conservation	3.96	VB Very Beneficial
Minimize soil erosion, nutrient lose,	3.95	VB Very Beneficial
pest and disease occurrence		
Improvement of microclimatic condition and soil fertility	3.64	VB Very Beneficial
Soil conservation and amelioration	3.85	VB Very Beneficial
To conserve water, soil	3.96	VB Very Beneficial
and other natural resources		
To enhance environmental rehabilitation	3.61	VB Very Beneficial
Grand Mean	3.83	VB Very Beneficial

** -- Highly significant at 95% Conf. Interval t-value = 46.11** P = 0.00

Limit	Interval Rating	Percentage Rating
3.50 – 4.00	Very Beneficial (VB)	76% - 100% contribution
2.50 – 3.49	Beneficial (B)	51% - 75% contribution
1.50 – 2.49	Moderately Beneficial (MB)	50% and below contribution
0.50 – 1.49	Not Beneficial (NB)	No contribution

Problems Encountered by the Respondents in Applying Indigenous Agroforestry Practices

Table 5 presents the list of problems encountered by the respondents in applying indigenous agroforestry practices. Based on the computed mean, very serious problem is the lack of capital. Then it is followed by serious problems by; lack of raw materials, knowledge in implementation, equipment and credit facilities; lack of guidelines on land use allocation; lack of an efficient marketing scheme for farm product and deficiency in production technology respectively. Moreover, the hypothesis that the respondents encountered problems in practicing indigenous Agroforestry practices is accepted as supported t-value of 1.5^{ns}, which is not significant.

Likewise, other problems cited by some respondents are: occurrence of pest and diseases, irrigation to farms especially when summer time, over usage of fertilizer that causes soil fertility loss, incidence on forest fires, problems on garbage disposal, air pollution due to poultries, and the equal sharing of funds designated to the barangay officials for environmental purposes.

Table 5. Degree of seriousness of problems encountered by the respondents

PROBLEMS	MEAN	DESCRIPTION	EQUIVALENT
Lack of capital	3.82	VS	Very Serious
Lack of raw materials	3.04	S	Serious
Lack of knowledge in implementation	3.92	VS	Very Serious
Lack of equipment and credit facilities	3.13	S	Serious
Lack of guidelines on land use allocation	3.24	S	Serious
Lack of an efficient marketing scheme for farm product	3.18	S	Serious
Deficiency in production technology	3.54	VS	Very Serious
Grand Mean	3.04	S	Serious

ns – not significant at 95% Conf. Interval t-value = 1.15^{ns} P = 0.25

Limit	Interval Rating	Percentage Rating
3.50 – 4.00	Very Serious (VS)	76% - 100% effect
2.50 – 3.49	Serious (S)	51% - 75% effect
1.50 – 2.49	Moderately Serious (MS)	50% and below effect
0.50 – 1.49	Not Serious (NS)	No effect

Plate no. 11 Farm to market road

Plate no. 12. The group after the interviews

Recommended Solutions on the Encountered Problems of the Respondents in Applying the Different Agroforestry Practices to Maintain and Promote Agroforestry Practices

Table 6 presents the recommended solutions of the respondents on the encountered problems. Almost all of the respondents, highly recommended the following: farm to market roads, providing of seedling, farm inputs, health services, extension services appropriate policies in applying agroforestry and technology transfer and farmers on-sit and off-site training on technical aspects of agroforestry as well as entrepreneurial skills are the strategies to which they are highly recommended, to provide the farmers with a continued source of livelihood that is compatible with the principles of sustainable management and at the same time serves as a tool for forest protection will developed, involving farmers in planning and in solving problems and identified information and education campaign to facilitate and give knowledge and understanding to the farmers. The strategy on develop transferable technology, giving of economic incentives to the farmers and security of tenure and benefit sharing are recommended. The foregoing findings indicate the application of indigenous agroforestry practices as highly recommended due to the beneficial contributions. The cited recommendations are highly significant supported by grand mean of 3.76 and the computed t-value of 25.98** with an associated at 0.00 probability is highly significant. In addition, majority of the respondents recommend certain measures in combating the problem through introduction of new species or varieties of plants, control use of fertilizers, seminars on appropriate herbicides/insecticides/fertilizer to pest and diseases of plants, tree planting programs, vehicles that is suited for vegetables only and lastly, proper cooperation of farmers.

