Contributions of Community-Based Resource Management Project as a Management Strategy for Upland Community Development and Forest Restoration in Usmad, Argao, Cebu, Philippines

Archiebald Baltazar B. Malaki and Ricardo T. Bagarinao

Abstract— The Community-based Resource Management Project (CBRMP) in Argao, Cebu was evaluated for its effectiveness in empowering the recipient community and improving the status of the forest resources in the study site. A survey was conducted among the project beneficiaries in Brgy. Usmad from January to March 2006 and a follow up study was conducted on October 2016 particularly on the tree plantation established by the People's Organization (PO) on the community. The study aimed to determine the impacts of the project on beneficiaries household income, level of awareness on the importance of forest resources, their participation in various project activities, condition of the forest and other natural resources and the various problems in implementing the projects and their potential solutions as identified by the respondents. Two groups of respondents were involved in the survey: a) project beneficiaries; and b) project implementers. *In situ* measurement on the survival and growth of reforestation species and fruit trees in tree plantation and agroforestry farm were also conducted. Results of the study show that the respondents were moderately empowered economically, socially and intellectually but highly empowered politically. Respondents' average monthly household income has increased significantly ($p<0.00$) by 92% from their income without the project. The mean survival rate in tree plantation obtained from *in situ* assessment is significantly difference ($p<0.05$) with what is obtained from the interview. However, the survival rate of mango and pomelo based from *in situ* is significantly different from the survival acquired from the interview with ($p<0.01$). The two very serious problems identified by the respondents in the area are the scarcity of water and low soil fertility resulting to poor growth of planted seedlings and low farm productivity. Observance of the planting season and proper choice of species to be planted are the two very effective solutions they have identified.

Index Terms— Community-Based Resource Management, Upland Community Development, Community Empowerment, Forest Restoration

1 INTRODUCTION

THE dilemma of protecting the forests for the interests of the majority, particularly the lowlanders on one hand, and accommodating the interests of the forest occupants on the other, has led policy makers to reconsider the kaingineros. The forest policy, concerning the kaingineros, have been modified by integrating them into an overall management scheme for the forestland they occupy [16]. Thus, several management strategies with community involvement were developed. Social Forestry is one of those strategies that were developed to address the issue of community partnership in resource management. The concept assumed that people have symbiotic relationship with other elements of the environment. It viewed that people and tree can co-exist in a way that one would be able to sustain the other and vice versa [1].

In 1995, a similar policy otherwise known as Community-Based Forest/Resource Management (CBFM/CBRM) Law was passed under Executive Order No. 263. This law was recognized as the national strategy to achieve sustainable forestry and social justice in the country. It espouses the idea of "people first so that sustainable forestry may follow." It believes that only when communities in and near forestlands commit themselves and undertake sustainable management will the remaining natural forests be protected and managed and degraded forests be rehabilitated. This scheme calls for the integration of all watershed management plans into the overall land use and development plans of the respective Local Government Units (Austria & Wagan, 1997).

The Municipality of Argao is a growth point in the second Congressional District of Cebu Province. In 1989-1992, it piloted a Community-Based Resource Management Project (CBRMP) supported by the provincial government and the Central Visayas Regional Project-I (CVRP-I). By the lessons learned from CVRP-I and other community projects, the municipality is now more focused to address rehabilitation and management issues of its natural resources. Thus, it embarked again on a CBRM project known as the Argao Watershed and Coastal Resource Rehabilitation and Management Project (AWCRRMP).

AWCRRMP is designed to gradually reduce rural poverty and environmental degradation through the support of locally generated and implemented natural resource management strategies. The physical, socio-economic, and environmental assessment of these areas indicated a need to rehabilitate and manage them in a sustainable manner for potential development. This development may significantly improve the household's economic status within these areas.

The cost associated with this project warrants an evaluation of its effectivity as a strategy for upland and coastal development. Also, the paucity of information on how CBRM strategy works in the study site requires an endeavor that will pinpoint the specific contributions and weaknesses of the project. The evaluation is expected to show whether or not the project is just a mechanism for *"burden transfer"*, i.e. transferring the burden in managing the resources to the community from the agencies responsible for it.

There were factors have been pointed out by some literatures and authors affecting the implementation of the many CBRM Projects which eventually leads to failure. The study of Einsiedel (1968) as cited by Campilan (1985) and Closa (1987) on community development projects in Batangas suggested that the lack of information among the people about the value of the project, lack of community involvement and the lack of coordination of the various services in the area were the causes of the failure of the projects implementation. The constraints of the previous implementation of Integrated Social Forestry Program (ISFP) in 1982 included the lack of well trained and dedicated personnel, neglected ISF principles of people participation in all phases of project implementation, inadequate marketing support, and peace and order situation [15].

However, inputs like the natural, technical, financial and educational resources are required for implementing a CBRM strategy. These inputs must be congruent with the needs, programs and capacity of the communities. Needless to say, if the required inputs are not available, or if the inputs are available but do not somehow match the needs, programs and capacities in the area, then the CBRM program will most likely fail. In situations where the external change agent is a government entity, a bureaucratic reorientation is needed similar to the participatory irrigation project implemented by the National Irrigation Administration (NIA) may be necessary to bring about program success [14]. The tendency to plan and implement without knowledge of vital relationships between human and environmental resources eventually leads to error. While the problem of social forestry's slow acceptance is emanating from the neglect of sociologically oriented factors in the phase of the projects [3].

