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Perceived Economic Impacts of the Projects Under the Community-Based Forest Management-Comprehensive Agrarian Reform Program (CBFM-CARP) in Caraga Region

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A B S T R A C T

The Community-Based Forest Management-Comprehensive Agrarian Reform Program (CBFM-CARP) is a national strategy designed to empower local communities through sustainable forest resource use and improved livelihoods. This study assessed the perceived economic impacts of the CBFM-CARP projects among nine People's Organizations (POs) in the Caraga Region, Philippines. Using the standardized assessment tool from FMB Technical Bulletin No. 9., the study evaluated household income changes before and after project implementation through one-on-one assisted interviews with 129 direct project beneficiaries. Findings revealed that the estimated contribution of CBFM-CARP interventions to total household income ranged from 24% to 62%. Eight out of nine POs showed a statistically significant increase in household income after project implementation (α=0.05), indicating the positive effect of agroforestry, mangrove rehabilitation, and livelihood diversification supported by the program. The study also documented increases in net farm-based income, particularly among upland beneficiaries involved in rubber, falcata, and fruit tree cultivation. Meanwhile, coastal POs engaged in mangrove rehabilitation showed mixed outcomes. Overall, the CBFM-CARP projects have contributed meaningfully to improving household income and socio-economic conditions of participating communities, while promoting sustainable forest resource management. The findings support the continued integration of community-based forestry and agrarian reform initiatives to foster inclusive rural development.

Keywords: *Rural Livelihoods, Forest-Based Enterprises, Agroforestry Development Rural Livelihoods,*

1 Introduction

Sustainable forest management seeks to harmonize current social, economic, and environmental requirements with those of the coming generations. The Forest Stewardship Council (FSC) is a global organization promoting responsible forest management. They facilitated and joined with environmental organizations, representatives of the forest industry, and community representatives in the multi-stakeholder process that resulted in developing a set of guidelines and standards for forest management. The FSC certification procedure demands that forests be maintained in a way that is commercially sustainable, socially just, and environmentally responsible (Council 2021). In the Philippines context, addressing rural poverty remains a pressing concern, particularly in

rural areas where poverty remains a recurring issue, especially in areas where agriculture and forest resources are primary sources of livelihood.

In response to the continued degradation of the country's forestlands and the inequitable distribution of benefits from forest resources, the Philippine government adopted the Community-Based Forest Management (CBFM) strategy in 1995 to address widespread deforestation and rural poverty (Carandang 2012). CBFM advocates for active community participation in managing, conserving, and utilizing forest resources, thereby improving both environmental outcomes and community welfare (Guiang et al. 2001, Carandang et al. 2013). Historical data from the Food and Agriculture Organization (1997) reveal a drastic reduction in Philippine forest cover from 12 million hectares in 1960 to approximately 5.7 million hectares, largely due to illegal logging, land conversion, and population pressures. Along with the Comprehensive Agrarian Reform Program (CARP), the government initiative aims to empower communities through land tenure security, livelihood opportunities, and greater participation in natural resources stewardship. However, economic impacts remain mixed due to limited market access, inadequate support, and policy inconsistencies (Ballesteros 2017).

The Caraga Region, commonly referred to as the "timber corridor" of the Philippines, is a key area for smallholder tree farming and agroforestry. Despite favorable biophysical conditions and significant timber production potential, many of the region's farmers continue to face economic hardship. Recent studies have shown that a large proportion of both tree farmers and non-tree farmers earn below the national and regional poverty thresholds, indicating persistent income insecurity and limited access to sustainable livelihood opportunities (Peras et al. 2020). Participation in the CBFM program, however, has demonstrated potential in enhancing the well-being of upland communities with notably increased household income compared to pre-CBFM levels, acquisition of household and farm assets previously uncommon in forest-dependent areas, and the creation of local employment opportunities (Espiritu et al. 2010).

