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Documentation of Agroforestry Farming Systems in Ifugao, Philippines

Nelson S. Latap

Ifugao State University, Potia Campus, Alfonso Lista, Ifugao, 3608 Philippines

Abstract: ***Ifugaos have practiced agriculture for centuries despite their relatively mountainous land. They adapted their agro-forestry farming system to the environment and were able to practice both wet and dry agriculture. They laboured to develop the watershed or the forested areas because they know that they are interdependent to each other. However, because of the topographical differences within the province, like in Alfonso Lista, Lamut, and Lagawe wherein there are largely flat lands while the wider chunk of the province is mountainous, there is a slight to almost entirely different agro-forestry system being practiced by the farmers. Aside from the physical condition of the land, the existence of sub-tribes of Ifugaos with diverse cultures gives rise to different agro-forestry farming systems in the province aside from the two indigenous systems – the kaingin or slash and burn farming and terracing to establish rice terraces. The kind of agro-forestry farming system being practiced in the locality affects the utilization of the land and other resources. This explains why the forest cover in some parts of the province has diminished while in some areas, lush green forest cover still exists. A set of interview questionnaires were given to the respondents to obtain primary data, while the secondary data were taken from reports submitted by those who are directly involved in the provincial office concerned. The study showed that agro-silvicultural farming system is the most commonly practiced system by the respondents. Eighty-seven percent (87%) of agro-silvicultural farmers were readily observed by the researchers in the different study sites. The crops were grown at random due to the mountainous and in some cases, steep topographic nature of the land. The study also showed that Ifugao farmers planted trees along their agricultural crops for additional income and protection against soil erosion. Descriptive analysis was used to document the agro-forestry farming systems for the kinds of plants commonly planted in the agro-forestry farms and problems met by the farmers in Ifugao.***

Keywords: Agro-forestry farming systems, Ifugao, muyong, rice terraces, agro-silvicultural farmers

1. Introduction

Cordillera Administrative Region (CAR) is blessed with abundant natural resources like wide forest cover and as such, it is aptly called the “watershed cradle of Northern Luzon”. However, the region is now confronted with an imbalance between the productive and protective uses of the watersheds. Socio-economic pressures have forced upland dwellers to farm even steep slopes, and even to the extent of converting forest lands for agricultural purposes. At the start of the new millennium, there were reported illegal massive clearings of forest lands in Tinoc, Ifugao. Since then, the place became the extension farms of the famous Buguias vegetable gardeners of Mt. Province.

Agroforestry is so far the best solution to ecological degradation. There is now a worldwide acceptance of agroforestry as the most appropriate technological approach to improve the upland areas. In CAR, agroforestry development was listed in the Regional Development Plan of 2004-2010 as one of the programs that will support the watershed cradle.

Like other areas in CAR, Ifugao has diverse tribal cultural communities. These groups practice agroforestry as farming system that they themselves developed in their own locality. A peculiar example is the Banaue Rice Terraces that existed for almost 2000 years now, and considered as one of the “wonders of the world”. For many years, the Banaue Rice Terraces was cited as one of the most popular example of agroforestry system.

One peculiarity of agroforestry farming systems is their being location-specific. Because of the presence of diverse cultural communities in the province, a number of indigenous agroforestry farming systems have also been developed in other localities. As far as agroforestry farming practices in the province is concerned, no documentation studies were conducted on the indigenous as well as other agroforestry farming systems that were introduced and practiced by the Ifugao farmers. This paper documented the different agroforestry farming systems to contribute to the science of agroforestry and add to the lexicon of agroforestry in the Philippines or even worldwide.

1.1 Objectives of the Study

The general objective of the study was to document existing agroforestry systems in the province of Ifugao. Specifically, it aimed to: a) Identify the existing agroforestry systems practiced in the province of Ifugao, b) Describe the existing agroforestry systems in the province, and c) Assess and solicit information about the problems encountered by the farmers as basis in formulating and prescribing improvements in their existing farming systems.

2. Methodology

2.1. Place of the Study

The research was conducted in the eleven (11) municipalities composed of 57 barangays of Ifugao where agroforestry as a farming system was observed. Specifically, this study was conducted in the municipalities of Kiangan, Asipulo, Hingyon, Hungduan, Mayoyao, Banaue, Potia, Aguinaldo, Lagawe, Lamut and Tinoc shown in Figure 1.

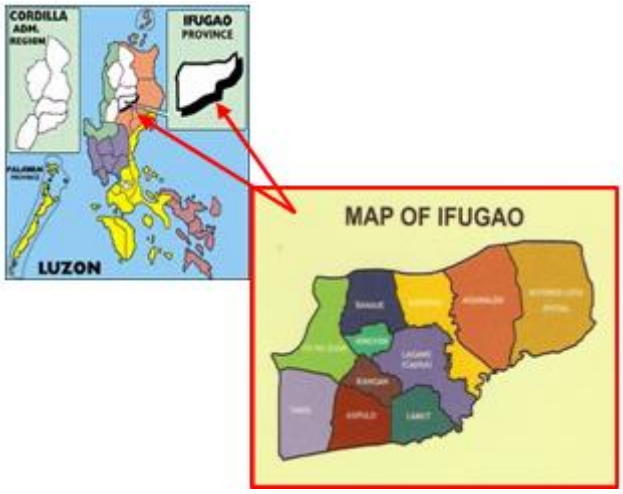

Figure 1: Map showing the study area

2.2 Data Collection

A preliminary survey was conducted that determined the existence of agroforestry farming systems of the different municipalities in the province. Both primary and secondary information were gathered for this study. Primary information was obtained from key informants or respondents that include individual farmers and project-in-charge from government and non-government organizations (GOs and NGOs) through personal interviews with the use of guided questionnaire. Field visits were also done to gather first-hand information. Secondary information, on the other hand, was obtained from the reports or records made by GOs and NGOs that were involved in the practice of agroforestry.

