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Financial Efficiency and Equitability of Pulangi Watershed Rehabilitation Sub-Project in Bukidnon

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Abstract

The Japan Bank International Cooperation (JBIC) had poured-in substantial funding to the Pulangi Watershed Rehabilitation Sub-project (PWRS) for its rehabilitation. The Pulangi watershed in Bukidnon is essential for irrigating highly productive ricefields and generating electric power in Region 10. The PWRS aimed to improve the ecological balance of the watershed and to uplift the socioeconomic condition of the underprivileged community members using the CBFM strategy/approach. This study examined the financial efficiency and equitability of the PWRS implemented by the People Organization-Community Environmental Development Management of Concepcion (PO-CEDAMCO) Incorporated. The study used descriptive and analytical methods in collecting, organizing, and interpreting data. Financial efficiency indicators, namely household and farm income were analyzed and Net Present Value (NPV) of the project's reforestation component was determined. Equitability was analyzed by determining the evenness of the distribution of project benefits to the participants using Gini Ratio. Results of the study showed that the project did not yield the expected results. Positive economic condition and equitability occurred temporarily while the project lasted. When the project funds stopped, the positive changes were unsustained. The NPV of the reforestation component was negative, equitability problem worsened as the economically affluent and local elites captured the project benefits. The project through the PO-CEDAMCO should adopt policies that would enhance participation of disadvantaged and poorest of the poor community members.

Keywords: community-based forestry, equitability, financial efficiency, gini ratio, net present value

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1.0 Introduction

In 1995, the Japan Bank for International Cooperation (JBIC) had allotted considerable amount of financial aid to the Philippine government for rehabilitation projects of the critical watersheds in the country. Consequently, 55 project sites nationwide were funded for implementation under the JBIC Loan II (COA Report, 2006-07D). One of these is the Pulangi Watershed Rehabilitation Sub-project (PWRS) in Bukidnon, implemented with funding support for the period 1996 to 2003. The PWRS had expended a total of Php 151.44 million covering four sites with a total aggregate area of 5,095.72 hectares of the Pulangi watershed (PWRS Terminal Report, 2003). The Pulangi area is one of the most important watersheds in Bukidnon primarily because it irrigates highly productive ricefields and generates 255 megawatts of electric power (PWRS Terminal Report, 2003).

Based on the feasibility study, the project was economically feasible, having an Economic Internal Rate of Return (EIRR) at 26.3% and a net present value (NPV) of Php 13,300,258 at 12% discount rate (PWRS FS Report, 1995). As designed, the project was largely focused on biophysical rehabilitation implemented by local-based People's Organizations. The Community Environmental Development Management of Concepcion (CEDAMCO) Incorporated, is one of the cooperating PO's which implemented the CBFM-PWRS. It has a total active members of 152. It received a total budget amounting to Php 34.02 million covering, 1,498 hectares and consisting of five components, namely: reforestation, agroforestry, rattan, bamboo, and agrosilvipastural. More than half of the total amount was spent for reforestation component. The PWRS aimed to improve the ecological balance of the Pulangi watershed and to uplift the socioeconomic condition of the upland poor and underprivileged community members using the CBFM strategy/ approach. But despite CBFM's pro-poor approach, the achievement of the core objectives of social equitability and financial efficiency in forest development is constrained (Dahal and Capistrano, 2006). The benefits of community forestry projects in the Philippines are captured by the elites (Dahal and Capistrano, 2006). Apparently, there is a dearth of scientific investigation on the effectiveness of the PWRS in terms of addressing its core objectives (efficiency and equitability).

Social programs such as PWRS are crucial to reduce poverty and inequity in the Philippines. In theory, the operation of social programs, is considered more socially sustainable if it meets two criteria: efficiency and equity; in other words, if the program can help more people who need it the most (Tirado et al., 2015).

Efficiency is measured on how close observed performance from desired performance (Grosskopf,

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1985). It aims to use minimum resources to deliver the most results (Athanassopoulos, 1998). Efficiency means maximum production for given level of inputs or cost (Worell, 1970). It can be derived using financial analysis to determine the profitability of the project investments. The most widely used measure is the Net Present Value (NPV) which determines the financial viability of the projects by taking into account a time preference for money using discount interest rate. Calderon and Nawir (2006) examined the financial feasibility of the tree plantation component of the two CBFMP projects and two projects of the Integrated Forest Management Program using 15% interest rate which showed that the projects were financially feasible.