Hence, the study was conducted to determine the following: economic benefits coming from the project; levels of respondents' participation in the project implementation; farm income of the respondents with or without the project; change in the status of the forest resources in the sampling site due to project interventions; and problems encountered during project implementation and their potential solutions.

2 METHODOLOGY

2.1 Study Site. The Municipality of Argao is a growth point of the second congressional district of the Cebu Province. It is located about 66.9 km southeast of Cebu City. It is bounded in the north by the Municipality of Sibonga, in the south by the Municipality of Dalaguete, in the east by Bohol strait and in the west by the Municipalities of Dumanhug, Ronda, Alcantara and Badian. It is geographically located between the north latitudes of 9°50′, and 10°00′ and east longitudes of 123°28′ and 123°37′.

The CBRM Sub-project interventions are situated in fourteen (14) barangays of the municipality, four of which are located in upland areas and 10 in coastal areas. The study covered only one (i.e. Usmad) of the four upland barangays for the following considerations including it served as the pilot area for the CBRM Project during the incipient stage of project implementation in 2005. In addition, it is also very accessible and near the school (CSCST-AIFC now CTU-Argao Campus) hence the cost of transportation is lower compared to the three other project sites. Considering that the study site is also closer to the campus this can facilitate easy monitoring, collection of data and reassessment if the need arises. Lastly, since there is no funding allocation from the Civil Service Commission the government agency responsible for granting of scholarship to the proponent only the tuition fee of school where the scholar is currently enrolled for his masteral degree so it is but proper to choose study site that would incur him/her the least expense in terms time, money, and effort respectively. The barangay had a total population of 1,009 as of 2000.

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2.2. Primary Data Collection

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2.2.1 Key Informant Interview. Key informant interview was conducted from February 15 –17, 2006 by using a pre-tested interview schedule . The key informants interviewed included some members of the Project Technical Working Group or the Project Steering Committee headed by the Municipal Mayor. Seven members of the project technical working group were interviewed. The selection was based on knowledge about the project, since they were the direct project implementers. They were in the position to disclose information regarding the project.

2.2.2 Household Interview with beneficiaries. The household interview was conducted from February 6 to 17, 2006 by using an interview schedule (Appendix A). Respondents included the entire beneficiaries of the CBRM project. Of the 48 beneficiaries, only 30 were interviewed. Data on the change in income, attendance to meetings, trainings, etc., management and/or forest restoration activities, income sources, frequency of attendance to project activities and performance of their assigned task, level of community participation, impact of the project to the natural resources in the area, level of awareness of the beneficiaries on the importance of the resources in the area, problems encountered and the possible solutions to the said problems, among others were gathered.

2.2.3 Field Assessment on the Project's Impacts on the Condition of the Forest and Other Resources in the Study Site. To determine the impact of the project on the restoration of the project site, data on the total area (in has.) being reforested and established as agroforestry farm, the type of species planted, the survival rate of planted species, growth rate of the surviving species, and the environmental factors affecting their growth and survival rate were collected except for the reforested area. All data, were gathered through in situ measurements and interview.

The survival rate was calculated by using the following formula:

Eq. 1

$$\% \text{ Survival} = \frac{\text{total no. of seedlings counted alive} \times 100}{\text{total no. of seedlings planted per unit area}}$$

Actual counting was conducted from February 15 to 17, 2006 at the high and mid-elevations of the tree plantation in the study site. The total area assessed was about 1.25 ha with a total of 1,308 planted seedlings. About 0.75 ha. is located in high elevation with 630 seedlings and 0.5 ha. at mid-elevation with 678 seedlings. The diameter and height of the seedlings were also measured to determine the status of the surviving seedlings.

2.3. Survey Instrument

Part 1. Community Empowerment

1.1. Economic Empowerment. The following data were gathered: household income; types or forms of benefits; how these benefits were given to the respondents; length of time they enjoy the benefits; effects on their total income.

1.2 Political Empowerment. The data gathered were: the key players in the decision-making process, the process, the total number of the beneficiaries involved in the process, the final decision-makers, and the selection of players in decision-making process.

1.3 Social and Intellectual Empowerment. The data gathered were: the pieces of information that are introduced to the community, and the way they were informed on their role/s in the management and restoration of the forest resources, and how they performed these roles.

Part 2 Level of Community Participation. The respondents were asked regarding their participation in the implementation of the project, the frequency of their participation, and the performance of their roles in the management and restoration of forest resources.

Part 3 Problems encountered during project implementation and their potential solutions. This section focused on eliciting information about the problems encountered during the implementation of the project and their potential solutions as identified both by the implementers and the community.

2.4. Secondary Data Collection. Secondary data were also collected through the study. They were sourced out from the different government and non-government agencies, such as Argao CBRM office, Regional Office of the Department of Environment Natural Resources (DENR), PCEEM Office in Cebu City and Mag-uugmad Foundation Office. Local and international publications were reviewed.

2.5. Data analysis. The data generated from the household survey, key informant interview and *in situ* assessments were analyzed by using mean, frequency distribution, percentages, simple t-test and correlation analysis. A Statistical Package for Social Sciences (SPSS) software program, version 12 was used.