2.3 Data Analysis

After gathering the necessary information, the data were examined. It was determined whether a unique information and agroforestry farming system was practiced in the province. Likewise, suggestions or recommendations were formulated based on the result of evaluation of the farming systems in order to possibly improve local environmental conditions and farm production of farmers.

3. Findings and Discussions

3.1 Socio-demographic profile

The respondents were chosen at random from the different municipalities of Ifugao. Both males and females were picked and their ages were not used as factor. However, as reflected in Table 1, 80% of the respondents were males while the remaining 20% were females. As to their age, most of them belonged to the 40-49 age brackets (32%) and the 50-59 age brackets (26%) while only a few (5.0%) belonged to the 20-29 age brackets. The older folks were also considered as respondents. In fact, 19% of them were 60 years old and above.

Table 1: Age and Gender of Respondents

	GENDER					
	Male		Female		Total	
AGE Bracket	F	%	F	%	F	%
20-29	11	4	2	1	13	5
30-39	39	15	10	4	49	19
40-49	67	26	15	6	82	32
50-59	53	20	14	5	67	26
60 and above	38	15	11	4	49	19
Total	208	80	52	20	260	100

As to the respondents' civil status, 92% of them were married and 7% were single and only a single person found as widowers. It is also further reflected in Table 2 that they have diverse educational attainment. Of the 260 respondent farmers, 61 were high school graduates, 60 were college graduates, 45 of them managed to attend high school, 44 were not able to finish the elementary grades, 17 were able to finish elementary, 2 were masteral degree holders, and the remaining 2 of were illiterates.

Table 2: Civil Status and Educational Attainment

Educational Attainment	Civil Status							
	Single		Married		Widow/er		Total	
	F	%	F	%	F	%	F	%
Illiterate	1	1	0	0	1	1	2	1
Elem Level	0	0	44	17	0	0	44	17
Elem Grad.	1	1	16	6	0	0	17	7
High School level	8	3	36	14	1	0	45	17
High School Grad	3	1	57	22	1	1	61	23
College Level	1	1	28	11	0	0	29	11
College Grad	4	2	56	22	0	0	60	23
Master Degree	0		1	1	1	1	2	1
Total	18	7	238	92	4	2	260	100

The researcher went throughout the province and interviewed farmers in the different localities. The disparity in the number of respondents in the locality depends on the availability of respondents, their willingness to cooperate, and the length of time spent in the locality. Thus, as gleaned in Table 3, majority of the respondents 17% came from the different barangays

of Kiangan, 13% from Lagawe, 12% from the municipality of Asipulo and Mayoyao, 9% (24 respondents) were from Alfonso Lista, 10 % (25 respondents) came from the municipality of Banaue, 15 came from 2 barangays of Hungduan, 12 from Aguinaldo, and 10 from 3 barangays of Tinoc.

Table 3: Residence and Place of AF Area

Location of Agroforesty	Respondents	
	F	**%**
Aguinaldo (Brgys: Bunhian, Galonogon, Jacmal, Ta-ang)	12	5
A.Lista (Brgys: Namillangan, Santa Maria, Dolowog, & Busilac)	24	9
Asipulo (Brgys: Pula, Antipolo, Halliap, Panubtuban, and Amduntog)	30	12
Banaue (Brgys: Ducligan, Anaba, Bangaan Uha, & Viewpoint)	25	10
Hingyon (Brgys: Anao, Mompolia, & Bitu)	13	5
Hungduan (Brgys: Abatan, & Poblacion)	15	6
Kiangan (Brgys: Ambabag, Pindongan, Nagacadan, Duit, Bolog, Hucab, & Jolowon)	44	17
Lagawe (Brgys: Caba, Boliwong, Cudog, Pob. South, & Tupaya)	34	13
Lamut (Brgys: Jolowon, Panopdopan, Umilag, Lucban, Lawig, Payawan, & Pob.West)	23	9
Mayoyao (Brgys: Aduyungan, Mongol, Poblacion, Balangbang, Guinihon, Mapawoy, Dolowog, Jacmal, & Ta-ang)	30	12
Tinoc (Brgys: Poblacion, Binablayan, & Tulaed)	10	4
Others (Brgys: Namillangan, Santa Maria, & Busilac)	11	4

3.2 Area of Agroforestry

As to the area of respondents' agroforestry farm, most of them (46%) owned less than one hectare (Table 4) that were mostly agrisilvicultural (Plate 1) and based on spatial arrangement, mostly regular (Plate 2). However, based on temporal arrangement, they are mostly intermittent (Table 5) and functionally productive (Table 6). Findings of this study in terms of area have the similarity as to the area of farmer-beneficiaries of Certificate of Stewardship Contracts (CSC) in Ifugao [7].