Equitability in social programs reflects how fair resources are distributed according to the population needs and the characteristics of the goods or services provided (Athanassopoulos, 1998). Equitability measures the evenness of the distribution of project benefits among human beneficiaries (Chambers and Conway, 1992). This can be viewed in terms of how benefits, services and access to resources were distributed. Eckholm (1979) argues that deprivation to access and benefits sharing in community forest management projects cannot be avoided.

On the other hand, Gini ratio is the most widely used measures of inequitability of distribution of income in a given population (Lorenz, 1905). But anything that varies among members of a population, such as land area distribution and financial benefits of the project have also been subjected to the Gini ratio analyses by many researchers. Gini ratio is the ratio of the area between the Lorenz curve and 45^0 line to the area under the 45^0 line (Gastwirth, 1972). A Lorenz curve plots the cumulative proportion of income (or other variables) by cumulative proportion of population, ordered by increasing income (Lorenz, 1905). A Gini ratio is a single number that measures the area between the line of perfect equality and the Lorenz curve; the larger the area, the greater is the inequality. Gini (1955) expresses this area as the fraction of the total area under the line of perfect equality. If the Gini ratio is zero, the Lorenz curve follows a diagonal line, implying that there is perfect equality or even distribution of income, benefits, and the like. However, if the Gini ratio is one, it coincides with the axes, implying that there is perfect inequality. Cruz et al., (1998) used Gini Ratio and Lorenz curve to determine the equitability of farm land distribution among the occupants of the Makiling forest reserve under the jurisdiction of the University of the Philippines Los Baños. Their study revealed that the land distribution among occupants was generally unequal with relatively high Gini Ratio of 0.67. This was depicted in her Lorenz curve showing the proportion of the household population holding a corresponding percentage of land area, with 12.5% of the total households occupying 66.7% of the land area, while the majority, at 55% of the population, occupied only 7.6% of the total land area.

This study examined the financial efficiency and equitability of the Pulangi Watershed Rehabilitation Subproject (PWRS) implemented by the Community Environmental Development Management of Concepcion (CEDAMCO) Incorporated.

2.0 Research Methodology

The study used descriptive and analytical methods in collecting, organizing, and interpreting data. It also applied descriptive statistics for data interpretation. The Net Present Value and Gini ratio were used in analyzing the financial efficiency and equitability, respectively, of the project intervention.

The following techniques were employed in data collection: review of secondary data, key informant interview, focus group discussion, survey, direct field observations, walkthrough and actual field measurements. The data were gathered from June 2007 to February 2009.

The study was conducted in PWRS geographically located at coordinates $125^0$11'13.8" to $125^0$18'50.5" longitude and $7^0$52'32.5" to $7^0$55'48.18 latitude (figure 1). The area of the Community Environmental Development of Concepcion (CEDAMCO) Inc. consists of 16 sub-villages, is located in barangay Concepcion of the City of Valencia, Bukidnon covering a total forest land area of 4,485.02 hectares.

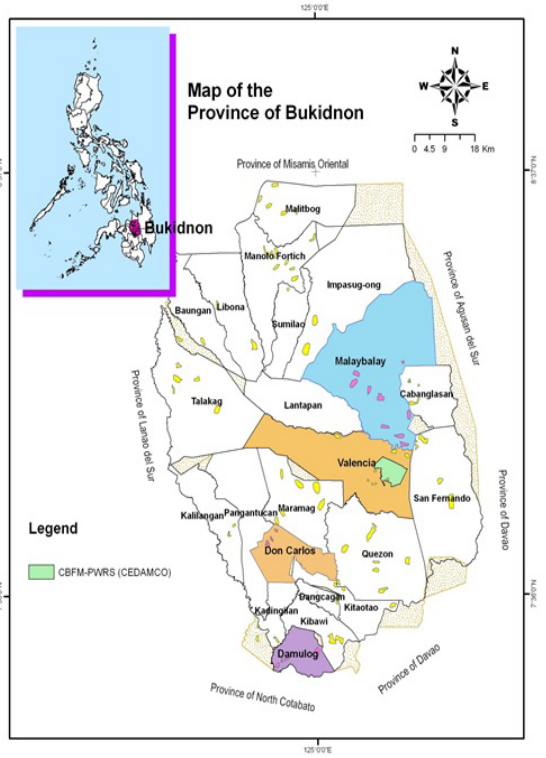

Figure 1. Location map of the province of Bukidnon showing the study areas

The respondents of the survey included the project participants. The sampling size of the participant respondents was determined using the Slovin's formula. The sampling size was 142 based on the total numbers of officially registered members of the association at 221. The 221 officially registered participants were assigned a respective number for selection. Sampled respondents who were already dead or who had migrated were replaced. It was emphasized to the respondents that all answers will be treated with strict confidentiality.

