

## **Agroforestry Program a Strategy for Development of Upland Dwellers in Region XII, Philippines**

**Aileen D. Tacbalan**

Eastern Visayas State University – Burauen  
Burauen, Leyte  
E-mail: sweetenia\_143@yahoo.com

### **ABSTRACT**

This study aimed to assess the respondents' perception on the level of effectiveness and impact of agroforestry program in Region XII, Philippines. Survey instrument was used to a total of 250 respondents' randomly selected. Data were examined using descriptive statistics. Results revealed that perception of agroforestry was agreed and effectiveness of agroforestry was effective to socio-economic upliftment and very effective to restoration of the degraded upland areas. Impact of agroforestry to soil and water conservation, increased income and conservation of remaining natural resources was effective, protection of remaining natural resources and regeneration of the degraded upland areas was very effective. Socio-demographic found not significant their perception on concept of agroforestry. Number of years involved, average size and model of agroforestry found as significant predictors in policy and management strategies. Number of years involved in agroforestry significantly influenced the components of agroforestry. Socio-demographic on the effectiveness of agroforestry significantly influenced the number of years involved in agroforestry in socio-economic upliftment. Number of years involved in agroforestry, average size and model of agroforestry significantly influenced the effectiveness of agroforestry in terms of restoration of the degraded upland areas. Perception of agroforestry on its impact significantly influenced to conserve soil and water and protect the remaining natural resources. Perception of agroforestry significantly influenced its impact to increased income, conservation of remaining natural resources and regeneration of degraded upland areas. Effectiveness of agroforestry significantly influenced the impact of agroforestry to soil and water conservation, increased income, protection of remaining natural resources, conservation of remaining natural resources and regeneration of degraded upland areas.

### **Keywords:**

Agroforestry, Strategy, Development, Perception, Effectiveness, Impact

### **1.Introduction**

The concept of agroforestry is relatively new in the Philippines but the rudimentary practices of it has been known to be quite old. During the early days of homestead era, farmers were required to keep a portion of their homestead lots in wooded conditions and to till the rest for raising agricultural crops. Similarly, rural farmers tend some groves of trees in their homelots and farms or maintain a line of trees along farm boundaries, creeks, rivers and other waterways. Today, agroforestry is undoubtedly considered as one of the many alternatives being employed to develop degraded uplands to bring back the productivity and stability to meet the needs of man [1]. Agroforestry is a plantation system that incorporates yields or farm animals with plants and bushes. The causing natural connections deliver various welfares, comprising varied earnings, augmented organic production, healthier water condition, and recovered environments for both human beings and flora and fauna. Growers embrace to perform agroforestry for two reasons, to boost their financial stability and recover the supervision of forest reserves under their care [2]. This definition bring about a category in trees with crops and trees with pastures that applies, successive and immediate methods and in area with varied arrays of trees and crops. Social forestry covers agroforestry notions with knowledge and skills and it is extensively used to

signify to the practice of expending plants or tree planting particularly to follow social purposes for improvement of the poor, by delivering forest produce and services to the local people [3].

Indeed, Cannel, et.al. [4] as cited by Marohn, C. et.al. [4] pointed out that agroforestry system called rainforestation used indigenous timber species planted in high density and diversity. This method intends to emulate natural forest ecosystems and asserted to be more irrepressible than using exotic species (Margraf & Milan, [4] as cited by Marohn, C. et.al., [4]). An agroforestry system rainforestation contains the use of annual crops during the first years of establishment and successively of shadow tolerant crops as permanent understory. One of the vital advantages credited to agroforestry systems is the deep-rooting trees can move nutrients from the subsoil via leaf litter to the topsoil, where they also become available to crops. It is also a vital practice for sustainable land use management to help farming production of the farmers with aid in better income such as food security, employment and income generation of the people (Semgalawe, [5], cited by Uisso and Masao, [5]).

In addition, the major cause for the upland devastation is the haphazard lawful and unlawful cutting of trees. Increased population has enforced lowlanders to absorb cleared areas over logging and fortified unmanageable farming. Another cause had been pleasing ended of huge agroindustry fears of massive areas of moderately slanted lowland farms, pushing several unfortunate peoples to enlarge farming against steep to very steep hills. The dwellers performed the slash and burn cultivation and utilizing lowland technologies not suitable to the steep uplands. This activity caused in serious soil corrosion, low production and consequently extremely low earnings and worth of life [6].

During heavy rains, floods occur causing destructions of farms and establishments in the lowlands. Irrigation canals and ricefields are filled with eroded soil reducing production. Rapid siltation of river and creeks diminish fishermen's catch for it destroys the breeding places of fish. People need not always be victims of the adverse effect of this problem for there is something they can do to prevent soil erosion and become more productive instead. Hence, introduction of Sloping Agricultural Land Technology (SALT) or what is called the agroforestry system is one of the solution to prevent soil erosion and at the same time helps upland dwellers to improve their way of living by means of gaining additional income to farming in hilly land areas [7].