Table 4: Area of Agroforestry farm

Area in hectares	Frequency	Percent
below 1 ha.	120	46
1.1- 2 ha.	73	28
2.1- 3 ha.	31	12
3.1 - 4 ha.	10	4
4.1 and above	26	10

3.3 Classification of Agroforestry Farming Systems

The classifications of agroforestry are discussed in this section into eight different components. They are shown in Plates 1 and 2, Tables 5, 6, 7, 8, 9 and 10. Classifications were based from scientific works of various agroforestry scientist.[2], [11], [6], [5], [3], [1], [4], [9], [10], [8], and [12]

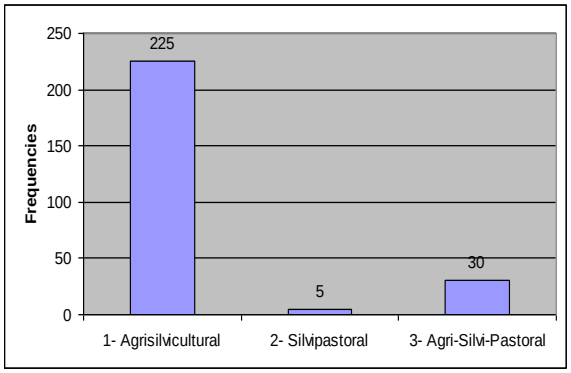

Plate 1: Agro forestry based on the nature of components

As to the nature of components, agroforestry was classified into three structural basis like: agrisilvicultural, silvipastoral, and agri-silvi-pastoral. Agrisilvicultural is the production of agricultural crops and forest crops. It has two major crops: agriculture and trees. As shown in Plate 1, almost all (87%) practiced this system. This is obvious because of the topographic characteristics of the Province where the terrain is mountainous. This system is much more applicable as it serves economically and protectively. This system is found in all the study sites (10 municipalities). Silvipastoral is the integration of trees and animal production on the same unit of land. It has likewise two major components which are trees and animals. This system is found in two study sites like in Alfonso Lista and Aguinaldo. These two study sites have vast open lands which were classified by the Department of Environment and Natural Resources (DENR-Ifugao) as pasture lands and were leased (Leased in this study refers to pasture lease agreement (PLA). Awarded by the DENR to all qualified bonafide residents for pasture. It is a 25-year lease contract and renewable for another 25 years) to all bonafide residents of the province who used them as pasture land. Agrisilvipastoral is the production of agricultural crops, tree crops, and animals. It has three components combined together on the same unit of land. The system is more socio-economic and environmental friendly than silvi-pastoral. The practitioner could produce three different crops or products at the same time on the same unit of land. This system has a wider scope of adoptability. The system is observed in the 10 municipalities of Ifugao like: Alfonso Lista, Aguinaldo, Lamut, Asipulo, Kiangan, Lagawe, Hingyon, Banaue, Hungduan, and Mayoyao.

Based on spatial arrangement, agroforestry is classified as regular and irregular. Arrangement of components refers to the plant components of the system involving the dimensions of space (spatial) and time (temporal). Spatial arrangement refers to the way the plant components are arranged on the surface of an agroforestry farm. Thus, based on this criterion, agroforestry system in the province was named as either

regular or irregular. Regular are those agroforestry systems where the forest trees are grown or planted in association with the farm crops regularly arranged. Since the topographic nature of the province is mountainous and rugged terrain, the respondents could hardly arrange their crops so they grow their crops in randomly arranged pattern such that the trees were placed alongside or around farm crops depending on its ground suitability. Thus, forming irregularly arranged crops. Findings of this study showed that there is an almost equal observation of adoption on this agroforestry system and were observed in all the study sites.

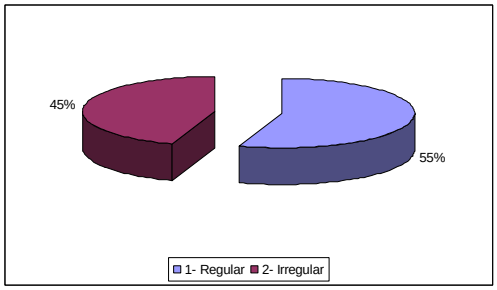

Plate 2: Agroforestry farming systems based spatial arrangement of the components

Temporal arrangements include agroforestry systems where trees and crops are alternately grown over a period of time in a given space and could either be temporary or permanent. It is temporary when the agricultural component does not last the length of the forest rotation. It is permanent when maintained for more than a year rotation. These systems were observed in the province as shown in Table 5 and majority, 58% where intermittent adopters. Intermittent, as observed in the province, is the planting of taro and ginger as annual crops under coffee, betel nut, and acacia (tree crops). Concomitant, when the area is cleared dried and burned. This is also commonly observed in all the study sites. Coincident is the planting of coffee under acacia trees. As was observed in this study, the population of acacia declined rapidly due to its usefulness as raw material for wood carving. Wood carving is a very popular industry in the province. Wood carvers penetrated almost all the forest in the province to search for acacia and an alternative species good for wood carving. Coincident is mostly observed in the areas of Lamut, Kiangan, and Lagawe. This is because coffee (excelsa) adoptably grow in these areas.

Table 5: Agroforestry farming systems based on temporal arrangement

Farming System	Frequency	Percent
Intermittent	152	58
Concomitant	103	40
Coincident	72	28
interpolated	34	13

As to the functional basis, this refers to the major functions or roles of the system, mainly of the tree component. This study revealed that the respondents adopted agroforestry system for productive and protective purposes. They planted woody perennial or forest components for food, fuel, and lumber (productive) and at the same time for soil and water conservation (protective) as shown in Table 6. The study further revealed that upland farmers in the province have realized the importance of forest in the sustainable land use. They came to know the important relationship of agriculture and forestry.

