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1 Acknowledgments

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And to all those who, in one way or another, have contributed to the project's success, thank you very much!

1.1 Acronyms

ACIAR	Australian Centre for International Agricultural Research
APFNet	Asia-Pacific Network for Sustainable Forest and Rehabilitation
ANOVA	Analysis of variance
AMF	Arbuscular mycorrhizal fungi
BN	Briefing Note
BSA	Benefit-sharing agreement
CBFM	Community-based Forest Management
CCC	Community-Capacity Curve
CDO	Community Development Officer
CDP	Continuous Development Program
CENRO	City Environment and Natural Resources Officer
DA	Department of Agriculture
DAR	Department of Agrarian Reform
DENR	Department of Environment and Natural Resources
DOST	Department of Science and Technology
DTI	Department of Trade and Industry
EDC	Energy Development Corporation
FAO	Food and Agriculture Organisation
FFP	Forest Foundation Philippines
FGD	Focus Group Discussion
FLR	Forest and Landscape Restoration
FMB	Forest Management Bureau
GAD	Gender and Development Program
IUCN	International Union for the Conservation of Nature
KII	Key Informant Interview
KFW	*Kreditanstalt fur Wiederaufabau*
LGU	Local Government Unit
LRAF	Livelihood Resource Assessment Form
LOA	Letter of Agreement
MoU	Memorandum of Understanding
NAPOCOR	National Power Corporation
NGP	National Greening Program
NIA	National Irrigation Administration
OC	Organic Carbon
PCA	Philippines Coconut Authority
PCAARRD	Philippines Council for Agriculture, Aquatic and Natural Resources Research and Development
PENRO	Provincial Environment and Natural Resources Office/r
PO	People's Organization
PRC	Professionals Regulations Commission
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SCU	Southern Cross University
SDG	Sustainable Development Goals
SLF	Sustainable Livelihoods Framework
USC	University of the Sunshine Coast
VSU	Visayas State University
WWF	World Wide Fund for Nature

2 Executive summary

With a research-for-development approach, the ACIAR-funded Forest Landscape Restoration Project in the Philippines (hereafter FLR Project) sought ways to operationalise large-scale community-based reforestation to meet ecological and rural development goals. The research team from the University of the Sunshine Coast (Australia) and Visayas State University (Philippines), together with representatives of the Department of Environment and Natural Resources (DENR) involved in the National Greening Programme and various local government agencies, worked with ten People's Organizations (POs) in Iloilo, Cebu, Biliran, and Leyte Provinces for the FLR Project implementation. Its activities included nursery establishment, tree planting trials under diverse settings (e.g., mixed-plantations and tree integration into other land uses), studies on soil fertility, pest and diseases dynamics, agroforestry experiments with various commodities (e.g., dragon fruit, cacao), and trials with other alternative livelihoods (e.g., pig and chicken raising). All activities were guided by participatory baseline socio-economic assessments at the project's onset. Another significant activity was conducting an international conference on FLR (2019). The knowledge gained and alliances formed helped VSU team members take prominent roles in the Project implementation. A further benefit of this was incorporating Project results into the VSU curriculum. Over the five years of the Project, five PhD and one MSc degrees were completed, 25 papers were published in peer-reviewed international journals, multiple extension materials were disseminated, and capacity-building activities in the POs, often including local governmental officials, were carried out.

The main results of the Project, with a conceptual nature that are of broad importance, include three frameworks for facilitating the designing and monitoring of FLR interventions. First is the 'community-capacity curve,' a conceptual and practice-based approach to capturing the differences among communities in their FLR-relevant skill sets. Second, the Project generated a novel approach to recognising when intermediate outcomes indicate whether FLR activities are on the desired path. This recognition allows the adaptive implementation to enhance Project effectiveness. Third, the FLR Project developed an approach to monitoring tree-planting activities based on evaluating existing systems. This effort, which included an assessment of NGP, REDD+, and CBFM practices, resulted in a follow-up system and data collection templates by DENR to help streamline NGP activities.

Project research revealed several structural barriers to social inclusion in FLR. Most fundamentally, FLR initiatives must incentivise young people to remain in their communities. The low financial return of FLR activities results in a preference for higher rent generation options outside FLR projects. Given the substantial labour and physically demanding tasks required for FLR, this issue is critical. Land claimants pose another barrier to collective FLR action in areas allocated to POs in Community-Based Forest Management (CBFM) agreements. Although most POs developed mechanisms to facilitate transparency in operations and governance, their benefit-sharing agreements with land claimants were not formalised in written, thus being fragile and jeopardising FLR outcomes.

Government regulations promoting gender equality and FLR Project initiatives resulted in substantial women's participation in FLR. Their contributions to all aspects of FLR success were significant, as were the tangible household benefits of their participation (e.g., increased family income), improved self-esteem, ability to act, and social status.

In addition to insights derived from plantation, agroforestry, and alternative livelihood trials, securing a private-sector partnership to scale out FLR activities was another significant outcome. This already initiated 30-year project came into being because the research-for-development initiatives of the FLR Project were viewed as an exemplar for application in a large-scale community-based carbon project employing nature-based solutions. This new project is adopting the FLR Project's science-based practices to restore forest landscapes, mitigate climate change, enhance biodiversity, and improve the livelihoods of rural people.

3 Background

The Philippines was historically one of the world's most biodiverse countries, with rich rainforests and diverse ecosystems. However, deforestation resulted in the loss of approximately 47% of the country's forest cover from 1920 to 2010 (FAO[1]). In 2010, the Philippines had 13.2Mha of natural forest, extending over 62% of its land area. Recent analyses show that the country lost 13% of humid primary forests from 2001 to 2022 and 1.42Mha of tree cover (848 Mt of CO_2e emissions). In 2022, the Philippines lost 62.9k ha of natural forest, equivalent to 39.8Mt of CO_2 emissions (Global Forest Watch, 2023). The country now occupies the not-so-honoured 8th place among the ten countries where forest loss was most significant in 2022 (Global Forest Watch, 2023).

The main drivers of deforestation include excessive degradation due to commercial logging operations, exacerbated by weak law enforcement and corruption. Small-scale agricultural practices, such as slash-and-burn farming (*kaingin*) and the expansion of cash crops like palm oil and rubber, have also consolidated the permanent loss of forests. This issue has had far-reaching environmental, social, and economic consequences, including soil erosion, reduced water quality, and decreased biodiversity. Deforestation has contributed to climate change by releasing large amounts of carbon dioxide into the atmosphere and reducing the country's capacity to absorb greenhouse gases.

The economic implications of deforestation are also noteworthy. The Philippines heavily relies on agriculture and natural resources for economic growth. However, deforestation has resulted in soil degradation, reduced agricultural productivity, and increased vulnerability to natural disasters such as landslides, flooding during the monsoon season, and fire. The loss of forest resources has also affected the timber industry and ecotourism, which could otherwise provide sustainable economic opportunities.

In response to forest loss and degradation, reforestation in the Philippines became a critical environmental initiative undertaken through a series of programs, including the recent National Greening Program (NGP). The NGP was promoted as a comprehensive initiative to restore and conserve the country's forests and natural resources, promote sustainable land management through supporting rural livelihoods (i.e., reducing poverty and promoting food security), and mitigate climate change impacts. The program also created conditions for biodiversity conservation and climate change adaptation and mitigation.

The NGP's agenda was launched in 2011 as a collaborative effort between the government, the private sector, and local communities. It targeted a total reforestation area of 1.5 million hectares by 2016, contributing to the Philippines' commitment to the Bonn Challenge and the Aichi Biodiversity Targets. The program was expanded to achieve 7.1 M ha by 2028 (DENR, 2015). NGP activities are advanced through the adoption of the Forest Landscape Restoration framework. This approach refers to the systematic process of rehabilitating degraded forests, improving their ecological integrity, and promoting sustainable land use practices (DENR, 2015).

Through its multi-stakeholder approach, the scope for the provision of livelihood opportunities, and focus on watershed rehabilitation, as of 2021, the NGP restored over 2 M hectares through tree planting, agroforestry, and sustainable land management practices (DENR, 2021). In the same year, the program also provided livelihood opportunities for about 18,000 families in local communities that participated in the program (DENR, 2023).

[1]FAO. Country Profile [https://www.fao.org/countryprofiles/index/en/]

Reforestation efforts in the Philippines have faced significant challenges and have not achieved the desired outcomes across all regions, which is inconsistent with the resources and efforts invested. Several factors have contributed to the less successful results of forest restoration initiatives, including continued deforestation. Forest loss in the country remains high due to illegal logging, unsustainable agricultural practices, and rapid urbanisation. Compared to 2021, the Philippines lost four times more forest in 2022 (27kha: Global Forest Watch, 2023). The loss of forest cover leads to degraded ecosystems and biodiversity, compounding the challenge of reforestation efforts to restore the original ecological balance.

The inadequate enforcement of existing forestry laws and weak governance have undermined reforestation efforts. Corruption and lack of political will hindered the effective implementation of forestry regulations, allowing illegal logging and encroachments on forested areas to persist. This not only exacerbated deforestation but has jeopardised the success of reforestation initiatives. Furthermore, socio-economic factors play a significant role in the limited success of reforestation projects. Many local communities, particularly in rural areas, rely on forest lands and resources for their livelihoods. The lack of alternative income-generating opportunities and inadequate support for sustainable livelihoods make it difficult for communities to transition away from activities contributing to deforestation and forest degradation.

The limited financial resources and access to funding for reforestation have been a significant constraint. This has resulted in inadequate monitoring and maintenance of reforested areas, leading to high mortality rates of planted trees. Further, the impacts of climate change, including increased frequency and intensity of extreme weather events, pose additional challenges to reforestation efforts: severe storms, droughts, and wildfires damaged established plantations and existing forests.

The latest evaluation of the NGP by the Commission of Audit of the Philippines government (CoA, 2019) highlighted the lack of results at the scale of the program and remarked that the best outcomes were achieved in places where strong social institutions were already established (e.g., cooperatives existed). These institutions could better take advantage of the support offered by the program while serving as a foundation to access other sources of support, including participation in private partnerships. When institutional contexts were strong, such as through the more explicit adoption of the national convergence mandate, People's Organisations were seldom able to capitalise on the coordinated action of governmental agencies (CoA, 2019). In most cases, achieving benchmarks, such as the number of seedlings produced and the area planted, was prioritised over the quality of reforestation efforts, including quality seedling production and matching species to suitable sites (Gregorio, 2023).

As has been the case in other tropical countries, continued forest loss and degradation have not translated into overall improved life quality for Filipino nationals. Inequality remains high (42.3% in 2018) (World Bank, 2022). The top 1% of earners captured 17% of national income, while only 14% is shared by the bottom 50%, with significant geographic variation within the country. The poorest of the poor do not have equal opportunities, and their prospects are hampered by low mobility across generations, inability to accumulate generational wealth, and difficulty in accessing tertiary education, all made worse during COVID-19 that set back the limited progress made.

Increasing agriculture productivity has been recently proposed as a mechanism to ensure transformation and boost rural development (World Bank, 2022). This need is recognised in Philippine reforestation programs, given that most reforestation activities occur in areas wheresmallholders practise agriculture. This recognition framed the research for development activities of the FLR Project. The Project builds on the experience and lessons from implementing a series of four ACIAR-funded projects of the FLR Project team of

researchers, including the ASEM/2010/050, which grounded knowledge and best practices for community-based reforestation with an FLR lens.

The design, approach, and activities of FLR projects are context-dependent; hence, they vary in different geographical locations. Given an incomplete understanding of how to best integrate agriculture, forestry, and forest restoration at a landscape scale, the FLR Project investigates how to scale out the successful community-based FLR model developed under the previous ASEM/2010/050 in Biliran Province to other areas in the Philippines. As such, the FLR Project fills a necessary research and practise gap (Höhl et al., 2020) regarding real-world forest and landscape restoration efforts recognising the intersection of socioeconomic and environmental conditions. The FLR Project designed FLR systems tailored to the communities, considering the land-use mosaics, including subsistence agriculture. This work complements research on critical technical issues regarding selecting and establishing appropriate timber tree species and crops as part of FLR systems.

4 Objectives

This Project aims to improve rural livelihoods in the Philippines through forest and landscape restoration. The research objectives and related activities are as follows:

Objective 1: Improve the livelihoods of smallholders involved in Forest and Landscape Restoration.

Activity 1.1 Undertake a gender analysis of the role of women and men in FLR initiatives.

Activity 1.2 Assess the impact of livelihood initiatives included in NGP projects.

Activity 1.3 Identify agricultural crops, timber trees and livelihood activities.

Activity 1.4 Develop bio-economic models to evaluate options for landscape-scale community reforestation incorporating woodlots, agroforestry, agricultural and other livelihood activities to identify best-bet options.

Activity 1.5 Pilot test designs for multi-species, multiple product uneven-aged woodlots, agroforestry systems, and woodlot/crop livelihood systems suited to smallholders and communities.

Activity 1.6 Develop and test ways to improve the resilience of reforestation systems to the impacts of fire and weed competition.

Activity 1.7 Investigate the potential for bio-fertilisers produced by communities to improve growth of trees and crops along with providing livelihood opportunities.

Activity 1.8 Investigate soil/plant/water relations in existing plantations and apply these to the design of improved mixed-species reforestation systems for the NGP.

Objective 2: Develop and test options for scaling out landscape-scale community-based reforestation.

Activity 2.1 Assess FLR initiatives to identify key factors likely to impact success for scaling out.

Activity 2.2 Hold an international conference on FLR.

Activity 2.3 Design improved models for implementing and scaling out reforestation in the Philippines.

Activity 2.4 Work with 10 communities to test different models for scaling out and scaling up FLR.

Activity 2.5 Explore options for financing community-based FLR initiatives by private sector and donor organisations.

Activity 2.6 Develop geospatial models of the impacts of FLR.

Objective 3: Achieve better economic outcomes for smallholders through improved monitoring, best practices and policy.

Activity 3.1 Design and implement ongoing monitoring of the effectiveness of FLR initiatives.

Activity 3.2 Develop extension materials and best practice guidelines.

Activity 3.3 Pilot test changes to policy at the local and provincial levels to address social, institutional and political problems.

Activity 3.4 Assist in the formulation of national policy.

Activity 3.5 Assist in the formulation of policy within the Asia-Pacific region.

Objective 1: Activities aim to better understand the conditions under which FLR can benefit members of ten communities participating in NGP projects. Due attention will be given to gender issues, as well as to production systems based on specific crops for which further knowledge will be generated in cooperation with DENR regarding technical and economic aspects of the implementation of the systems (e.g., use of bio-fertilisers and other practises to improve crop and tree growth; bio-economic models). Implementing pilot tests of selected options will allow for determining best practices for improved reforestation design in the NGP. Main outcomes relate to community-based demonstration plantings and associated benefits and costs.

Objective 2: Activities on this objective will help identify key factors likely to enable successful scaling out, including catalysing private sector support. Use of modeling tools will help ground existing knowledge to simulate outcomes, guided, among others, by exchanges of international experts during a conference on FLR. The main product of the work for this objective will be the test of the models in 10 communities that will inform implementation of the NGP.

Objective 3: Activities include the design and use of effectiveness monitoring protocols for FLR to assess the pilot-tests under Objective 2. Results will be disseminated in various formats to actors involved in reforestation policy-making in-country and beyond in the Asia-Pacific region. Some of that information will be relevant to consolidating local community skills and strengthening forestry curricula nationally.

5 Methodology

The improved operational effectiveness of the tree nursery sector resulting from a previous ACIAR-funded project, ASEM 2006/091, helped ground best practices on seedling quality regulation beyond communities, reaching agencies involved in implementing the *National Greening Program* and other reforestation initiatives of the government and private sectors. Along with the practical guidelines, critical knowledge was generated regarding conditions under which watershed rehabilitation would occur. Because of the continued economic limitations of local communities and their reduced opportunity to accumulate and transfer wealth to future generations, the FLR Project needed to invest efforts to understand better and document the potential for livelihood development as a mechanism to realise reforestation at scale. As such, linking forest landscape restoration goals more explicitly with the achievement of livelihood aspirations became the focus of the FLR Project and is addressed in this Report.

The FLR Project hinged on the partnerships established over the last two decades from the sequence of ACIAR-funded research projects in the Philippines centred on improving the performance of forest restoration while achieving livelihood outcomes. Participants in these collaborations include academics (Visayas State University), governmental (DENR, LGUs), local community organisations, and members of the private sector. Specifically, the Department of Environment and Natural Resources (DENR), across national and local levels, reaffirmed their support for the FLR Project through the Forest Management Bureau (FMB) Director issuing a memorandum directing regional and local offices to collaborate in the project implementation.

Project sites were selected by the Project team members and relevant DENR personnel, using the following criteria: situated in the Visayas Region, supportive DENR officials, and presence of POs engaged in reforestation projects. After that, PO selection was based on age from PO formation, the land and tree tenure, proximity to the major town, capacity to implement reforestation projects, and type of support agency.

The Project sites included three of the 18 Regions in the country, all located in the Visayas geographical regions: VI - Northern portion of Iloilo Province, VII -Northern Cebu, and VIII Eastern Leyte and Biliran Province (Figure 1). The Project was implemented in ten communities with reforestation sites managed by People Organisations (POs). POs are recognised associations of community residents, in this case, smallholders and farmers, with a defined structure (e.g., membership, leadership, established procedures) and work towards coordinated and agreed-upon goals.

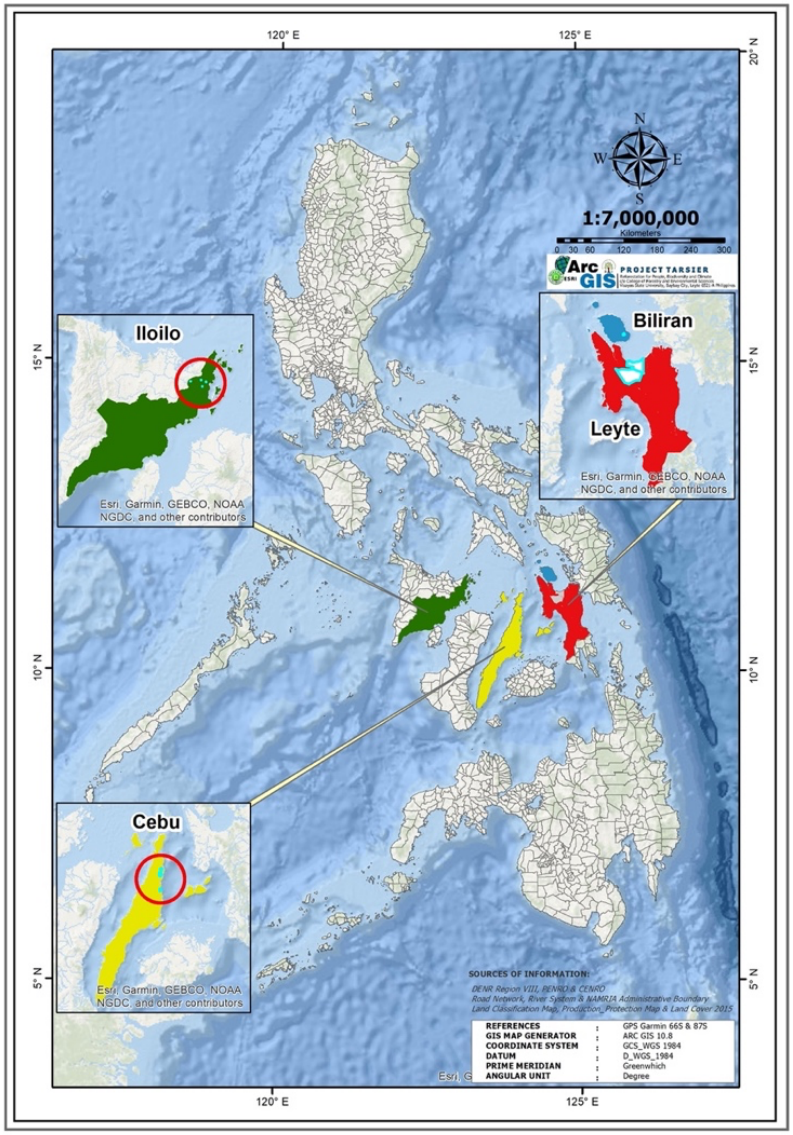


Figure 1 Location of FLR Project regions where activities were developed. Region VI: Iloilo; Region VII: Cebu; and Region VIII; Leyte (Map by Marlon Bote -VSU Team).

A local Community Development Officer (CDO) was assigned to each region for the duration of the Project. The CDO served as a facilitator for effective and efficient implementation of project activities, an intermediary of information, and was responsible for organising research activities involving Project researchers from VSU and USC. A Regional Research Leader, a faculty member of VSU, was also assigned to each region to oversee the implementation of research activities.

The CDOs established and maintained close contact with POs by visiting them weekly and participating in monthly meetings. The CDOs, Region Leaders, study leaders, and the Project leader met online every week. The Project leader met with the VSU researchers every quarter, either in person or online. Other meetings were scheduled as needed. A *Zoom room* was set up in the ACIAR FLR Project office at VSU early in October 2019. The communication plan also included regular meetings of Project implementers and stakeholders, workshops, and presentations of Project updates and research findings in symposia and conferences. The FLR Project also created a Facebook page with updates on key activities [Available here: https://www.facebook.com/ramnyl.rismam/].

There is a Memorandum of Understanding (MoU) between USC and VSU for Project implementation. At the Project's commencement, other partnership agreements (Letter of Agreement -LOA) were signed between VSU and partner POs. These agreements were

formalised after rigorous Information, Education and Communication initiatives of the Project, including introducing the nature of the Project, goals, activities, type and level of support, benefits, and responsibilities of the POs. The Project partnered with the DENR, the Department of Science and Technology (DOST), and the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCCARD). The collaboration was formalised with the establishment of a Memorandum of Understanding (for Region VI), Memorandum of Agreement (with PCCARD) and Memorandum Orders (e.g., from FMB for Regions VII and VIII).

5.1 Region VI. Iloilo

The Iloilo Province was selected as one of the Project sites upon the recommendation of the Forest Management Bureau. Iloilo is one of the two provinces on Panay Island in the Western part of the Visayas Region. The prevailing climate in northern Iloilo is Type 3, where the season is not very pronounced but relatively dry from November to April. Soil is primarily acidic with volcanic origin. The four partner POs in the province are DECCA, TUCODA, PACEDA and PAGLAOM (Figure 2). These POs are situated in the municipalities of Sara and San Dionisio. Corn farming is the principal livelihood of communities in these municipalities, which resulted in the extensive conversion of forests into agricultural farms.

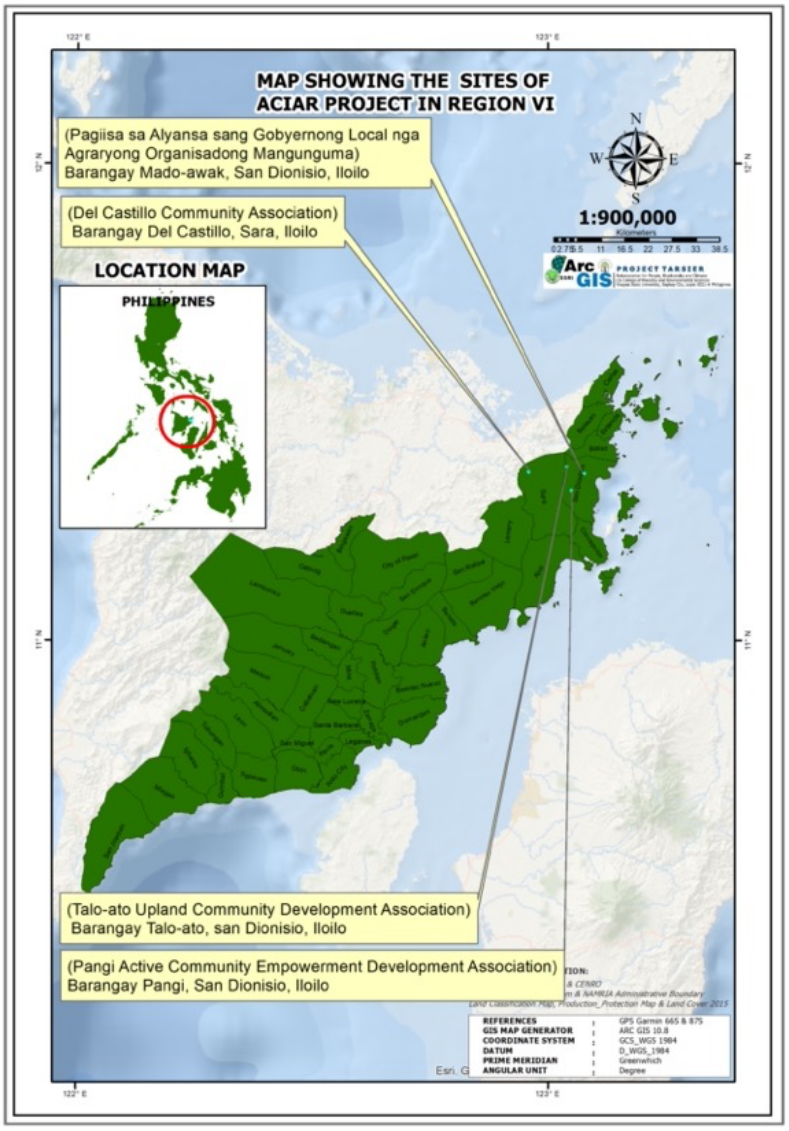


Figure 2 Location of Region VI -Iloilo and the four People's Organisations where the FLR Project developed activities: DECCA, TUCODA, PACEDA, and PAGLAOM (Map by Marlon Bote -VSU Team).

5.2 Region VII. Cebu

The Cebu Province was identified through the recommendation by the Regional Executive Director of DENR VII, and partner POs were suggested by the CENR Officer in Carmen, Cebu. These POs were NAGMATA, BTFAI and HIMASACA, all in the northern part of Cebu (Figure 3). Northern Cebu has a Type 4 climate with evenly distributed rainfall and is dominated by calcareous soils. Farming is the main livelihood of the partner POs.

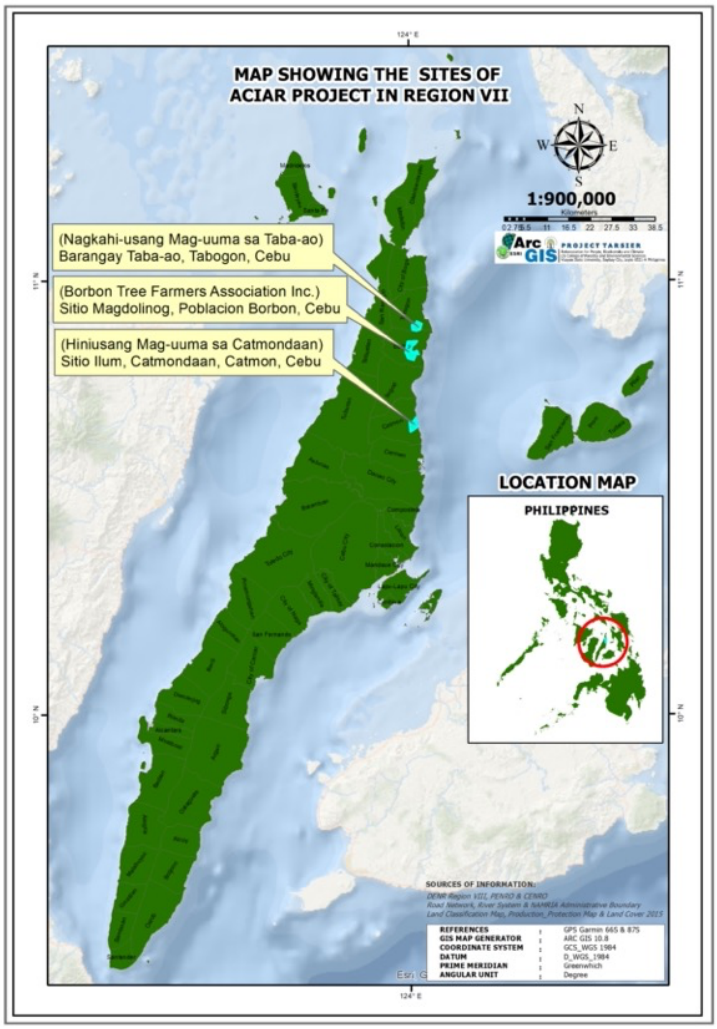


Figure 3 Location of People's Organisations (POs) in Region VII, Cebu: NAGMATA, BTFAI and HIMASACA (Map by Marlon Bote -VSU Team).

5.3 Region VIII. Leyte and Biliran

Leyte and Biliran provinces in Region VIII were chosen because previous ACIAR projects were based in these provinces. The partner POs were UMACAP and MFA in Eastern Leyte and KFAI in Biliran (Figure 4). UMACAP was identified through the suggestion of DENR CENRO Albuera. A private company organised and supported MFA, while KFAI was a partner PO of the preceding ACIAR Watershed Project. Eastern Leyte has a Type 4 climate with acidic soils of volcanic origin. Biliran Island has a Type 2 climate with no prominent dry

season and maximum rainfall between November and January. Farming was the primary source of income and food for the members of partner POs.