A survey questionnaire was formulated. This questionnaire was subjected to content validity by experts and reliability test using Statistical Package for Social Sciences for subjective answers. Results of the reliability test revealed that the Cronbachs Alpha value of the questionnaire was 0.89, which was within the desirable reliability minimum coefficient of 0.70 (Nunnally, 1978; cited in Court et al., 2002). The questionnaire was consist of the following parts: respondents' background, project financial efficiency and equitability indicators. The purpose of using a financial efficiency indicators is to determine whether or not the incomes of the participants had increased or enhanced over time by the project intervention. So, the financial conditions before, during, and after the project were gathered, which were incorporated in the survey questionnaire for both the subjective and objective data.

Subjective data were validated using observations of the existing biophysical and economic indicators, focus group discussion and informants' interview. Subjective data for financial efficiency status were composed of the following attributes: household income, farm productivity, household employment opportunities, availability of credit assistance, and market for logs/lumber and farm products. Respondents chose the following 5-point likert scale answers: 1-decrease; 2-no change; 3-little increase/improvement; 4-moderate increase/improvement; 5- high increase/improvement. The objective data were classified into total household income and farm income.

The attributes of equitability upon which subjective measurements were made were as follows: equitability in the distribution of benefits and resources of the CBFM-PWRS area among participants; and access of resource poor people to the resources of the project/CBFMA area. The objective data included in Gini Ratio analysis were: income of the participants before, during, and after the project intervention; and the land area distribution inside project site.

The subjective data were analyzed by transforming 5-point likert-scale into frequency and percentage. The average per attribute was computed as well as the over-all average of each indicator. The over-all average rating per indicator was fitted to a 4-point descriptive rating as follows: 4.51 – 5.0 (High Increase/Improvement); 3.51–4.50 (Moderate Increase/Improvement); 2.51–3.50 (Little Increase/Improvement); <2.5 (No Change/Decrease).

To further analyze the equitability and financial efficiency of project intervention, the household and farm income analysis were conducted. The income analysis was focused on the over-all household income and farm income of the respondents, primarily to find-out whether the project was able to address the problem of low income and the income in equitability among households in the project sites using three periods (Years 1995, 2000, 2007).

The household income included the analysis of all sources of income from members of the participating households, namely: non-farm/off-farm, on-farm, and livestocks/poultry. Non-farm/off-farm income included businesses, net-cash income, employment (hired/casual, regularly earning), remittances, and other income not derived from the respondents' farm. On-farm income included net income of the respondents from their own farm/land outside and inside the project area. Livestock/animals/poultry owned by the farmer respondents were valued and form part of the income.

The farm income analysis included the net farm income of the respondents from the farmland area inside CBFM which was determined by valuing all direct inputs incurred and the corresponding farm outputs. The analysis was focused on agricultural and or agroforestry farm areas. The net farm income per hectare was used to find-out the incremental effect of the project with the income equitability using three periods/years (1995, 2000, and 2007).

The inputs evaluated were all materials (seeds/banana suckers, fertilizers, chemicals), labor (hired and family) and harvesting costs directly incurred for the production of farm output regardless of whether from the farmers-own pocket or from the project. Management costs for respondents hiring laborers were valued in man-days term. The outputs included farm production from agricultural/annual crops and perennial crops and fruit trees. To allow comparison, the 2007 local prices was used for both inputs and outputs to eliminate the effect of changes in prices in the three periods (Richards et al., 2003). The data were used to test the income difference of the three time periods using One-way Analysis of Variance (ANOVA) and the Least Significant Difference (LSD) test for comparative analysis.

Given the data on benefits and costs for reforestation component of the project, the financial efficiency was determined using the Net Present Value (NPV) computed as follows:

$$NPV_{t=1} = \sum_{t=1}^{n} \frac{B_t}{(1+i)^t} - \sum_{t=1}^{n} \frac{C_t}{(1+i)^t} \quad \text{(Equation 1)}$$

Where:

NPV = net present value

Bt = benefits at time t

Ct = costs at time t
i = discount rate
n = number of years in the rotation period
t = time, Year 1 to n

To be financially efficient or profitable, the NPV must be positive. A negative NPV means the project is financially inefficient or not profitable.