Table 6: Agroforestry farming systems based on functional basis

Function	Frequency	Percent
Productive	250	96
Protective	235	90
Others	6	2

3.4 Socio-Economics

Socio-economically, 81% are basically intermediate (Table 7) and most, 83% of the respondents practiced random mix (Table 8) in the intercropping of their farm. They also planted trees in the crop fields (Table 9). It was further found out that most, 43% of the farmers practiced *kaingin* farming system and very few practice SALT (Table 10).

Table 7: Agroforestry Farming Systems based on socio-economic basis

Farming System	Frequency	Percent
Intermediate	212	81
Subsistence	45	17
Commercial	4	2

Table 8: AF Farming Systems based on the type of intercropping system

Agroforestry Farming System	Frequency	Percent
Random Mix	218	83
Trees along the borders	36	13
Alternative Strips	10	3
Alternative Rows	3	1

Table 9: Agroforestry Farming Systems based on tree planting niches

Farming System	Frequency	Percent
Trees in crop fields	109	42
Trees in temporal systems	92	35
Trees along farm borders	36	14
Trees around the house	21	8
Trees in livestock system	17	6

Table 10: AF Farming Systems based on Philippines agroforestry systems

Farming Systems	Frequency	Percent
Kaingin System	111	43
Fallow System	83	32
Rice Terraces F. System	62	24
SALT	2	1

Under this scheme, socio-economic criteria such as scales of production, level of technology, inputs and management were used in classifying agroforestry systems. This study groups system into commercial, intermediate and subsistence (Table 7). Commercial system is used when the production of the output is usually a single commodity and the sale is the major aim. Intermediate systems are those that are intermediate between commercial and subsistence scales of production and management. They can be distinguished from those of the commercial and subsistence system based on the landholding size and level of the economic prosperity of the farmer. Subsistence, are those where the use of the land is directed toward satisfying the basic needs and managed mostly by the owner.

Few (2%), as recorded in this study, had practiced commercial system. This is because their production is just enough for subsistence. However, because the respondents need cash, they sell part of their products to enable them to buy other needs which makes the classification intermediate. One factor affecting this situation is the limited area in terms of land holdings of the clienteles. In this study, it was found out that the average farm size is one (1) hectare per upland farmer/respondent. The situation is coupled with the topographic terrain of the area which is mountainous. This situation requires planting of tree crops for soil and water conservation. The planting of tree crops covers 50% of the land area for agricultural crops. Thus, production of agricultural crops for food and for market is lessened. This in turn makes majority (81%) of the farming systems intermediate.

Lines of trees are used either as boundary markers, live fences, windbreakers or firebreaks, source of green manure, source of fodder for livestocks, and source of fuel. It was found out in this study that trees (tree crops) were intercropped either along borders, planted in alternate rows or strips and found in random mix with agricultural crops. These arrangements were observed throughout the ten study areas and found to be protectively and economically viable. It helped the farmers to produce income both from tree and agricultural crops. However, it was observed in this study that majority (83%) adopted random mix (Table 8). This is contributed by climatic factors, soil factors, topographic factors, and biotic factors. These factors were observed in all the study sites. Except in wider open lands in Alfonso Lista and portions of Lamut, Kiangan, Lagawe, and Aguinaldo, trees along the borders were observed in their grazing lands. Hence, Table 8 presents the percentage distribution of the agroforestry type based on intercropping system.

Both alternate rows and alternate strips are very effective systems for erosion control and slope stabilization especially when grown following the contours. They can serve as sources of food, fuel and organic fertilizers, fodder and for site stabilization.

The different agroforestry systems under each farm niche are as follows; a) trees in crop fields, b) trees in livestock system, c) trees around the house, d) trees in temporal systems, and e) trees along borders. This study as showed in Table 9, found out that majority (42%), practiced planting tree in crop fields. Trees, as observed during the study, were planted either as alley cropping or as shade trees. Alley cropping is practiced in the municipalities of Lamut, Kiangan, and Asipulo while shade tree cropping system was observed in Hingyon, Lagawe, Kiangan, Lamut, Mayoyao and Aguinaldo. The shade trees act as nurse tree. Tolerant species (Tolerant species are those that can survive under shaded areas. Examples of this species that were observed in the study sites were: coffee, cacao, taro, gabi, ginger and betel nut.) were grown under trees comprising of two or more tree crops planted in the same unit of agroforestry farmland.

3.5 Agroforestry Farming Systems based on Philippines agroforestry systems

It is recognized that agroforestry, as a practice, has long been present in the tropical world. In the Philippines, we have a number of age old and recent agroforestry systems. These agroforestry systems are: a) rice terraces-forest land; b) fallow system; c) *kaingin* system; d) Sloping Agricultural Land Technology (SALT); e) Naalad; f) The PICOP Model (PICOP is an acronym of Paper Industries Corporation of the Philippines (PICOP Model). PICOP used /plant *Pasaserianthes falcataria* as their agroforestry tree species.); g) NALCO Silvipastoral System, and; the system introduced by h) Benguet State University – Pine-Coffee System. The first four systems were the old systems while the second four are the new developed agroforestry systems. The first four systems were observed in the province. Coffee under trees is an old agroforestry practice in Ifugao but not Pine-coffee system. Likewise, the system developed by PICOP and NALCO was not observed within the respondents' farms. However, other systems developed in other Philippine islands are now adopted in the province because of their potential economic and environmental contributions. An example of these systems is Naalad.

