

# Indigenous Agroforestry Systems of Ifugao, Philippines

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**Abstract** The study sought to document the different agroforestry systems of selected ethnic tribes of Ifugao. Data were gathered through survey and analyzed with the use of descriptive statistics. Result showed that there were three indigenous agroforestry systems such as *payoh – pinugo/hino-ub/hayukkung* system, *uma/inum-an/habal* system and multistorey system. The indigenous agroforestry practices found in the systems were: *uma an punmoyungon*, *pogpog an natamnan chi agiw*, *henoncho on nitanum hi nun phatanon chi ojiw*, *mamatakhu on ojiw on mi-alad*, *ojiw an mamatakhu on khun omajatan chi henomcho*, *ojiw on khun linong hi aggayam*, and *ojiw on khun linong hi nitanum*. Indigenous soil and water conservation practices, customary laws and cooperation system reinforced the indigenous agroforestry systems.

**Keywords** Ethnic Tribes of Ifugao, Indigenous Agroforestry Systems, Indigenous Agroforestry practices, Indigenous Soil and Water Conservation Practices, Customary Laws, Cooperation System

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## 1. Introduction

The Philippines is considered as one of the biodiversity hot spots in the world due to its unique flora and fauna. Just like in many parts of the world, Philippines is also experiencing forest destruction (deforestation and/or forest degradation). These consequently pose a great threat to the integrity of the whole ecosystem.

Historically, in 1521, 90 percent of the country's total land area or 27 million hectares were covered with forest. Sometimes in 1900, forest cover was recorded at 21 million hectares. Between 1934 and 1941, forest cover further decline to 17 million hectares or 57 percent of the land area [1]. In 2013, the official forestry statistic showed that the country had only 6,839,718 million hectares [2].

The magnitude of forest destruction is now being felt adversely in many areas. Mountain slips, landslides, flash floods, and massive soil erosion are now a common phenomenon in the country. These calamities continue to occur resulting to untold miseries and sufferings to the people. These calamities are further aggravated by pervasive poverty of people in the countryside, people that continue to depend on the fragile uplands which they themselves continue to destroy to eke a living, thus, perpetuating the never-ending cycle of poverty and environmental degradation [3].

Unregulated land uses have caused the dwindling of the resources. The growing population in the uplands, the presence of big logging companies, illegal loggers and poachers contribute largely in pushing further to the limit,

the country's resources. As population increases and technology advances, the pressure on our forest resources becomes stronger in man's bid to utilize more lands for agriculture and other related activities. As a result, more and more forest are not spared from the onslaught of destruction [4].

Deforestation and forest degradation were caused directly by forest products extraction (legal and illegal or poaching, fuelwood gathering, charcoal making, and non-timber forest products collection), agricultural expansion (kaingin/swidden cultivation), infrastructure expansion (mining, road and hydropower dam construction) and biophysical factors (climate change, typhoons, floods, landslides). On the other hand, policy, institutional and governance (weak institutional capacities, weak law enforcement, corruption and collusion), socio-demographic and cultural (migration to the forests and irresponsible attitude towards forest), and economic, market and technological (high demand for wood, limited livelihood options and poverty) were the indirect drivers of deforestation and forest degradation [3].

To proactively respond to the deteriorating condition of the forest, the government launched a lot of upland development programs. Prominent among these programs was the Integrated Social Forestry Program (ISFP), which vigorously promoted Agroforestry as the pillar technology for the sustainable development of the uplands.

Agroforestry is being viewed as the most promising land-use and has been going on for many centuries in many upland areas in the world. It is believed being practiced by an estimated 630 million farmers considered as poorest of the world's poor [5]. Agroforestry involved the planting of tree crops with agricultural crops and whose tree produce may either be intended for lumber, fodder, food, and fiber. It is the most appropriate farming system because it addresses both concerns for increased productivity and

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enhanced ecological stability. This tree-based farming system can maintain its dual functions for crop production and environmental production over time [6]. Through its combined economic, environmental and social functions, agroforestry is vital towards the attainment of sustainable development [7].

In the mid-1970s, around 500 families benefited from the initial Agroforestry project of the Department of Environment and Natural Resources (DENR) – ISFP. Out of the total ISFP area of 657, 780 only 234,647 hectares (35.67%) were developed into Agroforestry farms [8].