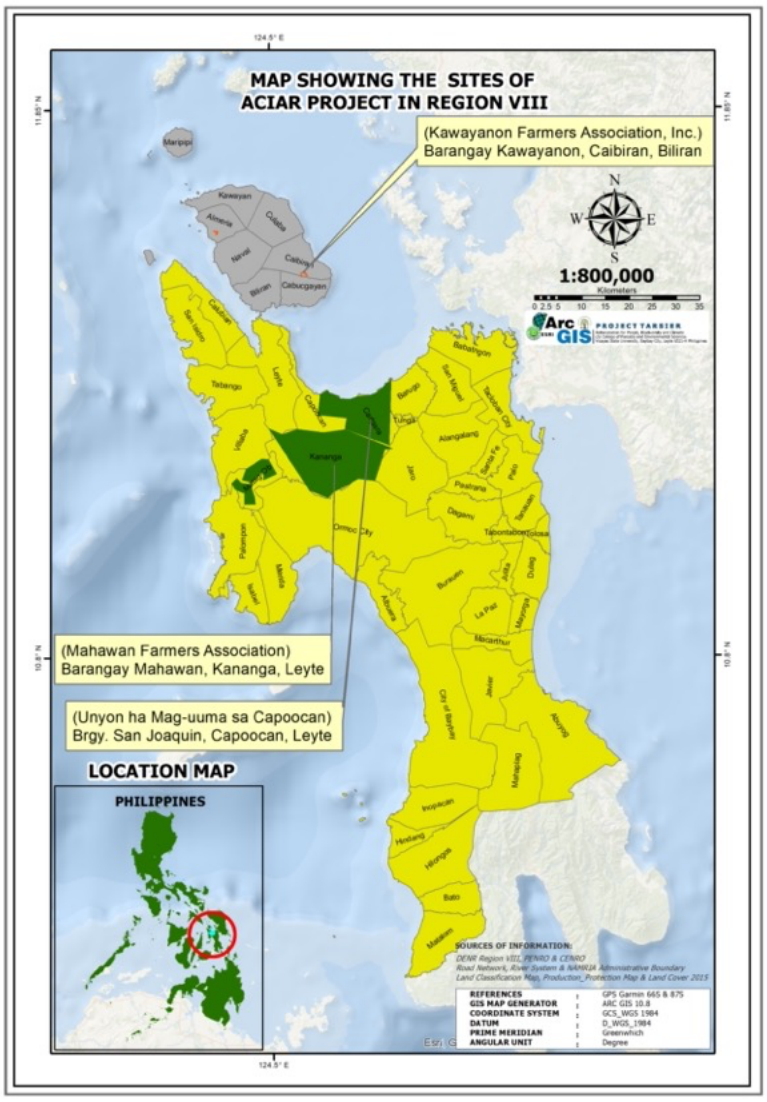


Figure 4 Location of Region VIII-Leyte in the Philippines (insert) and the 3 POs in the Region: MFA, UMACAP, and KFAI (Map by Marlon Bote -VSU Team).

The Project activities centred around the context of each PO, its characteristics (i.e., location, socio-economic, environmental, and policy attributes), and the needs and aspirations of its members. The overall methodological approach using mixed methods through a transdisciplinary lens focused on different topics is discussed in the context of the Project objective and corresponding activities.

Given the Project's explicit focus on enhancing local livelihoods, assessments leading to fine-tuning the research developed in each PO were based on adopting the Sustainable Livelihoods Framework (SLF) (DFID, 2001). Tools linked to adopt a participatory action research approach (e.g., problem identification and visioning, dialogues, engagement with various stakeholders) were combined with qualitative and quantitative methods (e.g., interviews and focus-group discussions) and ecological resource assessment and management tools. This facilitated shaping on-the-ground Project activities.

Parallel FLR Project activities included reaching out to governmental organisations at local, regional, and national levels. This enabled setting the Project's agenda more broadly as activities became more precisely defined and implemented. In doing so, spaces for

technical, practice, research, policy, and other dialogues emerged, resulting in specific collaborations and opportunities for mutual learning and information exchange.

5.4 Methods specific to each Project objective

The Project implementation and research activities counted on extensive in-country experience from the Team, complemented by the expertise of recognised leaders in the emerging field of forest landscape restoration. Dr John Herbohn and Dr Nestor Gregorio from UniSC guided objective refining and integrated activity implementation in close collaboration with the VSU local team led by Dr Arturo Pasa.

A range of thematic experts were brought to lead specific research activities. These included experts in gender issues (Dr G. Lidestav -Sweden), livelihoods systems (Dr L. Ota - USC), community forestry and silviculture (Dr N. Gregorio -USC, Dr J. Herbohn – USC and Dr J. Vanclay -SCU), hydrological aspects (Dr S. Bruijnzel), and forest and landscape restoration (Prof R. Chazdon). This core team was complemented by in-country expertise, primarily based at FLR Project's leading partner institution, the VSU, namely Dr L. Nuñez, Dr H. Goltiano, Dr A. Polinar, Dr A. Ferraren, D. Custodio, K. Galvez, Dr E. Mangaoang, Y. Mangaoang, Dr A. Ramos, Dr R. Gravoso, and Dr D. Peque, along with various students and qualified staff members (https://www.vsu.edu.ph/)

At the Project's onset, baseline data were gathered from POs regarding their socio-economic conditions, the biophysical characteristics of restoration sites, the quality of seedlings used in restoration, and the status and impacts of livelihood projects associated with the NGP. Workshops held in each of the ten POs were used as needs assessment tools, specifically to assess NGP implementation gaps and discuss potential remedial actions and FLR Project activities.

Processes related to PO selection as well as baseline establishment led to the emergence of two novel conceptual frameworks for defining PO strategies (i.e., community capacity curve; Herbohn et al., 2023) and for advancing monitoring activities (e.g., leading and lagging indicators; Ota et al., 2021). Both innovations consider the inherent variability of the capacity of the POs and the need to tailor Project activities accordingly. Also, they recognised that changes occur in different time frames for various activities. The formalisation of this indicator framework proved helpful in all activities of the Project.

The pandemic and associated travel restrictions prevented regular meetings and workshops with senior officials across DENR's vertical structure. Capturing their time for virtual meetings was less straightforward. Further, the travel restrictions prevented international researchers from travelling to the Philippines. This resulted in Philippine partners carrying out Project activities with remote participation of international researchers. Also, local travel restrictions curtailed Philippine-based researchers and Project staff from visiting project sites and interacting face-to-face with stakeholders. Alternative data collection methods, including phone calls, emails, and virtual meetings and interviews, were employed and proved effective in undertaking research and monitoring activities (e.g., assessment of agroforestry systems and communal livelihoods, determining socioeconomic impacts of restoration projects, investigating fire incidence and underlying issues, biofertiliser use and option for smallholder livelihood, and options for integrating trees in corn-dominated forest landscapes).

When the pandemic hampered the mobility of international and local researchers, CDOs were instrumental in maintaining Project activities. CDOs had opportunities to conduct face-to-face meetings with partner POs in their respective regions. Research findings were disseminated through webinars, online training events, and Facebook posts. However, on several occasions, the communication was delayed due to the lack of access to mobile and internet networks, especially when CDOs were in the field. This affected the completion of

Project tasks and delayed the understanding of Australian researchers of some of the nuances and field difficulties imposed by the pandemic.

With the lifting of the pandemic restrictions in the first half of 2022, dissemination was carried out through in-house face-to-face reviews and live via Facebook at VSU. The research team also met DENR-FMB Officials and the Australian Ambassador in Manila in March 2022 and in September 2023.

5.4.1 Objective 1. Improve the livelihoods of smallholders involved in Forest and Landscape Restoration

Activity 1.1 Undertake a gender analysis of the role of women and men in FLR initiatives

A comprehensive literature review was undertaken using the Scopus database regarding the roles of men, women, and youth in reforestation and FLR. The selected 140 papers were read thoroughly, and data were extracted from each publication based on research questions. A thematic analysis of the data extracted was carried out (Ota et al., 2023). The results of these analyses guided the survey design to gather similar information from the POs. This tool was initially used in three research communities in Region VII (i.e., Cebu) and sequentially expanded to all Project areas in Regions VI and VIII (see Activity 2.4 below; Nuñez et al., 2023). This work was complemented by the Project *Tarsie*r workshop on *Designing a Sustainable Community-based Forest Restoration Project*, with gender roles in forest restoration as one of the topics.

Activity 1.2 Assess the impact of livelihood initiatives included in NGP projects.

Activities included social and economic assessments of the impacts of NGP projects. At least nine members of each PO were interviewed through two surveys focused on assessing POs' awareness of NGP and its livelihood impacts and revealing the reasons linked to the success or failure of the program's activities (Goltiano et al., 2019). Workshops and interviews with communities and DENR revealed NGP implementation gaps (e.g., policy). The interviews and workshops were undertaken sequentially in all project sites.

Data collected from the interview were validated through actual field visits to the POs' NGP sites and individual farmer's fields. To understand socially based and economic measures of effectiveness, the SLF was used to retrospectively assess individuals' perceptions regarding their situation and their communities as influenced by NGP implementation. In addition to using traditionally applied indicators, this exercise allowed participants to propose "indicators" to represent their conditions and perceptions.

An adapted Livelihood Resource Assessment Form (LRAF) was used for participants to rank (scale of 1-5, with 5 as the highest) their livelihood resources. Data were analysed and compared through the Wilcoxon Signed-Ranks Test to determine significant changes, complemented with content analysis to distil the themes and categories of the responses. Information was triangulated through interviews with key informants and local DENR field officers and using secondary data.

Activity 1.3 Identify agricultural crops, timber trees and livelihood activities.

Interviews and focus group discussions (FGDs) with members of the research communities (e.g., DENR technicians, academic experts and nine POs in Region VIII) were held to identify crops for livelihood options (Ramos et al., 2021) and tree species preference (ten POs in this case including KFAI) (Polinar et al., 2021). Fifteen and ten respondents were randomly selected in each PO, for tree preference and livelihood crops identification, respectively. The selection was based on the list of members of the organisation and from DENR records. Open-ended questionnaires were used, and the responses were validated through focus-group discussion (minimum of 15 participants per PO). Preferred species were matched with the biophysical conditions of the planting sites and POs' access to germplasm. Subsequent surveys were undertaken to identify non-crop-related livelihood

projects of each PO. The surveys and workshops with the communities and DENR enabled the design of FLR systems and the development of implementation plans.

Activity 1.4 Develop bio-economic models to evaluate options for landscape-scale community reforestation incorporating woodlots, agroforestry, agricultural and other livelihood activities to identify best-bet options.

The economic viability of agroforestry systems in four FLR Project POs was analysed by adopting a model using soil information from the sites as the biophysical component. Yield measurements and input and output prices were determined and projected to calculate NPV and annualised income for smallholders (Galvez, 2023). This work was informed by the results of one of the postgraduate research activities in this project (Ribeiro, 2023).

Activity 1.5 Pilot test designs for multi-species, multiple-product uneven-aged woodlots, agroforestry systems, and woodlot/crop livelihood systems suited to smallholders and communities.

Results from Activity 1.3 and the literature review on ANR (Stevenson, 2020) guided Activity 1.5. Pilot trials were designed to test improved FLR practices and livelihood options in all POs. The trials were informed by the results of surveys, KIIs, FGDs and workshops with community members of the ten POs. Respondents provided information on plot sizes, distance from households to agricultural plots, agroforestry species composition, person-day wage rates for various farm tasks, and price of inputs and interest rates. High-quality seedlings were produced based on knowledge generated in previous ACIAR projects.

Site and soil characterisations were conducted, including understanding parent material, land use, drainage, climate, vegetation, topographic position, landform location, and soil morpho-physical characteristics (Oraiz, 2021). Composite soil samples were collected in each horizon using a quantitative sampling procedure and analysed based on established protocols for organic matter and total N determination, particle size distribution, bulk density, soil pH and organic carbon, extractable phosphorus, and exchangeable bases.

In Iloilo, two field trial sites were identified in PACEDA and PAGLAOM, two in NAGMATA and BTFAI in Cebu, and one in UMACAP in Leyte. Tree integration in corn farms was set up with 27 farmers who are members of the partner POs in Iloilo. Forest and fruit trees were planted along the boundaries of corn farms.

Two hectares of agroforestry farms were established in PACEDA, DECCA PAGLAOM and TUCODA. To document community agricultural activities and variations throughout the year, the seasonal calendar method, which includes the participatory investigation of local knowledge, human-environment relationships, agricultural cycles, and patterns of resource use, was utilised. The collected data were further complemented by six interviews with local legislators, authorities in the local government unit, and key personnel of the DA and the DENR. The interviews reported the main challenges and agencies' programs in agriculture and forest and landscape restoration (Ribeiro, 2023).

In 2019, the BTFAI, NAGMATA and HIMASACA in Cebu established enrichment plantings in 5 ha of open forests using 11 tree species. Tree parameters were measured by the POs with the guidance of the CDOs. BTFAI and NAGMATA established another 20-ha plantation in their respective sites in 2023.

In Leyte, 40 ha of tree plantations were established by UMACAP with the support of the Project and DENR. The Project provided the technical assistance for the PO to produce high-quality seedlings while DENR provided funds for nursery operation and plantation establishment. A mixed-species trial was established in December 2020 in MFA. The field trial block comprised 20 plots, each with 20 seedlings of 20 species planted at 3m x 3m spacing (Figure 5).

Species Trial in Brgy. Mahawan Kananga, Leyte

53 meters

Mol	Nar	Hin	Tam	W.Lau	Nar	Bit	PUs	Bit	Kal	Mah	Mal	Mal	Nat	Yak	Mah
Mal	Gui	Tea	Kam	Tea	Ipi	Bal	Ala	Pus	Hin	Tam	Mol	Bit	Tam	Kam	Kal
Ipi	Bit	Bal	Pus	Mah	Yak	Dao	Kal	Kam	Dao	Yak	Gui	Ala	Bal	Pus	Tea
Yak	Ala	Dao	Mah	Mol	Nat	Kam	Gui	Ipi	Nat	Bal	Ala	Ipi	Hin	Gme	Nar
Kal	W.Lau	Nat	Gme	Tam	Gme	Mal	Hin	Nar	Tea	W.Lau	Gme	Gui	Mol	Dao	W.Lau
Gui	Kal	Tam	W.Lau	Bal	Dao	Gui	Mah	Gme	Kal	Gui	Hin	Kam	W.Lau	Nat	Nar
Mah	Hin	Mol	Kam	Tea	Gme	Mol	Ala	Kam	Pus	Mah	Bit	Mol	Gme	Pus	Kal
Mal	Dao	Yak	Bal	Yak	Tam	Nar	Mal	Yak	Bal	Dao	Tea	Bit	Ipi	Ala	Tea
Nat	Nar	Ipi	Tea	Bit	Ipi	Kam	W.Lau	Mal	Tam	Ala	Mol	Tam	Yak	Hin	Gui
Pus	Ala	Bit	Gme	Hin	Pus	Kal	Nat	Nar	W.Lau	Ipi	Nat	Dao	Mah	Bal	Mal
Tam	Gme	Mah	Mol	Nat	Tea	Gme	Kam	Kam	Tam	Pus	Mal	Kal	Nat	Pus	Tea
Kam	Pus	Ipi	Yak	Pus	Ala	Ipi	Mah	Ipi	W.Lau	Nat	Mah	Dao	Mah	Nar	Tam
Bit	Bal	Dao	Nat	Hin	Gui	W.Lau	Mol	Bit	Yak	Nar	Ala	Bit	Gme	Gui	Mal
Gui	Ala	Kal	Mal	Bit	Yak	Kal	Tam	Gui	Kal	Bal	Gme	W.Lau	Yak	Hin	Ipi
Hin	Tea	W.Lau	Nar	Dao	Mal	Nar	Bal	Hin	Dao	Tea	Mol	Mol	Kam	Bal	Ala
Bit	Nar	Nat	Gui	Pus	Dao	Tea	Bit	Tea	Ala	W.Lau	Kal	Mah	Nat	Mal	Gui
Hin	Gme	Ala	Dao	Mah	Hin	Ala	Ipi	Dao	Yak	Bit	Bal	Kam	Nar	Mol	Hin
Kam	Mal	Mol	W.Lau	Bal	Mal	Gui	Kal	Nar	Gme	Pus	Mah	Kal	Gme	Ala	Bal
Yak	Tam	Tea	Kal	W.Lau	Mol	Nat	Nar	Kam	Gui	Hin	Ipi	Tam	Tea	Dao	Bit
Mah	Ipi	Bal	Pus	Kam	Gme	Yak	Tam	Mol	Tam	Nat	Mal	Ipi	Pus	W.Lau	Yak
W.Lau	Gme	Bal	Nar	Ala	Gme	Yak	Dao	Ipi	Hin	Nar	Bit	Kal	Gui	Hin	Dao
Tea	Mah	Bit	Gui	Bal	Kam	Tam	Tea	Mah	Mal	Gme	Gui	Mol	Nar	Mah	W.Lau
Mol	Hin	Dao	Ipi	Nat	Kal	Bit	Pus	Dao	Kam	Tam	Mol	Tam	Ala	Mal	Pus
Kal	Pus	Tam	Nat	Ipi	Mol	Mal	W.Lau	Kal	Ala	Pus	W.Lau	Nat	Yak	Bal	Gme
Ala	Kam	Mal	Yak	Nar	Gui	Hin	Mah	Nat	Yak	Tea	Bal	Bit	Kam	Tea	Ipi

80 m

80 m

53 meters

Legend:

Ala - Alahan	Gme - Gmelina	Mah - Mahogany	Pus - Puso puso
Bal - Balobo	Hin - Hindang	Mal - Malatapai	Tam - Tamayoan
Bit - Bitanghol	Ipi - Ipil	Mol - Molave	Tea - Teak
Dao - Dao	Kal - Kalumpit	Nar - Narra	W.Lau - White Lauan
Gui - Guisok - guisok	Kam - Kamagong	Nat - Nato	Yak - Yakal

Distribution of numbers per plot

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20

Figure 5 Planting disposition of MFA trials with 20 tree species (Gregorio et al., 2020).

The subsequent field trial with MFA, established in January 2022, was the variable spacing trial to determine tree growth and grass suppression influenced by planting distances. It consisted of 2 blocks containing four plots, each with 64 seedlings (n= 512). Block 1 was planted with mahogany, and block 2 was planted with narra seedlings. There were four grass treatments in each block: ring weeding, brushing, trampling, and the control (no disturbance). An additional field trial using mahogany seedlings was established in Albuera to showcase the effect of using high-quality seedlings in tree farming and reforestation.

Activity 1.6 Develop and test ways to improve the resilience of reforestation systems to the impacts of fire and weed competition.

Surveys with local communities in Regions VIII (Leyte) and VI (Iloilo) on fire risks and occurrence in forests and plantations (Peque et al., 2023) were carried out. A total of 30 respondents from the Project's participating POs were interviewed. POs were selected based on their involvement in the NGP or other reforestation projects of the Philippine government. The respondents were mainly the presidents or officers knowledgeable of their reforestation activities.

The survey solicited data and information, including background information about the PO, the plantation and other crops grown, and knowledge on forest fires and prevention measures. Additionally, data were gathered regarding social and technical preparations and budgetary requirements, institutional arrangements and governance, history of forest fire damage on plantations and its impact, and lessons learned in protecting a reforestation project from fire as the basis for future actions.

Data were encoded and processed in MS Excel. Four correlation methods were used to determine significant linear relationships between the variables: Point-Biserial Correlation Coefficient, Chi-square Test for Independence, Phi Coefficient, and Pearson Correlation Coefficient.

Field trials on grass suppression through tree establishment were established in MFA to investigate the scope of improving the resilience of reforestation systems to the impacts of fire and weed competition. Seedlings of forest trees for grass suppression trials were produced. However, issues on land ownership of the proposed site arose shortly before site preparation. When the trials were finally established in 2019, travel restrictions and community lockdowns prevented the research team from performing maintenance activities.

Activity 1.7 Investigate the potential for bio-fertilisers produced by communities to improve the growth of trees and crops along with providing livelihood opportunities.

Surveys with PO members determined biofertilisers and other inputs for their seedlings, trees, and crops (Ferraren et al., 2020; Pasa et al., 2020; Preciados et al., 2018). These activities were complemented with two field trials (UMACAP in Leyte and NAGMATA in Cebu). Soil nutrient assessments were done for each PO (see details of soil analyses in Activity 1.5). The fertility status of the soils was evaluated by matching the values of selected soil characteristics with the published threshold values of the properties for crop growth and production.

A nursery trial was put in place to assess the effect of nutrient sources on seedling growth of *Dracontomelon dao*, *Pterocarpus indicus*, *Gmelina arborea* and *Swietenia macrophylla* (Krishnan, 2022; Krishnan et al., 2023). Additionally, A*. mangium* and *A. petriei* seeds were grown in manipulated nutrient conditions to assess growth responses. The study used a randomised complete block design with replicates nested in four separate blocks. The FLR Project also supported PACEDA in establishing a smallholder biofertiliser production facility, while UMACAP and BTFAI ventured into vermicomposting with compost materials used for their nursery seedling production enterprise.

Trials were also established to determine arbuscular mycorrhizal (AMF) associations in the *Ecosystem Research and Development Services* of DENR in Malaybalay, Bukidnon. A randomised block replicated three times was used with eight treatment combinations. Each had two types of potting medium and two levels of fertiliser to assess the growth and photosynthetic rate of seedlings. Nutrient analyses looked at total phosphorus, potassium, and nitrogen concentrations. Data were analysed through ANOVA.

Activity 1.8 Investigate soil/plant/water relations in existing plantations and apply these to the design of improved mixed-species reforestation systems for the NGP.

Research works were not developed for this activity, as the FLR Project could not secure the collaboration of a VSU-based researcher with expertise in hydrology.

5.4.2 Objective 2: Develop and test options for scaling out landscape-scale community-based reforestation.

Activity 2.1 Assess FLR initiatives to identify key factors likely to impact success for scaling out.

A case-study approach focused on the tropics helped identify factors associated with the success of FLR and the development of an influence diagram of FLR systems performance. The influence diagram was based on the past studies in Region VIII by Le et al. (2020) and Baynes et al. (2015) and ten identified case studies in various countries presented during the FLR Conference in Manila in 2019.

The diagram was reinforced using the data collected from the ten partner POs of the Project. The influence diagram was translated into a Bayesian Belief Network for forest restoration success. The model elements and their relationships, states, and overall structure were validated in a workshop with key stakeholder groups in November 2019. Surveys were conducted to gather the necessary data to populate the model. An online workshop with

Project staff dealing with the POs, extension officers of DENR, and community forestry experts from the academia was conducted in 2021 to re-validate the model.

In parallel, a systematic review was carried out to understand the roles of agricultural policies in enabling and promoting FLR. The study defined agriculture as land use and economy, a product of cultivation or domestication of plants or animals to produce food, fibre, fuel and other products. Search terms were identified and complemented with a subsequent consultation process with a pool of agriculture, social sciences, landscape restoration and forestry experts. Standard procedures for systematic review were followed (i.e., papers were assessed against the eligibility criteria described; abstracts were scanned based on search, final selection for full review). Content and thematic analyses guided the analysis of information.

Additionally, surveys, key informant interviews, group discussions, and government reports were reviewed, and information was extracted to analyse and lay out the land use goals of multiple stakeholders considering their inherent constraints (e.g., labour and input requirements and local land use practices). Costs and profits information was gathered (e.g., local yields, wages of on-farm jobs, market selling prices of intended products). Information on business conditions (e.g., available credit and terms as interest rates) was collected.

Activity 2.2 Hold an international conference on FLR.

The FLR Project team members organised the international conference on "*Forest and Landscape Restoration – Making it Happen*" in Manila in February 2019 (https://flr2019.weebly.com/). The conference attracted 139 participants from 22 countries, who presented 70 research and practice case studies related to FLR. Ten of the presented case studies were selected for inclusion in a special issue of the journal *Forests.* A book of abstracts of the FLR framework was also released based on the content of the presentations at the FLR Conference.

In addition to ACIAR, local and international organisations and agencies, including the Forest Foundation Philippines (FFP), Energy Development Corporation (EDC), the Asia-Pacific Network for Sustainable Forest and Rehabilitation (APFNet), and PCAARRD, provided financial support to the Conference. In addition to the cadre of international experts, local researchers, graduate students, and the academic community from USC participated and presented at the event.

Activity 2.3 Design improved models for implementing and scaling out reforestation in the Philippines.

A meta-analysis of the ten international case studies on FLR (Activity 2.2) was conducted, and a research article *Achieving Quality Forest and Landscape Restoration* was published (Ota et al., 2020; see section 10.2). Research was developed in Leyte to understand better the factors that influence the engagement of local people in NGP projects, their ability to perform reforestation activities, and the extent of involvement of NGP officials in their implementation at the local level (Wiset, 2022; 2023). Qualitative analyses were used through various methods, including a landscape visualisation activity. Semi-structured and one-on-one interviews were conducted with sub-groups of PO members, including land claimants and other farmers affected by the PO's reforestation activities, to determine their interests and preferences for reforestation (also see Nuñez, 2023 for a summary). The visualisation exercises helped reflect and define collective future scenarios for collaborative action. Data were analysed through content analysis to establish themes, concepts, and the most common choice for land use systems and planting patterns for NGP projects.

Another central aspect of the FLR implementation in the country was the role of gender (Nuñez et al., 2023). Guided by the results of the systematic review on gender and reforestation (Activity 1.1), a characterisation of gender roles in households and POs, PO dynamics, community involvement, and the impact of FLR on gender and vice versa was undertaken through focus group discussions with all POs.

Results from the FGD guided the design of KIIs on the status and internal dynamics of the POs. These were conducted with one female officer per PO and three project field personnel supporting the POs during NGP project implementation. This was complemented by reviewing secondary data on these communities to understand the local context in which these sociological systems exist. The results informed the design of the interview schedule with PO officers and members (55 male and 110 female PO members and officers). Four FGDs were all-female groups, one FGD was all-male, and another was a mixed group with roughly equal numbers of males and females. Data were analysed using descriptive statistics and content analysis to identify the main themes and concepts. A demographic survey to determine the size and age composition of the POs as determinants of the availability of labour for FLR tasks complemented this study.

Activity 2.4 Work with 10 communities to test different models for scaling out and scaling up FLR.

Twenty-one potential communities suggested by DENR offices in Regions VI, VII and VIII were visited from 2017 to 2018. After the visits, 15 communities were shortlisted. The final ten communities were selected from April 2018 to January 2019 (four sites in Region VI, three in Region VII, and three in Region VIII) (Gregorio et al., 2018a). Partnerships with each community were formalised through a Memorandum of Agreement between the POs, the DENR and the FLR Project.

Baseline background information, including the socio-economic characteristics of the POs, biophysical condition of reforestation sites, livelihood projects and the status, reforestation species planted and the condition of established plantations, and PO operational dynamics, were collected through a survey (Gregorio, 2018a). Planning workshops were conducted in each PO to design Project implementation strategies considering their aspirations, experience, and site characteristics (Gregorio, 2018b and Gregorio et al., 2018b). Commencement reports were prepared in each region by VSU faculty coordinators and CDOs (Pasa et al., 2019). Surveys on PO members' perceptions of the socio-economic impacts of the Project were conducted towards the Project's culmination stage (Goltiano, 2023a).

Besides reinforcing the necessary technical training activities in nursery management and plant propagation, planting and tending practices, organic fertiliser production, understanding of existing soil-fertility management activities, and management of local soil conditions (e.g., climate-smart agroforestry), the Project offered capacity-building activities to the POs on other more administrative topics, including bookkeeping and proposal writing (Custodio, 2023). Also, enhancing organisational and leadership skills was included (Goltiano, 2023b; Nuñez, 2023). FGD and surveys were carried out to identify the training needs.

It is common in the country for land attributed under CBFM to POs to have contested claims. This situation can compromise the progress and performance of activities in the PO as sometimes land claimants are not official members of the POs, and their practices may represent a risk to FLR achievements (e.g., accidental fire spread and increased damage to PO livelihood activities). Surveys with their respective officers were completed to understand land claimants' evolution in partner POs' reforestation sites.

A crucial conceptual breakthrough for the FLR Project was formulating the Community-Capacity Curve (CCC) framework (Herbohn et al., 2023). Data collected through baseline surveys from each PO revealed the existence of different SLF attributes, which were reinforced with the bridging and bonding capitals (Baynes et al., 2015). The analyses of these differences provided the foundation for formulating the CCC framework. Further analyses of the framework helped to identify opportunities for scaling out reforestation activities of the FLR Project (Ota et al., 2023).