Huxley [8] revealed that agroforestry is only a new word for an old land use practice. Perhaps scientists and farmers have at least succeeded in rediscovering kind of agriculture that respects the environment, does not acidify and exhaust the soil. Instead, it protects the soil from being carried away by wind or rain. Diversity is one of Agroforestry's key benefits compared to other land use systems. It aimed for a continuous production and conservation instead of destructive utilization of natural resources. Another highlights of agroforestry is its capability of operating even on the smallest land unit available. Although agroforestry was practiced long before, it was only during the last three decades that agroforestry was recognized as a field of study. Agroforestry integrates the two major components of utilizing various combinations of food crops, trees, animals and other resources at the same time integration of soil and water conservation for efficient productivity.

This study aimed to provide benchmark information to the policy-makers, management and program implementers of agroforestry programs of DENR Region XII as to the effectiveness of agroforestry program as a strategy for the development of the upland dwellers. The findings of the study would be beneficial to the concern government agencies, private organizations and funding agencies, Upland Dwellers/Farmers and other stakeholders to develop more effectively in implementing agroforestry program/projects in identified degraded upland areas. Specifically,

it may provide very significant information to program planners and implementers on the relevance and advancement of the program undertaking to regenerate the degraded upland areas. The result of the study may also serve as basis for more improved/advanced implementation of Agroforestry Program.

Policy-makers, researchers and implementers would be guided on the programs effective implementation and management. This would also provide direction on policy to sustain upland resources. Likewise, the assessment of effectiveness of agroforestry program as a strategy for the development may give a quick and convincing feedback for the program planners and implementers to enhance and improve program planning and implementation. This study would support to identify the strength, weaknesses, opportunities and threats of the upland dwellers to engage them to get involved in a developed and advanced way of Agroforestry System.

Findings may provide insights and additional knowledge and information to advocates of environment protection and conservation, agricultural, rural and community development, students and future researchers to introduce new knowledge and technology to the upland dwellers. Therefore, this study intended to ascertain the upland dwellers strategy for development with emphasis of their perception on identifying the effectiveness and impact of agroforestry program.

## **2. Methodology**

The study was employed the descriptive - correlation research design particularly the combination of descriptive and regression analysis. The study was conducted at CBFMP and NGP areas in Region XII, Philippines. The respondents were the 250 upland dwellers who are the project beneficiaries. Approximately 10% of the project beneficiaries of each PO was randomly chosen. The province of North Cotabato, South Cotabato and Sultan Kudarat served as the strata. The distribution of the respondents was obtained, 85 project beneficiaries were interviewed from North Cotabato, 75 from South Cotabato and 90 from the province of Sultan Kudarat. The study was used questionnaires to gather data. Respondents were properly notified through their respective organizations. They were briefed as to the purpose of the study and how they would go about answering the questions. Actual observation of the project areas was also done. Secondary data was also obtained.

Descriptive statistics was utilized in the study. Data was analyzed using SPSS with the assistance of a numerical analyst. The demographic attributes of the respondents were described and analyzed using the frequency distribution, percentage and average. A four level Likert Scale was used to quantify the respondents' perception, effectiveness and impact of agroforestry program. Data gathered and collected were tabulated in numerical values. Correlation and multiple regression statistical tools was used to ascertain the correlation and influence of the independent and dependent variables. Hypothesis was tested and set at 5% significance level.

## **3. Findings Analysis**

### **3.1 Respondents Demographic Features**

As shown in Table 1 results revealed that age of the beneficiaries 89 or 35.6% were in the age range of 41-50 years old; and age bracket between 61-65 years old or 4.0%. The findings imply that the working age and membership of the respondents in the organization was generally in the middle age group. This confirmed the study of Aquino [9] that age is found to be strong

determinant in the successful implementation of a program. The results agreed with Balanag [10] who cited that organization composed of older professionals is likely to be more stable organization compared to an organization of young professionals. Results also revealed that 186 or 74.4% of the respondents are male while 64 or 25.6% are females. The findings disclosed that males can handle this kind of field work than females. Balanag [11] believed that male usually dominated the field as it requires heavy works. Likewise, he found out that there is now an increasing involvement of women in the application of community development programs.

Majority of respondents were secondary graduate (141 or 56.4%). Results imply that respondents were all literate. Pinguaman [12] quoted that educated farmers knew better on what to do and how to increase productivity compared to farmers with little education. For marital status majority (223 or 89.2%) were married. Findings imply that married respondents have more desire to adopt the program because married individuals have family to sustain and additional responsibilities to support. The findings reported by Balanag [10] found out that marital status is not correlated with the farmers' adoption of improved farming practices. Majority (102 or 40.8%) labourer while 72 or 28.8% Brgy. Officials, (49 or 19.6%) engaged in small business, (26 or 10.4%) single motorcycle drivers and 1 or 0.4% was an OFW. This implies that the respondents did not only rely on farming but other sources of income providing them comfort and needs to their family. Dinampo [10] as cited by Balanag [10] affirmed that farmers who had higher income were more innovative than those who had limited earnings. Result implies that the respondents were earning above the poverty level since they engaged an alternative sources of livelihood. This supported the findings of Daval [13] that Rice-Based Farming System project was a great help for farmers by adopting technologies to improved farming activities and increase of farm productivity and income. Majority (68.8%) had a household members of 4 to 6, and 8 or 3.2% had 10 to 12 household members. Findings imply that the number of family members played a vital role in farm productivity as children can be a source of labor. The findings supported Pandaliday [14] that household size imperative is highly correlated to farm productivity where direct hand labor is a must. Farmers had an advantage of six children and that parents like to have many children as they were sources of labor, household and farm helpers.