The misuse and abuse of our forest had caused tremendously negative impact on both the uplands and the lowlands; land degradation through accelerated soil erosion, siltation/sedimentation of rivers and dams, climate change that brought floods during wet seasons and drought during dry seasons, loss of valuable genetic materials, shortage of forest products like wood, and the overall reduction in productivity and sustainability.

On July 19, 1995, Executive Order (E.O) No. 263 known as the Community Based Forest Management Program (CBFMP) was adopted as a national strategy to ensure sustainable development of the country's forestland resources and providing mechanism for its implementation. It integrated all upland development programs like ISFP. Further: it aims to promote socio-economic upliftment of forest dependent communities; recognize and support the capabilities and indispensable roles of local communities (coastal, indigenous peoples and upland); and to protect, rehabilitate, develop, utilize and manage forest lands and related resources. Agroforestry technologies are again being emphasized and utilized in this program.

As a social forestry program, the CBFMP recognizes and emphasizes integrated forestry technologies "built upon indigenous knowledge and cultural systems". This is because people by nature, especially the upland farmers, reject something new and insist on their own traditional systems and practices; and extension personnel found it difficult to introduce new technologies, particularly those technologies developed by technical professionals. Thus, there have been considerable efforts to document indigenous knowledge systems to complement professional knowledge system that are results of research experiments.

In the northern part of the Luzon countryside, there are areas occupied by indigenous people, which are known because of their promising indigenous agroforestry system. The most famous among them is the Province of Ifugao whose natives developed the engineering marvel – the rice terraces, considered as the 8th Wonder of the World. Its practices have been developed over many generations and important lessons can be drawn from them that are relevant to the restoration of the forest and the grandeur of natural resources.

Over the years, changes have taken place both in the physical and socio-economic milieu of the Ifugaos that made many of them switch to other economic endeavours. Upland farming has been replaced by more profitable

livelihood activities. Indigenous farming practices like the rice terraces are now being relegated and slowly being forgotten. Indigenous technical knowledge of the Ifugaos, are now being threatened. There is an imperative need, therefore, to document these indigenous agroforestry systems before they are thrown into oblivion.

The study was conducted to document, identify, and describe the actual indigenous Agroforestry systems of the Ifugaos. It also determined the effect of these systems on the environment and on the socio-economic status of the Ifugaos as well as the reasons for the adoption of such agroforestry systems.

## 2. Research Design and Methodology

### 2.1. Research Method

The study employed descriptive method of research. Primary data were obtained through the use of an scheduled interview. It was pre-tested to ensure the validity and reliability of information gathered. Secondary data were gathered to supplement the primary information. Data were validated through actual field activity and interview with the local officials and elders.

### 2.2. Location of the Study

The study was conducted in six communities, namely: Batad, Ahin, Hapao, Nagacadan, Liwon and Bimpal within the province of Ifugao where the three major ethnic tribes reside. The study areas were selected based on population of each community dominated by the ethnic tribe and presence of indigenous agroforestry systems.

Ifugao is located in Northern Philippines at the foot of the Cordillera mountain ranges. It is bounded on the North by Mountain Province, South by Nueva Viscaya, East by Isabela and on the West by Benguet province. It is generally located between 120 degrees 40 minutes longitude and between 16 degrees 35 minutes and 17 degrees 5 minutes latitude. Ifugao is recognizing by United Nations Educational, Scientific and Cultural Organization as a "World Heritage Site" and the World Trade and Tourism Council as a "Pilot Green Globe Destination".

The province could be reached by land transportation like public utility bus and/jeep through the use of the national road connected from Bagabag, Nueva Viscaya which traversed Lamut, Lagawe, Hingyon and Banaue and connected to a national road going to Bontoc, Mountain Province. A rugged road is also available during dry season from Banaue to Ramon, Isabela.

### 2.3. Respondents of the Study

The Ifugaos are composed of sub-groups. The major sub-groups are the Ayangan, Kalanguya and Tuwali. The sub-grouping was based largely on the differences of dialects and were named after the dialects that each speaks. Thus, the Ayangan were named after Ayangan, the Tuwali after Tuwali and Kalanguya after Kalanguya. The Tuwali

composed the majority of Kiangnan, Lagawe, Hingyon, Hungduan, and Banaue. Kalanguya composed the population of Tinoc and some part of Kiangnan and Asipulo. Ayangan make up the population of Mayoyao, Aguinardo, and some parts of Banaue, Kiangnan, Lagawe, Lamut and Alfonso Lista.

