

International Conference

Forest and Landscape Restoration: Making it Happen

PROCEEDINGS

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Welcome Message

Globally, Forest and Landscape Restoration (FLR) is receiving increasing attention from the governments and agencies for its potential to provide key ecosystem services and to improve human wellbeing. The Bonn Challenge, launched in Germany in 2011, currently involving 56 nations, pledged to restore 150 million hectares of degraded and deforested areas by 2020 and 350 million hectares by 2030. This is one of the largest initiatives so far in the line of FLR. Other key global initiatives include (but not limited to) – the New York Declaration on Forests signed in 2014 and the Trillion Trees Partnership.

Despite the prospect and emergence of FLR in last years, many aspects of FLR including governance, monitoring and success criteria and indicators are not properly understood. This three-day conference will bring together leading international experts and practitioners working on FLR across the world. The conference will make an important contribution to our understanding of FLR and how to improve its planning, implementation, assessment and monitoring. With five different themes, we will also use empirical case studies to report both positive and negative outcomes in regard to FLR design, management, monitoring and implementation.

The conference has been organised as part of the activities of two projects funded by the Australian Centre for International Agricultural Research (ACIAR) projects - ASEM/2016/103 Improving Livelihoods through Forest and Landscape Restoration and FST/2016/153 Enabling Community Forestry in Papua New Guinea. We thank ACIAR for the financial support provided through these projects that has made this conference possible. We would also like to thank Forest Foundation Philippines (FFP) for providing financial support to sponsor the attendance of local delegates and to hire the conference venue. We are grateful to the Asia Pacific Forestry Network (APFNet) for their funding to support three international participants to present insights from FLR projects in their home countries. We also thank the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) and Energy Development Corporation (EDC) for the financial assistance.

We extend thanks to the various conference organizing committees for all of the hard work that has gone into making the conference a great success. The project staff and researchers from ASEM/2016/103 based at the Visayas State University have work tirelessly on the local logistics to ensure that the conference has run smoothly. From the Australian-based team, Drs Liz Ota, Nestor Gregorio, and Sharif Mukul have worked hard to coordinate the participation of more than 60 international researchers and in the production of the various materials associated with the conference.



Professor John Herbohn
Conference Chair



Professor Robin Chazdon
Conference Chair

Day 1 PLENARY SESSION Moderator: RHETT HARRISON

Keynote plenary: The Forest and Landscape Restoration Context (*Ballroom III*)

THE ESSENCE OF FOREST AND LANDSCAPE RESTORATION: BEYOND BANDWAGONS AND BUSINESS AS USUAL

Robin L. Chazdon

Tropical Forests and People Research Centre, University of the Sunshine Coast, Maroochydore DC, QLD 4558, Australia

ABSTRACT: Forest and landscape restoration (FLR) is becoming widely used as a term, concept, and recommended approach by NGOs, international conventions, and government agencies. As a holistic approach that strives to balance improvement in ecological integrity, livelihoods, human well-being, and landscape functions in deforested or degraded forest landscapes, FLR holds great promise. But this promise may be empty if the FLR process fails to take hold on the ground and does not move restoration and reforestation practices beyond past business-as-usual approaches. The *bandwagon effect* is a phenomenon whereby the rate of uptake of beliefs, ideas, fads and trends increases the more that they have already been adopted by others. As more people come to believe in something, others also "hop on the bandwagon" regardless of the underlying evidence or the lack of preparation, capacity or enabling conditions. Despite the advantages of being popular, the bandwagon effect could reflect a short-lived fad that undermines the need for robust evidence and long-term commitment.

FLR is a healing process, not a bandage. The essence of FLR is embodied in six core principles that distinguish the concept and practice from business-as-usual approaches to restoration, reforestation and land management. Although rapid implementation of 3- to 5-year projects may be necessary for demonstrating progress and reporting to funding agencies, externally initiated, governed, and financed interventions do not fulfil FLR principles if they fail to recognize and act on the need for local empowerment and governance of the FLR process. Local agency and sustained involvement are fundamental to co-create a long-term pathway that develops on the ground and transforms lives for the better. In addition to the role of impassioned and charismatic individuals (including religious leaders), the support, collaboration, and alignment of local institutions, professional associations, community groups, and government agencies are essential to reverse entrenched unsustainable and/or unjust practices within landscapes and territories. Implementation and sustainability of FLR

in landscapes will likely require adaptations in local governance, power structures, markets and supply chains. By grounding FLR practice on the core principles, the potential for transforming landscapes can be realized along with a growing evidence base and support tools.

COMMUNITY CAPACITY AND FLR PROGRESS

John Herbohn

Tropical Forests and People Research Centre, University of the Sunshine Coast, Maroochydore DC, QLD 4558, Australia

ABSTRACT: In tropical developing countries, smallholders and communities are often engaged to undertake restoration projects. However, the funders of reforestation and the government agencies and NGOs who are responsible for implementing restoration programs often treat both smallholders and communities, along with the landscapes within they live, as homogeneous. The capacity of smallholders and communities to implement restoration is however highly heterogeneous; and also impacts substantially on their ability and willingness to become involved in restoration /reforestation projects, such as those implemented as part of Forest and Landscape Restoration (FLR). This paper outlines our recent thinking about the relationship between community capacity and restoration. We develop a conceptual model which we then use to illustrate that communities with different levels of community capacity will require different levels and types of assistance if FLR projects are to have a high chance of success. We outline how this conceptual model can be used to design restoration projects to be implemented by community and smallholders and to better inform policy decisions.

ZTopic: Community Capacity & FLR Progress

John Herbohn commended the workshop for developing a model that showed the principles that can be applied to the community level as they work with community groups. He further noted that the learnings from the workshop will be developed into an action plan for FFP to improve implementation based on those principles.

Steve Elliott: *This is specifically for John Herbohn, is there any timeline to determine success of FLR?*

John Herbohn: *I think that is a great question. There is also another workshop that was held on that regard and one of the things we realized is that – a lot of our metrics of success for FLR has been short-term, i.e. the number of seedlings planted, the number of hectares planted. We need to develop metrics that are more, what is important should be outcomes for lead indicators of success in the future; e.g. longer-term forest cover – such indicators have been lacking in the FLR.*

Steve Elliott: *This is a question for Patrick Durst. What would be the ideal scale/size for forest restoration to proceed?*

Patrick Durst: *That is also another very good question there. But I don't think there is any set answer for that. When we talk about landscape restoration, we want an area that is big enough to deliver some of these broader benefits, ecological functions being enhanced and restored and expanded biodiversity. Some of these things can happen in pretty small areas, some require very large areas, and it really depends on what is there. When we get into incorporating the people into the landscape, there are advantages if we keep it small. But when we start talking about the ecological benefits, we need to expand.*

Steve Elliott: *This is addressed to all speakers: My question has to do with language. And the term "incentivize". Is there a room for incentives in grooming behaviour? And how do we evaluate equity within these groups?*

Patrick Durst: *Ideally, we want people to do what is good for society or good for the community or good for themselves. But I'd rather use the term "compensation" because I was talking in terms of looking for people who potentially are going to feel they are "losers" in the process. So, we are talking of compensating losers; we provide incentives to people who are doing good. Maybe they are two sides of the same coin. But perhaps incentive is a nicer term, and incentivize them to do the right thing. Incentive is a nice word for a financial planner, but sometimes it is good to compensate people so that they will feel that they are giving their share. The second part of your question on what is a fair share and assessing the equity and inequity in communities is a little bit more complicated for me and it would be better for my other colleagues to answer that.*

John Herbohn: *It's really a very complex issue on who the winners, who the losers are in a community; who benefits and who doesn't ... I think it just comes back to diffuse the community as the focal point and engage the community as a primary stakeholder. The preferences and desires are building on the planning stage. And you get a better chance of an equitable outcome than if you simply use a top-down approach. Part of this equity issue is dealt by ensuring that communities have a real voice in planning of the reforestation and restoration.*

Patrick Durst: *I just would like to add one thing to that. From my experience, I am amazed at how clear community groups sometimes are and they themselves are in identifying who are going to be disadvantaged, who needs additional help, additional compensation and incentivizing. That process is not something someone from the outside could do very well.*

Robin Chazdon: *There is a real price in doing FLR. The FLR itself provides the rewards for the community. And by improving their environment, by improving their social cohesion, by reducing the inequities, by benefit-sharing, they have already transformed their social structure, their governance, and their landscape. That is a prize for everybody.*

Topic: Main challenges on the ground for practitioners

Andres Ignacio: *This is for all speakers: Is there any consideration on the role of the youth in any of the strategies? Because from where we are, in Mindanao, we focus a lot on the youth participation formation so that we will have something more long term in terms of perspective and appreciation of the process.*

Patrick Durst: *Thank you. I think that is a very good point. That should've been included in all our presentations. Looking at the trend of youth in the community – going out to study...and they never come back. This may not be a bad thing. But in many cases, we also would like to make it viable for youth to carry on and the community to carry on. But this won't happen if there is no opportunity and they have no interest.*

Patrick Durst further stressed that a “facilitator needs to walk on water,” explaining that there are agencies working with different sectors that are actually working in a single community. However, it takes somebody who has the sense of being able to pull everything together for creativity and be able to motivate people to work together in one particular landscape or area.

Topic: The Essence of Forest and Landscape Restoration: Beyond Bandwagons and Business as Usual

Tom Swinfield: *Is there any cross-sectoral collaboration? (Voice is fading away; cannot decipher the question he is asking.)*

Robin Chazdon: *Well, for one, I don't think it requires money necessarily. There are budgets that can be reallocated to some of these cross-sectoral programs. So rather than each of the units having their own FLR mandate – there can be some collaboration and getting them to pitch in some amount of their budgets. There is a good example in Brazil, the former Brazil where this happened. A variety of different ministries formed a working group to fight deforestation in the Amazon. It was very effective when this was going on. This also involved the police force for public security. They had a very sensitive sending remote system – were very successful in countering these problems that any single unit could not do on its own. I think there is a need to show pilot examples in some countries where we can learn lessons from that consider differences in each country – need some kind of FLR taskforce that will be able to initiate its activities.*

Celso Diaz: *This question is for Robin Chazdon. If I am practitioner of FLR, I would follow those discussed. How do you operationalize those core principles?*

Robin Chazdon: *That is a very good question. And it is something that a group of people who are working on that for the last couple of years. In fact, we just had a workshop on these issues. We are not quite there yet – there will more discussion on this later and perhaps you can join that discussion. Essentially, we think we can develop working frameworks from the same basic set of principles that everybody shares. Then we can have a timeline for steps (logical progression outlined), because certain activities need to happen first before a lot of others happen.*

Day 1 PANEL SESSION Moderator: ROBERT FISHER

Panel: Advances in science, practice and policy to inform FLR and improve outcomes (Ballroom III)

CAPACITY-BUILDING FOR FOREST LANDSCAPE RESTORATION (FLR)

David Neidel

ELTI Asia Program

ABSTRACT: Forest Landscape Restoration (FLR) is critical for conserving biological diversity and ensuring the adequate provision of fundamental environmental services. Restoration of degraded lands, however, often has had limited success in terms of quality and extent due to financial, technical, political, and socio-economic constraints. This presentation will explore some of the challenges to scaling up FLR efforts by examining the work of Yale University's Environmental Leadership and Training Initiative (ELTI). Since 2006, ELTI has been working to increase local capacity to conduct forest restoration and degraded land rehabilitation through a variety of field-based, online, and blended training events. Through its Leadership Program, ELTI also provides Training Program alumni with follow-up support to help ensure that the knowledge and skills learned through the trainings are implemented on the ground. This presentation will provide an introspective assessment of ELTI's work on FLR. It will also highlight the array of strategies that ELTI is using to scale up FLR, as well as explore some of the challenges that have arisen in this work and the key lessons learned. This presentation will also give particular focus to the importance of network building to overcome impediments to field implementation. Finally, it will present some of ELTI's achievements to date while underlining the difficulty in formulating and actualizing metrics of success.