Results revealed that, 37.2% of the respondents engaged in farming activities from 11 years to 20 years, 31 or 12.4% for 31 to 40 years. This implies that the respondents ventured on farming activities considering the opportunity of living in productive upland areas. Aquino (2008) affirmed that with increasing experience in farming and accumulation of sufficient knowledge, the farmers tended to develop more self-confidence to try some risky but profitable farming ventures. It shows that 58% or 145 respondents involved in agroforestry for 5 years; Findings entail that majority of respondents have the same number of years in the involvement of the program. It shows that 102 or 40.8% of the respondents had 1.1 to 2.0 hectares of farm land, and 69 or 27.6% only 0.5 to 1.0 hectare. It implies that the farm areas cultivated by the project beneficiaries are declared public land and they are holders of Certificate of Stewardship Contracts (CSC's). Balanag [11] emphasized that bigger farm size means bigger production. Bigger production means bigger income. Majority (77.2%) of the respondents practiced a non-agri-silvicultural model of agroforestry; and 4 or 1.6% on agric-silvi-pastoral. Findings suggest that majority of respondents practiced the model of combination of planting agricultural crops and trees. Majority (85.2%) of the respondents attended trainings/seminars conducted by the implementing agencies from 1 to 15 trainings; and 2 or 0.8% had 31 and above attended trainings/seminars. Findings imply that almost all of the respondents attended the trainings/seminars conducted by the implementing agencies. Balanag [10] quoted that the lack of

formal education and training among farmers becomes a major drawback since they cannot avail of opportunities which require specialized skills and expertise. Hadjinasser [15] affirmed that informal education through trainings/seminars could help improve the knowledge and skills of the farmers in handling any development programs of the government.

**Table 1.** Respondents Demographic Features.

Features	Frequency (n=250)	Percentage (%)
<b>Age (year)</b>		
21 – 30 years	12	4.8
31 – 40	75	30.0
41 – 50	89	35.6
51 – 60	64	25.6
61 – 65	10	4.0
<b>Gender</b>		
Male	186	74.4
Female	64	25.6
<b>Level of Education</b>		
Primary Level	11	4.4
Primary Graduate	17	6.8
Secondary Level	44	17.6
Secondary Graduate	141	56.4
Tertiary Level	17	6.8
Tertiary Graduate	4	1.6
Vocational	16	6.4
<b>Marital Status</b>		
Single	8	3.2
Married	223	89.2
Widowed	10	4.0
Separated	9	3.6
<b>Other Sources of Income</b>		
Honorarium (Brgy. Officials)	72	28.8
Small Business (Mini store/lending)	49	19.6
Driver (Habal-habal)	26	10.4
Laborer (Nursery)	102	40.8
Helper (OFW)	1	0.4
<b>Average Monthly Income</b>		
P 5,000.00 and below	63	25.2
P 5,001.00 – 10,000.00	134	53.6
P10,001.00 – 15,000.00	48	19.2
P15,001.00 – 20,000.00	5	2.0

Table 1. Continued.....

Characteristics	Frequency (n=250)	Percentage (%)
<b>Number of Household Members</b>		
1 – 3	33	13.2
4 – 6	172	68.8
7 – 9	37	14.8
10 – 12	8	3.2
<b>Number of Years in Farming</b>		
Below 10	55	22.0
11 – 20	93	37.2
21 – 30	71	28.4
31 – 40	31	12.4
<b>Number of Years Involved in Agroforestry</b>		
Three	35	14.0
Four	15	6.0
Five	145	58.0
Six	35	14.0
Seven	20	8.0
<b>Model of Agroforestry</b>		
Non-agri-silvicultural	193	77.2
Agric-horticultural	53	21.2
Agric-silvi-pastoral	4	1.6
<b>Number of Trainings/Seminars Attended</b>		
1 – 15	213	85.2
16 – 30	35	14.0
31 – above	2	0.8

### 3.2 Respondents Perception towards Agroforestry Program

The outcomes in Table 2 shows that the respondents' perception towards agroforestry program was all agreed in terms of management strategies, concept, policy and components. The findings imply that the program is beneficial for the improvement and productivity in the degraded upland areas as well as empowerment of the upland dwellers to be united, independent and capable in doing task. There is a need to strengthen the program for the improvement of the well-being of the upland dwellers. The concept of agroforestry program has a great extent of respondents' consent to the program. The respondents are also well oriented and aware of the fundamental purpose of agroforestry which is to regenerate the degraded upland areas. The agroforestry program needs to strengthen its goals and objectives for the directed satisfaction of the beneficiaries and in order to maximize its involvement in all aspects with the program.