Caraga Region, with a total land area of approximately 1.9 million hectares and 523,292 hectares of forest cover (as per the 2007 Philippine Forestry Statistics), has been one of the key regions for the implementation of CBFM-CARP. Characterized by a mix of mountainous, rolling, and lowland terrain, it has seen the active participation of several People's Organizations (POs) engaged in reforestation, livelihood generation, and forest management. Given the scale of intervention, it is imperative to assess the economic impacts of the program on its beneficiaries. This study, therefore, aims to evaluate the perceived economic impacts of the CBFM-CARP projects in the Caraga Region. Through this assessment, the research seeks to determine how these initiatives have influenced household incomes, employment opportunities, land productivity, and community resilience. Moreover, the impact assessment will provide critical insights into the program's effectiveness, highlighting both its advantages and limitations and guiding future improvements in policy and implementation (FMB Technical Bulletin No. 9). As such, the Community-Based Forest Management and the Comprehensive Agrarian Reform Program stand as cornerstones of inclusive environmental governance and rural development in the Philippines.

2 Materials and Methods

Profile of Participating People's Organizations

The impact assessment encompassed nine (9) duly recognized People's Organizations (POs) operating within the Caraga Region, Philippines. These organizations were purposively selected based on their direct involvement in community-based resource management and conservation initiatives. The participating POs include: (1) Bonifacio Reforestation People's Organization (BORPO); (2) Marcos Calo Farmers Multi-Purpose Cooperative (MACAFA-MPC); (3) Balungagan Reforestation Farmers Association (BARFA); (4) Lawigan Farmers and Fisherfolk Association (LAFFA); (5) Opong/Fabio Dwellers Mangrove Association (OPFADMA); (6) San Isidro Coastal Dwellers Association, Incorporated (SICDAI); (7) Iligan Tribal Farmers Community Development Association, Incorporated (ITFCDAI); (8) Singanan Upland Farmers Producers Cooperative (SUFPCO); and (9) Tigpanalipod sa Katunggan nan Magasang (TIKAMA).

The geographical distribution of these POs and the corresponding number of project beneficiaries engaged during the assessment are presented in Figure 1 and Table 1. In total, 129 project beneficiaries participated in the assessment.

Assessment Framework and Instrumentation

The assessment applied FMB Technical Bulletin No. 9, the Department of Environment and Natural Resources' standard tool for evaluating the impacts of Community-Based Forest Management projects under the Comprehensive Agrarian Reform Program