A Gini Ratio was computed to determine the equitability of the distribution of income (*I*) and land area (*LA*) of the participants as a result of project intervention. A Gini Ratio (*GR*) value ranges from 0 to 1. If the *GR* is equal to 0, it denotes equitable distribution. The lower the *GR*, the lesser is the degree of inequality. The formula used for the *GR* of participants' income and land area distribution was:

$$\underset{i=1}{GR} = 1 - \left[\left(\sum_{i=1}^{n} \frac{C\%I_i}{C\%R_i}\right)/n\right] \qquad \text{(Equation 2)}$$

Where:

GR = Gini ratio
$C\%I_i$ = Cumulative percentage of income (I) inside the CBF project area of each participant with respect to the total income of all sampled participants, arranged in ascending order.
$C\%R_i$ = Cumulative rank (Ri) of participants with respect to the total number of sampled participants, arranged in ascending order.
i = entry (income) from 1….n
n = total number of entries or sampled participants
1 = constant value of Lorenz curve

Where:

$$\%I = \frac{\text{total income (I) of each participants in ascending order}}{\text{total income (I) of all sampled participants}} \qquad \text{(Equation 3)}$$

$$\%R = \frac{\text{rank of income (I) in ascending order}}{\text{total number of sampled participants}} \qquad \text{(Equation 4)}$$

As to the primary project objective, the three categories of income were subjected to equitability analyses with Gini Ratio using before, during, and after project implementation. The following were considered: over-all household income, one hectare net farm income and cash income received by the participants from the project. In addition, the Gini Ratio of land area inside project site was also computed to determine how the enormous amount of budget has affected land area distribution among participants.

3.0 Results and Discussion

The respondents were much older, averaging 50.5 years old, mostly male (71%) (Table 1). Almost all were married, with an average household size of five members. Nearly three-fourths (71.83%) followed Roman Catholicism and Cebuano, by ethnicity, indicating the predominance of migrants in the project area (only 12% belonged to indigenous group). The respondents' main source of income was farming. Educational attainment was generally low, reaching up to Grade V on the average and most (71%) managed to attend elementary level only. Nine out of ten respondents had been a member of the CEDAMCO for a minimum of nine years, while the average length of membership was 11.1 years. Sixteen percent of them had experienced as officer or as chairman of the various committees of the association.

Table 1. Profile of the respondents of CBFM-PWRS of PO-CEDAMCO

Characteristics	Frequency	Percentage
Age (Years)		
< 30	1	0.70
31-50	74	52.11
> 50	67	47.18
Mean	50.51	
Sex		
Male	101	71.10
Female	41	28.90
Civil Status		
Single	3	2.10
Married	139	97.90
Religion		
Roman Catholic	102	71.83
Iglesia sa Dios Espirito Santo	14	9.86
Baptist	13	9.15
Seventh Day Adventist	4	2.82
UCCP	3	2.11
Penticostal	4	2.80
Filipinista	2	1.40
Ethnic Group		
Cebuano	105	73.94
Boholano	13	9.15
Manobo	17	11.97
Waray	4	2.80
Ilonggo	3	2.11
Household Members		
1-3	42	29.58
4-6	61	42.96
> 6	39	27.46
Mean	5	
Educational Attainment		
None	3	2.11
Elementary	102	71.83
High School	31	21.83
College	6	4.23
Number of years in the PO		
< 5	1	0.70
5-8	12	8.45
9-12	129	90.85
Mean	11.07	
Position in the Association		
Officer/Staff (previous/present)	23	16.20
Non-officer/member	119	83.80

Perception on the Influence of the Project to the Financial Development and Equitability

The respondents perceived the six attributes of financial development (income, farm productivity,

Table 2. Respondent's rating on indicators/attributes of on economic development of PWRS area of PO-CEDAMCO