Surveys on pests and diseases of seedlings in smallholder nurseries of our partner POs (HIMASACA, NAGMATA, and BTFAI in Cebu and PACEDA and PAGLAOM in Iloilo), private nursery operators, and other POs producing tree seedlings for the NGP were undertaken (Mangaoang, 2021). The sampling area consisted of three plots of mixed or single tree species (n=20 trees/plot). Data were gathered per tree species and the pest problem of each sample tree per plot. Data collection included identifying tree damage, type of damage (i.e., spot, cuts, holes, tunnels, galleries, trails, gall or swelling, burn or drying, etc.), and presence of pests and pathogens. These parameters helped establish the percentage pest/disease incidence and percentage pest/disease severity. The severity of pests and diseases was rated on a scale of 0 and 5 (0 means no pest/disease; 5 means 100% of the tree infected).

Activity 2.5 Explore options for financing community-based FLR initiatives by the private sector and donor organisations.

A study was carried out to document models and experiences of private and donor organisations' engagement with local communities to achieve FLR goals (Pasa et al., 2018; Mangaoang, 2022). Secondary literature review and institutional reports were examined to synthesise information regarding arrangements between local communities and institutions for access and transfer of supporting resources. The search focused on policy environments, implementation strategies, sustainability, and stakeholder participation. The results of this review guided the elaboration of surveys in partner POs, local government units and relevant agencies. The survey helped shed light on processes and requirements to access funding, conditions and terms of engagement, and the potential of this funding and PO capacity to improve access to other types of support. Surveys were conducted through FGDs and interviews with key representatives of partner POs, government officials and department/section heads in Sara and San Dionisio (Iloilo) municipalities, municipal council officials and heads of planning, agriculture, and environment departments to understand funding modalities and gain insights into existing financial opportunities and financing schemes available to smallholders.

Options were explored to secure financial support from Forest Foundation Philippines FFP to finance PO livelihood initiatives in Biliran (KFAI), Leyte (UMACAP and MFA), Cebu (NAGMATA and BTFAI), and Iloilo (PACEDA and DECCA). The project team provided technical support to POs in developing project proposals. The proposed collaborations did not materialise.

Silva, a European-based organisation working to support cacao farmers by purchasing their production for direct export to the Netherlands, was also approached by the Project leaders. Unfortunately, the envisaged initiative did not move ahead.

Another attempt at establishing a new partnership facilitated by the FLR Project was with MATIMCO to support the forest landscape restoration activities of HIMASACA in Cebu. MATIMCO is a timber processing company based in Cebu that is also engaged in forest restoration as part of its sustainable timber production program. They contracted with HIMASACA to establish best-practice reforestation of 150 ha over three years (~50 ha/yr). The FLR Project's role was to provide technical support on high-quality seedling production, plantation establishment and other silvicultural management aspects of reforestation. Although a memorandum of understanding was drafted and discussed, the project was not pursued.

A significant milestone of the FLR Project has been the formulation of a large-scale research for-development project (*Tarsier)*. This ongoing project scales out and up best practices developed from the FLR Project and preceding ACIAR-funded projects of the FLR Project research team. *Tarsier* is a privately funded project to restore at least 10,000 ha of deforested and degraded forest landscapes in Samar, Leyte, and Biliran Islands. The project has a 30-year duration and provides a living laboratory to continuously showcase important findings of the team's ACIAR-funded Projects (nursery, watershed and FLR).

Tarsier also applies the lessons learned and builds on the partnerships created over decades of ACIAR projects in the Philippines.

Recognising the improved technical capacity of the partner POs of the FLR Project, *Tarsier* has established partnerships with KFAI, UMACAP and MFA to produce high-quality seedlings. The POs received financial assistance establishing nurseries and were paid for each seedling they produced. In 2022, KFAI earned PhP540,000. In 2023, the three POs produced 60,000 seedlings with an estimated individual PO income of PhP900,000.

Activity 2.6 Develop geospatial models of the impacts of FLR.

A study on the perceived impacts of FLR on Biliran Island was conducted. This research focused on ecosystem services, namely supporting, provisioning, regulating, and cultural (Mukul et al., 2020; Mukul et al., 2019). Ecosystem services quantification was made through participatory assessment and scoring. Stakeholders' consultations included DENR staff, NGP beneficiaries, smallholder farmers, barangay leaders, PO members, local elderly persons, and women/youth representatives. Participants were selected based on their familiarity with the area and knowledge of the benefits of different land use and land covers (e.g., annual crops, perennial crops, degraded forests).

Each ecosystem service was given a relative score between 0 and 5, with 0 being the lowest, indicating no relevant capacity of a particular land use/land cover to provide the corresponding ecosystem service. A land use/land cover map and photographs of each type were provided during the consultation.

A geospatial model was also developed to explore the potential for a hypothetical community-based reforestation project in the Philippines. The project would theoretically bring back forests to generate carbon credits while improving local people's well-being and promoting biodiversity conservation. The model combined socioeconomic and governance data with land use data and site characteristics to determine the area's potential for reforestation and the opportunities and challenges.

5.4.3 Objective 3: Achieve better economic outcomes for smallholders through improved monitoring, best practices and policy.

Activity 3.1 Design and implement ongoing monitoring of the effectiveness of FLR initiatives.

Monitoring protocols were drafted, and field tested for each main FLR activity (e.g., tree integration, mixed-tree plantations, agroforestry). As this progressed, FLR Project designed means to better capturing the complexity of goals aimed through FLR. Recognising that while trying to achieve livelihood goals of diversifying and securing continuous sources of income, FLR also has aspirations to increase forest cover and reduce land degradation. However, because change occurs in incremental and often non-linear manners and manifests at different times as a function of contrasting conditions (i.e., contexts and POs), a conceptual framework on indicators was formulated (Ota et al., 2021). This monitoring tool laid out the need to discriminate between those indicators that could be used to assess when change already occurred (i.e., lagging indicators), as well as those to signal whether the observed change is in the desired direction, increasing the likelihood of achieving more long-term outcomes (i.e., leading indicators). The essential components of the monitoring protocol were published in 2021 and have been fully adopted by *Tarsier.*

Another activity of the FLR Project aimed at assessing the social impacts of the project implementation. Surveys were conducted to evaluate the level of satisfaction and its determinants, along with social impact measures (Custodio, 2023). The study followed a stratified random sampling strategy.

Activity 3.2 Develop extension materials and best practice guidelines.

The Project adopted and enhanced the training and extension materials developed in the previous ASEM/2010/050 project with new information and used them in the capacity-building activities. Also, the scope of the materials was expanded to include additional topics in more depth. For instance, a manual on designing, implementing, and monitoring FLR was developed that included vital information from the cases presented during the International FLR Conference in Manila (Activity 2.2) and also from outputs of the Forest and Landscape Restoration Workshop in Tacloban, Leyte, in February 2019. Other extension resources, besides training materials, were flyers and posters that provided an overview of FLR. These were disseminated to project partners, research communities and other stakeholders.

Extension and training activities were held with all POs, and related specific materials were designed, produced, and circulated to all members to streamline best practices for quality seedling production and overall nursery management. Other topics included mother tree selection and nursery accreditation methods, agroforestry systems, soil characterisation, and forest and landscape restoration. Extension materials were translated into Cebuano and Ilonggo dialects to suit the language needs of the partner POs. Training sessions were also delivered using the local language of partner POs.

Besides PO members and local officials, capacity-building activities were held for other stakeholders. These included on-the-job training for VSU students in FLR Project POs, students' research in topics related to FLR (e.g., tree domestication), and improved proficiency in using FLR Project laboratory equipment and facilities at VSU as part of their courses and research. Additionally, VSU staff members were sponsored to join international conferences on FLR and visits to USC for research discussions (e.g., gender issues and FLR) and to participate in fieldwork activities in Australia.

The FLR Project utilised complementary communication strategies. Besides printed resources and face-to-face training, several video clips were prepared, and social media outlets were designed and implemented. Topics covered include pest and disease control, bio-fertiliser production, basic soil characterisation methods, nursery seedling production and plantation establishment, the establishment of fire lines, asexual propagation of preferred fruit trees, bamboo propagation, and nursery and plantation practices.

Activity 3.3 Pilot test changes to policy at the local and provincial levels to address social, institutional and political problems.

Interviews and workshops with communities and DENR were held to identify policy and governance gaps in implementing the NGP and strategies to address them at the regional level (Ribeiro et al., 2022). Information relevant to guiding the implementation of the NGP was generated through surveys to determine the extent to which the existence of land claimants could put at risk investments made in FLR. This tool also helped put in perspective the policy adjustments that participating POs would have to implement to guarantee the continued benefits of FLR implementation.

The barriers and limitations of agroforestry adoption were assessed (Preciados et al., 2023). It analysed the socio-economic and demographic profiles of adopters (29 individuals) and non-adopters (71) in Iloilo, Leyte, and Cebu provinces through interviews. The authors also characterised the aspect of their farms in terms of slope and knowledge/skills base to develop the activities and motivations to adopt agroforestry.

A survey was conducted to document the inherent constraints in the Project POs imposed by the demographic characteristics. The country generates ~ 10% of its GDP from remittances: rural populations, particularly the young, tend to move abroad in search of better-paid jobs. The loss of this able labour force implies that the burden of carrying FLR activities is on the remaining individuals, mostly older people, who may find working on high slopes and harsh climates challenging. Understanding the demographic dynamics can inform better policy design and support systems for POs (Gravoso et al., 2023).

Inherent to implementing FLR interventions was strengthening the capacity of partner POs. One component of enhancing social capital was the development of new and enhancing existing intra-PO policies on membership and benefit-sharing. Policies at the community level, including ordinances contributing to protecting the plantations. A Multi-stakeholder Forest Protection Council in Biliran was also formulated to enhance forest protection in the province. This initiative was carried out in partnership with Tarsier. The Governor of Biliran issued the Executive order launching the council in December 2023.

An end-of-project reflection with POs in February 2023 led to developing a visionary exercise with DECCA in Region VI. A workshop was conducted to define a plan to sustain restoration activities initiated under the FLR Project with the participation of local government and institutions (FLR Research Team 2023).

Activity 3.4 Assist in the formulation of national policy.

Regional policy dialogues were conducted to discuss limitations in NGP implementation, and results were shared with the DENR National Office (e.g., Iloilo strategic planning in October 2019). Another relevant event linked to this Project was a workshop in March 2020 (Project *Tarsier* Team, 2020). This event was sponsored by *Tarsier* and joined by 65 participants (POs, communities, academics from the Biliran Province State University, LGU and DENR, and team members of *Tarsier).* The event discussed difficulties in implementing FLR projects. Issues raised included the existence of land claims, the need for high-quality seedlings, inconsistent community participation in activities, insufficient engagement of LGU and extension officers who were overloaded with responsibilities, the need for increased clarity of benefit-sharing mechanisms, fire and other risks, payment amounts, and overall low skills from participants, among others. A follow-on policy workshop was conducted in Biliran Province in February 2023. That workshop resulted in formulating the *Multistakeholder Forest Protection Council* in Biliran Province (Project *Tarsier Team 2023)*.

Meetings were also held with the Forest Management Bureau (FMB) at the DENR Central Office in Quezon City, during which findings from the Policy Workshop conducted by the Project (Iloilo 2019) were shared. These included a lack of knowledge and skills on high-quality seedling production, insufficient comprehension of appropriate silvicultural practices, low seedling survival, limited germplasm sources, and poor soil quality. Other threat factors discussed were fire occurrence and risk, presence of grazing animals, inadequate plantation maintenance when project funds become exhausted, remoteness of planting sites and difficult accessibility, and no legal arrangements with land claimants. Additionally, the discussion recognised that DENR Extension Officers had enormous workloads. The combined effect of all these issues was aggravated, given that FLR projects are primarily implemented in areas with unfavourable biophysical conditions.

Meetings with DENR at the local and national levels were avenues to communicate the challenges in community-based FLR as among the critical research findings and suggested the suitability of a family-based approach within the CBFM as an option. This approach indicated that the reforestation area would be divided among family members of the POs. In May 2020, FMB issued a memorandum adopting the *Family Approach to Reforestation* nationwide, a policy decision we believe could be attributed to sharing the Project's findings. Restoration and management of portions of CBFM areas nationwide are now undertaken by individual families.

The FLR Project published eight policy briefs on gender issues in FLR, monitoring FLR, barriers to scaling out and securing private sector investment, high-quality seedling production, challenges in implementing NGP, and capacity building and extension.

Research efforts included generating a more general understanding of the common challenges and constraints among agriculture and forest restoration stakeholders (Ribeiro, 2023). It used a social network approach to determine how collaborations are established and influence information and resource flow. This assessment revealed stakeholder organisations' roles in the agriculture-forest restoration network (Ribeiro, 2022b). This analysis also identified opportunities for further collaboration among agriculture and forest

restoration stakeholders and the funding and capacity-building priorities. Other research activities included the identification of practical constraints in the implementation of the NGP in all POs in Region VI. This study employed surveys, interviews, observations, workshops, and document reviews to facilitate the triangulation of data and information. During the workshop, an analysis was made of barriers, contextual factors that enable successful FLR, and the development of strategies to overcome the *status quo*. Participants were a mix of PO leaders and DENR staff (Ribeiro 2023a).

Another study using a case-study approach was completed to elucidate conditions that impeded restoration practices from achieving biodiversity conservation objectives and gain insights into how to incorporate biodiversity concerns (von Kleist, 2020). Respondents (n=14) included project managers, nursery operators, researchers, field personnel, and leaders of people's organisations (POs) from Region I (Luzon) and VIII (Leyte). Participants played diverse roles in planning, implementing, and managing reforestation projects, which allowed for triangulation and verification to improve data quality and credibility.

Finally, a political ecology analysis explored the challenges and enablers of ecosystem restoration within agriculture-dominated landscapes, as in the Philippines (Ribeiro, 2023b). This lens allowed an understanding of socio-ecological systems shaped by power relations among social classes or groups to access, control, and use resources. The research included specifying the timeline of agriculture, natural resources, economic policies, and other international landmarks that have shaped the agricultural sector and associated land degradation in the Philippines from the 1900s to the present. Policies were sourced from regulatory databases, peer-reviewed articles, books and reports.

Activity 3.5 Assist in the formulation of policy within the Asia-Pacific region.

Two events helped put the FLR Project in international settings to stimulate policy development and updating. The first was the FLoRES task force meeting (http://florestaskforce.org) held in February 2019 in Tacloban (Leyte), which aimed to develop a high-level conceptual framework for FLR. Given the traction that FLR has gained in recent years worldwide as a nature-based solution to address global climate change and as a mechanism to advance toward the 2030 agenda, the contribution of this event was to raise the urgent need for precise terminology and concepts to design FLR interventions, and articulation of how to better integrate those local scale levels of implementation with national levels of governance and international settings, on which governmental commitments operate. The discussions and resulting deliverables guided the anchor of a common conceptual framework to serve as an umbrella to all implementation modalities of forest restoration at the landscape scale and tools (indicators and monitoring setups) to follow up implementation. This meeting was attended by 25 researchers and practitioners of FLR from ten countries.

The second event was the International Conference on FLR held in Manila in February 2019, with 140 participants from 22 countries. Besides gathering a cadre of world-renowned experts and practitioners in forest restoration. This event allowed for exchanging ideas on opportunities and challenges to advance FLR, with due attention to policy needs. It helped highlight the Philippines' programs to advance FLR with the NGP and create a sense of community and collegiality around collaboration and experience exchange to improve FLR practice. It also contributed to synthesising research and practice experiences, thus increasing the scope for FLR to be more effectively integrated into other national policies in various countries and achieve its goals.

6 Achievements against activities and outputs/milestones

Objective 1: To improve the livelihood of smallholders involved in Forest and Landscape Restoration …

No.	Activity	Outputs/ milestones	Completion date	Comments
1.1	Undertake a gender analysis of the role of women and men in FLR initiatives.	Literature review on gender relations and FLR and how gender issues are included in legislation; policy brief to DENR on key issues identified (Dec 2017).	2017 **2023**	1. Ota, L., Lidestav, G., Andersson, E., Page, T., Curnow, J., Nuñez, L., Goltiano, H., Ferreira dos Santos, N., and Herbohn, J. (2023). Gender roles, relations, and perspectives in small-scale and community forestry – implications for policy and practice. Manuscript 2. Baynes, J., Herbohn, J., Gregorio, N., Unsworth, W., & Tremblay, É. (2019). Equity for Women and Marginalized Groups in Patriarchal Societies during Forest Landscape Restoration: The Controlling Influence of Tradition and Culture. *Environmental Conservation*
		Report outlining results of gender analysis of research communities (Dec 2018).	2017 **2023**	3. Nuñez, L., Ota, L., Gregorio, N. and Herbohn, J. (2023). Gender Analysis of FLR Projects in the Visayas Regions of the Philippines. Report

1.2	Assess the impact of livelihood initiatives included in NGP projects.	Assessment of 12 communities completed (July 2018). Report on the impacts of CBFM CARP projects on livelihoods of smallholders involved in the NGP (Sept 2018).	2018 **2020**	4. Goltiano H., Gregorio, N., Pasa, A., Herbohn, J., Tripoli, R., Polinar, B., Rife, K., Moreno, O., Leysa, J., Doria, K., and Jabagat, M. (2020). The efficacy of livelihood assistance for upland farmers viewed from the Sustainable Livelihoods Perspective. Report
		Protocols for assessment of CBFM CARP projects elsewhere in the Philippines (Dec 2018).	2018 **2021**	5. Goltiano, H., Gregorio, N., Pasa, A., Herbohn, J., Tripoli, R., and Valenzona, J. (2021). The Effect of the Implementation of the National Greening Program on the Socioeconomic Status of Smallholders in Caibiran, Biliran, Philippines. *Small-Scale Forestry*
			2023	6. Galvez, K., Pasa, A., and Gregorio, N. Assessing the impacts of the National Greening Program on the socio-economic status of participating households in the Visayas, Philippines. Concept Note
		Indicators work and protocols	2018 **2021**	7. Ota, L., Firn, J., Chazdon, R., Gregorio, N., Mukul, S., Viani, R., Romero, C., and Herbohn, J. (2021). Using leading and lagging indicators for forest restoration. *Journal of Applied Ecology*
		Monitoring guidelines	**2023**	8. Gregorio, N. (2023). ASEM/2016/103 Reforestation Monitoring Guidelines
1.3	Identify agricultural crops, timber trees and livelihood activities.	Information collated (Jan 2018).	2018 **2021**	9. Polinar, A., Ramos, A., Pasa, E., Gregorio, N., Doria, K. and Leysa, J. (2021). Preference on timber trees among beneficiaries of the National Greening Program (NGO) in the Visayas Region, Philippines. Report
			2021	10. Ramos, A., Pasa, A., Gregorio, N. Herbohn, J., Doria, K., Leysa, J., and Tripoli. R. (2021). Agricultural crops preferences among National Greening Program (NGP) beneficiaries in the Visayas Region. Report
			2023	11. Polinar, A., Pasa, A., Gregorio, N. and Doria, K. (2023). Species diversity. composition, abundance and ddistribution of forest plants in norther Cebu, Philippines.
			2021	12. Demotor, A., Polinar, A, and Doria, K. (2021). Domesticated trees and agricultural crops among upland farmers in barangay Raba-ao, Tabogon, Cebu. Report
		Report outlining best-bet options and community preferences prepared and critical areas for further research identified (Mar 2018).	2018 **2018**	See reports on site selection and planning workshops in each FLR Project Region (section 2.4).

1.4	Develop bio-economic models to evaluate options for landscape-scale community reforestation incorporating woodlots, agroforestry, agricultural and other livelihood activities to identify best-bet options.	Data collected (Mar 2018). Bio-economic model developed and report of recommendations for options to include in FLR prepared (July 2018).	2018 **2023** **2023** **2023**	13. Galvez, J. (2023). Bioeconomic Modeling of Agroforestry and Livelihood Project of the ACIAR-FLR Project in the Visayas Region, Philippines. Research Concept Note 14. Ribeiro, C., Leysa, J., Doria, K., Jagabat, M., Tripoli, R., Ota, L., Gregorio, N., and Herbohn, J. (2023). Towards improving the outcomes of crops and agroforestry in landscape restoration projects in the Philippines. Manuscript 15. Ribeiro, C., Leysa, J., Ota, L., Gregorio, N., and Herbohn, J., (2023). Integrating land uses to mitigate risks and reconcile the goals of multiple stakeholders in the Philippines. Manuscript

1.5	Pilot test designs for multi-species, multiple product uneven-aged woodlots, agroforestry systems, and woodlot/crop livelihood systems suited to smallholders and communities.	Species selection for trials completed (July 2018). Field trials establishment in communities as part of Activity 2.4 commenced (Sept 2018). Initial survival and growth assessments undertaken (Oct 2018-Dec 2019). Field trials monitored and data collected (Dec 2018 – July 2021). Soil assessment report completed (Dec 2020).	 2018 **2020** **2021** **2023** **2020** **2019**	See above activity 1.3 16. Stevenson, K. (2020). Literature review on assisted natural regeneration. Report 17. Doria, K., (2020). Community-based forest restoration project: a demonstration of assisted natural regeneration (ANR) and enrichment planting techniques in restoring denuded lands. Report. 18. Moreno, O. & Tripoli, R. (2020). Mahawan Field Trial Barangay Mahawan Kananga, Leyte. Report. 19. Tripoli, R. (2020). Identify the growth performance of 20 different species using elevated hardening beds in the nursery. Report. 20. Gregorio, N., Moreno, O., & Tripoli, R. (2020). Competition and complementarity of forest trees in a mixed plantation (trial destroyed by a typhoon). Report. 21. Gregorio, N. (2023). Effects of hardening bed on the morphology and field performance of big-leaf mahogany (*Swietenia macrophylla* L., Jacq.) seedlings. Report. 22. Oraiz, K., (2021). Characteristics and fertility status of soils in the forest landscape restoration sites in Central Visayas. Report 23. Vanclay, J.K., Gregorio, N.O. and Herbohn, J.L., (2023). Competition in a Mixed-Species Planting with Four Contrasting Tree Species. *Small-scale Forestry* 24. Le, H., Smith, C., Herbohn, J., & Nguyen, H. (2020). A Comparison of Growth, Structure and Diversity of Mixed Species and Monoculture Reforestation Systems in the Philippines. *Journal of Sustainable Forestry* 25. Bonner, M., Herbohn, J., Gregorio, N., Pasa, A., Avela, M., & Solano, C. Maranguit, O., Almndras-Ferraren, A., Wills, J., Shoo, L., & Schmidt, S. (2019). Soil organic carbon recovery in tropical tree plantations may depend on restoration of soil microbial composition and function. *Geoderma*

		Three manuals in smallholder-based tree-crop farming systems for extension and instruction developed (Feb 2022). Twenty scientific articles published (March 2022).	**2019, 2020**	Manual 1.Gregorio, N., Herbohn, J., Harrison, S., and Pasa, A. (2019). Quality seedling production in smallholder nurseries. Manual 2. Pasa, A., Gregorio, N., Gravoso, R., & Herbohn, J. (2020). Agroforestry for FLR Manual 3. Gregorio, N., Pasa, A., Gravoso, R., & Herbohn, J. (2020). Selecting mother trees of timber species. Manual 4. Ramos, A., Gregorio, N., Pasa, A. & Herbohn, J. (2020). Asexual propagation. 26. The FLR Project published 25 peer-reviewed articles. Also, see list Section 10-2.
1.6	Develop and test ways to improve the resilience of reforestation systems to the impacts of fire and weed competition.	Information collated and report including potential trees with grass suppression traits completed (Jan 2018). Field trial established (July 2018). Field trial monitored and data collected (July 2018-July 2021). Report on diseases (Dec 2021).	2018 2018 **2023** **2021**	This work was not finalised. 27. Peque, D., Gregorio, N., and Bartido, R. (2023). Forest fires in Forest landscape Restoration projects in the Philippines. Report 28. Mangaoang, Y. (2021). Assessment of pests and diseases of tree plantation in NGP reforestation and FLR trial sites of Visayas, Philippines. Report

1.7	Investigate the potential for biofertilisers produced by communities to improve growth of trees and crops along with providing livelihood opportunities.	Seedlings produced and field trials established in two selected research communities (Dec 2018).	2018 **2020**	29. Ferraren, A., Gregorio, N., Agne, L., Avela, M. and Pasa, A. (2020). Growth performance and nutrient update by falcata (*Paraserianthess falcataria)* as influenced by potting medium, chemical fertilizer, and arbuscular mycorrhizal fungal inoculation. Report
			2022	Krishnan, V. (2022). The role of nitrogen in enhancing the resilience of tropical tree seedlings used for restoration. Dissertation. Doctor in Philosophy. University of Queensland. https://doi.org/10.14264/3d117a1
			2023	30. Krishnan, V., Robinson, N., Firn, J., Herbohn, J., and Schmidt, S., (2023). Organic nitrogen improves the water use of tropical tree seedlings cultivated for restoration plantings. *Plants People Planet*
			2022	31. Mukul, S.A., Herbohn, J., Ferraren, A. and Congdon, R. (2022). Limited role of shifting cultivation in soil carbon and nutrients recovery in regenerating tropical secondary forests. *Frontiers in Environmental Science*
		Business plans developed (Sept 2019).		After several attempts, this activity was not pursued because the researcher leading the scientific work and the student both shifted to another topic. We could not find other personnel to work on this issue.
		Biofertiliser in livelihood projects of the communities incorporated (Jan 2020).	**2018**	32. Preciados, L. (2018). Summary of observations and findings: field visit report for organic fertilizers in Leyte, Philippines. Report
			2020	33. Pasa, A., Gregorio, N., Jagabat, M., Leysa, J., Tripoli, R, Doria, K., Maranguit, O., Rife, K, and Herbohn, J. (2020). Biofertilizer application among NGP participants in the Visayas, Philippines**.** Report

1.8	Investigate soil/plant/water relations in existing plantations and apply these to the design of improved mixed-species reforestation systems for the NGP.	Field- and lab-based infiltration analysis completed and report prepared (July 2018). Macropore analysis completed and report prepared (December 2018). Field trials for macropores established (December 2019). Plant water analysis completed and report prepared (December 2019). Field trials established (December 2020).		

Objective 2: To develop and test options for scaling out landscape-scale community-based reforestation

No.	Activity	Outputs/ milestones	Completion date	Comments
2.1	Assess FLR initiatives to identify key factors likely to impact success for scaling out.	Literature review and four case analyses completed (December 2018)	2018 **2018**	34. Ota, L., Herbohn, J., Harrison, S., Gregorio, N. & Engel, V.L. (2018). Smallholder reforestation and livelihoods in the humid tropics: a systematic mapping study. *Agroforestry Systems*
		Study tour of FLR initiatives in Vietnam, Indonesia and Cambodia (March 2018)	**2020**	35. Ota, L., Herbohn. J., Gregorio, N. & Harrison, S. (2020). Reforestation and smallholder livelihoods in the humid tropics *Land Use Policy*
		Publication	**2020**	Mukul, Shariff A. (2020). Shifting cultivation in the upland secondary forests of the Philippines: Biodiversity and carbon stock assessment, and ecosystem services trade-offs in land-use decisions. Dissertation. Doctor of Philosophy. University of Queensland. https://doi.org/10.14264/uql.2016.222
		Publication	**2020**	36. Mukul, S., Herbohn, J., & Firn, J. (2020). Rapid recovery of tropical forest diversity and structure after shifting cultivation in the Philippines uplands. *Ecology and Evolution*
		Publication	**2020**	37. Mukul, S., Halim, M., & Herbohn, J. (2020). Forest Carbon Stock and Fluxes: Distribution, Biogeochemical Cycles, and Measurement Techniques. In: *Life on Land, Encyclopedia of the UN Sustainable Development Goals.* Springer Nature, Switzerland.