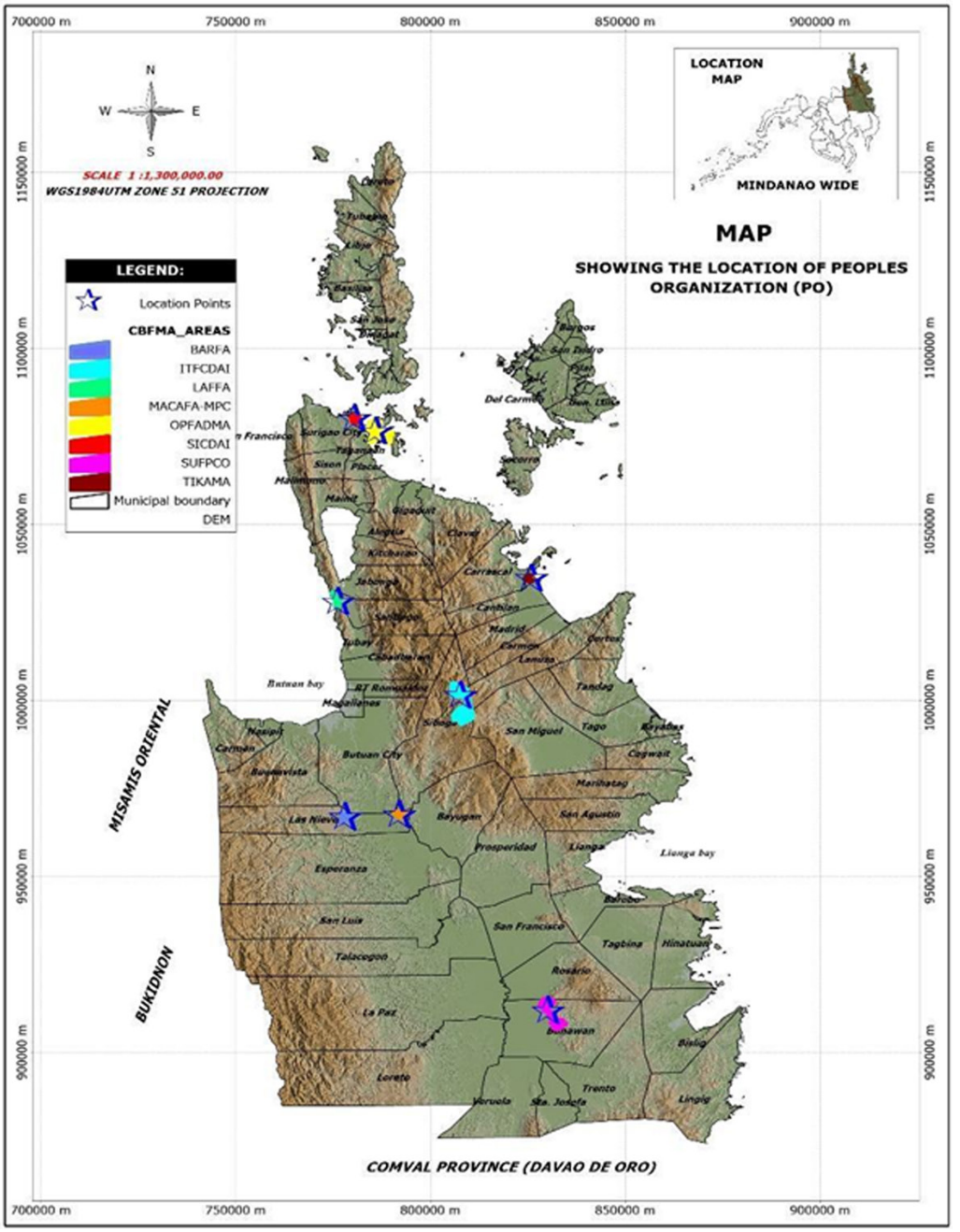

Figure 1. Location of People's Organization in Caraga Region, Philippines

Table 1. People's Organization Participants and Location

PO Name	Location	Number of Participant-Beneficiaries
Bonifacio Reforestation People's Organization (BORPO)	Barangay Bonifacio, Las Nieves, Agusan del Norte	14
Marcos Calo Farmers Multi-Purpose Cooperative (MACAFA-MPC)	Barangay Marcos Calo, Las Nieves, Agusan del Norte	17
Balungagan Reforestation Farmers Association (BARFA)	Barangay Balungagan, Las Nieves, Agusan del Norte	20
Lawigan Farmers and Fisherfolk Association (LAFFA)	Barangay Lawigan, Tubay, Agusan del Norte	11
Opong/Fabio Dwellers Mangrove Association (OPFADMA)	Brgy. Opong/Fabio, Taganaan, Surigao City, Surigao del Norte	13
San Isidro Coastal Dwellers Association, Incorporated (SICDAI)	Barangay San Isidro, Surigao City, Surigao del Norte	13
Iligan Tribal Farmers Community Development Association Inc. (ITFCDAI)	Barangay Padiay, Sibagat, Agusan del Sur	9
Singanan Upland Farmers Producers Cooperative (SUFPCO)	Brgy. San Andres and Consuelo, Bunawan, Agusan del Sur	13
Tigpanalipod sa Katunggan nan Magasang (TIKAMA)	Magasang, Cantilan, Surigao del Sur	19

(CBFM-CARP). This instrument comprises two distinct components designed to capture both socio-economic and biophysical indicators of project outcomes.

Set A of the instrument was utilized to assess the socio-economic impacts of the project, specifically focusing on changes in household income and livelihood conditions. Set B, on the other hand, was employed to evaluate the biophysical condition of the project sites, encompassing aspects such as forest cover, land use, and resource management practices.

The present study primarily concentrated on the socio-economic dimension, with particular emphasis on determining: (i) the total monthly household income before and following project implementation; (ii) the total income generated directly from the CBFM-CARP project interventions; and (iii) the net income derived from various farm-based livelihood sources.

Data Collection and Sample Selection Criteria

Data collection activities were conducted across the identified project locations, facilitated by designated representatives from the DENR Regional Office and the respective City Environment and Natural Resources Offices (CENROs) in Caraga. It is important to emphasize that project interventions varied across People's Organization (PO) members; therefore, only those members who directly received project assistance and met the eligibility requirements were invited to participate in the assessment.