The main respondents of the study were the household heads, who were responsible in maintaining the social and welfare of the family. However, in the absence of father or incapacitate of both parents, the mother or any member of the family who maintained the welfare of the family were taken as the respondents, respectively.

The respondents were taken from six study site; namely Ahin, Tinoc and Liwon, Asipulo representing Kalanguya tribe, Hapao, Hungduan and Nagacadan, Kiangnan representing Tuwali tribe, Bimpal, Lamut and Batad, Banaue representing Ayangan tribe. One hundred twelve household respondents were taken from the 6 study sites.

#### 2.4. Statistical Tool

Simple descriptive statistics like frequency counts, percentages, mean and ranking were used in analyzing the data.

### 3. Result and Discussion

#### 3.1. Socio Demographic Profile

Of the 112 respondents, the Tuwali ethnic group headed the respondents comprising 52 (46.43%), followed by the Ayangans with 41 (36.61%) respondents and 19 (16.96%) respondents of Kalanguya. The dominant respondents were those with age from 46 – 55 (46.43%). This implies that the respondents were still in the right working age being in the active stage and strong to handle hard manual work that their agroforestry activities requires. Majority 60 (53.57%) of the respondents were male. In Ifugao, the father is given the authority to transact business being recognized as the head of the family. The father is the center of authority among Filipinos, he is always allowed to transact for the family.

There were 64 (57.14%) of the respondents who were under 7 - 10 number of children followed by 22 (19.64%) under 4 - 6 number of children, 11 (9.82%) who do not have children, 9 (8.04%) under 1 – 3 number of children and 6 (5.36%) under 11 & above number of children. The mean number of children was 8. This finding goes with the belief of most Ifugaos that having more children is a wealth. This is also a normal in upland community that entails extra family labor needed in the farm. As the children grow it is the duty of the parents to impart to them the tribal knowledge. In return, the children when they grow up especially the child who has inherited family property provide needed things of their parents like animals needed in rituals and their basic needs. In case the child has not yet obtained his/her inheritance, the needed things/materials of his/her parents will be charged upon the property allotted to him/her.

Out of the 112 respondents, 60 (53.57%) were Catholic

respondents dominate followed by 30 (26.79%) Protestant, 8 (7.14%) Babtist, 5 (4.46%) Pentecost, 4 (3.57%) Espiritista, 3 (2.68%) Anglican and atlist 2 (1.79%) were pagan. Catholic dominates because it reached Ifugao and the first religion to stablish church in Ifugao as early as the Spanish regime. Their church could be found in the entire study sites. Previously, the Ifugaos were animistic believers. They believed in gods and goddesses. Even ancestors were deified because they were invoked during the rituals and were believed to have influenced over the well-being of living kin. It was generally believed that everything in man's life and what he does depends in favor of the gods. Out of the 112 respondents, 7 (6.25%) were able to finish a degree of which 3 practiced their profession, 6 (5.36%) college level, 7 (6.25%) high school graduates, 8 (7.14%) high school level, 20 (17.86%) elementary graduates, 40 (35.71 %) elementary level and 24 (21.43%) were not able attend formal schooling. They were not able to finish a higher degree of education due to the distance of schools to their places hence they land to farming as major source of livelihood headed by 48 (42.86%) Tuwalis followed by 19 (16.96%) Kalanguyas and 37 (33.04%) Ayangans. Other main sources of livelihood were: 3 (2.68%) employee, 2 each (1.79%) were receiving pension as world war II veteran and woodcarving, and 1 (.89%) mainly depended on Inn and restaurant. The main least source of livelihood was found in Batad, which was accounted to the fact that it is a worldwide tourist destination. The secondary sources of income were ranked as follows: fuelwood gathering and native chicken raising, hired labor in non-farm activities, hired labor in farm, duck raising, fishing, hog raising, duck raising and carpentry, wood carving, buy and sell, hunting, driving, honey bee collecting, cogon/bamboo collecting, softbroom making, bamboo craft and contractual labor, and charcoal making. These secondary sources according to the respondents had considerably contributed to their daily existence during fallow period of their farm and while waiting for their farm crops to be harvested. The Ifugaos leaved their farm and go to other provinces like Quirino and Isabela in Region 2 and Benguet Province in Cordillera Administrative Region (CAR) to look for a greener pasture. Their income derived in farming were not sufficient to support their family income. The mean income per annum of the respondents was P 22, 000.00 which was below the poverty level.