3 Results and Discussion

3.1 Community Empowerment. Table 1 shows the overall rating of the various components of community empowerment. In general the community has been empowered economically, politically, socially and intellectually.

3.2 Economic Empowerment. Based on the results of the

survey, the respondents were moderately empowered economically by the project with a quantitative score of 42%.

3.2.1 Change in Household Monthly Income. A comparison of the respondents' average monthly household income with and without the project is shown in figure 1. The average monthly income of the respondents without the project is about PhP1, 600.00/month (PRA 1999).

Table 1. The overall rating of the various components of community empowerment.

Components of the Community Empowerment	Overall Rating
Economic empowerment	42%
Political empowerment	78%
Social and intellectual empowerment	57%

Legend: 1 – 33 – 1.0 - low
34 – 66 – 2.0 – moderate
67 –100 - 3.0 – excellent

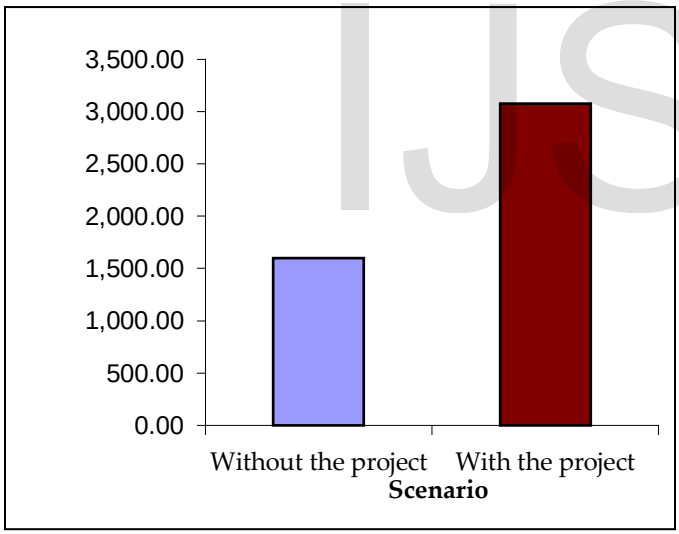

Figure 1. Comparison of the average monthly household income of respondents without the project.

This income comes from on- and off-farm sources. With the project, the average monthly household income of the respondents has increased by approximately 92% or about PhP3,075.00/month. This increase is significantly different ($p<0.00$) from their income without the project. The respondents did not find such change in their income as highly significant despite its magnitude of increase. Based on reassessment conducted on October 13, 2016 majority of the respondents interviewed (n-15) mostly PO active members could no longer figured out whether or not their income could be attributed to the benefits extended from the project in the sense that the project had no more funding for this particular purpose. However, for the officers especially for the BOD they received a very small amount from their monthly honoraria of PhP 200.00 wherein the amount PhP 20.00 is deducted to form part of their share capital in the cooperative. The funding for the said BOD honoria was derived from their income at the PO managed public comport room at the Argao public market. The management of the Argao Public Market Comport Room was awarded to the organization by virtue of a bidding process (pers. comm. with the PO president and one of the respondents).

3.2.2 Economic Benefits from the Project. The change of the household income of the respondents was attributed to the various forms of benefits that they received from the project. Table 2 shows these benefits and their respective economic value. Estimated value of PhP2,561.66 for adapting these technologies.

Both organic and inorganic fertilizers the value of which was estimated to be PhP2, 018.31 follow this benefit. They also received some remuneration for their labor in preparing the land for tree plantation (average value = PhP1,110.17/ha) and agroforestry farm (average value = PhP773.80/ha). In addition, they were also paid for every seedling they planted in these areas. Both key informants and beneficiary respondents differ in their views as to the length of time that the beneficiaries can enjoy these benefits. About 63% of the respondents and all key informants believed these benefits exist only within the lifespan of the project.

Table 2. Forms of benefits received by project beneficiaries

Types or Forms of Benefits Received	Mean (Php)
1. Fertilizers (Organic/Commercial)	2,018.31
2. Vegetable Seeds	193.09
3. Paid labor (tree plantation)	415.33
4. Provision of fruit trees (pomelo,mango)	555.35
5. Land preparation (Php 823.80/ha)	1,110.17
6. Land preparation (Php 773.80/ha)	892.62
7. Planting of hedgrows; - napier – Php 2.00/linear meter - cacawate – Php 1.00/linear meter	2,561.66
8. Jackfruit planted (agroforestry) - Php 9.75/seedling planted	341.67
9. Avocado planted (agroforestry) - Php 9.75/seedling planted	231.51
Total benefits	**5,900.00**

Although an estimated 33% believed that they could still enjoy some of the benefits even after project implementation. They are looking forward to enjoying the benefits from tree plantation and agroforestry farms. Based from the validation and reassessment (October 13, 2006) through interview with the 15 active PO members as well the PO president they are one saying that they are still receiving some benefits from project especially the active members this is coming from the Department of Agriculture (DA) and these include 50 cacao seedlings for every active member to be planted in their own area and this will monitored soon after the seedlings were already planted, few active coop members were recipient of the goat dispersal project of DA, four sacks of organic fertilizers (chicken dung) were provided to active coop members and two sacks of the said fertilizer were also provided to inactive members. The cooperative was also extending loan assistance to PO members and Non-PO members the largest amount was PhP 10,000.00, however, at present the lending business of the cooperative was no longer in operation because bankruptcy due to majority were not paying their loan obligation. The coop lending business was in full force of operation since 2005 up to 2010 only in the span of five years their asset ranging up to PhP 600,000.00 but completely shut down from 2011 up to present due to above mentioned issues. Few were still maintaining their activities relative to cow dispersal.

