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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/]

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1/2,3$"4, 56%"@:<E<:<29!/<R!:* 12::23!80F239:/0F!:D2!@*0F<:<*09!80 23!CD<@D!=?%!@/0!1202A<:! R2R1239!* !:20!@*RR80<:<29!G/3:<@<G/:<0>!<0!Z&'!G3*B2@:9H!V82!/::20:<*0!C<;;!12!><E20!:*! >20F23!<99829X!/9!C2;;!/9!:* G3*F8@:<*0!9L9:2R9!1/92F!*0!9G2@<A<@!@3*G9!A*3!CD<@D!A83:D23!]0*C;2F>2!C<;;!12!>2023/:2F!<0!@**G23/:<*0!C<:D!VWZ%!32>/3F<0>!:2@D0<@/;!/0F!2 *0*R<@! /9G2@:9!*A!:D2!<RG;2R20:/:<*0!*A!:D2! L9:2R9! 2H>HX!8 2!*A!1<*OA23:<;<9239!/0F!*:D23!G3/@:<929! :*!<RG3*E2!@3*G!/0F!:322!>3*C:DK!1<*O2@*0*R<@!R* 2;9SH!$RG;2R20:<0>!G<;*:!:29:9!*A!92;2@:2F! *G:<*09! C<;;! /;;*C!A*3! F2:23R<0< >! 129:! G3/@:<@29!A*3! <RG3*E2F! 32A*329:/:<*0! F29<>0! <0!:D2! Z&' !N/<0!*8:@*R29!32;/:2!:*!@*RR80<:LO1/92F!F2R*09:3/:<*0!G; 0:<0>9!/0F! 99*@</:2F! 1202A<:9!/0F!@*9:9H!

1/2,3$"4, A6% "@:<E<:<29! *0! :D<9! *1B2@:<E2! C<;;! D2;G! <F20:<AL!]2L! A/@:*39! ;<]2;L! :*! 2 /1;2! 98@@299A8;!9@/;<0>!*8:X!<0@;8F<0 !@/:/;L9<0 !G3<E/:2!92 :*3!98GG*3:H!Q 2!*A!R*F2;<0>!:**;9! C<;;! D2;G! >3*80F! 2+<9:<0>!]0*C;2F>2! :*! 9<R8;/:2! *8:@*R29X! >8<F2FX! /R*0>! *:D239X! 1L! 2+@D/0>29!*A!<0:230/:<*0/;!2+G23:9!F83<0 !/!@*0A2320@2!*0!=?%H!4D2!R/<0!G3*F8@:!*A!:D2! C*3]! A*3! :D<9! *1B2@:<E2! C<;;! 12! :D2! :29:! *A! :D2! R*F2;9! <0! ,7! @*RR80<:<29! :D/:! C<;;! <0A*3R! <RG;2R20:/:<*0!*A!:D2!Z&'H!

1/2,3$"4, B6% "@:<E<:<29!<0@;8F2!:D2!F29<>0!/0F!892!*A!2AA2@:<E20299!R*0<:*3<0>!G3*:*@* 9!A*3! =?%!:*! /992 9!:D2! G<;* O:29:9! 80F23!(1B2@:<E2! 5 %298;:9! <;;! 12! F<992R<0/:2F! < ! E/3<*89! A*3R/:9!:*!/@:*39!<0E*;E2F!<0!32A*329:/:<*0!G*;<@LOR/]<0>!<0O@*80:3L!/0F!12L*0F!<0!:D !"9</O '/@<A<@!32><*0H P*R2!*A!:D/:!<0 *3R/:<*0!C<;;!12!32 2E/0:!:*!@*09*;<F/ <0>!;*@/;!@*RR80<:L! 9]<;;9!/ F!9:320>:D20< >!A*329:3L!@833<@8;/ 0/:<*0/;;LH!

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'3*B2@:!9<:29!C232!92;2@:2F!1L!:D2!'3*B2 :!:2/R!R2R1239! 0F!32;2E/0:!VWZ%!G239*002;X! 89<0> D2!A*;;*C<0>!@3<:23</J!9<:8 :2F!<0!:D2!I 9/L/9!%2><*0X!98GG*3:<E2!VWZ%!*AA<@</;9X!/0F! G32920@2!*A!'(9!20>/>2F!<0!32A*329:/:<*0!G3*B2@:9H!"A:23!:D/: !'(!92; @:<*0!C/9!1/92F!*0! />2!A3*R!'(!A*3 /:<*0X!:D2! /0F!/0F!:322!:20832X!G3*+<R<:L!:*!:D2!R/B*3!:*C0X!@/G/@<:L!: ! <RG;2R20:!32A*329:/:<*0!G3*B2@:9X!/0F!:LG2!*A!98GG*3:!/>20@LH!

4D2!' B2@:!9<:29!<0@;8 2F!:D322 *A!:D2!,b!%2><*09!<0!:D2!@*80:3LX!/;;!;*@/:2F!<0!:D2!I<9/L/9! >2*>3/GD<@/;!32><*09J!I$!O Z*3:D230!G 3<:<*0!*A!$;*<;*!'3*E<0@2X!I$$!OZ*3 D230!#218X!/0F!I$$$! W/9:230! ?2L:2! /0F!)<;<3/0! '3*E<0@2! M=<>832! ,SH! 4D2! '3*B2@:! C/9! <RG;2R20:2F! <0! 20! @*RR80< <29! C<:D 32A*329:/ <* ! 9<:29!R/0/>2F!1L!'2*G;2! (3>/0<9/:<*09! '(9 ! '(9! /32! 32@*>0<92F!/99*@</:<*09! A!@*RR80<:L! 329<F20:9X!<0!:D<9! @/92X! 9R/;;D*;F239!/0F!A/3R239X! C<:D!/!F2 <02F!9:38@:832!M2H>HX!R2R123 D X!;2/F2 9D<GX!29:/1;<9D2F!G3*@2F8329S!/0F!C*3]! :*C/3F9!@**3F<0/:2F!/0F!/>322FO8G*0!>*/;9H!

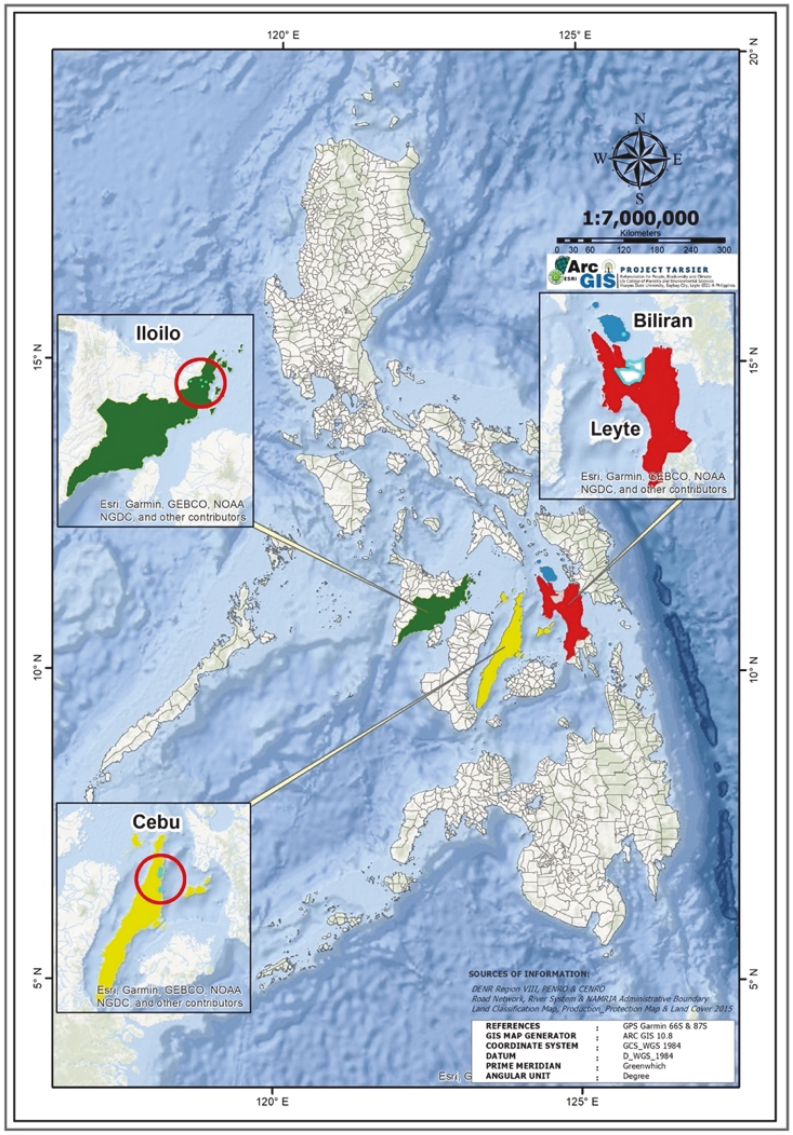

Figure 1 Location of FLR Project regions where activities were developed. Region VI: Iloilo; Region VII: Cebu; and Region VIII; Leyte (Map by Marlon Bote -VSU Team).

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.

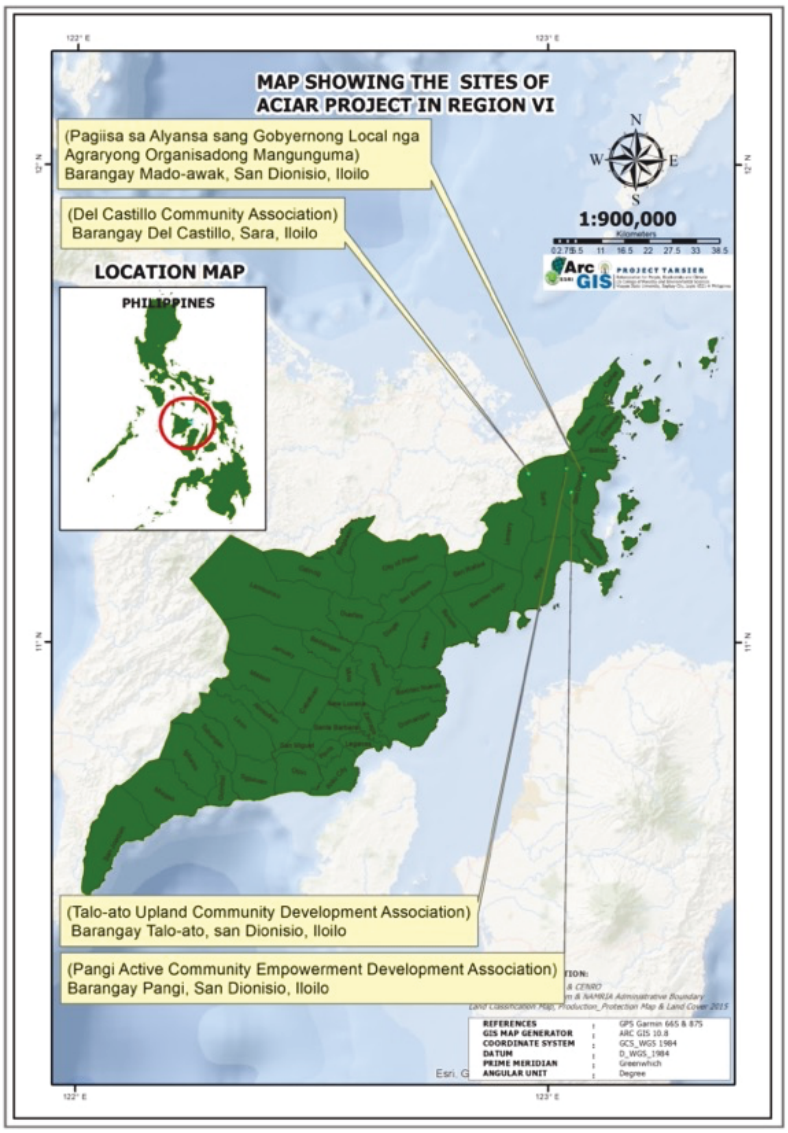

Figure 2 Location of Region VI -Iloilo and the four People's Organisations where the FLR Project developed activities: DECCA, TUCODA, PACEDA, and PAGLAOM (Map by Marlon Bote -VSU Team).

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.

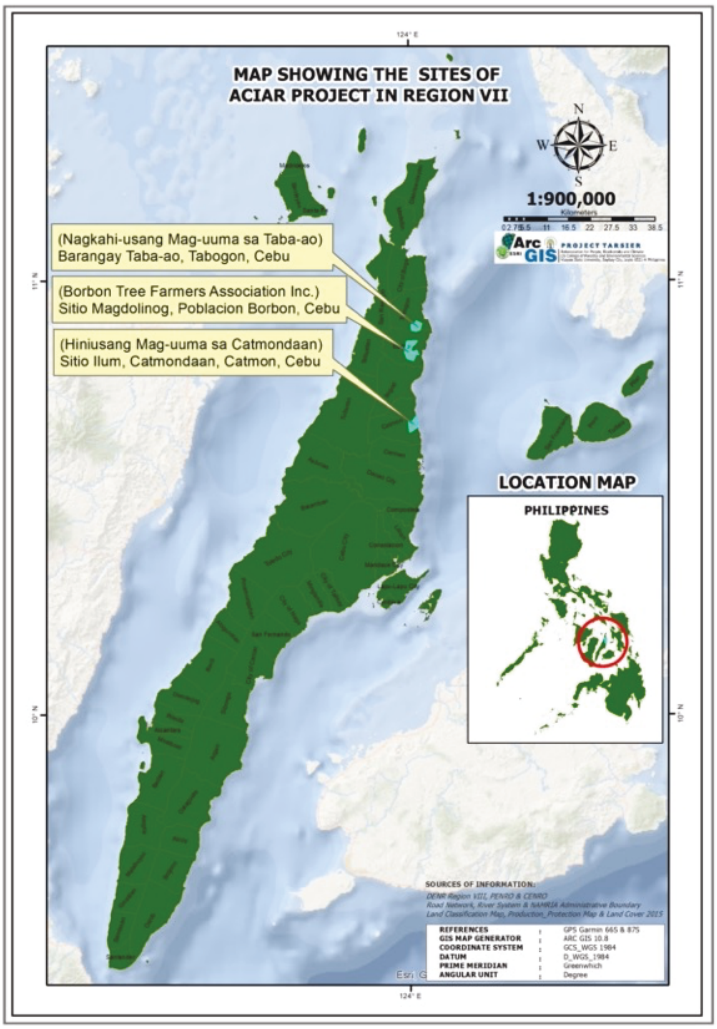

Figure 3 Location of People's Organisations (POs) in Region VII, Cebu: NAGMATA, BTFAI and HIMASACA (Map by Marlon Bote -VSU Team).

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.

