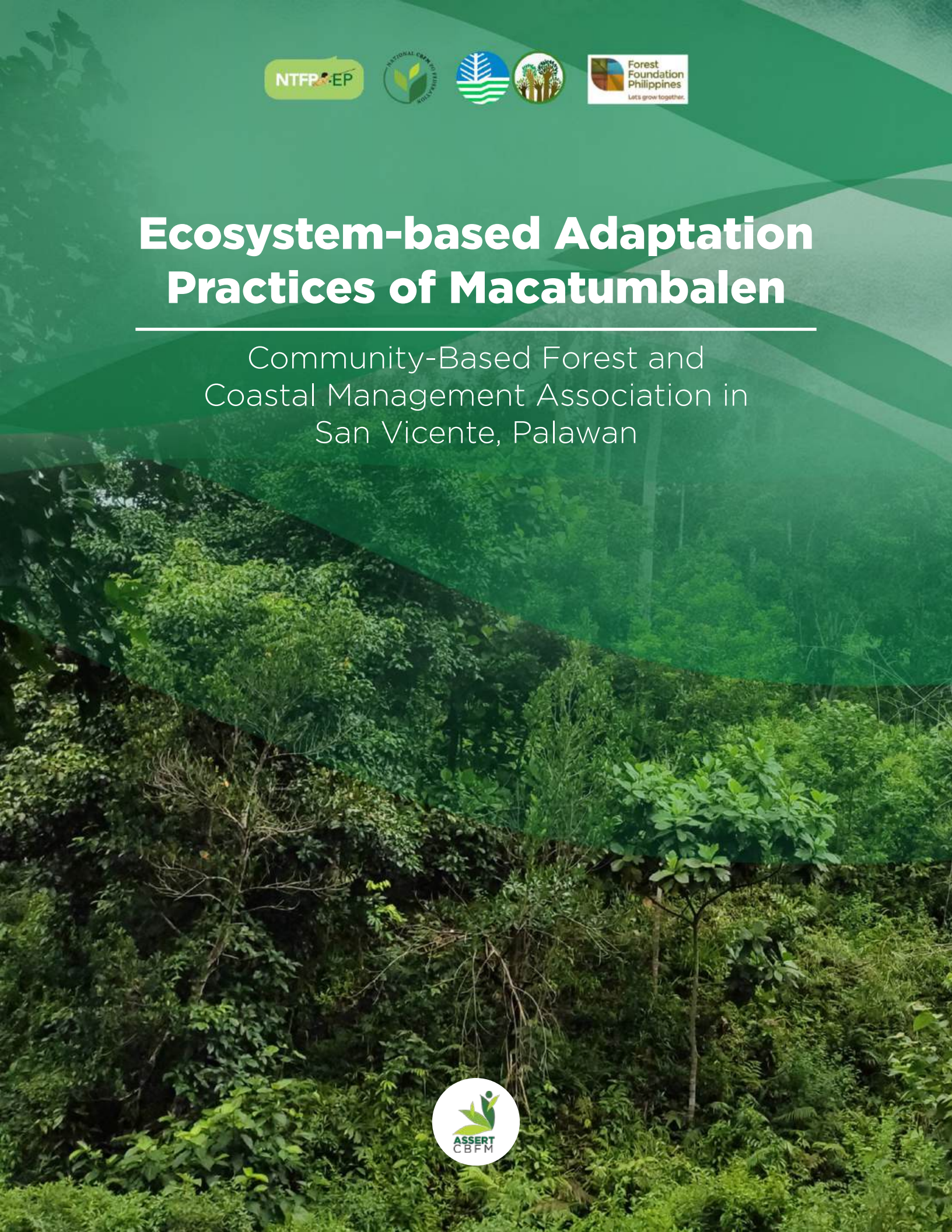
Ecosystem-based Adaptation Practices of Macatumbalen

Community-Based Forest and Coastal Management Association in San Vicente, Palawan



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LIST OF ACRONYMS

CARP	Comprehensive Agrarian Reform Project
CBFM	Community-Based Forest Management
CBFMA	Community-Based Forest Management Agreement
CBMS	Community-Based Monitoring System
CCC	Climate Change Commission
DA	Department of Agriculture
DENR	Department of Environment and Natural Resources
DOST	Department of Science and Technology
EbA	Ecosystem-based Adaptation
ELAC	Environmental Legal Assistance Center
ENGP	Expanded National Greening Program
FEBA	Friends of EbA
FFP	Forest Foundation Philippines
FMB	Forest Management Bureau
GGGI	Global Green Growth Institute
IPCC	Intergovernmental Panel on Climate Change
LCCAP	Local Climate Change Action Plan
LGU	Local Government Unit
MCBFCMA	Macatumbalen Community-Based Forest and Coastal Management Association
NDC	Nationally Determined Contributions
NGP	National Greening Program
NTFP	Non-Timber Forest Product
NTFP-EP	Non-Timber Forest Products - Exchange Programme
NWRB	National Water Resources Board
PCSD	Palawan Council for Sustainable Development
PhilFIDA	Philippine Fiber Industry Development Authority
PNNI	Palawan NGO Network Inc.
PO	People's Organization
PSA	Philippine Statistics Authority
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

Executive Summary

The Philippines is among developing countries with the least greenhouse gas emissions but are greatly affected by the impacts of climate change. A signatory to the 2015 Paris Agreement that seeks to limit global warming, the Philippine government has recognized the roles of forest ecosystems in the fight against climate change, and included forest protection and restoration in its updated Nationally Determined Contributions (NDCs) (Republic of the Philippines, 2021). Such climate action commitments have been integrated into the National Climate Change Action Plan 2011-2028 and the Philippine Master Plan for Climate Resilient Forestry Development 2016-2028. Specifically, forest protection and restoration, regarded as ecosystem-based adaptation (EbA) approaches for increasing forest ecosystems and communities' climate resilience, are undertaken through the National Greening Program (NGP) and Community-Based Forest Management (CBFM) (FMB, 2016, p. 135). The twin strategies are aimed at re-greening unproductive, denuded and degraded forestlands while addressing economic inequalities among forest-dependent rural communities nationwide.

In support of the country's fulfillment of climate commitments, the Non-Timber Forest Products-Exchange Programme (NTFP-EP) led a two-year project entitled, "Assessing, Engaging, and Recognizing Community-based Forest Management towards NDCs (ASSERT CBFM in NDCs) in the Philippines," from November 2019 to December 2021. Co-implemented with the NTFP-EP Philippines, FMB and CBFM People's Organization (PO) Federation, the project's overall goal was to assess, engage and recognize CBFM towards the Philippines' NDCs. Specifically, the project objectives are as follows: (1) assess, engage, and capacitate partners and key stakeholders of CBFM on NDCs through collective, collaborative learning and knowledge exchange activities, dialogues and exposure on community based and sustainable resource management and ecosystem-based adaptation practices; and (2) formulate policy inputs and recommendations from the collective and collaborative learnings and experiences and elevate policy recommendations to the NWG-CBFM and related national mechanisms on NDCs in the Philippines.