FAO'S FOREST AND LANDSCAPE RESTORATION (FLR) INITIATIVES IN THE ASIA-PACIFIC REGION

Karl Villegas and Kenichi Shono

Food and Agriculture Organization of the United Nations (FAO), Bangkok, Thailand

ABSTRACT: Over the past two decades, forest area in the Asia-Pacific region overall has been increasing. However, this trend is due to large-scale reforestation efforts in a handful of countries, while deforestation and forest degradation remains high in many countries, particularly in Southeast Asia. Despite some achievements on forest restoration, the extent of degraded lands that could benefit from restoration remains huge. Recognizing this potential, ambitious international, regional and national forest restoration targets have been adopted. With the increased recognition of the importance of accommodating broader

objectives and values at landscape levels in implementing restoration programs, there is an emerging emphasis on forest and landscape restoration (FLR) as an integrated response. FAO has been implementing a diverse range of activities to support countries in the implementation of FLR in response to member countries' needs. These include: 1) the development of a regional strategy and action plan on FLR; 2) supporting the development and implementation of national FLR plans in Cambodia and Philippines through the FLR Mechanism (a global FLR programme of FAO); 3) strengthening coordination and collaboration among partners; 4) recent publication of "Advancing the Role of Natural Regeneration in Large-Scale Forest and Landscape Restoration"; 5) co-organization of workshops and training with partners focusing on financing, private sector investment and FLR monitoring; 6) mobilization of financing for FLR; 7) launching of a global project on FLR funded by the International Climate Initiative (IKI); and 8) supporting field actions on FLR through various field projects.

Topic: FAO's FLR related initiatives in Southeast Asia

Inquisitor: This is for Karl Villegas. Recognizing the need to promote the concept and principles of FLR, and importance of providing support for this, I would like to know how many countries in the Asia Pacific have documented and implemented FLR plans?

Karl Villegas: As of now, support to FLR plans & initiatives is extended to two countries in the region. One is in Cambodia and the other is in the Philippines. These two countries have FLR Action Plans and have collaborated with the government.

Inquisitor: This is for Director Sofio Quintana. I have two recommendations that I would like to share to Dir. Quintana. I think we should maximize the materials being produced by the 28 SUCs regarding facilities. There is a need to buy all the seedlings produced by these SUCs. And secondly, the accreditation of forest nurseries. It is already included in Many are asking the details of the accreditation process. But there is already a clear set of guidelines as there has been 7 years that passed.

Sofio Quintana: In fact, we will now be issuing an order to all regional directors to coordinate with state universities and colleges so that the seedlings they will be producing in their nursery facilities will be used in their respective targets. Agree and I was also part of the team that drafted the policy that there should be an accreditation of all nurseries. ERDB will be responsible for the accreditation process, certification will be issued by Forest Management Bureau.

Inquisitor: This question is for Karl Villegas, FAO speaker. Based on the observation that there is an increase in the forest cover, my question is ... was there an attempt to measure increase in biodiversity along with these increases? Have there been increase in ecological services?

Karl Villegas: Yes, I can see in behalf of the country projects in the Philippines. There is an existing effort to measure biodiversity but focused on traditional agroforest landscapes in traditional heritage sites. There is also effort to measure productivity in traditional agroforest landscapes. FAO has come up with ... how to measure biodiversity in these sites.

Inquisitor: This is for Director Sofio Quintana. In terms of tree selection, maximizing seed quality, to what extent is local knowledge used to protect genetic biodiversity?

Sofio Quintana: We are promoting indigenous species in the restoration of forest land through the National Greening Program (NGP) in order to address the multiple purpose of the NGP, for the restoration of the forest land, measure the increase in the restoration capacity of the land, increase in food security, and at the same time be able to address issues related to biodiversity.

Inquisitor: This question is for Jerry Vanclay. What recommendations can you give for a way forward?

Jerry Vanclay: *Think more broadly when doing FLR, think of what community needs are, which serve the community. Conduct new experiments that are efficient to know which species work - it would be good to have different kinds of research to do that.*

Inquisitor: *Here is another question for Jerry Vanclay. Do you have any evaluation on the capacity of the community (how many hectares) to manage these forests?*

Jerry Vanclay: *First number of hectares the 1 hectare was planted with trees. Then community establishes and develops relationship with the Department of Environment and Natural Resources (DENR) because prior to this there was suspicion (absence of trust) between the community and the DENR. Through the trust that was created after planting in this initial 1-hectare piece of land, the community then applied for a bigger land area under the Community Based Forest Management Agreement (CBFMA). So, they were then given the 2, 200-hectare site – some of which are agroforest, some are degraded, and some were deforested. During the time that the community is managing the 2,200-hectare land, they planted additional products, plantation around the area.*

USING LEADING AND LAGGING INDICATORS FOR FLR

Liz Ota¹, John Herbohn¹, Jennifer Firn² and Nestor Gregorio¹

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ABSTRACT: Current major forest restoration goals around the world are based on a forest and landscape approach. This approach is concerned with not only enhancing biodiversity conservation and ecological function, but also with improving the status and wellbeing of people and communities involved. Landscape-scale approaches are characterised by multi-governance structure and management, embedded in a larger socioeconomic-political context. Despite this complex setting, in which stakeholders have different priorities at different levels of governance, targets are often planned, implemented, measured and reported based solely on number of seedlings or area planted. Besides the plurality of objectives sought, an additional concern with the way forest restoration is assessed refers to the short period in which success is expected to be observed. Because the current paradigm of forest restoration combines multiple objectives related to both ecological and human wellbeing and is focused on long-term processes instead of interventions in individual sites, projects and programs, we defend the use of leading and lagging indicators to design, plan, assess and manage adaptively forest restoration for enhanced impacts.

Topic: Using Leading and Lagging Indicators for FLR

The discussion after the presentation mainly focused on the identification of good leading indicators. The presenters highlighted that either lagging or leading indicators can be used for monitoring progress of activities.

The researchers further explained that the efforts agencies can make to simplify complicated but good leading indicators (e.g. culture) to villages is to *“take care of the complicated part and just deliver the easy part that can be used in the communities.”* They assured that the indicators will be tested with different stakeholders to gather feedback and develop an easier model.

Day 1 CONCURRENT SESSIONS

Concurrent Session 1: Enabling Conditions for Forest Landscape Restoration (FLR) in Bukidnon/Misamis Oriental, Philippines (*Ballroom III*)

FOREST FOUNDATION RESULTS FRAMEWORK 2017-2021: SUSTAINABLE FOREST LANDSCAPE APPROACH IN BUKIDNON/MISAMIS ORIENTAL

Forest Foundation Philippines

ABSTRACT: Forest Foundation Philippines (formerly known as the Philippine Tropical Forest Conservation Foundation) developed a five-year program plan, with priorities given to the forested landscapes lying within the geographic areas of Sierra Madre, Palawan, Samar-Leyte and Bukinon/Misamis Oriental, given their ecological significance and importance to their neighboring provinces and regions. The Framework employs sustainable forest landscape approach through supporting projects that aim to increase understanding on the impacts of a holistic management approach and establish participatory and coordinated forest protection strategies on a large scale.

The forested landscape of Bukidnon/Misamis Oriental is critically important as it covers the Cagayan de Oro River Basin, five protected parks, and other forestlands. Moreover, the landscape is recognized as home to the tribes of Higaunon, Manobo, Matigsalug, Talaandig, Tigwahanon and Umaymnon. Due to the richness of natural resources, the landscape faces threats that contribute to the deterioration of products and services crucial to the livelihoods and quality of life of both forest-dependent and lowland communities. Beginning 2017, the Foundation, in partnership with multiple stakeholders, provides support to around 12 projects that will enable sustainable forest landscape management and restoration in Bukidnon/Misamis Oriental.

The paper discusses how participatory and coordinated strategies on forest protection and restoration in Bukidnon-Misamis Oriental provided the enabling conditions toward a sustainable landscape.

SCIENTIFICALLY-SOUND FOREST ECOSYSTEM ASSESSMENT: LAND COVER MAPPING

Environmental Science for Social Change (ESSC)

ABSTRACT: In 2005, a land cover assessment and mapping of Bukidnon Province was conducted by the Environmental Science for Social Change (ESSC), indicating various land cover classes such as natural forests, plantation forest and crops. In an effort to update this Bukidnon land cover map, ESSC is now performing a new land cover assessment for 2018/2019. Sentinel 2 satellite images collected from June 2017 to the end of 2018 were downloaded and processed and were complemented by photos and images from ground and aerial campaigns during the same period. The 2018 land cover map identified 22 land cover classes which have been designed to be comparable to the 2005 Bukidnon land cover data. This allows the detection and mapping of land cover/land-use changes between 2005 and 2018 using various techniques such as the stock change method. Preliminary analysis on the drivers of forest change was conducted, identifying sources and agents of deforestation and forest degradation as negative drivers and forest protection and sustainable management as positive drivers.

The 2018 Bukidnon land cover map shall serve as an input for Forest Land-use Planning for Local Government Units and the DENR and be the major reference for forest conservation interventions from hereon. This is relevant in FLR as restoration interventions must consider the 2018 land cover map as a baseline and basis for site-specific FLR interventions.

SCIENTIFICALLY-SOUND FOREST ECOSYSTEM ASSESSMENT: MANGROVE ASSESSMENT

Macajalar Bay Development Alliance (MBDA)

ABSTRACT: Species-site suitability is crucial in mangrove restoration and not just based on convenience in mangrove planting such as the common practice of direct planting of mono species (*Rhizophora*). Disregarding the basic requirement on species-site suitability may lead to mortality of planted mangroves or even further environmental degradation such as the case of seagrass areas and mudflats planted with mangroves. Suitability assessment requires survey and mapping on the location of the existing mangrove forest (natural growth and planted) and characterization of the mangroves as to species composition, substrate and other information.

To generate a scientifically-sound assessment of the mangrove forest of Macajalar Bay in Misamis Oriental, the Xavier University-Ateneo de Cagayan implements a mangrove mapping project. This aims to generate information on the mangroves of Macajalar Bay as to bio-physical profile (of natural growth, planted mangroves and potential areas for restoration) and impacts of sedimentation/siltation on the mangroves. The information shall be

developed as Communication, Education and Public Awareness (CEPA) materials for distribution to the member-LGUs of Macajalar Bay Development Alliance (MBDA).

The paper reflects the realities and challenges of conducting bay-wide scientifically-sound mangrove forest assessment as basis for mangrove management including restoration.

CAPACITY STRENGTHENING, PARTNERSHIP BUILDING AND ENHANCING GOVERNANCE

Xavier Science Foundation (XSF)

ABSTRACT: Mt. Kalatungan Range Natural Park (MKRaNP) is home to local and indigenous communities that consider forests as sacred grounds and source of their basic needs such as food and medicine. These communities play a critical role in rehabilitating and protecting the forest within their domain. Thus, engagement of IP communities in forest management and conservation of local ecosystems is deemed essential.

This critical role of indigenous communities in forest conservation is not unique to Mt. Kalatungan but has been recognized in many other countries as reported by the Convention on Biological Diversity Secretariat and the Indigenous Peoples and Local Communities Conserved Areas and Territories (ICCA).

Capacities of these communities, however, require further strengthening consistent with their Indigenous Knowledge Systems and Practices. There is also the need to recognize the emerging role of youth and women in forest conservation. Moreover, given the intensifying commercial pressures and natural calamities that cut across boundaries, there is an urgent demand to harmonize resource governance with other stakeholders, mobilize support among their partners and enhance the policy environment.