		Poster Report completed (May 2018) and paper published (Dec 2018)	**2019** **2020**	38. Ribeiro, C., Herbohn, J., Ota, L., & Baynes, J. 2019. Agroforestry and ecological farming practices to improve landscape restoration initiatives in the humid tropics. . 39. Ota, L., Chazdon, R., Herbohn, J., Gregorio, N., Mukul, S., and Wilson, S. (2020). Achieving quality forest and landscape restoration in the Tropics. *Forests*
2.2	Hold an international conference on FLR.	International conference conducted with around 20 invited attendees (July 2018). Proceedings of the conference developed (August 2018). Special issue of a journal developed (Sept 2018).	2018 **2019** **2019** **2020**	Conference synthesis published here: https://www.mdpi.com/journal/forests/special_issues/Landscape_Happen 140 participants from 22 countries Conference website: https://flr2019.weebly.com/ Book of abstracts and Conference Proceedings can be found here: https://protect-au.mimecast.com/s/U46GCnxyMwtr9VVgU96IZ5?domain=flr2019.weebly.com 40. List of articles published in the Special Issue of *Forests* featuring selected case-studies in SE Asia, Africa, and Latin America. Publications are available on this link: https://www.mdpi.com/journal/forests/special_issues/Landscape_Happen#published

2.3	Design improved models for implementing and scaling out reforestation in the Philippines.	Case study field work completed (Mar 2018). Report including potential roles and contributions of women in the community in implementing and scaling out reforestation completed (June 2018). PhD Dissertation	2018 **2020** **2022**	41. Valette, M., B. Vinceti, N. Gregorio, A. Bailey, E. Thomas, and R. Jalonen. 2020. Beyond fixes that fail: identifying sustainable improvements to tree seed supply and farmer participation in forest and landscape restoration. *Ecology and Society* Wiset, Kanchana. (2022). Engaging local people in forest landscape restoration: Case Studies in Eastern Visayas (The Philippines) and Ramu-Markham Valley (Papua New Guinea). Dissertation. Doctor of Philosophy. University of the Sunshine Coast, Queensland. https://doi.org/10.25907/00674
		Publication	**2023**	42. Wiset, K., Gregorio, N., FIsher, R., Mangaoang, E., & Herbohn, J. (2023). Assessing the effectiveness of the engagement of local people in restoring degraded forest landscapes in Leyte and Biliran Provinces, the Philippines. *Environmental Science & Policy*
		Policy brief on engagement	**2020**	43. Pasa, A. (2020). Engaging communities in Forest Landscape Restoration
		Publication	**2023**	44. Herbohn J, Ota L, Gregorio N, Chazdon R, Fisher R, Baynes J, Applegate G, Page T, Carias D, Romero C, Putz F & Fim J. (2023). Relationships between livelihood assets and reforestation success – the Community Capacity Curve applied to reforestation. *Philosophical Transactions of the Royal Society B*
		PhD Dissertation	**2023**	Ribeiro, Camila M. N. (2023). Improving the agricultural component of Forest and Landscape Restoration projects in the Philippines. Dissertation. Doctor of Philosophy. University of the Sunshine Coast, Queensland (Embargoed document until March 2024).

2.4	Work with 10 communities to test different models for scaling out and scaling up FLR.	Ten communities selected to include in pilot testing (Tentative list, October 2017, final list, December 2017).	2017 **2018** **2019**	45. Gregorio, N., Tripoli, R., Pasa, A., Polinar, A., Peque, D., (2018). Selection of Research Sites for ASEM 2016/103. Report 46. Gregorio, N. (2019). Report Baseline Survey: PO Level. Report
		Needs assessment for first five communities completed (Mar 2018) and then second five (October 2018).	**2019**	47. Baseline profiles of 10 Project POs. (2019). Report
		Commence pilot testing of site-specific FLR models in 10 communities (July 2018).	**2018**	48. Gregorio, N., Gravoso, R., and Pasa, A. (2018). Planning Workshop to Design Improved FLR in the Visayas Region of the Philippines (Region VI). Report 49. Gregorio, N. (2018). Planning Workshop to Design Improved FLR in the Visayas Region of the Philippines (Regions VII and VIII). Report 50. Pasa, A. (2019). Commencement report region VI. Report Polinar, A. (2019). Commencement report region VII. Report Peque, D. (2019). Commencement report region VIII. Report
		Around 200 ha of community-based reforestation established by July 2019) In excess of 500 ha of community-based reforestation established (July 2021)	2019 **2023**	About 350 ha of tree plantations were established across three POs in Cebu (2019, 2021), one PO in Leyte (2019) and four POs in Biliran (2022). The plantations of four POs in Biliran were established under Project Tarsier. Over 1,500 ha of tree plantations will be established by seven POs in So. Leyte and one PO in Leyte in 2023 under project Tarsier, following the best practices developed by the FLR Project.
		Community baseline socio-economic data collected (July 2018) and second round of data collected (Dec 2020), third round of data collected (Dec 2021)	**Nov. 2023**	50a. Goltiano, H (2023). Community socio-economic data updated after FLR Project. Socio-economic baseline survey (activity 1.2) was again applied in 2023 in all FLR Project POs.
		Reports from each case study site completed (February 2022). Final reports per region will be prepared for each FLR Project PO. These reports will be finalised in November 2023. In the meantime, we include the Region reports prepared in January 2023.	**Feb. 2023**	51. Pasa, A. & Jagabat, M. (Jan 2023). Report all projects region VI 52. Polinar, A., & Mordequillo, E. (Jan 2023). Report all projects region VII 53. Peque, D., and Rañin, J. (Jan 2023). Report all projects region VIII 53a. Jagabat, M. (Dec 2023). Final report all projects region VI 53b. Rañin, J. (Dec 2023). Final report all projects region VIII

2.5	Explore options for financing community-based FLR initiatives by private sector and donor organisations	Report and policy brief of potential options and enabling conditions for private sector investment in reforestation (Aug 2018). Feasibility assessment of the potential to scale up the pilot reforestation in Biliran completed (Oct 2018). Case study with private sector commenced (Dec 2018).	2018 **2018** **2022**	54. Pasa, A., Peque, D., and Tripoli, R. (2018). Explore options for financing FLR initiatives by private sector and donor organizations. Report 55. Mangaoang, E. (2022). Financing Status of Community-Based Forest and Landscape Restoration (FLR) Initiatives: The Case of ACIAR-FLR Project Sites in the Visayas, Philippines. Report Specific text included in the Report Specific text included in the Report
2.6	Develop geo-spatial models of the impacts of FLR.	Baseline biophysical and socio-economic characterisation of 10 communities completed (March 2018). Reports of baseline characterisation completed (July 2018). Model showing FLR impacts completed (Dec 2021).	2021 **2020** **2020** **2020**	See Goltiano et al., (2020, and 2021), activity 2.1 See Commencement Reports (example for Region VI, activity 2.4) 56. Mukul S., Herbohn, J., Gregorio, N., and Pasa, A., (2020). Projecting ecosystem services supply potential from forest and landscape restoration in Biliran Island, the Philippines. 57. Mukul, S., Herbohn, J., Fern, J., & Gregorio, N. (2020). Carbon and Biodiversity Outcomes under Divergent Management Scenarios in Shifting Cultivation Landscapes in the Upland Philippines. In: Cairns, M. (ed.), Farmer Innovations and Best Practices by Shifting Cultivators in Asia-Pacific, pp. 408-420. CABI, UK. ISBN: 978-0-415-74603-8. 58. Gregorio, N., Herbohn, J., Tripoli, R., and Pasa, E. (2020). A Local Initiative to Achieve Global Forest and Landscape Restoration Challenge—Lessons Learned from a Community-Based Forest Restoration Project in Biliran Province, Philippines. *Forests*

Objective 3: To achieve better landscape-scale reforestation outcomes for smallholders through improved monitoring, best practices, and policy.

No.	Activity	Outputs/ milestones	Completion date	What has been achieved?

3.1	Design and implement ongoing monitoring of the effectiveness of FLR initiatives.	Design of program monitoring completed (May 2018). Report Testing of monitoring techniques in 10 communities commenced (July 2018). Report Review and revision (if necessary) of monitoring techniques completed (Dec 2019). Report outlining biophysical, socio-economic and livelihoods impacts of FLR.	2018 **2022** **2023** 2019 **2022** **2023**	59. Ota, L. (2022). A protocol for assessing the success of FLR projects including livelihoods. Report 60. Ota, L., Fiirn, J., Chazdon, R., Gregorio, N., Romero, C., Tripoli, R., Doria, K., Leysa, J. and Herbohn, J. (2023). Community capacity for forest restoration. Report 61. Gutierrez, V., Hallet, H. G., Otz, L., Sterling, E., WIlson, S.J., Bodin, B. & Chazdon, R. (2022). Forest and landscape restoration monitoring frameworks: how principled are they? *Restoration Ecology* 62. Custodio, D. (2023). Assessing the Social Impacts of the ACIAR- Forest Landscape Restoration (FLR) Livelihood Projects in the Philippines. Concept Note.

3.2	Develop extension materials and best practice guidelines.	Four training and extension manuals developed and about 1500 copies printed, best practice guidelines completed; three training modules developed (Jan 2018).	2018 **Various dates**	63. List of all Extension Materials including Trainings (formal and informal) and other activities. See activity 1.5. See Report section 8.4. 64. Polinar, A. (2023). BSF OJT/Field Practice Report
		Best practice technologies incorporated into forestry curriculum (June 2018).	**2023**	See Report section 7.4.1
		Training workshop with 100 extension staff of DENR and LGUs conducted (Feb 2018).	2018 **Various dates**	See # 63. See Report section 8.4
		Examples of training activities	**2018**	65. Gregorio, N. (2018). Hands-on high-quality seedling production in smallholder nurseries (held in Papua New Guinea). Report
			2019	66. Rife, K., & Pasa, A., (2019). Training on Undertaking Social Science Research (joint with ACIAR PNG project held at VSU). Report
			2019	67. Gravoso, R., (2019). Social Methods Research Training. Participatory Action Research. Prof. R. Fisher. Report
			2019	68. Pasa, A., (2019). Learning event on plantation establishment, agroforestry system and climate-smart high value vegetable production for CBFM POs, MEOs, and Coordinators. Report
			2019	69. Pasa, A. (2019). Training on Vegetative Propagation and Organic Fertilizer Production for Partner People's Organizations in Northern Iloilo. Report
			2019	70. Ferraren, A., Polinar, A., Doria, K., and Demotor, A. (2019). Soil fertility management training.
			2021	Ribeiro, C. (2021). Agroforestry training: design and management (provided to farmers, extension officers and other project participants). Available here: https://www.youtube.com/watch?v=X4yxV6Ht0SY
			2023	71. Custodio, D. (2023). Materials workshops Book-keeping and proposal writing.
			2023	72. Goltiano, H. (2023b). Leadership and organizational capacity workshop.

		Farmer-to-farmer Field School developed and trialled in Region 8 (July 2018), and Regions 7 and 10 (December 2019) in at least one site in each region. MSc Thesis VSU	**2023** **2019** **2022** **2023**	72a. Nuñez, L. (2023). Assessment of the Organizational Strength of People's Organizations Engaged in NGP: Enhancing Capacities for Sustainable Reforestation Projects 73. Polinar, A. (2019). POs visit to VSU. 74. FLR Project Team (2022). Farmer-to-farmer Field School. Visit POs to Nagmata. Regmi, Bandana (2023). Factors influencing the adoption of quality seedling production technology. Thesis. MSc. Visayas State University. Baybay City, Leyte. The Philippines [available upon request]
3.3	Pilot test changes to policy at the local and provincial levels to address social, institutional and political problems.	Reports on policy and governance gaps completed (Mar 2018). Recommendations on improved policy and governance to pilot test developed (July 2018). Improved policy and governance pilot tested in 10 communities (July 2018 through to Nov 2023).	2018 **2022** 2018 **(2023)** 2018 **Various dates** **2023** **2023** **2023** **2023**	75. Ribeiro, C., Ota, L. Gregorio, N., Jagabat, M. & Herbohn, J. (2022). Social network analysis to link agriculture and forest landscape restoration projects in the Philippines. Manuscript 76. Pasa, A. (2023). Policy Working Session with DENR (September 18, 2023 in Manila). Report. See Report section 7.4.3 and appendix 77 76a. Preciados, L., Gravoso, R., Gregorio, N., Peque, D. and Pasa, A. (2023). Agroforestry Adoption: Profile, Influential factors, Perceptions, Importance, Barriers, Implications, and Recommendations. Report. 77. FLR Project Team (2023). List of PO arrangements and internal policies. 78. FLR Project Team. (2023). Partners' Community Feedbacking Session and Workshop. Report 79. FLR Project Team. (2023). Enhancing livelihoods through FLR. Sustainability Plan DECCA. Report

3.4	Assist in formulation of national policy.	Annual meetings (every November) with top DENR officials (from 2017 to 2020).	2017 **2022**	Pasa, A. and Gregorio, N. (2023). Summary of meetings with DENR officials in Manila. See Report section 7.4.5
		National policy to promote successful and sustainable FLR institutionalised (Oct 2023).	**2020**	80. Gregorio, N. (2020). A case of policy, scientific and capacity impacts of ACIAR FLR Project. Report.
			2023	81. Ribeiro, C., (2023). How can agricultural practices promote forest and landscape restoration? A systematic review. Report
		Various documents between reports, PhD Dissertation and manuscripts	**2023**	82. Ribeiro, C. (2023). The political ecology of access use and control of resources in the Philippines, a policy timeline. Report
			2020	Von Kleist, Kurt (2020). Are biodiversity provisions outlined in the Forest and Landscape Restoration approach being attained? Case studies from the Philippines and beyond. Dissertation. Doctor of Philosophy. University of the Sunshine Coast, Queensland. https://doi.org/10.25907/00229
			2021	83. Von Kleist, K., Herbohn, J., Baynes, J. and Gregorio, N., (2021). How improved governance can help achieve the biodiversity conservation goals of the Philippine National Greening Program. Land Use Policy
		Policy workshop report	**2019**	84. FLR Project Team. (2019). Strategic Planning & Policy Workshop on FLR for Iloilo. Report
			2023	85. Gravoso, N., Gregorio, N. & Pasa, A., (2023). Experiences in implementing reforestation projects: the case of people's organizations in Iloilo. Report
			2021	86. Gravoso, R., Pasa, A., & Gregorio, N. (2021). Responding to constraints in reforestation projects: An example of a collaborative problem analysis and strategy development for improved forest and landscape restoration. Report
			2022	87. Project Tarsier Team (2020). Workshop on Designing a Sustainable Community-based Forest Restoration Project through Voluntary Carbon Market. Report
			2023	88. Project Tarsier Team (2023). Biliran Province Workshop February 2023. Report
		Policy Briefs	**2023**	89. Goltiano, H. (2023c). Burnout among Extension officers: a serious problem deserving serious attention

			2023	90. Goltiano, H (2023d). Continuous capability-building for People's Organisations is essential for successful Forest Landscape Restoration (FLR)
			2023	91. Pasa, A. (2023). Implementing the National Greening Program in Maize-dominated landscapes.
			2023	92. Gregorio, N., Pasa, A., & Herbohn, J. (2023). Avoid tripping over the first hurdle: Continued prevalence of low-quality seedlings in forest restoration programs in the Philippines.
			2023	93. Ota, L. (2023). Leading and Lagging Indicators for Forest Land Restoration in the Philippines
			2023	94. Nuñez, L. and Ota, L. (2023). Building the Capacity of Women for Forest Landscape restoration (FLR).
				95. Mangaoang, E. (2023) Key Policy Options for Promoting Enabling Environments for Private Sector Investment in Reforestation.

3.5	Assist in the formulation of policy within the Asia-Pacific region.	Initial FLR Workshop conducted (Activity 2.2) (July 2018).	2018 **2019**	See activity 2.2
		Final FLR Workshop conducted (Aug 2023).		This activity will not take place. However, and internal research workshop on benefit-sharing in FLR-NBS took place in October 2023 under Project *Tarsier,* with which the FLR-Project will collaborate and researchers of the Project attended.
		Guidelines drafted based on project findings (Jun 2021).	2021 **2023**	96. Gregorio, N. (2023). Improving seedling quality in community-based forest and landscape restoration programs in the Philippines: translating science into policy and practise. Manuscript
		Guidelines finalised and published	**2020**	97. Chazdon, R., Gutierrez, V., Brancalion, P, Laestadius, L., and Guariguata, M. (2020). Co-Creating Conceptual and Working Frameworks for Implementing Forest and Landscape Restoration Based on Core Principles. Forests
			2020	98. Chazdon, R., Herbohn, J., Mukul, S., Gregorio, N., Ota, L. Harrison, R., Durst, P., Chaves, R., Pasa, A., Hallett, J., Neidel, J., Watson, C., and Gutierrez, V. (2020). Manila Declaration on Forest and Landscape Restoration: Making It Happen. Forests
			2021	99. Chazdon, R. L., S. J. Wilson, and J. Herbohn. (2021). Building capacity of farmers and communities for forest and landscape restoration Pages 106-113 in J. Ghazoul and D. Schweizer, editors. Forests for the future: Restoration success at landscape scale - what will it take and what have we learned? Prince Bernhard Chair Reports (issue 1).
			2023	100. Tedesco, A.M., López-Cubillos, S., Chazdon, R., Rhodes, J.R., Archibald, C.L., Pérez-Hämmerle, K.V., Brancalion, P.H., Wilson, K.A., Oliveira, M., Correa, D.F. and Ota, L. (2023). Beyond ecology: ecosystem restoration as a process for social-ecological transformation. Trends in *Ecology & Evolution*

7 Key results and discussion

For ease of presentation, results and corresponding discussions were organised according to the following main topics: (7.1) Design and monitoring of FLR systems; (7.2) Implementation of FLR in the Philippines; (7.3) Other FLR-Project Research Activities; and (7.4) Research Applications and Sustainability Plans. Table 1 outlines the relationship of each theme to the objectives and specific activities of the Project.

Table 1. Thematic organisation of results and discussion presentation highlighting the relevance of information for FLR Project activities.

SECTION	OBJECTIVE	ACTIVITIES
(7.1) Designing and Monitoring FLR Systems	1 2 3	1.1 2.1 3.1, 3.2
(7.2) Implementation of FLR in the Philippines	1 2 3	1.1, 1.2, 2.1, 2.3, 2.4 3.1, 3.3
(7.3) Other FLR-Project Research Activities	1 2 3	1.2, 1.3, 1.4, 1.5, 1.6, 1.7 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7 3.1, 3.2, 3.3, 3.4, 3.5
(7.4) Research Applications and Sustainability Plans	2 3	2.3 3.2, 3.3, 3.4

The implementation of the FLR Project was informed by the findings and lessons learned from previous ACIAR-funded projects of the FLR Project team members from USC and VSU (i.e., ASEM/2000/088, ASEM 2003/052, ASEM 2006/091, and ASEM/2010/050). ACIAR's continuous commitment and support over two decades helped overcome some of the limitations of traditional projects with relatively short funding cycles. Earlier works with POs helped identify suitable ways of collaboration and provision of support, which are vital elements of what would become an example of a practical FLR agenda in the country.

Existing collaborations with key governmental agencies at all levels were also solidified through the continuous support from ACIAR. The FLR Project built on previous agreements with DENR, LGUs and other agencies in formalising collaborations. This partnership and long-term engagement are examples to consider, as consistent, meaningful collaboration around an agreed-upon goal in practice has yet to be achieved.

7.1 Designing and Monitoring FLR Systems

Designing and monitoring FLR systems are complex activities within a much larger set of actions necessary to set in motion FLR agendas. Even within a well-established national initiative, like the National Greening Program, with clearly defined goals, the steps that must be taken for FLR implementation could be more explicit. Tailoring activities to each situation in ways that there is genuine and sustained participation of both communities and institutional actors still represents a barrier to streamlining NGP nationwide. Ultimately, it will determine how NGP would perform in different places.

7.1.1 Capacities of Communities and Other FLR Actors

Challenges for FLR performance persist as structural characteristics of communities in general, and those of POs in particular, still threaten the realisation of sustained positive impacts. Gregorio et al. (2020a) and Pasa (2020) noted that livelihood projects, together with tenure security of land and trees, equitable benefit-sharing arrangements, and improved human and social capital, are keys to the communities' long-term engagement in reforestation projects. Because almost half of the country's population is rural and resides and practises agricultural activities in areas where restoration activities are implemented (Dikitanan et al., 2017), aligning in practice the goals of sustaining livelihoods, addressing climate change while reforesting degraded lands is a task filled with challenges. Despite continuous efforts to maintain stakeholders ' engagement and building capacity, insufficient local skills at the individual, community, and institutional levels are among these challenges. Additional barriers remain for inter-institutional coordination despite the government-promoted initiative of Convergence formulated early in 2011 (Executive Order No. 26, 2011; Bangsal, 2016; CoA, 2019). Continued overlapping roles and insufficient funding hampered the desired institutional collaboration and alignment of agendas.

The ACIAR-FLR project contributed to improving livelihoods based on the perception of PO members (Goltiano, 2023a). The sustained engagement has improved the self-sufficiency of some POs. The project's training activities enhanced the human capital of PO members, which was instrumental in increasing their income. The social preparation initiatives of the FLR Project resulted in POs' rejuvenation, cohesive organisation, and, in some cases, increased membership. The COVID-19 pandemic may have curtailed realising the potential benefits.

Parallel activities related to enhancing organisational strength and skills were informed by the training needs assessment results through interviews and FGDs (Nuñez 2023). The remaining challenges relate to the lack of capacities of POs to set strategic goals to fulfil their visions, define activities to achieve them, and the necessary good leadership and sound project management.

A literature review pertinent to FLR design focused on conditions under which reforestation could deliver improved outcomes. This study recognised that FLR land use overlaps with several livelihood activities for smallholders, and their integration within a portfolio of options is critical to achieving optimal outcomes (Ota et al., 2020). Restoration projects can present alternatives to farmers wishing to transition from investing in unsustainable debt systems of cash crops while avoiding further agricultural land expansion and degradation (Ribeiro et al., 2022 b). Although capacities, knowledge, and networks were identified as key to advancing reforestation goals, other limitations, such as increased risk due to biotic or abiotic threats (e.g., unclear tenure and rights; presence of land claimants) and lack of resources could hamper the full integration of reforestation into livelihood activities.

Reflection on these limitations led to the formulation of the community capacity curve, which guided the Project implementation design and strategies (Herbohn et al., 2023; Figure 6). To realise the goals of community management of resources as a mechanism through which smallholders can achieve livelihood benefits (Ota et al., 2020), be it for reforestation or other land uses within an FLR framework, recognising community characteristics can lead to more targeted efforts by supporting interventions.

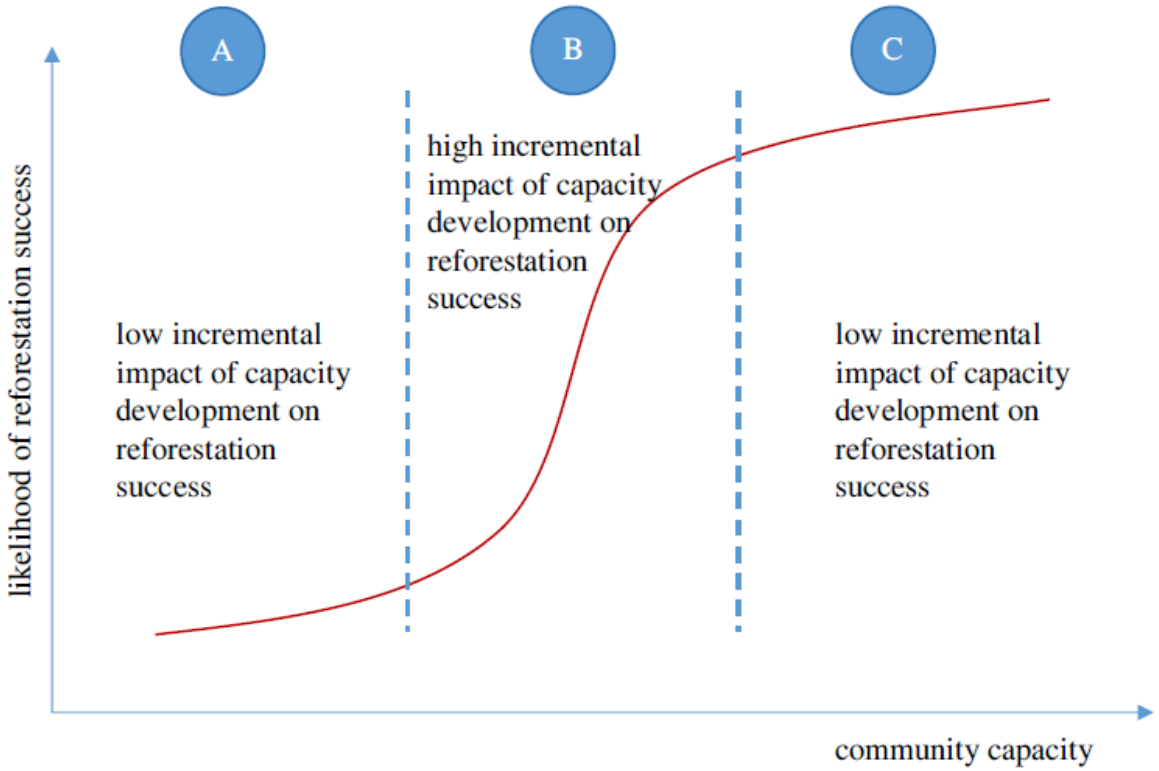


Figure 6. Community Capacity Curve model that portrays the differing likelihood for communities to achieve FLR goals as a function of the capital assets (i.e.,g physical, natural, social, human and financial). On the far left of the curve, more than considerable investment in communities may be needed to push communities up the curve. More sustained positive changes (far right side of the curve) can be achieved even with minor investment for communities already vested in FLR, with little incremental change (from Herbohn et al., 2023).

The community capacity curve model sets guidelines for establishing a practical assessment towards characterising communities' capacities in ways that will clarify the most suitable entry points and types of interventions. A prominent attribute of this conceptual model is its relative simplicity and visualisation, which can help depict trajectories of change as a function of the achievement of incremental change through time. This framework can also help identify specific areas where communities may be more restricted (e.g., organisational versus access to capital), which can determine immediate needs and how these can be fulfilled.

In one of the Project communities analysed through the framework, for instance, financial support was provided by the government to start the reforestation activities. But when the funding stream ceased, the reforestation project almost failed. Further reflection on this situation with the community and an injection of further support allowed the PO to move along the capacity curve to a point where reforestation investments in terms of efforts and resources could lead to long-lasting benefits (Herbohn et al., 2023). This switch implied a transition for the PO to move beyond the common reforestation-deforestation cycles (Perez et al., 2020). The community capacity curve study also highlighted an important aspect of funding for development that seems so inclined to be results-oriented, often with limited attention to the process. In this case, investments in social capital for some communities to build social preparation (Gravoso et al., 2021) may trigger other positive changes and lead to irreversible gains with positive consequences for the resource base.

A more recent FLR Project research built on the community capacity curve model interrogated practical ways for its application for successful FLR (Ota et al., 2023b). This

study could help fill a research and practice gap related to FLR indicators (see Gutierrez et al., 2020). Focused on the ten FLR Project POs, this study used 41 variables related to capacities to characterise their potential for FLR. It identified the types of capital more critical for POs in different positions along the curve, with marked geographical signals between POs located in similar regions. This ongoing work has great potential to inform FLR design and implementation.

7.1.2 Contextual Factors & Social Inclusion

Besides insufficient capacities, other challenges for FLR must be amenable to change and have limited scope for the FLR Project to address. These include aspects related to NGP restricted accompaniment of participants (Goltiano 2023c), micro- and macro-economic characteristics influenced by local/regional dynamics (e.g., household composition; out-migration leading to reduced availability of labour; disturbance regimes), and insufficient availability of local support (e.g., credit and market access) to implement FLR.

A survey of demographic characteristics of partner POs revealed that in most POs, women dominated the membership and were younger than men across POs; mean age ranges between 33-57 (mean=49). Men's average age range was 43-62 (mean 53). Of all the POs, only DECCA had a considerable fraction of the population younger than 35 (about 24%). In all the other POs, there were no women younger than 43 or men younger than 51.

The significant contribution to GDP that remittances have in the country (~10%; 4th country in the world) represented around US$37 B in 2022, with a 4.3% increase from the previous year (World Bank, 2023) is well established. FLR Project findings indicated that FLR agendas must create local incentives to attract younger populations into communities and engage in reforestation and community livelihood projects.

Given the nature of activities for FLR, the difficulty of accessing remote areas often situated on high slopes and the preponderance of an older population in the POs could limit proper tending and delivery of best practices in forest restoration. Also, the risk of FLR-based livelihoods posed by a changing climate is increasing. Even if recent research has suggested that tropical cyclones have become less frequent (Chand et al., 2022), their destructive power has increased (i.e., super typhoons or storms that gain strength quickly: Zhang et al., 2019), and seasonal occurrence has changed. Local communities have already suffered the impacts of previous storm systems that destroyed their livelihood and reforestation projects (e.g., Typhoons Haiyan and Rai in 2014 and 2021, respectively), and perception of risks from these experiences may shape their willingness to engage in FLR activities.

The FLR Project also mapped current and prospective opportunities to reinforce FLR implementation as a mechanism of broad social inclusion and a vehicle to consolidate gender agendas more broadly. It identified how gender issues were represented (or not) in national policy frameworks, regulations, and institutional arrangements (Nuñez and Ota, 2023).

The gender lens allows us to discern the differences in roles, opportunities, and interactions between women and men when they engage in reforestation in ways that interventions are tailored to address diversity in the visions, aspirations, experiences, power, and needs of these groups. The several initiatives to encourage women's participation in FLR, despite prominent national plans (e.g., Philippine Plan for Gender-Responsive Development -1995-2025; DENR's Gender and Development Program -GAD) and international commitments (*Agenda 2030*, specifically SDG 5), still need to be articulated at the local level to create enabling environments. The FLR Project addressed some of the limitations discussed in Section 7.2.2.