Executive Summary

As part of the ASSERT CBFM in NDCs Project, this case study was carried out to document the EbA practices of the Macatumbalen Community-Based Forest and Coastal Management Association (MCBFCMA), a PO based in the first-class Municipality of San Vicente in northern Palawan. The MCBFCMA – composed of 18 women and 17 men regular members – secured a CBFMA with the DENR in 2002. Under this 25-year production sharing agreement (renewable for another 25 years) covering 1,850-hectare forests, the PO has been authorized to implement forest protection, reforestation and forest-based entrepreneurial activities. For its 20 years of forest stewardship, multiple socioeconomic and environmental benefits have been generated, as per the assessment results of this case study that utilized the EbA quality standards and indicators designed by the Friends of EbA (FEBA, 2017). This study demonstrated that while the MCBFCMA's assisted natural regeneration projects and other related interventions were not initially planned out as EbA approaches, these eventually qualified as such in the long run. The following are the EbA outcomes and key lessons gleaned from the MCBFCMA:

EbA Outcomes

- Enrichment of 1,850-ha. forest (especially the watershed) with indigenous ipil, akle and narra trees, resulting in the protection of the community from more intense typhoons, droughts and other hazards associated with climate change
- NGP-funded reforestation of over 300-hectare area within the CBFMA area, providing cash-for-work opportunities for the MCBFCMA members from 2010 to 2019
- Monetary benefits from harvesting timber and non-timber forest products planted in the forest production sites site, allowing the MCBFCMA to establish its climate emergency fund
- Presence of Palawan and Philippine endemic wildlife species in the CBFMA
- Two decades of active community-initiated forestry law enforcement resulted in the seizure of 28 unregistered chainsaws, keeping the CBFMA area alive and thriving
- Access to steady supply of clean, free water for agriculture and domestic uses by PO members and non-members in Macatumbalen
- Empowerment and inclusion of traditionally disenfranchised sectors, such as women, youth and in participatory planning, decision-making and project implementing

Executive Summary

Key Lessons

Local capacity building allows for co-benefits maximization

- When forest-dependent people's full potentials are developed, they are fired up to implement interventions with short and long-term co-benefits that spill over to nearby communities
- Marginalized women, youth and indigenous peoples area should be integrated into the CBFMA area and must be empowered to become potent partners in EbA strategy execution
- Media reportage and local knowledge on weather and climate can help reduce forest communities' vulnerability to extreme weather event-related hazards
- Transparency with regards to organizational cash flow can maintain trust between and among PO members, in turn promoting cohesion, one key ingredient to community resiliency

Enabling policies usher in multisectoral support and commitment

- Multiple government policies promoting CBFM can elicit wider community support to EbA, thereby allowing CBFMA holders to scale up and replicate their positive impacts
- Alignment of EbA with local and national climate change action plans and development agenda ensures political recognition and approval of CBFM activities
- Sustained support to the CBFM program by the government, private and nonprofit institutions paves the way for the successful implementation of reforestation and other EbA projects
- Barriers to EbA implementation faced by the CBFMA holder must be overcome through the introduction of enabling approaches in order to achieve increased forest ecosystem resiliency

Executive Summary

Ecosystem health maintenance supports increased community resilience

- Maintaining forest ecosystem health is key to the sustainability of forest resources that are crucial for building climate-resilient livelihoods and communal emergency fund
- Biodiversity can be a source of community pride and inspiration, pushing people to continue carrying out forest conservation and protection initiatives even with less external support
- Strong typhoons can reverse reforestation gains and adversely impact forest ecosystem, thereby reducing the quality and quantity of benefits it provides to communities
- Overdependence of communities to forest-based livelihoods can heighten their vulnerability in case this ecosystem is hit by climate extremes, hence the need for diversification
- Key findings from this case study can guide concerned public, private and nonprofit institutions in designing EbA and non-EbA related programs and projects intended for increasing the climate resilience of POs involved in the CBFM. Additionally, the findings can also be used by the POs themselves in community-level planning and action to address their sources of vulnerability to climate change in order to increase their adaptive capacity over time.

1 Introduction

As human activities with immense greenhouse gas emissions have increased since the Industrial Revolution, scientists have observed changes in the earth's climate, giving rise to extreme weather events that have left unprecedented losses and damages to social and natural systems (Intergovernmental Panel on Climate Change [IPCC], 2022). The Philippines as the third most vulnerable to climate change is bearing the brunt of its impacts, primarily but not limited to shifts in rainfall patterns and distributions, more intense droughts and typhoons, water scarcity and biodiversity loss (Climate Change Commission [CCC], n.d.).

Philippine ecosystems under immense pressure from climate change include the forests. As of 2015 forestry statistics, the country recorded 7 million hectares of forest cover (Forest Management Bureau [FMB], 2020). With climate change at play, Lasco et al. (2008) warned that the reduction of forest areas due to increased forest fire occurrences can undermine forest ecosystem provisioning, regulating, supporting and cultural services. The FMB (2016) said this can adversely affect the climate resilience of forest-dependent rural communities, identified as the country's third poorest sector with poverty incidence at 34% in 2018 (Philippine Statistics Authority [PSA], 2020).

Ensuring forest health is vital to climate change adaptation of forest-dependent people (Meybeck et al., 2021). The United Nations Environment Programme (UNEP, 2019a) noted that adaptation is crucial for communities and economies to flourish even amid a changing climate, and it is possible through ecosystem-based adaptation (EbA). As defined by the Convention on Biological Diversity (CBD, 2009 as cited in FEBA, 2017), EbA is "the use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change." In harmony with the 2015 Paris Agreement that placed emphasis on promoting and maintaining ecosystem resiliency, the Philippines has included EbA in its NDCs on climate change adaptation strategies (Department of Environment and Natural Resources [DENR], 2016).

1. Introduction

In the Philippines' updated NDC (Republic of the Philippines, 2021, p.5), the country vows to undertake EbA in the forestry sector by pursuing "forest protection, forest restoration and reforestation, and access to results-based finance in forest conservation." In fact, the country has already been doing so through its several flagship environmental programs, notably the CBFM, which was institutionalized through Executive Order No. 263 (Office of the President of the Philippines, 1995).

A national strategy to achieve sustainable forestry and social justice, the Philippine government, through the CBFM, has entrusted the responsibility of forest rehabilitation, protection, and conservation to forest-dependent communities. Under this program, POs with a 25-year CBFM agreement with the DENR are provided with tenurial security and incentives to develop, utilize and manage specific portions of forestlands (DENR Administrative Order No. 29, 1996). Among the CBFMA holders is the Macatumbalen CBFCMA based in San Vicente, Palawan – the focus of this case study.

In an effort to raise awareness of the crucial roles that the CBFM plays in realizing the Philippines' NDC, the Non-Timber Forest Products-Exchange Programme (NTFP-EP) Asia led a two-year project entitled, "Assessing, Engaging, and Recognizing Community-based Forest Management towards Nationally Determined Contributions in the Philippines (ASSERT CBFM in NDCs)." Running from November 2019 to December 2021, it was co-implemented with the NTFP-EP Philippines, FMB and CBFM PO Federation. Among its expected outcomes is the conduct of pilot studies in Palawan and Sierra Madre landscapes that will increase the knowledge and common understanding of the contributions of CBFM to the NDCs. Hence, this case study was undertaken to document the EbA strategies of the MCBFCMA, a PO recognized by the FMB for its best forest conservation practices (Villanueva, 2018).

The overall objective of this case study is to provide evidence of CBFM's crucial role in the realization of the Philippine NDCs in order to gain more broad-based support for POs engaging in this sustainable forestry management strategy. More specifically, it seeks to (1) determine the climate change vulnerability of MCBFCMA; (2) to highlight MCBFCMA's EbA practices consistent with the NDCs; and (3) to recommend options for overcoming barriers to MCBFCMA's sustained climate resilience. Key findings from this case study can serve as bases for further improving the CBFM and the quantity and quality of government support being extended to POs engaging in this program supportive of NDCs.

2 Methodology

2.1 Study site

The study covered the 1,850-hectare Macatumbalen CBFMA area in Sitio Macatumbalen, Barangay Poblacion in the Municipality of San Vicente, Province of Palawan. Under the CBFMA or the production sharing agreement between the DENR and the MCBFCMA signed in 2022, 1,450 hectares or 78% of the area have been designated as protection zone, while 400 hectares or 22% have been devoted to production. The CBFMA area occupies 11% of the 165,799-hectare total land area of San Vicente, a first-class town with 31,232 people (PSA, 2017, p.4). Based on the 2014 CBMS results (as cited in LGU San Vicente, 2016, p.17), the municipality had a total labor force of 8,812 people – 4.48% were engaging in forestry enterprises. As of March 2022, the association that manages the CBFMA area has 35 regular members – 18 women and 17 men – all based in Poblacion's Sitio Macatumbalen. On one hand, it has 300 Tagbanua federate members – 150 women and 150 men – from the adjacent barangay of Kemdeng.