The paper reflects the catalytic role of Xavier Science Foundation (XSF) in enhancing the capacities of the indigenous communities on forest and protected area management, building partnerships and enhancing resource governance in MKRaNP.

PLACING INCENTIVES FOR PROTECTING AND MANAGING FORESTS OF THE MOUNT KITANGLAD RANGE NATURAL PARK

Kitanglad Guard Volunteers (KGV)

ABSTRACT: The Mount Kitanglad Range Natural Park (MKRNP) was declared as Protected Area through Republic Act 9878 and ASEAN Heritage Park. It occupies portions of eight municipalities in Bukidnon and provides various ecosystems services to the province and nearby cities. It is the ancestral domain of the Talaandig, Higaonon and Bukidnon.

The Kitanglad Guard Volunteers (KGV), composed of around 380 members from the 28 barangays surrounding the MKRNP, was organized in 1997 to assist in forest protection. A federation of people's organization, KGV is primarily engaged in forest monitoring and addressing threats such as forest fires. The federation's efforts are widely recognized, given its contribution to the sustainable management of MKRNP. Initially operating on a voluntary basis, the KGV now receives both cash and in-kind assistance from the DENR, Local Government Units, and other donors. However, there is a need to amplify support for the production of the wide range of products with economic value coming from sustainable forest landscapes.

The paper shall discuss the support on improving the livelihood assets of the KGV communities as an incentive for protecting and managing the forests of MKRNP.

Concurrent Session 2: Approaches and practices for FLR (*Press Room 1*)

TROPICAL PEAT SWAMP FOREST RESTORATION: NATURAL, ASSISTED, OR DIRECT RE-VEGETATION?

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ABSTRACT: After fires, haze and high carbon emission, Indonesia is focused on restoring its expansive areas of degraded tropical peat swamp forests (TPSF). With over ten million hectares to restore, however, it is essential that cost-effective, landscape-scale methods are used. Direct re-vegetation is expensive and time-consuming, although sometimes necessary. Assisted natural regeneration (ANR), such as removal of weeds, can be appropriate in areas with some self-regeneration capabilities. Finally, in some less degraded areas, natural regeneration may be sufficient.

In Central Kalimantan an area of over one million hectares of TPSF became degraded through a government agricultural scheme in the 1990s. Now the focus of restoration activities, an assessment of best re-vegetation methods was undertaken. Some degraded areas were found to support high natural seedlings density but were unable to continue growing due to a thick invasive fern canopy – in these areas ANR was conducted through weeding trials. Other areas lacking high seedling densities were targeted for direct replanting. Vegetation monitoring plots were established at the ANR, replanting and natural forest sites.

Measurements enabled a quantitative analysis on the densities, species compositions and heights of the seedlings across all treatments. This study showed that although seedling densities were initially lower in ANR sites than at replanted sites, the ANR area showed good signs of continued recruitment. Growth rates were comparable, and ANR species diversity was higher than replanted sites. The ANR activities were also far less costly than replanting. This study, therefore, highlights the importance of site-assessment and employing targeted restoration methods.

CAN NATURAL REGENERATION BE A COST-EFFECTIVE RESTORATION STRATEGY IN THE UPLAND PHILIPPINES?

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ABSTRACT: Forest landscape restoration in the tropics has a clearly recognized potential for biodiversity conservation and climate change mitigation. Different interventions are currently available to restore degraded forested landscapes with varying level of biodiversity and carbon co-benefits. High maintenance costs, technical and operational knowledge, however, hindering many of their implementation in the tropics. Natural regeneration in such circumstances can be a desirable forest restoration strategy. We measure the biodiversity and carbon co-benefits in secondary forests regrowing naturally following shifting cultivation in the upland Philippines. When compared with other existing restoration strategies in the country, we found that natural regeneration can offer superior biodiversity and carbon co-benefits. Our financial analysis also confirmed natural regeneration as a cost-effective restoration strategy in the Philippines. We finally discuss potential mechanisms through which natural regeneration can be integrated into national forest restoration programs and issues that may affect their progress.

PROVISION OF ADEQUATE TREE SEED PORTFOLIOS TO ENHANCE PRODUCTIVITY AND RESILIENCE OF FLR IN ETHIOPIA

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ABSTRACT: Ethiopia intends to expand its existing 15.5% forest cover to 30% by 2030. These ambitious plans will require largescale afforestation and reforestation. However, a major challenge is that FLR requires the use of multiple tree species at the same time. In Ethiopia, as in most countries, the availability of seed of diverse species is limited, posing the risk of restoration based only a handful of species. To address this, the Provision of Adequate Tree Seeds Portfolio Project (PATSP0) is supporting the Ethiopian tree seed sector, with the aim of invigorating and enabling it to provide high quality tree seed of priority species for largescale restoration. Implemented by ICRAF in coordination with Ethiopia's Environment, Forest and Climate Change Commission and the Ethiopian Environment and Forest Research

Institute, PATSPO focuses on the national tree seed centre and the four regional seed centres in Amhara, Oromia, Tigray, and Southern Nations and Nationalities Peoples' Region. It has already identified 150 species of priority among the approximately 1200 woody species that are indigenous to Ethiopia and set up mother blocks of important species, including *Cordia Africana*. PATSPO partners include the Ethiopian Orthodox Church, the forests and tree compounds of which are repositories for many Ethiopian tree species, the private sector, farmers and the community groups, which collect most of the seed being distributed and sold through the seed centres and private seed dealers. PATSPO is funded by the Norwegian government and anticipated to run from 2017 to 2020.

PLANT FUNCTIONAL TRAITS FOR SPECIES SELECTION IN TROPICAL SUBSISTENCE AGROFORESTRY SYSTEMS

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ABSTRACT: Plant species selection, including the many choices on combinations of species and life-forms, is one of the greatest challenges in tropical forest restoration, particularly where the livelihoods of forest dependent people represent a central consideration in the selection process. With over 60,000 identified tree species alone, generalisable tools that break down choices, such as the use of plant functional traits to select for desired ecological functions and services, are becoming increasingly popular. Most of the focus on functional traits has been on how plants can influence ecosystem processes, however there is a lack of understanding on how functional traits could be applied to similarly improve socio-economic outcomes of local people in subsistence agroforestry systems. For example, plant growth rate is a trait that influences ecological succession, however also reflects local people's needs as slow growth produces timber while fast growth produces fuelwood. This study aims to investigate the use of plant functional traits to inform and improve species selection for short- and long-term environmental and socio-economic outcomes. Using the Philippine National Greening Program (NGP) as a case study, this research will examine the current species selection techniques across 17 regions since the NGP's inception in 2011, compare species diversity with trait diversity across different spatial scales, and investigate how the objectives of the NGP compare to the resultant planting data.

A SMALLHOLDER-BASED SEEDLING PRODUCTION SYSTEM TO IMPROVING FOREST RESTORATION OUTCOMES IN THE PHILIPPINES

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ABSTRACT: The importance of high-quality seedlings in forest landscape restoration (FLR) is widely understood although this is often given scant attention in the planning and implementation of FLR programs. A series of research projects were implemented in the Philippines to investigate the underlying reasons for low-quality seedlings in community-based forest restoration programs in the country. Intervention measures to improve the supply and promote the planting of high-quality seedlings were pilot tested. It was found that prevalence of low-quality seedlings is not merely a function of technical issues but attributed to many factors including less developed supply chain of high-quality germplasm, lack of appreciation of the importance of high-quality seedlings, limited funds to adopt nursery best practice, and lack of policy regulating the quality of seedlings in forest restoration projects. Addressing the issue on lack of technical skills does not necessarily result in increased production and planting of high-quality seedlings. Improved access to high-quality germplasm and governance promoting the uptake of high-quality planting materials are imperative. Our research also suggests that producing high-quality seedlings does not necessarily require expensive facilities and sophisticated techniques. Simple nursery practices that are often neglected will profoundly improve seedling quality when rectified. The key findings of our research have broad applicability to seedling production for FLR programs throughout the tropics.

Topic: Tropical Peat Swamp Forest Restoration: Natural, Assisted or Direct Revegetation?

Jim Hallet: *This is for Graham Laura. Filling-up of the canal seems to be an ambitious project—what did it entail?*

Graham Laura: *There are different kinds of canals which according to hydrologists require different strategies (to be blocked). Thus, the organization has been working closely with the government's Department of Public Works to have the needed expertise, especially in trying to recreate a peat system for the canals, dams and infillings to work simultaneously. For the small canals, BOS has a canal blocking program for the communities to use. Communities are also given alternative packages for them develop ownership of the project.*

Juvilyn Dormiterio (IIRR): *This question is for Graham Laura. What is the most challenging part in forest peatlands restoration compared to other forest landscape restoration?*

Graham Laura: *Despite a lot of capacity, knowledge-management, and policies in relation to Indonesia's peatlands, the most challenging part is answering the question on "why is it still not working?" This is because it is a very dynamic system- it is an ecological and socially dynamic system. The focus is not just on the biomass or forest alone but including the peat, the water, and its conditions. Systems when used by people changes, as well as this system. Thus, any restoration project—considering its goals—are also constantly or shifting. At present, we are now focused on networking, on Indonesia's jurisdiction, and doing things on the right time.*

Topic: Accelerating Succession through Selective Thinning

Jeffery Gesida: *This is for Tom Swinfield. We have an impenetrable area on field. Do you have any experience in terms of opening a forest- free for all?*

Tom Swinfield: *The answer to the question has two parts: (1) What happen if you open-up a forest? People may use the access to take forest products, especially to gain income. (Yes, the case was experienced.) (2) Could this be done in an impenetrable area and what is its value? It depends on what the project desires for the forest's future condition. If the desire is to generate more utility from the perceived unused forest for the community to generate revenue then it may be on value to do so.*

Grahame Applegate: *This question is for Tom Swinfield. In 1950s or 60's a forest department tried this thinning for commercial production. Similar results, in the presentation, were showed up to the timeframe/age of 20 years. Are you going to continue in your measurement and for how long? Once you start the thinning process, what will happen to the forest once the project leaves?*

Tom Swinfield: *The comment and suggestion are very fascinating and useful. The question on how long it will be monitored, there are permanent thoughts in place. The trees are tight which can be checked on the future, provided these are maintained at some point. It will not be surprising if in the future more late successional species will be seen than the desirable species. But again, it will all depend on the wanted purpose of the forest. It is not impossible if the forest be part of the managed forest and landscape in the future which delivers a mixture of timber and biodiversity. The answer to the second question is still not known or if that situation is really a problem, especially if the agenda is to make something out from the forest.*

Topic: Plant Functional Traits for Species Selection in Tropical Subsistence Agroforestry Systems

Karl Villegas: *This question is for Michelle Mogilski. Have you considered, as one of the criteria, tenure instruments or rights because in the Philippines most of the NGP sites where people organizations/ communities are relying on memorandum of agreements with the DENR which affects the continuation or maintenance of projects or plots?*

Michelle Mogilski: *Not quite sure/familiar with the tenure instruments or issues on the NGP sites.*

Karl Villegas: (Functional Traits of Selected NGP species) *Have you considered the perspective of the local people because what we are imposing (as functional) may be based on scientific literature but local people may have different perspective on the functional traits of species? Also, the gender of the local people may vary- the males may prefer the functionality of a timber while for females it's the functionality to bear fruits.*

Michelle Mogilski: *Yes, the different community values of specific species are being considered. Interviews with the community will focus on how and why they perceive and value such functionality of species like narra.*

Tony Page: *This is for Michelle Mogilski. Have you considered the plasticity of the traits, especially some plant traits maybe moved or be complementary to other species?*

Michelle Mogilski: *Yes, this is considered. Maybe the initial start would be to look on trees which are more rigid on how they appeal, like growth rate. The start of the study would be simple then I will work my way out on the compounding factors.*

Topic: Smallholder-Based Seedling Production Systems to Improving Forest Restoration Outcomes in the Philippines

Karl Villegas: *For Arturo Pasa, are there any instances of pests or diseases considered in the seedling assessments in the nurseries?*

Arturo Pasa: *An experience with the partnered people organization shared an experience where a disease happened in the nursery. The people's organization applied insecticides and later learned that the problem was fungus-related. The expert who figured about the fungus problem was then hired by the team of sir Arturo Pasa to be part of the team and assist in resolving such problems.*

Concurrent session 3: Designing, monitoring and managing adaptively for success (*Press Room 2*)

TO GUIDE OR NOT TO GUIDE FLR? ANALYZING PROPOSED GUIDANCE AND STANDARDS

Marcel Starfinger

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ABSTRACT: The Forest Landscape Restoration (FLR) concept recently experienced unparalleled uptake and political attention, which is also due to its inclusiveness and win-win rhetoric. This led some to voice concerns about conceptual ambiguity and potential negligence of ecological or social aspects and thus proposed standards as a remedy.