The rice terraces of the Ifugaos in Northern Luzon, Philippines particularly in Banaue, is one of the most ancient agroforestry farming system in the country. The agricultural component is rice planted in terraces and a forest called "pinugo" in Ifugao, established above the terraces. The forest is protected from cutting or any form of land use and is maintained in the surroundings to act as a water reservoir or source of water supply for the terraces. This system is likewise observed in six other study areas namely: Hungduan, Kiangan, Hingyon, Lagawe, Mayoyao, and Aguinaldo.

The fallow system, also called shifting cultivation is considered as the oldest form of agroforestry. What the respondents normally do in their agroforestry farm was that, the entire farm is cleared, burned and cropped for a period of two to three years. After that, the land is then rested (fallow) or left unattended while the natural vegetation is allowed to regenerate. Farmers do this to allow the depleted soil fertility to be regained through the regenerative action of the woody vegeta-

tion. Despite of the small land area which also means small quantity of production, Table 10 showed that this system is still observed by the farmer respondents. This further showed that the farmer-respondents know the principles of natural soil recovery in the sustenance of soil fertility. Aside, it also means that there are other sources of livelihood aside from farming.

SALT is pioneered by the Mindanao Baptist Rural Life Centre (MBRLC) in Davao Del Sur. It has evolved into a system that is more complex but the main strategy is "alley cropping" or the planting of hedgerows along contours to arrest soil erosion. The alley formed between two hedgerows is planted with agricultural crops. This technology was introduced by the Ifugao State University (IFSU) in the province. A group of five agriculture instructors/professors from IFSU paired with one farmer each and went for a couple of weeks training in Davao and brought the technology into the province. The technology was then extended to the farmers all over the province through the services of IFSU and its farmer partners. The technology rapidly expanded and was adopted because of the sustainability and the potential of the technology. The extension service from IFSU (University) was not sustained but the technology remains good. It was observed that there were still farmer-respondents adopting this system.

Among the other land uses, it was gathered that aside from using the land as rice terraces and residential areas, it is further utilized as *muyong* or private forest, *kaingin*, or as garden (Table 11). The steep areas are utilized to plant cash crops and trees (Table 12). Those areas that are already forested were protected and used as source of lumber (Table 13).

Table 11: Other Land Use Systems used by the Community

Other land uses	Frequency	Percent
Muyong/forest	237	91
Kaingin	199	77
Gardens	162	62
Aquatic/ Fish Ponds	98	38
Pasture Land	65	25
Bangkag	49	19
Recreational Areas	3	1

Muyong, as known in Ifugao, is the forest. It appeared in this study that this system ranks first (91%) in the other land use systems. The forest, as described by the DENR based on PD 1159, is a public forest. Public forest is defined (PD 1159) as the mass of lands of the public domain which has not been subjected to the present system of classification for the determination of which lands are needed for forest purposes and which are not. The forest described in this study is not the public forest given by the DENR but the *muyong*. As a practice, the community people protect their *muyong* for environmental and socio-economic reasons which they believe are helpful to them. The *muyong* serves as a source of food and livelihood. Those were the reasons that made the *muyong* as one of the community's land use system. It appeared in Table 12 that steep slopes (Steep slopes in this study shall mean all areas above 50 percent in slope. These areas were classified by the DENR as forest land) were used primarily, 62% for planting cash crops which means that these areas have fertile soil and that the growing of cash crops is very rewarding. The farmer-respondents, however, believe in soil conservation. Hence, although the soil is fertile, they still conserve the area by planting trees (58%) and other fruit trees (52%). These prevented farmers from clearing wider areas and at the same time reduce soil erosion. A small part of the land is utilized as pasture area. This is due to the topographic characteristics of the area which is mountainous and too steep. With this topographic condition of the area, only 2% of the land is utilized for. Otherwise, the area is left to allow natural regeneration.

Table 12: Land uses of Steep areas

Land uses of steep areas	Frequency	Percent
plant cash crops	161	62
plant trees	152	58
plant fruit trees	135	52
kaingin	41	16
pasture area	22	8
Garden	6	2

Agroforestry is an effective tool for rehabilitating and managing degraded uplands and promoting rural development. It has the potential to contribute to the conservation and amelioration of the uplands' natural resources-base similar to the beneficial effects derived from the forest ecosystem. It can also bring an increase in crop productivity, self-sufficiency in basic necessities, and overall improvement in the socio-economic conditions of upland farmers. The realization of these potentials is based on two premises as showed in Table 13 – the productive and protective. Productive uses like: a) source of lumber (60%); b) watershed and for irrigation (20%); c) *kaingin* as source of food (17%); d) source of firewood (8%); e) hunting ground (3%); f) garden (%), and; as g) source of wood carving material (2%). Protective use is the environmental protection that a forest can give to man. This is the main reason why farmer-respondents protect the forest for future use (50%).