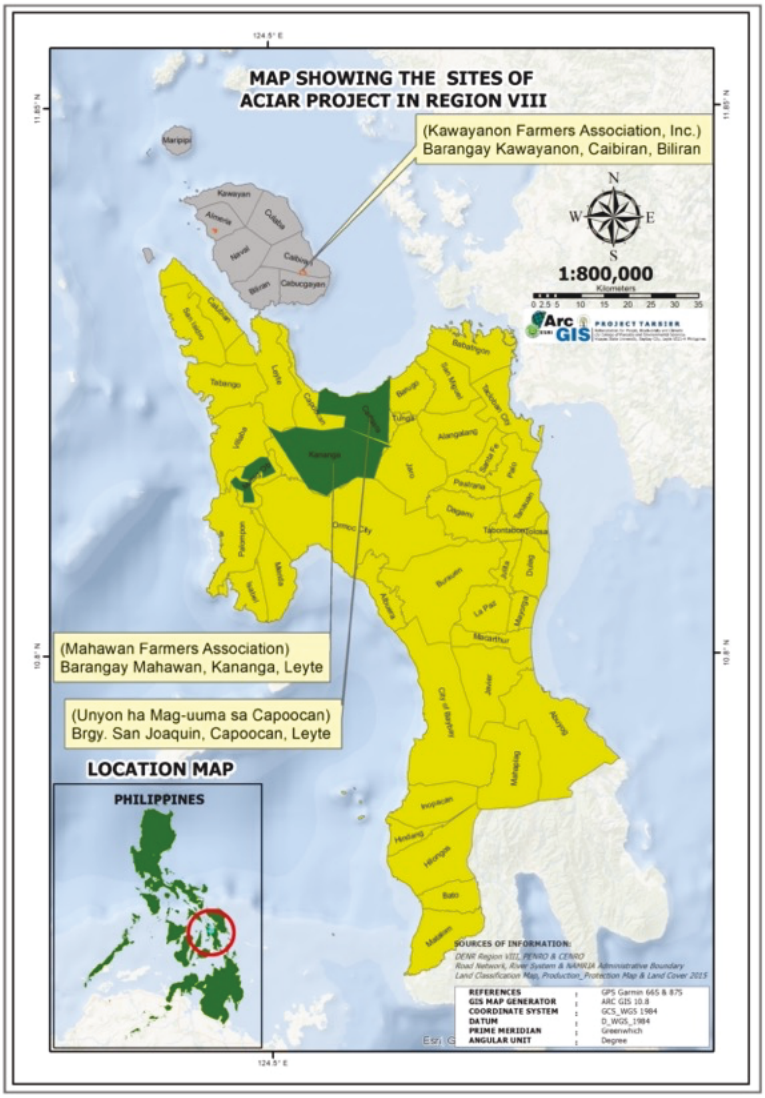

Figure 4 Location of Region VIII-Leyte in the Philippines (insert) and the 3 POs in the Region: MFA, UMACAP, and KFAI (Map by Marlon Bote -VSU Team).

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

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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).

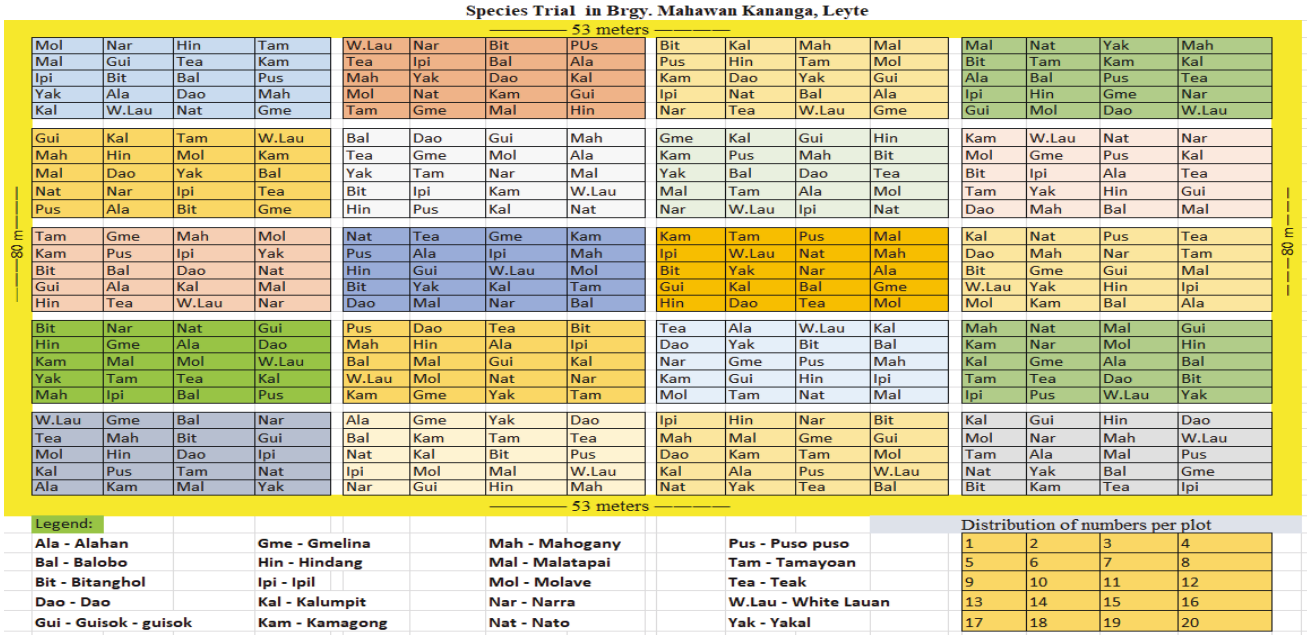

Figure 5 Planting disposition of MFA trials with 20 tree species (Gregorio et al., 2020).

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.

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.

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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.

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W+<9:<0>! @*;;/1*3/:<*09! C :D!]2L! >*E230R20:/ ! />20@<29! /:! /;;! ;2E2;9! C232!/;9*! 9*;<F<A<2F! :D3*8>D!:D2!@*0:<08*89 8GG*3:!A3*R!"#$"%H!4D2!=?%!'3*B2@:!18<;:!*0!G32E<*89!/>322R20:9! C<:D!VWZ%X!?&Q9!/0F!*:D23!/>20@<29!<0!A*3R/;<9<0>!@*;;/1*3/:<*09H!4D<9!G/3:0239D<G!/0F! ;*0>O:23R! 0>/>2R20:!/32!2+/RG;29!:*!@* 9<F23X!/9!@*09<9:20:X!R /0<0>A8; @*;;/1*3 :<*0! /3*80F!/0!/>322FO8G*0!>*/;!<0!G3/@:<@2!D/9!L2:!:*!12!/@D<2E2FH!

F"!# G.+0/(0(/#;(<#?'(0:'&0(/#H9-#I)+:.*+#

V29<>0<0>!/0F!R*0<:*3<0>!=?%!9L9:2R9!/32!@*RG;2+!/ :<E<:<29!C<:D<0!/!R8@D!;/3>23!92:!*A! /@:<*09!02@299/3L!:*!92:!<0!R*:<*0!=?%!/>20F/9H!WE20!C<:D<0!/!C2;;O29:/1;<9D2F!0/:<*0/;! <0<:</:<E2X!;<]2!:D2!Z/:<*0/;!&3 20< >!'3*>3/RX!C<:D!@;2 3;L!F2A<02F!>*/;9X!:D2!9:2G9!:D/:!R89:! 12!:/]20!A*3!=?% <RG;2R20:/:<*0!@*8;F!12!R*32!2+G;<@<:!H!4/<;*3<0>!/@:<E<:<29!:*!2/@D!9<:8/:<*0! <0! / 9! :D/:! :D232! <9! >208 02! /0F! 989:/<02F! G/3:<@<G/:<*0! *A! 1*:D! @*RR80<:<29! /0F! <09:<:8:<*0/;!/@:*39!9:<;;!32G32920:9!/!1/33<2 !:*!9:32/R;<0< >!Z&'!0/:<*0C<F2H!Q;:<R/:2;LX!<:! C<;;!F2:23R<02!D*C!Z&'!C*8;F!G23A*3R!<0!F<AA2320 !G;/@29H!

F>5>5% J8F8#6-6)./&M/J&,,5%6-6)./8%*/@-D)9/OPL/"#-&9./

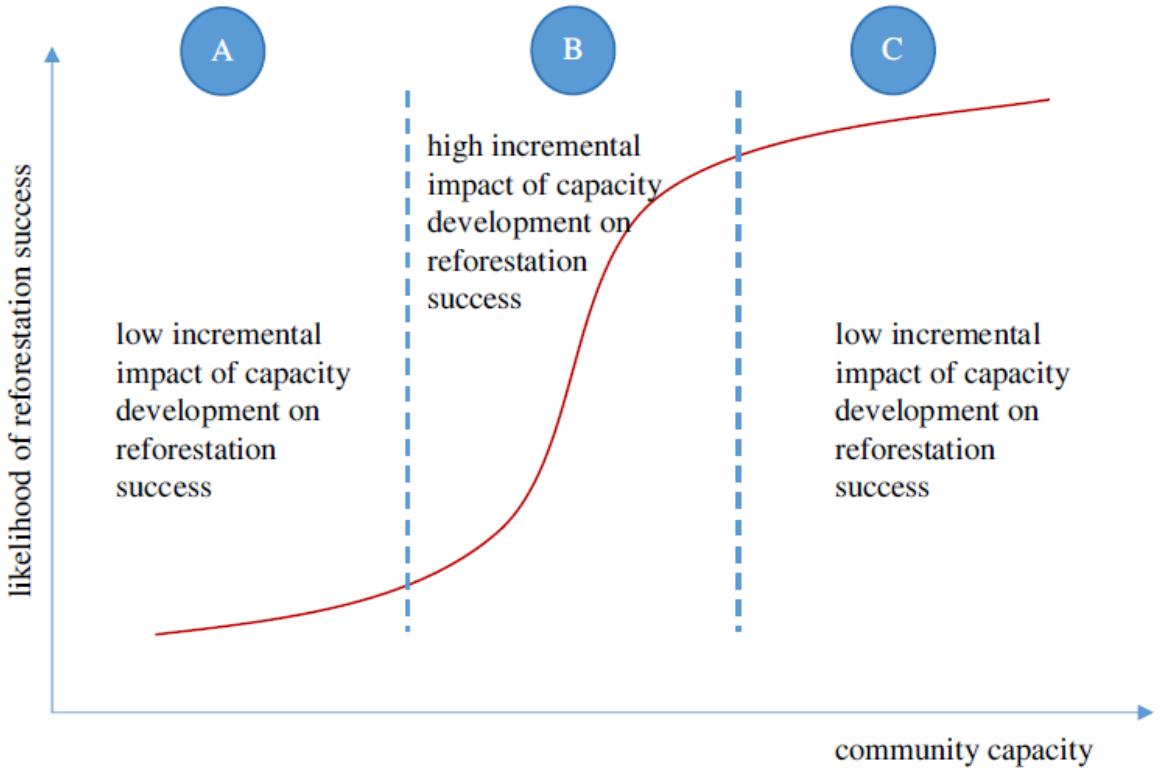
#D/;;20>29! A*3! =?% G23A*3R/0@2! G239<9:! /9! 9:38@:83/ ! @D/3/@:23<9:<@9! *A! @*RR80<:<29! <0! >2023/;X!/0F!:D*92!*A!'(9!<0!G/3:<@8;/3X!9:<;;!:D32/:20!:D2! 32/;<9/:<*0!*A!989:/<02F!G*9<:<E2! <RG/@:9H!&32>*3<*!2:!/;H! M5757/S!/0F!'/9/! M5757S!0*:2F!:D/:!;<E2;<D**F!G3*B2@:9X!:*>2:D23! C<:D! :20832! 92@83<:L! *A! ;/0F! /0F! :3229X! 2k8<:/1; ! 1202A<:O9D/3<0>! /33/0>2R20:9X! /0F! <RG3*E2F!D8R/ !/0F!9*@</;!@/G<:/;X!/32!]2L9!:*!:D2!@*RR80<:<29i!;*0>O:23R!20>/>2R20:!<0! 32A*329:/:<*0!G3*B2@: H!)2@/892!/;R*9:!D/;A!*A!: 2!@*80:3Li9!G*G8;/:<*0!<9!383/;!/0F!329<F29! /0F!G3/@:<929!/>3<@8;:83/;!/@:<E<:<29!<0!/32/9!CD232!329:*3/:<*0!/@:<E<:<29!/32!<RG;2R20:2 ! MV<]<:/0/0!2:!/;HX 57,.SX ;<>0<0>!<0!G3/@:<@2!:D2!>*/;9!*A!98 :/<0<0>!;<E2;<D**F9X!/FF3299<0>! @;<R/:2!@D/0>2! D;2! 32A*329:<0>!F2>3/F2F!;/0F9!<9! !:/9]! <;;2F!C<:D!@D/;;20>29H!V29G<:2! @*0:<08*89!2AA*3:9!:*!R/<0:/<0!9:/]2D*;F239!U!20>/>2R20:!/0F!18<;F<0>!@/G/@<:LX!<098AA<@<20:! ;*@/;!9]<;;9!/:!:D2!<0F<E<F8/;X!@*RR80<:LX!/0F!<09:<:8:<*0/;!;2E2;9!/32!/R*0>!:D292!@D/;;20>29H! "FF<:<*0/;! 1/33<239! 32R/<0! A*3! <0:23O<09:<:8:<*0/;! @**3F 0/:<*0! F29G<:2! :D2! >*E230R20:O G3*R*:2F!<0<:</:<E2!*A!#*0E23>20@2!A*3 8;/:2F!2/3 L!<0!57,,!MW+2@8:<E2!(3F23!Z*H!56X!57,,K!)/0>9/;X!57,6K!#*"X!5 ,^SH!#* :<082F!*E23;/GG<0>!3*;29!/0F!<098AA<@<20:!A80F<0>!D/RG232F! :D2!F2 <32F!<09:<:8: *0/;!@*;;/1*3/:<*0!/0F!/;<>0R20:!*A!/>20F/9H!

4D2!"#$"%O=?%!G3*B2@:!@*0:3<18:2F!:*!<RG3*E<0>!;<E2 <D**F9!1/92F!*0!:D2!G23@2G:<*0!*A!'(! R2R1239!M&*;:</0*X!575Y/SH!4D2!989:/<02F!20>/>2R20:!D/9!<RG3* 2 ! D2!92;AO98AA<@<20@L! *A!9*R2 '(9H!4D !G3*B2@:U9!:3/<0<0>!/@:<E<:<29!20D/0@2F!:D2!D8R/0!@/G<:/;!*A!'(!R2R1239X! D<@D!C/9!<09:38R20:/;!<0 0@32/9<0>!:D2<3!<0@*R2H!4D2!9*@</;!G32G/3/:<*0!<0<:</:<E29!*A!:D2! ?%! '3*B2@:! 3298;:2F! <0! '(9i! 32B8E20/ <*0X! @*D29<E2! *3>/0<9/:<*0X! /0FX! <0! 9*R2! @/929X! 0@32/92F!R2R1239D GH4 2!#(I$VO,^!G/0F2R<@!R/L!D/E2 @83:/<;2F!32/ <9<0>!:D2!G* 20:</;! 1202A<:9H!

'/3/;;2;!/@:<E<:<29!32;/:2F!:*!20D/0@<0>!*3>/0<9/:<*0/;!9 20>:D!/0F!9]<;;9!C2 2!<0A*3R2F!1L! :D2!:3/<0<0>! 022F9! /99299R20:! 3298;:9!:D3*8>D! <0:23E<2C9! /0F!=&V9!MZ8d2e!575YSH!4D2! 32R/<0<0>!@D/;;20>29!32;/:2!:*!:D2!;/]!*A!@/G/@<:<29!*A!'(9!:*!92 !9:3/:2><@!>*/;9!:*!A8;A<;! :D2<3! E<9<*09X! F2A<02! /@:<E<:<29! :*! /@D<2E2! :D2RX! /0F! :D2! 02@299/3L! >**F! ;2/F239D<G! /0F! 9*80F!G3* @:!R/0/>2R20:H!