INDICATORS AND ATTRIBUTES	RATING			
	During vs. Before Project		During vs. Before Project	
	Numerical	Descriptive	Numerical	Descriptive
Economic Development	**3.31**	**Little Increase**	**2.85**	**Little Increase**
Household income	3.32	Little increase	2.54	Little increase
Farm productivity	3.27	Little increase	2.79	Little increase
Household employment opportunity	3.25	Little increase	2.69	Little increase
Household livelihood oppurtunity	3.15	Little increase	2.72	Little increase
Availability of credit assistance	3.14	Little increase	2.80	Little increase
Market for lumber/logs and farm products	3.70	Moderate increase	3.54	Moderate increase
Equitability	**3.12**	**Little Improvement**	**2.83**	**Little Improvement**
Distribution of benefits and resources	2.96	Little improvement	2.84	Little improvement
Access of women and poor peoples	3.27	Little improvement	2.82	Little improvement
OVER-ALL AVERAGE	**3.22**	**Little increase**	**2.84**	**Little increase**

employment and livelihood opportunities, and credit and market assistance) to have little to moderate increase during project implementation (Table 2). The enormous financial infusion in the form of direct subsidy and momentary employment generation did not create a dramatic economic change to sway the project participants' opinion on the project. As indicated, the descriptive ratings of these attributes using during project and after project conditions (i.e., 2007) did not change at all.

At a closer look, there is a decreasing trend in the ratings, implying that the project had just momentarily uplifted the economic condition of the local people, but this was not sustained. Also, there was ecological disruption exemplified by the conversion of the forest and tree plantation into banana plantation.

The favorable market condition of banana that was created by the Association's Income Generating Project (IGP) encouraged the land-use change. The project is unsustainable which contradicts the findings of Dolom (2001) on CBFM projects in Ilagan, Isabela which attributes of economic indicator were enhanced, indicating economic sustainability of the project component.

Financial Efficiency of the Project

Table 3 shows the average annual household income of the respondents before, during and after project intervention, using the 2007 prices of goods, services, and commodities. Before project implementation (1995), the average annual household income of the respondents was Php 65,846.69. But during project implementation (2000), it increased to Php 92,221, an increment of 40%.

However, five years after project intervention, this decreased to Php 62,761, a decrease of 4.7%. The one-way ANOVA test of difference of these incomes shows a significant difference at 5% level of significance. The Least Significant Difference (LSD) test shows a significant increase of year 2000 income from that of the 1995 and 2007 incomes, respectively. Yet, there is no significant difference between the 1995 and 2007 incomes. This result indicates that the project had only temporarily uplifted the participants' income. The result conforms to the finding of Gascon (1998) of the tree growing integration of Hanunoo in their farming practice which is not economically efficient and viable because it could not provide a year-round supply of balanced food diet of the Hanunoo members.

Table 3. Least Significant Difference (LSD) test on the average household annual income of PO-CEDAMCO respondents for the three periods: 1995 (before), 2000 (during), and 2007 (after) project

	YEARS		
	1995 (Before)	**2000 (During)**	**2007 (After)**
Average Income (in Php)	65,847[a]	92,221[b]	62,761[a]
Compared Year	2000 2007	1995 2007	1995 2000
Mean Difference	-26374.19 3085.28	26374.19 29459.46	-3085.28 -29459.46
Standard Error	7887.61 7887.61	7887.61 7887.61	7887.61 7887.61
Significance	0.001 0.696	0.001 0.000	0.696 0.000

Note: different superscripts of average income indicate significant difference at 5% level

Table 4 shows the difference of a one hectare farm's net income in three periods. In 2000, the income was 36% higher than in 1995 and appears significant at 5% level of significance. This implies that the farmers incurred sufficient funds and resources out of the income generated from the

project. In 2007, although there was an increase, the change was not significant. The project failed to address farm development related problems.

The Net Present Value (NPV) of Php 1,041.00 (Table 5) implies that the reforestation technology is not financially profitable. The result differs with Calderon and Nawir (2006) finding on the economic efficiency of the tree growing project of the two CBFM projects. The attributing factors for these two CBFM project economic efficiency include good yield, cost of production and favorable market conditions.

In this study, the very low value of NPV is attributed to the enormous costs incurred especially during the first three years and inappropriate choice of reforestation species as manifested by the stunted growth of planted species (i.e., *Gmelina arborea*, *Acacia mangium* and *Eucalyptus* species).

This is aggravated by the low interest of the participants to care and maintain the plantation after project due to the low prices of logs/timber and the expensive and tedious process of getting tree cutting permit from the DENR.