2. Methodology

2.2 Data Collection

Multiple primary and secondary data collection techniques were utilized for this case study conducted in March 2022. Primary data collection was done through key informant interviews (KIIs) and focus group discussions (FGDs) with MCBFCMA officials and members. Separate KIIs were also conducted with key DENR and LGU officials as part of data triangulation.

- Primary data collection: A questionnaire patterned after FEBA's (2017) assessment framework for EbA quality standards was developed to elicit insights into the EbA practices of the Macatumbalen community. For the FGDs, the following eight participatory tools adapted from CARE International (2019) were employed: hazard map, historical timeline, seasonal calendar, daily clock, Venn diagram, vulnerability matrix, impact chains and adaptation pathways.

  The FGDs had 14 participants, selected based on their active participation and length of experience in the association's activities. They were divided into two groups: one for association officials and another for members. Each group had seven participants, representing diverse sectors in the community, including women, youth, senior citizens, and indigenous peoples.

- Secondary data collection: Secondary sources, such as published and unpublished documents from various public, private and nonprofit institutions, were utilized in the study. Key points were synthesized to enrich the discussions on the study site's climate, ecosystem, livelihood, gender and governance contexts. Additionally, these secondary data aided in the cross-verification of KII and FGD responses concerning EbA quality standards and indicators achieved by the MCBFCMA.

3 Key Issues and Findings

3.1 Analysis of Climate Risks and Changes

San Vicente municipality's baseline climate falls under Type III climate, having a short dry season from January to April, with rainfall averaging from 10.6mm in February (driest) to 35.7mm in April, based on its Local Climate Change Action Plan (LGU San Vicente, 2016, p.15). The months of June to October experience the most rainfall with mean monthly values ranging from 242.0mm to 290.8mm. The action plan, moreover, noted that the municipality's annual mean temperature is 27.6°C, with the highest monthly mean value of 28.8° in May and the lowest of 26.9°C in January.

Climate projections by the Climate Change Commission and Global Green Growth Institute (CCC & GGGI, 2014, p.10) revealed the municipality would experience an increase in mean annual temperature by 1.8°C for 2050. Moreover, shorter but drier dry season (about 25% decrease in rainfall), as well as longer and wetter wet season (approximately 60-115% increase in rainfall), could also be expected. The projections also cover the potential increase in the number of months with extreme rainfall during the wet season and in the number of days with rainfall greater than 300 mm.

Over the past three decades, the Macatumbalen community has observed that the wet and dry seasons have changed and become more extreme. Specifically, community members, mostly belonging to Palawan indigenous groups Agutaynen, Cuyonen and Tagbanua, took note of the increase in frequency and intensity of typhoons that hit Palawan. According to San Vicente's Local Climate Change Action Plan, the municipality is no stranger to tropical cycles year after year, as the province saw a total of 105 tropical cyclones crossing from 1948 to 2011 (p.15).

3. Key Issues and Findings

3.1 Analysis of Climate Risks and Challenges

"With shorter/ drier dry seasons and longer/ wetter wet seasons expected to become more prevalent," according to San Vicente's LCCAP (p.38), "more frequent flood and drought events are expected to affect the local community's activities." The IPCC report (2022) stated with high confidence that agriculture and forestry are among the climate-exposed sectors that are expected to bear the brunt of economic damages from climate change. The Macatumbalen PO is not exempted as it is dependent on agro-forestry and non-timber forest products. Harvesting of honey and fruits, such as rambutan, jack fruit, banana, mango and marang, within the CBFMA area's production sites, respectively peaks in June to August and August to September. As this livelihood activity coincides with the wet season, rainfall intensification as a result of climate change within this period may diminish the quantity and quality of their harvest and income.

Taking into account the above climate projections and reflecting on their lived experiences of climate change, MCBFCMA members perceive that the increasing frequency of intense typhoons and drought are the most important climate risks affecting their EbA practices that underpin their forest-based livelihoods. Based on the responses from the FGD utilizing impact chain participatory tool, the direct impacts (immediate consequences) of intense and more frequent typhoons are flood, destruction of properties, and loss of trees; meanwhile, direct impacts for intense and more frequent droughts are forest fire, water scarcity and loss of crops. Below are the association's perceived indirect impacts (secondary consequences) of the abovementioned risks with implications to the MCBFCMA'S EbA practices and resilience:

3. Key Issues and Findings

3.1 Analysis of Climate Risks and Challenges

- On community enterprises and income: Occurrences of flooding, property destruction and tree loss due to typhoons could result in limited access to economically important NTFP (i.e., fruits, rattans, almaciga resins and honey) and other forest-based resources. Additionally, indirect impacts also include temporary closure of community-based ecotourism sites (i.e., mangrove ecopark and waterfalls) and destruction of upland reforestation sites and vegetable gardens in lowland. The decline in the quality and quantity of resources gathered, as well as the non-availability of their secondary income sources would mean reduction in income of the association and its members engaging in these economic activities. Drought-induced water scarcity is perceived to result in livestock and crop losses in the area.
- On community infrastructures and facilities: With typhoon-induced flooding, property destruction and tree loss, the indirect impacts could be the destruction of community infrastructures and facilities, such as telecommunication and power lines, access roads, and the association-run nursery house and water system. A facility susceptible to destruction resulting from drought-induced forest fires is the association-run water system found in the watershed within the CBFMA area. On one hand, their nursery house is spared from this risk as it is located in the lowland.
- On community health and well-being: Flooding as a result of typhoons and heavy rainfalls associated with monsoon surges could give rise to water-borne human illnesses and also contribute to the decline of water quality of the association's water system. Property destructions linked to the abovementioned climate risks are anticipated to result in homelessness. Moreover, forest loss due to typhoons and droughts is perceived to result in income reduction, food shortage, and more exposure to heat-related illnesses, thus impacting community health and well-being.

3. Key Issues and Findings

3.1 Analysis of Climate Risks and Challenges

- On household and community dynamics: Droughts that may trigger wild forest fire, water scarcity and loss of watershed could mean additional workload for women and their children who may be tasked to fetch spring and/or deep well water instead of sourcing it from the faucet. Water supply shortages could also trigger household and community conflicts. Additionally, the reduction of household income may force not just the father but everyone in the family to also pursue non-forest-based work to supply their family needs. All these are perceived to reduce their time for rest and recreation.
- On forest habitat and wildlife species: Both typhoons and droughts are seen to induce forest habitat and wildlife species loss. With typhoons, strong wind may topple many trees and kill wildlife. Droughts, meanwhile, may cause forest fire that can decimate wildlife. In extreme weather events like these, the community's capacity to patrol the forest and enforce environmental laws may also be stifled, emboldening violators to take advantage of the situation. In such cases, it may result in further deterioration of forest habitat and wildlife populations, which could have negative repercussions as well to the community's health and well-being, forest-based enterprises and household income.

3. Key Issues and Findings

3.1 Analysis of Climate Risks and Challenges

Typhoon Odette and Beyond: Most of the direct and indirect impacts listed above have been apparent in the aftermath of Typhoon Odette. On December 17, 2021, Typhoon Odette made a destructive landfall over northern Palawan, destroying many trees within the CBFMA area. Elders in the people's organization said Odette was so far the strongest storm to batter their municipality. Assessments of the full extent of forest damage left by Odette in the area only began in March 2022 or three months after the typhoon, with the Community Environment and Natural Resources Office – Roxas taking the lead.

If not cleared immediately, voluminous tree debris scattered all over the CBFMA area due to Odette may cause forest fire when the dry season comes in full swing. Other observable climate change-linked hazards, albeit currently perceived to be low impact, are heavy rainfall-induced floods in the Inandeng River whose headwater is the CBFMA area. The people's organization pointed to the illegal small-scale gravel and sand collection in the river by non-members as aggravating this problem during the rainy season. All these risks are threatening the sustainability of forest resources in the CBFMA area.