The respondents are knowledgeable with the orientation of the program with emphasized to planting of fruits and forest trees. However, given emphasized of the program by introduction of agri-silvi-pastoral model of agroforestry wherein these are combination of agricultural crops, fruit trees and animals are not well defined to the respondents. This entails that concerned agencies necessitates to strengthen the top priorities of the program goals and objectives as well as given

enhance skills and knowledge to the beneficiaries the beneficial effect if such model of agroforestry would attempt to apply. The skills trainings and team buildings in joining the organization is an effective strategy to developed leadership. Yet, enforcement of sanction for individuals' violation is also an effective strategy to an organization because everyone should be aware and cooperate for the success of the program. This is essential that program implementers must disseminated any development that should affect socio-economic aspects of the beneficiaries and allocation of resources must be in a systematic ways in order to ensure success in all aspect of the activities.

Respondents' perceptions towards agroforestry in the study area were obtained to be varied because of certain circumstances that they have experienced in the past agroforestry projects. They observed that the usage is made for their individual contentment and family consumption. The result of the study by Sharmin and Rabbi [16] reported that significant proportion of the farmers

positive reflection about agroforestry systems. They supposed that Agroforestry does not hinder their conventional farming system and it has a vast part in managing, area utilization and amusing role and to meet their demands of wood, firewood and other forest products thus, respondents strongly agreed with this point of view. However, farmers also noticed that Agroforestry is more lucrative and less dangerous than other farming alternatives.

Most of these reasons were also reported by Kittur and Bargali, [17] in India that farmer's perception about agroforestry in the study area is measured by Likert Scale. The results of the study were persuading, which showed that the farmers were fulfilling the consequence of trees, crop and pasture to meet their need of lumber, fuel wood, food supply and increase the capital creation. Farmers also reported that through agroforestry practice they can get agricultural produces in the short term as well as receive a big amount of money from selling of trees in the long term. The study of Kofi [18], give a noteworthy results that agroforestry is perceived by the respondents to have a capacity of solving their fuelwood necessities, recover the soil fertility, and give favourable climate for produces. Motis, [19] cited on his article that Agroforestry systems create a utmost usage of land. Each part of the land is measured suitable for beneficial plants. Emphasis is put on perennial, various purpose crops that are sowed after and yield benefits over a extended period of time.

Wray [20] as cited by Guevarra [20] states that the old concept of improvement and involvement of peoples participation in something previously defined and intended for them in program based and powerful leaders sympathy to the necessities of the community. The results of the study of Guevarra [20] further stressed that in terms of concept of the program effectiveness revealed that the study recognized the significance of the program in giving the upland people the benefits and in improving their economic status and the productivity of the degraded upland area. It was also suggests that empowered upland inhabitants will have the opportunity to handle circumstances and be able to boost sustainability in the management and protection of forest lands.

The greatness of interactive influence of plant and agroforestry systems components varies the features of plant species, planting density, and spatial planning and management of trees. Managing in a rural development project, must take into account to go along with the management functions. The functions of management are the directing principles on how to manage a certain program/project to be implemented particularly to rural development. The accomplishment of any programs/projects must endure a well plan implementation [21]. Swaminathan [22] disclosed that agroforestry is an applied, economical substitute for food

production as well as environmental protection, forest units of several nations are assimilating agroforestry programs with traditional afforestation.

**Table 2.** Respondents Perception towards Agroforestry Program.

Variable	Mean	Remarks
Concept	3.07	Agree
Policy	3.00	Agree
Components	2.94	Agree
Management Strategies	3.11	Agree

### 3.3 Effectiveness of Agroforestry Program

The effectiveness of agroforestry program in the study area provides improvement on the socio-economic condition of the beneficiaries and effective implementation of the agroforestry program and purposeful deliberation of the goals and objectives (Table 3). The findings revealed that the shorter the length of time they have been involved in agroforestry the higher the effectiveness of agroforestry program in terms of socio-economic upliftment of the respondents'. Extensive involvement in agroforestry significantly influence on the effectiveness of agroforestry in terms of respondents socio-economic upliftment and restoration of the degraded upland areas.

This also implies that the bigger the size of agroforestry farm the higher the influence of the agroforestry program in terms of restoration of the degraded upland areas. The favorable model of agroforestry they practiced the higher the influence on the effectiveness of agroforestry program in terms of restoration of the degraded upland areas.

Aquino [9] quoted that respondents recognized the objectives of the program and ultimately the income of the farmer. Agroforestry provides economic benefits to communities of smallholders in various ways. On a local level, these activities can provide jobs in the community in logging, trucking, building, as well as sawmill operations, handicrafts and carpentry shops. Tree nursery management and planting also provides jobs [23]. Accordingly, Pulhin et.al. [24] regrowth foliage is the primary growth of forest cover and through reforestation projects a farm was established by farmers and others through impulsive tree growing. Though forest cover estimation in the year 2003 was exact and it worsened the forestland of most nation's that needs reintegration for environmental and socioeconomic purposes. Bringing back of plant cover that includes a combination of environmental and profitable reforestation is a course of reforestation.[24].