Eligibility criteria for participation included the following conditions:

- The respondent must be a direct beneficiary of the CBFM-CARP project;
- In instances where the direct beneficiary was unavailable, the spouse or an immediate household member knowledgeable about the project outcomes was permitted to participate on their behalf;
- For non-literate beneficiaries, family members were allowed to assist in providing the necessary information during the interview process.

An assisted, one-on-one interview approach was utilized to elicit data from the participants, focusing on their perceptions of the economic impacts of the CBFM-CARP project. This method ensured data quality by providing clarification and assistance to respondents as needed, particularly for those with limited literacy or comprehension.

Data Analysis

The study utilized a quantitative research design to assess the economic status of selected project beneficiaries, with particular emphasis on income derived from CBFM-CARP projects and other farm-based livelihood sources. Descriptive statistical methods, including the computation of means, standard deviations, frequencies, and percentages, were employed to summarize and describe the key characteristics of the data. Wilcoxon Signed-Rank test, a non-parametric statistical analysis appropriate for paired observations, was conducted to evaluate changes in household income before and after project implementation.

3 Results and Discussion

The decline of forest cover and degradation of its resources are often attributed to poverty, high upland population growth, de facto management, and open access (Guiang et al., 2001). The recognition of this

problem has led to the proclamation of Presidential Executive Order (EO) No. 263 as a national strategy to ensure the sustainable development of the country's forestland resources. EO 263 legitimates the respective people's organization, on which their livelihood depends, as resource managers of the nation's forest.

People's Organization Profile and Project Awarded

Caraga has one-hundred twenty-six (126) CBFM Agreements (CBFMA) as of 2013. This agreement is entered into by and between the government and the local community, represented by the PO, as forest manager. Table 1 shows the list of POs assessed in this study which has approved funding from 2012 to 2015. Six POs are in an upland ecosystem, while three are in a coastal ecosystem. Project in the upland includes agroforestry planting of rubber, falcata, fruit trees, cacao, and banana, while mangrove rehabilitation and mud crab fattening projects in the coastal area. The project with a greater number of members has the highest funding attributed to the number of individuals who can implement the work plan activities (Table 2). Among the POs that have the highest funding are BORPO, MACAFA-MPC, and SUFPCO, which have a total members of 561, 121, and 118, respectively. These POs received more than one (1) million pesos in funding. BORPO and MACAFA-MPC are both in the municipality of Las Nieves and have the same project - Rubber Plantation Development with Banana and SUFPCO with Rubber and Falcata Development project. In contrast, the project with less funding is on the coastal area that involved mangrove rehabilitation. This project has fewer activities and materials needed compared to upland projects.

Respondents Socio-Economic Profile

Socio-economic data helps understand actual conditions in the community. This study can help identify POs with limited education, fewer employment opportunities, and low income, which can be used as a basis for targeted measures to reduce poverty and bridge inequality gaps.

The average age of members across POs ranges from 47.37 years to 57.67 years, indicating a relatively mature aging population actively involved in these organizations (Table 3). In terms of educational attainment (measured as years in school), it varies between 7.22 and 9.74 years, which suggests that some participants may have completed elementary to early level, and others have slightly higher educational exposure. Training and capacity building conducted by various national government agencies under respective programs from the Department of Environment and Natural Resources (DENR), the Department of Agriculture (DA), the Department of Social Work and Development

Table 2. Peoples Organization Profile and Project Awarded Details

PO's Name	Total Area (hectare)	Total No. of PO Members	CBFM No. and Date Awarded	CBFM-CARP Project	Year Approved for Funding (Php)	Project Cost
BORPO	242	561	70030 / October 19, 2005	Rubber Plantation Development with Banana	2012	1,088,506.25
MACAFA-MPC	356	121	70029 / October 19, 2005	Rubber Plantation Development with Banana	2012	1,088,506.25
BARFA	399	86	70033 / October 19, 2005	Rubber Plantation Development with Cacao	2013	827,700.00
LAFFA	267	58	70028 / October 20, 2005	Rubber and Fruit Trees Plantation Development	2013	492,055.00
OPFADMA	1,401.50	81	72009 / June 24, 2003	Mangrove Rehabilitation	2013	254,330.00
SICDAI	324	24	72005/ December 22, 2000	Mangrove Rehabilitation	2015	512,350.00
IITFCDAI	2,639.75	41	71005 / December 31, 1998	Rubber and Falcata Plantation Development	2012	808,629.00
SUFPCO	1,037.00	118	71019 / July 29, 2002	Rubber and Falcata Development	2014	1,056.537.00
TIKAMANA	53.0	38	73031 / August 6, 2011	Mangrove Rehabilitation and Mud Crab Fattening	2012	151,425.00

(DSWD), and others have helped them acquire learnings that could improve their well-being.