Since the MCBFCMA is heavily reliant on the forest resources for their daily needs, their survival is likewise left hanging in the balance. In the aftermath of Typhoon Odette, many trees fell and blocked trails, limiting men in the community from accessing non-timber forest products like the economically important honey, fruit trees, rattans, and almaciga resins. Trails leading to three waterfalls with high ecotourism potentials were also obstructed by forest debris.

3. Key Issues and Findings

3.1 Analysis of Climate Risks and Challenges

Disruptions such as these have resulted in the reduction of household income in the Macatumbalen community, pressuring women who, on top of doing household chores from sunrise to sundown, have traditionally been assigned to make both ends meet out of their stretched-thin family finances. Typhoons that may successively occur in the future could further take a toll on women's mental health and well-being, affecting their ability to realize their fullest potentials. On one hand, blocked trails have extended hike time to reforestation and production sites to little over three hours, thus exposing men to heat-related illnesses, such as stroke, exhaustion, cramps, sunburn and rash (Centers for Disease Control and Prevention, 2017). They are also prone to get knocked out by falling dead trees or being caught in forest fire while making visits to the area during the dry season.

In times of climate-related shocks and stresses like the recent typhoon, community members observed shifts in household dynamics. For instance, the time typically allotted by men for going into the CBFMA area for their forest-based livelihoods had been devoted to rebuilding their houses. Women, on top of their usual workloads, such as cooking and looking after the welfare of their children, had spent extra hours putting back things inside their homes in order. Time spent by households for leisure, like watching nighttime television shows, was non-existent during and after the typhoon that caused power lines to break. The association's access to services rendered by government and non-government institutions during this period was also hampered due to the impassability of roads and unavailability of power and telecommunication services for several days.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

Resilience is defined in the IPCC report (2022, p.35) as "the capacity of social, economic and ecosystems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure as well as biodiversity in case of ecosystems while also maintaining the capacity for adaptation, learning and transformation." For communities to improve their climate resilience capacities, adaptation is of paramount importance. In practice, adaptation is achieved through employing actions aimed at moderating potential damages to human and natural systems as a result of existing and expected climate change impacts (UNFCCC, n.d.).

Adaptation solutions can be through EbA, wherein ecosystems are sustainably managed, conserved and restored to provide benefits to communities for them to withstand the adverse effects of a changing climate. Since EbA was officially defined in the CBD (2009, as cited in FEBA, 2017, p.3), related initiatives have been introduced globally, including in the Philippines. To ensure that these climate solutions qualify as EbA, global collaborative network, Friends of EbA (2017, p.5), emphasized that they must be meeting the three elements under the CBD definition: (1) "helps people adapt to climate change" (2) "by an active use of biodiversity and ecosystem services," (3) "in the context of an overall adaptation strategy."

Moreover, FEBA designed an assessment framework containing five qualification criteria tailored around the abovementioned elements. For each criterion, a set of indicators is provided to assess whether or not an initiative qualifies as an EbA and whether this initiative is weak or strong in terms of EbA quality. The same assessment framework for EbA quality standards was used in this case study and its results are synthesized and presented in this section.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

3.2.1 Reduces Social and Environmental Vulnerabilities

Use of climate information: Communities' climate information primarily comes from the media. Elders prefer television and radio, while the young ones mainly receive weather forecasts and news about climate change through social media (i.e., Facebook and YouTube). Both of them are reached by free mobile disaster alerts of the National Disaster Risk Reduction and Management Council. Access to these information sources allows them to prepare ahead of climate risks, such as intense monsoon-driven rainfalls and typhoons that could trigger flash floods and landslides.

Use of local and traditional knowledge: The Macatumbalen CBFCMA also uses local and traditional and local knowledge to reduce their vulnerability. For instance, they consider the unusually loud noises by animals like cats, dogs and birds, coupled with gray skies and strong winds, as predictive of the incoming storms. Combined with scientific weather and climate information, it helps men in the association to take extra precautions (e.g., wearing raincoats, watching their steps while negotiating slippery trails and steep slopes, and being wary of falling trees) while in the forest.

The active participation of a wide range of sectors, especially fisherfolk, farmers, women, youth and indigenous peoples, in all of the association's sustainable forest management activities, contributes to the reduction of social and environmental vulnerabilities in the CBFMA area. All these members from different sectors are present in association meetings in the form of a regular meeting every third Saturday of the month, and an annual general assembly every December, wherein their local and traditional knowledge supportive of forest conservation and sustainable utilization are considered.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

Taking into account findings of vulnerability assessment: Participatory capacity and vulnerability tools (e.g., seasonal calendar, hazard map, etc.) have yet to be integrated into the association's planning process, although some of its officials already encountered these in the capacity-building training they had attended with their partner government and non-government entities. Nonetheless, EbA in the form of forest protection and conservation remains the centerpiece of climate change adaptation strategies indicated in their Community Resource Management Framework and 5-year Work Plan (DENR & MCBFCMA, 2019, p.29).

Vulnerability reduction at the appropriate scale: The association members believe that it is through the sustainable management of their forest they will be able to continue reaping its critical ecosystem services, which provide natural barriers against hazards, among other benefits (UN Office for Disaster Risk Reduction, n.d.). Its protective functions had been tested when Typhoon Odette hit northern Palawan, but only left most of the houses partially damaged and one casualty in San Vicente town (LGU San Vicente, 2021). The Macatumbalen PO believes that the destruction could have been worse if there had been no measures in place to safeguard the CBFMA area against degradation over the past years.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

3.2.2 Societal Benefits in the Context of Climate Change Adaptation

Quantity and quality of societal benefits: The association's CBFMA area stewardship since 2002 has enabled its members to enjoy the forest ecosystem's provisioning services through the utilization of material resources crucial for establishing climate-resilient livelihoods (Terton & Dazé, 2018). On average, MCBFCMA members earn P9,000 a month, primarily from gathering NTFPs (i.e., fruits, honey, rattans and almaciga resins), participating in NGP and other government livelihood projects and rattan furniture-making (DENR & MCBFCMA, 2019, p.13). Other secondary livelihood sources supporting them are livestock and poultry-raising, carpentry/construction, and office work.

From 2010 to 2019, the MCBFCMA has been engaging in government-funded agroforestry and reforestation livelihood projects (see Table 1). A total of 86-hectare CBFM-Comprehensive Agrarian Reform Project (CARP) agroforestry project was awarded to the MCBFCMA in 2010-2011; it entailed the planting of forest trees and fruit-bearing trees (DENR & MCBFCMA, 2019, p. 9). The association has also served as a partner for the National Greening Program (NGP), which has covered unproductive, denuded and degraded forestlands nationwide since 2011 (DENR, 2020). Under the 2011-2019 NGP and Expanded NGP programs covering a total of 235 ha. within the CBFMA, the association also planted forest trees, fruit trees, as well as rattan. Tree species included ipil, akle, narra, ipil-ipil, mahogany, mangium, gmelina and raintree. Species planted in the orchard included coffee, pili, cacao, marang, rambutan and banana. Outside the CBFMA, the association was also contracted to undertake an NGP mangrove and beach forest rehab project covering 200 ha. along San Vicente's shoreline in 2014-2015.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

Table 1. List of Government-funded Reforestation Projects Implemented by the MCBFCMA in San Vicente, Palawan

Government-funded reforestation projects within the CBFMA
• 86-ha. CBFM-CARP agroforestry project (2010-2011)
• 90-ha. agroforestry project under NGP (2011)
• 110-ha. reforestation project under NGP-PTFCF (2013)
• 35-ha. rattan project under NGP (2018)
Government-funded reforestation projects outside the CBFMA
• 200-ha. mangrove and beach forest rehabilitation project under NGP (2014-2015)

Aside from getting monetary incentives in exchange for NGP-related work, they are allowed to harvest, process and transport forest and non-timber forest products from the plantation sites within the coverage of the CBFMA that they helped establish and maintain (DENR, 2004). These livelihood activities generate income for community members, allowing them to contribute to building their association's emergency fund, which they can also access in periods of climate shocks and stress. Savings from these projects went to the association's emergency fund; part of which had been loaned to its members at a low-interest rate of 2% to help them cushion the pandemic's economic impact. The association has lifted the loan interest since January 2022 to aid members' recovery from Typhoon Odette.