Kalaba, et al. [25] uncovered that during rainy season over 90% of rural families' experience regular hunger. Related results reported for Malawi, Zambia and Mozambique [33]. This entails that most families endure food uncertainty an indication of high occurrence of rural poverty. Insufficient skills and training for production and marketing skills are typified by low literacy of rural families. Because of the effectiveness of agroforestry know-hows Franzel et al., [27]; Ajayi et al., [28] and the influence on the households and the environment Kwesiga et al., [29], existence efforts were made to increase the implementation of the technology and recover its suitability amongst probable farmers that benefit from the technology.

In contrast, Kalaba et al [30] indicate that studies conducted in the southern African region show that agroforestry gives farmers importance for its likely relation indicators to food security and households, but the prevalent interest of agroforestry in facing certain disagreements includes restriction of land cover, rights of the land they occupied, and intensive nature of knowledge to the technology. The adequacy of farmers and advanced technology implementation would be influenced by the degree to which attempts are made to settle these disputes [28].

Because of the multi-ingredient and years in which agroforestry research, alteration and implementation takes place [34], the adoption of agroforestry technologies is more complicated than those for annual crops and recent agricultural growth packages based on biochemical inputs [30]. Fusion of Zambia agroforestry adoption studies Ajayi et al., [34] revealed that agroforestry implementation is not a clear correlation of the empirical advantages of an agroforestry method, but is manipulated by several factors.

More than 480,000 smallholder farmers in southern Africa are interested in agroforestry, according to the World Agroforestry Centre (ICRAF) (ICRAF 2007). The consecutive adoption rate was imputed to the standards of implementation involved in nature. Conversely, Akinnifesi et al. [35] reported an increase in demand by farmers for the adoption of agroforestry. Similarly, as quoted by Reyes, Beets [36] also showed that agroforestry is recommended for mountainous land in the tropics and subtropics because it always has two functions: development (fuelwood, timber, fodder and other non-wood forest products) and services (increase in soil fertility, control of erosion).

On the other hand, the findings of the study by Regmi [37] upholds that most of the respondents agreed that agro-forestry does improved soil fertility, intensified farm income and lessened the possibilities of crop breakdown. The respondents strongly agreed that agroforestry system upheld/developed close acclimatization of the forest. It is noteworthy that these families have practiced developed vegetation and observed increased function of farm trees to meet their want of fodder and firewood.

Furthermore to increased agronomic and wood crop production, agro-forestry have an effect on the income level of the participating shifting cultivator through; increased hired labor income and increased income from nonfarm activities for instance cottage industries, orchid selling, etc. A noticeable increased income of the shifting cultivator, it may then be predictable by project co-operators to weaken the varied income gap between upland and lowland farmers.

**Table 3.** Effectiveness of Agroforestry Program

Variable	Mean	Remarks
Socio-economic Upliftment	3.15	Effective
Restoration of the Degraded Upland Areas	3.39	Effective

### 3.4 Impact of Agroforestry Program

Brief findings on impact of agroforestry program showed in Table 4. The results of the study revealed that soil and water conservation management in the upland areas had a complete intervention and has a massive information campaign with the upland dwellers. This implies that the complete intervention and massive information provide awareness to the respondents and

effective outcomes of the program. The findings also imply that the beneficiaries gained the advantages of the program. The beneficiaries had improvement in terms of increase of incomes considering that they gain employment with the project. The results revealed that the enforcement to the protection of the remaining natural resources in Region XII had been strengthened. This implies further that the upland dwellers are prohibited in cutting forest trees particularly endangered species. In addition, upland communities are encouraged in attending orientation seminars, thus they are aware the possibilities if they encroach the laws and policies of the program. The results indicate that conservation of endangered species within the areas was strengthened by the upland dwellers. This entails that beneficiaries are conscious with regards to conservation of remaining natural resources in the area. The degraded upland areas is now regenerated and bring back the close canopy of the forest. Indeed, it is necessary that there must have a close supervision and monitoring from the concerned agencies and community people for those individuals who wanted to destroy the regenerated forested areas.

Barr, et.al. [23] pointed out that forest regeneration is a vital component of any viable Forest Management Plan. Rebugio [37] stressed that CBFM takes place in the Philippines as a result of myriad driving factors, including 'land and environmental destruction' and unstable access to and benefits from forest resources. Indeed, Bungayon [38] further stressed out that agroforestry is one of the soil and water technologies that were moved to farmer participants in the CBFMP as a means of developing their economic conditions while restoring the degraded uplands. It permits farmers to plant agricultural crops (economic livelihood) with tree crops (reforestation aspect). Agroforestry has been used as a main approach to enjoin forest dwellers to become cohorts in regenerating degraded forestlands.