A study assessed the barriers and limitations to POs adopting agroforestry activities (Preciados et al., 2023). The findings suggested increased income generation was not the primary motivation for agroforestry adoption. Still, having access to diverse products for self-sufficiency was an attractive option. Another motivation was the belief that this practice

improves the quality of the soil and, thus, the value of the land and could help them cope with climate variability and commercial disruptions. The main barriers to adoption included a lack of planting materials, financial resources, tenure security and constraints imposed by the remote location and slope of their farms. The authors quantitatively estimated the likelihood of adoption. They found that higher household income, younger age, farmers who planted trees, and farmers who own their land were more likely to adopt agroforestry.

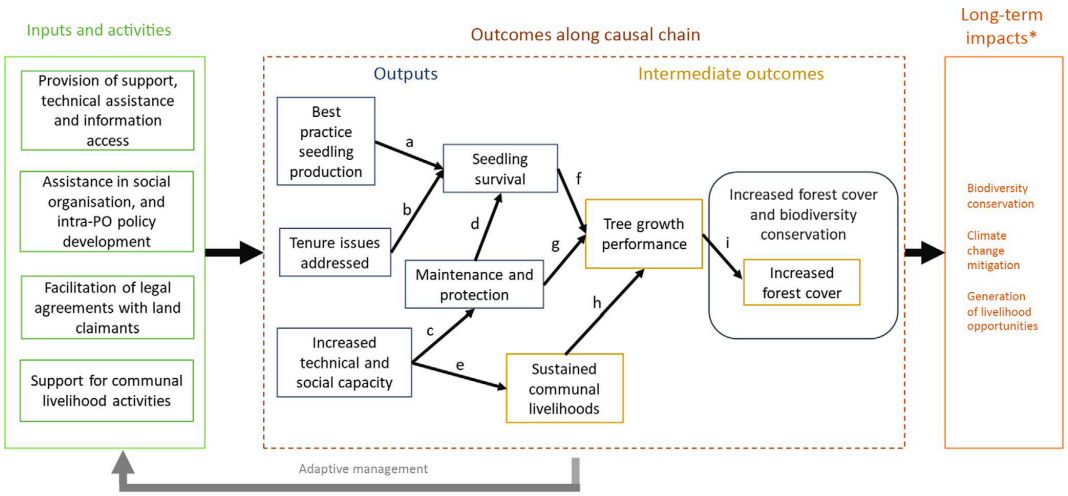
7.1.3 Monitoring & Indicators

The FLR Project also made strides in assessing and monitoring change and in formalising an understanding that the change process is gradual and slow. Analysis of ten FLR tropical case studies indicated that more strategically defined intermediate goals that incrementally lead to desired changes could result in more successful adoption of quality FLR practices (Ota et al., 2020). This research served as a prelude to developing a system of indicators that distinguished ways to track the results of activities to deliver medium- and long-term goals (Ota et al., 2021). The conceptual and practical approach developed grounds to look beyond short-term indicators, also known as lagging indicators (e.g., seedling survival rates), that may insufficiently signal the potential for positive restoration results.

The 'leading and lagging indicators' thinking developed by the FLR Project has been trialled and adapted since February 2022 at Project *Tarsier*, allowing the opportunity to test the outputs of this project in real-world scenarios. The indicators are reported regularly for tracking progress, decision-making, and adaptive management. During the initial phase, indicators related to Health, Safety, Security, and Environment (HSSE) received great emphasis. Community-based reforestation has yet to be implemented with industry-level standards related to HSSE. However, the magnitude of reforestation necessary to meet global goals, including reforestation to be implemented by communities and standards about carbon accreditation, which is expected to fund much of these initiatives, will require stricter HSSE guidelines than currently under use in most NGP projects. HSSE indicators have helped identify risks to people involved in the project, including staff and community members, and adopt mitigating measures.

Indicators related to community engagement, including FPIC documentation, contracts and agreements with stakeholders, and feedback and grievances, have also led to adaptive management decisions. These indicators were accompanied by qualitative information, and follow-up consultations took place.

The monitoring tool with leading and lagging indicators has proven helpful in practice. The indicators provide a structure for tracking progress towards the project objectives and adequate information for decision-making. The indicators in the list are easy and cost-efficient to track and can be adapted to other projects (Ota et al., 2022; Appendix 59). In its original formulation and using a theory-of-change model as a background, the specific, measurable indicators can be mapped so that interactions and dependencies become evident, and practitioners can understand prospects for success and address issues in an adaptive manner (Figure 7).



Causal pathway ID	Assumption	Assumption robustness	Output or outcome	Potential indicators ► Leading ● Lagging
a	Chance of seedling survival increases as best-practices are used in seedling production	High	Best practice seedling production	% Farmers using best practices/time► % Quality seedlings produced/time► Survival rate of seedlings planted●
b	There is higher risk of purposeful or non-purposeful burning or killing of seedlings when there are no land or tree tenure disputes	High	Tenure issues addressed	% Area with no tenurial disputes► Survival rate of seedlings planted●
c	Maintenance and protection are more likely when knowledge on tree growth and social organisation and cooperation increase and when social conflicts are minimised and/or effectively resolved	Fair	Increased technical & social capacities	% Farmers who received training successfully implementing practices► # Social conflicts reported► % Area under regular maintenance and protection after end of support●
d	Patrolling and maintenance increase the chance of seedling survival	High	Seedling survival	# Hours invested in patrolling/time► # Hours invested in maintenance/time► Change in seedling survival rates/time●
e	Communal livelihood activities are more likely to be sustained beyond duration of support when level of local capacity is higher	Fair	Sustained communal livelihoods	Level of community capacity*► % Income changes from alternative livelihoods/time●
f	Trees will only have the chance to grow if they survive the initial years	High	Tree growth performance	Survival rate of seedlings planted► tree growth rates●
g	Maintenance and protection increase the likelihood of better performance of tree growth	Fair	Maintenance & protection	% Area under regular maintenance and protection after end of support► Δ Tree growth rates and basal area/time●
h	If communal activities are sustainable, the more likely the community is to apply appropriate silvicultural management for improved tree growth performance	Fair	Tree growth performance	Level of community cohesion*► Tree growth rates●
i	Improved tree growth favours increase in forest cover	Fair	Increased forest cover	Tree growth rate► % Change in forest cover●

* These indicators can be documented through qualitative methods.

***Figure 7* Example of the use of leading (►) and lagging (●) indicators in a Theory of Change for a single mid-term outcome (Increased forest cover) for an externally-supported FLR intervention with communities in the Philippines under the NGP. Letters on causal pathways from outputs to intermediate outcomes indicate assumptions specified in the Assumptions table (from Ota et al., 2021 JAE).**

This model also allows explicitly formulating and assigning robustness grades to assumptions, which must be considered when implementing reforestation activities. The use of leading indicators or measures of the quality of implementation of activities (e.g., planted seedling quality; Gregorio et al., 2015; Gregorio, 2023) would contribute to a better understanding of the likelihood of future restoration results (Ota, 2023).

Another FLR Project's effort related to indicators allowed researchers to experiment with more fit-for-purpose measures to understand the impacts of reforestation projects better. In this case, Goltiano et al. (2019) carried out activities to assess the socio-economic impacts of CBFM-CARP livelihood projects. They came up with a set of community-derived metrics of impact, which they used to document changes associated with the program (see below).

7.2 Implementation of FLR in the Philippines

Ten partner POs were identified in the early phase of the Project. FLR activities were carried out with these POs, including restoration trials in their respective sites (FLR Project Team,

2018). Planning workshops were held, and visions for the landscape and working plans were developed in each region and PO (Gregorio et al., 2018; Gregorio, 2018).

Positive outcomes of the Project include its ability to influence national agendas in how the NGP was implemented. For instance, consolidation of the establishment of national guidelines for seedling production (Gregorio et al., 2015a, b) was accompanied by a government shift of focus of NGP activities at the family level [see section 7.2 (4)].

7.2.1 Building on Understanding of NGP's Socio-Economic & Livelihoods Impacts

The FLR Project generated deep insights into how NGP implementation had served communities. Information was collected at the Project commencement and culmination phases to account for changes contributed by the Project (Goltiano et al., 2021). Using a retrospective mixed-methods approach, this researcher focused on the ten partner POs and some members of supporting agencies to gather and cross-validate information. Along with participants, he developed a list of meaningful metrics that often need to be added to standard indicator systems. These included personal qualities (e.g., the establishment of self-identity, boosted self-confidence), family well-being (e.g., deepened bonds, becoming role models for younger generations), and organisational well-being (e.g., bolstered PO image and ability to relate with governmental and other agencies).

"*The advocacy of the PO caused the municipal government, through the Mayor, to discourage planting corn in higher elevations"* (Goltiano et al., 2019).

On the socio-economic topic, an in-depth assessment of early-on socio-economic status changes of NGP implementation was undertaken in Caibiran, Biliran, a high poverty incidence site (38%), through a comparison of NGP participants with non-participants (Goltiano et al., 2021). Using before and after comparisons (2014 and 2016) and a mixed-methods approach, the researchers found that the program remunerations led to some significant changes in status, particularly in durable goods (i.e., improved quality of materials used for housing and roofing), an informative metric of the positive impact of NGP as it is often when there is additional income that this type of investments are possible.

Other indicators improved equally in participating and non-participating groups (e.g., house floor type and food consumed) despite participants not fully perceiving the realisation of these changes. They acknowledged their increase in capacities and knowledge and reinforced individual influence in the community. Overall, and given their livelihoods are constantly at the margin, participants recognised they would engage in any program that would offer support opportunities towards change. This study also helped discover potential loopholes in NGP implementation, particularly mismatches between species and densities selection and site characteristics, reduced income from labour, the short-term framework of NGP contracts, and insufficient and often delayed extension support (see Goltiano, 2023c).

More related to reforestation and FLR in general, a fundamental aspect that may limit the success of FLR activities in the Philippines is its apparent focus on tree planting, as this is the closest metric associated with forest restoration success. This relatively narrow focus can be detrimental to achieving food security and sustained well-being, which are also expected outcomes of the NGP. A large portion of the area where the program is implemented is an agriculture-dominated landscape. Given that even minor improvements in agricultural productivity can lead to socio-economic benefits for local communities, it seemed necessary to better understand how this activity could, in turn, lead to reforestation success rather than competing with it. This was one of the emphases of the research developed by a Project team member (Ribeiro, 2023). Using a suite of mixed-methods approaches and governmental secondary information, this researcher examined the roles that policy, social networks and local characteristics (i.e., labour availability, skills and knowledge, and market dynamics) play in providing a framework to facilitate the integration of agricultural activities into FLR.

For this purpose, a systematic literature review determined opportunities for agriculture to contribute to FLR. Analyses of 137 published sources revealed attention to the impacts of agricultural practices on several species of wildlife and soil quality, with more recent attention to socio-economic aspects (e.g., land tenure, perception, food security, and gendered perspectives) and the role of culture to mediate these relationships (Ribeiro et al., 2022a). The analyses identified the scale at which the biophysical (area covered by FLR system, functional diversity and connectivity) and socio-cultural (e.g., support of local institutions and knowledge, market-oriented terms) landscapes had been studied and traced back intermediate and short-term outcomes on each domain at the level of the landscape and the farm (i.e., function indicators).

The resulting framework (Figure 8) proposes a set of three related steps to promote effective FLR: (1) stopping deforestation (spatial location and extension); (2) rehabilitating degraded lands (type and intensity of land management including practices that maintain land productivity); and (3) establish positive feedbacks between areas with different land uses through improved yields and planned agricultural expansion (mosaic configuration for their synergistic operation across the landscape; Ribeiro et al., 2023b).

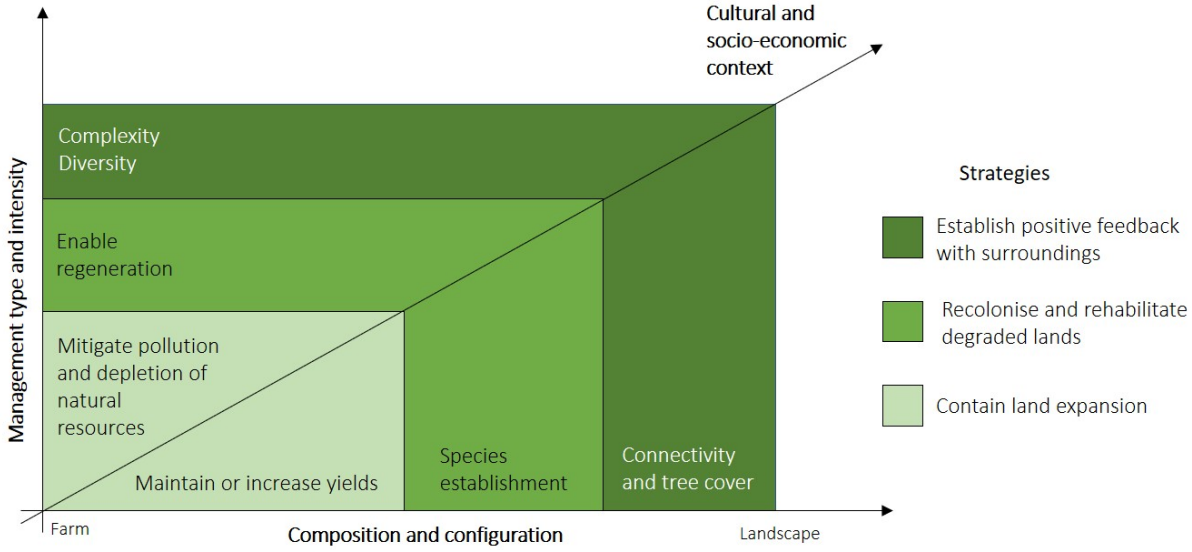


Figure 8 Conceptual framework: three possible strategies for agriculture to promote Forest and Landscape Restoration (FLR) in the tropics (from Ribeiro et al., 2023b).

7.2.2 Mechanisms of NGP Implementation: Local Participation & Financial Arrangements

Local Participation

Project activities revealed limited community engagement and highlighted the consequences of this failure to achieve NGP goals (Wiset et al., 2023). This case study-based research in Biliran and Leyte (four Project POs) used group interviews with PO members and interviews with representatives of partner agencies of each PO. It determined that local preferences should have been considered due to reduced local participation and agency in implementing the program (i.e., '*transfer of responsibilities without devolution of authority*'; Wiset et al., 2023). As community strengthening and engagement activities are not considered tasks within the NGP, POs are left to develop their terms of engagement (e.g., internal policies to ensure transparency and disperse benefits), which they only sometimes achieve satisfactorily.

Lack of clarity regarding tenure and sustained access to potential benefits also threaten effective engagement. Notably, implementing FLR activities through NGP involves contractual agreements on terms not always understood or perceived to provide immediate benefits to local communities. Communities are not well positioned to negotiate a bottom-up approach, which suggests establishing common grounds to harmonise national with local interests to increase prospects of achieving landscape-level benefits (Wiset, 2022).

How FLR designers and implementers capture local interests can significantly influence engagement. Research addressing this question found that local understanding and perceptions of potential benefits and costs (i.e., level of community and individual efforts) of FLR could be elicited early on during the definition of FLR agendas for improved outcomes (Wiset, 2022; Pasa, 2020). Exercises focused on visualising the landscapes where all livelihood activities are developed, including restoration, were held in four Project POs. These have also elicited information regarding people's perceptions of FLR and perceived potential preferences as a function of gender, along with their motivations to engage in FLR implementation (Figures 9 and 10).

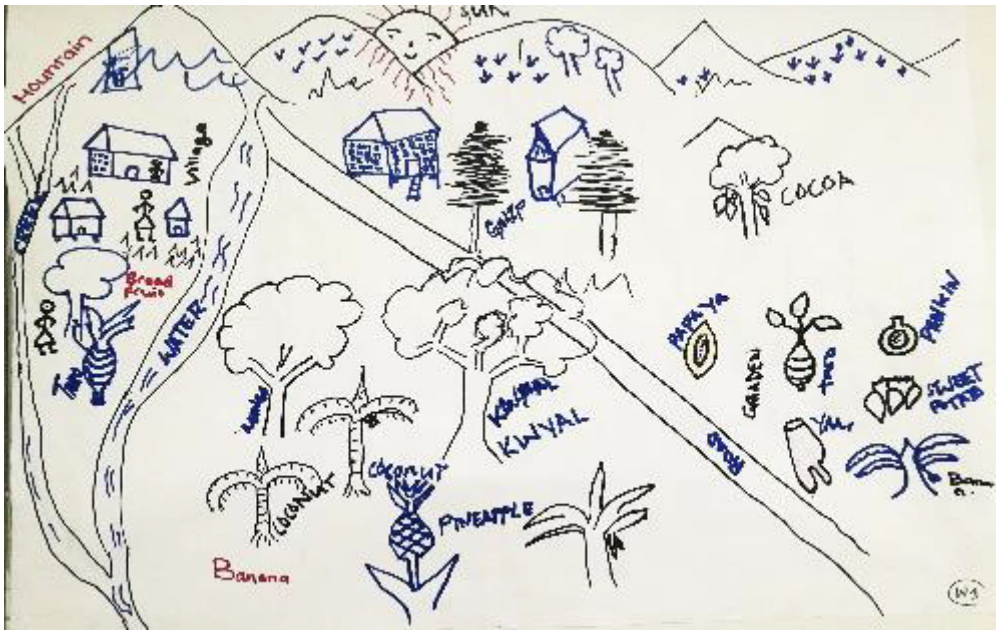


Figure 9 This is the landscape scenario visualised by a women's group emphasising fruit trees and home gardens (from Wiset 2022).

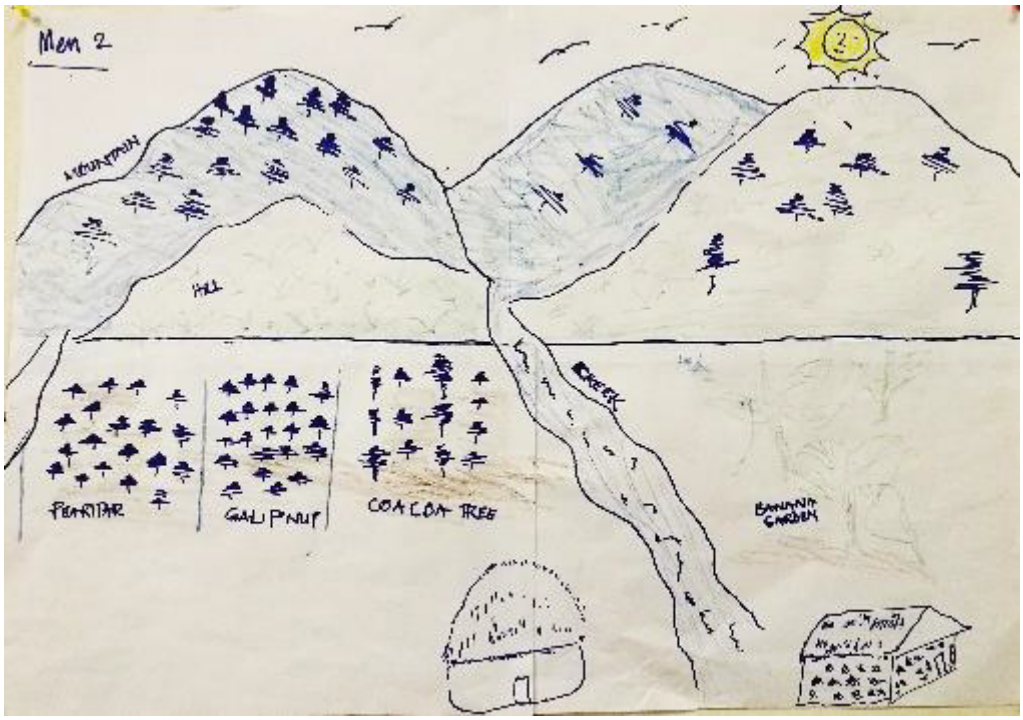


Figure 10 This landscape scenario was visualised by men who emphasised commercial crops more isolated from the home (from Wiset, 2022).

Overall, PO and governmental officer respondents were aware of the environmental and potential socio-economic benefits of joining FLR initiatives. These included enhanced safety and the ability to meet security needs and scope to increase personal skills. Agroforestry, including fruit trees, was the preferred set-up, responding to immediate community concerns on food security. For forested areas, both native species (e.g., *Pterocarpus indicus* and *Shorea contorta)* and exotic trees (*Acacia mangium* and *Swietenia macrophylla)* were the first choices to plant.

On the gender front, the FLR Project revealed practical considerations crucial for the success of FLR activities. Research by the FLR Project Team revealed that while community-based arrangements for resource management have achieved socio-environmental benefits, contextual characteristics that encourage participation determine whether these benefits can be sustained (Baynes et al., 2019). A novel technique of the Project in KFAI called institutional bricolage combines different approaches to understand better a situation given the complexity, dynamics, and adaptability of social-environmental systems. Researchers found that women, particularly those acting as officers of the PO, had an increased ability to express their concerns to protect their livelihoods. Even if men dominate decision-making processes, women's roles can incrementally elevate the scope for women to achieve fair benefits from FLR implementation.

Preparatory work on gender aspects and reforestation was done through a systematic literature review (Ota et al., 2023a), where the examination of 140 published studies revealed the most active role of men in the high-income generation. In smallholder settings, these activities were related to timber harvesting or resource extraction. In contrast, women were associated with managing the subsistence component of livelihoods (orchard tending, house chores, and family care). When women generated income from engagement in productive activities, investments were made to secure household needs. Overall, studies recognised that insufficient participation by women would have consequences that negatively affect households and communities. The common recommendation of these

research efforts was for interventions to include women in decision-making processes while recognising the importance of cultural and other characteristics of the communities.

These results informed the complementary research of characterising gender perspectives from implementing FLR in the ten partner POs and dialogues with officers of relevant institutions (e.g., DENR; see research below Nuñez et al., 2023). Project researchers used the *Restoration Opportunities Assessment Methodology (ROAM*) toolkit (IUCN, 2017) along with the *Gender Roles Framework* (Ludgate, 2016) to analyse social dynamics, cultural notions, and effort allocation to reforestation by women and men. A mixed-methods approach (i.e., focus-group discussion) was used to collect and validate data. Results revealed that more women (56%) were active PO members than men. The family-based membership system allowed for substituting vulnerable members when demanding tasks were implemented (Nuñez et al., 2023). Although the dominant system was patriarchal, decision-making and income earning, primarily from agriculture, were mostly evenly shared across husband and wife, a significant difference when considering national trends. Yet, women's work burden increased when they were involved in PO activities, which was often the case (47% of women participated in PO meetings). However, women carried most non-remunerated work and other lower-paid tasks (e.g., nursery activities, especially when pregnant or old) (Figure 11).

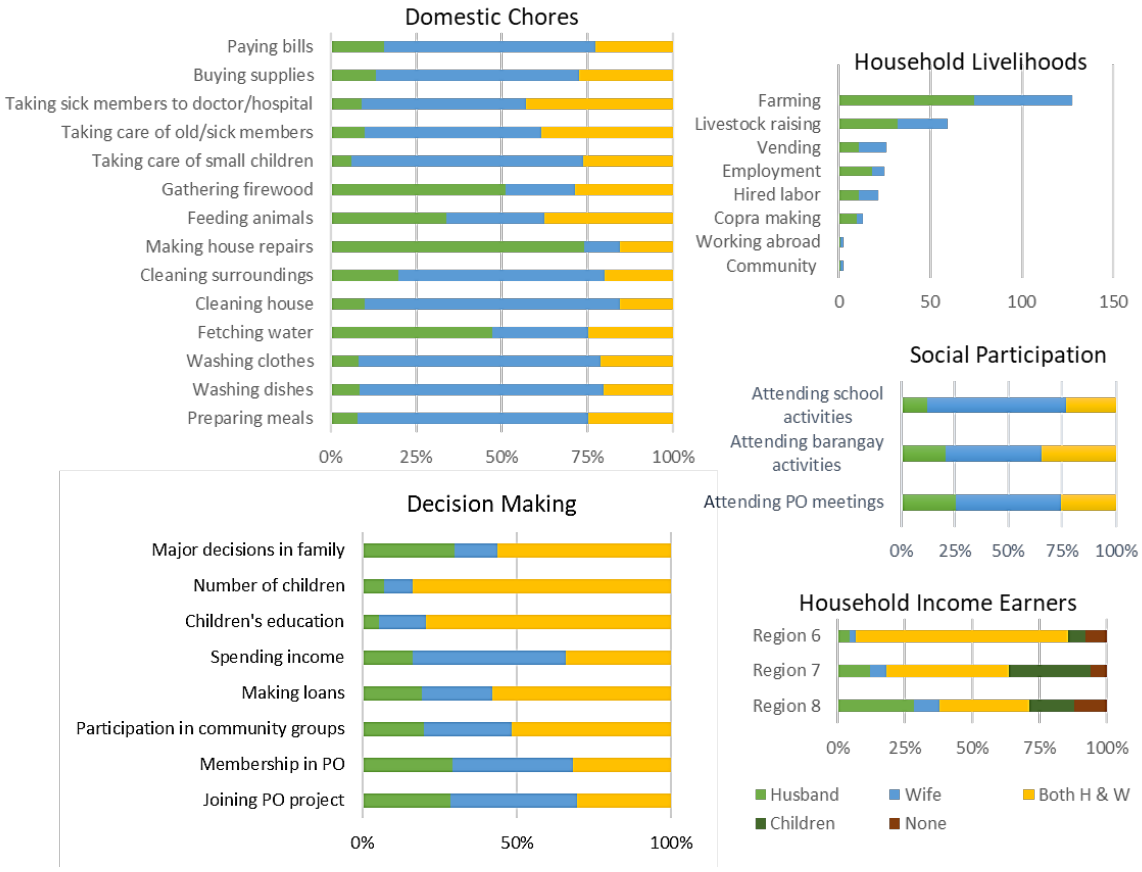


Figure 11 Gendered division of household activities in the 10 Project POs (from Nuñez et al., 2023).

In one case, the PO organisation was led by women, although in general, they had more female officers who usually occupied secretarial and treasurer roles. Both men and women benefited equally from the capacity-building activities, and women participants stated how these activities increased their perception of empowerment. Another non-monetary benefit

for women's participation in FLR activities was the supporting network role this engagement provided them.

Taking Stock of FLR Financing

The scope for financing FLR so that its practices can be scaled out and scaled up was investigated (Mangaoang, 2022). The study was built on an early assessment done by the Project Team (Pasa et al., 2018). Outcomes of mixed methods and secondary information gathered from nine FLR ACIAR Project POs (Figure 12) mapped the local and international organisations involved with POs.

Figure 12 Several methods, including interviews and focus-group discussions, were used to assess the current status of the financing situation of POs in the FLR Project. Meetings with PO members (e.g., DECCA; left side) and key informant interviews were held with San Dionisio officials in January 2020 (from Mangaoang 2022).

Sources of support included institutions that operated at the national level from an ODA perspective, such as the World Bank, Asian Development Bank, Ford Foundation, and USAID. These sources were also complemented by international NGOs (WWF). On the national front, several programs from different agencies besides the DENR, including the National Irrigation Administration (NIA) and the National Power Corporation (NAPOCOR), had some appropriations for forest rehabilitation. At the local level, LGUs had available support through the *Mandanas Ruling*[2] to address climate change and environmental issues.

The private sector is also supporting reforestation initiatives. Examples are the Energy Development Corporation Seedling program (BINHI), the Development Bank of the Philippines, the Land Bank of the Philippines, and foreign institutions like the Germany-based *Kreditanstalt fur Wiederaufabau* (see Table 2). Some of the support were provided to the POs before the introduction of the FLR Project (e.g., KFW to DECCA).

Table 2 Information gathered for FLR Project POs in Iloilo (Region VI) regarding their funding sources and activities (from Mangaoang 2022).

[2] *The Mandanas Ruling was stated by the Supreme Court in 2018 and confirmed in 2019 to support decentralisation. Effective in 2022, it increases the share of national government tax revenue transferred to local governments (e.g., LGUs; https://www.worldbank.org/en/news/press-release/2021/06/10/philippines-mandanas-ruling-provides-opportunities-for-improving-service-delivery-through-enhanced-decentralization).*

People's Organization	Donor/Source	Project/Activity	Scale/Size	Cost (PhP)
PAGLAOM	• DENR- NGP • ACIAR FLR	• Reforestation, Tree plantation establishment/maintenance • Agroforestry • Nursery & planting stocks production • Tree plantation establishment/maintenance	• 50ha/medium • 2ha/small • Small • 1ha/small	• 400,000 • 250,000 • 80,000 (24,000 PO labor counterpart) • 50,000 • PO counterpart
DECCA	• NGP-DENR • KFW	• Reforestation • Reforestation/agroforestry	• 40ha/medium • 60ha/medium	• 450,000 • 1.0m
PACEDA	• ACIAR • DENR	• Cacao-banana agroforestry • NGP reforestation • Livestock raising (carabao)	• 2 ha/Small • 300 ha/Large • Small	• 80,000 • 4m • 80,000/20,000 PO counterpart
TUCODA	• NGP/DENR • ACIAR	• Reforestation • Agroforestry	• 85ha/medium • 2ha/small	• 1m • 135,000

Respondents also stated that closed monitoring and prompt billing for accomplished activities in the ACIAR FLR Project encouraged POs to engage in forest restoration projects. In their previous restoration projects, when funding was unavailable at the onset of initiatives, which was mostly the case, coping strategies were included borrowing money from lenders, often at high interest rates. In some cases (e.g., DECCA), POs adopted strategic investments to create buffers while funding was available (e.g., fruit tree-based agroforestry).