The association's CBFMA area stewardship has further resulted in the maintenance of forest ecosystem health and water provisioning services. In its designated forest protection area, an alive and thriving watershed supports a small water impounding service (SWIS) project, turned over by the DENR in 2018. The SWIS project has facilitated NGP partner people's organizations' access to water not only for the growth and survival of their planted trees but also for their domestic and agricultural uses (DENR, 2021). The dependability of such a water system was put to test in the aftermath of Typhoon Odette, when the Macatumbalen community has not experienced any water interruptions, thus facilitating speedy recovery. In the first quarter of 2022, the National Water Resources Board (NWRB) approved the association's conditional water permit, a formal written authority that will allow it "to operate and maintain water supply system, charge rates and provide water supply service" (NWRB, n.d.) to both association members and non-members within the sitio. Service fee collections from this project will help ensure its operational viability and provide the association with another steady stream of revenue.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

Economic feasibility and advantages compared to other adaptation options: Between community enterprises being carried out in the forest and lowland, the Macatumbalen community perceives that the former weighs more in terms of cost-effectiveness. Among the forest-based livelihood activities in the community are harvesting and marketing NTFPs, such as fruits, honey, rattan and almaciga. On one hand, income-generating activities outside the forest include lowland rice, root crops and vegetable farming, as well as livestock-raising. Unlike their lowland-based enterprises, they said the ones located in the CBFMA area are not labor and input (i.e., water, feed and fertilizer) intensive.

Timescale of societal benefits demonstrated: As opposed to lowland-based enterprises, they perceive the forest-based enterprises' existence to be long-term once established, except when hit by natural disturbances like drought and typhoon. Nonetheless, some of the association members still maintain their small-scale lowland farms to diversify their livelihoods and help them become resilient when forest-based economic activities are downed by seasonal changes.

Number of beneficiaries: As of December 2021, the association has 35 "regular members," wherein 18 are females and 17 are males between ages 20s to 70s. The majority have identified themselves as members of the Palawan indigenous groups Agutaynen and Cuyonen, while the rest are migrants (i.e., Ilocano, Bicolano and Bisaya) from other provinces. Moreover, a total of 150 males and 150 females from the Tagbuana indigenous communities living around the CBFMA area are considered as "federate members" and are primarily tapped in NTFP collections. A separate organization for the youth was also formed in 2021; it is composed of 18 members with 12 girls and 6 boys aged 15 to 18, mostly children of regular members. The association has partnered with its youth group counterpart in nursery maintenance, upland and coastal forest enrichment, and awareness-raising activities.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

Distribution of benefits: Benefit-sharing policies of the association are stipulated in its by-laws and communicated to members, especially during regular monthly and annual meetings. All sales from the NTFPs and fast-growing trees harvested from the CBFMA area's forest production sites go to the association's fund. For products grown and collected in lands of individual property rights holders, known as "associate members," within the CBFMA area, the association receives a share of 20% in sales. Tagbanua indigenous people as "federate members" based in San Vicente's Barangay Kemdeng are specifically engaged in gathering rattan and honey in the CBFMA area, for which they respectively earn P5 to P12 per pole and P100 (unprocessed) per kilo when bought by the association. NGP site workers, on one hand, earn P300 as daily incentives. By engaging in all these forest-based community enterprises through the years, the association managed to acquire two residential land assets in Macatumbalen.

Other benefits from the CBFMA area are also extended to non-members who also live in Sitio Macatumbalen. Primarily, they have been able to tap into the water provisioning services provided by the PO-managed SWIS facility situated in a watershed within the CBFMA area. Water coming from this facility is utilized in the sitio for domestic and small-scale agriculture (i.e., backyard vegetable farming, and livestock and poultry production) purposes. Once all its permits to commercially operate are approved by relevant agencies, the PO is looking forward to charging user fees in order to generate revenues for the facility maintenance, and as well as for sustaining its other EbA-related activities that contribute to the long-term forest and water resources availability.

Additionally, the MCBFCMA has also shared its tree seedlings with non-members in the wider San Vicente community. For instance, it recently donated seedlings to churches and schools to re-green their surroundings. Relatedly, the LGU San Vicente's environment office purchased seedlings grown from the CBFMA area for its tree-planting activities all over the municipality. On one hand, non-monetary benefits both shared by the PO members and non-members are derived from the forests' regulating, supporting and cultural functions, notably extreme weather impact mitigation, biodiversity maintenance, and recreation and ecotourism.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

3.2.3 Ecosystem health restoration, maintenance and improvement

Appropriate scale of management, and protection and management area coverage/ diversification of land use: Agricultural, forest and orchard plantations are the current land uses in the 1,850-ha. Macatumbalen CBFMA area . A total of 1,450 ha. have been designated as protection forest, while the remaining 400 ha. have been devoted to the production of timber and non-timber resources. The MCBFCMA has sustained its reforestation efforts even after the NGP and ENGP projects, which posted a survival rate of 85%-90%.

The group has set up a nursery house in the lowland to grow seedlings of indigenous ipil, akle and narra species in order to continue enriching, most specially its protection forest. Only indigenous tree species are planted in the protection forest, while introduced species (i.e., mahogany, gmelina, mangium and raintree) are reserved for the production forest. Tree-planting activities previously initiated by the MCBFCMA also covered 12 ha. for ipil-ipil plantation for fuelwood purposes.

Taking the lessons PO members learned from the technical capacity building associated with the NGP projects, planted trees are then monitored at least once a week, and replaced when needed to ensure high survival. For these initiatives, the MCBFCMA has been a recipient of several awards at the provincial up to the national level. In 2018, it was included in the 10 POs recognized for best forestry practices by the DENR-FMB (Villanueva, 2018).

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

Prioritization of key ecosystem services within management: San Vicente town is home to a wide range of flora and fauna species (Brief profile of San Vicente, Palawan, 2017, pp. 40-41), including the ones covered by the IUCN Red List. Community members have reported sightings of endemic species in the area, signifying its ecological richness. These included, among many others, the Philippine pangolin (Manis culionensis), peacock-pheasant (Polyplectron napoleonis), monitor lizard (Varanus palawanensis), stink badger (Mydaus marchei), porcupine (Hystrix pumila), bearded pig (Sus ahoenobarbus), bearcat (Arctictis binturong) Palawan flying squirrel (Hylopetes nigripes), fruit bat (Acerodon leucotis), cockatoo (Cacatua haematuropygia) and talking mynah (Gracula religiosa palawanensis). The presence of these wild animals in the CBFMA area is reflective of the association's effective forest stewardship over the past two decades. Further biodiversity assessments, however, are needed to validate the community observations.

Monitoring of ecosystem services health & stability: Men in the association regularly conduct a foot patrolling activity every month, and promptly respond to violation reports reaching them through their Tagbanua federate members who have been issued with six basic mobile phones. Monitoring and reporting are also aided with 14 radio handsets donated by a foreign media organization that filmed the association's forest conservation and protection initiatives. The association has set aside a monetary reward of P5,000 for every unregistered chainsaw confiscated from timber poachers by its members, in cooperation with the Palawan NGO Network Inc. Apprehensions of armed individuals are coordinated and carried out with the local-based Philippine army and police. Seized chainsaws and timber, along with the apprehension receipts and supporting photos and/or videos, are turned over to the DENR and its attached agency, Palawan Council for Sustainable Development (PCSD) for proper custody and filing of appropriate cases.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

Level of co-management: Co-management of the Macatumbalen CBFMA area involves the DENR, MCBFCMA and LGU San Vicente. This management setup is set forth in CBFMA signed by DENR and MCBFCMA, pursuant to the provisions of DENR Administrative Order No. 96-29 and Local Government Code. Under the 25-year agreement effective 2002 to 2027, the DENR is obligated to ensure MCBFCMA's exclusive occupation and use of forest land and resources in the CBFMA area. On one hand, the MCBFCMA is primarily tasked to assume the responsibility of protecting the CBFMA area against destructive forest activities, and also to assist the DENR in prosecuting violators.