The POs' household size ranges from 4.20 to 6.23, indicating moderately large family sizes, which is typical of rural or agrarian communities. Some household children who are married still stay with their parents, making the household size large. Results of the number of earning family members suggest that only about two members contribute to the family income. This may reflect underemployment or limited job opportunities in their respective area. While interview results indicate that some members of the household work abroad and help augment household income. In terms of income, there is a significant disparity where the lowest income is reflected in the members of LAFFA and the highest in the members of TIKAMANA. High-income variation for POs like TIKAMANA, SUFPCO, and MACAFA-MPC implies a large income gap within their memberships, reflecting unequal access to livelihood opportunities or diversified income sources. On the other hand, POs like LAFFA, SICDAI, and OPFADMA have low household incomes with relatively smaller standard deviations, indicating economic homogeneity characterized by subsistence living and limited livelihood options.

Income derived from CBFM-CARP Projects

The funds granted by the CBFM-CARP projects provided the organization with materials needed in agroforestry and rehabilitation activities such as establishing a nursery, procuring seedlings and organic fertilizer, and planting. Over time, plantation and rehabilitation could reap many benefits from the direct provision of additional income from agricultural and forestry products and improve ecosystem service of mangroves that contribute to increased fisheries production (Ellison et al. 2020). Such products are expected to account for substantial shares as known sources of food and construction materials (Wiebe et al. 2022). The average monthly income of all POs before the project implementation falls between poor and low-income classes based on the indicative range of monthly family incomes in the Philippines (Albert et al. 2018). Before the project, every household could earn an average monthly income of PHP 15,000.0 or below (Figure 2).

On the other hand, a significant income increase can be seen from the figure, except for the case of SICDAI, which shows a relatively decreased trend after the project was implemented. Four POs namely BORPO, ITFCDAI, SUFPCO, and TIKAMANA have improved their income classification as a low middle-income class with average monthly income falling between PhP19,040.00 and PhP38,080.00. This increase in income can be attributed to project revenues and benefits, where a higher percentage of the households' earnings came from CBFM-CARP projects (Figure 3).

Approximately 62.5% of the total monthly income of SUFPCO beneficiaries is derived from CBFM-CARP projects, as the majority of members rely on agroforestry as their primary source of livelihood. While other POs show a high increase in income after the project implementation, such as TIKAMANA yielded from Php14,989.00 to PhP29,889.00 average earnings, some other POs remained at the poor income classification, such as BARFA, LAFFA, and SICDAI, which should be given more attention. In the case of LAFFA, with the lowest percentage (24.1%) of earnings from the project, the organization resorted to other means of living since most of the project's activities were not fully attained. This is after finding some planting failures during the project implementation and other inevitable factors, such as the biophysical characteristics of the study location. Generally, the

Table 3. Socio-economic profile of participants from nine participating POs

PO Name	Age	No of years in School	Household Size	Number of earning family members	Total Household Monthly Income (in peso)
BORPO	54.46 ± 12.69	9.38 ± 4.01	6.08 ± 2.47	1.92 ± 0.95	59,704.00 ± 76,421.99
MACAFA-MPC	57.67 ± 12.99	7.73 ± 2.55	5.47 ± 2.61	1.87 ± 0.92	141,101.33 ± 121,722.20
BARFA	54.40 ± 12.24	7.28 ± 4.35	5.8 ± 2.89	1.67 ± 0.91	76,965.00 ± 76,686.56
LAFFA	51.00 ± 16.01	8.20 ± 3.08	4.20 ± 1.75	1.88 ± 1.13	9,661.73 ± 5,080.87
OPFADMA	57.31 11.43	9.62 3.80	6.23 ± 2.95	1.70 ± 0.95	14,575.64 ± 20,592.29
SICDAI	51.38 ± 8.76	8.85 ± 2.38	5.62 ± 2.10	1.92 ± 1.26	10,103.85 ± 7,637.35
ITFCDAI	49.00 ± 20.32	7.22 ± 4.52	5.7 ± 2.2	2.22 ± 0.97	22,566.48 ± 22,126.76
SUFPCO	53.69 ± 13.51	8.31 ± 3.79	4.23 ± 1.33	2.15 ± 0.99	253,584.62 ± 221,225.46
TIKAMA	47.37 ± 9.24	9.74 ± 2.60	6.21 ± 1.78	2.32 ± 1.34	358.666.95 ± 447,219.9