Participants highlighted the need for timely and quality information to better seek and benefit from funding opportunities. The role of universities and other organisations besides DENR could secure the availability of this information for POs. The Project addressed one of the needs identified by POs regarding the need to overcome limited PO members' skills in proposal development, and targeted activities to that end were developed (Custodio, 2023).

A critical reflection on the part of participating PO members was their strong awareness that forest loss and degradation had not resulted in suitable livelihood outcomes. However, as the researcher suggested, active LGU engagement as a facilitator of FLR implementation activities by POs can be a powerful mechanism to boost its results. That there is interest on the part of LGUs to play a more active role on the FLR agenda was a finding on which another Project result, the DECCA Sustainability Plan, was built (See below).

7.3 Other FLR Research Activities

7.3.1 FLR Project Trials

Research activities of the FLR Project helped elucidate critical biophysical aspects of reforestation. The FLR Project carried out several trials for mixed and monoculture plantations (e.g., Le et al., 2020; Gregorio et al., 2023; Gregorio et al., 2020b; Tripoli, 2020; Moreno and Tripoli, 2020). The trials, however, were damaged by typhoons, and the lack of staff mobility across communities during the COVID hampered the collection of data and maintenance of trees. Le et al. (2019) compared performance (i.e., forest growth and structure and tree species diversity) for 168 reforestation projects across the island of Leyte. Researchers found improved species mix performance, even when exotic trees were part of the species sets.

One study manipulated species composition and individual spacing to assess the growth responses of four species. It determined whether some of these benefited from the presence of other species or individuals of the same species or were adversely affected by it (Vanclay et al., 2023). Results indicated that, for instance, *Paraserianthes falcataria* was

more suited to be planted in isolation. In contrast, *Shorea palosapis* would grow well on plantations either as monoculture or in mixed settings. However, when soil moisture is limited, mixing fast-growing exotics was detrimental to climax native trees. This type of practical knowledge can guide implementers of reforestation activities.

Part of the mechanism for the FLR Project promoting reforestation and tree integration in agricultural landscapes was to elicit information on preferences for timber trees in upland areas among NGP participants in the Project sites. This survey-based study also used focus-group discussions, key informant interviews with NGP participants in the ten Project POs, and site visits. Results revealed that between 12 and 36 species among indigenous and exotic trees were preferred by smallholders (Polinar et al., 2021).

Criteria that guided species selection related to the potential for immediate use (e.g., forage, charcoal making), scope to capitalise on tree products (e.g., seed source and timber for consumption), improve local environmental characteristics (e.g., protection against soil erosion), and for future commercialisation (i.e., wood quality and market demand). Researchers found that preferences had shifted through time, given their evidence of some species having adverse effects on other crops, poor wood quality or susceptibility to breakage in high winds, being exotic, or because of harvesting restrictions. Lack of propagules and limited space due to increased crop area were other factors determining changes in planting choices. Domestication favoured species that produced fruit early and had durable wood and market demand (Demotor et al., 2021). Also, the availability of planting materials and some knowledge of growth characteristics facilitated domestication. Fruit trees (e.g., avocado, mango, jackfruit, guyabano) were beneficial for family-consumption and income.

The Assisted Natural Regeneration (ANR) as an FLR mechanism was tested through the ACIAR FLR Project (Doria, 2020). The trial was set up in Cebu, specifically in degraded forests of HIMASACA, BTFAI, and NAGMATA. Each PO planted various tree species in a 5-ha demonstration site. They produced and planted high-quality seedlings following the smallholder-based best practices promoted in the FLR Project. With the guidance of the CDO, the POs identified and marked mother trees from nearby forests where germplasm was collected.

FLR activities in the POs included agroforestry, tree integration, and livelihood initiatives. These systems were implemented based on the choices made by each PO, which, in most cases, corresponded to their circumstance and the most suitable options for their respective localities. The CDOs conducted surveys annually to assess their progress (Rañin 2023; Jagabat 2023). The agroforestry system of DECCA became a model farm recognised across the Region. Tree integration was done in some cases with corn farmers. Some POs sold seedlings, including fruit trees, to stakeholders (e.g., electricity companies and the Philippine Coconut Authority), generating considerable income from the activity.

7.3.2 Agroforestry and FLR

Similar practical knowledge was generated by investigating farmers' preferences in implementing agroforestry systems along with the results mentioned in the previous section. This study characterised crops currently and previously grown by partner POs (Ramos et al., 2021). Results showed that various crops, including cereals, fruit trees, root crops, plantation crops, and vegetables, were used by the nine POs (no studies were done in KFAI). Farmers' growing involvement in FLR activities resulted in less time for tending their crops. Likewise, changes in market preferences, along with insufficient area for planting and the prevalence of cogon grass, resulted in changes to their crop production portfolios. Culture and tenure influenced planting choices and aspirations for deriving incomes and supporting food security (Ribeiro et al., 2022). Lack of sufficient capital limited the extent to which corn was planted in some areas (Iloilo), and the adoption of other crops was precluded due to reduced planting material.

Interestingly, the study revealed gender-based differences in crop preferences. Women leaned toward planting sweet potatoes, cassava and bananas, while men preferred planting sweet corn and coconuts. This corroborates the findings of Wiset (2022). Vegetable crops that do not require large areas also received high preference from participants.

One of the research activities used the seasonal calendar method to understand the distribution of agricultural-related tasks throughout the year, considering the context of community members' aspirations (Ribeiro et al., 2023b; 2023c) (Figure 13). This participatory tool, which allows problem analysis to be carried out, also utilised a financial analysis tool (AmazonSaf) to assess the profitability of different land-use options.

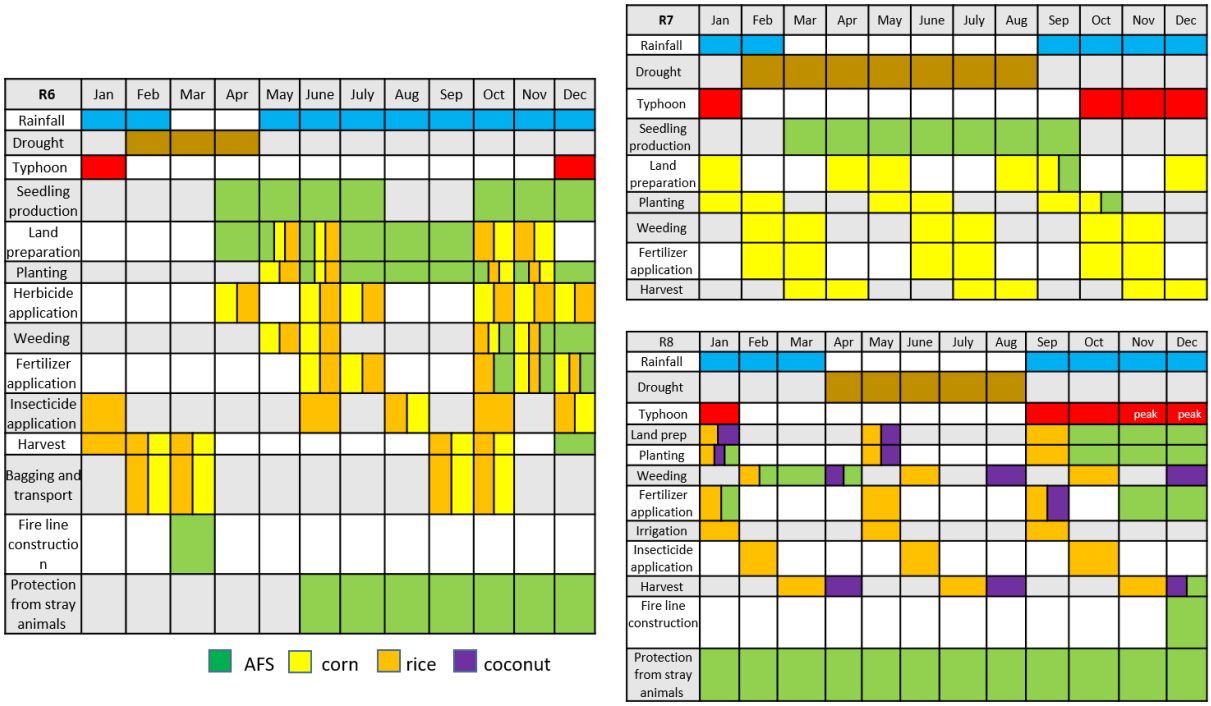


Figure 13 Seasonal calendars for each region. This tool allows for rapid visualisation of efforts made by farmers in a participatory manner, using their information. This product can help allocate resources more effectively and help farmers recognise potential time allocation inefficiencies and needs. (from Ribeiro et al., 2023c).

Identifying tasks and labour demand throughout the year helped enhance recognition by smallholders of bottlenecks for some productive systems. It also revealed times when other activities, including tending to fruit trees or processing or transforming other products, could be undertaken without jeopardising the performance of the crop systems.

Given the volatility of markets for key crops in the region (rice and corn), farmers desired to include fruit tree planting into their land uses, taking advantage of better market conditions for these products (e.g., bignay *Antidesma bunius* for juice production). Still, the need for well-established markets and value chains remained a main impediment, an issue that could be addressed by creating processing facilities for fruit products to help add value to local crops. Extreme weather and, in some cases, poor soils also increased farmers' risks.

Overall, agroforestry practices were associated with more seasonal employment opportunities when compared to single-crop systems. There was a perception among smallholders that crops like rice and corn had reduced time and labour demands, which was not the case in the Iloilo (Region VI). The fact that there were established markets for

these products and the existence of support through financing mechanisms from local financiers led farmers to adopt rice and corn farming in the region despite the high labour demand.

Agroforestry products yielded lower financial benefits in some cases when compared to corn, while in others, inadequate performance led to the discontinuation of a few agroforestry crops. The study has identified the need to improve practises (e.g., reduction of chemical inputs) that could result in enhanced environmental conditions in ways that could be documented and included in the NGP benefit portfolio associated with climate mitigation and adaptation.

Reflections on the characteristics of local production systems and their goals led to designing a prototype agroforestry system and determining projected financial performance from the perspective of smallholders (Ribeiro et al., 2020 c Appendix 8). This analysis was in response to a proposed expansion of the planting of Napier grass for briquette fabrication that would dominate the land use by smallholders in Iloilo. The integrated land-use design, with vegetable and root crops and the grass, would gradually shift emphasis from Napier grass planting to other crops, such as fruit trees, rather than having the grass planted as a mono-crop system across the landscape. Its financial performance was superior and less risky than the grass monoculture system (15%), yet less profitable than corn (39%). The added advantage of the integrated land-use prototype was its potential to provide food security to farmers. Considerations derived from this study could be examined in other mixed land-use systems to determine potential trade-offs or win-win situations.

In general, wages for labour in undertaking agroforestry activities were essential to support farmers during the COVID pandemic, and it was challenging to find sources of food and income. Overall, agroforestry-related income seemed more stable than other crops (e.g., rice and corn), even if employment opportunities fluctuated with the seasons. However, the fact that corn and rice farmers were already tightly linked to markets, in some situations, led to their disregard of agroforestry as a livelihood strategy. In these areas, FLR may be restricted to restoration and, potentially, tree integration (See Pasa, 2023).

7.3.3 Soil and Nutrient Characteristics & Fire Risks as Real-World Constraints for FLR

Soils, Nutrients, Diseases & Pests

One barrier to successful restoration is low soil fertility. An FLR Project study found that PO members utilise many kinds of fertilisers, primarily based on availability and their potential to access these sources (e.g., cash for purchase of chemical products or availability of manure in their livelihood projects: Pasa et al., 2022).

Management practices that could enhance nutrient status early in plant development in nurseries were explored, including the inoculation of mycorrhizal fungi and fertiliser application. Assessment of effectiveness at promoting plant development was done as a function of manipulation of the planting medium. This factorial experiment (Ferraren et al., 2020) tested the use of different potting media in plant performance and found that nodulation rates, as well as growth and biomass accumulation and other physiological traits (e.g., photosynthetic rate), increased with rice hull potting medium when compared to materials with less fertility.

The author found that increased soil porosity of this medium could have favoured root growth and, thus, higher nodulation rates. Also, the potential chemical composition of the rice hull-amended soil (e.g., higher silica presence) could have assisted nutrient uptake, particularly phosphorus, which is an energy source for metabolic activity. An important finding was that small amounts of soil fertiliser could improve plant performance in nutrient-limited soils, a relationship mediated by potting medium fertility. A related study addressed the effect of nitrogen addition and potting medium on total biomass with a range of species (*Dracontomelon dao*, *Eucalyptus deglupta, Pterocarpus indicus, Acacia mangium,* and

Gmelina arborea) (Krishnan, 2022*)*. This study included a glasshouse examination of seedling growth and monitoring their field performance.

FLR practitioners implicitly assume that tree planting and agroforestry practices will improve soil characteristics. This topic was the goal of FLR-Project researchers, who set to analyse soil organic carbon and other soil attributes (Bonner et al., 2019). Set up in a monoculture plantation of mahogany (*Swietenia macrophylla*), researchers found that the higher productivity of this system, when compared to those with native species, could favour soil organic carbon formation rates. In turn, this could enhance soil microbial composition. However, the causal mechanisms of these complex time-scale dependent relationships remained unclear.

These two studies complemented research that experimentally examined the facilitating factor that nitrogen (organic and inorganic) has increased water use in tree nurseries and potential effects in improving seedling survival when transplanted in water-limited areas (Krishnan et al., 2023). Nitrogen availability is a control of water use when this is not abundant. Seedlings of *Acacia mangium and Alphitonia petrei* were grown in environments supplied with inorganic nitrogen and used more water when compared to those grown in similar conditions but where organic nitrogen, which often comes at a higher cost than its inorganic counterpart, had been incorporated. Organic nitrogen-modulated seedling traits are crucial to plant development and survival (e.g., root biomass, nodulation, water use efficiency).

Alongside poor soil characteristics and low fertility, pests and diseases threaten the performance of reforestation initiatives. A study assessed the occurrence of pests and diseases in NGP plantations and FLR field trials implemented by the Project (Mangaoang,2021). Incidence was compared across several stages of FLR implementation, along with analyses of factors that could enhance pests and disease frequency. This study also assessed the communities' ability to recognise and handle these problems. A manual was developed to reinforce existing knowledge and manage pests and diseases. Results of pest surveys in five partner POs (NAGMATA, BTFAI and HIMASAKA in Cebu and PACEDA and PAGLAOM in Iloilo) showed the presence of beetles and caterpillars and associated damage to tree parts, including agroforestry crops such as cacao and fruit trees (range: 11%-37%), with varying levels of severity (range 6%-15%). Other species had fungal and mite presence.

Fire Risks

Fire is another important source of risk for FLR. Fire occurrence and impacts on reforestation success still need to be better understood. Thus, fire prevention and management remain vital tasks to be performed by smallholders implementing reforestation projects. A study aimed to characterise how fire represented a hazard in participating POs (Peque et al., 2023). Surveys were conducted to investigate the extent to which fires had historically caused damage to smallholders' assets, their awareness of fire risks, practises for their management, and resources available to smallholders for fire prevention. Results show that participants understood the dangers of kaingin practices for increasing fire risk. Other factors associated with fire occurrence included charcoal making, hunting, and, to a lesser extent, drought and intentional burning. People recognised the high fire sensitivity of corn and pasture areas, often dominated by cogon grass to fire risk. Seasonality of fire also was identified by respondents, who pointed to March-May as months where fire occurrence was higher.

Management strategies implemented by farmers included the establishment of fire breaks (about 63% of respondents), but only about 50% maintained them. Other practices involve planting firelines with crops and less fire-sensitive species (e.g., banana, fruit trees, abaca, pineapple, and cassava). This practice, however, was limited. Although monitoring was shown as a potential way of preventing fire damage effectively, community education and collaboration with government officials (e.g., through joint fire brigades) were seen as promising avenues to explore for future fire management. Lack of equipment, training,

information, and overall support are significant impediments to successful community-based fire management, but some community members have stated willingness to gain these skills. Reporting fire damage to authorities (DENR, barangay) is not a common practice, and there are no PO policies regarding fire management despite existing requirements to replant plantations when fires occur.

7.3.4 FLR International Research Exchanges

FLR Project activities, notably the International Conference held in 2019 in the Philippines, provided vibrant settings to advance the articulation of FLR principles and activities. Clear concepts and means of assessing FLR can translate into more effective forest restoration across borders. The international Conference and the FLoRES Task Force meeting held beforehand: https://forestorationinternational.org/flores-task-force/) allowed experience exchange and consolidated research collaborations around FLR (International Conference on FLR). Conference synthesis published here: https://www.mdpi.com/1999-4907/11/4; book of abstracts and conference proceedings are available here: https://flr2019.weebly.com/).

Fundamental FLR case studies were published in a special issue of the journal *Forests* (see Appendix 40). List of articles published in the Special Issue of Forests featuring selected case- studies in SE Asia, Africa, and Latin America. Publications are available at this link: https://www.asem2016-103.com/publications1.html). These materials have collectively been cited over 250 times, demonstrating the impact of the event on FLR research and implementation.

One specific effort at providing an FLR baseline framework was developed by FLR Project researchers (Chazdon et al., 2020), who argued the need to elaborate practical terminology and guidelines in a participative manner. Although no one size will fit every FLR need, and the mix of practices of what will turn into FLR in each place will vary each time, this common foundation can build and strengthen interactions in this developing and dynamic community of practice. Some attributes are highlighted below (Figure 14), where a shared understanding of local needs, contextual constraints, and opportunities can result in significant, sustained change away from rural poverty and landscape degradation at larger regional and national scales.

Figure 14 This FLR framework emphasises planning and working together transparently, strengthening capacity and communication, distributing benefits and well-being, and learning about the landscape to produce different products through restoration. Participants elaborated on it during the Tacloban Workshop, partially sponsored by the Project (from Chazdon et al., 2020).

"Ambitious aspirations need to guide practical steps and holistic activities to reverse the drivers of deforestation and environmental degradation and to improve the lives and livelihoods of all people." (Chazdon et al., 2020).

7.4 Research Application and Sustainability Plans

The FLR Project generated information used in the several training and day-to-day interactions the CDOs and research personnel led and participated (Section 10.2 and Appendix 63). Five students from two Australian universities obtained their doctoral degrees through their involvement with the FLR Project and, along the way, actively interacted with VSU, PO members, and local organisations, who derived benefits from these research experiences as well. One student from VSU obtained her MSc with support from the FLR Project.

7.4.1 The FLR Project and VSU

Results from the ACIAR FLR Project, which include high-quality seedling production, mother tree selection, and plantation establishment and management, were incorporated into the BS Forestry curriculum at the Department of Forest Science at VSU. Courses or subjects where these courses are incorporated include *Silviculture 1* (Forest Nurseries and Plantation Establishment), *Advanced Forest Nursery Management*, *Forest Governance and Policy*, *Integrated Forest Resources Management*, and *Watershed Management*. Students learned the global and local status of forest landscape restoration challenges, opportunities and initiatives.

FLR Project findings were also shared online with more than 500 individuals during the *Continuous Development Program* (CDP) of the *Professionals Regulations Commission* (PRC) of the Republic of the Philippines through the facilitation of the *Center for Continuing Educatio*n of VSU. PRC requires registered foresters to attend seminars/training/conferences because these are needed to renew their Professional License and to keep them up to date about the recent developments in forest landscape restoration. Project manuals and leaflets were also shared with students, professionals, and farmers during the recent VSU anniversary in April 2023. These activities are expected to impact local policies and practices towards better forest landscape restoration in the region. Curriculum integration is an initiative of faculty members of the Dept of Forest Science, VSU, who need those important topics/findings from the ACIAR FLR project and started in the calendar year 2020, especially during the online class period due to COVID-19.

Additionally, investments made by the FLR Project included purchasing and setting up a high-quality analytical laboratory at the university. This research facility was used in BSc forestry courses to demonstrate its operation and compare it with less modern equipment. For example, laser hypsometers were used in forest mensuration; the canopy analyser and the soil auger were used in tree physiology training and students' research and soil analyses, respectively. Soil samples from students were analysed in this facility. Finally, the infrared gas analyser was used in postgraduate student research on coffee production.

7.4.2 FLR -Biodiversity & Ecosystem Services

One of the objectives of FLR is to restore landscape functionality and ecological integrity, including ecosystem service provision, which implies biodiversity improvement goals (Beatty et al., 2018). Previous ACIAR-supported research has discussed this potential (Mukul et al., 2016). A short assessment of the ecosystem services potential of FLR was conducted in Biliran (Mukul et al., 2021). Participants ranked their perceptions of relationships between land use and ecosystem service provision by combining stakeholders' consultations. This information was used to develop tentative scenarios of more strategic areas to invest for FLR, which could show better results in open forests than grasslands. Overall, the spatial configuration of each place matters in determining the potential for achieving FLR results in practice, given the patchy distribution of existing forest fragments and the frequent emphasis on reforestation to focus on one or two species (von Kleist, 2020).

Results of this case study, which focused on active implementers of NGP activities in Regions 1 and 8, showed that elements of the NGP design, as pointed out by several researchers (e.g., Wiset, 2020; Ribeiro, 2023), including a governmental-led evaluation of NGP implementation (CoA 2019), contributed to limited results. Specifically, the number of seedlings planted could be a better proxy for the potential biodiversity benefits of program adoption. Other factors linked to the NGP focus on seedling numbers relate to planting a few species given the limited knowledge potential of nurseries for different species. Respondents recognised the ambiguity regarding local communities' rights on a program led them to believe that NGP restricted their role as providers of planting labour, and not legitimate protagonists of CBFM, which has been recognised as a critical element of locally based prosperous livelihoods. However, perceptions by implementing agencies highlighted smallholders' limited individual and organisational capacities to emerge as more 'active' partners for the program (von Kleist et al., 2021). Emphasis on restructuring the NGP governance structures and focusing on program implementation (e.g., landscape planning) could address some of the identified problems. These findings resonate with the conclusions of the CoA (2019) evaluation and the guidelines offered by Ureta et al. (2018) regarding the potential for using a theory-of-change approach to improve the effectiveness of the NGP.

'*We [in the community] needed more information; my knowledge was insufficient. [We accepted] methods from ACIAR relating to knowledge specifics, and now we produce better seedlings than other POs'* (von Kleist et al., 2021).

The geospatial modelling exercise established the environmental and social complexity of the reforestation landscape contributed to less successful reforestation efforts. There are overlapping claims over the land that lead to uncertain rights, which would increase the costs of implementing initiatives to manage these landscapes for reforestation or other uses.

Finally, a lack of proper planning and gaps in the implementation would not favour the realisation of biodiversity outcomes from the NGP. Specifically, adequate consideration of ecological and ecosystem constraints and potential did not result in land use zoning (e.g., distinction between production and protection of planted areas). Overall, lessons from previous reforestation efforts have yet to translate into drastic improvements in how NGP has continued operating (von Kleist, 2020). Fundamentally, specific considerations regarding how biodiversity will be included in practices represented a significant loophole for the NGP to achieve FLR goals (Beatty et al., 2018).

7.4.3 Local Adaption: PO policies

One mechanism for the FLR Project to support local policy change was to examine how POs adapted their rules to avoid potential conflicts or resolve them. Several POs participating in the project developed intra-PO policies and agreements on various topics, including benefit-sharing and financial transparency (see list appendix 77). In some cases,

agreements determined that benefits would be shared in kind at the end of the year, whereas in other POs, there were direct cash transfers (Wiset et al., 2023).

7.4.4 Policy Context and the Social Landscape for FLR

Recognition that effective landscape management requires cooperation among stakeholders led to analyses of the social networks around FLR in the country (Ribeiro et al., 2022b). Improved coordination, collaboration, and governance around FLR can emerge from insights derived from research on these issues that can result in improved effectiveness and resource allocation, as formulation of NGP takes for granted that all involved have unified aspirations of its implementation. This analysis focused on Sara and San Dionisio municipalities in the Iloilo Province (Region. VI). About three-quarters of the province focuses on agriculture, which is dominated by corn and rice. The results of mapping institutional and PO activities, information flow, and existing collaborations were depicted as sociograms (Figure 15).

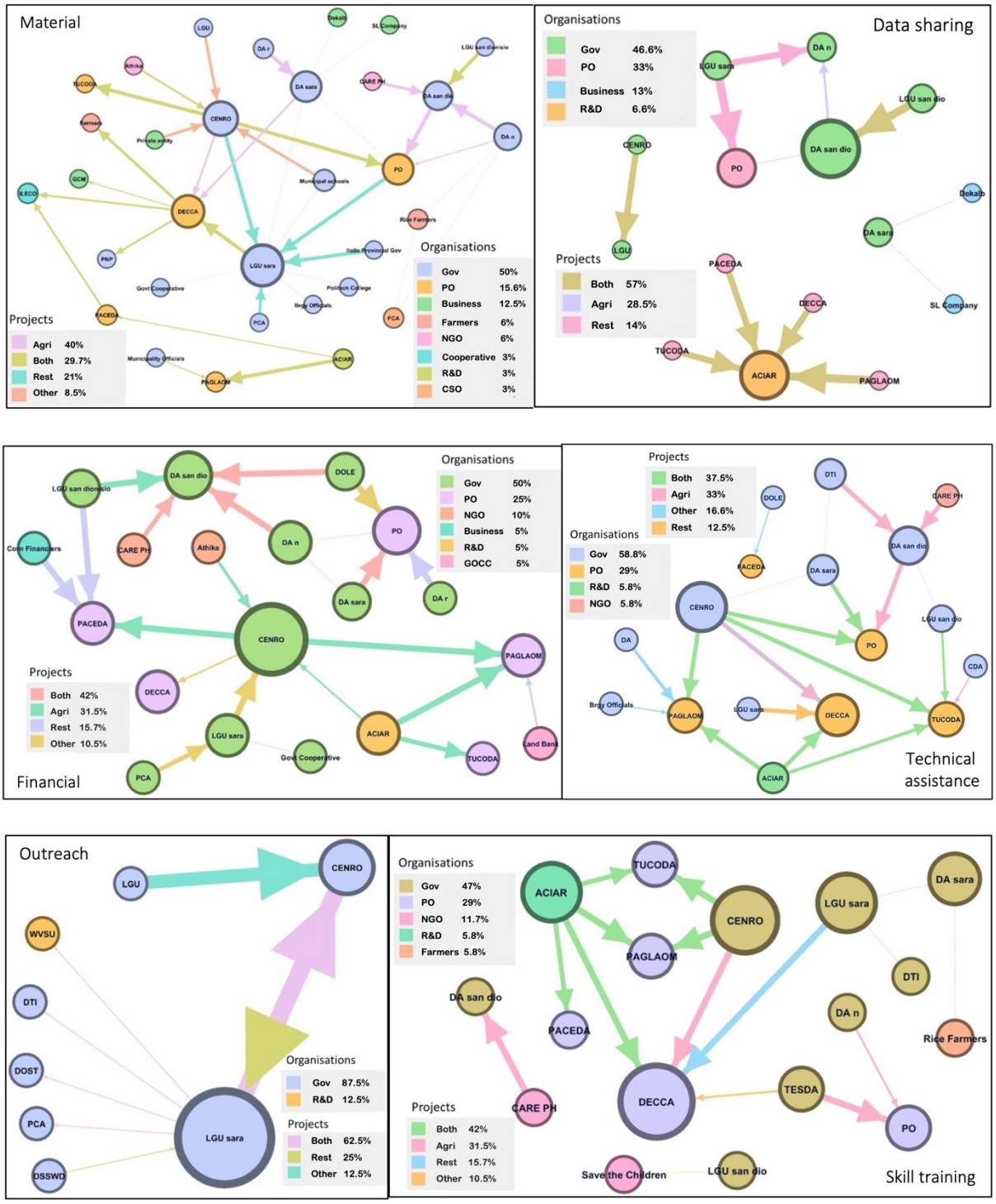


Figure 15 Resource and information sociograms produced in GEPHI 0.9.2. Arrow thickness indicates between-node relationship strength. More connected nodes are depicted as more extensive; node colour indicates the type of organisation; colours of arrows indicate the type of project. Organisations: Gov = Governmental; PO= Peoples Organisation; NGO = Non-government organisation; R&D = Research and Development. Projects: Agri = Agricultural; Rest= Restoration; CSO= Civil society organisation. Percentages in the keys on each panel labelled 'Projects' refer to the proportion of connections (i.e., arrows), whereas for 'Organizations', the percentages refer to the proportion of nodes (from Ribeiro et al., 2022b).