" ;<:2 :832!32E<2C!G23:<020:!:*!=?%!F29<>0!A*@892F!*0!@* F<:<*09!80F23!CD<@D!32A*329:/:<*0! @*8;F!F2;<E23! G3*E2F!*8:@*R29H!4D<9!9:8FL!32@*>0<92F!:D/:!=?%!;/0F!892!*E2 ;/G9!C<:D! 92E23/; ;<E2 <D**F!/@:<E<:<29!A*3!9R/;;D*;F239X!/0F!:D2<3!<0:2>3/:<*0!C<:D<0!/!G*3: *; *!*A!*G:<*09! <9!@3<:<@/;!:*!/@D<2E<0>!*G:<R/;!*8:@*R29!M(:/!2:!/;HX!5757 H!%29:*3/:<*0!G3*B2@:9!@/0!G32920 ! /;:230/:<E29!:*!A/3R239!C<9D<0>!:*!:3/09<:<*0!A3*R!<0E29:<0>!<0!80989:/<0/1;2!F21:!9L9:2R9!*A! @/9D!@3*G9!CD<;2!/E*<F<0>!A8 :D23!/>3 @8;:83/;!;/0F!2+G 09<*0!/0F! 2>3/F/:<*0!M%<12<3*!2:! /;HX! 5755! 1SH! ";:D*8>D! @/G/@<:29X!]0*C;2F>2X! /0F! 02:C*3]9! C232! <F20:<A<2F! /9!]2L! :*! /FE/0@<0>! 32A*329:/:<*0! >*/ 9X! *:D23! ;R<:/:<*09X! 98@D! /9! <0@32/92F! 3<9]! F82! :* 1<*:<@! *3! /1<*:<@! :D32/:9! M2H>HX! 80@;2/3! :20832! /0F! 3<> :9 G32920@2! *A! ;/0F! @;/<R/0:9S! /0F! ;/@]! *A! 329*83@29!@*8;F!D/RG23!:D2!A8;!<0:2>3/:<*0!*A! 2A*329:/:<*0!<0 *!;<E2;<D**F!/@:<E<:<29H!

%2A;2@:<*0!*0!:D292!;<R<:/:<*09!;2F!:*!:D2!A* R8;/:<*0!*A!:D2!@*RR80<:L!@/G/@<:L!@83E2X!CD<@D! >8<F2F!:D2!'3*B2@:!<RG;2R20:/:<*0!F29<>0!/0F!9 /:2><29!M[231*D0!2:!/;HX!575YK!=<>8 2!6SH!! 4*! 32/;<92! :D2! >*/;9! *A! @*RR80<:L! R/0/>2R20:! *A! 329*83@29! /9! /! R2@D/0<9R! :D3*8>D! CD<@D!9R/;;D*;F239!@/0!/@D<2E2!;<E2;<D**F!1202A<:9!M(:/!2:!/;HX!5757SX!12!<:!A* !32A*329:/:<*0! *3 *:D23! ;/0F! 8929!C<:D<0! /0!=?%!A3/R2C*3]X! 32@*>0<9<0>! @*RR80<:L! @D/3/@:23< :<@9! @/0! ;2/F!:*!R*32!:/3>2:2 !2AA*3:9!1L!98GG*3:<0>!<0:23E20:<*09H!


A
B
C
likelihood of reforestation success
low incremental impact of capacity development on reforestation success
high incremental impact of capacity development on reforestation success
low incremental impact of capacity development on reforestation success
community capacity

9:8FL!@*8;F!D2;G!A<;;!/!3292/3@D!/0F!G3/@:<@2!>/G!32; :2F!:*!=?%!<0F<@/:*39!M922!&8:<2332e!2:! /;HX!5757SH!=*@892F!*0!:D2!:20!=?%!'3*B2@:!'(9X!:D<9! 9:8FL!892F!T,! E/3</1 29! 32;/:2F!:*! @/G/@<:<29!:*!@D/3/@:23<92!:D2<3!G*:20:</;!A*3!=?%H!$:!<F 0:<A<2F!:D2!:LG29!*A!@/G<:/;!R*32!@3<:<@/;! A*3!'(9!<0!F<AA2320:!G*9<:<*09!/;*0>!:D2!@83E2X C< D!R/3]2F!>2*> /GD<@/;!9<>0/;9!12:C220! '(9!;*@/:2F!<0!9<R<;/3!32> 09H!4D<9!*0>*<0>!C*3]!D/9!>32 :!G*:20:</; :*!<0A*3R!=?%!F29<>0! /0F!<RG;2R20:/:<*0H!

F>5>A% J&%-)4-58(/O8#-&9./U/V&#68(/N%#(5.6&%/

)29<F29 098AA<@<20:!@/G/@<:<29X!*:D2@D/;;20>29!A*3!=?%!R89:!1 !/R20/1;2!:*!@D/0>2!/0F! D/E2!;<R<:2F!9@*G2!A*3!:D2!=?%!'3*B2@:!:*!/FF3299H!4D292!<0@;8F2!/9G2@:9!32;/:2F!:*!Z&'! 329:3<@:2F! /@@*RG/0<R20:! *A! G/3:<@<G/0:9! M&*;:</0*! 575Y@SX! R<@3*O /0F! R/@3*O2@*0*R<@! @D/3/@:2 <9:<@9! <0A;820@2F! 1L! ;*@/;j32><*0/;! FL0/R<@9! M2 >HX! D*892D*;F! @*RG*9<:<*0K! *8:O R<>3/:<*0! ;2/F<0>!:*! 32F8@2F! / /<;/1<;<: ! *A! ;/1*83K! F<9:831/0@2! 32><R29SX! /0F! <098AA<@<20:! /E/ 1 ;<:L!*A!; @/;! 8 G* H>HX!@32F:! 0F 3]2 !/@@29 !:* G R20:! ?%

"!983E2L!*A!F2R*>3/GD<@!@D/3/@:23<9:<@9!*A!G/3 023!'(9!32E2/;2F!:D/:!<0!R*9:!'(9X!C*R20! F*R< /:2F!:D2!R2R123 D<G!/0F!C232!L*80>23!:D/0!R20!/@3*99!'(9K!R2/0!/>2! 3/0>29! 12:C220!YYO-.!MR2/0fT^SH!N20U9!/E2 />2!/>2!3/0>2!C/9!TY 5!MR2/0!-YSH!(A!/;;!:D2!'(9X! *0;L!VW##"!D/F!/!@*09<F23/1;2!A3/@:<*0!*A!:D2!G*G8;/:<*0!L*80>23!:D/0!Y-!M/1*8:!5TpSH!$0! /;;!:D2!*:D23!'(9X!:D232!C232!0*!C*R20!L*80>23! D/0!TY! 3!R20!L*80 23!:D/0!-,H!

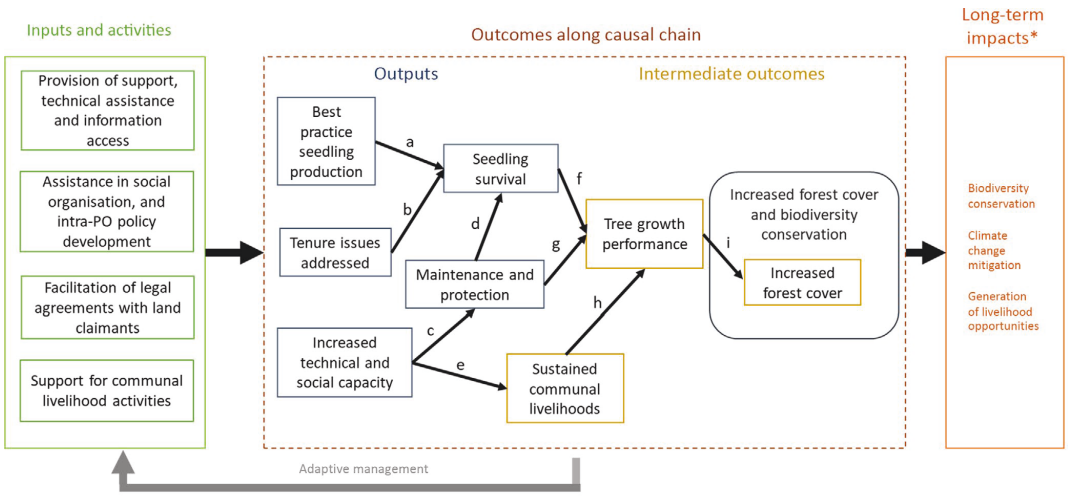
4D2!9<>0<A<@/0:!@*0:3<18:<*0!: !&V'!:D/:!32R<::/0@29!D/E2!<0!:D2!@*80:3L!Mx,7pK!T:D!@*80:3L! <0!:D2!C*3;FS!32G3292 :2F!/3*80F!QPyY.!)!<0!5755X!C<:D!/!THYp!<0 32/92!A3*R!:D2!G32E<*89! L2/3! Mc*3;F!) 0]X! 575YS! <9! C2;;! 29:/1;<9D2 H! =?%! '3*B2@:! A<0F<0>9! <0F<@/:2F! :D/ =?%! />20F/9!R89:!@32/:2!;*@/;!<0@20:<E29! *!/::3/@:!L*80>2 !G* 8;/:<*09!<0:*!@*RR80< <2 !/0F! 20>/>2!<0!32 *329:/:<*0!/0F!@*RR80<:L!;<E2;<D**F!G3*B2@:9H!

&<E20 :D2!0/:832!*A!/@:<E<:<29!A*3!=?%X!:D2!F<AA<@8;:L!*A!/@@299<0>!32R*:2!/32/9!*A:20!9<:8/:2F! *0!D<>D!9;*G29!/0F!:D2!G32G*0F23/0@2!*A!/0 *;F23!G*G8;/:<*0!<0!:D2!'(9!@*8;F!;<R<:!G3*G23! :20F<0>! /0F! F2;<E23L! *A! 129 G3/@:<@29! <0! A*329:! 329:*3/:<*0H!";9*X! :D2! 3<9]! *A! =?%O1/92F! ;<E2;<D**F9! G*92F! 1L! /! @D/0><0>! @;<R/:2! <9! <0@32/9<0>H! WE20! <A! 32@20:! 3292/3@D! D/9! 98>> 9:2F! :D/:! :3*G @/! @L@;*029! D/E2! 12@*R2! ; 99! 32 820:! M#D/0F! 2:! /;HX! 57 5SX! :D2<3! F29:38@:<E2!G*C2 !D/9!<0@32/92F!M<H2HX!98G2 !:LGD** 9!*3!9:*3R9 D/:!>/<0!9:320>:D!k8<@];LJ! zD/0>! 2:! /;HX 57 ^SX! /0F! 92/9*0/;! *@@83320@2! D/9! @D/0>2FH! ?*@/;! @* 80<:<29! D/E2! /;32/FL!98AA232F!:D2!<RG/@:9!*A!G32E<*89!9:*3R!9L9:2R9!:D/:!F29:3*L2F!:D2<3!;<E2;<D**F!/0F! 32A*329:/:<*0!G3*B2@:9!M2H>HX!4LGD**09![/<L/0!/0F!%/<!<0!57,T /0F!5 5,X!329G2@:<E2;LSX!/0F! G23@2G:<*0!*A!3<9]9!A3*R!:D292 2+G23<20@29!R/L!9D/G2!:D2<3!C<;;<0>0299!:*!20>/>2!<0!=?%! /@:<E<:<29H!

4D2! =?%! '3*B2@:! /;9*! R/GG2F! @83320 ! /0F! G3*9G2@:<E2! *GG*3:80<:<29! :*! 32<0A*3@2! =?%! <RG;2R20:/:<*0! /9! /! R2@D/0< R! *A! 13*/F! 9*@</;! <0@;89<*0! /0F! /! E2D<@;2! :*! @*09*;<F/:2! >20F23!/>20F/9 *32!13*/F LH!$:!<F20:<A<2F!D*C!>20F 3!<99829!C232!32G32920:2F!M*3!0*:S!<0! 0/:<* /;! G*;<@L!A3/R2C*3]9X! 32>8;/:<*09X! /0F <09:<:8:<* /;! /33/0>2R20:9! MZ8d2e! /0F!(:/X! 575YSH!

4D2!>20F23!;20 !/; *C9! 9!:*!F<9@230!:D2!F<AA2320@29!<0!3*;29X!*GG*3:80<:<29X!/0F!<0:23/@:<*09! 12:C220!C*R20!/0F!R20!CD20!:D2L!20>/>2! 0!32A*329:/:<*0!<0!C/L9!:D/:!<0:23E20:<*09!/32! :/<;*32F!:*!/FF3299!F<E239<:L!<0! 2!E<9<*09X!/9G<3/:<*09X!2+G23<20@29X!G*C23X!/0F!02 F9!*A! :D292!>3*8G9H!4D2!92E23/;!<0<:</:<E29!:*!20@*83/>2!C*R20U9!G/3:<@<G/:<*0 <0!=?%X!F29G<:2! G3*R<020:!0/:<*0/;!G;/09!M2H>HX!'D<;<GG<0 !';/0!A* !&20F23O%29G*09<E2!V2E2;*GR20:!O,^^-O 575-K!VWZ%i9!&20F23!/0F!V2E2;*GR20:!'3*>3/R! &"VS!/0F!<0:230/:<*0/;!@*RR<:R20:9! M:#&-*,'K[M[X!9G2@< <@/;;L!PV !-SX!9:<;;!022F!:*!12!/3:<@8;/:2F!/ :D2!;*@/;!;2E2;!:*!@32/:2! 20/1;<0>!20 <3*0R20:9H!4D2!=? !'3*B2@:!/ F32992F!9*R2!*A!:D2!;<R<:/:<*09!F<9@8992F!<0! P2@:<*0!.H5H5H!

"! 9:8FL! 992992F! :D2! 1/33<239! /0F ;<R<:/:<*09! :*! '(9! /F*G:<0>! />3*A*329:3L! /@:<E<:<29! M'32@</F*9!2:!/;HX!575YSH!4D2!A<0F<0>9!98>>29:2F!<0@32/92F!<0@*R2!>2023/:<*0!C/9!0*:!:D2! G3R/3L! *:<E/:<*0! *3!/>3*A*329:3L! /F*G:<*0H!P:<;;X!D/E<0>! /@@299!:*! F<E2392! G3*F8@:9!A*3! 92;AO98A<@<20@L!C/9!/0!/::3/@:<E2!*G:<*0H! 0*:D23!R*:<E/:<*0!C/9!:D2 12;<2A!:D/ !:D<9!G3/@:<@2!



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,

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'*9 :<E2!*8:@*R29!* !:D2 3*B2@:!<0@;8F2!<:9 1<;<: !:*!<0A;820@2!0/:<*0/;!/>20F/9 !D*C!:D2! Z&'! C/9! <RG;2R20:2F ! *3! <09:/0@2X! @*09*;<F/: *0! *A :D2! 29:/1;<9DR20:! *A! 0/:<*0/;! >8<F2;<029! A*3! 922F;<0>! G3*F8@:<*0! M&32>*3<*! 2:! /;HX! 57,-/X! 1S! C/9! /@@*R /0<2F! 1L! /! >*E230R20:!9D<A:!*A!A*@89!*A!Z&'!/@:<E<:<29!/:!:D2! /R<;L!;2E2;!r922!92@:<*0!.H5!MTSsH

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4D2! =?%! '3*B2@:! >2023/:2F! F 2G! <09<>D:9! <0:*! D*C! Z&'! <RG;2R20:/:<*0! D/F! 923E2F! @*RR80<:<29H! $0A*3R/:<*0! C/9! @*;;2@:2F! /:! :D2! '3*B2@:! @*RR20@2R20:! /0F! @8;R< /:<*0! GD/929!:*!/@@*80:!A*3!@D/0>29!@*0:3<18:2F!1L!:D2!'3*B2@:!M&*;:</0*!2:!/;HX!575,SH!Q9<0>!/! 32:3*9G2@:<E2!R<+2FOR2:D*F9!/GG3 /@DX!:D<9!3292/3@D23 A*@892F!*0!:D2!:20!G/3:023!'(9!/0F! 9*R2!R2R1 39!*A!98GG*3:<0>!/>20@<29!:*!>/:D23!/0F!@3*99OE/;<F/:2!<0A*3R/:<*0H!";*0>!C<:D! G/3:<@<G/0:9X! D2! F2E2;*G2F! /! ;<9:! *A! 2/0<0> 8;! R2:3<@9! :D/:! *A:20! 022F! :*! 12! /FF2F! :*! 9:/0F/3F!<0F<@/:*3!9L9:2R9H!4D292!<0@;8F2F!G239*0/;!k8/;<:<29! M2H>HX!:D2!29:/1;<9DR20:!*A! 92;AO<F2 :<:LX!1**9:2F!92;AO@*0A<F20@2SX!A/R<;L!C2;;O12<0>!M2H>HX!F22G202F!1*0F9X!12@*R<0>! 3*;2!R*F2;9!A*3! L*80>23! >2023/:<*09SX! /0F! *3>/0<9/:<*0/;! C2;;O12<0 ! M2H>HX! 1*;9:232F! '(! <R/> !/0F!/1<;<:L!:*!32;/:2!C<:D!> E230R20 /;!/0F!*:D23!/>20@<29 !