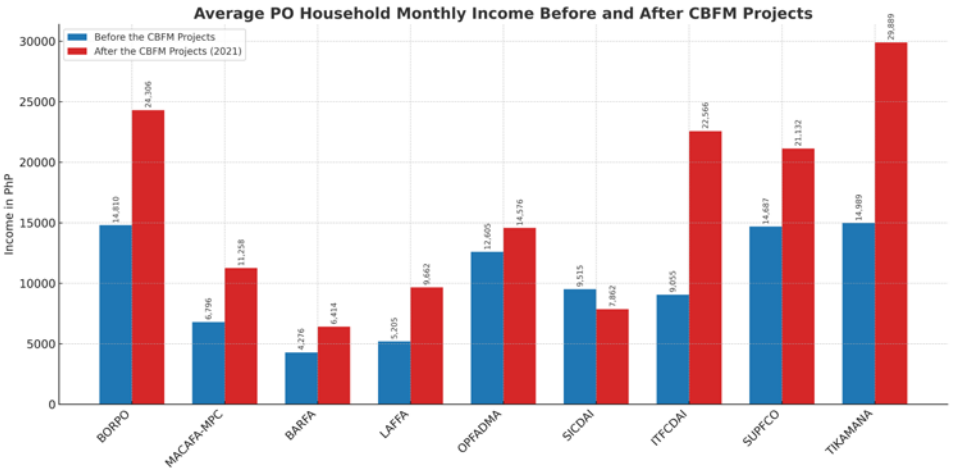

Figure 2. Estimated average total household monthly income of PO Members

CBFM-CARP projects awarded for these POs help in the income generation of its beneficiaries.

Income derived from other Farm Sources

Figure 4 shows the net income derived from farm sources before and after the implementation of the CBFM project. These were from fruit trees, crops, non-timber forest products, forest trees, livestock, and aquaculture activities. Data shows that the income of MACAFA-MPC, BARFA, LAFFA, SICDAI, SUFPCO, and TIKAMANA increased during the year 2020-2021, attributed to increased production and prices of fruits, crops, trees, and other farm produce. CBFM encourages the beneficiaries to develop various income-generating activities in addition to the sustainable harvesting of forest products. Communities may see increased revenues due to this diversification of income sources. Community-managed Forest areas might have better access to new markets for forest goods or timber products that are certified as sustainable. Also, communities can do away with middlemen or intermediaries by handling the harvesting and selling of forest products themselves. This practice may increase revenue and profits from using forest resources (Carandang & Wilson 2005, Tacconi & Kaimowitz 2019). For communities, this may open new revenue options. Aside from economic benefits, the communities also increased social capital, which can lead to greater cooperation and coordination within the organization. In addition, the enhanced skills and knowledge acquired are beneficial for the group. However, BORPO, OPFADMA, and IFTCDAI net income decreased due to pest attacks and natural calamities.

During the phase of the implementation period, members of these organizations refused to raise livestock such as swine due to high inputs and African Swine Fever (ASF) disease. Many countries also experienced major price volatility of pigs in the market due to the ASF outbreak resulting from scaled backing of the operations (Xu et al. 2022). Certain community members may have better access to resources than others in some instances where the distribution of forest resources under CBFM is not equitable. Increased production of forest products due to CBFM may result in overproduction and lower prices in local markets. For communities that depend on the sale of forest products, this may mean lower incomes (Iversen & Chhetri 2011, Poudyal & Baral 2011). Community-based financial management (CBFM) communities may be exposed to outside forces including natural disasters, shifting economic conditions, and governmental regulations. These elements may have an adverse effect on income levels and local.