Table 6. Recommended solutions on the encountered problems by the respondents

RECOMMENDATIONS	MEAN	DESCRIPTION EQUIVALENT	
Farmers will undergo on-site and off-site training on technical aspects agroforestry as well as entrepreneurial skills.	3.90	HR	Highly Recomm.
Support systems for the farmers such as farm to market roads	3.99	HR	Highly Recomm.
Seedlings, farm inputs, health services, extension services and technology transfer will be provided.	3.91	HR	Highly Recomm.
Provide the farmers with a continued source of livelihood that is compatible with the principles of sustainable management and at the same serves as a tool for forest protection will be developed.	3.81	HR	Highly Recomm.
Identified information and education campaign to facilitate and give knowledge and understanding to the farmers.	3.70	HR	Highly Recomm.
Develop of transferable technology	3.41	R	Recommended
Involving farmers in planning and in solving problems	3.87	HR	Highly Recomm.
Giving of economic incentives to the farmers	3.18	R	Recommended
Appropriate policies in applying agroforestry	3.91	HR	Highly Recomm.
Security of tenure and benefit sharing	3.18	R	Recommended
Grand Mean	3.76	R	Recommended

** -- Highly significant at 95% Conf. Interval t-value = 25.98** P = 0.00

Limit Rating	Interval Rating	Percentage
3.50 – 4.00	Highly Recommended (HR)	76% - 100% effect
2.50 – 3.49	Recommended (R)	51% - 75% effect
1.50 – 2.49	Moderately Recommended (MR)	50% and below effect
0.50 – 1.49	Not Recommended (NR)	No effect

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the findings of the study, the following conclusions are drawn:

1. The awareness of respondents on the indigenous agroforestry practices shows that they are applying the following indigenous agroforestry practices: terracing, swidden cultivation, home garden and raising cattle in forest as for the intercropping, alley cropping and multi-story practices are rated aware.

2. The awareness of the respondents on the beneficial aspects of the different indigenous agroforestry is highly significant.

3. The very serious problem of the respondents in applying indigenous agroforestry practices is the lack of capital while other serious problems encountered that affect the respondents are: lack of raw materials, lack of knowledge in implementation, lack of equipment and credit facilities, lack of guidelines on land use allocation, lack of an efficient marketing scheme for farm product, and deficiency in production technology.

4. Highly recommended solutions on the problem encountered by the respondents are the following: farmers will undergo on-site and off-site training on technical aspects regarding agroforestry as well as entrepreneurial skills, support systems for the farmers such as farm to market roads, seedlings, farm inputs, health services, extension services and technology transfer will be provided, provide the farmers with a continued source of livelihood that is compatible with the principles of sustainable management and at the same

serves as a tool for forest protection that will be developed, identified information and education campaign to facilitate and give knowledge, involving farmers in planning in solving problems and appropriate policies in applying agroforestry.

Recommendations

1. The municipal and barangay official should conduct continuous supervisions and Information Education Campaign and Communication (IECC) addressing indigenous agroforestry practices and its benefits and government should put forth on how to enrich and improve the knowledge of the respondents on what is agroforestry all about.

2. The major problem encountered by the respondents is the lack of capital or financial dilemma so the government should provide adequate fund to support the respondents in the implementing projects that will help in the productivity and sustainability of the applied indigenous agroforestry practices and providing suitable adequate equipments and proper guidelines and maintenance is also enjoined.

3. Collaboration and support of all concerned agencies and organization including local officials to the community should be persistent in order to enhance the livelihood of the community through applying indigenous agroforestry practices.

4. The respondents should be empowered in doing their responsibility toward the productivity, sustainability and proper management and implementation of the different indigenous agroforestry practices.

5. Similar studies considering other related variables should be done.

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