Table 4. Least Significant Difference (LSD) test on the average one hectare net farm income of PO-CEDAMCO respondents for the three periods: 1995 (before), 2000 (during), and 2007 (after) project

	YEARS		
	1995 (Before)	**2000 (During)**	**2007 (After)**
Average Income (in Php)	13,956[a]	18,967[b]	17,144[a]
Compared Year	2000 2007	1995 2007	1995 2000
Mean Difference	-5040.32 -3217.58	5040.32 1822.73	3217.58 -1822.73
Standard Error	1594.11 1594.11	1594.11 1594.11	1594.11 1594.11
Significance	0.004 0.108	0.004 0.487	0.108 0.487

Note: different superscripts of average income indicate significant difference at 5% level

Table 5. Financial Analysis (Php '000) of the forestation project of CBFM-PWRS established in 1997

ITEMS	YEAR									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Revenues/Outputs										
Thinning Revenue	0.00	0.00	0.00	0.00	0.00	33.89	3.80	0.00	0.00	0.00
Harvesting Revenue	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4643.70
Total Benefits	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**33.89**	**3.80**	**0.00**	**0.00**	**4643.70**
Costs/Inputs										
Government Costs										
Seedlings	400.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plantation Establishment	324.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Protection and Maintenance	115.52	301.51	171.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Infrastructure (bunk houses, look-out towers, etc)	0.00	27.40	8.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tools and Equipment	4.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Direct Management Costs (15% of the direct costs)	126.64	49.34	26.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sub-Total	**970.92**	**378.25**	**206.65**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Participants' Costs										
Plantation Development	16.20	16.83	16.75	7.84	6.52	5.24	12.56	2.58	2.52	0.00
Harvesting	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2274.11
Sub-Total	**16.20**	**16.83**	**16.75**	**7.84**	**6.52**	**5.24**	**12.56**	**2.58**	**2.52**	**2274.11**
Miscellaneous Costs										
Government's Share (25% of gross harvesting revenue)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1160.92
Association's Share (5% of gross harvesting revenue)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	232.19
Sub-Total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1393.11**
Total Costs	**987.12**	**395.08**	**223.40**	**7.84**	**6.52**	**5.24**	**12.56**	**2.58**	**2.52**	**3667.22**
Discounted (i = 12%)										
Total Benefits	0.00	0.00	0.00	0.00	0.00	17.17	1.72	0.00	0.00	1495.15
Total Costs	881.36	314.96	159.01	4.98	3.70	2.65	5.68	1.04	0.91	1180.75
Net	-881.36	-314.96	-159.01	-4.98	-3.70	14.51	-3.96	-1.04	-0.91	314.40
NPV at i = 12%	**-1041.00**									

Table 6. Stand and Stock Table of the reforestation project of CBFM - PWRS established in 1997

Diameter at Breast Height (DBH)		SPECIES				TOTAL
		Gmelina	Mangium	Bagras	Ayangile	
	No. of Trees	401.0	1451.0	57.0	57.0	**1966.0**
20 cm	No. of Logs	645.0	2138.5	69.5	69.0	**2922.0**
	Vol. (cu.m)	65.0	215.5	7.0	7.0	**294.48**
	No. of Trees	580.0	1309.0	159.0	695.0	**2743.0**
25 cm	No. of Logs	937.5	2202	305	1192	**4636.50**
	Vol. (cu.m)	147.63	346.75	48.03	187.70	**730.10**
	No. of Trees	401	2238	84	260	**2983.0**
30 cm	No. of Logs	761	4139.5	168.5	38.21	**1260.08**
	Vol. (cu.m)	172.56	938.65	38.21	110.66	**1260.08**
	No. of Trees	44.0	659.0	10.0	35.0	**748.0**
35 cm	No. of Logs	76.0	1456.5	26.5	61.5	**1620.50**
	Vol. (cu.m)	23.46	449.53	8.18	18.98	**500.15**
	No. of Trees	9.0	66.0	0.0	0.0	**75.0**
40 cm	No. of Logs	13.5	121	0.0	0.0	**134.5**
	Vol. (cu.m)	5.44	48.78	0.0	0.0	**54.22**
	No. of Trees	5.0	39.0	1.0	0.0	**45.00**
45 cm	No. of Logs	11.0	98.5	1.0	0.0	**110.50**
	Vol. (cu.m)	5.61	50.25	0.51	0.0	**56.38**
	No. of Trees	0.0	15.0	0.0	1.0	**16.0**
50 cm and up	No. of Logs	0.0	27.0	0.0	2.0	**29.0**
	Vol. (cu.m)	0.0	17.01	0	1.26	**18.27**
	No. of Trees	**1440.0**	**5777.0**	**311.0**	**1048.0**	**8576.0**
TOTAL	**No. of Logs**	**2444**	**10183**	**570.5**	**1812.5**	**15010.0**
	Vol. (cu.m)	**419.7**	**2066.49**	**101.93**	**325.55**	**2913.67**

As an off-shoot, the average yield production per hectare at rotation was 40.94 cu.m./ha.(Table 6), less than half of the standard yield production (80 to 100 cu.m./ha/rotation) of the planted tree species (DENR-ERDB, 1998).