This study explores different proposals and expert statements regarding standards or guidance for FLR by applying argumentative discourse analysis. All of the experts agreed to the necessity of creating some form of improved guidance for FLR. The rationales for this choice varied and included the need for conceptual clarity. Others intended to exclude ecologically unsound practices or ensure longevity of restoration. While only half of the experts supported an actual form of standards, another group disagreed and rather called for alternative forms of soft guidance. Reservations arose due to concerns about national sovereignty or the significant expenditure of a standard setting process.

The most dominant discourses focused on sustainable development and ecological modernization that contested statements of a smaller group adhering to civic environmentalism. The analysis of the discourse coalitions revealed an overlap, as many agreed to maintaining conceptual inclusiveness but also voiced concerns about business as usual, which mirrors the opposed discourses. The results allowed to deduct standard/guidance typologies, which either complement existent guidance, make normative claims or are topic specific. Others are conciliatory or solely build on existent guidance. The results foreshadow the development of heterogeneous forms of softer guidance rather than one uniform standard.

DEVELOPING SUCCESS INDICATORS FOR SUSTAINABLE FOREST MANAGEMENT

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Abstract: A study was conducted in selected regions in the Philippines to identify set of criteria and indicators for assessing sustainable forest management. The research method involved a combination of key informant interviews, focus group discussions and stakeholder's consultations. Results of the study indicate that six (6) criteria and 38 indicators for assessing sustainable forest management and can be used as standards for the

implementation of forest certification in the country. The developed criteria and indicators aside from being in compliant to international standards, the applicability, measurability and attainability to the Philippine setting was also taken into account for the following management units: 1. Community-based forest management; 2. Industrial forest management; and 3. Private tree plantations/farms. The 38 indicators are distributed among the six (6) criteria as follows: Criterion 1- Compliance with forestry laws, rules and regulations with eight (8) indicators; Criterion 2- Maintenance of ecosystem health and vitality with five (5) indicators; Criterion 3- Maintenance and enhancement of productive functions of forests (timber and non-timber forest products and services) with six (6) indicators; Criterion 4 – Maintenance, conservation and appropriate enhancement of biological diversity in forest ecosystems with eight (8) indicators; Criterion 5 – Maintenance and appropriate enhancement of protective functions in forest management (notably soil and water) with four (4) indicators and Criterion 6 – Maintenance of other socio-economic functions and conditions with seven (7) indicators. The developed criteria and indicators can provide comprehensive framework towards the attainment of SFM in the country.

IS SEEKING PERFECTION IN FLR OUTCOMES ACHIEVABLE OR DESIRABLE?

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ABSTRACT: There has been considerable discussion in the FLR literature about developing ways of assessing the quality of outcomes. There are also discussions about the desirability of restoring ‘original’ biodiversity. These discourses are effectively about aiming for perfection. This paper argues that defining perfect outcomes raises numerous practical and theoretical difficulties and questions how meaningful the search for perfection can be. One major challenge is the practical difficulty of restoring forest landscapes to anything like their original conditions. Even the most optimistic efforts are unlikely to replace anything near all original biodiversity. A related challenge is whether the aim in anthropogenic landscapes would be to restore the landscape to conditions prior to human influence. A third major challenge is the question as to whether anything original is possible in the context of inevitable climate change. There is a deeper issue about the aims of FLR. Is it about restoring natural landscapes or does it also include human use and livelihood outcomes? The paper argues that, if FLR is about collaboration with ‘stakeholders’ or negotiated outcomes, then questions about who decides what a perfect outcome would become central and that any consensus about perfect outcomes is unachievable and undesirable. The paper will consider a variety of case studies, including Papua New Guinea and others from Asia.

Topic: To Guide or Not to Guide FLR? Analysing proposed guidance and standards

Liz Ota: *How should we guide FLR and what tools do you consider the most needed at the moment?*

Marcel Starfinger: *(Agreement) No guidance or no standards is not an option. In light of the climate crisis, it is better to work on a smaller scale of good quality restoration than aim for very large goals that may only bring temporary restoration. (Proposed Action) A softer form of guidance based on principles may be used. In terms of what tool, the presenter is looking forward to the FLORES taskforce presentation. There is a need to have a discussion on what to do.*

Topic: Revision of the ITTO restoration guidelines

Riina Jalonen: *Why was the term restoration dropped from the revised guidelines?*

Cesar Sabogal: *(Agreement) The “restoration” word was not dropped. Only in 2002, the word “landscape” was not in the title and instead used “restoration” or “rehabilitation”, which were terms ecologists decided to use. (Proposed Action) Now that restoration is an umbrella term, they will be using “Restoration for tropical forest landscapes” in the revised guidelines, with emphasis on the forest part because, within it are many other tools that deal with other areas like agriculture, and landscapes.*

Riina Jalonen: *The question mark on the investment prospects for natural forest production models.*

Cesar Sabogal: *(Proposed Action) This may likened to identifying a business case, in terms of protection of assets, resources, and social license, as done in the business sector. As in the Philippines, together with the government and other stakeholders, certain policies and guidelines, and assistance, were developed for them to put money or invest on ecosystems-based projects to protect natural forests.*

Topic: Is seeking perfection in FLR outcomes achievable or desirable?

Rhett Harrison: How are you going to manage these platforms?

Robert Fisher: *(Proposed Action/s)* In the Ostrom principles, a hierarchical structure is suggested. This means people at the local level are given a voice but there is also some representation system to include the higher levels.

Rhett Harrison: *Who's going to do it?*

Bob Fisher: *(Agreement/s)* Not in any purist way, it can be more or less an independent facilitator. For example, in social impact assessments in Australia, the company who is the protagonist of the project employs the consultant who will do the social/environmental impact assessment. But the problem with this process is that it's arbitrary and unpredictable, yet completely central to what we're trying to do.

Rhett Harrison: *(Proposed Action/s)* There are arguments that independent facilitators may be employed over those from any of the important stakeholder groups. Maybe we need to think about the kinds of additional knowledge we need to get from such social processes. These kinds of questions can also be examined through an experiment, which can be planned, especially in the national scale. By creating a cost-benefit analysis, for example, having an independent facilitator may be more expensive but may actually save a lot of time and get better results, etc. Maybe we need to think about how we can identify these set of problems and embed learning into the process so we get better at it as we roll out FLR. In FLR, to meet the targets set or agreed to by the government, the person appointed to be the facilitator will be pressured to proceed in a certain way. Therefore, it's more about how to achieve a greater degree of independence or getting into a situation where some people are really trusted.

Day 2

PLENARY SESSION
Moderator: RAFAEL CHAVEZ

Keynote plenary (*Ballroom III*)

RESTORATION AND MONITORING FRAMEWORK IN THE STATE OF SÃO PAULO, BRAZIL

Rafael Chaves¹

¹*Secretariat for the Environment of the State of São Paulo, Brazil*

ABSTRACT: To be effective, Forest and Landscape Restoration must be associated with clear and achievable results, necessary condition to make good action plans and avoid wasting money and efforts. In the last decade, many governments committed themselves to restore millions of hectares within their respective territories, encouraged by international agreements and inter-linked concerns about loss of biodiversity, ecosystem services and livelihoods. However, public policies did not grow or evolve at the same rhythm as those ambitious goals. This underscores the urgent need to build efficient frameworks capable of bridging the gap between knowledge and the effective practice to scale-up long-lasting restoration at a landscape scale. In this context, the innovative approach implemented by the São Paulo State government to verify whether the restoration targets are being achieved represents a ground-breaking policy regarding monitoring and legal frameworks. The regulation includes a set of three simple and integrative ecological indicators that shall be measured and informed through a geo-referenced online system until each restoration project attains the expected results, following a monitoring protocol that can be applied by landowners as easily as by specialists. The indicators used in Sao Paulo fulfil the Brazilian legislation need for biodiversity and ecosystem services provisioning. For FLR broader arrangements that shall contemplate multiple approaches, more components can be encompassed in the monitoring framework, especially addressing social aspects. I reinforce that, regardless of the context, it is possible to establish simple and practical monitoring frameworks, desirably associated with policy, to foster better restoration results.

Day 2

PANEL DISCUSSION
Moderator: ROBIN CHAZDON

Panel: Lessons learned: Case studies of FLR design, implementation and outcomes (*Ballroom III*)

PILOT FOREST RESTORATION PROJECT IN BILIRAN, PHILIPPINES

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ABSTRACT: The negative ecological and socio-economic impacts of forest and land degradation prompted the global aspiration to restore significant areas of denuded lands following the forest landscape restoration (FLR) approach. In the tropics, FLR is mainly undertaken by groups of smallholders whose livelihoods are primarily forest-based. Restoration initiatives are implemented mainly to alleviate poverty and restore the ecological integrity of forestlands. However, achieving the production and conservation functions of forest landscapes through the involvement of local communities is a significant challenge. In the Philippines, the implementation of forest restoration programs involving people's organizations (PO) showed mixed results. A case study was undertaken in Biliran Province to understand the impediments, and pilot test interventions to improve restoration outcomes. The project was designed using systems thinking, employing smallholder-based best-practice, and applying the principles of a participatory approach. The results revealed that weak governance as among the many issues that limit the success of community-based forest restoration programs. Initial participation of smallholders is mostly driven by short-term financial incentive, but long-term commitment to manage the trees is attributed mainly to sustainable livelihood, land and tree rights, equitable sharing of benefits, and improved human and social capital. The role of women in forest restoration cannot be overemphasized and the use of high-quality seedlings is essential. Our research suggests that addressing the multiple issues including technical, social, and economic is imperative but employing good governance is central to promoting a successful community-based forest restoration.

Topic: The BINHI Project

Camila Rebeiro: *For Liezl of EDC, sites that have been reforested but were destroyed by typhoon Yolanda were shown in the presentation. In your reflection, what are the things that need to be changed in planning to make the systems have more resilience to these types of events?*

Liezl B.: *We have sample documentation on the species of acacia during the time EDC was still a GOCC because we have those plantations. We found out that sites planted with exotic species have been totally wiped out during Yolanda compared to plots planted with native species and rattan wherein the top were cut. After a few months the native species have regenerated. Studies are still being conducted to learn more about native species to find out which are more resilient to typhoons like Yolanda.*

Topic: Managing Private Sector for FLR

For this topic, a participant asked the kinds of agronomic practices being undertaken by the company in terms of soil protection and/or reduction of agrochemicals, considering they follow the RSPO standards.