3.3 Political Empowerment. The results of the survey indicated that all respondents were given the opportunity to attend and participate in project meetings and decision-making activities. These beneficiaries were highly empowered politically with an over-all rating of 78%. It should be emphasized, however, that their involvement depended on their knowledge regarding the project, the position they are holding, and their willingness to carry out the plans and decisions related to the project. However, there seems to be some variations in the answers of the respondents as to who are involved in making a decision. According to the recently concluded rapid assessment conducted on the above mentioned date though the PO members were highly empowered in this category during the conduct of the first interview in 2006, however, the factors affecting their willingness to participate in the activities mentioned above had manifested like for instance the position they are holding because at present more than haft of its PO members were already inactive (48 – original strength of the membership) now there were only about 15 active members and most of them were officers of the cooperative and PO members.

3.4 Social and intellectual empowerment. As with the other aspects of community empowerment, the respondents showed a moderate rating (57%) in social and intellectual empowerment. This result implies that their intellect and sociability are moderately empowered by the project. The results of the survey showed that the respondents' technical capabilities associated with tree plantation and agroforestry farm development were enhanced through the project. These trainings include pre-membership seminar for cooperative, community action plan on the making of a 5-year development plan, leadership training, 5-year sustainability-plan, and 25-year development plan. This result implies that the project has contributed to the enhancement of the respondents' capability to formulate a development plan though there is still a need for further training. Based from the interview with respondents during the conduct of the reassessment in October 13, 2016 they have said that their technical capabilities in tree plantation and agroforestry farm development were really enhanced because of the project, though they were moderately empowered along this category based from the first assessment in 2006. However, the results obtained during the first survey and the reassessment was consistent especially in the aspect of uplifting their capabilities in those two major activities of the project namely tree plantation establishment and agroforestry enterprise development. On the other hand, in the aspect of empowering the members in terms of organizational development it seemed that this endeavor is a bit a failure based from the revalidation conducted recently. The manifestations seemed evident due to degenerations of its PO memberships from the strength of 48 it went down to 15 only active members are still sustainably clinging to the organization. However, majority of the respondents have said that the project is really beneficial to them though in some ways the organization is not certainly attaining its expectations.

COMMUNITY PARTICIPATION IN PROJECT ACTIVITIES

1 Project Activities. The activities of the project to which the respondents may participate in are divided into management and restoration/rehabilitation activities. As the name suggests, these activities are necessary to restore and/or rehabilitate the forest resources in the project site. Specifically, these were the activities needed to establish and manage the reforestation components (i.e. tree plantation and agroforestry) of the project. Table 3 shows a checklist of the various management and restoration activities in tree plantation and agroforestry farm as identified by both respondents and key informants. As can be seen, there are some differences in the activities.

2 Level of Community Participation and Performance of the Activities. The computed rating for community participation reveals that the respondents are moderately participating in the project activities. This can be attributed to the non-performance of some respondents on some restoration and management activities.

In addition, barely more than half (57%) of the respondents perform replanting. This activity is done to replace those dead planted seedlings. Moreover, these respondents conducted this activity only twice a year. But more respondents are performing the other activities in tree plantation and agroforestry sites. About 77% of them have applied fertilizers around the base of the plant twice a year; 73% have constructed fireline at about 7-10 meters around the tree plantation site; 67% have done liberation cutting to allow the young stand not to pass the sapling stage to avoid competition with older or overtopping trees and vines;

Table 3. Management and restoration activities in tree plantation and agroforestry.

Activity	Reforestation Site	
Management	Tree Plantation	Agroforestry
Ring weeding and cultivation	X	X
	X	
Replanting	X	X
Fertilizer application	X	
Fireline/firebreak construction	X	
	X	
Liberation cutting		X
Pest and diseases detection		X
		X
Soil management		X
Integrated pest management		
Crop protection		
Brushing and pruning		
Restoration/Rehabilitation		
Seedling production	X	
Site clearing/land preparation	X	X
	X	
Staking	X	X
Hauling	X	X
Hole digging	X	X
Outplanting		X
Lay-outing		X
Hedgerow establishment		

70% performed pest and disease detection activities in tree plantation; 63% have done crop protection and brushing and pruning in agroforestry site; and 83-87% participated in the preparation of the site for tree plantation and agroforestry establishment. In addition, about 77% of the respondents have conducted hedgerow establishment after lay-outing the area for agroforestry farm. Hedgerow establishment involves the use of cacawate *Gliricidia sepium* Jacq. or napier *Pennisetum purpureum* Sch. grass along contour lines of the site. Management of hedgerows is done for two times in a year. Based from the results of the recently conducted reassessment through interviews with key informants and the remaining active members of the PO and *in situ* measurement and field observation, it showed that there are still activities that are sustainably performed especially the active members of the PO including resource protection and maintenance particularly monitoring of illegal tree cutters and poachers in the established tree plantation, routine site clearing and preparations in their respective agroforestry farm, maintenance activities through tree pruning especially those mahogany trees planted within the farm, organic fertilizer application and planting of corn as their main agricultural crop.