Equitability of the Project Benefits

Many respondents felt a little improvement on the access of resource-poor farmers to forest and PO resources during project period. The respondents earlier believed that the CBFM approach would provide opportunities to poor local people to access and avail of forest resources benefits. Figures 2 through 5 illustrate the Lorenz Curve and the Gini Ratio of incomes, cash received from the CSD project, and land holdings. A Gini Ratio value closer to zero means better equitable distribution of benefits to the population. The closer the income curve (i.e., Lorenz curve) to the line of perfect equality, the more equitable is the distribution of income.

Point A in figure 2 present that around 63% of the respondents owned only 30% of the total income. The remaining 70% of that total income is distributed to the remaining 37% of the respondents.

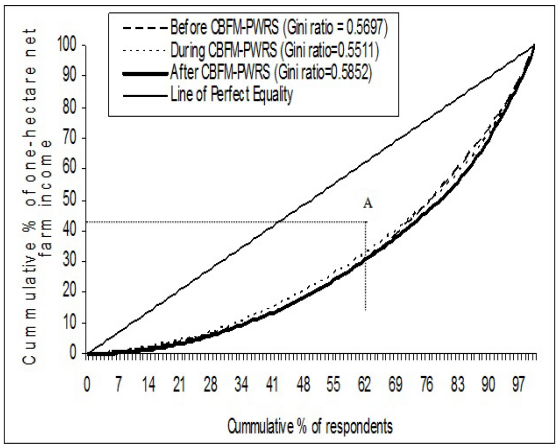

Figure 2. Distribution of the one-hectare net farm income of the CBFM-PWRS participants before project (1995), during project (2000), and after project (2007)

As discussed, the equitability problem was not addressed by the project, as manifested by the income variable. The Gini Ratio value for one-hectare net

farm income of the respondents (figure 2) during project implementation decreased slightly from 0.57 to 0.551; but after project, it increased to 0.585.A similar trend is observed of the Gini Ratio of income of the respondents from all sources (figure 3).

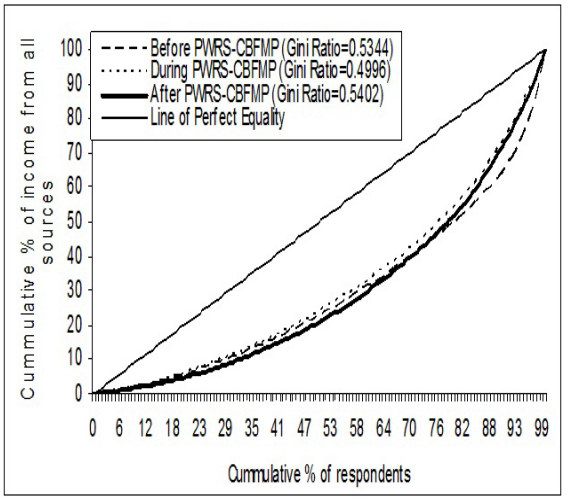

Figure 3. Distribution of total income from all sources of the CBFM-PWRS participants before project (1995), during project (2000), and after project (2007)

This result is inconsistent with the finding of Legada (1998) of the Upland Stabilization Project in Palawan, Philippines which showed that the net farm income inequality was much higher before project implementation, obtaining a GR of 0.67, compared to 0.62 and 0.60, during and after project implementation, respectively.

The distribution of cash income from the project through employment, CSD subsidy, and others, is highly inequitable, obtaining a Gini Ratio of 0.741 (figure 4).