Table 13: Uses of forested areas (how community use the forested areas)

Uses of forested areas	Frequency	Percent
Source of Lumber (productive)	157	60
Protect it for future use (protective)	130	50
Watershed and for irrigation (productive)	52	20
Kaingin (productive)	43	17
Source of Firewood (productive)	21	8
hunting ground (productive)	9	3
turn it to garden (productive)	7	3
source of woodcarving material	5	2

Almost all of the respondents were aware of the importance of forests to their rice terraces (Table 14) and other farms. Thus, they would not allow other people to cut trees or harvest forest

products from their own *muyong* or from the community forest (Table 15). The prohibition of harvesting of forest products from their *muyong* is applied to the outsiders, non-residents of the barangay. Thus, sharing of forest resources is still observed among the members of the community, relatives, friends, and students (Table 16).

Table 14: Knowledge of the community on the importance of the forest

Knowledge on the importance of forest	Frequency	Percent
Yes (with knowledge)	255	98
No knowledge	5	2

Table 15: Sharing of forest products within the community

Sharing of forest products	Frequency	Percent
No sharing	152	58
Yes (with sharing)	108	42

Table 16: Persons allowed sharing forest products within the community

Sharing responsibility	Frequency	Percent
N/A	152	58
community People	93	36
Relatives	16	6
friends	2	1
acquaintances	5	2
student	3	1

The Local Government Unit (LGU) at the barangay and municipal levels together with the personnel from the DENR and Department of Agriculture (DA) in partnership with the community are the prime movers and actors in the protection of their forest and forest resources (Table 17). The LGU and the DENR help to protect through the implementation of forest policies and giving of sanctions for forest policy breakers.

Table 17: Persons responsible in sharing the responsibility in protecting and preserving the community forest

Persons responsible	Frequency	Percent
Barangay Officials	215	83
DENR	151	58
community	63	24
relatives	50	19
DA	37	14
Others	30	12
Municipal Officials	24	9

The gathered data also showed that almost all the respondents are owners of their agroforestry farms which they acquired by inheritance or by purchase. Their most common proof of ownership is a tax declaration (Table 18).

Table 18: Proof of ownership

Proof of ownership	Frequency	Percent
Tax Declaration	200	77
Land Title	31	12
CSC	15	6
No response	14	5

CSC: means Certificate of Stewardship Contract awarded by the DENR to farmer beneficiary. It is a Social Forestry Program that would last for 25 years and can be renewed for another 25 years.

However, not everybody can just establish or claim an area as his own *muyong* (Tables 19 and 20). They are guided with policies and rules to fit their qualifications. Aside from these, it must be inconsonant with their existing customs and traditions. In the CSC for instance, the applicant should be a bona fide resident of the barangay were s/he is applying to enable him/her to till the land awarded by the DENR. These practices form part of the prohibition for anybody to openly claim portions as private forest for their own family use.

Table 19: Freewill of the community to claim a portion of the forest for his own family use

Freedom	Frequency	Percent
No freedom	226	87
Yes (with freedom)	34	13

Table 20: Freedom for anybody to establish a private forest (*muyong*) for family use

Freedom to establish	Frequency	Percent
No freedom	258	99
Yes (with freedom)	2	1

3.6 Description of Agroforestry Farming System

Farmers have integrated trees in their agroforestry farming systems for centuries. It was further gathered that most of the respondents planted tree crops within their farms (Table 21). These are fruit bearing trees (Table 22) and cash or agronomic crops (Table 23). Their main purpose in maintaining their agroforestry farm is mainly for additional income and as a ready source of lumber and as a protection for soil erosion (Table 24).

The respondent farmers claimed that they have always tried to maximize the use of their agro-forestry farms by integrating fruit trees and other selected tree species in their *kaingin*s and gardens as well as cash crops in their *muyong*s or private forests. The trees are planted along the boundaries to serve as wind brakes and within areas too steep to be operated as gardens or *kaingin*. As shown in Table 12, the tree that is most often integrated with other cash crops is gmelina (77%) because of its fast growth and high demand by furniture shops. It is followed by coffee because of its ready market and betel nut which is highly in demand by the people not only within the province but even by other cultural communities. *Bakuwog* is

also being grown by most farmers because of the discovery that its fruit is a potent killer of the golden snails.

Among the fruit trees, mango is the number one choice of the farmers (40%) as shown in Table 22. It is because according to them, mango trees do not require input and attention. It is followed by banana, pomelo, and rattan in order. Among the cash crops, taro ranks number one according to the respondents followed by corn, rice and camote. As shown in the table, there are many other kinds of cash crops that the farmers plant in their *kaingin*s or dry farms.

3.7 Purpose of Maintaining Agro-forestry farm.

When they were asked why they maintain agro-forestry farms, most (85%) of the respondents said that they do it for additional income, a ready source of lumber, and protection from soil erosion. It was further gathered that most of the respondents do not own their agro-forestry farm. This is because of the indigenous land use practices of the Ifugaos that allows community ownership of the areas intended for *kaingin*. Thus, anybody can clean and operate an abandoned *kaingin* or agro-forestry farm provided that he does not destroy perennial plants planted by the previous operator. This explains why 249 of the respondents could not pin point who the owner is. For those who own their agro-forestry farm, they claimed that they inherited them from their parents and a few had it through purchase.