#### 3.2. Indigenous Agroforestry Systems

##### 3.2.1. Types of Indigenous Agroforestry Systems

The indigenous agroforestry system which were found to be practiced by the tribes were rice terraces forest – coupled agroforestry system, kaingin and multistorey System.

The rice terraces forest-coupled agroforestry system called “*payoh*”-*pinugo*”/”*hayokong*”/”*hino-ub*” system is a unique type of indigenous agroforestry system believed to be practiced by the Ifugao ethnic tribes before the birth of Christ. It involved the conversion of a sloping areas into rice terraces in consideration of the water source located just above the

terraces or about 1 to 2 kilometers away. The water source is an undisturbed forest stand about .5 to 6 hectares wide, govern and manage by clan, family or group of people who is using it as a watershed.

The kaingin called “*uma*”/“*habal*”/“*inuman*” involved the clearing of a patch of a sloping grassland/secondary growth forest by removing all the vegetation including the roots or retaining of selected species of trees. Sweet potato (*Apomea abataatas*) was the usual crop planted. Agricultural crops were raised for 2 to 5 years depending on the fertility of the soil accumulated during the 2 to 4 years fallow period. The technologies such as indigenous agroforestry practices as well as the indigenous soil and water conservation were employed during the period of *uma/inum-an/habal*.

Multistorey agroforestry system is characterized by having 2 – 5 layers of canopies. The above layer is occupied by trees or woody perennials while agricultural crops and/or animals are found below. The most unique multistorey of the Ifugao ethnic tribe was the “*muyong* system” which resembles the tropical rain forest having different species of flora and fauna.

The mean size of all agroforestry farms was .68 hectare, which range from .01 to 6 hectares. Multistorey agroforestry farm of Tawali has a mean of 1.75 hectares dominating the sizes of all agroforestry farms of the respondents and the lowest was the .33 hectare mean of Kalanguya rice terraces agroforestry farm.

In terms of rice terraces, the Ayangans was wider with a mean of .41 hectares followed by Tawali .39 hectares. and .33 hectares of Kalanguya. For multistorey, the Tawali headed it with a mean of 1.75. Kalanguya headed also kaingin with a mean of .73 hectares that proves their trade mark as hardworking tribe.

Their believe to practice agroforestry system were ranked as fallows: environmentally safe, productive in terms of harvest, requires less expensive inputs, suitable to farm biophysical condition and compatible with the customs and traditions.

There were 77.68% of the respondents who signified that they learned their agroforestry systems from their parents, 11.61% from grandparents, 9.82% from other relatives and the least was 5.36% who learned from friend/neighbors. Accordingly, it is an obligation of the parents to transmit their culture to their children. Result proved that the agroforestry systems where transmitted from generation to generation within the family of the Ifugaos.

Out of the 249 agroforestry farms of the respondents 148 (51.21%) were inherited, 88 (35.34%) were squatted, 7 (2.81%) were purchased and the least 6 (2.41%) were awarded by the government. Out of 80 rice terraces, 79 were claimed to be inherited. They stated that they were not yet born when their rice terraces were constructed. In Batad, Ahin, Nagacadan, and Hapao, they claimed that their rice terraces were made before the birth of Christ.

In terms of inheritance system, the prerogative is given to the first child to select which property he/she would like to

inherit. This practice was true to all ethnic tribes. *Baddang* strictly mean - the act of harvesting rice by friends, relatives and parents of bride and grooms. Among Tualis “*baddang*” generally means help. However, this was done also, when a parents of either party has rice field to be given to the bride and groom as inheritance. The *baddang* will declare that the property belongs to the newlywed couple. Whenever land dispute arises, the people who went for the *baddang* will serve as witnesses to who own the rice fields. The 6 agroforestry farm of the respondents were acquired from the government through Integrated Social Forestry Program (ISFP) of the Department of Environment and Natural Resources (DENR). However, the respondents beneficiaries commented that land title should be the one to be awarded to them and not a merely certificate.