Lee Ming Enn: *There are principle & criteria that we follow. One of these is the best management practices. Chemicals is one of those things that we are trying to reduce & not using those hazardous chemicals. We have the integrated pest management control in Sime Darby. We use the bird owl for pest control method as we are trying to put the biological control in place. We also try to put back any organic matter that is coming out in our operation. We have compost facilities in all our sites. And our practice of no burning. So, all tree stump are chopped down and brought to the field for decomposing instead of burning them.*

Topic: The concept of Investment in FLR

Brian Sharp was asked where socio-cultural values lie and which type of donors would be interested in these benefits, and whether these can be measured in terms of values.

Brian Sharp: *Often the environmental & social values are intertwined. When you improve the environment, you also improve the health of the people. With this I think it would be difficult to work with scale. It would also depend on the particular project, the kind of issues and how degraded the landscape is. But I think that ultimately there is gonna be more social benefits after the environmental benefits take hold.*

Stephen Elliott: *For Brian Sharp, I have a \$100M that I want to invest in FLR. I am very interested in biodiversity conservation. I want to invest in FLR, I want to maximize biodiversity conservation and I want a little bit about the bank rate of 5 – 6% and I will invest it for 10 years. Where do I put my money?*

John Herbohn: *To get a return that is better than bank value would be a bit difficult. But it all comes back to what you value. If it's more of environmental & social values, a small timber value that's gonna be a very low financial return. It really goes back to your expectation and what is possible.*

(General Comment) Robin Chazdon: *How do we see potential for private sectors in this investment scheme? Part of that would be combining various restoration intervention & really checking the landscape approach to see some grounding of the landscape approach. Combining some of where your commercial enterprises coming in with public good types of services that perhaps someday will have ...*

Brian Sharp: *Yes, public-private partnership is surely possible, and it could be beyond project basis. Who would the private actively involved in this? In most cases that would be in the local areas there might be a particular company that identifies the issue and is prepared to work with the government and forges a partnership to implement the solution. Some of the land could be suitable for timber production. There has to be an agreement between the government and the private entity on the terms. It has to be on a project-by-project basis.*

FOREST LANDSCAPE RESTORATION AND HYDROLOGICAL RECOVERY IN THE HUMID TROPICS: WHAT CAN BE EXPECTED REALISTICALLY?

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ABSTRACT: Tropical landscapes are changing rapidly due to continued deforestation for agricultural uses, extractive tree plantations, and slash-and-burn cultivation in some areas versus land abandonment and natural forest regeneration in others. Advanced post-forest land degradation has demonstrably led to major disruptions in the natural streamflow regime, with increased wet-season flows and reduced dry-season flows in many areas (as well as increased surface erosion, land sliding and stream sediment loads). Secondary forests now cover >50% of the total tropical forest area and constitute the dominant forest type in most humid tropical countries. Yet, the associated hydrological impacts are far from clear. Throughfall tends to be lower compared to old-growth forest (OGF) during the first 10 years of regrowth but stabilizes after ~20 years while stemflow may be greatly enhanced at the early stage. Transpiration appears to be higher relative to OGF after 5 years, but it is unclear for how long this situation applies and under what conditions (e.g. re-sprouting versus regeneration from seed). Soil infiltration capacity recovery during fallowing requires at least 1–2 decades after agricultural abandonment, with corresponding decreases in overland flow production and surface erosion, but peak flows in headwater areas do not seem to vary systematically with age of regrowth while reported trends for low flows vary between locations. Large-scale tree planting schemes have been initiated in an increasing number of tropical countries, amongst others in the expectation to improve streamflow regimes and reduce erosion and siltation. Much has been made of the high water use of fast-growing tree plantations causing streams to dry up after foresting grass- or cropland, but this widely held view is based mostly on controlled experimental studies in which soil degradation was not prevalent. Rather, evidence is on the increase that dry-season flows may indeed be boosted after planting trees on highly degraded land through improved infiltration that exceeds the new vegetation's higher water use (S Korea, SE China, SW India, Laos, Philippines, Costa Rica) although at least a decade of uninterrupted forest development appears to be required for the effect to become visible. A global modelling exercise of this 'trade-off' between changes in infiltration and tree water use indicates the greatest positive impact on dry-season flows in areas with high rainfall and initially advanced degradation. Certain types of tree plantations (notably teak) perform much more poorly in terms of their soil protection capacity and surface runoff generation and additional soil conservation techniques will be required.

The rainfall-enhancing effect of (large tracts of) forest has received renewed attention of late with the advent of moisture-tracking models predicting where moisture evaporated by regional-scale forests may be returned again as precipitation. The topic remains contentious, however, with model-predicted effects seemingly at odds with stable isotope-based evidence

as to the source of the rainfall (oceanic vs. terrestrial evaporation). Other gaps in knowledge with respect to the general theme of forestation and water include the quantification of agroforestry systems (likely less water-demanding); the possibility of using trees in degraded but foggy areas (especially under semi-arid conditions) to capture passing fog to increase soil- and groundwater recharge; and the relative capacity of agroforestry systems versus planted forests and natural regrowth to restore soil hydrological functioning.

SOIL AND WATER IMPACTS OF REFORESTING FIRE-CLIMAX GRASSLANDS ON LEYTE ISLAND (PHILIPPINES): KEY RESULTS OBTAINED BY ACIAR PROJECT ASEM/2010/050

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ABSTRACT: Decades of logging and slash-and-burn agriculture have turned large tracts of land in SE Asia into unproductive fire-climax grasslands that are generally perceived as being prone to surface-runoff generation and erosion. As such, these *Imperata*-dominated grasslands are widely targeted for large-scale tree planting. However, tropical reforestation schemes have been criticized for their potentially adverse impacts on streamflow, notably the reduction of dry-season flows. On the other hand, there are claims of *improved* dry-season flows after reforestation of degraded land, allegedly because the extra infiltration of rain water afforded by the reforestation exceeds the new vegetation's higher water use (the so-called 'infiltration trade-off' hypothesis). To examine one such, claim of improved streamflow after reforesting a degraded fire-climax grassland by the Manobo tribe near Tacloban City (NE Leyte, Visayas) in depth, we instrumented two headwater catchments with contrasting land cover but similar soils and geology (Basper: 3.2 ha, fire-climax grassland and shrub; Manobo: 8.75 ha, 23-year-old mixed broad-leaf 'reforest'). Rainfall inputs, streamflow outputs, soil- and groundwater dynamics, as well as water quality (electric conductivity EC and suspended sediment SSC) were monitored for a year (June 2013–May 2014). In addition, key physical characteristics of the grassland- and forest soils were determined. The area was hit by super-typhoon Haiyan on 8 November 2013, one of the largest events on record and causing major disruption in terms of landsliding in the Basper grassland and defoliating and damaging trees in the Manobo reforest.

Canopy disturbance during passage of Haiyan caused a temporary drop in leaf area index (LAI) of the Manobo reforest from 5.1 ± 0.65 prior to disturbance to 2.9 ± 0.9 four weeks after the event; the LAI recovered more or less to pre-disturbance values after ca. 4 months ($5.4 \pm$

1.3). Rainfall interception loss I was reduced accordingly from 18% of incident rainfall before Haiyan to 12% during the period with the most extensive defoliation, and back to 17.5% after canopy recovery. The effect of the disturbance on overall annual I was small at 4%.

Pre-typhoon average storm runoff coefficients (quickflow Q_q divided by rainfall P) for the grassland and reforest were 24% and 16%, respectively, indicating lower responsiveness to rainfall for the forest. For the much more rainy post-typhoon period the corresponding values were 47% and 44%, indicating extremely responsive hydrological conditions at the height of the rainy season *regardless of vegetation type*. Stormflow in the grassland consisted almost entirely of infiltration-excess overland flow (IOF) due to physically poor soils with very low soil infiltration capacity, while IOF was absent in the reforest due to high top-soil permeabilities. Substantial amounts of Q_q in the forest occurred only during peak rainy conditions when foot-slopes became saturated and generated saturation-excess overland flow (SOF). Data-based mechanistic modelling suggested that the higher stormflows during the post-Haiyan period were caused mostly by the higher rainfall rather than by reduced plant water uptake due to lower LAI.

At 27.4 t ha^{-1} , the annual sediment yield of the grassland catchment was high and heavily dominated by post-Haiyan sediment transport (94%). Haiyan generated ample sediment in the form of landslides and no obvious declining trend in stream sediment transport with time after typhoon passage was observed (indicating transport-limited conditions). No landslides occurred in the reforest, where annual sediment yield was low (3.7 t ha^{-1}); nearly two-thirds (64%) of the total were produced during the first two months after the typhoon. After this initial flushing, SSC dropped markedly, despite renewed high rainfall in April 2014, suggesting the system had become effectively supply-limited by then.

Comparing water-budget based estimates of annual evapotranspiration (ET) and annual stormflow totals (ΣQ_q) for the Basper grassland and the Manobo reforest under undisturbed conditions suggested that the extra infiltration following reforestation ($\sim 240 \text{ mm yr}^{-1}$) exceeded the extra ET of the reforest (100–185 mm yr^{-1} , depending on the method of estimation), implying a net positive trade-off of 55–140 mm yr^{-1} after 23 years of forest development and tentatively confirming local claims of improved dry-season flow. However, long-term rainfall data for Tacloban Airport reveal a gradual increase by $\sim 11 \text{ mm yr}^{-1}$ on average which may have contributed to the development of perennial flow conditions over time.

In conclusion, 23 years of forest development at Manobo had a very positive effect on soil physical characteristics, hillslope hydrological functioning, and soil conservation.

To examine the representativeness of soil conditions (and therefore hydrological functioning) in the Basper grassland and the Manobo reforest, additional fire-climax grassland sites (3 on volcanics and 3 on limestone), various tree plantations (9 on volcanics, 7 on limestone) and regenerating forests (3 each on volcanics and limestone) were sampled using small cores across Leyte and Biliran island for analysis of their chief soil physical

characteristics. Briefly, matrix permeability (K_{sat}) values were generally low for the heavy clay soils developed over limestone rock, with little effect of vegetation type, except for mahogany. Much higher values were obtained for volcanic top-soils but K_{sat} declined rapidly at shallow depth, suggesting a possibility of ponding during high rainfall intensity and the generation of hillside SOF. However, small cores tend to underestimate K_{sat} in soils with macro-pores and additional work is needed to quantify macro-porosity for the respective situations, e.g. using blue-dye infiltration tests and larger infiltrating surfaces. Within the limitations of the small-core data, K_{sat} in mahogany and *Acacia* plantations on volcanic soils were higher than those of the grassland and comparable to regenerating forest, but *Gmelina* performed much more poorly in this respect (also on limestones).

As for future work, it would be desirable to confirm the inferred dominance of IOF as the main storm-flow generating mechanism in the Basper grassland by actual measurements on hillside runoff plots, and to compare the hydrological behaviour of the Basper catchment with fire-climax grasslands elsewhere in the Philippines, notably the equally responsive Angat watersheds in Luzon (operated by ERDB). Further, re-measurement of streamflow from the two study catchments during the possibly very dry year 2019 will provide a further test of the inferred positive trade-off after reforestation of degraded fire-climax grassland.