3 Community Empowerment and Level of Participation. Table 4 shows the results of the correlation analysis between community empowerment and level of participation.

Table 4. Correlation analysis between community empowerment and level of participation.

	Level of Participation	
	r- value	p- value
1. Economic	0.207	0.272
2. Political	0.576	0.001**
3. Social and intellectual	0.367	0.046*
4. Community empowerment	0.544	0.002**

A significant relationship exists between these two factors (p = 0.002) indicating that empowering the community is vital in enhancing their participation in restoring and managing the natural resources in a community-based resource management project site. In addition, the results confirm the findings of some CBRM evaluation studies.

The level of participation is significantly correlated with political empowerment as well as socio-intellectual empowerment with p values of 0.001 and 0.046 at 0.05 levels of significance, respectively but this is not significantly correlated with economic empowerment (p = 0.272). This indicates that a community that is given an opportunity to be involved in every planning and decision-making activity is more likely to actively participate in the project; more so, if they are informed and prepared to participate in the various project activities.

4 STATUS OF THE FOREST RESOURCES IN THE PROJECT SITE. The project had targeted an estimated area for reforestation of about 34.06 hectares (has) in the site [5]. Again, this area is divided into two reforestation sites: tree plantation and agroforestry.

4.1. Tree Plantation Established. Based on the data from the CBRM Office in Argao, around 12 has in the project site are to be reforested. The interview, however, reveals that the project was able to reforest about 99% of this target land area. But secondary information [5] pointed out that all 12 has for reforestation are actually fully planted with trees. The discrepancy may be due to the fact that respondents simply gave an estimated value for this factor. The area was mostly planted with mahogany *Sweitenia macrophylla* King. trees.

4.2 Agroforestry Farm Established. The data from CBRM office showed a total of 34.06 has of agroforestry farm being established by the project. But the results of the interview indicated a lower value (23.8 has). Again, this discrepancy may be due to the inability of the respondents to recall the exact land area devoted to this reforestation component. In fact, only 67% of the respondents gave an estimated value for this factor while the other 33% abstained from answering the question because of the difficulty in recalling this piece of information.

4.3. Survival and Growth of Seedlings in Reforestation Sites. On the average, the survival rate of seedlings in the tree plantation was pegged at 66% based on *in situ* measurements or 74% based on interviews. This value, however, is about 8-12% lower than the survival rate standard of 80% set by DENR. This low average value can be attributed to the low survival rate of seedlings in higher elevations. For example, only 50% of the seedlings planted in higher elevation areas survived. These areas are usually rocky, which makes it difficult for the roots of the seedlings to penetrate into the soil substratum. They also lack water. Thus, during summer, both planted and replanted seedlings will just die though they have already reached a height of 0.5 m because of this condition (Manila pers. comm.).

In terms of growth performance, tree plantation species performs best in low elevation areas that are open. Measured average diameter and height of seedlings in this area are about 40 mm and 3.2 m, respectively (Figures 2 and 3). After ten years a rapid assessment on the status of tree plantation and agroforestry farm was conducted to determine whether or not the planted trees and fruit trees in the tree plantation and agroforestry farm were really growing and performing well on the study site. The assessment was focused on Sitio Dalahay one of the two CBRM project sites in Brgy. Usmad where tree plantation and agroforestry farm were being established by the organization. The data collection was conducted on October 13, 2016, Thursday. A 20 m X 20 m plot was established at the lowest elevation open area where the mahogany planted seedlings had the best performance during the first measurement conducted on February 6, 2006. With the use of a tape measure, all standing mahogany trees enclosed within the sampling plot were measured with their circumference in centimeters and the total height in meters were also estimated. The diameter-at-breast height (DBH) in centimeters were then subsequently computed using the mathematical formula for determining tree circumference which is equal to pi multiplied by tree diameter (C = pi.D).

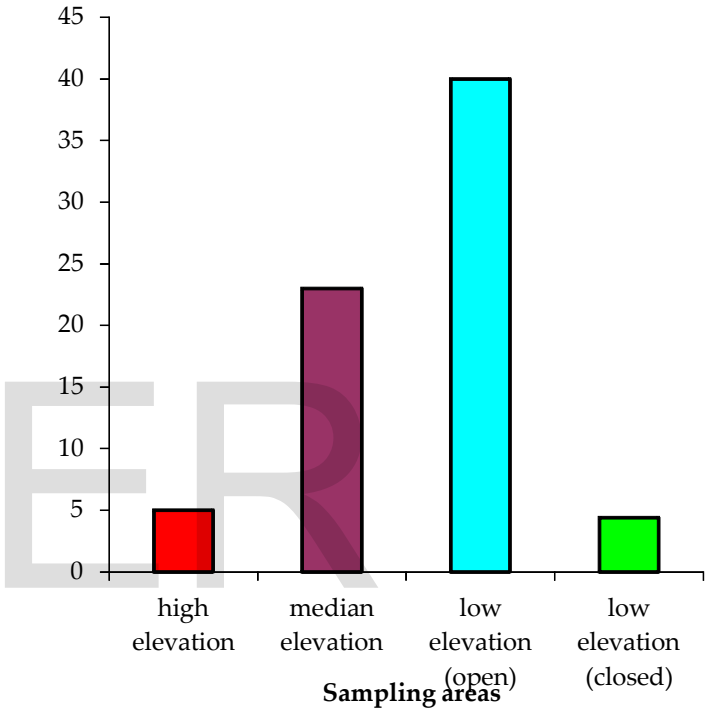

Figure 2. Average diameter of seedlings in sampling areas (in millimeters)