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(0!:D2!9*@< O2@*0*R<@!:*G @X!/0! 0OF2G:D!/99299R20:!*A!2/3;LO 0!9*@<*O2@*0*R<@!9:/:89! @D/0>29! *A! Z&'! <RG;2R20:/:<*0! C/9! 80F23:/]20! <0! #/<1<3/0X!)<;<3/0X! /! D<>D! G*E23:L! <0@<F20@2! 9<:2! MYbp X! :D3*8>D! /! @*RG/3<9*0! *A! Z&'! G/3:<@<G/0: ! C<:D! 0*0OG/3:<@<G/0:9! M&*;:</0*!2:!/;HX!5 5,SH!Q9<0>!12A*32!/0F!/A:23!@*RG/3<9*09!M57,T!/0F!57, S!/0F!/!R<+2FO R2:D*F9! /GG3*/@DX :D2! 3292/3@D239! A*80F! :D/:! :D2! G3*>3/R! 32R8023/:<*09! ;2F! :*! 9*R2! 9<>0<A<@/0:! @D/0>29! <0! 9:/:89X! G/3:<@8;/3;L! <0! F83/1;2! >**F9! M<H2HX! <RG3*E2F! k8/;<:L! *A! R/:23</;9!892F!A*3!D*89<0>!/0F!3**A<0>SX!/0!<0A*3R/:<E2!R2:3<@!*A!:D2!G*9<:<E2!<RG/@:!*A!Z&'! /9!<:!<9!*A: 0!CD20!:D232!<9!/FF<:<*0/;!<0@* 2!:D/:!:D<9!: G2!*A!<0E29:R20:9!/32!G* 9<1;2H!

(:D23!<0F<@/:*39!<RG3* 2F!2k8/;;L!<0!G/3:<@<G/:<0>!/0F!0*0OG/3:<@<G/: 0>!>3*8G9! 2H>HX!D*892! A;**3!:LG2!/0F!A**F! @*098R2FS! F29G<:2!G/3:<@<G/0:9! 0*:!A8;;L! G23@2<E<0>!:D2! 32/;<9/:<*0! *A! :D292! @D/0>29H! 4D2L! /@]0*C;2F> F! :D2<3! <0@32/92! <0! @/G/@<:<29! /0F!]0*C;2F>2! /0F! 32<0 *3@2 ! <0F<E<F8/;! <0A;820@2! <0!:D2! @*RR80<:LH!(E23/;;X! /0F! ><E20!:D2<3! ;<E2;<D**F9! /32! @*09:/0:;L!/:!:D2!R/3><0X!G/3:<@<G/0:9!32@*>0<92F!:D2L!C*8;F!20>/>2!<0!/0L!G3*>3/R!:D/:! C*8;F!* A23!98GG*3:!*GG*3:80<:<29!*C/3F9!@D/0>2H!4D<9!9:8FL!/;9*!D2;G2F!F<9@*E23!G*:20:</;! ;**GD*;29!<0!Z&'!<R ;2R20:/:<*0X!G/3:<@8;/3;L!R<9R/:@D29!12:C220!9G2@<29!/0F!F209<:<29! 92;2@:<*0!/0F!9<:2!@D/3/@:23<9:<@9X!32F8@2F!<0@*R2!A3*R!;/1*83X!:D2!9D*3:O:23R!A3/R2C*3]!*A! Z&'!@*0:3/@:9X!/0F <098AA<@<20:!/0F!*A:20!F2;/L2F!2+:209<*0!98GG*3:!M922!&*;:</0 X!575Y@SH!

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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).

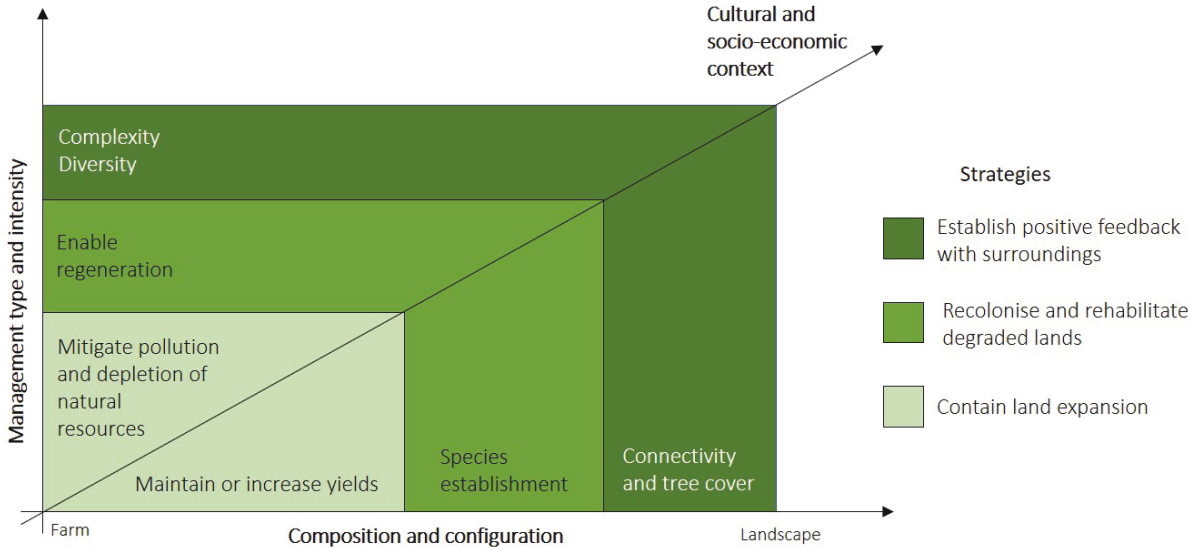

Figure 8 Conceptual framework: three possible strategies for agriculture to promote Forest and Landscape Restoration (FLR) in the tropics (from Ribeiro et al., 2023b).

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).

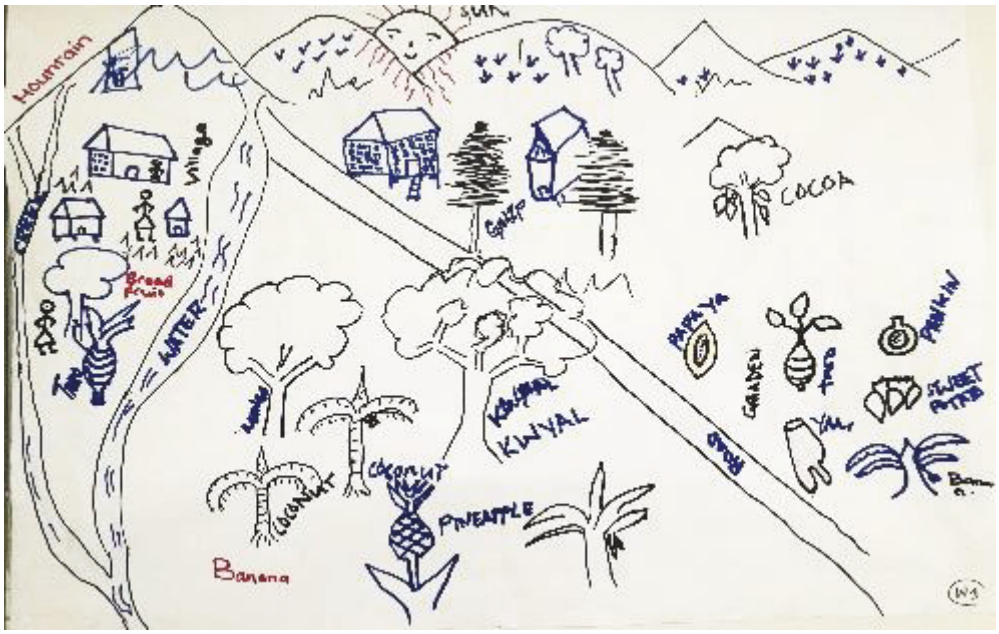

Figure 9 This is the landscape scenario visualised by a women's group emphasising fruit trees and home gardens (from Wiset 2022).

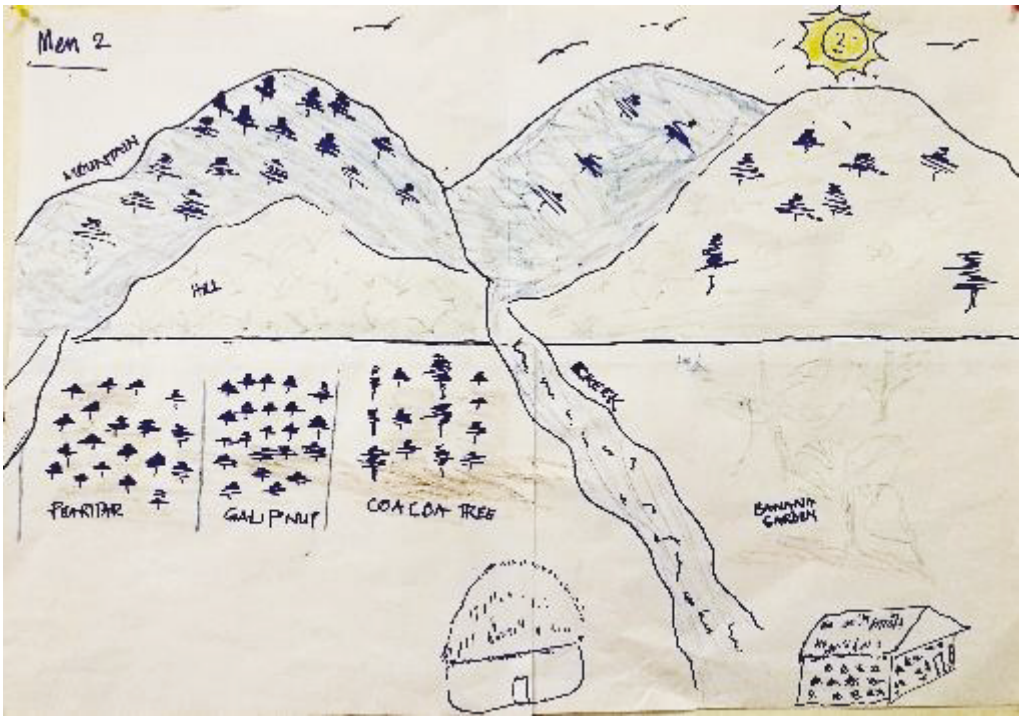

Figure 10 This landscape scenario was visualised by men who emphasised commercial crops more isolated from the home (from Wiset, 2022).

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).

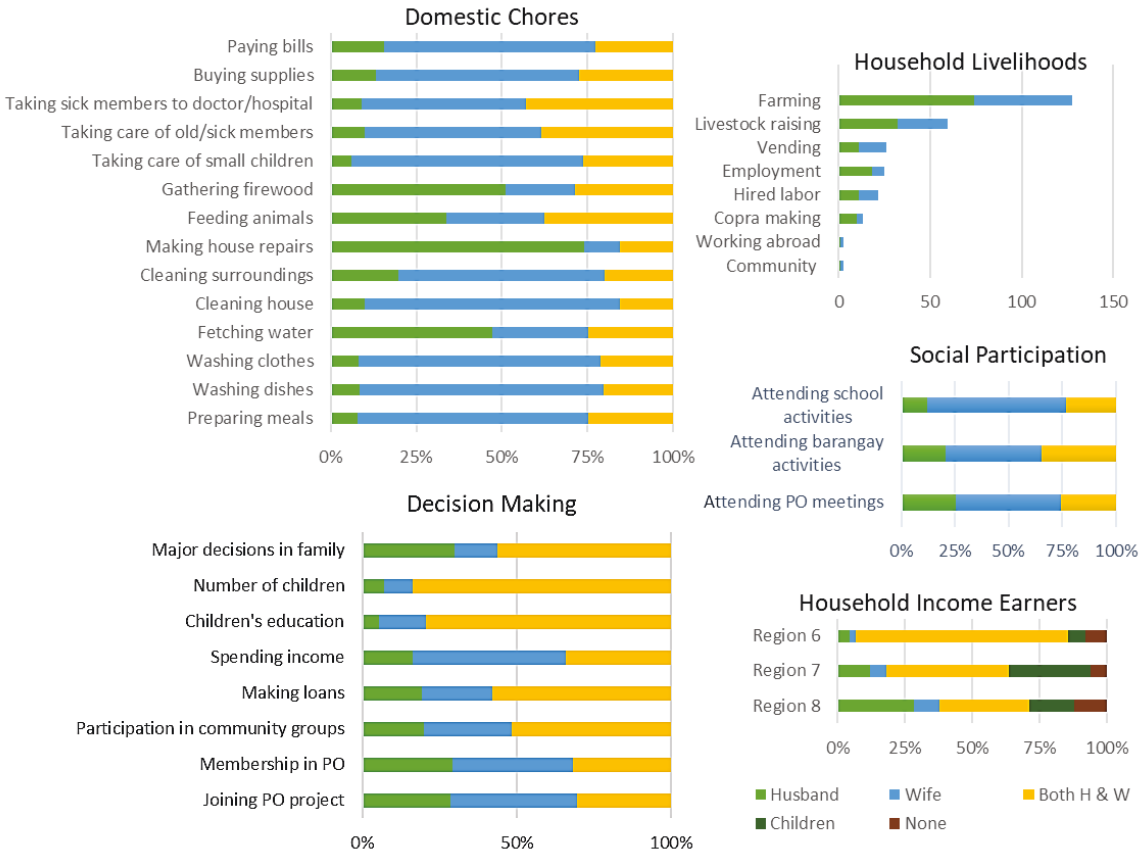

Figure 11 Gendered division of household activities in the 10 Project POs (from Nuñez et al., 2023).

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

R*32! 98<:2F!:*!12!G;/0:2F! !<9*;/:<*0H!$0!@*0:3/9:X!GA5%&,'L,/5.,L".'C*8;F!>3*C!C2 ;!*0! G;/0:/: *09! 2<:D23! /9! R*0*@8;:832! *3! <0! R<+2F! 92::<0>9H! [*C2E23X! CD20! 9*<;! R <9:832! <9! ;<R<:2FX! R<+<0>! A/9:O>3*C<0>! 2 *:<@9! C/9! F2:3<R20:/;! :*! @;<R/+! 0/ <E2! :3229H!4D<9! :LG2! *A! G3/@:<@/;!]0*C;2F>2!@/0!>8<F2!<RG;2R20:239!*A!32A* 29:/:<*0 /@:<E<:<29H!

'/3:!*A!:D2! 2@D/0<9R!A*3!:D2!= %!'3*B2@:!G3*R*:<0>!32A*329:/:<*0!/0F! 322!<0:2> /:<*0!<0! />3<@8;:83/;!;/0 9@/G29!C/9!:*!2;<@<:!<0A 3R/: *0!*0!G32A2320@29!A*3!:<R123!:3229!<0!8G;/0F! /32/9! /R*0>! Z&'! G/3:<@<G/0:9! <0! :D2! '3*B2 :! 9<:29H! 4D<! 983E2LO1/92F! 9:8FL! /;9*! 892F! A*@89O>3*8G!F<9@899<*09X!]2L!<0A*3R/0:!<0:23E<2C9!C<:D!Z&'!G/3:<@<G/0:9!<0!:D2!:20!'3*B2@:! '(9X!/0F!9<:2!E<9<:9H!%298;:9!32E2/;2F!:D/:!12:C220!,5!/0F!Y6!9G2@<29!/R*0>!<0F<>20*89! /0F!2+*:<@!:3229!C232!G32A2332F!1L!9R/;;D*;F239!M *;<0/3!2:!/; X!575,SH!