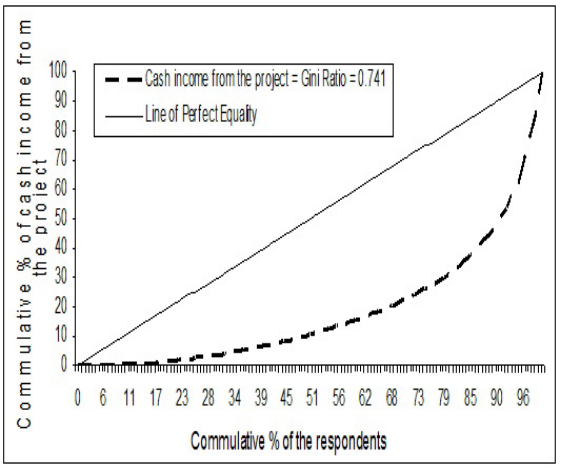

Figure 4. Distribution of the total cash income received by the PO-CEDAMCO respondents from 1996 to 2003

The policy on PO membership which requires allocation of farmer's land-area to CSD technology and in availing of CSD subsidy without limits, favored the economically affluent and big land-owners. The CBFM project benefits have been captured by the local elites and businessmen in the community (Dahal and Capistrano, 2006; Pulhin, 2000). This unintended effect is an off-shoot of fast tracking the CSD implementation in order to post billing at the earliest possible time and enjoy greater financial benefits. Using the median of land holdings of 4 ha., the respondents could be categorized into: small land-owner (≤3.0 ha.); medium land-owner (3.1 to 5.0 ha.); and big land-owner (>5.0 ha.).

Table 7 shows that 43% of the total project cash income was acquired by the big land-owners, 32% for medium land-owners, and 25% for small land-owners. Big land-owners were considered affluent in the community, having an average annual income of Php 96,097 in 2007 (higher than the poverty threshold of the same year by Php 26,907). Medium and small land-owners just earned an average annual income of Php 47,866.59 and Php 44,366.95, respectively (lower than the poverty threshold of 2007 at Php 69,190).

Table 7. Comparative average project cash income received by PO-CEDAMCO respondents' category

Category	Ave. Annual Income (Php)	Project Cash Income	
		Average (Php)	%
Small land-owner (≤3.0 ha) (N=56)	44,366.95	30,092.86	25
Medium land-owner (3.1 to 5.0 ha) (N=29)	47,866.59	39,380.34	32
Big land-owner (>5 ha) (N=57)	96,097.00	53,306.12	43
TOTAL		**122,779.32**	**100**

Equitability of land area holdings was somehow enhanced by local project governance as indicated by consistently decreasing Gini Ratio values during and after project intervention with reference to the 1995 Gini Ratio (figure 5). Hence, the income derived from the project enhanced the financial capability of the medium and small land holder participants which they used to purchase or rent land. Cruz (1988) in her study on farm land distribution among the occupants of the Makiling forest reserve of the University of the Philippines Los Baños, similarly found the unequitable distribution with relatively high Gini ratio of 0.67. This was depicted in her Lorenz curve showing the proportion of the household population holding a corresponding percentage of land area,

with 12.5% of the total households occupying 66.7% of the land area, while the majority, at 55% of the population, occupied only 7.6% of the total land area.

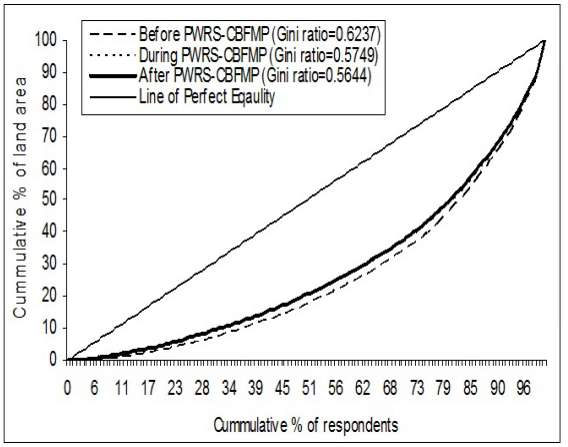

Figure 5. Distribution of land area of the CB-FM-PWRS participants before project (1995), during project (2000), and after project (2007)

4.0 Conclusion

Based on the findings, it can be concluded that the Pulangi Watershed Rehabilitation Sub-project was not able to attain financial efficiency and address equitability. Economic condition of the participants was temporarily improved because of the increase in income; but this was not sustained after project termination. The project component (reforestation) turned out to be non-financially profitable because of the poor growth performance of trees.

Equitable distribution of benefits to participants was only temporarily addressed by the project. The equitability problem recurs after project termination. Only those economically affluent, local elites and those who had big land resources had access to tree growing; and thus reaped the project's financial benefits. Access of the disadvantaged, landless and resource poor people was constrained by the policy of the Association on participation which required farmers to allocate a portion of their land to tree growing as requisite for membership.

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