The results showed that the average diameter growth increment in millimeters for a ten year period based from the data in 2006 up to the present is 169.94 mm with an average annual increment of 16.99 mm. As for the average incremental height growth increase, it was found out that the measured mahogany trees (n=22) accumulated about 12.21 m with an average annual growth of 1.22 m respectively.

Among the plant species planted in agroforestry farm, mahogany (n = 137) has the largest average diameter (44.58 mm) and longest average height (2.76 m) measured *in situ*. It is followed by pomelo (n = 7; ave. diameter = 25.67 mm; ave. height = 2.60 m), and mango (n = 2; ave. diameter = 18 mm; ave. height = 1.70 m). Lowest value for diameter (14.50 mm) was measured in jackfruit (n = 60) while for height (1.39 m) was measured in avocado (n =29). However, the same assessment was also undertaken at present for the same purpose

(October 13, 2016) on the agroforestry farm adjacent to the tree plantation but no sampling plot had been established. Almost all mahogany standing trees along the border in between alleys of agroforestry farm as well as those growing on the farm edge were also measured specially the tree circumference as a requirement for determining the tree DBH either in centimeters and/or in millimeters. Then ocular tree height calculation in meters were also undertaken. The same process was also used for the fruit trees like nangka and pomelo because other fruit trees planted on the farm were no longer existed except for cacao and mango though there are still other fruit trees growing within the farm but their number could longer be considered as sample in the assessment process with two pomelo and with only one cacao fruit tree left standing in the farm.

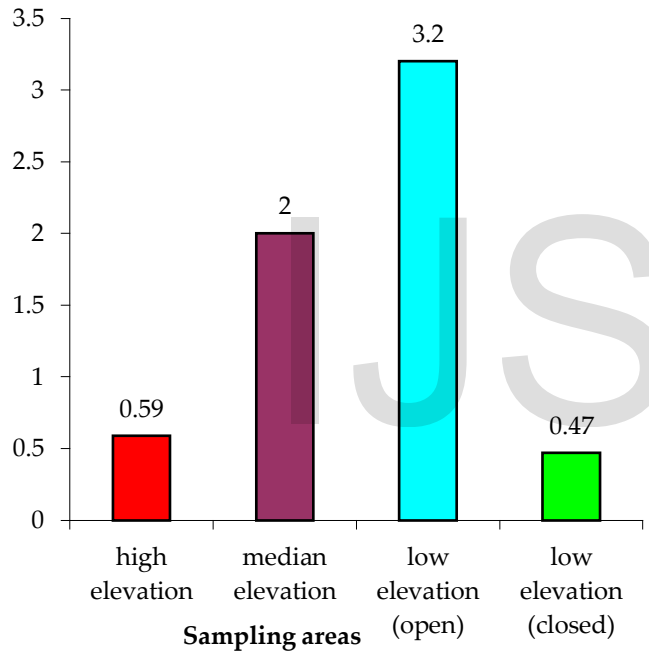

Figure 3. Average height of seedlings in sampling areas (in meters)

Among the plant species planted in agroforestry farm, mahogany (n = 137) has the largest average diameter (44.58 mm) and longest average height (2.76 m) measured *in situ*. It is followed by pomelo (n = 7; ave. diameter = 25.67 mm; ave. height = 2.60 m), and mango (n = 2; ave. diameter = 18 mm; ave. height = 1.70 m). Lowest value for diameter (14.50 mm) was measured in jackfruit (n = 60) while for height (1.39 m) was measured in avocado (n =29). However, the same assessment was also undertaken at present for the same purpose (October 13, 2016) on the agroforestry farm adjacent to the tree plantation but no sampling plot had been established. Almost all mahogany standing trees along the border in between alleys of agroforestry farm as well as those growing on the farm edge were also measured specially the tree circumference as a requirement for determining the tree DBH either in centimeters and/or in millimeters. Then ocular tree height calculation in meters were also undertaken. The same process was also used for the fruit trees like nangka and pomelo because other fruit trees planted on the farm were no longer existed except for cacao and mango though there are still other fruit trees growing within the farm but their number could longer be considered as sample in the assessment process with two pomelo and with only one cacao fruit tree left standing in the farm. Based on the measurement that we have conducted we have found out that for planted mahogany standing trees we have measured (n=53) compared to 137 trees being measured on the first measurement on February 6, 2006 on the same farm the results showed that it accumulated an average diameter growth increment for a ten year period up to present of about 161.88 mm with about an average annual diameter growth increment of 16.188 mm. This results had a very little difference with the measurement obtained in the tree plantation which is about 16.99 mm average annual diameter growth rate. Interestingly, as for the incremental height increase it accumulated given the same period (2006 up to 2016) of about an average of 6.25 meters with an annual average height increment of 0.625 meter. With a big difference compared to the average annual height increment obtained in the tree plantation of about 1.22 meters. This is attributed to the regular trimmings or pruning of branches including the tops conducted on planted mahogany trees on the agroforestry farm to avoid shading over the agricultural crops primarily corn which are planted along or in between alleys. Among the fruit trees planted in the farm jackfruit had a better survival up to the present time 2016 of the 16 trees compared to 60 trees measured during the first measurement in 2006 it accumulated an average diameter increment growth of about 105.463 mm with an average annual increment of 10.55 mm. For pomelo with only two trees being measured it accumulated an average diameter increment growth for the ten year period of about 60.273 mm with an average annual growth rate of 6.03 mm. As for the incremental height increase for the same period it accumulated of about 2.4 meters with an average annual growth rate of 0.24 meter. Interestingly, pomelo had slower growth rate both in height as well as in diameter increase.