On the other hand, Akinnifesi et al. [33] stated that the effect of the adoption of agroforestry on farmers' livelihoods in Malawi, Mozambique and Zambia includes increased crop production, income, savings causing wealth change and soil improvement. It uncovered by Tropentag [39] that choice of proper agroforestry technologies for erosion control in particular condition is an essential factor in the design of such projects. Increased waste production and humus development improve soil structure and nutrient availability for plants. In effect, the absence of information about degraded upland soils have also added to the collapse of the major government effort at enormous forest reintegration in the former [40].

Indeed, Lasco and Pulhin [41] suggested that the initiatives of the CBFM could also contribute to the conservation of water in the Philippine watershed areas through technological participation that encourages the incorporation of trees into farms and landscapes. They also noted that a number of studies have shown that, compared to monoculture cash crop farming, agroforestry systems, tree homesteads and forested lands usually have reduced water surface overflow. Young [42] as cited by Kassie, [42] pointed out that soil and water conservation use of agroforestry is the combined effect between conservation and production which is crucial for sustainable land use.

Schroth et al. [43] accentuate that sustainable agroforestry practices allow the use of devastated areas over a longer period of time than substitute land use methods, such as pure annual cropping and tree crop monocultures. The adoption of agroforestry may diminish the need to deforest new upland areas. However, it should be emphasized that sustainability is not an inherent characteristic of agroforestry practices. It is important to replenish the trees removed during harvest to make sure a long-term source of timber, but it is also important to preserve and enhance the structural range and ecosystem function of the forest [23]. Forest degradation and

reduction of forest area impact negatively on cultural aspects, ecological services and socio-economic conditions [44].

Devastated and declining forest areas require to be rehabilitated to recover lost benefits. On the other hand, Asio & Milan [45] pointed out that, reforestation is the conventional and most extensively disseminated approach to restoring degraded uplands areas. It is now commonly known that the use of exotic species in reforestation projects does not recover biodiversity and site quality [45]. Utilizing of indigenous tree species particularly the hardwood Dipterocarp species that are available locally in assortment with some food crops is an alternative approach for reforestation. Such approach has been verified effectively in the restoration of degraded lands in various sites in Leyte [46].

Similar studies as cited by Glover, et.al. [3] was found that the mixing of trees and crops in spatial or temporal systems promotes the improvement of food and nutritional protection and the alleviation of environmental degradation, providing a sustainable replacement for the development of monoculture production. The success of agroforestry is likely to certainly affect uplands political strength in the long run. An essential factor to consider, however, is the ability of government institutions to deal with the needs of agroforestry areas which have intense organizations and large mass bases.

**Table 4.** Impact of Agroforestry Program

<b>Variable</b>	<b>Mean</b>	<b>Remarks</b>
Soil and Water Conservation	2.90	Effective
Increased Income	3.05	Effective
Protection of the Remaining Natural Resources	3.31	Very Effective
Conservation of the Remaining Natural Resources	3.27	Effective
Regeneration of the Degraded Upland Areas	3.51	Very Effective

#### 4. Conclusions

The findings of this study revealed that the respondents' perception of agroforestry program in terms of concept, policy, components and management strategies was agreed. The respondents' are well oriented and aware of the program effectiveness based on the first stage of the program implementation. The effectiveness of agroforestry program in terms of respondents' socio-economic upliftment was effective. However, the effectiveness of agroforestry program in terms of restoration of the degraded upland areas was very effective. Based on the results, the implementation of agroforestry program is valuable to the degraded upland areas as well as development of project beneficiaries' socio-economic condition. The impact of agroforestry program in soil and water conservation, increased income, and conservation of remaining natural resources was effective. Protection of remaining natural resources and regeneration of the

degraded upland areas was very effective. The impact of agroforestry program was vital. The effectiveness of the program can be observed by the changed of the previous problems felt by the upland dwellers resulted to greater improvement. Therefore, agroforestry is significantly influence in the improvement of upland dwellers livelihoods. Hence, the present study recommends a convincing demand to strengthen promotion of agroforestry and full support to policy makers and concerned agencies. A similar study may be conducted in other areas of agroforestry projects to include other variables that also best describe its implementation.