All activities within the CBFMA area must be aligned with its CRMF and 5-yr WP. The plan was updated in 2019 through the collaboration between the DENR and MCBFCMA; the planning process was also attended by the LGU through the Barangay Council. The updating was made possible through a project grant from the nonprofit Forest Foundation Philippines (FFP). Nonprofit, civil society and private sectors' engagements are only limited to providing technical, financial and market linkage assistance to the MCBFCMA; nonetheless, this external support has enabled the association to effectively carry out its role of managing the CBFMA area.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

3.2.4 Supported by policies at multiple levels

Compatibility with policy and legal frameworks & policy support: In 2009, the Philippine Climate Change Act was enacted as the national government's response to the global climate crisis. This paved the way for the formulation of the National Framework Strategy on Climate Change in 2010. Among the framework's guiding principles related to EbA and CBFM are"to build the adaptive capacity of communities and increase the resilience of natural ecosystems to climate change" and recognize " the value of forming multi stakeholder participation and partnerships in climate change initiatives" (CCC, 2010, p.5). Following the framework's adoption, the National Climate Change Action Plan 2011-2028 was conceived, with "ecological and environmental stability" as among its priority areas (CCC, 2011). Revolving around EbA, this priority focuses on "the protection and rehabilitation of critical ecosystems, and the restoration of ecological services" as its immediate outcome.

The Philippines' nationally determined contribution (NDC) has vowed to "pursue forest protection, forest restoration and reforestation, and access to results-based finance in forest conservation" as part of the country's overall adaptation measures (Republic of the Philippines, 2021, p. 5). In achieving a climate and disaster-resilient and low carbon economy, the NDC recognizes the need for a whole-of-government-and-society approach, promoting the active and meaningful participation of local communities. Clearly, this is where the Macatumbalen association comes in, considering its indispensable role in the continuity of the CBFM program, the national government's overall strategy for sustainable forest management. This EbA strategy is consistent with the 2015 Paris Agreement that has placed emphasis on promoting and maintaining ecosystem resiliency and for which the Philippines is a signatory.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

The EbA strategies (i.e., upland and coastal forest conservation and protection activities) being implemented by the MCBFCMA complement the Municipal Ordinance No. 20-2014 or the San Vicente's Environment Code. The Municipal Environmental Code emanated from RA 7160-1991 or the Local Government Code, wherein LGUs are mandated to implement CBFM, among other devolved DENR functions. Moreover, forest conservation and protection are also included in the adaptation options under the municipality's LCCAP. In the said plan that was adopted through Municipal Resolution No. 41-2017, CBFM gained the second spot in the municipality's priority adaptation projects (LGU San Vicente, 2016, p. 81). The MCBFCMA'S EbA strategies are also supportive of the Bantay Gubat and Coastal Marine Programs under the San Vicente's Medium Term Development Plan 2016-2020 (p. 73). In the San Vicente's Environmentally Critical Areas Network Program component for managing climate impacts, people's organizations, including the MCBFCMA, are also tapped in the rehabilitation of mangrove forests and upland reforestation using indigenous and hardwood forest tree species in the municipality (p. 78).

Table 1 provides a non-exhaustive list of existing government policies and plans that mandate concerned public agencies and officials to channel support to MCBFCMA and other POs involved in the CBFM program.

Table 2. Government Policies and Plans Supportive of MCBFCMA's EbA Activities in San Vicente, Palawan

National	Local
• Local Government Code (1991) • Philippine Climate Change Act (2009) • National Framework Strategy on Climate Change (2010) • National Climate Change Action Plan 2011-2028 • Philippine Master Plan for Climate Resilient Forestry Development 2016-2028 • The Philippines' Nationally Determined Contributions (2021)	• Municipal Ordinance No. 20-2014 or An Ordinance Enacting the Environment Code of San Vicente, Palawan • Municipal Resolution No. 41-2017 or A Resolution Adopting and Approving the Local Climate Change Action Plan of the Municipality of San Vicente, Province of Palawan • San Vicente, Palawan: Local Climate Change Action Plan (2016) • San Vicente's Medium Term Development Plan 2016-2020

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

Multi-actor & multi-sector engagement (communities, civil society, private sector): State (i.e., government) and non-state (i.e., civil society organizations) actors are working together with the MCBFCMA to pave the way for the effective EbA implementation in the CBFMA area. The PO ranked these partners based on their level of engagement in EbA activities in the area (See Table 2). The major services and resources these actors extend to the PO can be summarized as follows:

- **Policy, planning, accreditation and/or permit:** Government institutions, such as the DENR, Municipal and Barangay LGU, issued policies and plans placing emphasis on the significant role of local communities in sustainable forest management. This government recognition was formalized through PO accreditation, thus legitimizing forest protection, conservation and development activities of the MCBFCMA in its CBFMA area. Besides the PO's CBFMA with the DENR, it is also registered with the LGU San Vicente, DOLE, DTI and BIR, and also secures forest product transport permits from the PCSD.
- **Capacity building and networking:** Civil society organizations, such as the NTFP-EP, FFP, CBFM Association Federation, PNNI, ELAC and Philippine-German Foundation, were the primary sources of capacity building and networking opportunities for the MCBFCMA. As for the government's side, these were provided by the DENR and other national agencies, such as the DOST, DA and PhilFIDA. Immersions in learning opportunities have empowered this PO to better manage its natural resource base and community enterprises, thereby increasing its adaptive capacity.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

- **Collaborative partnership:** State-funded reforestation projects have become the entry points for a collaborative partnership between the DENR and MCBFCMA. Meanwhile, the LGU MENRO has tapped the MCBFCMA as the supplier of tree seedlings for the municipal government-initiated reforestation projects. Schools have also partnered with the MCBFCMA for tree planting and coastal clean-up activities, and also for access to water from the PO-managed water system. In turn, schools help the PO promote environmentally friendly behavior among the youth.
- **Law enforcement:** In order to ensure the sustainability of the basic function and condition of the forest within the CBFMA area, one of the MCBFCMA's responsibilities is to safeguard it against illegal loggers. In operations involving armed law violators, the MCBFCMA coordinates with the PNNI and Philippine marines and police for backup. Filing of appropriate environmental cases in court is undertaken with the DENR and PCSD.
- **Moral and spiritual:** MCBFCMA members also attributed the success of their EbA implementation to the church, which provides them with moral support and spiritual guidance. The church is likewise a partner in tree planting activities outside the CBFMA area, with its seedlings coming from the PO. Furthermore, the church, with its mediator role, promotes community cohesion, encouraging the members to work together towards common goals despite their differences.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

Table 3. Actors and Sectors Involved in EbA Implementation in Macatumbalen CBFMA Area in San Vicente, Palawan

Name of Actors	Sectors	Nature of Support
DENR	Government	Policy and planning Capacity building and networking Collaborative partnership Law enforcement
NTFP-EP and FFP	CSO	Capacity building and networking
CBFM Association Federation	CSO	Capacity building and networking
DOLE and BIR	Government	Accreditation
PNNI and ELAC	CSO	Capacity building and law enforcement
Philippine Marines and Police	Government	Law enforcement
School	Government	Collaborative partnership
HIGH RELEVANCE/IMPORTANCE		

Name of Actors	Sectors	Nature of Support
LGU	Government	Policy, accreditation and collaborative partnership
PCSD	Government	Transport permit issuance Law enforcement
DOST	Government	Capacity building
DA	Government	Capacity building
PhilFDA	Government	Capacity building
DOH	Government	Water quality testing
BLGU	Government	Policy
Philippine-German Foundation	CSO	Capacity building
Church	CSO	Moral and spiritual
MEDIUM RELEVANCE/IMPORTANCE		

Name of Actors	Sectors	Nature of Support
DSWD	Government	Relief aid
DTI	Government	Registration
LOW RELEVANCE/IMPORTANCE		

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

3.2.5 Supports equitable governance and enhances capacities

Accountability & group representation: Participatory governance of natural resources at the Macatumbalen CBFMA area is achieved with the active involvement of different sectors, especially the marginalized women, youth and indigenous peoples, from the host and adjacent communities. As community participation deepens, so does its members' sense of ownership to the CBFMA area, pushing them to continue their forest conservation and protection initiatives to ensure the sustainability of the material and non-material benefits they derive from it.