#3<:23</!:D/:!>8 F2F!9G2@<29!92;2@:<*0!32;/:2F!:*!:D2!G*:2 :</;!A*3!<RR2F /:2!892! 2H>HX!A*3/>2X! @D/3@*/;!R/]<0>SX! 9@*G2!:*!@/G<:/;<92!*0!:322!G3*F8@:9! M2H>HX! 922F!9*83@2!/0F!:<R123!A*3! @*098RG:<*0SX! <RG3*E2! ;*@/;! 20E<3*0R20:/;! @D/3/@:23<9:<@9! M2H>HX! G3*:2@:<*0! />/<09:! 9*<;! 23*9<*0SX! /0F! A*3! A8:832! @*RR23@</;<9/:<*0! M<H2HX! C**F! k8/;<:L! /0F! R/3]2:! F2R/0FSH! %292/3@D239!A*80F!:D/ G32A2320@29!D/F!9D<A:2F!:D3*8>D!:<R2X!><E20!:D2<3!2E<F20@2!*A!9*R2! 9G2@<29! D/E<0>! /FE2392! 2 2@:9! *0! *:D23! @3*G9X! G**3! ** ! k8/;<:L! *3! 989@2G:<1<;<:L! :*! 132/]/>2! <0! D<>D! C<0F9X! 12<0>! +*:<@X! *3! 12@/892! *A! D/3E29:<0>! 329:3<@:<*09H! ?/@]! * ! G3*G/>8;29!/0F!;<R<:2 !9G/@2!F 2!:*!<0@32/92F!@3*G!/32/!C232!*:D23!A/@:*39! 2:23R<0<0>! @D/0>29!<0!G;/0:<0>!@D*<@29 *R29:<@/:<*0!A/E*8 F!9G2@<29!:D/:!G3*F8@2F!A38<:!2/3;L!/0F! D/F! F83/1;2! C**F! /0F! R/3]2:! F2R/0F! MV2R*:*3! 2:! /;HX! 575,SH! ";9*X! :D2! /E/</1<;<:L! *A! G;/0:<0>!R/:23</;9!/0F!9*R2!]0*C; F>2!* !>3*C:D!@D/3/@:23<9:<@9!A/@<;<:/:2F! *R29:<@/:<*0H! =38<:! :3229! M2H>HX! E*@/F*X R/0>*X! B/@]A38<:X! >8 /1/0* ! C232! 1202A<@</;! A*3! A/R<;LO @*098RG:<*0!/0F!<0@*R2H!

4D2!"99<9:2F!Z/:83 ;!%2>2023/:<*0!M"Z%S!/ !/0!=?%!R2@D/0<9R!C/9!:29:2F!:D3*8>D!:D2! "#$"%!=?%!'3*B2@:! MV*3</X!5757SH! D2!:3</;!C/9!92:!8G!<0!#218X!9G2@<A<@/;;L!<0!F2>3/F2F! A*329:9!*A![$N"P"#"X!)4="$X!/0F!Z"&N"4"H! W/@D! (!G;/0:2F!E/ <*89!:322!9G2@<29!<0!/! -OD/!F2R*09:3/:<*0! 9<:2H!4D2L!G3*F8@2F!/0F!G;/0:2F!D<>DOk8/;<:L! 922F;<0>9!A*;;*C<0>!:D2! 9R ;;D*;F23O1 92F!1 9:!G3/@:<@29!G *R*:2F!<0!:D2!=?%!'3*B2@:H! <:D!:D2!>8<F/0@2!*A!:D2! #V(X!:D2!'(9!<F20:<A<2F!/0F!R/3]2F!R*:D23!:3229!A3*R!02/31L!A*329:9!CD232!>23RG;/9R! C/9!@*;;2@:2FH!

=?%!/@:<E :< 9!<0!:D2!'(9!< @;8F2F!/>3*A*329:3LX!:322!<0:2>3/:<*0X!/0F ;<E2;<D**F!<0<:</:<E29H! 4D292!9L9:2R9!C232!<RG;2R20:2F!1/92F!*0!:D2!@D*<@29!R/F2!1L! /@D!'(X!CD<@DX!<0!R*9:! @/929X!@*3329G*0F2F!:*!:D2<3!@<3@8R9:/0@2!/0F! D2!R*9:!98<:/1;2!*G:<*09!A*3!:D2<3!329G2@:<E2! ;*@/;<:<29H!4D2!#V(9!@*0F8@:2F! 983E2L9! /008/;;L!:*! / 9299!:D2<3! G3*>3299! M%/d<0! 575 ! a/>/1/:! 575YSH! 4D2! />3*A*329:3L! 9L9:2R! *A! VW##"! 12@/R2! / R*F2;! A/3R! 32@*> <92F! /@3*99!:D2!%2><*0H!4322!<0:2>3/:<*0!C/9!F*02!<0!9*R2!@/929!C<:D!@*30!A/3R239H!P*R2!'(! 9*;F! 922F;<0>9X! <0@;8F<0>! A38<:! :3229X! :*! 9:/]2D*;F239!M2H>HX! 2;2@:3<@<:L! @*RG/0<29! /0F! :D2! 'D<;<GG<02!#*@*08:!"8:D* <:LSX! 2023 :<0>!@*09<F23/1;2!<0@*R2!A3*R!:D2!/@:<E<:LH!

F>B>A% "+9&M&9).-9:/8%*/OPL/

< <;/3! G3/@:<@/;!]0*C;2F>2! C/9! >2023/:2F! 1L! <0E29:<>/: 0>! A/3R239i! G32A2320@29! <0! <RG;2R 0:<0>! />3* *329:3L!9L9:2R9!/*0>!C<:D!:D2!3298;:9!R20:<*02F!<0!:D2!G32E<*89!92@:<*0H! 4D<9!9:8FL!@D/3/@:23<92F!@3*G9!@8 320:;L!/0F 32E<*89; !>3*C0!1L!G/3:023!'(9!M%/R*9!2:! /;HX! 575,SH! %298;:9! 9D C2F! :D/:! E/3<*89! @3*G9X! <0@;8F<0>! @232/;9X! A38<:! :3229X! 3**:! @3*G9X! G;/0:/: *0! @3*G9X! /0F! E2>2:/1;29X!C232! 892F! 1L!:D2!0<02!'(9! M0*! 9:8F<29! C232! F*02! <0! \="$SH!=/3R239U!>3 C<0>! 0E*;E2R20 !<0!= %!/@:<E<:<29!3298;:2F!<0!;299!:<R2!A*3!:20F<0>!:D2<3! @3*G9H! ?<]2C<92X! @D/0>29! <0!R/3]2:! G32A2 0@29X!/;*0>!C<:D! <098AA<@<20:! /32/!A*3! G;/0 0>! /0F!:D2!G32E/;20@2!*A!@*>*0!>3/99X!3298;:2F!<0!@D/0>29!:*!:D2<3!@3*G!G3*F8@:<*0!G*3:A*;<*9H! #8;:832 /0F!:20832!<0A;820@2F!G;/0:<0>! @D*<@29!/0F!/9G<3/:<*09!A*3!F23<E<0>!<0@*R29!/0F! 98GG*3:<0>!A**F!92@83<:L!M%<12<3*!2:!/;HX!5755SH!?/@]!*A!98AA<@<20:!@/G< /;!;<R<:2F!:D2!2+:20:!: ! CD<@D! @*30! C/9! G;/0:2F! <0! 9*R2! /32/9! M$;*<;*SX! /0F! :D2! /F*G:<*0! *A! *:D23! @3*G9! C/9! G3 @; F2F!F82!:* 32F8@2F!G;/0:<0>!R/:2 </;H!

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.

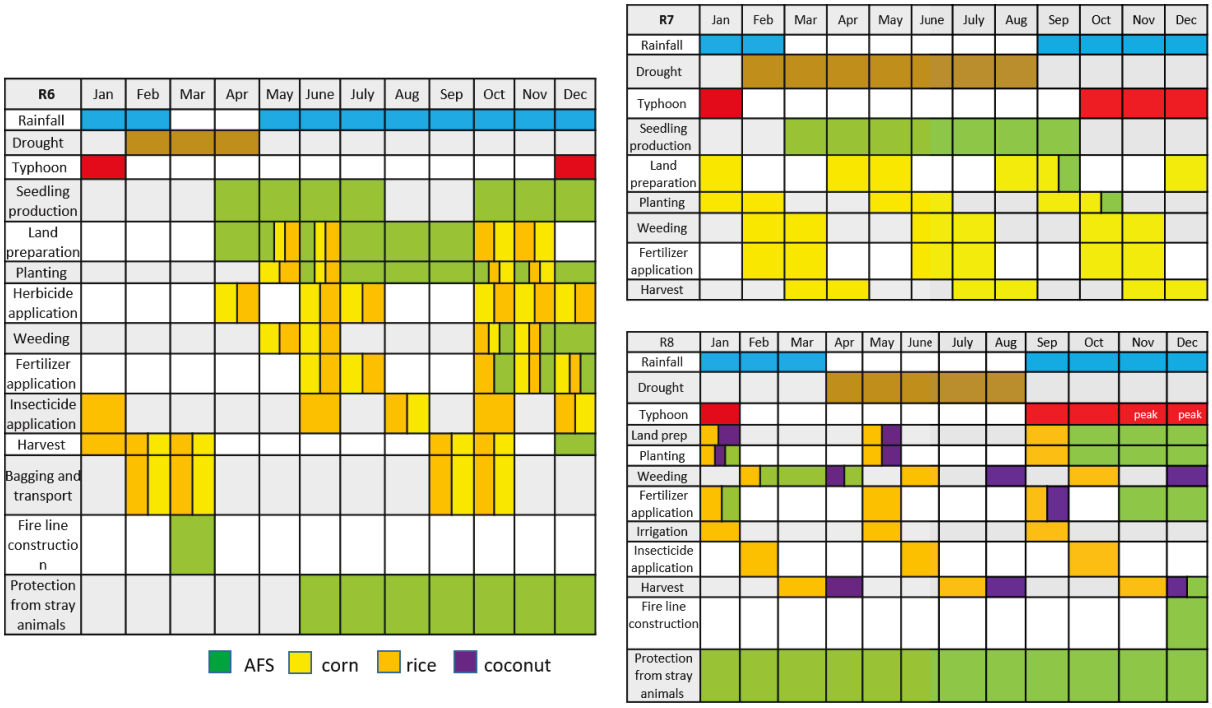

Figure 13 Seasonal calendars for each region. This tool allows for rapid visualisation of efforts made by farmers in a participatory manner, using their information. This product can help allocate resources more effectively and help farmers recognise potential time allocation inefficiencies and needs.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

:D292! G3*F8@:9! /0F! :D2! 2+<9:20@2! *A! 98 *3:! :D3*8>D! A<0/0@<0>! R2@D/0<9R9! A3 R! ; @/;! A<0/0@<239!;2F!A/3R239!:*!/F*G:!3<@2!/0F!@*30!A/3R<0>!<0!:D2!32><*0!F29G<:2!:D2!D<>D!;/1*83! F2R/0FH!

">3*A*329:3L! G3*F8@:9! L<2; 2F! ;* 23! <0/0@</;! 1202A<:9! <0! 9*R2! @/929! CD20! @*RG/32F!:*! @*30! CD<;2! <0! *:D239X! <0/F2k8/:2! G23A*3R 0@2! ;2F! :*! : 2! F<9@*0:<08/:<*0! *A! /! A2C! />3*A*329:3L!@3*G9H!4D2!9:8FL!D/9!<F20:<A<2F!:D2!022F!:*!<RG3*E2!G3/@:<929!M2H>HX! 2F8@:<*0! *A! @D R<@/;! <0G8:9S!:D/:! @*8;F! 3298;:! <0! 20D/0@2F! 20E<3*0R20 ;! @*0F<:<*09! <0! C/L9!:D/:! @*8;F! 12! F*@8R20:2F! /0F! <0@;8F2F! <0!:D2! Z&'! 1202A<:! G*3:A*;<*! /99*@</:2F!C<:D! @;<R/:2! R<:<>/:<*0!/0F!/F/G:/:<*0H!

%2A;2@:<*09! *0! :D2! @D/3/@:23<9:<@9! *A! ;*@/;! G3*F8@:<*0! 9L9:2R9! /0F! :D2<3! >*/;9! ;2F! :*! F29<>0<0>!/!G3*:*:LG2!/>3*A*329:3L!9L9:2R!/0F!F2:23R<0<0>!G3*B2@:2F!A<0/0@</;!G23A*3R/0@2! A3*R!:D2!G239G2@:<E2!*A!9R/;;D*;F239!M%< 2<3*!2:!/;HX!5757!@!"GG20F<+!bSH!4D<9!/0/;L9<9!C/9! <0!329G*092!:*!/!G3*G* 2 !2+G/09<*0! A:D2!G;/0:<0>!*A!Z/G<23!>3/99!A*3!13<k82::2!A/13<@/:<*0! /:!C*8;F!F*R<0/:2!:D2!;/ F!892!1L!9R/;;D*;F239!<0!$;*<;*H!4D2!<0:2>3/:2F!;/0FO892!F29<>0X! C<:D!E2> :/1;2!/0F!3**:!@3*G9!/0F!:D2!>3/99X!C*8;F!>3/F8/;;L!9D<A:!2RGD/9<9!A3*R!Z/G<23! >3/99!G;/0:<0>!:*!*:D23!@3*G9X!98@D!/9!A38<:!:3229X!3/:D23!:D/0!D/E<0>!:D2!> 99!G;/0:2F!/9!/! R*0*O 3*G!9L9:2R!/@3*99!:D2!;/0F9@/G2H!$:9! <0 0@</;!G23A*3R 0@2!C/9!98G23<*3!/0F!;2 9! 3<9]L!:D/0!:D2!>3/99!R*0*@8; 832!9L9:2R!M,-pSX!L2:!;299!G3*A<:/1;2!:D/0!@*30!MY^pSH!4D2! /FF2F! /FE/0:/>2! *A! :D ! :2>3/:2F /0FO892! G3*:*:LG2! C/9! <: ! G* 0:</;! :*! G3*E<F2! A**F! 92@83<:L! :*! A/3R239H! #*09<F23/: *09! F23<E2F! A3*R! :D<9! 9:8FL! @*8;F! 12! 2+/R<02F! <0! *:D23! R<+2F!;/0FO892!9L9:2R9!:*!F2:23R<02!G*:20:</;!:3/F2O*AA9!*3!C 0OC<0!9<:8/:<*09H!

$0!>2023/;X!C/>29!A*3!;/1*83!<0!80F23:/]<0>!/>3*A*329:3L!/@:<E<:<29!C232!29920:</;!:*!98GG*3:! 3R239!F 3<0>!:D2!#(I$V!G/0F2R<@X!/0F!<:!C/9!@D/;;20><0>!:*!A<0F!9*83@29!*A!A**F!/0F! <0@*R2H!(E23/; X!/>3*A*329:3LO32;/:2F!<0@*R2!922R2F!R*32!9:/1;2!:D/0!*:D23!@3*G9!M2H>HX! 3<@2!/0F!@*30SX!2E20!<A!2RG;*LR20:!*GG*3:80<:<29!A;8@:8/:2F!C<:D!:D2!92/9*09H![*C2E23X!:D2! A/@:!:D/:!@*30!/0F! <@2!A/3R239!C232!/;32/FL!:<>D:;L!;<0]2 !:*! /3]2:9X!<0!9*R2!9<:8/: *09X!;2F! :*! :D2<3 F<932>/3F! *A! />3*A*329:3L! /9! /! ;<E2;<D**F! 9:3/:2>LH! $0! :D292! /32/9X! =?%! R/L! 12! 329:3<@:2F!:*!329:*3/:<*0!/0FX!G*:20:</;;LX!:322!<0:2>3/:<*0 MP22!'/9/X!575YSH!