Topic: Soil and water impacts of reforesting fire-climax grasslands on Leyte Island, the Philippines

Sampurno Bruijnzeel: *You may wonder that given the soil permeability and infiltration in the grassland was so low whether our catchment was any representative for it. Luckily the Ecosystem Research and Development Bureau in Los Banos, they operate another grassland catchment up in Luzon, which was a black box study – only rainfall input and streamflow output. But they found equally high hydrological response to rainfall. We don't have any source information on that area, we really would like to visit but basically our grassland catchment those catchments are very similar in their hydrological behavior. Looks like these cogon grasslands are ideal places to boost your hydrology by reforestation on it.*

Patrick Durst: *For Sampurno Bruijnzeel, if I understand it correctly, if you have a very degraded site, poor infiltration, why do you have to suffer at least 20 years of reduced flows, in order to achieve some gain after some point.*

Sampurno Bruijnzeel: *Not necessarily. Even though it takes at least 20, if not, more years to recover the original infiltration capacity of the forest soil, that doesn't mean that you require an equally high value to accommodate the rainfall. Because most rainfalls are pretty long in intensity. As long as you can accommodate most of the rainfalls, most of that would infiltrate even if you don't attain those very high infiltration capacities of the original old growth forests. So, I would say, within 5 years you can have a much better situation.*

Concurrent session 1: Challenges and opportunities for FLR (*Ballroom III*)

ANTHROPOGENIC FIRES IN THE RAMU-MARKHAM VALLEY: UNDERLYING CAUSES AND MOTIVATIONS

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ABSTRACT: Anthropogenic fires present a continuous challenge to landscape management in the Ramu Markham Valley (RMV) in Papua New Guinea. Aided by favourable climatic and weather conditions, topography and fuel availability these fires have proven to be detrimental to areas affected. The fires affect commercial plantation crops (oil palm and sugar), restored forests and locally established agricultural gardens. Strategies to reduce fire damage and incidence will depend on better understanding of the range of causes and, in the case of deliberately lit fires, understanding of motivations. Popular explanations of fire lighting behaviour tend to make simplistic assumptions about cultural practices, including the idea that “people just like lighting fires”. Common cultural practice in the RMV see fires being lit for hunting, to prepare land for gardens and as a result of conflicts. It is essential to understand and differentiate between fires that are lit due to cultural practices and those that are lit to target the gardens of individuals or commercial crops. This paper reports on data on recorded fire events in and around Ramu Township and the area of operations of Ramu-Agricultural Industries Limited (RAIL). Evidence on the causes of these fires is presented and analysed in order to establish a typology of causes and motivations of anthropogenic fire in the RMV.

FOREST LANDSCAPE RESTORATION IN A GLOBAL PRODUCTION NETWORK: THE CASE OF THE BRAZILIAN AMAZON

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ABSTRACT: Governance of forest restoration in the Brazilian Amazon is embedded within a global production network that links demand with supply of forest and landscape restoration. The FLR production network links spatially interconnected seed and seedling production and planning and restoration actions with the national and international demand for ecosystem services. Demand is driven by legal requirements to offset environmental impact and restore trees on rural private properties. The Brazilian government has established strong mechanisms for accessing results-dependent payments for voluntary schemes to reduce greenhouse gases emissions from international climate funds. As part of the Brazilian goals related to the international climate change agreement, there is a restoration target of 4.8

million hectares by 2030 in the Amazon region. International funding schemes, such as the Amazon Fund, have invested resources for building frameworks to forest restoration. In the past decade, initiatives have emerged based on local knowledge and local participation. Community networks in the Upper Xingu have been successful in supplying more than 170 tonnes of seeds for restoring 5,000 hectares since 2007. Ecosystem services have been delivered as a result of restoration actions contributing to international and national demand for forest restoration and providing wood and non-timber forest products (provisioning services) for local stakeholders. FLR is commonly understood in terms of local processes and national policy and programs. This paper shows how these processes are linked with international factors in ways that can be understood as a global production network.

LOCAL KNOWLEDGE AND PRACTICES OF COMMUNITIES ON PEST AND DISEASE MANAGEMENT IN TREE NURSERIES IN BILIRAN PROVINCE, PHILIPPINES

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ABSTRACT: A study was conducted to assess the occurrence of pests and diseases including their management practices in tree nurseries of NGP planting stock suppliers in Biliran Province, Philippines. Results have indicated a) high occurrence and varying severity of pests and diseases in the tree nurseries, b) existence of various factors contributory to pest and disease incidence, c) insufficient or limited local communities' knowledge and skills for pest and disease management and d) the need for trainings and access to information about pests and diseases and their management.

There was low to high incidence and severity of pests & diseases in the different sites depending on tree species. Pest problems consisted of common leaf-eating arthropod pests and fungal diseases. Occurrence was aggravated by nursery factors such as sanitation problem, overcrowding of plants, improper spacing, presence of weeds and coarse vegetation, etc.

K-I-I results revealed that nursery caretakers were generally familiar with damage and symptoms but lacked knowledge on the specific cause of the problem. Some tree farmers are able to implement physical, biological, cultural, and chemical control measures. Having no clear pest management plan, it is apparent that most of them exercise own sense of judgment in dealing with pest & disease problems. Farmers expressed the need for training and access to information about pests and diseases, diagnostic and monitoring skills, and effective pest management plan.

TREE SPECIES SELECTION: ONE OF THE COMPONENTS FOR SUCCESSFUL FLR IN PNG

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ABSTRACT: Papua New Guinea has 70% of its population living in rural areas with an increasing dependence on forests and trees. These forested lands are being cleared and burnt for other land uses which has resulted in large areas of degraded grasslands. Restoration of these degraded landscapes is being addressed through a number of public and private tree planting enterprises, which involve tree species that are promoted as having socio-economic values and suitable silvicultural characteristics. These reforestation activities and projects have had mixed results. Part of the solution for improving reforestation performances involves adopting research results that identify the right species for the right sites and includes those with economic end uses and market accessibility. The identification of suitable species was recognised in the early 1960s with the commencement of species trials in East Sepik Province. Some of these trials were established with the aim of identifying species that performed well on degraded sites and had economic values for landowners. This paper provides a summary of growth and yield for selected tree species and provenances from the list of over 100 species trialled between 1965 and 2009. The results of these trials have provided valuable inputs to government sponsor forest and landscape restoration initiatives such as the current “PainimGraun, PlanimDiwai”, agroforestry projects and landowner plantings across various sites in PNG. Results have indicated the importance of provenance selection in identification of suitable species. For example, *Eucalyptus deglupta* plantings in Milne Bay where the growth of provenance A was double that of Provenance B at age 17 years. Similarly, on fertile, high rainfall sites near Lae, the growth of *Intsiabijuga* and *Pterocarpusindicus* was 25% less at age 10 years than *Pometiapinnata*, another high value species.

PREDICTION OF FOREST COVER CHANGE USING REMOTE SENSING AND GIS

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ABSTRACT: Land use and land cover changes (LULCC) including deforestation for agricultural land and others are elements that contribute on global environmental change. Therefore, understanding a trend of these changes in the past, current, and future is important for making proper decisions to develop in a sustainable way. This study analyzed land use and land cover (LULC) changes over time for Dak Nong province of Vietnam based on LULC maps classified from a set of multirate Landsat satellite images captured from 1989 to 2017 using object-based image analysis (OBIA). The LULC spatio-temporal changes in the area were classified into 9 categories including forest category. Based on these changes over

time, potential LULC in 2026 was predicted using Cellular Automata (CA)–Markov model. The predicted results of the change in LULC in 2026 reveal that the total area of natural forest will lose 29,000ha accounting of 16% in total area of the changes. This may be mainly caused by converting forest cover to agriculture (account for 12%), and other land (4%). The findings suggest that the forest conversion needs to be controlled and well managed, and a reasonable land use plan should be developed in a harmonization way with forest resources conservation.

Concurrent session 2: Forest restoration and livelihoods (*Press Room 1*)

THE EFFECT OF THE NATIONAL GREENING PROGRAM ON THE SOCIOECONOMIC STATUS OF SMALLHOLDERS IN THE PHILIPPINES

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ABSTRACT: The Philippine Government launched in 2011 the National Greening Program (NGP), a massive forest restoration program that aimed to plant 1.5 billion trees in 1.5 million ha by 2016 and consequently improve the socioeconomic status of the participating farmers. Among the provinces where NGP was implemented was the island province of Biliran in Eastern Visayas, Philippines. While the environmental effects of the NGP can be felt only some years after its full implementation when the trees planted shall have matured, it was assumed that it could bring socioeconomic benefits to members of the people's organization (PO) paid to undertake plantation site establishment and management up to plantation maintenance. This study validated the assumption. The socioeconomic status (SES) of PO member households who participated in the NGP was compared to that of non-member households'. The Mann-Whitney U Test showed that the two groups had basically the same SES scores in 2014 benchmark survey and in the 2016 end line survey. This means that the former's participation in the NGP did not significantly lift them above their non-member counterparts. The Wilcoxon Signed Rank Test on the other hand showed a significant increase in CFPBA-member households' 2016 SES over the 2014. However, CFPBA-member respondents' testimonies indicated that they did not feel the improvement. They suggested that for a program similar to the NGP to have significant socioeconomic benefit, it must have a sustainable livelihood component. The NGP as implemented in Biliran did not have.

OPPORTUNITIES AND CHALLENGES IN IMPLEMENTING FORESTRY LIVELIHOODS IN FOREST LANDSCAPE RESTORATION

Casimiro V. Olvida

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ABSTRACT: Cutting of trees coupled with slash and burn cultivation and implementation of unregulated agriculture -based livelihood projects contributed in the loss of natural forest cover in Mindanao from 2.77 million hectares in 1988 to only 1.95 hectares in 2003 (NAMRIA Maps). In fifteen years, more than 819,000 hectares or 30% of Mindanao's total land area were deforested registering an annual forest cover loss of 54,630 hectares per year. Of these areas, more than 286,000 hectares are agricultural crops which are mostly corn and coconut located in steep slopes or protection forest occupying close to 51,000 hectares or 18% of the total agricultural crops. Realizing the increasing loss of forest cover, the Philippine government embarked on various initiatives to reverse this trend. Participatory forest land use planning and implementation which include participatory allocation of forestlands, active involvement of civil society organizations in upland development and multi-sectoral forest protection activities, among others, yielded positive results. From 2003 to 2015, Mindanao increased its natural forest cover by 9.6% from 1.95 million hectares to 2.14 million hectares. Close to 0.2 million hectares used to be covered by annual and perennial crops.

Topic: Opportunities and Challenges in Implementing Forestry Livelihoods in Forest Landscape Restoration

Art Pasa: *This is for Casimiro Olvida. What can we get from tuai?*

Casimiro Olvida: *Tuai are fruits being eaten by birds but also being eaten by tribal members. Usually used in making boats “Bangka” or to some extent to furniture. It is basically a single tree which addresses both biodiversity and food security.*

Tomas Reyes: *This is for Casimiro Olvida. Is the picture of Mt. Apo which was planted with coconut trees in steeping slopes, an ETC site (BINHI Program site)? If not, does it mean that BINHI program really works?*

Casimiro Olvida: *No. The picture presented was taken in a lower portion of Mt. Apo. So, yes. (BINHI program works)*

Juvilyn Dormiterio (IIRR): *For Casimiro Olvida, how did we deal or include in our indicator the targets the promotion of biodiversity in our livelihood programs to really better enhance our biological diversity in our forest and landscape?*

Casimiro Olvida: *Coming from my background as technical assistance team member from USAID, we first assisted the T’boli and Manobo tribes and we came-up with their indigenous knowledge in systems and practices in managing natural resources. When I finished that engagement, for about 16 years, I was assigned in Masim, the first step done was to immerse myself in the community while maintaining being low leveled status. In several weeks and months of learning, consulting and talking to the tribe leader, we were able to convince them to plant the indigenous endemic species. When they saw the usage of the trees, they intercept it with their cash-crops. It takes a lot giving a big “heart” to the local people- success factor. “The heart of the development is the development of the heart.”*

Juvilyn Dormiterio (IIRR): *Did you include in your report the increase of “something like this” as part of your indicator?*

Casimiro Olvida: *Yes. (Indicator included.)*

Topic: The Effect of the National Greening Program on the Socioeconomic Status of Smallholders in Caibiran, Biliran, Philippines