Transparency and accountability are key ingredients to sound fiscal management of the Macatumbalen people's organization. These are observed by the organization officials who are mandated under their by-laws to prepare and present a cash flow statement to the general assembly that, as part of a democratic society, has the power to determine the organization's overall direction. Liquidation and other financial documents are also submitted to external reviewers, like public, private and nonprofit entity funders and overseers, with the help of an accountant and a bookkeeper commissioned by the organization.

The same organizational by-laws hold members accountable for their actions and non-actions. For instance, the non-attendance of members in three consecutive annual general assembly meetings can result in expulsion from the organization. All these mechanisms contribute to the financial health of the organization, helping it become climate-resilient. At the same time, this system of checks and balances in the MCBFCMA minimizes fraud risk and instills trust and confidence between and among its members; all of these are essential for building a socially cohesive community whose members are helping each other out in the face of climate uncertainties.

3. Key Issues and Findings

3.2 Analysis of Existing Resilience Capacities

Consideration of gender balance and empowerment: Gender-sensitive practices are observed in the Macatumbalen people's organization. As an example, both men and women have equal opportunities to take on top seats that advance everyone's interests and concerns with respect to the utilization of CBFMA area's biodiversity and ecosystem services. Here, a woman serves as its president, while a man acts as its general manager, embodying the fundamental principle of non-discrimination set forth in Article 7 of the Universal Declaration of Human Rights (United Nations General Assembly, 1948).

Long-term capacity to ensure sustainable governance: Moreover, empowerment of all concerned sectors involved in the CBFMA area ensures its long-term sustainable governance, which is central to the climate resilience of the Macatumbalen people's organization. Support and commitment of government agencies (e.g., DENR, DA, DOST, etc.) and nonprofit groups (e.g., NTFP-EP Philippines, Forest Foundation Philippines, PNNI, ELAC, etc.) concerned for ecosystem management in the area are evident in their investments in a series of training aimed at building the community's capacity on organizational, fiscal and natural resources management.

Women have been trained and assigned to handle the day-to-day operations of the group's nursery and honey processing house. Young people have also been equipped to partake in tasks related to nursery maintenance, such as potting up and watering seedlings. Transplanting seedlings inside and outside the CBFMA area is a communal activity involving men, women and youth in the organization, in cooperation with their partner schools, churches, local government and other sectors in the municipality. The Tagbanua indigenous people's from adjacent communities are also empowered to have fair and equitable access to NTFPs like honey, rattan and almaciga, for which they are applying the sufficiency principle, in turn supporting their traditional economy and cultural practices that enhance their adaptive capacity.

3. Key Issues and Findings

3.3 Key Barriers to Resilience, and Adaptation Options

Gaps in the enabling environment hamper the successful implementation of any ecosystem-based and other adaptation measures (UNEP, 2019b, p. 4). Other than climate-related factors, these challenges are not necessarily climate-linked but undermine MCBFCMA's ability to implement EbA. These can be natural, social and economic-related concerns that exacerbate the PO's climate vulnerability and thus should be addressed in order to see EbA and its full range of benefits flourish. Listed below are the top barriers to EbA implementation and resilience-building that the MCBFCMA faces:

- **Few exposures of women to opportunities:** While both men and women have time to learn new things to increase their adaptive capacity, the former, being the family head, receives more exposure to opportunities given his more interactions with external entities during calamities.
- **Typhoon's impact on income-generating plantations:** The destruction left by Typhoon Odette in the CBFMA area has impacted its provisioning services that underpin forest-based livelihood activities, thus inhibiting the association's climate resilience.
- **Lack of alternative livelihood sources:** The recent extreme weather disturbance's economic impact is aggravated by the lack of other alternative livelihood sources that association members could turn to in an effort to improve their household income.
- **Low financial capability to purchase machineries.** The PO's financial capability is low, hence purchasing more advanced machines for scaling up honey processing, vermicomposting and other enterprises that can improve their individual and organizational income is a challenge.

3. Key Issues and Findings

3.3 Key Barriers to Resilience, and Adaptation Options

- **Unstable power and internet services:** The instability of power and internet services in the municipality hampers the community's access to electronic and digital media sources of simplified weather forecasts and climate information.
- **Lack of access to climate adaptation plans:** The technicalities of local and national climate change action plans and the community members' lack of knowledge on where and how to access and utilize these vital documents add up to their climate vulnerabilities.
- **More support needed to develop ecotourism:** The MCBFCMA needs technical and financial support in developing an ecotourism management plan to sustainably tap the potentials of their waterfalls, agroforestry sites and wildlife in order to generate additional livelihoods.
- **More support for community-led law enforcement:** Public investments in community-led law enforcement ensures that its enforcers are receiving salary and insurance that will motivate them even more to safeguard the forest against violators.
- **Presence of tax declarations within the CBFMA area:** Tax declarations within the CBFMA area and adjacent timberland-declared areas are seen as threats to the sustainability of EbA practices that support the association's forest-based livelihoods and water supply.

Taking climate extreme events and their impacts into consideration, the MCBFCMA enumerated in Table 3 a suite of EbA and non-EbA options-cum-enabling approaches it can undertake based on its existing capacities (marked as "1"), as well as options that need interventions from their partner government and non-government institutions (marked as "2") in order to achieve increased resilience over time.

3. Key Issues and Findings

3.3 Key Barriers to Resilience, and Adaptation Options

Table 4. Adaptation Options to Address Climate Change Impacts in Macatumbalen CBFMA Area in San Vicente, Palawan

Climate Extreme: More intense typhoons		
Direct Impacts	**Indirect Impacts**	**Adaptation Options/ Enabling Approaches**
Flood	• Water-borne human diseases outbreak • Landslide • Destruction of lowland vegetable gardens and upland reforestation sites • Income loss • Limited access to forest-based livelihood sources • Temporary closure of ecotourism sites (i.e., waterfalls and mangrove ecopark) • Decline in water quality of SWIS	• Establishment of community-based early warning systems (2) • Information campaign on water, safety and hygiene (1,2) • Implementation of regular vector control activities (1,2) • Vegetation restoration for erosion control on steep slopes (1) • Planting bamboos to prevent riverbank erosion (1) • Continuous law enforcement in upland and coastal forest (1,2) • Livelihood diversification through tech-voc skills enhancement (2) • Prohibition of river quarrying within the CBFMA area (2) • Building stronger family ties (1)
Loss of trees	• Tree debris blocked trails, limiting community's access to forest resources • Low production of NTFPs, reducing household and association income • Water supply shortage • Heat-related illnesses • Roads are impassable, limiting transportation	• Tech-voc skills development for livelihood diversification (e.g. backyard livestock and poultry production; personal care services; handicraft-making, sewing and cooking; multimedia arts; heavy equipment operation; and industrial arts) (2) • Information campaigns on disaster preparedness (1,2) • Continuous reforestation and forest law enforcement (1,2) • Upgrade of enforcement equipment (2)

3. Key Issues and Findings

3.3 Key Barriers to Resilience, and Adaptation Options

Table 4. Adaptation Options to Address Climate Change Impacts in Macatumbalen CBFMA Area in San Vicente, Palawan