F>B>B% V&6(/ 8%*/ X5-96)%-/ JD898#-)96.-6#./ U/ O69)/ L6.$./ 8./ L)8(S]&9(*/ J&%.-986%-./M&9/OPL/

F-'25B)G>&0'$7 5B)H'5$65$5)I)D$5&5)

(02!1/33<23!:*!98@@299A8;!329:*3/:<*0!<9!;*C!9*<;!A23: ;<:LH!"0!=?%!'3*B2@:!9:8FL!A*80F!:D/:!'(! R2R1239!8:<;<92!R/0L!]<0F9!*A!A23:<;<9239X!G <R/3<;L!1/92F *0!/E/</1<;<:L!/0F!:D2<3!G :20:</;! :*! /@@299!:D292! 9*83@29! M2H>HX! @/9D!A*3! G83@D/92! *A @D2R<@/;! G3*F8@:9! *3 /E/</1<;<:L! *A! R/0832! 0!:D2<3!;<E2;<D**F!G *B2@:9J!'/9/!2:!/;HX!5755SH!

N/0/>2R20:! G3/@:<@29!:D/:! @*8;F! 20D/0@2! 08 <20:! 9:/:89! 2/3;L! <0! G;/0:! F2E2;*GR20:! <0! 083923<29! C232! 2+G;*32FX! <0@;8F<0>! :D2! <0*@8;/:<*0! *A! RL@*33D<e/;! A80><! /0F! A23:<;<923! /GG;<@/:<*0H!"99299R20:!*A!2AA2@:<E20299!/:!G3*R*:<0>!G;/0 !F2E2;*GR20:!C/9!F*02!/9!/! 0@:<*0!*A!R/0<G8;/:<*0!*A!:D2!G;/0:<0>!R2F<8R 4D<9!A/@:*3</;!2+G 3<R20:!M=233/320!2:!/;HX! 5757S! :29:2 ! :D2! 892! *A! F<AA2320:! G* :<0>! R2F</! <0! G;/0:! G23A*3R/0@2 /0F! A*80F! /:! 0*F8;/:<*0!3/:29X!/9!C2;;!/9!>3*C:D!/0F!1< R/99!/@@8R8;/:<*0!/0F!*:D23!GDL9<*;*><@/;!:3/<:9! M2H>HX! GD*:*9L0 D2:<@! 3/:2SX! <0@32/92F! C<:D! 3<@2! D8;;! G*::<0>! R2F<8R! CD20! @*RG/32F! :*! R/:23</;9! <:D!;299!A23:<;<:LH!

4D2! /8 *3! A*80F /: @ /92F! 9* * 9 ! *A! :D<9 2F R! @*8;F! D/E2 E*832F! 3**:! >3*C:D!/0FX!:D8 X!D >D23!0*F8;/:<*0!3/:29H!";9*X!:D2!G*:20:</;!@D2R<@/;!@*RG*9<:<*0!*A!:D2! 3<@2!D8;;O/R20F2F! 9*<;! 2H>HX!D<>D23! 9«@/ G32920@2S! @*8;F!D/E2!/99<9:2F!08:3<20 !8G:/]2X! G/3:<@8;/3;L! GD*9GD*389X! CD<@D! <9! /0! 2023>L! 9*83@2! A*3! R2:/1*;<@! /@:<E<:LH! "0! <RG*3:/0 ! 0F<0>!C/9!:D/:!9R/;;!/ ! *80 !*A!9*<;!A23:<;<923!@*8;F!<RG3*E2!G;/0:!G23A*3R/0@2!<0!08:3<20:O ;<R<:2F!9*<;9X!/!32;/:<*09D<G!R2F /:2F!1L!G*: <0>!R2F<8R A23:<;<:LH!"!32;/:2 !9:8FL!/FF32992F! : 2!2AA2@:!*A!0<:3*>20!/FF<:<*0!/0F!G*::<0>!R2F<8R!*0!:*:/;!1<*R/99!C :D!/!3/0>2!*A!9G2@<29! MF%,;5-+58&/5-' *,5X T$;,/=L+$.' *&#/$ +, ' 7+&%5;,%L .' "-* ;$.O' :;,;"' 8 -# $8O' /0F!

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.

!"#$%&'(V'H5"3'!)0'/%,I&4*%[&I95,3"3&3'98,..".#',.7'4*%[".#'-*#&-5&%'-%,.39,%&.-8AQ'
3-%&.#-5&.".#'+,9,+"-A ,.7'+*II$."+,-"*.Q'7"3- "@$-".#'@&.&/"-3',.7'4&88E@&".#Q',.7'
8&,%.".#',@*$-'-5&'8,.73+,9&'-*'9%*7$+&'7"//&%&.-'9%*7$+-3'-5%*$#5'%&3-*%, "*.:'
1, , * "- $ &,+ @. * 3 *9 , * 3* 7 &
1%* &+-'B/%*I'?5,d7*.' -',8:Q'KYKYJ:'

_':82"+"5$.',.L"%,+"5-.'-&&*'+5'#$"*&'L% ;+";,/'.+&L.',-*'A5/ .+";',;+"<"+"&.'+5'%&<&%.&'+A&'
%<& .'50'&05%&.+,+"5-',-*'&-<"%5-8&-+,/'*&#%,*,+"5-',-*'+5'"8L%5<&'+A&'/"<&.',-*'
/"<&/"A55*.'50',//'L&5L &?u! #D/eF*0!2:!/;HX!5757SH!

F"># -.+.;&%@#$AA30%;:0'(#;(<#I7+:;0(;6030:)#C3;(+#

4D2! =?%! '3*B2@:! >2023/:2F! <0A*3R/:<*0! 892F! <0! :D2! 92E23/ ! :3/<0<0>! /0F! F/LO:*OF/L!
<0:23/@:<*09 D2! #V(9! /0F 292/3@D! G239*002;! ;2F! /0F! G/3:<@<G/:2F! MP2@:<*0! ,7H5! /0F!
"GG20F<+!6YSH!=<E2!9:8F20:9!A3*R!:C*!"89:3/;</0!80<E239<:<29!*1:/<02F!:D2<3!F*@:*3/;!F2>3229!
:D3*8>D!:D2<3!<0E*;E2R20:!C<:D!:D !=?%!'3*B2@:!/0FX!/;*0>!:D2!C/LX!/@:<E2;L!<0:23/@:2F!C<:D!
IPQX!'(! R2R1239X! /0F! ;*@/;! *3>/0<9/:<*09X! CD*! F23<E2F! 1202A<:9! A3*R! :D292! 3292/3@D!
2+G23<20 29!/9!C2;;H!(02!9:8F2 :!A3R!IPQ!*1:/<02F!D23!NP@!C< D!98GG*3:!A3*R!:D2!=?%!
'3*B2@:H!

F>C>5% \D)/OPL/Z9&B)#-/8%*/^VW/

%298;:9! A3*R! :D2! "#$"%! =?%! '3*B2@:X! C <@D! <0@;8 2! D<>DOk8/;<:L! 922F;<0>! G3*F8@:<*0X!
R*:D23!:322!92;2@:<*0X!/0F!G;/0:/:<*0 29:/1;<9DR20:!/0F!R/0/>2R20:X!C232!<0@*3G*3/:2F!
<0:*!:D2!)P!=*329:3L! 8 3<@8;8R!/:!:D2!V2G/3:R20:!*A!=*329:!P@<20@2!/:!IPQH!#*8 929!*3!
981B2@:9!CD232!:D292!@*83929!/32!<0@*3G*3/:2F!<0@;8F2!G"/<";$/+$%&'>'M=*329:!Z83923<29!/0F!
'; 0:/:<*0!W9:/1;<9DR20:SX!:*<,-;&*'!5%&.+'4$%.&%='Y,-,#&8&-+X!!5%&.+'65<&%-,-;&',-*'
75/";=X!N-+&#%,+&*' 5% .+'D&.5$%;&.'Y,-,#&8&-+X!/0F!1,+& .A&*'Y,-,#&8&-+H!P:8F20:9!
;2/302F!:D2!>;*1/;!/0F!;*@/;!9:/:89!*A!A*329:!;/0F9@/G2!329:*3/:<*0!@D/;;20>29X!*GG 3:80<:<29!
/0F!<0<:</:<E29H!

=?%!'3*B2@:!A<0F<0>9! C232! /;9*! 9D/32F! *0;<02!C<:D!R*32 :D/0! -77! <0F<E<F8/;9! F83<0>!:D2!
H5-+"-5.' F&<&/5L8&-+' 7%5#%,8'M#V'S! *A! :D2!7%50&.."5-,/.' D&#$/,+"5-.' H588".."5-'
M'%#S!*A! 2!%2G81;<@!*A!:D2!'D<;<GG<029!:D3*8>D!:D2!A/@<;<:/:<*0!*A!:D2!H&-+&%'05%'H5-+"-$"-#'
T*$;,+"50! *A! IPQH! '%#! 32k8<32! 32><9:232F! A*329:239! :* /::20F!
92R<0/39j:3/<0<0>j@*0A2320@29! 12@/892! :D292! /3 ! 022F2F! : ! 3202C! :D2<3! '3*A299<*0/;!
?<@20 2!/0F!:*!]22G!:D2R!8G!:*!F/:2!/1*8:!:D2!32@20:!F2E2;*GR20:9!<0!A*329:!;/0F9@/G2!
329:*3/:<*0H!'3*B2@:!R/08/;9!/0F!;2/A;2:9!C232!/;9*!9D/32F!C<:D!9:8F20:9X!G3*A299<*0/;9X!/0F!
A/3R239!F83<0>!:D2!32@20:!IPQ!/00<E239/3L!<0!"G3<;!575YH!4D292!/@ E<:<29!/32!2+G2@:2F!:*
<RG/@:! ;*@/; G*;<@<2 ! /0F! G3/@:<@29! :*C/3F ! 12::23! A*3 9:! ;/0F9@/G2! 329:*3/: *0! <0! :D2!
32><*0H!#833<@8;8R! <0:2>3/ <*0! <9! /0! < <:</: E2! *A! A/@8;:L! R2R1239! *A! :D2! V2G:! *A! =*329:!
@<20@2 IPQX! CD*! 022F! :D*92! <RG*3:/0:! :*G<@9jA<0F<0>9! A3*R! :D2! "#$"%! =? ! G*B2@:!
/0F!9:/3:2F! <0! :D2! @/;20F/3! L2/3! 5757 ! 29G2@</;;L! F83<0>! :D2! * ;<02! @;/99! G23<*F! F8 ! :*!
#(I$VO,^H!

FF<:<*0/;;LX!< E29:R20:9!R/F2!1L!:D2!=?%!'3*B2@:!<0@;8F2F!G83@D/9<0>!/0F!92::<0> 8G! !
<>DOk8/;<:L!/0/;L:<@/;!;/1* :*3L!/:!:D2!80<E239<:LH!4D<9! 3292 3@D!A/@<;<:L!C/9!892F!<0!)P@!
A*329:3L!@*83929 *!F2R*09:3/:2 :9!*G23/:<*0!/0F!@*RG/32!<:!C<:D!;299!R*F230!2k8<GR20:H!
=*3!2+/RG;2X!;/923! LG9*R2:239!C232!892F!<0!A*329:!R20983/:<*0K!:D2!@/0*GL! 0/ L923!/0F!
:D2! 9*<;! / >23! C232! 892F! <0! :322 GDL9<*;*>L! :3/<0 0>! /0F! 9:8F20:9U! 3292/3@D! /0F! 9*<;!
/0/;L929X!329G2@:<E2;LH!P*<;!9/RG;2 !A3*R!9:8F20:9!C232!/0/;L92F!<0!:D<9!A @≪:LH!=<0/;;LX!:D2!
32F /9!/0/;L923!C/9!892F!<0!G*9 F8/:2 :8F20:!3292/ D!*0!@*AA22!G3*F8@:<*0H!

F>C>A% OPL/S=6&*67)9.6-:/U/3#&.:.-),/V)976#)./

(02!*A!:D2!*1B2@:<E29!*A!=?%!<9!:*!329:*32!;/0F9@/G2!A80@:<*0/;<:L!/0F!2@*;*><@/;!<0:2>3 :LX! <0@;8F<0>! 2@*9L9:2R! 923E<@2! G3*E<9<*0X! CD<@D! <RG;<29! 1<*F<E239<:L! <RG3*E2R20:! >*/;9! M)2/::L! 2:! / HX! 57,bSH! '32E<*89! "#$" O98GG*3:2F! 3292/3@D! D/9! F<9@8992F! :D<9! G*:20:</;! MN8]8;!2:!/;HX!57,6SH!"!9D*3:!/99299R20:!*A!:D2!2@*9L9:2R!923E<@29!G*:20 /;!*A!=? !C/9! @*0F @:2F! <0!)<;<3/ ! MN8]8;! 2:]/;HX! 575,SH! '/3:<@<G/0:9! 3/0 2F! :D2<3 G23@2G:<*09! *A! 32;/:<*09D<G9! 12:C220! ;/0 ! 892! /0F! 2@*9L9:2R! 23E<@2! G3*E<9<*0! 1 ! @*R1<0<0 ! 9:/ 2D*;F239U! @*098;:/:<*09H!4D<9! <0A* /:<*0!C/9! 892F :*! F2E2;*G!:20:/:<E2! 9@20/3<*9! A! R*32!9:3/:2><@!/32/9!:*!<0E2 :!A*3!=?%X!CD<@D!@*8;F!9D*C!12::23!3298;:9!<0!*G20! *329:9!:D/0! >3/99;/0F9H! (E23/;;X! :D ! 9G/:</;! @*0A<>83/: *0! *A! 2/@D! G;/@2! R/::239! <0! F2:23R<0<0>! :D2! G*:20:</;!A*3!/@D<2E<0>!=?%!3298;:9!<0!G3/@:<@2X!>< 20!:D2! /:@DL!F<9:3<18:<*0!*A!2+<9:<0>!A*329:! A3/>R20:9!/0F!:D2!A32k820:!2RGD/ <9!*0!32A*329:/:<*0!:*!A*@89!*0!*02 *3!:C*!9G @< 9!ME*0! \;2<9:X!5757SH!