### 3.2.2. Perceived Effects of the Agroforestry Systems on Socio-economic Condition

The tribes revealed that the agroforestry systems will ensures their basic needs (57.14%) because it increased their production (32.14%) which will lead to the improvement of their socio-economic condition (31.25%). Higher aspiration also of their children (30.36%) has possibility to be attained. Their positive reaction implied that they have already observed the positive effect of agroforestry sytems on their socio-economic condition.

### 3.2.3. Perceived Effects of Agroforestry Systems on the Environment

It was found out that majority (80) of the tribes believed that their agroforestry systems conserve/ameliorate water (75%), followed by improved climatic condition (53.57%), conserve/ameliorate soil condition (30.36%) and preserve and conserve plants and animals (26.79%).

### 3.2.4. Agroforestry System Calendar of Activities

The tribes have their own calendar of activities that they followed in producing rice (*Oriza sativa*) in their rice terraces forest-coupled agroforestry system and agricultural crops in their kaingin agroforestry system. Traditionally, the respondents do *ahihopnak/hihophak* or sow their rice seeds called *binayngo/binong-oh* in December or January because they believe that the first rain of the year will come in as much the temperature became cooler. *Bibgay/ahitunod* (transplanting) start in the month of February and *ahi-ani/hiani* (harvesting) was accomplished in the month of late July or early August. Planting and harvesting always starts in the field of the farmer with the widest rice terraces. After harvest season, the field were laid idle to fallow.

When transplanting was over and made sure that their rice plants survived in their rice field, they started prospecting their kaingin on March and made sure to accomplished the cleaning on April and burning on early May. When rain comes on May, they planted sweet potatoes. It usually take 4 to 5 months before the sweet potatoes were harvested.

### 3.3. Indigenous Soil and Water Conservation

Soil and water conservation of the tribes was headed by fallowing and the least practiced was farm ponds. *Gengen*, *belkeh* and *day-og* were found to be practiced only by the kalanguya tribe. The indigenous agroforestry systems were found to be protected by two or more of the following soil and water conservation of the tribes:

1. Terracing. Soil surface in slope areas were levelled following the contour lines starting from lower to higher elevation for making rice field. The terraces controlled soil erosion and conserved water in the area.
2. *Tuping*. Piling of stones one after the other and on top of each other. The size of stone decreased from bottom to top. Sticky mud were used to connect the stones.
3. *Banong*. It is usually made up of sticky mud which were constructed on top of stonewalls or soil walls of rice fields. The dikes were constructed surrounding rice paddies and enclosed to control the flow of water in and out of the field and conserved soil by acting as barrier in the rice field.
4. *Muntanum chi Kaiw/Ojiv*. Planting of different tree species along kaingin, *pinugo*, *muyong*, silvipasture and homegarden.
5. *Pingkol/Inado/Intuol*. Piling of hays and other agricultural wastes and mixed with mud and form several mounds within the field and were planted with vegetables like onions. The hays and other agricultural waste decomposed easily since it was heated and moisten by the mud. When decomposed, it improved the soil fertility, friability, and acted as sponge that hold soil moisture in the field.
6. *Belkeh*. Grasses were planted across the kaingin forming a series of belts. The grasses will control the flow of water and soil erosion.
7. *Day-og*. A series of excavation were dug 3 to 4 meters and about 8 to 10 inches deep. The pit were filled with materials such as weeds to be composted then filled with soil removed earlier. Each pit was separated with a canal that served as drainage.
8. *Gengen*. Grasses and sweet potato residue materials after harvesting were buried in a contour trench dug across the kaingin, which formed a series of wide flat humps that look like terraces. The grasses and sweet potato residues when decomposed were utilized as fertilizer and the *gengen* prevented soil erosion.
9. Pond. Small pond 1 to 2 feet deep with a diameter of about 2 meters created by animals in low laying areas of the farms were maintained and utilized when water was needed by the farmer for his plants and animals.
10. Canal. Small canals were constructed on the surroundings of slightly sloping kaingin and between spans planted with different kinds of crops. The canals act as drainage and span division of the kaingin.
11. *Akup*. About 1 meter wide and ½ meter height stone wall structure were piled across the slope of *inum-an*.

A Kalanguya respondent revealed that his *inum-an* with *akup* was used for 20 years and observed only a fallow period of 1 year.