Eugene Bautista (DENR-8): *This is for Henry Goltiano. Did you officially inform the concerned field office, PENRO Biliran?*

Henry Goltiano: *At various stages of the project in Biliran, forums with Biliran's PENRO were done. The project results were also presented. Assistant Director Antonio Daño requested a copy of the paper, thus sent to him through an email.*

Celso Diaz: *This is for Henry Goltiano. I wonder if you take in consideration the comparison between the SES with the poverty thresholds in the Biliran's municipality? Since NGP started in 2011, and your study started in 2014, do you think if you studied it on 2012 (with the two-year difference) there would be significant difference on their SES? {presentation of NGP impacts during the seminar/conference last week in Pampanga showed impacts starting in 2011}*

Henry Goltiano: *Poverty thresholds are determined by the national government but in social science we thought of "who should define poverty threshold or poverty?" Poverty can be defined in many ways. Thus, for this study poverty threshold was not used but we rather asked people whether this particular project, as they got involved in it, did improve their SES. It's the word of people who defined if they are poor or not. So though statistics says that there is an increase, it is SES definition really depends on the people. They are the only one who can really claim if their SES has really increased or not. No. The consideration was that NGP was launched in 2011 but it was not able to start on field on the same year. In 2012, it was implemented but there were so many flaws in the implementation, and if we are talking here about the socio-economic benefit from the project, then certainly it would not steep down to the communities in 2012 and 2013. In fact, based on literature (Memorandums), the final guidelines for the NGP were released only in about 2013 (based on the paper of Ismael and Lintag). We delayed the study implementation to ensure that NGP was really already working on the ground. In the early stage, the money allotted for the works of POs were always delayed- so in that stage, there were no benefits but rather disadvantages on the part of the POs (they had to follow the project's phasing without getting their timely payments causing the POs to loan money with 10% interest). It should be noted that the study was only conducted in Biliran, thus cannot represent the nationwide situation of NGP. However, similar cases may be also occurring in different NGP sites.*

Topic: Revitalization of Livelihoods through Rice Cultivation as an Approach for Tropical Peatland Restoration

Arsenio Ramos (VSU): *This is for Eli Nur Nirmala Sari. Could you share to us the problems encountered by the farmers as they convert the peatlands to rice production?*

Eli Nur Nirmala Sari: *Changing the behavior of people, specifically the idea that peatlands can be used for rice cultivation is the most challenging. The people became pessimistic already due to the previous failed experiences. The government also requested for a published science-based paper regarding the technique in partnership with the ministry of agriculture of Indonesia.*

Topic: Contributions of Community-Based Resource Management Project as Strategy for Upland; Community Development and Forest Restoration

Archiebald Baltazar was asked why he didn't use bird identification or inventory considering that this is his known expertise.

Archiebald Baltazar: *I did not include that because the time spend for that particular survey is very short. That is why we did not include possible increase in terms of bird species in the area, and we also do not have the baseline for that. But the main reason is for the lack of time.*

Topic: Mangrove Forest Landscape Restoration in the North of Vietnam

Nguyen Cuc was asked whether he used a readily formulated or available allometric equation or whether he was the one who computed the allometric equations to carbon sequestration or budget in mangroves.

Nguyen Cuc: *The study is from 2002 up to date where there are measurements. Thus, we based on the study plots to compute the on and below ground carbon and so we tried to compute the carbon flux. We tried to develop the equation to compute it because we considered the specific size to calculate the biomass, and the biomass to calculate the carbon. It is quite difficult to apply the available equation for my study but with the long study period involved, it became possible.*

Concurrent session 3: A people-centred approach (*Press Room 2*)

ASSESSMENT OF ROLES AND PARTICIPATION OF LOCAL COMMUNITIES IN THE IMPLEMENTATION OF NATIONAL GREENING PROGRAM IN BILIRAN PROVINCE, PHILIPPINES

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ABSTRACT: Executive Order 26 (EO 26) known as the National Greening Program (NGP) states the coordinated roles and responsibilities of Local Governments (LGUs) and People's Organizations (POs) in the implementation of massive forest rehabilitation program in the Philippines. The study aimed to examine the roles, and actual contribution of local governments at municipal and provincial levels and concerned POs in the implementation of NGP in Biliran Province. Data were gathered through conduct of desk review and face-to-face (F2F) key informant interview (KII) and analysed using SPSS program. Respondents were purposively selected based on engagement and supposedly participation as promulgated in EO 26. Findings reveal that DENR Biliran has established long years of partnership with provincial, municipal and barangay LGUs. However, LGUs, particularly at provincial and municipal levels did not have clear and substantial participation in NGP. Selected POs have been more active in NGP serving as contractors of nursery and plantation establishment and maintenance. Change in LGU leadership and lack of interest caused discontinuance of environment-related partnership projects with DENR. LGUs' lack of technical know-how and acquaintances with DENR staff have unfavourably affected interest to participate in NGP. Building LGU champions and composite LGU-DENR NGP Team is recommended to boost local morale and participation. Continuing interaction with and monitoring of PO partners can sustain POs' participation and support to NGP and related endeavours of the government.

EMPOWERING WOMEN THROUGH FOREST LANDSCAPE RESTORATION

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ABSTRACT: Gender equality, often manifested in women's and men's equal access to and control over resources and sharing of costs and benefits, has been recognized as an enabler of development. Thus, forest landscape restoration projects stress the need to involve both women and men in project planning, implementation, and monitoring to ensure that initiatives succeed in "regaining ecological functionality and enhancing human well-being across deforested or degraded lands" (Siles & Prebble 2018). Participation of various stakeholders in FLR allows more access to resources and sharing of benefits (Basnett et.al. 2017). While men tend to dominate and be recognized in the sphere of agriculture, women play a significant role in restoration efforts as experienced by people's organizations in the Visayas regions of the Philippines. Tapped by the Department of Environment and Natural Resources (DENR) to implement reforestation projects, communities situated in forest lands

organize themselves and undergo relevant trainings and seminars. Because men feel the need to engage in regular, non-forest-based livelihood activities for the family, women have the upper hand in restoration activities. In the process, women become empowered as they undertake a wide range of FLR activities including decision making and organizational development. FLR, therefore, performs the latent function of empowering women and making them as productive as men. As a goal of gender and development, women's empowerment translates into higher household income, greater food security, and increased wellbeing of the family and community (Khachatryan & Peterson 2018), not to mention increased sustainability of restoration efforts.

LOCAL STAKEHOLDERS' DECISION-MAKING IN FOREST LANDSCAPE RESTORATION: CASE STUDIES OF THE PHILIPPINES AND PAPUA NEW GUINEA

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ABSTRACT: Stakeholder engagement is critical to the success of Forest Landscape Restoration (FLR). A key challenge is to understand what guides people's engagement. Particularly, local people within landscape may have complementary or competing interests on the uses of lands. In response, we undertook two case studies, in the Philippines and Papua New Guinea, to understand what influence local people's decision-making regarding land uses for FLR.

We interviewed the individual and groups of local stakeholders in both countries. In PNG, people wanted to grow trees for households' uses e.g. house construction and fuel woods, whereas forest-dependent people in Philippines expected cash income from participating in reforestation activities. Except the expectation on their livelihood benefits, the interests of local people were also influenced by other factors including cultural norms, gender roles, capacities to adopt and implement the plantation, and market opportunities. Land use decisions in both countries were guided by their power to contribute to overall group decision-making, which were governed by their rights over common-pool resources. In the Philippines, local people have rights over forestlands for only their subsistence uses, which this condition result in a limited involvement for determining land-use scenarios in government reforestation initiatives. In PNG, local people have customary land rights, which enables them to contribute to land-use decisions and manage their own lands. The implications of our results are that a country case-by-case design is needed for a suitable approach of local stakeholder engagement. Understanding local stakeholders and their decisions are a precursor for their engagement in FLR.

GENDER, AGROFORESTRY AND FOREST LANDSCAPE RESTORATION IN THE RAMU-MARKHAM VALLEY

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ABSTRACT: Efforts to implement FLR in the Ramu-Markham Valley (RMV) in Papua New Guinea have increasingly focused on family or small group-based activities, incorporating agroforestry. Gender issues are crucial in these activities both for practical and equity reasons. The practical reason is that even though both men and women have a key role in any agricultural activity, women provide much of the labour on a daily basis. Interventions will only be successful if women support activities, benefit from them both in the short and long term and are willing and able to provide labour. Equity is important because changes to gardening and related activities impose costs on women, both in the form of increasing labour and changes to the availability of food and forest products and the distribution of benefits from these. Society in the RMV tends to be heavily male-dominated and this is reflected in decision-making including decisions about use of resources. Nevertheless, the domination is not absolute and understanding opportunities for greater involvement of women in agriculture and agroforestry requires nuanced understanding of the women's roles and activities. This paper presents preliminary results of a study into the relationship between gender, women's labour and economic activities in the RMV, paying attention to resource rights and decision-making about resource use and benefit sharing. The paper also discusses a strategy to incorporate gender into project activities as a cross-cutting theme.

SUSTAINABLE FOREST REHABILITATION AND MANAGEMENT THROUGH COMMUNITY BASED APPROACH: A CASE STUDY IN NORTHERN SHAN STATE, MYANMAR

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Ministry of Natural Resources and Environmental Conservation, Myanmar

ABSTRACT: The deforestation and forest degradation has been found in Myanmar since a few decades ago. Amongst many reasons, poverty and unsystematic land use, especially shifting cultivation, are the major reasons of deforestation and forest degradation in montane forests in Myanmar. So, introducing the suitable community-based forest management approach which is well balanced to develop economically and environmentally rehabilitation models technology is very crucial for those regions. To meet that needs, the project was conducted in montane forest in Northern Shan State of Myanmar. Identification of locally preferred species through consultations with local people and field experiences, their traditional knowledge, assessment on socioeconomic conditions and livelihood patterns, review on the existing rehabilitation models, organizing trainings and workshops on sustainable forest management and enhancement of income, the extension on forest conservation to local people were done. Efficient cooking stoves were distributed to local people to reduced fuelwood consumption. The majority of local farmers have improved their awareness on tree planting and community forestry. Different suitable rehabilitation and

management models such as community forestry, farm forestry, assisted natural regeneration, conservation natural water spring, and home garden were set out as the demonstration plots based on the findings during the three-year period. The project developed community-based rehabilitation and management models which are integrated with traditional knowledge and scientific methods with the aim to support the sustainable forest management of montane forests in Northern Shan State, Myanmar. The project was supported by Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet).