%298;:9! *A! :D<9! @/92! 9:8FLX! CD<@D! A*@892F! *0! /@: E2! <RG;2R20:239! *A! Z&' /@:<E<:<29! <0! %2><*09! ,! /0F! bX! 9D*C2F! :D/:! 2;2R20:9! *A! :D2! Z&'! F29<>0X! /9! G*<0:2F! *8:! 1L! 92E23/;! 3292/3@D239!M2H>HX!c<92:X!5757 !%<12<3*X!575YSX!<0@;8F<0>!/!>*E230R20:/;O; F!2E/;8/:<* !*A! Z&'!<RG;2R20:/:<*0!M#*"!57,^SX!@*0:3<18:2F!:*!;<R<:2F!3298;:9H!PG2@<A<@/;;LX!:D2!08R 23!*A! 922F;<0>9!G;/0:2F!@*8;F!12!/!12::23!G3*+L!A*3!:D2!G*:20:</ !1<*F<E239<:L!1202A<:9!*A!G3 >3/R! /F*G:<*0H!(:D23!A/@:*39!;<0]2F!:*!:D2!Z&'! *@89!*0!922F;<0>!08R1239!32;/: !:*!G;/0: 0>!/! A2C! 9G2@<29! ><E20! :D2! ;<R<:2F]0*C;2F>2! G*:20:</;! *A! 083923<29! A*3! F<AA2320:! 9G2@<29H! %29G*0F20:9!32@*>0<92F!:D2!/R1<>8<:L!32>/3F<0>!;*@/;!@*RR80<:<29U!3<>D:9!*0!/!G3*>3/R! ;2F!:D2R!:*!1 ;<2E2!:D/:!Z&'!329:3<@:2 !:D2<3!3 ;2!/9!G3*E<F239!*A!G;/0:<0>!;/1*83X!/0F!0*:! ;2>< <R/:2! 3*:/>*0<9:9!*A!#)=NX!CD<@D!D/9!1220!32@*>0<92F!/9!/!@3<:<@/;!2;2R20:!*A ;*@/; L! 1/92F!G 9G2 89 ;< ** 9 ![*C2E23X! 23@2G:<*09!1 < G;2R2 :< >!/>20@<29!D<>D D:2F! 9R/;;D*;F239i!;<R<:2F! <0F<E<F8/;! /0F! *3>/0<9/:<*0/;! @/G/@<:<29!:*! 2R23>2! /9!R* ! /@:<E2U! G/3:0239! A*3! : 2! G *>3/ !ME*0! \;2<9:! 2:! /;HX! 575,SH! WRGD/9<9! *0! 329:38@:83<0 ! :D2! Z&'! >*E230/0@2!9:38@:8329!/0 !A*@89<0>!*0!G3*>3/R!<RG;2R20:/:<*0!M2H> X!/0F9@/G2!G;/00<0>S! @*8;F! / 3299! 9*R2! *A! :D2! <F20:<A<2F! G3*1;2R9H! 4D292! A<0F<0>9! 329*0/:2! C<:D! :D2! @*0@;89<*09!*A!:D2!#*"!M57,^S!2E/;8/:<*0!/0F :D2!>8<F2;<029!*AA232F!1L!Q32:/!2:!/; !M57,bS! 32>/3F<0>!:D2!G*:20: /;!A*3!89<0>!/!:D2*3LO*AO@D/0>2!/GG3*/@D!:*!<RG3*E2!:D2!2AA2@:<E20299! *A!:D2!Z&'H!

h1&' b"- +A&' ;588$-"+=c' -&&*&*' 85%& "-05%8,+"5-d' 8=' 3-5B/&*# ' B,.' "-.$00";"&-+?' b1&' ,;;&L+&*c'8&+A *.'0%58':HN:D'%&/,+"-#'+5'3-5B/&*#&'.L&;"0";.O',-*'-5B'B&'L%5* ;&'2&++&%' .&&*/"-#.'+A,-'5+A&%'7^.e'ME*0 \;2<9:!2: /; X!575,S !

4D2!>2*9G/:</;!R*F2;;<0>!2+23@<92!29:/1;<9D2F!:D2!20E<3*0R20:/;!/0F!9*@</;!@*RG;2+<:L!*A! :D2!32A* 29:/:<*0!;/0 9@/G2!@*0: <18:2F!:*!;299! 8 @299A8;!32A*329:/:<*0 2AA*3:9H!4D232!/32! *E23;/GG<0> @;/<R9! *E23! D2! ;/0F!:D/:! ;2/F!:*! 80@23:/<0! 3<>D:9X!CD<@D!C*8;F! <0@32/92!:D2! @*9:9! *A! <RG;2R20:<0>! <0<:</:<E29! :*! R/0/>2! :D292! ;/0F9@/G29! A*3! 32A*329:/:<*0! *3! *:D23! 8929H!

=<0/;;LX! /! ;/@]! *A! G3*G23! G;/00<0>! /0F! >/G9! <0! :D2! <RG;2R20:/:<*0! C*8;F! 0*:! A/E*83! :D2! 32/;<9/:<*0!*A!1<*F<E239<:L!*8:@*R29!A3*R!:D !Z&'H!PG2@<A<@/;;LX!/F2k8/:2!@*09<F23/:<*0!*A! 2@*;*><@/;!/0F!2@*9L9:2R!@*09:3/<0:9!/0F!G*:20:</;!F<F!0*:!3298;:!<0!;/0F!892!e*0<0> M H>HX! F<9:<0@:<*0! 12:C220! G3*F8@:<*0! /0F! G3 :2@:<*0! *A! G;/0:2F! /32/9SH! (E23/;;X! ;299*09! A3*R! G32E<*89!32A*329:/:<*0!2AA* :9!D/E2!L2:!:*!:3/09;/:2!<0:*!F3/9:<@!<RG3*E2R20 9!<0!D*C!Z&'! D/9! @*0:< 82F! *G23/:<0>! ME*0! \;2<9:X! 5757 =80F/R20 X! 9G2@<A<@! @*09 23/:<*09! 32>/3F<0>!D*C!1<*F<E239<:L!C ;;!12!<0@;8F2F <0!G3/@:<@29!32G32920:2F!/!9<>0<A<@/0:!;**GD*;2! A 3!:D2 Z&'!:*!/@D<2E2!=?%!>*/;9!M)2/::L!2:!/;HX!5 ,bSH!

F>C>B% P&#8(/"*8F-6&%Q/Z@/F&(6#6)./

(02!R2@D/0<9R!A*3!:D2!=?%!'3*B2@:!:* 98GG*3:!;*@/;!G*;<@L!@D/0>2!C/9!:*!2+/R<02!D*C! '(9! /F/G:2F! :D2<3! 38;29! :*! /E*<F! G*:20:</;! @*0A;<@:9! *3! 329*;E2! :D2RH! P2E23/;! '(9! G/3:<@<G/:<0>!<0!:D2!G3*B2@:!F2E2;*G2F!<0:3/O'(!G*;<@<29!/0F!/>322R20:9!*0!E/3<*89!:*G<@9X! <0@;8F<0>!1202A<:O9D/3<0>!/ F!A 0/0@</;!:3/09G/320@L!M922! <9:!/GG20F<+!..SH! $0!9*R2!@/929X!

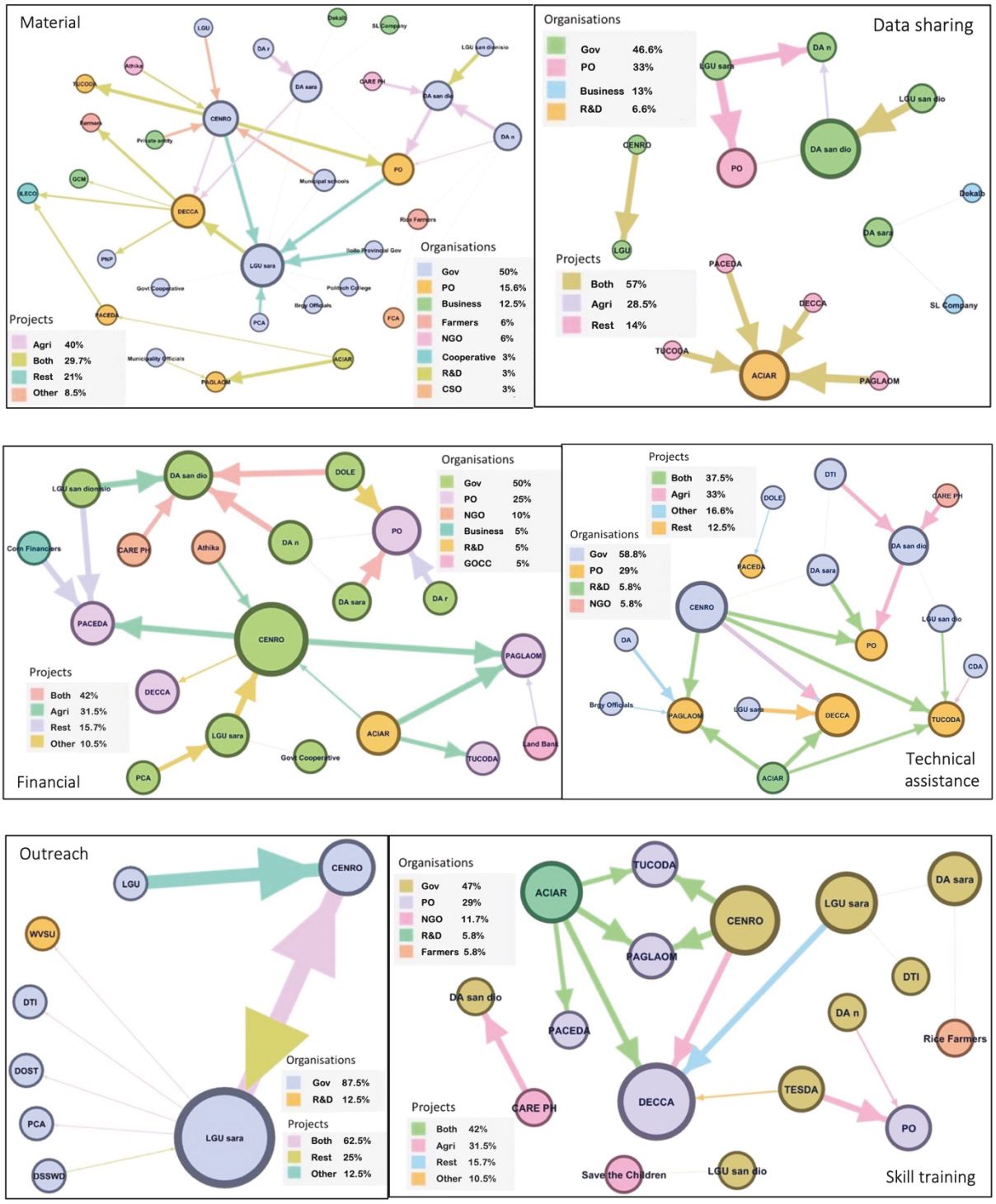

Figure 15 Resource and information sociograms produced in GEPHI 0.9.2. Arrow thickness indicates between-node relationship strength. More connected nodes are depicted as more extensive; node colour indicates the type of organisation; colours of arrows indicate the type of project. Organisations: Gov = 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

F>C>D% Z&(6#:/N%-)98#-6&%./M&9/OPL/Z9&B)#-/N,F(),)%-8-6&%/

N22:<0>9!C<:D!VWZ%!/<R2F!:*!<0:3*F8@2!:D2 G3*B2@:!/0F!9*;<@<:!98GG*3:!A*3!:D<9!G3*B2@:!M'/9/X! 575YSH!"9!/! 3298;:X!><E20!G3<*3! 98@@299A8;!2+G23<20@29!12:C220!:D<9!/>20@L!/0F!"#$"%O 98GG*3:2F!G3*B2@:9X!:D2!=N)!V<32@:*3!<9982F!/!R2R*3/0F8R!:*!VWZ%!I$X!I$$X!/0F!I$$$!:*! 98GG*3:!:D2!G3*B2@:!<RG;2R20:/: *0!<0!:D2<3!329G2@:<E2!32><*09H!

c<:D!:D2!D2;G!*A!:D2!#WZ%(!(AA<@239X!Z&'!/0F!#)=N!#**3F<0 :*39!/0F!2+:209<*0!*AA<@239X! :D2! =? ! '3*B2@:! :2/R! C/9! /1;2! :*! <F2 :<AL! <:9! G/3:<@<G/:<0>! '(9H! $0! "8> 9:! 57,^X! =?%! %292/3@D!42/R R2R1239!R2:!C<:D!VWZ%!* <@29!A3*R!%2><*0!I$$!:*!9D/32!G/3:</;!3298;:9!*A! :D2!=?%!'3*B2@:H!?*C!3/:29!*A!98@@299!*A!Z&'!<RG;2R20:/:<*0X!3/:D23!:D/0!:D2!/9G<3/:<*0/;! b-pX!C232!0*:!/@D<2E2F!/@3*99!G/3:<@<G/:<0>!@*RR80<:<29X!/0F!;*COk8/;<:L!922F;<0>!C/9!:D2! 0*3R! M&32>*3<*X! 575YSH! 4D2! R/<0! :2@D0<k829! F2E2;*G2F! 1L! :D2! =?%! '3]B2@:! *A! D/E<0>! 2;2E/:2F!D/3F20<0>!12F9!A*3! 922F;<0>9!/;;*C2F!:*!F2E2;*G!A<02! 3**:9X!CD<@D!<0@32/92!:D2! A8:832!/@@;<R/:<* !:2@D0<k82!*A! D292! 922F;<0>9! 0@2!:3/ 9G;/0:2F! M&32>*3<* !5757SH 4D2! 3298;:9!*A!/GG;L<0>!:D292!:2@D0<k829!C232!C<F2;L!9D/32F!/0F!F2R*09:3/:2F!:*!#WZ%(9H! P**0!/A:23!:D2!R22 <0>!MN 3@D!5757SX!:D2!%2><*0/;!V<32@:*3!A*3!%2> *0!I$$!]<32@:2F!/;;!:D2<3! 981*3F<0 :2!*3>/0<9/:<*09!:*!/F*G:!:D2!];2E/:2F!12F!G3/@:<929!M&32>*3<*!2:!/;HX!5757K!922! G/>2!Y!A]3!VWZ%!R2R* /0F8RSH!

QG:/]2! *A! :D<9! 32;2E/0:! 3292/3@D! *8:@*R2! C/9! A/@<;<:/:2F!1L! R/]<0>! <:! /GG;<@/1;2! :*! :D2! G23:<020:! *3>/0<9/:<*0X! <0! :D<9! @/92X! VWZ%! /0F! /:! :D2! ;*@/;! ;2E2;! #WZ%(! /0F! 083923L! *G23/:*39X!<0!<:23/:<E2!C/L9!:D3*8>D D2!92E23/;!"#$"%OA80F2F!<]<:</:<E29!:*!Q0<QP#H!4D2! @32/:<*0!*A!/!@*;;2@:<E2!80F239:/0F 0>!*A!:D2!G3*1;2R!:]/:!C/9!F*@8R20:2F!2RG<3<@/;;L!/0F! /! ;*0>O:23R!]0*C;2F 2! G/3:0239D<G :D/:X! <0! :D<9! @/92X! C/9! 989:/<02F! :D3*8>D! @*0:<082F! A80F<0>!/0F!20>/>2R20:!D2;G2F!9:320>:D20!@*RR<:R20:9!A*3!@*;;/1*3/ [<*0!F*C0!:D2!3* FX! CD<@D!32R/<0!:*!:D<9!F/L!M&32>*3<*X!575YSH!4D292!/ :<*09!20/1;2F!2E<F20@2O1/92F!G*;<@L!<0! :D2!@/92!*A!:D2!022F!:*!<RG3*E2!922F;<0>!k8/;<:LH!