Economic Impact of CBFM Projects: Comparison of Household Income Before and After Project Implementation

In the Philippines, forest-dependent communities have experienced significant changes in household income levels following the implementation of Community-Based Forest Management (CBFM) initiatives. Results of the Wilcoxon Signed-Rank Test (Table 4), revealed a statistically significant difference ($p < 0.05$) in the total monthly household income of most beneficiary

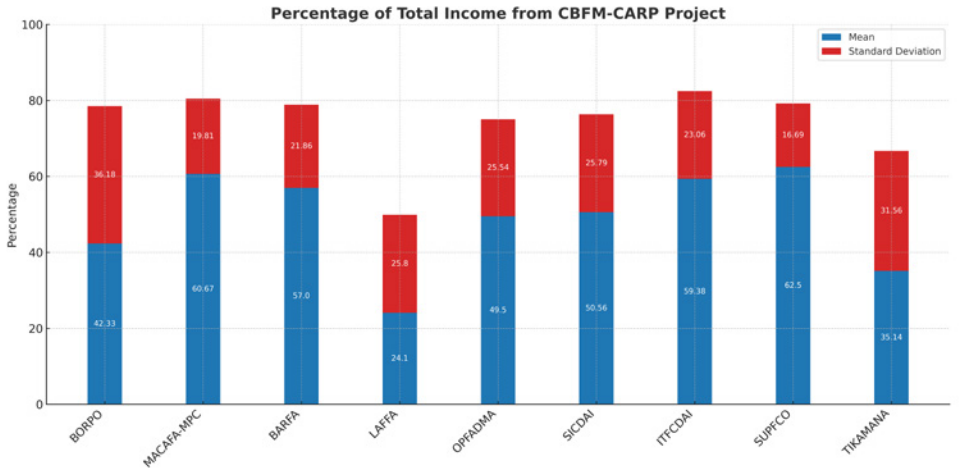

Figure 3. Estimated Percentage of total income from CBFM-CARP Project livelihoods (Tigabu & Luukkanen, 2012).

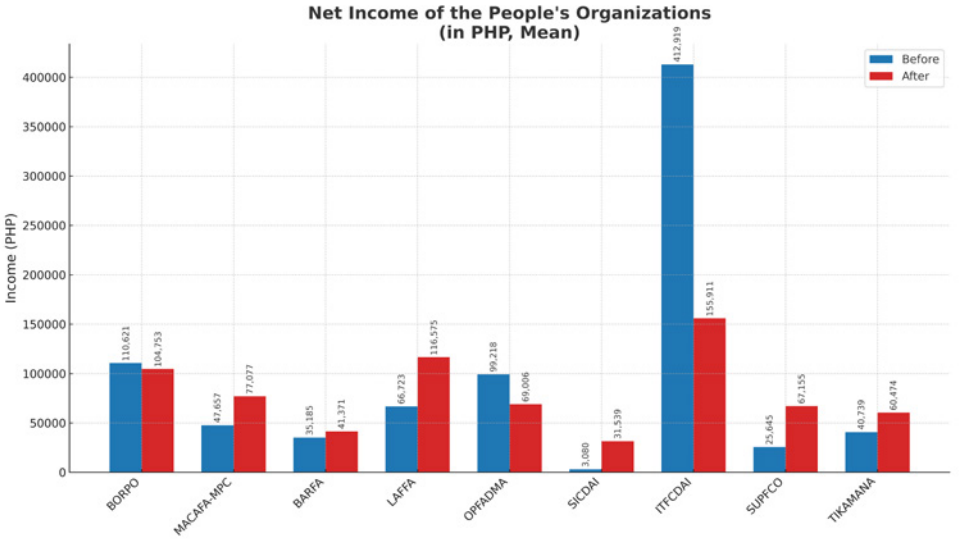

Figure 4. Summary of estimated net income derived from different farm sources before and after CBFM project implementation.

members of People's Organizations (POs) before and after project implementation. This indicates that the CBFM-CARP interventions contributed to improving household income among the majority of project participants.

However, the results for the Opong/Fabio Dwellers Mangrove Association (OPFADMA) were not statistically significant, suggesting no measurable change in the monthly household income of its members following project implementation. This may be attributed to project design, incomplete implementation of planned interventions, or external socio-economic and environmental factors, which warrant further investigation through localized case studies or process evaluations.