## References

- [1] Agroforestry Project Planning Management Training Manual, (1994).
- [2] Beetz, A. Agroforestry Overview, Appropriate Technology Transfer for Rural Areas (ATTRA). National Center for Appropriate Technology (NCAT). Arkansas, California, USA. Pp1, (2002).
- [3] Glover, E. K. et.al.. Analysis of Socio-Economic Conditions Influencing Adoption of Agroforestry Practices. *International Journal of Agriculture and Forestry*, 3(4): 178-184, (2013).
- [4] Marohn, C.A., et.al.. Assessment of Soil Microbial Activity Measurements to Distinguish Land Uses in Leyte, Philippines. University of Hohenheim, Institute of Plant Production and Agroecology in the Tropics and Subtropics, 70593 Stuttgart, Germany; Martin Luther University Halle-Wittenberg, Institute for Soil Science and Plant Nutrition, 06099 Halle/Saale, Germany, (2005).
- [5] Uisso, A.J. and Masao, C.A. Women Participation in Agroforestry Farming System: A Strategy Towards Poverty Reduction in Morogoro, Rural District, Tanzania. Ethiopian Institute of Resource Assessment (IRA) - University of Dar es Salaam, P.O. Box 35097, Dar es Salaam, Tanzania 2 Tanzania Forestry Research Institute (TAFORI), P.O. Box 1854, Morogoro, Tanzania. *Journal of Environmental Studies & Management* 9(5): 613 – 624, 2016. ISSN:1998-0507, (2016).
- [6] Upland Development Program, (1998).
- [7] DENR Technology Transfer Series, (1991).
- [8] Huxley, P.. *Tropical Agroforestry*. Blackwell Sciences Ltd.. MA, USA. Pp. 3-50, 1999.
- [9] Aquino, S.A.. Impact of the Plant Now, Pay Later (PNP) Program on the Upliftment of Upland Farmers in the Province of North Cotabato. Ph.D. Dissertation. University of Southern Mindanao, Kabacan, Cotabato, (2008).
- [10] Balanag, S.U.. The Impact of the Special Area for Agricultural Development (SAAD) Program as a Strategy for Rural Development. Unpublished Dissertation. University of Southern Mindanao, Kabacan, Cotabato, (2006).
- [11] Balanag, S.U.. Factors Affecting the Adoption of Hybrid Rice Technology in Kabacan, Cotabato. Unpublished Thesis. University of Southern Mindanao, Kabacan, Cotabato, (2004).
- [12] Pinguiman, T.D.. The Social and Economic Benefits of the Implementation of DA-

- HVCC Program in ARMM as Perceived by Implementers and Beneficiaries. Unpublished Dissertation. University of Southern Mindanao, Kabacan, Cotabato. Pp. 11-47, (2008).
- [13]Daval, E.I.. Socio-economic Contributions of Mindanao Rural Development Program-Community Fund for Agricultural Development-Adaptable Program Loan 2 Livelihood Projects to the Upliftment of its Beneficiaries in Cotabato Province. Ph.D. Dissertation. University of Southern Mindanao, Kabacan, Cotabato. Pp. 7-14, (2012).
- [14]Pendaliday, A.M.. Assessment on the Sustainability Management of Ligawasan Wetland Biodiversity Reserve in the Province of Maguindanao. Unpublished Dissertation. University of Southern Mindanao, Kabacan, Cotabato, (2014).
- [15]Hadjinasser, A.M.. Effectiveness of Management Strategies and Program Implementation of Sarangani Bay Protected Seascape in Region XII. Unpublished Dissertation. University of Southern Mindanao, Kabacan, Cotabato, (2014).
- [16]Sharmin, Arifa and Rabbi, Shahriar Ashik.. Assessment of Farmers' Perception of Agroforestry Practices in Jhenaidah District of Bangladesh. Forestry and Wood Technology Discipline, Khulna University, Khulna -9208, Bangladesh. Journal of Agriculture and Ecology Research International 6(4): 1-10, 2016; (2016).
- [17]Kittur B, Bargali S.S. Perspectives of agroforestry: Present and future facets. Journal of Progressive Agriculture.; 4(2):91-94, (2013).
- [18]Kofi, A.F. et.al.. The Potential and Constraints of Agroforestry in Forest Fringe Communities of the Asunafo District Ghana. University of Amsterdam and supervised by lecturers of the Institute of Renewable Natural Resources and TBI-Ghana, (2003).
- [19]Motis, T.. An Echo Technical Note. Agroforestry Principles. North Fort Myers, USA, (2007).
- [20]Guevarra, C.A.. People's Participation in Community-Based Forest Management Program (CBFMP) in Barangay Don Panaca, Magpet, North Cotabato. Unpublished Dissertation. University of Southern Mindanao, Kabacan, Cotabato, (2003).
- [21]Sandoval, A.C.Y.. Planning and Administering Extension Programs. A Doctorate Study Guide. VSU Open University, Visayas State University, ViSCA, Baybay City, Leyte, (2001).
- [22]Swaminathan, M.S. The promise of agroforestry for ecological and nutritional security. International Rice Research Institute (IRRI). Manila, Philippines. International Union for Conservation of Nature and Natural Resources (IUCN) Gland;, Switzerland.
- [23]Barr, R. et.al.. Sustainable Community Forest Management: A Practical Guide to FSC Group Certification for Smallholder Agroforests. University Book Store Press. Printed in the United States of America, (2012).
- [24]Pulhin, J.M. et.al.. One Century of Forest Rehabilitation in the Philippines: Approaches, Outcomes and Lessons. Bogor, Indonesia: Center for International Forestry Research, 5-14, (2006).
- [25]Kalaba, F.K, et.al.. The role of indigenous fruit trees in rural livelihoods: the case of communities around the Mwekera area, Copperbelt province, Zambia. International