Table 21: Tree crops integrated within the agroforestry farm

C name	Local name	Scientific name	F	%	Rank
Gmelina	Gmelina	*Gmelina arboria*	201	77	1
Coffee	cape	*Coffea excelsa*	90	35	2
Betel nut	moma	*Areca cathecu*	58	22	3
Mahogany	mahogany	*S microphyla*	56	22	4
Narra	Nara	*P. indicus*	35	14	5
Acacia	akasya	*Samanea saman*	33	13	6
Oak tree	palayon	*L. jordanae*	31	12	7
	bakuwog		22	9	8
tuai	tuwol	*Biscofia javanica*	18	7	9
pine tree	saleng	*Pinus kiseya*	16	6	10
Alnus	arnus	*Alnus japonica*	15	6	11
	bacan	*Litsea perrottetii*	14	5	12
	Tabangawon	*W. hutchinsonii*	14	5	12
yakal	banutan	*Hopea plagata*	13	5	15
bamboo	bulo	*Bambusa vulgaris*	13	5	15
Dapdap	gabgab	*E. orientalis*	11	4	18
ipil	ipil	*Instia bijuga*	11	4	18
	dalakan	*Ardisia sp.*	6	2	19
alimit	hagimit		5	2	20
	pidicon		4	2	21
Molave	Sagat	*Vitex parviflora*	3	1	22
	kuldadannum		3	1	22
Agosip	podpod	*S. villariis*	2	1	27
Calantas	banginon	*Toona calantas*	2	1	27
	Gali-on		2	1	27
jatropha		*J. podagrica*	2	1	27
W lauan	apnit	*Shorea contorta*	2	1	27
balete	balitti	*Ficus balete*	2	1	27
	ihit		1	1	37
	bultik		1	1	37
Palosapis	kalusapis	*A. thurifera*	1	1	37
	balikhawon		1	1	37
kalantas	Bangtinon	*Toona kalanta*	1	1	37
	tikkom		1	1	37
	katmu	*V. whitfordii*	1	1	37
anabiong	anablon	*Trema orientalis*	1	1	37
	tobak		1	1	37
aplas	upla		1	1	37
Hauili	lagnob	Ficus hauili	1	1	37

Table 22: Fruit trees usually planted within the agroforestry farms

Trees	Scientific Name	Freq	%	Rank
mangga	*Mangifera indica*	104	40	1
Banana	*Musa sapientum*	91	35	2
pomelo	*Citrus grandis*	73	28	3
rattan	*Calamus mollis*	56	22	4
Cajel	*Citrus aurantium*	51	20	5
coconut	*Cocos nucifera*	44	17	6
pineapple	*Ananas comosus*	31	12	7
avocado	*Persea americana*	21	8	8
langka	*Artocarpus heterophyllus*	20	8	9
lansonez	*Lansium domesticum*	17	7	10
papaya	*Carica papaya*	16	6	11
rambutan	*Nephelium appaceum*	13	5	12
kalamansi	*Citrus vitis*	11	4	13
guava	*Psidium guajava*	9	3	14
santol	*Sandoricum koetjape*	8	3	15
star apple	*Chrysophyllum cainito*	6	2	16
Tiesa	*Pouteria campechiana*	5	2	17
guyabana	*Annona muricata*	4	2	18
bignay	*Antidesma bunius*	2	1	21
marang	*A. odoratissimus*	2	1	21
cacao	*Theobroma cacao*	2	1	21
bulon		2	1	21
mabolo	*Diospyros discolor*	2	1	21
sugarcane	*Saccharum oficinarum*	1	1	28
lemon	*Citrus lemonia*	1	1	28
watermelon	*Cirrultus tunatus*	1	1	28
macopa	*Eugenia malaccensis*	1	1	28
siniguelas	*Spondias purpurea*	1	1	28
atis	*Annona squamosa*	1	1	28

Table 24: Purpose of maintaining the agroforestry farm

	Frequency	Percent
additional income	222	85
Ready source of lumber	199	77
protection from soil erosion	173	67
source of other products other than lumber	166	64
Watershed and for irrigation	83	32
for beautification	4	1

Table 23: Cash crops commonly planted within the agroforestry farm

Crops	Scientific Name	Freq	%	Rank
Taro	*Alocasia macrorrhiza*	101	39	1
Corn	*Zea mays*	87	33	2
rice	*Oryza sativa*	66	25	3
Camote	*Ipomoea batatas*	45	17	4
squash	*Cucurbita maxima*	29	11	5
beans	*Phaseolus aureus*	26	10	6
pigeon pea	*Cajanus cajan*	25	10	7
Ginger	*Zingiber officinale*	22	9	8
sayote	*Sechium eduleI*	14	6	9
eggplant	*Solanum melongena*	13	5	10
Cassava	*Manihot esculenta*	10	4	11
petchay	*Brassica chinensis*	9	4	12
wingbeans		5	2	14
tomato	*L. esculentum*	5	2	14
bitter gourd	*Luffa cylindrica*	5	2	14
Mongo	*Phaseolus aureus*	4	2	17
pepper	*Capsicum frutescens*	4	2	17
cabbage	*Brassica oleracea*	3	1	19
tiger grass		3	1	19
cucumber	*Cucumis sativus*	3	1	19
watercress	*Nastoquim ifficinale*	2	1	22
string beans	*Vigna sesquipedtis*	2	1	22
onions	*Allium cepa*	2	1	22
carrots	*Daucus carota*	1	1	26
potato	Solanum tuberosum	1	1	26
sweet peas	*Pisum sativum*	1	1	26
mustard	*Brassica juncea*	1	1	26
okra	*Hibiscus esculentus*	1	1	26

3.8 Problems encountered in AF Farming Systems

As to the problems encountered by the respondent farmers, the data gathered showed that they do not have any serious problem regarding intruders and squatters (Tables 25 & 26) as well as in the marketing of their products. It was also known that aside from the protection of their ownership rights, they do not receive much assistance from the government for their forestry projects (Tables 27, 28 & 29).