5 Level of Participation and Plant Growth and Survival

Table 5 shows the correlation test between level of participation and plant survival.

Species	Level of Participation	
	r- value	*p*- value
1. Mahogany *Sweitenia macrophylla* king.	0.200	0.126

2. Jackfruit *Artocarpus heterophylla* Lam.	0.077	0.693
3. Avocado *Persia americana* Mill.	0.138	0.475
4. Pomelo *Citrus grandis* (L.) Osb.	0.192	0.337
5. Mango *Mangifera indica* L.	0.019	0.922

As indicated, correlation test result between these two factors is not significant implying that the level of survival of seedlings in tree plantation and agroforestry farm is due primarily to environmental factors (e.g. substrate and water).

6 Environmental Factors and Survival and Growth Performance. Both respondents and key informants had identified six environmental factors that may have contributed to the survival and growth performance of the plants. These factors include slope, elevation or altitude, main aspect or exposure, soil factors, rainfall, and type of original vegetation or the surrounding vegetation native to the area. The effect of slope on the survival and growth of seedlings is evident in tree plantation. Those seedlings planted in slopes greater than 50% have small diameter and height and poorly survived in these areas. According to RISE (1995), mahogany plants are lowland tree species and do not grow properly at high slopes and altitude of more than 600 masl. The amount of sunlight, abundant water, and soil nutrients also play very important roles in the growth of these plants. Any reduction in their amount may reduce the rate of the plant physiological processes, which consequently affect their growth and survival. Based from the results the above data still consistent with the recent data obtained in the reassessment survey especially the planted fruit trees pomelo, cacao, and mango there were very few survived as evident during the field observation only jackfruit had better performance but still few survived there were 60 trees measured previously in 2006 but only 16 trees have been measured during the *in situ* assessment and have better growth performance.

PROBLEMS ENCOUNTERED DURING PROJECT IMPLEMENTATION AND THEIR POTENTIAL SOLUTIONS

1 Problems. The study looked into five major areas of the project where problems were encountered during implementation. These areas include community organizing, agroforestry and farm development, tree plantation establishment, land tenure, and resource protection and conservation. These problems were categorized according to the degree of seriousness with 1 as not serious, 2 as serious and 3 as very serious.

1.1 Community Organizing. The beneficiary community of the project was organized into a people's organization. However, based on interviews, there is a very poor participation of members in PO-initiated activities. Both the respondents and key informants consider this as a very serious problem. It was indicated that implementers have difficulty in getting high participation from PO members especially during meetings. People especially those living within the timberland areas were hesitant to participate because they believe that government-sponsored community development projects will just end up with a litany of failures. Based from the results of the interview with the respondents and key informants and observations the very serious problem considered by the respondents during the first assessment in 2006 such as the very poor participation of members in PO-initiated activities has been seriously manifested at present through degeneration of PO membership as have been mentioned only 15 active members were remaining out of 48 before and majority of the members of the cooperative who have loaned with the cooperative did not pay back their loan amortization. In addition, another problem that had been experienced by the organization relative to community organization is that the premature withdrawal of the technician assigned to the organization this was due to lack of budget allocated by the project in the salary of the technician this leads to haft-baked capability building skills on organization development as well as constancy in overseeing and monitoring of the on-going PO activities especially on cooperative management this greatly contributed to the failure of the lending business of the later.

1.2 Agroforestry and Farm Development. Among the serious problems identified in this area of project implementation, lack of water supply is regarded as very serious. The scarcity of water supply in the project site resulted to poor growth and survival of the seedlings in agroforestry. The other serious problems include: lack of capital for farm inputs, low prices of farm products due to the presence of middlemen, outbreak of pests and diseases, occurrences of natural calamities, poor implementation of agroforestry system, and disagreement of absentee claimants in converting their land into CBRM project site. For this aspect the results showed from the reassessment that still lack of capital for farm inputs considered to be a serious problem experienced by the existing PO members at present. They received material benefit from DA like cacao seedlings and the organic fertilizer but still these are not sufficient to address their farm needs.