This information showed that concerns about the biophysical attributes of the area (i.e., soil and water conservation), challenges for FLR implementation (e.g., typhoons and landslides along with seedlings dying due to glyphosate leaching from nearby agricultural areas), and

the need to improve and diversify livelihoods were shared. However, this shared vision of issues did not lead to a unified group of actors who do not communicate or collaborate efficiently with critical actors (e.g., DA, LGUs, and DENR). There needed to be more industry participation, which could constrain achieving broad FLR goals, except for financiers who engaged with farmers individually. Other actors that could serve as information brokers and facilitate its transfer (e.g., barangay and cooperatives) needed to be more involved with POs. Information sharing, one of the main problems found, could be supported and led by key actors in the NGP implementation and facilitate strengthening relationships. Further consideration of local businesses could help consolidate markets for local products of the POs (Ribeiro et al., 2022c).

Further understanding of the policy frameworks with a historical perspective was provided by Ribeiro et al. (2023b). This analysis focused on identifying power relations, land use change and degradation drivers and proposed ways to support FLR agendas. The study highlighted the dominance of donor-funded activities in the country, which may have precluded the emergence of a bottom-up vision and practice of addressing these problems, including alternatives to address historical inequalities. The increased vulnerability of some groups (e.g., women and older members) was exacerbated by climate change, which in turn threatened even more the ability of some sectors of the population to fully participate and benefit from FLR activities.

The timeline of primary natural resource, agricultural, and economic policies and interactions with institutional, community and other actors revealed a trend toward supporting foreign investment in agricultural production for export (i.e., sugar, coconut, tobacco), which led to land accumulation. Agrarian reforms redistributed interests in the land, primarily rural-based industrialists, bankers and land speculators, which led sharecroppers to become landless poor. This is the community that years later became the main protagonist of the implementation of the NGP.

A key result of this study is for FLR implementers to emphasise aligning goals starting from the local level by promoting collaborations and coalitions that would leave benefits to local communities. This mode of operation would allow for a better understanding of local realities, valuing local concerns of communities as main implementation partners of FLR, as was recognised through workshops with local leaders in the same region as the study above (Gravoso et al., 2021). Focusing efforts at this level will also facilitate building individual and organisational capacities to address issues such as potential conflicts with land claimants and to improve relationships and negotiating skills with governmental agencies and their peers. This has been precisely the way through which the FLR Project was implemented.

For example, assessment with the Project POs (except for TUCODA) revealed the prevalence of land claimants in their managed areas. In most cases, the claimants were registered with DENR and rarely benefited from support from this agency. Some of these rights have been acquired through inheritance, but in other rare cases, 'properties' have been established even after recognising the PO and corresponding CBFMA of the land. Written agreements have yet to be established between land claimants and POs. In rare situations, land claims proceeded without costs (e.g., KFAI. UMACAP). In NAGMATA, for instance, a verbal benefit-sharing agreement between PO members and the two land claimants that hold about 25% of the CBFM area (75 ha) established a share of 35% of benefits with the POs. In BTFAI, two people who claimed about 45% of the CBFM area (120 ha) share 40% of their benefits with the PO. One land claimant has applied to DENR for legal occupancy (KFAI) in one PO. This rapid assessment underscores the importance of addressing the situation of land claimants, as they may pose risks to investments and create situations prone to conflict.

" ...*a key obstacle to establishing trees was seven people who claimed ownership to parts of the land, even though DENR did not recognise their claims. If the project had proceeded without including these people, there was a very high likelihood that they would respond by burning any newly planted trees*. " (Baynes et al., 2019).

7.4.5 Policy Interactions for FLR Project Implementation

Meetings with DENR aimed to introduce the project and solicit support for this project (Pasa, 2023). As a result, given prior successful experiences between this agency and ACIAR-supported projects, the FMB Director issued a memorandum to DENR VI, VII, and VIII to support the project implementation in their respective regions.

With the help of the CENRO Officers, NGP and CBFM Coordinators and extension officers, the FLR Project team was able to identify its participating POs. In August 2019, FLR Research Team members met with DENR offices from Region VII to share partial results of the FLR Project. Low rates of success of NGP implementation, rather than the aspirational 85%, were not achieved across participating communities, and low-quality seedling was the norm (Gregorio, 2023). The main techniques developed by the FLR Project of having elevated hardening beds for seedlings allowed to develop fine roots, which increase the future acclimation technique of these seedlings once transplanted (Gregorio, 2020). The results of applying these techniques were widely shared and demonstrated to CENROs. Soon after the meeting (March 2020), the Regional Director for Region VII directed all their subordinate organisations to adopt the elevated bed practises (Gregorio et al., 2020; see page 3 for DENR memorandum).

Uptake of this relevant research outcome was facilitated by making it applicable to the pertinent organisation, in this case, DENR and at the local level CENRO and nursery operators, in iterative ways through the several ACIAR-funded initiatives to UniUSC. The creation of a collective understanding of the problem that was documented empirically and a long-term knowledge partnership that, in this case, was sustained through continued funding and engagement helped strengthen commitments for collaboration down the road, which remain to this day (Gregorio, 2023). These actions enabled evidence-based policy in the case of the need to improve seedling quality.

Later that year, in November 2019, the FLR Research Team met with the Forest Management Bureau (FMB) at the DENR Central Office in Quezon City. During this event, findings from the Policy Workshop conducted in Iloilo City (Oct 10-11, 2019; FLR Project Team, 2019; appendix 84) regarding the weaknesses of POs in handling reforestation projects were discussed, which was joined by the NGP coordinator and staff, representatives from PENRO, CENRO and POs. Results included insufficient knowledge and skills on high-quality seedling production, lack of knowledge on appropriate silvicultural practices, low survival of planted seedlings, limited sources of germplasm (for both seeds and wildlings), poor soil quality, fire occurrence, presence of grazing animals, and lack of plantation maintenance when project funds are exhausted (Gravoso et al., 2021). Other factors highlighted during the workshop included the recognition of the remoteness of planting sites and difficult accessibility, establishing legal arrangements with land claimants, and the enormous workload of DENR Extension officers (for example, see Goltiano, 2023c). Governance issues remained regarding inadequate sharing agreements of benefits and poor sustainability of livelihood projects.

One option to address some PO limitations to achieve FLR goals would be to centre activities on the family nucleus within the CBFM. This formulation implies that the whole target reforestation project area will be divided by the number of families interested in reforestation and livelihood activities and assigned specific areas to work within the CBFM (see Baynes et al., 2019). In May 2020, FMB issued a Memorandum adopting the *Family Approach* to Reforestation nationwide (May 6th, 2020; available upon request), which we believe to have been influenced by the findings of the Project and the discussions held during this particular workshop. Families started entering contracts directly with DENR in government reforestation programs with that Memorandum.

7.4.6 FLR Coalitions at ACIAR's Project End

The FLR ACIAR project explored in practice what it would take to build institutional and other coalitions around the FLR activities supported by this Project. In May 2023, a

Sustainability Plan workshop was held for DECCA in Sara (Iloilo, Region VI; FLR Project Team, 2023). This event gathered representatives of local institutions (Mayor, LGU, DENR, DA) and PO directives, who, under the technical guidance of FLR Project personnel, developed a visionary exercise to reveal mutual expectations of performance by all. These expectations were then turned into commitments by a group exercise that identified a shared common vision, goals, and activities under the model of a logical framework for the future of this PO once the ACIAR FLR ends. This was a practical trial of a recommendation made by FLR Project Team members to formalise the change process to assist in FLR design decisions (Tedesco et al., 2023).

In the case of DECCA, the Mayor and institutional actors recognised the potential of this PO to become a demonstration centre of the potential for FLR, creating benefits for all. Importantly, all participants felt this story of success should continue and became engaged in seeing the success of DECCA turning into their own institutional and administrative success.

Workshop organisers finalised the *Sustainability Plan* (Appendix 79), integrating the logical framework and a theory of change with an indicator system that would help the PO communicate promptly and transparently with supporting institutions and the Mayor's office at the culmination of the Project. This indicator system is novel in that it resulted from the visionary collective exercise developed with the PO and institutional partners, which can demonstrate practical ways to fill one of the gaps highlighted elsewhere by FLR Project researchers to operationalise effective and efficient monitoring of FLR in action (Gutierrez et al., 2020). This increased interaction was a joint call from all participating in the workshop. Alongside, commitments made were formalised through a Resolution in the office of the Mayor of Sara for its enactment. Everybody felt that the collective decisions made during the workshop would be strengthened and respected irrespective of who was occupying the office, and the Resolution was a mechanism to guarantee respect for commitments made.
Impacts

7.5 Scientific impacts – now and in 5 years

NOW

The FLR Project established and put in practice conceptual frameworks to operationalise FLR. One main achievement was the design of a novel framework to conceptualise changes associated with reforestation activities through a system of leading and lagging indicators. This system provides critical insights into identifying suitable indicators for different points after reforestation activities have commenced to make reforestation monitoring efforts more efficient and effective alongside a unified set of concepts that helped better understand the importance and approaches to assess community capacity for FLR.

Research activities from the FLR Project helped illuminate the importance of gender issues to advance reforestation. Adding this research lens helped recognise women's roles in community-based reforestation and the burdens created by this added involvement.

The best reforestation practices developed through the FLR Project set a scientific foundation for obtaining the best-quality seedlings, improved nursery management, and identifying species suitability under diverse conditions. Adoption of best practices by communities through social capital improvement was used in other projects (*Project Tarsier*), including regarding social aspects of participation of local communities and policy issues. Similar knowledge was developed in parallel regarding agroforestry crops and livelihood activities.

The solid scientific base of the FLR Project helped to gain the buy-in of the DENR at several levels, and the LGUs, who became close collaborators of the Project and, along the way, also helped enhance FLR practises related to nursery management. These processes helped create spaces for experience and idea exchange on FLR implementation, barriers, and enabling factors, pushing the knowledge frontier for successful restoration.

The FLR Project contributed scientific publications on FLR in different geographies, and its resources became a go-to for those looking to implement community-based reforestation in the Philippines and beyond. As such, VSU researchers could share their expertise upon request in designing smallholder FLR practices like reforestation and agroforestry farming systems in Eastern Samar and other countries. The two scientific and practitioner conferences organised through the Project helped establish new collaborations and refresh existing dialogues regarding community-based forest restoration.

Scientific resources from the project were used to integrate FLR into curricula programs at VSU and other universities in the country in topics like economics, communication, and forestry-oriented curricula. Another contribution to the VSU scientific community derived from the interaction of its staff and students with international Project team and students. The performance of VSU students was enhanced through the services of the improved analytical laboratory at the University during their scientific research.

IN 5 YEARS

Streamlining the operation of nurseries and plantations will result in cost-efficient and cost-effective implementation of the FLR program. Knowledge and skills gained by PO members, LGUs, DENR local officials, and local communities will help improve governance and conflict management between land claimants and the POs.

Research and knowledge exchange efforts on FLR will help make visible contributions of FLR to the SDG Agenda 30 (i.e., *Sustainable Development Goals)* and national development goals. This opportunity will also help to consolidate support for gender-based activities as part of institutions within FLR agendas.

Given the prominence of the NGP nationwide, there will be intensified research in FLR in the country by in-country students and researchers. Research will also be facilitated by greater involvement of governmental agencies supporting agroforestry development as part of FLR agendas (DA, DAR, PCA, DTI), expanding research and knowledge exchange among all.

7.6 Capacity impacts – now and in 5 years

NOW

The FLR Project enhanced the capacity of POs in forest restoration (i.e., technical, forestry and livelihoods) mainly through investments to improve human and social capital. Given the participatory and open ways through which the FLR Project was implemented, it helped improve the technical capacity of DENR and LGUs on best practices in forest restoration. Project activities helped enhance bridging and linking capitals of POs, enabling them to access support from various agencies directly.

At the same time, the Project offered opportunities to stimulate VSU personnel at all levels to continue participating in NGP activities. It also improved the knowledge and understanding of local and international researchers in undertaking people-based forest restoration.

At the institutional level and for higher-education institutions in the country, the FLR Project resources, which include manuals and research results, were shared broadly (>500 individuals) with the community of foresters to help in their accreditation requirements via VSU's *Center for Continuing Education*. Beyond this community of researchers and practitioners, Project results were disseminated to city authorities (Baybay and Ormoc), who actively searched Project representatives for their expertise.

IN 5 YEARS

There will be improved community and PO learning and practice networks for sharing experiences and knowledge on FLR. Demonstrated training methods can be expanded to

include learners with different skills and learning profiles, spreading the knowledge base on best practices for FLR. Some of the training activities can be advanced directly by POs, increasing their influence in other communities and creating a virtuous cycle of experience exchange and collaboration.

A more robust institutional understanding of FLR-related challenges could improve collaboration and integrated policy articulation. Institutional activities will be enhanced by the availability of more well-trained forestry professionals, who could work to improve the ability of POs and collaborating agencies to recognise problems and address them promptly.

Some POs already started to secure additional funding for FLR independently of the Project. Improved abilities of the PO administrative team will help them leverage further support from other sources and leadership to secure broader active engagement of PO members. Some additional funds can come from private sector actors who recognise the higher standing of POs (e.g., financial management and organisational capacities) to carry out FLR activities. Partnerships can be established at local, regional and national levels.

7.7 Community impacts – now and in 5 years

7.7.1 Economic impacts

NOW

FLR Project activities enabled POs to have diversified livelihood systems. As a result, participating families increased their assets with benefits that transcended the community. Increased income resulted from selling seedlings, agroforestry products, livestock, and poultry. Incorporating the POs as suppliers to the local market economy helped them gain bargaining power and business acumen.

IN 5 YEARS

Given the positive results of PO's diversified income systems, its members will seek to expand livelihood projects. As these production activities consolidate, families benefit from greater market access and stable value chains.

Other income-generation opportunities will be based on the diversification of products in the markets. Some of these opportunities will be based on local value-adding activities as interactions occur with local consumers and markets. As a result, normal variation in markets and ongoing risks to productivity imposed by a changing climate could be buffered, resulting in reduced economic vulnerability to shocks by PO members.

The increased resilience to disruptions imposed by the market and other contextual factors could also be enhanced as innovation and new alliances are forged with local actors. As the PO dependency on external resources is reduced, the POs may become local hubs for experience exchange and demonstration sites.

7.7.2 Social impacts

NOW

Project participating PO members improved their organisation and leadership. In some cases, they became the best advocates of improved resource management to tackle environmental degradation.

The new positionality of POs has made them local sources of expertise. Some PO members have been trainers in activities organised by the FLR Project (farmer-to-farmer exchanges)

and others. This type of engagement has increased the visibility and recognition of POs' contributions to FLR.

Project participation has led to more cohesive and mission-driven POs. These gains have allowed the POs to benefit from the insights of some community members, who tended to be sidelined, such as older women.

IN 5 YEARS

The POs have achieved local and regional recognition due to the activities they developed through the FLR Project. This situation may help them access a broad network of support providers. Likewise, an additional positive consequence is their more active participation in local development projects led by the LGUs and/or DENR offices.

The evolving capacities of POs to create and develop community enterprises may become more sustainable and beneficial to their broader communities. In this way, family members will have less pressure to migrate, with the resulting stable demographics helping sustain FLR activities.

Fulfilment of PO members' aspirations and their increased ability to manage livelihood systems could help them consolidate family well-being. It can also motivate the transfer of values to younger generations.

7.7.3 Environmental impacts

NOW

Overall, the effective implementation of the FLR Project contributed to reducing environmental degradation. Efforts at capacity-building helped increase social sensitisation to the values of planted forests and associated ecosystem services.

When livelihood systems proved suitable to generate income, reduced degradation and improvement of soil fertility and micro-climate were recognised by Project participants. Overall, Project efforts resulted in increased environmental literacy of direct Project participants and other actors from the region (neighbouring PO members, local authorities and organisations).

IN 5 YEARS

Maintenance of FLR activities would improve forest quality and associated ecological processes. The results will be reduced erosion and landslides and lessened vulnerability to flash floods and fires.

The improved biodiversity through reforestation and integration of trees in the farms will also aid in boosting ecosystem function. These benefits will trickle down to the production systems, including improved and more stable water supply.

7.8 Communication and dissemination activities[3]

Extension materials were prepared in local languages and widely circulated (Appendix 63). Training events were offered on several topics (List of Workshops and Training section, Appendix 63), and in-person PO member exchanges were fostered to support knowledge transfer and mutual learning (see below).

[3] The FLR Project has a public website where all materials are available. https://sites.google.com/view/asem2016-103-project/.

Every opportunity was taken to optimise training efforts by facilitating the participation of POs in capacity-building activities offered by other agencies. For instance, partner POs in Region VII -Cebu- participated in a training event on bamboo plantation establishment, harvesting, product development and business enterprise with the support of DENR and an NGO in partnership with the project support of DENR and a non-government organisation (PhilDRAA) in collaboration with the FLR Project. On some occasions, online and face-to-face training events were conducted following the request of DENR and local government units (LGUs). This workshop was complemented by additional social science research methods training by Prof. R. Fisher (Gravoso, 2019).

VSU students had their research sponsored by the FLR Project (e.g., Demotor et al., 2021 appendix 12) while others (5) participated in on-the-job training activities related to FLR (see Appendix 63 section VSU students and the FLR Project and activity report in https://www.dropbox.com/home/End-of%20Project%20Review/EXTENSION%20ACTIVITIES/TRAININGS). VSU's laboratory facilities of the FLR Project, which were modernised from what was developed during previous ACIAR-funded projects, served as training grounds for several VSU students. FLR Project staff led their training for proper use of equipment for their research (for list of equipment and list of students who utilised it see: https://www.dropbox.com/home/End-of%20Project%20Review/Laboratory%20Facilities%20%26%20Equipment).

Additionally, FLR Project participants from VSU participated in the International Conference in Manila (2019; see activity 2.2 and appendix 63, section international conferences and visits), which helped increase their awareness of FLR issues and solidify their skills. Some (e.g., Dr Goltiano and Dr Nuñez) joined an international panel of experts on gender issues at USC in 2019. Other FLR Project staff (Moreno, Tripoli, Parcia) visited Australia to join field sessions in northern Queensland in 2019.

One remarkable training was a three-day session done with another ACIAR-funded project, the *Enabling Community Forestry in Papua New Guinea* (FST/ 2016/153), which also partially focused on reforestation (Rife, 2019). This joint effort brought together 36 participants from 11 organisations from both countries, which occurred at Visayas State University in 2019 (Rife and Pasa, 2019). It helped demonstrate key target seedling concepts, high-quality seedling production, seedling quality evaluation, mother tree selection, and smallholder seed production area establishment to participants from both countries.

Additionally, personnel from the FLR Project Team took advantage of critical junctures to disseminate research and practical knowledge generated through the project outcomes. One such effort was the *Hands-on Training of Trainers* led by N. Gregorio in June 2018, also in Papua New Guinea, to demonstrate best practices for smallholder seedling production (Gregorio, 2018). Participants were involved in another ACIAR-funded project in PNG. Based on post-training surveys, they recognised their increased skills after joining this event.

Training activities generally emphasised all the nursery, tree planting and agroforestry activities, including biofertiliser production. Because of the COVID-19 pandemic restrictions that precluded displacements across islands, the Project team facilitated visits between communities on the same island. Representatives of local organisations, like DENR, joined some of those visits. Once the pandemic restrictions became unsurmountable for getting groups together, training activities moved to virtual.

As crucial as carrying out multiple training activities in different formats for FLR participants is understanding whether these training achieve their goals. A postgraduate student from Visayas State University investigated whether capacity-building activities related to quality seedling production resulted in improved results in nurseries and determined the level of participants' satisfaction (Regmi, 2023). This qualitative research took place in six POs, three of which participated in this Project (i.e., MFA, UMACAP, and KFAI). It highlighted the importance of investing in skills and infrastructure for quality seedling production (i.e.,

including potting mix quality) and identifying good mother trees while examining barriers to adopting improved practices. The three non-Project POs did not receive support for FLR implementation. Results assessed the four levels associated with training: reaction to the activity, learning, behaviour change through adoption of practises learned, and dissemination of behaviour and learning to peers. Along with visits to the nurseries to assess the results of the practises (i.e., seedling height and stem form), elements of the training activities *per se* were examined (i.e., resource persons, teaching methodology, interactions between participants).

Research showed that although participants appreciated their increased occupational competence to raise high-quality seedlings, they would have liked longer sessions and additional time to increase peer interactions. Some resistance to fully recognising the value of proper seedling planting was perceived among respondents. Still, these were related to respondents needing functional nurseries, exclusively from POs not supported by the FLR ACIAR project. The best-performing nursery (KFAI) has received continuous support from ACIAR through the years, highlighting the need to find backing for POs to adopt the practises they learn; otherwise, the capacity-building efforts may produce little benefit for participants in these activities.

Understanding soil fertility management by local PO members seemed critical given the rapid decline in fertility of these soils due to extreme degradation and the opportunity to benefit from research results that reinforced the added benefits of enriched materials in the nurseries. Farmers have traditional knowledge of some of these practises, primarily based on the use of products other than chemicals given their costs, so this specific participatory workshop was designed to build on these existing skills and further helped documentation produced by the FLR Project Team (Pasa et al., 2022) with research results.

On this issue, one training activity worth highlighting complemented research performed on soil fertility (Ferraren et al., 2019 Appendix. 70). Participants of all Project POs from Region VII joined two FLR ACIAR Project researchers (Ferraren et al., 2019) on this event, during which critical aspects of soil characteristics (e.g., structure, types) were introduced. Participants discussed practices related to composting, including using vegetable leftovers and manure, which can be very useful once left to decompose for a few weeks to avoid hurting the plants. Other threats to fertility, like cogon grass, which is widespread in some areas, could be addressed through tree planting to shadow the grass, ensuring that tending is consistent to facilitate seedling establishment and growth (Ferraren et al., 2019).

Another effort at building capacity was based on peer-to-peer exchanges through cross-visits by PO members. Because community members have been practising reforestation and livelihood activities for several years, project leaders thought opening room for these exchanges could substantially benefit all participants (Polinar, 2019 Appendix 64). Early in 2019, PO members visited the VSU campus to observe a demonstration nursery's operation and understand its elements. They were exposed to plant propagation techniques and information on the selection of sources of vegetative planting materials and the basics of vermicomposting and production of other organic materials (e.g., pesticides) they could use in their PO activities (Polinar, 2019 Appendix 64).

Constraints imposed by the COVID-19 pandemic precluded the maintenance of these exchanges, and it was not until 2022 that another study-tour could be organised. In June of that year, a two-day visit to NAGMATA (in Region VII) took place, with the participation of members of all the other Project POs (except TUCODA, Region VI; FLR Project Team 2022 Appendix 74; Figure 16).

Figure 16 Poultry operation, group interactions, and participants of the study tour to NAGMATA held in June 2022. This Project-organised learning activity served to demonstrate practises utilised and build inter-PO collaborations for future experience exchange (from FLR Project Team, 2022).

Study leaders from VSU, COs in the three regions, DENR, and barangay representatives joined the visit. Activities included tours of the tree and molave plantations of NAGMATA and the water system project in the barangay managed by the PO, where they learned about technology of the system for household and irrigation. This system provides water for the barangay (Taba-ao). The group also visited the PO's dragon fruit plantation.

Members of NAGMATA shared details about the management practises of the plantations, including division of labour among members, plant propagation techniques, and fertiliser use (e.g., chicken dung). This tour was followed by a visit to the livelihood projects (i.e., piggery, poultry raising, and vegetable farm production of corn, eggplant, string beans, and chillies), where information on management, challenges and solutions adopted was discussed. The opportunity was taken to discuss challenges experienced by all POs and lessons learned through the implementation of FLR, including the experience of NAGMATA to address benefit-sharing concerns.

8 Conclusions and recommendations

8.1 Conclusions

The FLR Project worked with ten POs in four regions in the Philippines. Since the beginning, project implementers realised that PO members' capacity to implement FLR initiatives varied, and thus, PO characteristics should be recognised in planning and implementing activities. The Project endeavoured to design and tailor activities for each PO through a participatory and consultative process, considering their experience and aspirations.

Previous ACIAR-funded activities developed and streamlined systems for producing and using quality seedlings. Putting in place these systems was possible through careful design of capacity-building and other activities, along with specific funding allocated to participating POs. It was recognised that functional nurseries are an essential element for the success of FLR.

The continued investment in the FLR Project and meticulous design of activities helped consolidate the social preparation of PO members through purposeful engagement and sensitisation. Strong PO leadership and local skills were essential for the success of FLR. Activities also resulted in community members gaining awareness of underlying constraints for advancing successful reforestation and implementing livelihood activities.

Because sustainable livelihoods continue to be a requirement for successful FLR initiatives, such as the NGP, monitoring the performance of both reforestation and production systems in ways that these changes can be recognised by all, including those outside of the POs, remained a challenge. Proper understanding of constraints imposed on participants, particularly women whose workloads heightened due to engagement in FLR, and their contrasting preferences for specific crops or species were revealed.

The presence of land claimants within PO areas may compromise some of the gains made by communities. Unnecessary risks may emerge due to the activities developed by these actors, which may threaten the sustainability of realised benefits.

The implementation structure of FLR was successful (CDOs and their activities and interactions with other project members and local authorities/ institutions). This operational setup helped Project leaders stay abreast of local dynamics and unexpected changes in context. Complementary, local, and regional policy environments can be influenced by POs' activities, which demanded proper communication and perseverance.

Suitable governance systems within POs are necessary for the adoption of FLR systems. Beyond a clear administrative structure that includes the president, vice president, and treasurer, some POs effectively produced institutional arrangements for the smooth operation of their FLR initiatives.

Creative financial arrangements among governmental actors, POs, and the private sector will be required as FLR is costly. Some insights were gained during the FLR Project for POs to stay alert to these opportunities, and the model of having CDOs was instrumental in creating information gateways for accessing information.

8.2 Recommendations

Recommendations for Local Government Institutions

Engagement of local governments at all stages of FLR activities continues to be a necessary ingredient for successful restoration and livelihood improvement. It is envisaged that local government leaders will become more responsive to their constituents' requests for participation in FLR activities. These partnerships can become great models for catalysing activities toward NGP goals and boosting internal governance mechanisms within POs.

LGUs can be powerful partners for NGP implementation. Their engagement will be greatly facilitated by open communication with all organisations involved in FLR at the local and regional levels (e.g., DENR, DA, CENRO, PENRO). The steps taken with the FLR Project through the Sustainability Plan for DECCA in Iloilo could become an example for other LGUs that can adopt similar arrangements with POs under their jurisdictions.

Project POs took relevant steps to define mechanisms through which some of the grievances of problems would be addressed. These instruments were internal resolutions and agreements demonstrating the increased capacities and political understanding of PO directives to move beyond the problem. These instruments are recommended to gain recognition at the level of organisations involved with NGP implementation (e.g., DENR) and local authorities (e.g., Mayor's offices). The active endorsement of these institutional actors could strengthen the positionality and agency of POs.

Improved capacities at the level of local agencies like the CENRO, PENRO, and the DA were achieved due to the participation of representatives of these institutions in capacity-building and other Project activities. Improving communication between POs and representatives of these agencies could help make visible opportunities for support and engagement to solidify the results of POs-FLR engagement. Projects at an early stage of design could reach out to representatives of these and similar local organisations to better understand their training activities and aim to maximise theirs and the Project's budgets when combining efforts in synergistic manners.

Recommendations for DENR

Interactions between FLR project implementers and DENR helped maintain doors open for mutual learning, experience exchange, and continued adaptation of NGP implementation, as was demonstrated by the FLR Project. We urge DENR to continue to be open to change and experimentation based on the best research results produced by external actors (e.g., researchers of the FLR Project), which can result in improved NGP implementation and specific outcomes.

DENR officers at the more local levels could also help boost NGP outcomes by creating opportunities to exchange experiences and lessons learned among POs in their jurisdictions and DENR officials at these levels. On extension officers, it is recommended, along with the findings of the CoA report (2019), that more personnel is needed to reduce the load of existing agents who have to cover a vast geography with limited resources.

One mechanism to help curb the demographic drain that upland rural areas in the country continue to suffer could be the provision of support by the Philippines government to communities to improve their financial prospects of the NGP agenda implementation. Perhaps the DENR, the leading agency tasked with implementing the NGP, can create arguments for the national government to devise a programme based on economic incentives and others based on performance. Otherwise, the potential achievements of the NGP would only be temporary.