12. Mulching. Weeds removed from kaingin were placed on vacant soil surface between crops.
13. *Dakol di Tanom*. Two or more agricultural crops were planted at the same time in 1 unit of land.
14. Relay Cropping. Involved the planting of another agricultural crop while the other was still growing.
15. *Pallog di Tanom*. Species of agricultural crop were planted one after the other in the same unit of land. Crop of the respondents fallowed a seasonal pattern.
16. *Kinnebba/Tawonon/Tahgwunon*. Kaingin and rice terraces were laid idle to fallow in order to become fertile again. Rice terraces were usually laid idle to fallow for 5 months with in one year. For kaingin, Tawali and Ayangan ethnic tribes operated it for 2 to 4 years and 3 to 5 years fallow period while the Kalanguya farmed for 3 to 5 years and 2 to 3 years fallow period. A Kalanguya tribe from Ahin was noted to have practiced the shortest fallow period which was one year and longest kaingin period of 20 years.

### 3.4. Customary Laws

Today, the leadership of the communities/barangay rest on the elected barangay captain. The barangay captain was looked upon as the leader in the community because he resolved disputes among the inhabitants and made the final decision concerning the barangay like agroforestry farm disputes. Before, the ablest man in terms of wealth and strength among Tawalis and Ayangan tribes was looked upon as leader while for Kalanguyas no leader was designated the *lallakays* (elders) settled any problem of the people.

All tribes revealed that conflicts were settled first through customary laws. If unresolved, it will be settled by barangay captains before it will be brought to the municipal level. Male elders were invited and recognized in the conduct of hearing.

Among the Kalanguya tribes the traditional ways on settling their disputes were trial with the elders, trial by ordeal or trial that considered the performance of individual. *Tungtongan* (trial with the elders) handle civil disputes and other heinous crime and the decision lies in the hands of the elders where in an agreement prepared was made final. The trial was guided by the following principles: Judgement was immediate and executory, hearing were made in public, restoration was immediate and accomplished through a celebration involving the entire community, and the kin of the guilty were involved in the payment of the fines, while the kin of the offended party usually a recipient of a portion of the fine.

Among Tawalis and Ayangans their traditional way of settling disputes were through trial by ordeal for theft and *bultong* (wrestling mach) for boundary disputes. In wrestling mach, both representative meet at the boundary in question. The winner's side claimed was favored. After the mach, both

parties come together and chew betelnut as a sign that the decision was accepted. In case of theft, the *dau*, *uggub* or the *agba* will be performed. The process is the same with *da-u* for *du-o*, *uggub* for *bagto* of the Kalanguya. For *agba*, it was used to locate/trace lost things. In performing the *agba*, the *mun-agba* (gifted person to locate lost things) asks some questions as she/he tried to let an egg stand. If the egg stands then the answer to the question was positive. The *mun-agba* can tell where the object can be found by describing the place or the person in possession of the missing object.

### 3.5. Cooperation System

Agroforestry activities were usually accomplished through their cooperation which was inculcated in their social activities as a member of the tribe they belong. All the respondents admitted that they practiced the following:

1. *Ulno/Bfachang/Baddang*. A cooperation in the form of free labor or material form, which was needed immediately by any member of the tribe. It was not planned in advance. Example, if a household member died and their rice field should be harvested. The community was obliged to harvest the rice in favour of the bereaved family.
2. *Balhan/Bforhan*. Voluntary contribution in kind or in cast was given by the community to somebody who badly needed it. A member of the in need family collected contributions. Example, when somebody meets a serious accident in the kaingin while working, a member of his/her family collected contribution for his hospitalization. This was also practiced during justice cases, when the offender was not able to provide the fine, the community provided.
3. *Dah-ngah/Dang-a/Changa*. A group activity planned in advance. Usually, a free group labor was rendered to a family who wanted to do *dah-ngah*. It was a must that those who worked were feed by the host family during lunch time only.
4. *Ubbo/Ub-bfu*. This system was similar to *Balhan*, *Danga*, only that the participants of the group were bound by similar need. It was usually observed in accomplishing laborious works in kaingin and rice terraces.

### 3.6. Problems Related to Agroforestry Systems

The problems of the ethnic tribes in relation to their agroforestry systems were the following:

1. Decline of production. Harvested agricultural crops decreased in quality and quantity. In addition, soil fertility was observed by the respondents to decline within a short period of time usually 2 years. This prompted them to migrate to other places look for more productive site to raise crops.
2. Landslide. In the case of Batad, landslide occurs in some portion of their rice terraces. These were experienced also in Liwon. Such situation makes the rice terraces unavailable for cultivation.