Table 25: Presence of intruders of agroforestry farm

Presence of Intruders	Frequency	Percent
None	248	95
No Response	8	3
Yes	4	2

Table 26: Intruders of Agroforestry farm

Intruders	Frequency	Percent
N/A	255	98
Squatters	2	1
Buyers of Adjacent farm	2	1
Private individuals	1	1

Table 27: Government services offered to agroforestry projects

Government services	Frequency	Percent
None/Not Applicable	148	57
Agroforestry Trainings	64	25
Subsidies	98	38

Table 28: Relevance of government services to agro forestry farm

Relevance of government services	Frequency	Percent
No	148	57
Yes	112	43

Table 29: Ways of government services are helpful

Mode of government services helpful	Frequency	Percent
N/A	148	57
gave us seedlings to plant	86	33
gave me additional knowledge to improve & maintain my AF	53	20
gave me/us capital to have additional income and maintain my AF farm	32	12

4. Conclusions and Recommendations

4.1 Conclusion

There are various types of agro-forestry farming systems being practiced in Ifugao. Aside from their indigenous farming system, which include *kaingin* or slash and burn system and mountain slope terracing (rice terraces), there are other farming systems like agrisilvicultural system, agricilvipastoral, and silvipastoral. Among the three farming systems introduced in the province, the agripastoral system has been put into practice by the farmers in the greater areas of the province. This is due to the fact that the farmers could raise more products in a single designated area. Thus, the existing agroforestry system in Ifugao is a combination of agrisilvicultural, rice terracing, and *kaingin* systems. The *kaingin* system, being the system practiced by the marginal farmers, is mostly observed in the study sites. The study also showed that although the farmers do not receive any significant support from the government, they do not have any serious problem

aside from lack of farm to market roads and price manipulation by middlemen.

4.2 Recommendations

(1) Extension services: we need to educate the farmers on how to maximize production to their land by adopting appropriate agroforestry farming system. An extension services in partner with the Local Government Units (LGUs) at the national and local level and farmer organizations to further educate the farmers. This is to complement the leading agencies like DENR and Department of Agriculture (DA) in giving assistance to these stakeholders.

(2) Establishment of Agroforestry Farm in the University (IFSU) to serve as an agroforestry model to the farmers, students, and professionals.

(3) The practice of having a communal area for *kaingin* is good because it gives the chance for those who are industrious but have no land to be able to practice agriculture and help in the food production to feed the people. Thus, the government should adopt this cultural practice and protect the designated areas from intruders and people who want to declare a part of it for his private use. It is also recommended that more farms to markets be constructed to enable the farmers to bring their produce to the market and not just rely on middlemen to buy their produce to avoid being short changed. Agencies and offices as well as Local Government Units should regularly conduct extension service to educate the farmers about new agro-forestry farming technologies right in their own localities to increase their production. To complement whatever trainings given to the farmers, the University (IFSU) should establish a model agro-forestry farm for farmers, students, and even professionals to observe and learn from.

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References

[1] Agroforestry Project Planning and Management: A Training Manual (1994). University of the Philippines at Los Banos (UPLB) Agroforestry Program and Kapwa Upliftment Foundation Inc.

[2] Baguinon, N. T., R. Lasco, D. B. Macandog, P. N. Pasicolan and V. T. Villancio (2007) Agroforestry and Land Use in the Philippines. World Agroforestry Center. Transforming lives and landscapes.

[3] Dalmacio, R. V. et al (1995) Resource Rehabilitation and Improvement Methods for the Community Program NRMP-DAI.

[4] Developing an Agroforestry Curriculum using DACUM Process. Workshop Proceedings (1994) UPLB Agroforestry Program. University of the Philippines Los Banos, College, Laguna.

[5] Huxley, Peter (1999) Tropical Agroforestry. Blackwell Science Ltd.

[6] Lasco, R.D. and R. G. Visco (2003) Introduction to Agroforestry; Alecture Syllabus. University of the Philippines Los Banos, College, laguna: Philippine Agroforestry Education and Research network and the UPLB Institute of Agroforestry.

[7] Latap, Nelson S. (2015) Economic Assessment of Betel Nut (Areca catechu) as component in the Agroforestry Systems in Ifugao. Volume 4, Issue 6, pages 1896-1913, International Journal of Science and Research (IJSR). Published June 2015.

[8] MacDicken, K. G. and N. Vergara (1990) Agroforestry. Classification and Management. Wiley-interscience Publication, John0Wiley and Sons, Inc.

[9] Nair, P. K. R. (1993) An Introduction to Agroforestry. Kluws Academic Publishers.

[10] Philippines Uplands Resource Center (1993) Soil Erosion Control Measures for the Uplands. DLSU Social Development Research Center, 2401 Taft Avenue, malate 1004, Malate.

[11] Philippine Recommends for Agroforestry (2006) Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD) – Department of Science and Technology (DOST). World Agroforestry Center (ICRAF). Los Banos, Laguna.

[12] Young, Anthony (1989) Agroforestry for Soil Conservation. C. A. B. International Council for Research in Agroforestry. Wallingford, Oxon Oxio 8DE.