The observed increase in income among project beneficiaries is primarily attributed to the integration of diversified livelihood commodities within CBFM sites, including the cultivation of fruit trees, timber species, and non-timber forest products. This diversified approach enhanced harvest yields and generated additional income streams for the participating communities.

Previous studies have similarly documented the positive socio-economic impacts of community-based forest management initiatives. For instance,

Table 3. Socio-economic profile of participants from nine participating POs

Peoples Organization	p-value
BORPO	0.040**
MACAFA-MPC	0.003***
BARFA	0.008***
LAFFA	0.003***
OPFADMA	0.083^{ns}
SICDAI	0.003***
IITFCDAI	0.027**
SUFPCO	0.038**
TIKAMANA	0.004***

Braganza et al. (2012) highlighted that such projects significantly enhance the economic viability and overall sustainability of resource management efforts. Fajar & Kim (2019) further reported that CBFM not only provides direct employment opportunities (e.g., through forest management, agroforestry, and ecotourism) but also generates indirect economic benefits by stimulating related enterprises, such as food establishments, accommodations, transportation services, and small retail outlets near project sites.

Moreover, CBFM initiatives have effectively broadened economic opportunities for rural communities by facilitating access to financial capital, enabling land leasing for plantation development, and establishing market linkages for value-added forest-based products such as coffee, timber, and handicrafts. The creation of Community-Based Forest Enterprises (CBFEs) has been particularly instrumental in diversifying household income and promoting sustainable resource use. Pandit et al. (2008) emphasize that such enterprises enhance economic inclusion by ensuring the participation of marginalized groups and improving access to livelihood assets. As they noted, one good practice is the provision of a revolving fund by donors that will enable the poor to buy shares in the cooperative or company. Other practices include offering labor opportunities to the poorest, and representation of the poorest and marginalized in FUG executive committees (Pandit et al. 2008). These practices underscore how CBFEs serve not only as economic mechanisms but also as social instruments that foster equity and resilience in forest-dependent communities.

Empirical research demonstrates that participation in CBFEs leads to notably higher income levels compared to non-participants. In the Philippines, a comparative study in Baybay City, Leyte, found that CBFM member households had significantly greater mean incomes than non-members, based on independent samples t-tests across agroforestry projects involving coffee, cacao, and timber crop production (Compendio & Bande 2017). The study supports the findings of Pandit et al. (2008), who evaluated 28 forest user group enterprises and found that income benefits were highest in formal companies, followed by cooperatives and networks particularly where poorer members held shares or were directly employed in non-timber forest product processing. These enterprises enhanced market access by leveraging economies of scale, improving product quality, and enabling entry into higher-value markets, thereby reinforcing their role as economic drivers of sustainable rural development.

Before the implementation of CBFM, many forest-dependent communities engaged in environmentally unsustainable livelihood activities, including slash-and-burn agriculture and illegal timber harvesting (Charnley & Poe 2007, Peralta & Lasco 2014). The introduction of CBFM has provided these communities with more sustainable, ecologically sound, and economically viable livelihood alternatives, contributing to both poverty alleviation and forest conservation objectives.

4 Conclusion and Recommendations

The utilization of forest and mangrove resources is a source of income in upland and coastal communities. The lack of policy intervention on the means to safeguard these resources can lead to exploitation and degradation that further exacerbate poverty to its users and compromise the ecosystem services it provides. The community-based forest resource management strategy is a mechanism to harmonize socio-economic activity and the health

of the environment. Fund support and the capacity building of its direct stakeholders is an effective means to manage natural resources collectively. Income generated from agroforestry serves as an alternative source of income for its beneficiaries to improve their socio-economic status.

5 Acknowledgement

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6 Statement of Conflict of Interest

MV Elvira, part of the Editorial Board of JESEG abstained in the reviewing process of the article in the journal.

7 Author Contribution

JRD Apdohan drafted the extended abstract and introduction, the structural outline for the full paper and the final proofreading of the manuscript. KB Burdeos and MV Elvira wrote the methodology and collaborated with drafting the results and discussion and its revision. MAP Perodes, MC Amarille, and J Valdehueza created the study area map and contributed to the development of the introduction and the results and discussion sections. KJG Dulabay performed data analysis and interpretation.

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