3. Presence of pest. During the past, pest is not given attention today the respondents were bothered due to the presence of giant earthworms and kuhol which greatly affected their rice field.
4. Drought. Some portion of the tribe's rice terraces in Batad and Liwon were not cultivated when visited by the researcher. The respondents affirmed that water coming from the watershed was no longer enough to supply what was needed.
5. Land grabbing. In Batad, a past *Puchon* declared a certain portion of one of the watershed as his private woodlot. Such situation was a treat to the watershed.
6. Absence of farm to market road. The respondents in Batad, Liwon, Ahin and Nagacadan revealed that they were not encouraged to increase their farm production since they were hard up in hauling their product due to the absence of farm to market road and if there such it was not passable by vehicle.

### 3.7. Government and Nongovernmental Organization Programs and Policies

Aside from the barangay programs implemented in the study areas there were Government and Non-governmental organization that extend their services in some areas of the study sites.

According to some respondents, the Department of Agriculture (DA) of the Local Government Unit (LGU) in their own municipality invited them to attend various seminar-training in sustainable agriculture. They were distributed with fruit trees and certified seeds of rice and vegetables.

The DENR conducted environmental campaign, reforestation programs/national greening program and distributed seedlings of exotic and endemic tree species in at least 3 study sites namely Nagacadan, Bimpal and Hapao. The Central Cordillera Agricultural Program (CECAP) conducted various training-seminar, educational field trips and provided technical/fund assistance in various level in the improvement of agroforestry farms of the tribes.

The most common policy that the respondents were aware were: illegal logging and land taxation. The respondents commented that why were they charged of illegal logging if they were the one who planted and or tended such trees. Likewise, they were born in their lands which were taken cared by their forefathers and themselves that is why they do not respond to taxation program of the government.

## 4. Conclusions

The Ifugao ethnic tribes in the upland areas were near to subsistence as manifested in the level of living of the respondents. The customary laws gave support to the indigenous systems much that it unified the people and installed reverence to the environment. The informal council "*tungtongan*" encouraged them not to commit crimes either to nature or to people instead respect each other and

preserve nature.

Despite the existence of local government officials, the authority of an ethnic leader was still accepted by the Ifugao tribes. This was shown by the existence of their chieftain in their rice field who dictated the day of planting and harvesting and spearheaded the assessment of fine to violators of their law.

The Ifugaos recounted their past and see their future activities from their unique agricultural and lunar calendar that contributed much to the tribes' survival. These guided the tribes when to do their farming activities.

The present government laws and policies were not totally the direct cause of the fading of customary laws. However, it can be used also as instrument or fostering opportunities of unscrupulous elite people of the community. A concrete example was the finding in Batad Banaue that a past *Puchon* (chieftain) tax declare a portion of the said watershed.

The rice terraces components of the forest coupled agroforestry system has been subjected to ecological, social changes such as denudation of the watershed as indicated by the drying of rice terraces due to the decrease of water coming from the watershed, and conversion of rice terraces into residential area.

The cooperation system of the respondents such as *ulno/bfachang/baddang*, *balhan/bforhan*, *dang-a* and *ubbo* were found to be intact and were used to accomplish their agroforestry activities. These sustained their harmony.

The continuous utilization of the indigenous technologies was due to several reasons, such as they were part of their agroforestry systems, they increased production, they were already a tradition, they protected the crops in the farm and required less input. They favoured a technology that provided attractive and economic rewards at a range of input level.

Likewise, the principle of choice used by the Ifugaos was the principle of advantage, where farmers chose and utilized alternate upland farming technologies but did not make complex mathematical calculations of the overall utility of each technology. Rather, they utilized the technologies that simplified their decision-making calculations that they perceived to be socially, culturally, economically and ecologically advantageous. They further stated that using such technologies was a cognitive strategy to cope with their bio-physical and socio-economic environment.

The agroforestry systems revealed by the Ifugaos were rice terraces forest coupled agroforestry system, kaingin and

multistorey. The components of these systems and other indigenous technologies of the respondents were linked to one another. The most apparent was the *pinugo* that provides water for the rice field of the farmer. In return, the farmer protected the *pinugo*. The agroforestry systems of the Ifugaos were the result of their interaction with the different components of the cultural system such as social relations, economy, knowledge, and the environment.

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