1.3 Tree Plantation Establishment. As with agroforestry, water scarcity is also a very serious problem together with poor soil fertility in tree plantation. Both conditions affect the growth and survival of seedlings as indicated in the diameter and height measurements of these plants. Reduced soil fertility is due to severe soil erosion. Severe erosion results from the steepness of the slope of the area. The results showed based from the recent assessment conducted that along this line the present condition of the planted mahogany trees at the lower elevation in the open area showed the best performance this is consistent with the results of the *in situ* measurement con-

ducted on the same area in 2006, though, sampling was conducted only on this area because of time constraints and limitations.

1.4 Land Tenure. Two very serious problems were identified in this area. These problems are boundary conflict and hesitation of the landlord to convert their land into CBRM project sites. Both problems may threaten the adjacent CBRM sites through encroachment. This particular problem has not assessed during the recently conducted reassessment survey in October 13, 2016.

1.5 Resource Protection and Conservation. Among the identified problems in this area, three were considered as serious. They include the view on forest resources as open access, which will lead to intensive logging; mortgaging of certificate of stewardship contract (CSC), and unchecked or unregulated cutting of trees. The problems identified above by the respondents before in 2006 like the unchecked or unregulated cutting trees had already been minimized according to the PO president since they have been regularly conducted monitoring of the tree plantation established by the organization. The existing active PO members were encouraged of doing these activities because they have heard a feedback from the DENR that they could harvest the trees they were planted before both in the tree plantation and agroforestry farm just like had been experienced recently the POs in Mindanao Island respectively. In addition, the existing PO members have felt the need to protect the trees that they were planting and the environment due to the recently occurring natural calamities not only in the Visayas area but the entire country in particular.

A. Potential Solutions. The respondents have identified the imposition of penalty in the form of fines and/or hard labor to absentee members, expulsion from membership, and continuous follow-up and motivation as effective solutions to problems on poor participation. Also, the respondents recommend timing of planting activities and the use of drought-resistant species to minimize the effects of water scarcity in the area. Since the area is inherently limited in water supply, these solutions may help minimize its effect on the establishment of agroforestry and tree plantation. Lastly, trainings on integrated pest management, use of pest resistant species, and diversification of crops were considered as effective approaches to solve problems related to pest and diseases outbreaks. Soil-plant species compatibility would also be studied to address the issue of low soil fertility in the area. The effective solutions identified by the respondents before to address poor participation PO members in the different organizational activities still consistent with the results of the key informant interview conducted recently with the PO president he said that continuous follow-up and motivation are still considered to be an effective solution to poor member participation just like what he had done recently to the remaining active PO members. He motivated continuously these members through encouraging words which he said that "*kung mabungkag ang atong orgasasyon lisod na kaau pagtukod ug usab kay daghan kaau ug mga rekisetus ang CDA karong panahuna*" if our organization will be disintegrated it is so hard for us to organized this again due to the voluminous requirements imposed by CDA to new applicants or registrants. That is why the organization or the PO or the cooperative still surviving at this point time he added unlike other POs based on the feedback he received were already completely disintegrated.

4 CONCLUSIONS

Based on the results of the interviews, the respondents were moderately empowered economically, politically, and socio-intellectually through the project. Average household monthly income has increased significantly while their level of technical knowledge on tree plantation and agroforestry farm development was enhanced. They were also given the opportunity to participate in decision-making and planning activities. With moderate empowerment, the respondents had moderately participated in project activities especially in those activities that help restore and manage forest resources. Political empowerment and socio-intellectual empowerment are two important factors that encourage community participation in the study site. Correlation test shows a significant relationship between these factors and level of participation. Though economic empowerment is not significantly correlated with participation, its importance in enhancing participation could not be denied. This factor shows a positive correlation with participation, indicating its potential function in increasing community involvement in the conduct of project activities. Growth performance in terms of diameter and height changes and survival of these seedlings were observed to be dependent on environmental factors such as water, elevation, and exposure. The limited supply of water together with poor soil quality and pest and disease outbreaks were considered as very serious problems in tree plantation and agroforestry farm. Proper timing of planting activities and the use of drought-resistant species of plants are recommended as potential solutions to these problems.

RECOMMENDATIONS

Based on the limitations and results of the study, the following are recommended:

1. As recommended by the respondents, the establishment of a financial facility where farmers can make a loan for some capital with low interest and linkages with line agencies where they can seek financial assistance is a good

solution. The project implementers may help the beneficiaries establish these facilities.

2. The significant relationship between political and socio-intellectual empowerment and community participation indicates the need to strengthen community involvement in the decision-making and planning activities and their technical knowledge. Thus, it is recommended that any CBRM project must intensify their technical and capability-building trainings in order to increase participation.
3. The respondents mentioned that some beneficiaries and absentee claimants are resistant to CBRM project and some of its activities (e.g. agroforestry). Their resistance, however, is due to their misconception of the project's effects on their land or farms. It is therefore recommended that intensification of IEC activities about the benefits that can be derived from CBRM must be done.
4. Since the study focused only on one recipient barangay due to time and resource constraints, it is recommended that similar studies be conducted in the other project sites of the project.
5. It is further recommended that all other interventions of the project, including the small scale infrastructure and livelihood interventions, may be evaluated to be able to get a better picture of the effectiveness of CBRM as an upland community development approach.

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