?/:23! :D/:! L2/3X! <0! Z*E2R123! 57,^X! :D2! =?%! %292/3@D! 42/R! R2:! C<:D! :D2! =*329:! N/0 >2R20:!)832/8! =N)S!/:!:D2!VWZ% [#20:3/;!(AA<@2!<0!] 82e*0!#<:LH!V83<0>!:D<9!2E20:X! A<0F<0>9!A3*R :D2!'*;<@L!c*3]9D*G!@*0F8@:2F! 0!$;*<;*!#<:L!M(@:!,7O,,X!57,^K!=?%!'3*B2@:! 42/RX! 57,^K! /GG20F<+! bTS! 32>/3F<0>! :D2! C2/]029929! *A! '(9! <0! D/0F;<0>! 32A*329:/:<*0! G3]B2@:9! C232! F<9@8992FX] CD<@D! C/9! B*<02F! 1L! :D2!Z&'! @**3F<0/:*3! /0F! 9:/AAX! 32G32920:/:<E29!A3*R!'W %(X!#WZ%(!/0F!'(9H! %298;:9!<]@;8F2F!<098AA<@<20:!]0*C;2F>2! /0F!9]<;;9!*0!D<>DOk8/;<:L!922F;<0>!G3* 8@:<*0X!;/@]!*A!]0*C;2F>2!*0!/GG [*G3</:2!9<;E<@8;:83/;! G3]@:<@29X!;*C!983E<E/;!*A!G;/0:2F!922F;<0>9X!;<R<:2F!9*83@29!*A!>23RG;/9R!MA*3!1*:D!922F ! /0F!C<;F;<0>9SX!G**3!9*<;!k8/;<:LX!A<32!*@@83320@2X!G32920@2!]A!>3/e<0>!/0<R/;9X!/0F!;/@]!*A! G;/0:/: *0!R/<0:20/0@2!CD20! G3*B2@:!A80F9! /32! 2+D/89:2F! M&3/E*9*! 2:! /;HX!575,SH!(:D23! A/@:*39! D<>D;<>D:]F! F83<0>! :D2! C*3]9D*G! <0@;8F2F! :D2! 32@*>0<:<*0! *A]:D2! 32R*:20299! *A! G;/0:<0>!9<:29!/ F!F<AA<@8;:!/@@299<1<;<:LX!29:/1;<9D<0>;2>/;!/33/0>2R20:9!C D!;/0F!@;/<R/0:9X! /0F!:D2!20* R*89!C*3];*/F!*A!VWZ%!W+:209<*0!*AA<@239!MA*3!1*2+/RG;2X!922!&*;:</0*X!575Y@SH! &*E230/0@2! <99829! 32R/<02F! 32>/ [F<0>! <0/F2k8/:2! 9D/3<0> />322R20:9! *A! 1202A<:9! /0F! G**3!989:/<0/1<;<:L!*A!;<E2;<D** !G3*B2@:9H!

(02! *G:<*0! :*! / 3299! 9*R2! '(! ; R<:/:<*09! :*! /@D<2E2 =?% >*/;9! C*8;F! 12! :*! @20 32! /@:<E<:<29!*0! D2!A/R<;L!08 ;289!C<:D<0!:D2!#)=NH!4D<9!A*3R8;/:<*0!<RG;<29!:D/:!:D2!CD*;2! :/3>2:! 32A*329:/:<*0! G3*B2@:! /32/! C<;;! 12! F<E<F2F! 1L! :D2! 08R123! *A! A/R<;<29! <0:2329:2F! <0! 32A*329:/:<*0!/0F!;<E2;<D**F!/@:<E<:<2 !/0F!/99<>02F!9G2@<A<@! 32/9!:*!C*3]!C<:D 0!:D2!#)=N! M922 /L029!2:!/;HX!57,^S $0!N/ 5757X!=N)!<9982F !N2R*3/0F8R!/F*G:<0> :D2!!,8 ' :LL%5,;A':* %2A*329:/:<*0!0/:<*0C<F2!MN/L!6:DX!5757K!/E/<;/1;2!8G*0!32k829:SX!CD<@D!C2! 12;<2E2!:*! D/E2! 1220! <0A;820@2F!]L!:D2!A<0F<0>9! *A!:D2!'3*B2@:! /0F!:D2! F 9@899<]09! D2;F! F83<0>!:D<9!G/3 <@8;/3!C*3 9D*GH!=/R<;<29!/:3/2F!20:23<0>!@*0:3/@:9!F<32@:;L!C<:D!VWZ%!<0 >*E230R20:!32A*329 :<*0!G3*> /R9!C<:D!:D/:!N2R 3/0F8RH!

F>C>E% OPL/J&8(6-6&%./8-/"JN"L[./Z9&B)#-/3%*/

4D2!=?%!"#$"%!G3*B2@:!2+G;*32F!<0!G3/@:<@2!CD/:!<<:!C*8 F!:/]2!:* 18<;F!<09:<:8:<*0/;! 0F! *:D23! @*/ :<* 9! /3*80F! :D2! =?%! /@:<E<:<29! 98GG 3:2F! 1L! :D<9! '3*B2@:H! $0! N/L! 575YX! /!

G$.+,"-,2" "+='□/,-'C*3]9D*G!C/ □!D2;F!A*3!VW##" □<0!P/3/!M$;*<;*X!%2><*0!I$K!=?%!'3*B2@:! 42/RX!575YSH!4D<9!2E20:!>/:D232F!3 □G32920:/:<E29!*A!;*@/;!<09:<:8:<*09!MN/L*3X!?&QX! □WZ%X! V"S! /0F! '(! F<32 □:<E29X! CD*X! 80F23! □□2! :2@D0<@/;! >8<F/0@2! *A! =?%! '3*B2@:! G239*002;X! F2E2;*G2F!/!E<9<*0/3L!2+23@<92! *!32E2/;!R8:8/;!2+G2@:/:<*09!*A!G23A*3R/0@2!1L!/;;H!4D292! 2+G2@:/:<*0 □! C232! :D20! :8302F! <0:*! @* □ R<:R20:9! 1L! /! >3*8G! 2+23@<92! :D/:! <F20:<A<2F! /! 9D/32F!@*RR*0!E<9<*0X!>*/;9X!/0F!/@:<E<:<29!80F23!:D2!R*F2;!*A!/!;*><@/;!A3/R2C*3]!A*3!:D2! A8:832!*A!:D<9!'(!*0@2!:D2!"#$"%!=?%!20F9H!4 □<9!C/9!/!G3/@:<@/;!:3</;!*A!/!32@*RR20F/:<*0! R/F □! 1L! □?%!'3*B2@:!42/R!R □R1239!:*!A*3R/; 92!:D2! @D/0>2! G3*@299!:*! /99<9:! <0!=?%! F29<>0!F2@<9<*09!M42F29@*!2:!/;HX!575YSH!

$0!:D2! □□92!*A □ W##"X! □□2!N/L*3!/0F!<09:<:8:<*0/;!/@:*39!32@*>0<92F!:D2!G*:20:</ □□* □□:D<9! '(! □*! 12@*R2! /! F2R*09:3/:<*0!@20:32 □* □!:D2! G*:20:</;!A*3!=?%X! @32/:<0>! 1202A<:9!A*3! /;;H! $R □*3:/0:;LX!/;;!G/ □:<@<G/0:9!A2;:!:D<9!9*3L!*A!98@@299!9D* □;F!@*0:<082 □/0F!12@/R2!20>/>2F! <0! 922<0>! :D2! 98@@299! *A! VW##"! :830<0>! <0:*! :D2<3! *C0! <09:<:8 □<*0/;! /0F! /FR<0<9:3/:<E2! 98@@299H!

c*3]9D*G!*3>/0<9239!A<0/;<92F!:D2!G$.+,"-,2"/"+='7 □,-'M"GG20F<+!.^SX!<0:2>3/:<0>!:D2! *><@/;! A3/R2C*3]! /0F! /! :D2*3L! *A! @D/0>2! C<:D! /0! <0F<@/:*3 □9L9:2R! :D □:! C*8;F! D2;G! :D2! '(! @*RR80<@/:2!G3*RG:;L!/0F!:3/09G/320:;L!C<:D! □8GG*3:<0>!<09:<:8:<*09!/0F!:D2!N/L*3U9!*AA<@2! /:!:D2!@8;R<0/:<*0!*A!:D2!'3*B2@:H!4D<9! 0F<@/:*3!9L9:2R!<9!0*E2;!<0!:D/:!<:!3298;:2F!A3*R!:D2! E<9<*0/3L!@* □□□@:<E2!2+23@<92!F2E2;*G □F!C<:D!:D2!'(!/0F!<09:<:8:< □0/ □□G/3:0239X!CD<@D!@/0! F2R*09:3/ □2! G3/@:<@/;!C/L9! □*!A<;;! *02! *A!:D2! >/G9! D<>D;<>D:2 □! 2;92CD232! 1L!=?%!'3*B2@:! 3292/3 □D239!:*!* □23/:<*0/;<92!2AA2@:<E2!/0F!2AA<@<20:!R*0<:*3<0>!*A!=?%!<0!/@: *0!M& □:<2332e! 2:!/;HX!5757SH!4D<9!0@32/92F!<0:23/@:<*0!C/9!/!B*<0:!@/;;!A3*R □/;;!G/3:<@<G/:<0>! 0!:D2!C*3]9D*GH! ";*0>9<F □X! @*RR<:R20:9!R/F2!C232!A*3R/;<92F!:D3*8>D!/!%29*;8:<*0!<0!:D2!*AA<@2!*A!:D2! N/L*3!*A!P/3/!A*3!<:9!20/@:R20:H! □E23L1*FL!A2;:!:D/ □!:D2!@*;;2@:<E2!F2@<9<*09!R/F2!F83<0>! :D2!C*3]9D*G!C*8;F!12!9:320>:D202F!/0F!329G2@:2F!<3329G2@:<E2!*A!CD*!C/9!*@@8GL<0>!:D2! *AA<@2□!/0F!:D2!%29*;8:<*0!C/9!/!R2@D/0<9R!:*!>8/3/0:22!329G2@:!A*3!@*RR<:R20:9!R/F2H! $RG/@:9!

F",# I%0.(:0B0%#0*A;%:+#K#('L#;(<#0(#,#).;&+#

K1L%

4D2!=?%!' □*B2@:!29:/1;<9D2F!/ □F!G8:!<0!G3/@:<@2!@*0@2G:8/ □!A3/R2C*3]9!:*!*G23/:<*0/;<92! =?%H!(□2!R/<0!/@D<2E2R20:!C/9!:D2!F29<>0!*A!/! □*E2;!A3/R2C*3]! *!@*0@2G:8/;<92!@D/0>29! /99*@</ □□F!C<:D!32A*329:/:<*0!/@:<E<:<29!:D3*8>D!/!9L9:2R!*A!;2/F<0>!/0F!; □>><0>!<0F<@/:*39H! 4D<9!9L9:2R!G3*E<F29!@3<:<@/;!<09<>D:9!<0:*!< □20:<AL<0>!98</1 □2!<0F<@/:*39!A*3!F<AA2320:!G*<0:9! /A:23!32A*329:/:<*0!/@:<E<:<29!D/E2!@*RR20@2F!:*!R/]2!32A*329:/:<*0!R*0<:*3<0>!2AA*3:9!R*32! 2AA<@<20:!/0F!2AA2@:<E2!/;*0>9<F2!/!80 □A<2□!92:!*A!@*0@2G:9!:D/:!D2;G2F!12::23!80F239:/0F!:D2! <RG* □:/0@2!/0F!/GG3*/@D2 □!:*!/99299!@*RR80<:L!@/G/ □<:L!A*3!=?%H!

%292/3 □D!/@:<E<:<29!A3*R!:D2!=?%!'3*B2@:!D2;G2F!<;;8R<0/:2!:D2!<RG*3:/0@2 □*A!>20F23!<99829! :*! /FE/0@2! 32A*329:/:<*0H □"FF<0>! :D<9!3292/3@D! ;209! D2 □□2F!32@*>0<92! C*R20U9! 3*;29! <0! @*RR80<:LO1/92F!32A*329:/:<*0!/0F!:D2!183F209!@32/:2F!1L!:D<9!/FF2F!<0E*;E2R20:H!

4D2! 129:! 32A*329:/:<*0! G3/@:<@29! F2E2;*G2F! :D3*8>D! :D2! =?%! '3*B2@:! 92:! /! 9@<20:<A<@! □□80 □/:<*0! A*3! *1:/< □<0>! :D2! 129:Ok8/;<:L! 922F;<0>9X! <R □3*E2F! 08392 □L! R/0/>2R20:X! /0F! <F20:<AL<0>! 9G2@<29! 98</1<;<:L! 80F23! F<E23 □2! @*0F<:<*09H! "F*G:<*0! *A! 129:! G3/@:<@29! 1L! @*RR80<:<29! :D3*8>D! 9*@</;! @/G<:/;! <RG3*E2R20:! C/9! 892F! < □! *:D23! G3*B2@:9! M7%5J&;+' E,%."&%SX!<0@;8F<0>!32>/3F<0>!9*@</;!/9G2@:9!*A!;*@/;!@*RR80<:<29!/0F!G*;<@L! <99829H! P<R<;/3!]0*C;2F>2! C/9! F2E2;*G2F! <0! G3/;;2;! 32>/3F<0>! />3*A*329:3L! @3*G9! /0F! ;<E2;<D**F!/@: E<:<29H!

4D2!9*;<F!9@<20:<A<@!1/92!*A!:D2!=?%!'3*B2@:!D2;G2F!:*!>/<0!: □2! □8LO<0!*A!:D2!VWZ%!/:!92E23/;! ;2E2;9X!/0F!:D2 □?&Q9X!CD*!12@/ □ 2!@;*92!@*;;/1*3/:*39!*A!:D2!'3*B2@:!/0 □X!/;*0>!:D2!C/LX! /;9*! D2;G2F! 20D/0@2! =?%! G3/@<929! 32;/ □2F! :*! 083923L! R/0/>2R20:H! 4D292! G3*@29929! D2;G2F!@32/:2!9G/@29!A*3! □+G23<20@2!/0F!<F2/!2+@D/0>2!*0!=?%!<RG;2R20:/:<*0X!1/33<239X! /0F!20/1;<0>!A/@:*39X!G89D □0>!:D2!]0*C;2F>2!A3*0:<23!A* □!98@@2□9A8□!329:*3/:<*0H!

4D2!= %!'3*B2@:!@*0:3<18:2F!9@<20:<A<@!G81;<@/:<*09!*0!=?% <0! <AA2320:>2*>3/GD<29X!/0F!<:9! 329*83@29!12@/R2!/!>*O:*!A*3!:D*92!;**]<0>!:*!<RG;2R20:!@*RR80<:LO1/92F!32A*329:/:<*0!<0! :D2!'D ;<GG<029!/0F!12L*0FH!"9!98@DX!IPQ! 3292/3@D239!@*8;F!9D/32!:D2<3!2+G23:<92!8G*0! 32k829:!<0!F29<>0<0>!9R/;;D*;F23!=?%!G3/@:<@29!;<]2!32A*329:/:<*0!/0F!/>3*A*329:3L!A/3R<0>! 9L9:2R9! <0! W/9:230! P/R/3! /0F *:D23! @*80:3<29H! 4D ! :C*! 9@<20:<A<@! /0F! G3/@:<:<*023! @*0A2320@29!*3>/0<92F!:D3*8>D!:D2!'3*B2@:!D2;G2F!29:/1;<9D!02C!@*;;/1* /:<*09!/0F!32A329D! 2+<9:<0>!F</;*>829!32>/ F<0>!@*RR80<:LO1/92F!A*329:!329:*3/:<*0H!

P@<20:<A<@!329*83@29!A3*R!:D2!G3*B2@:!C23 !892F!:*!<0:2>3/:2!=?%!<0:*!@833<@8;/!G3*>3/R9!/:! IPQ! /0F! *:D23! 80<E239<:<29! <0!:D2! @*80:3L! <0!:*G<@9! ;<]2!2@*0*R<@9X @*RR80<@/:<*0X! /0F! A*329:3LO*3<20:2F 833<@8;/ "0*: 23! @*0:3<18:< 0!:*!:D2 PQ! 9@<20:<A<@! *RR80<: ! F2 <E2F! A3*R!:D2!<0:23/@:<*0!*A :9!9:/AA!/0F!9:8F20:9!C<:D!<0:230/ *0/;!'3*B2@:!:2/R!/0F!9:8F20:9H! 4D2! G 3A*3R/0@2!*A! IPQ! 9:8F20:9!C/9! 20D/0@2F!:D3*8>D!:D2! 923E<@29! *A!:D2!<RG3*E2F! /0/;L:<@/;!;/1*3/:*3L!/:!:D2!Q0<E239<:L!F83<0>!:D2<3!9@<20:<A<@!3292/3@DH!

7K%D%MN?=O%

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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.,

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.

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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.*

2. 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 353, pp.70-80.*

3. 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 11(6), p. 706*

4. 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 11(6), p. 685*

5. 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). WWF-Netherlands. http://www.bosquesandinos.org/wp-content/uploads/2021/06/Prince-Bernard-Chair-Restoration-report.pdf

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

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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

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