- Society for Horticultural Science. Leuven, Belgium, (2009).
- [26] Akinnifesi, et.al.. Domesticating priority miombo indigenous fruit trees as a promising livelihood option for smallholder farmers in southern Africa. *Acta Horticulturae* 632: 15–30, (2004).
- [27] Franzel, S. et.al.. Assessing the adoption potential of improved fallows in eastern Zambia. In: Franzel S, Scherr SJ (eds.) *Trees on the Farm: Assessing the Adoption Potential of Agroforestry Practices in Africa*. CAB International, Wallingford, UK, pp 37-64, (2002).
- [28] Ajayi , O.C., et.al.. Adoption of Renewable Soil Fertility Replenishment Technologies in Southern African Region: Lessons Learnt and the Way Forward. *Natural Resource Forum* 31 (4): 306-317, (2007).
- [29] Kwesiga, et.al.. Successes in African Agriculture: Case Study of Improved Fallows in Eastern Zambia. Environment and Production Technology Division (EPTD) Discussion Paper 130, IFPRI, Washington DC, (2005).
- [30] Kalaba, K.F. et.al.. Contribution of agroforestry to biodiversity and livelihoods improvement in rural communities of Southern African regions. World Agroforestry Centre (ICRAF), P. O. Box 30798, Lilongwe 03, Malawi. Springer-Verlag Berlin Heidelberg, (2010).
- [31] Mercer, D.E., 2004 Adoption of agroforestry innovations in the tropics: A review Southern Resecmh Stntion, USDA Forest Service, 3041 Cornwallis Roud, PO. Box 12254 Resenrch Triangle Park, NC 27709; USA; (2004).
- [32] Ajayi, O.C, et.al.. Adoption of improved fallow soil fertility management practices in Zambia: synthesis and emerging issues. *Agroforestry systems* 59 (3): 317-326, (2003).
- [33] Akinnifesi, F.K., et.al.. Contributions of agroforestry research and development to livelihood of smallholder farmers in Southern Africa: 2. Fruit, medicinal, fuelwood and fodder tree systems. *Agricultural Journal* 3 (1): 76-88, (2008).
- [34] Beets, W.C. 1990. Raising and Sustaining Productivity of Smallholder FarmingSystems in the Tropics. 738 p.
- [35] Reyes, Terja. Agroforestry System for Sustainable Livelihoods and Improved Land Management in the East Usambra Mountains, Tanzania. Academic Dissertation. Faculty of the University of Helsinki, Tanzania, (2008).
- [36] Regmi, B. N.. Contribution of agroforestry for rural livelihoods: A case of Dhading District, Nepal. Paper presented at The International Conference on Rural Livelihoods, Forests and Biodiversity 19-23 May 2003, Bonn, Germany. International and Rural Development Department, The University of Reading, UK, (2003).
- [37] Rebugio, L.L.. Promoting Sustainable Forest Management through Community Forestry in the Philippines. IUFRO-WFSE, (2010).
- [38] Bungayon, L.A. 2003. Socioeconomic and Environmental Benefits of Agroforestry Practices in a Community-based Forest Management Site in the Philippines. Paper Presented at The International Conference on Rural Livelihoods, Forests and Biodiversity 19-23 May 2003, Bonn, Germany, (2003).

- [39] Tropentag, Stuttgart-Hohenheim, October 11-13, 2005 Conference on International Agricultural Research for Development, (2005).
- [40] Asio, V.B. et.al.. A review of soil degradation in the Philippines. Department of Agronomy and Soil Science, Visayas State University, Baybay City, Leyte 6521-A, Philippines. *Annals of Tropical Research* 31[2]:69-94, (2009).
- [41] Lasco, R.D. and Pulhin, J.M.. Environmental Impacts of Community-based Forest Management in the Philippines. World Agroforestry Centre (ICRAF) Philippines, College of Forestry and Natural Resources, University of the Philippines, College, Laguna, Philippines. *Int. J. Environment and Sustainable Development*, Vol. 5, No. 1, (2006).
- [42] Kassie, G. W.. Agroforestry and land productivity: Evidence from rural Ethiopia. *Food Science and Technology Research Article. Cogent Food and Agriculture*, (2016).
- [43] Schroth, G. et.al.. *Agroforestry and Biodiversity Conservation in Tropical Landscapes*. Washington • Covelo • London Copyright Island Press 1718 Connecticut Avenue, N.W., Suite 300, Washington, DC, (2004).
- [44] Kobayashi, S.. An overview of techniques for the rehabilitation of degraded tropical forests and biodiversity conservation. *Current Science*, 93: 59-66. Li, X. & Wilson, S.D. 1998. Facilitation among woody plants establishing in an old field. *Ecology*, 79: 2964-2705, (2007).
- [45] Asio V.B. and Milan P.P.. Improvement of soil quality in degraded lands through Rainforestation farming. Paper presented at the International Symposium on Sustaining Food Security and Managing Natural Resources in Southeast Asia: Challenges for 21st Century, Chiang Mai, Thailand, (2002).
- [46] Asio, V.B. and Bande, M.J.M.. Innovative Community-Led Sustainable Forest Resources Conservation and Management in Baybay, Leyte, the Philippines. *Annals of Tropical Research*. Leyte State University, Baybay, Leyte, Philippines, (2002).