Climate Extreme: More intense droughts		
Direct Impacts	**Indirect Impacts**	**Adaptation Options/ Enabling Approaches**
Forest fire	• Habitat and wildlife loss • Destruction of water pipelines • Water and NTFP shortage • Income loss	• Change water pipeline placement from above-ground to underground (2) • Continuous reforestation, forest law enforcement and information campaign (1,2) • Upgrade of enforcement equipment (2) • Maintain good community relations to avoid arson (1) • Prohibit smoking or any activities that may cause forest fire (1)
Water scarcity	• Water-fetching as an additional domestic workload for women and children • Rise of household and community conflicts over limited water • Emergence of water, sanitation and hygiene-related diseases	• Prepare a community water conservation plan (2) • Information campaign on forest and water resource conservation, as well as on water, sanitation and hygiene (1,2) • Establishment of community water storage tanks (2) • Continuous reforestation and law enforcement (1,2)
Crop loss	• Income loss, poverty and hunger • Increase in school dropout rates • Crop production shortage	• Crop diversification (1,2) • Introduce drought-resilient crops and organic fertilizers (1,2) • Purchase a shredder machine to aid vermicomposting (2) • Practice good household financial management (1)

4 Conclusions and Recommendations

The MCBFCMA is no stranger to climate change impacts as per government-led climate change projections and vulnerability assessments. In particular, these are affecting community enterprises and income; infrastructures and facilities' health and well-being; household and community dynamics; and forest habitat and wildlife. Some of these impacts had become apparent when Typhoon Odette wreaked havoc in San Vicente town. Thus, it is indeed appropriate that the association practices sustainable forest management as a form of EbA, which is acknowledged internationally as a cost-effective nature-based solution for communities reeling from the impacts of climate change.

The CBFM program covering 1,850-hectare forests in Macatumbalen took off in 2002. While its forest conservation and protection initiatives were not originally designed as EbA approaches, this study demonstrated that such interventions being implemented by the MCBFCMA as part of its CBFMA responsibilities have emerged to be in accordance with the EbA quality standards set by the FEBA (2017). The PO's long-term forest stewardship has resulted in the maintenance of ecosystem health in the area, allowing the Macatumbalen community to continue enjoying its various ecosystem services necessary for climate resilience-building. These tangible benefits that encourage active community participation and continued buy-in included the community's accessibility to clean water for agriculture and household uses; creation of forest-based enterprises like NTFP gathering; and protection against typhoons, floods, droughts and other climate change-related hazards. In the process of protecting the forest, the community has also been able to provide a safe and viable habitat for threatened and endemic wildlife species that not only play key roles in maintaining the ecological balance but have also become the local's source of pride and inspiration.

4. Conclusions and Recommendations

Key EbA lessons from Macatumbalen are summarized below:

Local capacity building allows for co-benefits maximization: The Macatumbalen PO is living proof that there are Philippine communities that are willing to go the extra mile to ensure the sustainability of forest ecosystems and its many services amid a changing climate. Key to turning its collective vision into action is the external support it received throughout the years of engagement in the CBFM program. Specifically, the government, civil society organizations, church, media and other social institutions – as sources of information, capacity and resources – have played crucial roles in the EbA success and improvement of community's adaptive capacity at Macatumbalen CBFMA area.

Short and long-term co-benefits resulting from the PO's two decades of EbA implementation are not only enjoyed by its members but also by residents in the wider Macatumbalen and nearby communities within San Vicente. These multiple socioeconomic and environmental co-benefits shared by both PO members and non-members include timber and non-timber resources, clean air and water, extreme weather impact mitigation, biodiversity maintenance, and recreation and ecotourism. Exemplifying inclusivity, these have been generated and maximized through the empowerment and integration of the traditionally marginalized sectors, such as women, youth and indigenous peoples across all the association's EbA activities.

Seminars on organizational and financial management, wherein transparency was emphasized, were part of the capacity building support that the Macatumbalen PO received from state and non-state entities. In effect, transparency in organizational cash flow and benefit-sharing has built trust in Macatumbalen PO and it is one factor that makes it a socially cohesive unit. As everyone directly and indirectly benefits from EbA implementation, cohesion has become its key organizational strength, and it has aided in their slow yet steady collective recovery from the economic impacts of Typhoon Odette.

For Macatumbalen and other CBFM-participating POs to continue contributing to the country's sustainable forest management and EbA targets, consistent public investments on knowledge and capacity building of these communities must be ensured. To further improve their knowledge of climate change, the government should step up and work with the media to ensure that the community has access to national and local climate change action plans and its technical findings are simplified to be more comprehensible and useful to laypeople, allowing them to make necessary adjustments in their livelihoods and other aspects of life.

4. Conclusions and Recommendations

Enabling policies usher in multisectoral support and commitment: The case of Macatumbalen PO has shown that when multiple national and local government policies exist to promote CBFM, wider community support for EbA can be elicited. In turn, these laws and ordinances have legitimized the association's EbA activities and allowed them to collaborate with the municipal government in scaling up and replicating their positive impacts in areas outside their CBFMA coverage. Being looked up to in terms of best reforestation practices, Macatumbalen PO has been tapped by the local government, schools and churches as a supplier of tree seedlings for their regreening efforts in different locations in San Vicente.

With the Philippine government recognizing climate change and related hazards as impediments to the country's economic growth and resilience, enabling policies have been enforced and it resulted in the formulation of local and national climate change action plans and development agenda that include EbA as among priority adaptation options. Having such an alignment, the Macatumbalen PO has secured political recognition and approval of CBFM activities, and its members benefitted from cash-for-work opportunities related to NGP and other government reforestation projects. Sustained support to the CBFM program not only by the government, but also by the private and nonprofit institutions has paved the way for the successful implementation of reforestation and other EbA projects in the Macatumbalen CBFMA area.

However, there are barriers to EbA implementation being faced by Macatumbalen PO and other CBFMA holders that must be overcome through the introduction of enabling approaches in order to achieve increased forest ecosystem resiliency. One approach is likewise through putting in place new policies or strengthening existing ones to address natural, social and economic-related concerns that exacerbate CBFM-participating communities' climate vulnerability, in turn curtailing their capacity to consistently carry out EbA activities and reap its full range of co-benefits.

4. Conclusions and Recommendations

Ecosystem health maintenance supports increased community resilience: Through the association's active reforestation and forestry law enforcement within its CBFMA area over the past two decades, the forest ecosystem health in Macatumbalen has improved and contributed to the sustainability of forest resources therein. With flourishing provisioning services, the community has been able to create climate-resilient livelihoods associated with agroforestry and gathering non-timber resources. Years of engaging in these enterprises have enabled the organization to build its communal fund that members were able to tap into in the aftermath of Typhoon Odette, thus facilitating community recovery and resilience.

Biodiversity can be a source of community pride and inspiration, pushing people to continue carrying out forest conservation and protection initiatives even with less external support. This can be observed in the Macatumbalen PO whose members are proud of the presence of endemic wildlife in their forest. By knowing that these wildlife take refuge in their CBFMA area and it's one of the few places in the province that cradle such irreplaceable natural treasures, PO members, specifically men who are volunteer wildlaw law enforcers, are motivated to protect them against poachers. As these wildlife play different ecological roles that contribute to the maintenance of forest ecosystem health, forest-based enterprises are sustained as well.

Strong typhoons can reverse reforestation gains and adversely impact forest ecosystems, thereby reducing the quality and quantity of benefits it provides to communities. This was observed when Typhoon Odette wreaked havoc on NGP sites within the Macatumbalen CBFMA area. With trails blocked by tree debris, the association members' access to NTFPs and other natural resources had been reduced, thereby affecting their household income. This also goes to show that the over-dependence of communities to forest-based livelihoods can heighten their vulnerability in case the forest ecosystem is hit by climate extremes, hence the need for livelihood diversification.

Finally, this case study has presented CBFM as an example of a contribution to the Philippines' climate adaptation efforts, and therefore could be articulated and counted as part of the country's NDCs. To further provide more evidence that could support the above mentioned proposition, it is recommended that similar assessments using EbA criteria in other CBFMA areas be conducted. Results from such assessments could be counted as collective contributions from the CBFM program, and served as bases for rendering continuous support to participating POs in order to maintain ecosystems' protective functions and improve local communities' climate resilience.

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