Recommendations for Future Project Proponents on FLR-Related Topics

Best practices in project design include elaborating a theory of change that will reflect the expected outcomes of a project and underlying assumptions along the causal path. When the FLR Project was designed, mainstream use of this tool was needed. Adopting this framework will contribute to better mapping the change process and designing and implementing suitable monitoring of activities in ways that can help understand why the change happened or not. The adaptive use of the theory-of-change model throughout project implementation could contribute to improved learning by all project participants. A practical example of using this model was the participative elaboration of the *Sustainability Plan* for one of the Project POs.

Implementing livelihood projects has contributed to strengthening POs to engage in FLR activities so that these actors can be on the right path to improve their well-being. Although no project can plan for massive disruptions like the one imposed by the COVID-19 pandemic, it is proposed that longer project timeframes should be defined for initiatives with high-order ambitions, like improving livelihoods while performing reforestation or other environmentally based activities. For those projects that aim to improve livelihoods based on productive systems, developing and testing business models early in the project cycle may help track the suitability of these production systems.

It is recommended that all efforts should be made to elicit information regarding the costs and benefits, and to whom, of project activities developed, particularly when projects have livelihood elements. This information may reveal the suitability of the livelihood systems beyond informing on technical aspects and determine the long-term scope for continued adoption of these production systems.

It is recommended that projects become sensitive to potential issues derived from poor consideration of gender issues that could preclude vulnerable groups' participation in project implementation. Having these conversations with the project's participants and institutional actors who, in the case of the Philippines, have specific mandates to address gender equality could go a long way to strategise activities and ensure these actors are not left behind. It is recommended that more purposeful linking to national groups working on gender-related natural resource management issues.

When designing the capacity-building component of each project, proponents should consider that learning is an iterative and incremental process. Knowledge gains will benefit from the combination of contrasting approaches for capacity-building, as was demonstrated by the different tools utilised by the FLR Project (e.g., workshops, specific courses, sharing of printed materials in accessible terms, peer-to-peer exchanges). However, as individuals learn at different paces, planning training activities could consider more extended duration events and assess whether learning outcomes are achieved and knowledge is used.

Project directives should make every effort to communicate goals and preliminary achievements in ways amenable to proper understanding by all participants, particularly community members. The FLR Project translated the training materials, manuals and technical brochures, helping to create a solid knowledge base.

Project implementers should disseminate its results to a broad range of audiences, emphasising academics and practitioners. It was the dedication of the FLR Project personnel to communication during a scientific event that led to the scale-out and scale-up of the FLR agenda in the Philippines. The ongoing *Project Tarsier*, a 30-year private sector-funded initiative for the research team, supports NGP goals with carbon sequestration aspirations. This initiative directly results from the diffusion efforts made by the FLR project team and serves to witness the Project quality.

Recommendations for VSU and overall Academic Institutions Joining Development Projects

VSU played a critical role in the implementation of the FLR Project. This is an example of the potential for academic institutions to contribute more actively to national agendas, such as the NGP initiative. But for this to be successful, there is the need for incentives within academic institutions so that faculty and staff can dedicate their time and efforts to activities like the FLR Project without going in detriment of their academic obligations.

FLR Project benefits to other VSU units and other academic institutions regarding the professional performance of forestry activities were achieved thanks to the dissemination of the project's multiple scientific and other deliverables. It is recommended that opportunities to make the best of the knowledge gained by Projects are noticed, which will contribute to optimising the resources invested by ACIAR and others in supporting Projects.

The benefits for VSU students derived from participating in the FLR Project are evident. Possibly, VSU could design and adopt a more purposeful program to support paid internships for advanced students allocated on a competitive basis, akin to the on-the-job training trials implemented by the Project.

Recommendations for Community-Reforestation Future Project Funders, including ACIAR

The FLR Project has demonstrated that change on the ground is possible. Most of the positive results of the FLR Project are due to a long-standing continuous collaboration and support of this research team from ACIAR in the Philippines. Because desired changes in development and conservation take time and impact mostly become visible in the mid-to long-term periods, project cycles should be responsive and adapt their formulation to the dynamics of change. This insight became particularly true for projects like the FLR Project, which mandated the development of activities based on the preferences and characteristics of POs through careful needs assessment of local capacities and other local conditions. In that sense, an important recommendation is to recognise the heterogeneity of participating local actors and balance the investment of Project resources in achieving goals that would deliver long-lasting impacts, such as participation in training activities while striving to reach more short-term goals (e.g., increase local income).

Mechanisms to guarantee social engagement and inclusion in project implementation, as was learned in this FLR Project, should be devised and put in place by project proponents. These innovations could take the form of coalitions that could be fostered with local organisations and government agencies to build on national goals towards inclusion.

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9.2 List of publications produced by the Project

(in alphabetical order, includes 5 PhD Dissertations* and 1 MSc Thesis‡)

1. Baynes, J., Herbohn, J., Gregorio, N., Unsworth, W., & Tremblay, É. (2019). Equity for Women and Marginalized Groups in Patriarchal Societies during Forest Landscape Restoration: The Controlling Influence of Tradition and Culture. *Environmental Conservation 46(3), pp.241-246.*

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18. Ota, L., Herbohn. J., Gregorio, N. & Harrison, S. (2020). Reforestation and smallholder livelihoods in the humid tropics *Land Use Policy 92, p.104455.*

19. Ota, L., Mukul, S. A., Gregorio, N., & Herbohn J. (2020). Community-based management of tropical forests: lessons learned and implications for sustainable forest management. Burleigh Dodds Science Publishing Limited. http://dx.doi.org/10.19103/AS.2020.0074.24

20. Ota, L., Firn, J., Chazdon, R., Gregorio, N., Mukul, S., Viani, R., Romero, C., and Herbohn, J. (2021). Using leading and lagging indicators for forest restoration. *Journal of Applied Ecology 58(9), pp.1806-1812.*

21. Tedesco, A.M., López-Cubillos, S., Chazdon, R., Rhodes, J.R., Archibald, C.L., Pérez-Hämmerle, K.V., Brancalion, P.H., Wilson, K.A., Oliveira, M., Correa, D.F. and Ota, L. (2023). Beyond ecology: ecosystem restoration as a process for social-ecological transformation. *Trends in Ecology & Evolution 38, 643-653.*

22. Valette, M., Vinceti, B., Gregorio, N., Bailey, A., Thomas, E. and Jalonen, R., 2020. Beyond fixes that fail: identifying sustainable improvements to tree seed supply and farmer participation in forest and landscape restoration. Ecology and Society, 25(4).

23. Vanclay, J.K., Gregorio, N.O. and Herbohn, J.L. (2023). Competition in a Mixed-Species Planting with Four Contrasting Tree Species*. Small-scale Forestry 22(2), pp.351-369.*

24. Von Kleist, K., Herbohn, J., Baynes, J. and Gregorio, N., (2021). How improved governance can help achieve the biodiversity conservation goals of the Philippine National Greening Program. *Land Use Policy 104, p.104312.*

25. Wiset, K., Gregorio, N., FIsher, R., Mangaoang, E., & Herbohn, J. (2023). Assessing the effectiveness of the engagement of local people in restoring degraded forest landscapes in Leyte and Biliran Provinces, the Philippines. *Environmental Science & Policy 148, p.103545.*

9.3 List of PhD Dissertations and MSc Thesis from the Project

Objective 1

[Activity 1.7] **Krishnan, V**. (2022). The role of nitrogen in enhancing the resilience of tropical tree seedlings used for restoration. Dissertation. Doctor in Philosophy. University of Queensland. https://doi.org/10.14264/3d117a1

Objective 2

[Activity 2.1] **Mukul, Shariff A.** (2020). Shifting cultivation in the upland secondary forests of the Philippines: Biodiversity and carbon stock assessment, and ecosystem services trade-offs in land-use decisions. Dissertation. Doctor of Philosophy. University of Queensland. https://doi.org/10.14264/uql.2016.222

[Activities 2.2 & 2.3] **Wiset, Kanchana.** (2022). Engaging local people in forest landscape restoration: Case Studies in Eastern Visayas (The Philippines) and Ramu-Markham Valley (Papua New Guinea). Dissertation. Doctor of Philosophy. University of the Sunshine Coast, Queensland. https://doi.org/10.25907/00674

[Activities 2.2, 3.1 & 3.2] **Ribeiro, Camila M. N**. (2023). Improving the agricultural component of Forest and Landscape Restoration projects in the Philippines. Dissertation. Doctor of Philosophy. University of the Sunshine Coast, Queensland (Embargoed document until March 2024).

Objective 3

[Activity 3.2] **Regmi, Bandana** (2023). Factors influencing the adoption of quality seedling production technology. Thesis. MSc. Visayas State University. Baybay City, Leyte. The Philippines

(Activities 3.3 & 3.4] **Von Kleist, Kurt** (2020). Are biodiversity provisions outlined in the Forest and Landscape Restoration approach being attained? Case studies from the Philippines and beyond. Dissertation. Doctor of Philosophy. University of the Sunshine Coast, Queensland. https://doi.org/10.25907/00229

10 Appendices

10.1 Project Reports in Appendix 1

Project documents elaborated, including publications (*).

Document No.	Authors	TItle	Activity No.
1	Ota, L., Lidestav, G., Andersson, E., Page, T., Curnow, J., Nuñez, L., Goltiano, H., Ferreira dos Santos, N., and Herbohn, J. (2023). Manuscript	Gender roles, relations, and perspectives in small-scale and community forestry -implications for policy and practice.	1.1 & 3.4
2*	Baynes, J., Herbohn, J., Gregorio, N., Unsworth, W., & Tremblay, É. (2019)	Equity for Women and Marginalized Groups in Patriarchal Societies during Forest Landscape Restoration: The Controlling Influence of Tradition and Culture. *Environmental Conservation*	1.1 & 3.4
3	Nuñez, L., Ota, L., Gregorio, N., and Herbohn, J. (2023). Report	Gender analysis of FLR projects in the Visayas region in the Philippines.	1.1 & 3.4
4	Goltiano H., Gregorio, N., Pasa, A., Herbohn, J., Tripoli, R., Polinar, B., Rife, K., Moreno, O., Leysa, J., Doria, K., and Jabagat, M. (2020). Report	The efficacy of livelihood assistance for upland farmers viewed from the Sustainable Livelihoods Perspective.	1.2 & 2.1
5*	Goltiano, H., Gregorio, N., Pasa, A., Herbohn, J., Tripoli, R., and Valenzona, J.	The Effect of the Implementation of the National Greening Program on the Socioeconomic Status of Smallholders in Caibiran, Biliran, Philippines. (2021). *Small-Scale Forestry*	1.2 & 2.1
6	Galvez, K., Pasa, A., and Gregorio, N. Concept Note & Preliminary Report	Assessing the impacts of the National Greening Program on the socio-economic status of participating households in the Visayas, Philippines.	1.2 & 2.1
7*	Ota, L., Firn, J., Chazdon, R., Gregorio, N., Mukul, S., Viani, R., Romero, C., and Herbohn, J. (2021).	Using leading and lagging indicators for forest restoration. *Journal of Applied Ecology*	1.2 & 3.3 & 3.4
8	Gregorio, N. (2023). Report	ASEM/2016/103 Reforestation Monitoring Guidelines	1.2 & 3.3 & 3.4
9	Polinar, A., Ramos, A., Pasa, E., Gregorio, N., Doria, K. and Leysa, J. (2021). Report	Preference on timber trees among beneficiaries of the National Greening Program (NGO) in the Visayas Region, Philippines	1.3, 2.3 & 2.4
10	Ramos, A., Pasa, A., Gregorio, N. Herbohn, J., Doria, K., Leysa, J., and Tripoli. R. (2021). Report	Agricultural crops preferences among National Greening Program (NGP) beneficiaries in the Visayas Region	1.3, 2.3 & 2.4
11	Polinar, A., Pasa, A., Gregorio, N. and Doria, K. (2023). Report	Species diversity. composition, abundance and ddistribution of forest plants in norther Cebu, Philippines	1.3, 2.3 & 2.4
12	Demotor, A., Polinar, A, and Doria, K. (2021). Report	Domesticated trees and agricultural crops among upland farmers in barangay Raba-ao, Tabogon, Cebu.	1.3, 2.3 & 2.4
13	Galvez, K (2023). Research Concept Note	Bioeconomic Modeling of Agroforestry and Livelihood Project of the ACIAR-FLR Project in the Visayas Region, Philippines.	1.4

14	Ribeiro, C., Leysa, J., Doria, K., Jagabat, M., Tripoli, R., Ota, L., Gregorio, N., and Herbohn, J. (2023). Report	Towards improving the outcomes of crops and agroforestry in landscape restoration projects in the Philippines.	1.4
15	Ribeiro, C., Leysa, J., Ota, L., Gregorio, N., and Herbohn, J., (2023). Report	Integrating land uses to mitigate risks and reconcile the goals of multiple stakeholders in the Philippines.	1.4
16	Stevenson, K. (2020). Report	Literature review on assisted natural regeneration.	1.6
17	Doria, K., (2020). Report.	Community-based forest restoration project: a demonstration of assisted natural regeneration (ANR) and enrichment planting techniques in restoring denuded lands.	1.5
18	Moreno, O. & Tripoli, R. (2020). Report	Mahawan Field Trial Barangay Mahawan Kananga, Leyte	1.5
19	Tripoli, R. (2020). Report	Identify the growth performance of 20 different species using elevated hardening beds in the nursery.	1.5
20	Gregorio, N., Moreno, O., & Tripoli, R. (2020). Report	Competition and complementarity of forest trees in a mixed plantation	1.5
21	Gregorio, N. (2023). Report	Effects of hardening bed on the morphology and field performance of big-leaf mahogany *(Swietenia macrophylla L., Jacq.)* seedlings	1.5
22	Oraiz, K., (2021). Report	Characteristics and fertility status of soils in the forest landscape restoration sites in Central Visayas	1.5
23*	Vanclay, J.K., Gregorio, N.O. and Herbohn, J.L.	Competition in a Mixed-Species Planting with Four Contrasting Tree Species. (2023). *Small-scale Forestry.*	1.5
24*	Le, H., Smith, C., Herbohn, J., & Nguyen, H.	A Comparison of Growth, Structure and Diversity of Mixed Species and Monoculture Reforestation Systems in the Philippines. (2020). *Journal of Sustainable Forestry*	1.5
25	Bonner, M., Herbohn, J., Gregorio, N., Pasa, A., Avela, M., & Solano, C. Maranguit, O., Almndras-Ferraren, A., Wills, J., Shoo, L., & Schmidt, S.	Soil organic carbon recovery in tropical tree plantations may depend on restoration of soil microbial composition and function. (2019). *Geoderma*	1.5
26	Various authors and dates.	List of FLR Project Publications (See also Section 10.2)	1.5 & 3.2
27	Peque, D, Gregorio, N. and Bartido, R. (2023). Report	Forest fires in Forest Landscape Restoration projects in the Philippines	1.6
28	Mangaoang, Y. (2022). Report	Assessment of pests and diseases of tree plantation in NGP reforestation and FLR trial sites of Visayas, Philippines.	1.6
29	Ferraren, A., Gregorio, N., Agne, L., Avela, M. and Pasa, A. (2020). Report	Growth performance and nutrient update by falcata (*Paraserianthess falcataria)* as influenced by potting medium, chemical fertilizer, and arbuscular mycorrhizal fungal inoculation.	1.7
30*	Krishnan, V., Robinson, N., Firn, J., Herbohn, J., and Schmidt, S.	Organic nitrogen improves the water use of tropical tree seedlings cultivated for restoration plantings. (2023). *Plants People Planet*	1.7
31*	Mukul, S.A., Herbohn, J., Ferraren, A. and Congdon, R.	Limited role of shifting cultivation in soil carbon and nutrients recovery in regenerating tropical secondary forests. (2022). *Frontiers in Environmental Science*	1.7
32	Preciados, L. (2018). Report	Summary of observations and findings: field visit report for organic fertilizers in Leyte, Philippines.	1.7

33	Pasa, A., Gregorio, N., Jagabat, M., Leysa, J., Tripoli, R, Doria, K., Maranguit, O., Rife, K, and Herbohn, J. (2022). Report	Biofertilizer application among NGP participants in the Visayas, Philippines.	1.7
34*	Ota, L., Herbohn, J., Harrison, S., Gregorio, N. & Engel, V.L.	Smallholder reforestation and livelihoods in the humid tropics: a systematic mapping study. (2018). *Agroforestry Systems*	2.1
35*	Ota, L., Herbohn. J., Gregorio, N. & Harrison, S.	Reforestation and smallholder livelihoods in the humid tropics. (2020). *Land Use Policy*	2.1
36*	Mukul, S., Herbohn, J., & Firn, J.	Rapid recovery of tropical forest diversity and structure after shifting cultivation in the Philippines uplands. (2020). *Ecology and Evolution*	2.1
37*	Mukul, S., Halim, M., & Herbohn, J.	Forest Carbon Stock and Fluxes: Distribution, Biogeochemical Cycles, and Measurement Techniques. (2020). In: *Life on Land, Encyclopedia of the UN Sustainable Development Goals.* Springer Nature, Switzerland.	2.1
38	Ribeiro, C., Herbohn, J., Ota, L., & Baynes, J. 2019. Poster	Agroforestry and ecological farming practices to improve landscape restoration initiatives in the humid tropics.	2.1
39*	Ota, L., Chazdon, R., Herbohn, J., Gregorio, N., Mukul, S., and Wilson, S.	Achieving quality forest and landscape restoration in the Tropics. (2020). *Forests*	2.1
40	FLR Project Team (2019).	List of articles published in the Special Issue of *Forests* featuring selected case- studies in SE Asia, Africa, and Latin America. Publications available on this link: https://www.mdpi.com/journal/forests/special_issues/Landscape_Happen#published	2.2 & 2.3
41*	Valette, M., B. Vinceti, N. Gregorio, A. Bailey, E. Thomas, and R. Jalonen. (2020).	Beyond fixes that fail: identifying sustainable improvements to tree seed supply and farmer participation in forest and landscape restoration. *Ecology and Society*	2.2 & 2.3
42*	Wiset, K., Gregorio, N., FIsher, R., Mangaoang, E., & Herbohn, J.	Assessing the effectiveness of the engagement of local people in restoring degraded forest landscapes in Leyte and Biliran Provinces, the Philippines. (2023). *Environmental Science & Policy*	2.3
43	Pasa, A., (2020). Policy Brief	Engaging communities in Forest Landscape Restoration	1.2 & 3.3
44*	Herbohn J, Ota L, Gregorio N, Chazdon R, Fisher R, Baynes J, Applegate G, Page T, Carias D, Romero C, Putz F & Fim J.	Relationships between livelihood assets and reforestation success – the Community Capacity Curve applied to reforestation. (2023). *Philosophical Transactions of the Royal Society B*	2.3
45	Gregorio, N., Tripoli, R., Pasa, A., Polinar, A., Peque, D., (2018). Report	Selection of Research Sites for ASEM 2016/103	1.3, 1.5 & 2.4
46	Gregorio, N. (2019). Survey	Report Baseline Survey: PO Level	2.4
47	FLR- Project Team (2019). Report	Baseline profiles of Project POs.	2.4

48	Gregorio, N., Gravoso, R., and Pasa, A. (2018). Report	Planning Workshop to Design Improved FLR in the Visayas Region of the Philippines (Region VI)	1.3, 1.5 & 2.4
49	Gregorio, N. (2018). Report	Planning Workshop to Design Improved FLR in the Visayas Region of the Philippines (Regions VII and VIII).	1.3, 1.5 & 2.4
50	Pasa, A. (2019). Report	Commencement report region VI.	1.5 & 2.4
50a	Goltiano, H. (2023a). Report.	Follow-up study on the 2019 study on the impact of livelihood projects of 10 POs with DENR-supported livelihood projects.	1.2 & 2.4
51	Pasa, A. & Jagabat, M. (Jan 2023).	Report all projects region VI January 2023	2.4
52	Polinar, A., & Mordequillo, E. (Jan 2023)	Report all projects region VII January 2023	2.4
53	Peque, D., and Rañin, J. (Jan 2023).	Report all projects region VIII January 2023	2.4
53a	Jagabat, M. (Dec 2023)	Final Livelihood report region VI December 2023	2.4
53b	Rañin, J. (Dec 2023)	Final Livelihood report region VIII December 2023	2.4
54	Pasa, A., Peque, D., and Tripoli, R. (2018). Report	Explore options for financing FLR initiatives by private sector and donor organizations	2.5
55	Mangaoang, E. (2022). Report	Financing Status of Community-Based Forest and Landscape Restoration (FLR) Initiatives: The Case of ACIAR-FLR Project Sites in the Visayas, Philippines.	2.5
56	Mukul, S., Herbohm, J., Gregorio, N., and Pasa, A. (2021). Poster	Projecting ecosystem services supply potential from forest and landscape restoration in Biliran Island, the Philippines.	2.6
57*	Mukul, S., Herbohn, J., Fern, J., & Gregorio, N.	Carbon and Biodiversity Outcomes under Divergent Management Scenarios in Shifting Cultivation Landscapes in the Upland Philippines. (2020). In: Cairns, M. (ed.), Farmer Innovations and Best Practices by Shifting Cultivators in Asia-Pacific, pp. 408-420. CABI, UK. ISBN: 978-0-415-74603-8.	2.6
58*	Gregorio, N., Herbohn, J., Tripoli, R., and Pasa, E.	A Local Initiative to Achieve Global Forest and Landscape Restoration Challenge—Lessons Learned from a Community-Based Forest Restoration Project in Biliran Province, Philippines. (2020). *Forests*	2.6
59	Ota, L. (2022). Report	A protocol for assessing the success of FLR projects including livelihoods	3.1
60	Ota, L., Fiirn, J., Chazdon, R., Gregorio, N., Romero, C., Tripoli, R., Doria, K., Leysa, J. and Herbohn, J. (2023). Report	Community capacity for forest restoration.	3.1
61*	Gutierrez, V., Hallet, H. G., Otz, L., Sterling, E., WIlson, S.J., Bodin, B. & Chazdon, R.	Forest and landscape restoration monitoring frameworks: how principled are they? (2022). *Restoration Ecology*	3.1
62	Custodio, D. (2023). Research Concept note	Assessing the Social Impacts of the ACIAR-Forest Landscape Restoration (FLR) Livelihood Projects in the Philippines.	3.1
63	FLR Project Team	List of Extension Materials and Activities	3.2
64	Polinar, A. (2023). Report	BSF On the job training/ field practice	3.2
65	Gregorio, N. (2018). Report	Hands-on high-quality seedling production in smallholder nurseries (held in Papua New Guinea).	3.2
66	Rife, K., & Pasa, A., (2019). Report	Training on Undertaking Social Science Research	3.2

67	Gravoso, R., (2019). Report	Social Methods Research Training. Participatory Action Research. Prof. R. Fisher.	3.2
68	Pasa, A., (2019). Report	Learning event on plantation establishment, agroforestry system and climate-smart high value vegetable production for CBFM POs, MEOs, and Coordinators	3.2
69	Pasa, A. (2019). Report	Training on Vegetative Propagation and Organic Fertilizer Production for Partner People's Organizations in Northern Iloilo	3.2
70	Ferraren, A., Polinar, A., Doria, K., and Demotor, A. (2019). Report	Soil fertility management training.	3.2
71	Custodio, D. (2023). Report	Materials workshops (Cebu 3 topics; Iloilo: 1 topic). Appendix only has 1 topic for simplicity. All four topics available here: [https://www.dropbox.com/home/End-of%20Project%20Review/EXTENSION%20ACTIVITIES/TRAININGS]	3.2
72	Goltiano, H. (2023b). Report	Leadership and organizational capacity workshop.	3.2
72a	Nuñez, L. (2023). Report	Assessment of the Organizational Strength of People's Organizations Engaged in NGP: Enhancing Capacities for Sustainable Reforestation Projects.	3.2
73	Polinar, A. (2019). Report	POs visit to VSU	3.2
74	FLR Project Team (2022). Report	Farmer-to-farmer Field School. Visit POs.	3.2
75	Ribeiro, C., Ota, L. Gregorio, N., Jagabat, M. & Herbohn, J. (2022). Report	Social network analysis to link agriculture and forest landscape restoration projects in the Philippines.	3.3.
76	Pasa, A. (2023a)	Policy Session with DENR Manila (Agenda).	3.3
76a	Preciados, L., Gravoso, R., Gregorio, N., Peque, D. and Pasa, A. (2023). Report.	Agroforestry Adoption: Profile, Influential factors, Perceptions, Importance, Barriers, Implications, and Recommendations	3.3
77	FLR Project Team (2023).	List of PO arrangements and internal policies.	3.3
78	FLR Project Team. (2023). Report	Partners' Community Feedbacking Session and Workshop	3.3
79	FLR Project Team. (2023). Report	Enhancing livelihoods through FLR Sustainability Plan DECCA	3.3
80	Gregorio, N. (2020). Report	A case of policy, scientific and capacity impacts of ACIAR FLR Project	3.3, 2.4, 2.5 & 1.5
81	Ribeiro, C., (2022). Report	How can agricultural practices promote forest and landscape restoration? A systematic review.	3.4
82	Ribeiro, C. (2023). Report	The Political Ecology of ecosystem restoration in agriculture-dominated landscapes: access, use and control of resources in the Philippines.	3.4
83*	von Kleist, K., Herbohn, J., Baynes, J. and Gregorio, N.	How improved governance can help achieve the biodiversity conservation goals of the Philippine National Greening Program. (2021). *Land Use Policy*	3.4
84	FLR Project Team (2019). Report	Strategic Planning & Policy Workshop on FLR for Iloilo	3.4

85	Gravoso, N., Gregorio, N. & Pasa, A., (2023). Report	Experiences in implementing reforestation projects: the case of people's organizations in Iloilo.	3.4
86	Gravoso, R., Pasa, A., & Gregorio, N. (2021). Report	Responding to constraints in reforestation projects: An example of a collaborative problem analysis and strategy development for improved forest and landscape restoration.	3.4
87	Project Tarsier Team (2020). Report	Workshop on Designing a Sustainable Community-based Forest Restoration Project through Voluntary Carbon Market	3.3, 3.4
88	Project Tarsier Team (2023). Report	Biliran Province Workshop February 2023.	3.3, 3.4
89	Goltiano, H. (2023c). Policy Brief	Burnout among Extension officers: a serious problem deserving serious attention	3.3, 3.4
90	Goltiano, H (2023d). Policy Brief	Continuous capability-building for People's Organisations is essential for successful Forest Landscape Restoration (FLR)	3.3, 3.4
91	Pasa, A. (2023b). Policy Brief	Implementing the National Greening Program in Maize- dominated landscapes.	3.3, 3.4
92	Gregorio, N., Pasa, A., & Herbohn, J. (2023). Policy Brief	Avoid tripping over the first hurdle: Continued prevalence of low-quality seedlings in forest restoration programs in the Philippines.	3.3, 3.4
93	Ota, L. (2023). Policy Brief	Leading and Lagging Indicators for Forest Land Restoration in the Philippines	3.3, 3.4
94	Nuñez, L. and Ota, L. (2023). Policy Brief	Building capacity of Women for Forest Landscape restoration (FLR).	3.3, 3.4
95	Mangaoang, E. (2023). Policy Brief	Key Policy Options for Promoting Enabling Environments for Private Sector Investment in Reforestation.	3.3, 3.4
96	Gregorio, N. (2023). Manuscript	Improving seedling quality in community-based forest and landscape restoration programs in the Philippines: translating science into policy and practise.	3.3, 3.4
97*	Chazdon, R., Gutierrez, V., Brancalion, P, Laestadius, L., and Guariguata, M.	Co-Creating Conceptual and Working Frameworks for Implementing Forest and Landscape Restoration Based on Core Principles. (2020). *Forests*	3.5
98*	Chazdon, R., Herbohn, J., Mukul, S., Gregorio, N., Ota, L. Harrison, R., Durst, P., Chaves, R., Pasa, A., Hallett, J., Neidel, J., Watson, C., and Gutierrez, V.	Manila Declaration on Forest and Landscape Restoration: Making It Happen. (2020). *Forests*	3.5
99*	Chazdon, R. L., S. J. Wilson, and J. Herbohn.	Building capacity of farmers and communities for forest and landscape restoration. (2021). Pages 106-113 in J. Ghazoul and D. Schweizer, editors. Forests for the future: Restoration success at landscape scale - what will it take and what have we learned? Prince Bernhard Chair Reports (issue 1). WWF-Netherlands. http://www.bosquesandinos.org/wp-content/uploads/2021/06/Prince-Bernard-Chair-Restoration-report.pdf	3.5
100*	Tedesco, A.M., López-Cubillos, S., Chazdon, R., Rhodes, J.R., Archibald, C.L., Pérez-Hämmerle, K.V., Brancalion, P.H., Wilson, K.A., Oliveira, M., Correa, D.F. and Ota, L.	Beyond ecology: ecosystem restoration as a process for social-ecological transformation. (2023). *Trends in Ecology & Evolution.*	3.5