Topic: Assessment of roles and participation of local communities and line government agencies in the implementation of NGP in Biliran Province, Philippines

Riina Jalonen: *How common has this issue between DENR and LGU relations been? Has it been affecting all regions or is it just case-by-case? How have these results been communicated with the DENR and what have been their actions, if any?*

Eduardo Mangaoang: *This is the usual case we found in all DENR offices. Although there are fortunate cases where the LGUs do the work really well, despite minimal contact with DENR. Just as in Myanmar's presentation, 2-way communication is very important. But it should really be DENR's responsibility to really go into the communities and coordinate with the LGUs, particularly MLGUs, which is the level where implementation will take place and sustainability of the NGP may be probable. These findings have already been shared with the DENR through a conference meeting. Probably they have made some influence, in a way, that regional directors are now ordered to visit NGP sites.*

Li Jia: *In cases of such institutional barriers, as in the limited participation of women, what recommendations can you offer to overcome these, when by law they are limited, in terms of access to land tenure?*

Eduardo Mangaoang: *In the Philippines, it's not very difficult. But it depends on the situation or areas. For example, in the work on mangrove reforestation, the team was mainly women-dominated since the work needed was just near the houses. So, women highly participated in nursery, field planting, maintenance, and protection. But in upland cases, it would be difficult because the farms are usually not occupied by households. So, it will be difficult for women to go upland when they still need to do domestic or household work. In this setting, there are more men participation, especially in far-flung areas. Perhaps the IECs have also been instrumental in empowering women to go into development work.*

Topic: Local Stakeholders and interests for Forest Landscape Restoration: Case studies of the Philippines and Papua New Guinea

Aye Myat: *Is there a difference in some kinds of community participation and in the effectiveness of restoration activity between communities with tenure and without tenurial rights?*

Kanchana Wiset: *In the Philippines, some POs were granted by the government the CBFM or a 25-year right for a land they can manage. But when NGP came, it was more for restoration efforts. Seeking to expand this initiative, they engaged the POs without CBFM. In terms of effectiveness, POs with untenurial rights did not have harvesting rights over their planted products and only benefit from the income they incur from labour contracts in planting activities. If some PO work well even with untenurial instruments, the DENR would like to strengthen them and encourage them to apply for CBFM so they can harvest their planted products. But for POs with tenurial instruments, they would then, need to ensure how they will benefit from the intervention proposed over their managed land.*

Li Jia: *In cases of such institutional barriers, as in the limited participation of women, what recommendations can you offer to overcome these, when by law they are limited, in terms of access to land tenure?*

Kanchana Wiset: *It cannot be generalized. For example, the Philippines setting was surprising when only women spoke up during the meetings while men still needed to be encouraged to talk, which is quite different to the PNG setting. Therefore, the strategy should fit each society, then try to find a mechanism to address case-by-case.*

Topic: Gender, agroforestry and forest landscape restoration in the Ramu-Markham Valley

Rotacio Gravoso: *How are you progressing in letting women be actively involved in FLR? Is the women's participation increasing and are they happy with their participation? Is this not creating conflict within families, if the for example, the husband does not like the women to participate?*

Melinda Thom: *It is actually a complex setting, where land ownership is passed down only among the men. But times are also changing and now women are also starting to participate. In small separate meetings, women do freely talk among each other. But in bigger meetings involving men, the men would tend to dominate. But in participation to forestry activities, which is similar to the agricultural activities, women participate based on men's decisions.*

Sun Weina: *From your point of view, while strategizing FLR in PNG, is it more a clan-based approach or is it more a family-based?*

Melinda Thom: *Clans have the overall land ownership rights but families have user rights within portions of the clan land. So, it depends on the land that will be used for the intervention. If the land to be used does not have specific user rights, then it will be the clan's decision. But if the land to be used has specific user rights, then this should be decided amongst the family and not much of the clan as long as they don't go beyond their boundaries. If they encroach on the rest of the clan land, the clan will come to intervene.*

Topic: Sustainable forest rehabilitation and management through community-based approach: A Case study in Northern Shan State, Myanmar

Li Jia: *In cases of such institutional barriers, as in the limited participation of women, what recommendations can you offer to overcome these, when by law they are limited, in terms of access to land tenure?*

Inkyin Khaine: *Based on the experience in Shan State, women had the most participation, even if men had the authority to make decisions. In Myanmar it's not a big problem. But there have also been changes to improve the roles of women, such that women can now register ownership rights for their household and properties. For example, within the organization (FRI), there are actually more women than men. But it also depends on the operational types and business plan.*

Day 3 PANEL SESSION Moderator: DOMINIQUE CAGALANAN

Panel: Key interventions and directions for FLR (*Ballroom III*)

RESTORING FOREST LAND AND PREVENTING DEGRADATION IN A REFUGEE SETTING IN NW UGANDA

Cathy Watson

International Centre for Research on Agroforestry (ICRAF), Kenya

ABSTRACT: In 2016/7, close to 900,000 South Sudanese fled into Uganda, settling in a mosaic of grassland, closed forest, open forest and wetlands that local clans had hitherto used for hunting, grazing and collecting wild products. In contrast, host farmland was already degraded by charcoal making, brick burning, sand mining, tobacco curing and unsustainable agricultural practices. Conflict over natural resources seemed inevitable between hosts and the refugees, who received plots of up to 50x50m to build homes and grow food. In fact, conflict is so far rare, but what has occurred is massive loss of biomass to cooking and building. An ICRAF survey found 51-56 stumps per ha and foresaw, like FAO in the adjacent district, that if steps were not taken, all woody biomass within reach would be consumed within three years. But ICRAF also found immense species richness, over 80 tree species, of which over 30 had edible parts. Fruit of *Balinitesaegyptiaca* was the most commonly eaten. ICRAF started a project, which evolved three-prongs: regenerate stumps; mark/protect/add value to standing trees; and plant and manage a diversity of species. Over 20 tree species were raised; directly sown pigeon pea emerged as a key agroforestry shrub. We found that even in emergencies, populations invest in trees. But UN agencies and NGOs showed less sensibility, promoting a narrow range of exotics, some invasive, and buying fuelwood with scant regard to conservation value. A new humanitarian paradigm is needed that recognizes the value of the natural environment and aims from the start to minimize degradation and safeguard and restore ecosystems and biodiversity.

INTEGRATING FLR INTO THE POST-2020 GLOBAL BIODIVERSITY AGENDA

James G. Hallett

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ABSTRACT: The Aichi Biodiversity Targets (2011-2020) have guided the Parties to the Convention on Biological Diversity (CBD) in actions to improve outcomes for human wellbeing and biodiversity. Progress towards these targets supports and is consistent with other international efforts (e.g., UN Sustainable Development Goals and the UNCCD's Landscape Degradation Neutrality). Success in achieving the Aichi Targets has been mixed,

however, and this has been particularly true for Targets 5, 14, and 15, which directly invoke ecosystem restoration. To further progress, the CBD, IUCN, and other partners have developed tools to develop capacity for assessment and implementation of restorative activities. Consideration of how the Aichi Targets might be revised for 2021-2030 as an overarching framework has already begun. The need is clear for broader discussion of the benefits of a range of restorative activities, and a scaling-up of the ambitions of the Aichi Targets. Targets 14 and 15, for example, largely consider conservation and restoration as a means to provide ecosystem services and carbon sequestration, respectively. An opportunity exists to expand the scope of these targets by incorporating the Forest and Landscape Restoration (FLR) framework. This paper will consider how this might be accomplished and how this could improve outcomes for ecosystem function, biodiversity, and human wellbeing.

Topic: Smallholder forestry in Melanesia as a means for resource and landscape restoration

Robin Chazdon: *This is for Tony Page. You mentioned about tourism, on one side, and I see activities in the communities, on the other side. Do you see any way that we can link both?*

Tony Page: *We haven't really worked directly in that space so I cannot comment on the specifics. Particularly on sandalwood and canarian I can see that there is a huge potential because the products are highly desirable for tourists. In Vanuatu they haven't taken advantage of this possibility yet. With canarian, an associated project in USC has been looking at what we call the "suitcase export". When tourist come and has an interest on what the local food is, what the local products are, Vanuatu hasn't been good on that either, the Canarian nut that we are trying to develop as a domestic product though the suitcase export. It exposes people from other countries to this product without having to export and taste it So they become familiar with the product.*

Topic: Restoration and preventing FL degradation in a refugee setting in NW Uganda

A female participant asked how the researchers see the progress of these initiatives in a situation that refugees may be there on a temporary basis.

Cathy Watson: *(1) The Uganda government made a policy of providing land for the refugees and they have been praised internationally for that. (2) The average time now that refugees reside anywhere is 20 years, so long term plans are possible. (3) There is now tension with the host community because they are arguing over the natural resources.*

A question about how they operationalize the Theory of Change was also raised.

Rhett Harrison: *You identify the outcomes (long term goals) that you want to achieve. For example, increase tree cover, conservation benefits, improved livelihoods. Then, construct a diagram that illustrates very clearly what are the assumptions, what are proposed interventions that you are going to make to achieve those outcomes. And what are the assumptions behind those interventions. The reason I introduced the theory of change is because each of those assumptions is testable. One of the problems that we have especially with these very big projects that we have is – these assumptions are not quantified in any way. We just continue with the project with the assumptions. We think about these assumptions and think that it would be all right. But we can actually design a comparison or maybe we believe that local people will plant more trees, improve their income if we have a local timber market. Maybe the intervention should be to introduce the timber market not to plant the trees. Against an alternative which we want to do a tree planting program. So, we have two alternatives there aimed to achieving the same objective. We can test that. We can introduce a timber market in one village, and do tree planting in another village. And after 5 years we can see which came out better. The TOC allows you to organize very different types of interventions into the same framework and see if we can improve our performance in adaptive management through the FLR process.*

Day 3 PANEL SESSION Moderator: ROTACIO GRAVOSO

Panel: Key interventions and directions for FLR (*Ballroom III*)

Panel: Funding and Financing of FLR (*Ballroom III*)

SCALE MATTERS: MODELS OF PAYMENTS FOR ECOSYSTEM SERVICES FOR FLR IN THE PHILIPPINES

Dominique Cagalanan

Coastal Carolina University, USA

ABSTRACT: In the Philippines, enthusiasm for payments for ecosystem services (PES) has been increasing as an approach to meet the challenge of restoring degraded and human-dominated landscapes. This case study presents a PES program in San Carlos City, Philippines that has gained recognition as a model of success for reforestation and watershed restoration. The program is funded by a water levee with payments made to upland farmers who commit part of their land to native species reforestation. This case study also compares the model used in San Carlos to that used in the nationwide National Greening Program, essentially a state-funded PES program for typically larger-scale and community-based reforestation, to compare trade-offs that result from the divergent scales and implementation strategies employed. Some of the achievements of the San Carlos program over the national program include having a continuous funding stream, planting only native species, having high planting density, achieving long-term success of reforestation sites, maintaining high levels of monitoring and long-term maintenance, and planning for long-term livelihood benefit. However, the area of reforestation in San Carlos is limited by the lack of willing ecosystem service providers. For both programs, sites are ultimately selected by availability or opportunity and not targeted by restoration priority. The comparison highlights trade-offs with important considerations for restoration governance and management, many of which stem from differences in the scale of implementation: single large or many small sites, number of trees or planting density, community or individual implementation, short- or long-term management plans and livelihood opportunities.

Day 3 CONCURRENT SESSIONS

Concurrent session 1: Agriculture and FLR (*Ballroom III*)

THEOBROMA CACAO (COCOA) IN THE RAMU MARKHAM VALLEY: A STRENGTH, WEAKNESS, OPPORTUNITIES AND THREATS ANALYSIS

Clifford Single¹ and Jack Baynes²

¹*Ramu Agri Industries Ltd, Gusap Downs, Papua New Guinea*

²*Tropical Forests and People Research Centre, University of the Sunshine Coast, Maroochydore DC, QLD 4458, Australia*

ABSTRACT: In Papua New Guinea, growing cocoa with an overstorey of trees is a common agroforestry system in coastal provinces. However, little is known about the growth, yield and profitability of cocoa in the Markham/Ramu valley (RMV). Hence, we undertook interviews with farmers in five villages to find the strengths weaknesses opportunities and threats (i.e. a SWOT analysis) to smallholder cocoa farming in the RMV. A key strength is that cocoa can form approximately half of family cash income. However, prices for cocoa beans fluctuate with supply and are sometimes lower than the cost of production. Government extension assistance is very limited and information concerning insect pests and diseases is not widely available. Cocoa farming is also dominated by men, so promoting it in conjunction with tree growing will only indirectly assist women. Our findings suggest that if cocoa is to be promoted as a means in increasing agroforestry, expert horticultural assistance is required.

AGROFORESTRY AND ECOLOGICAL FARMING PRACTICES TO IMPROVE LANDSCAPE RESTORATION INITIATIVES IN THE HUMID TROPICS

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¹*Tropical Forests and People Research Centre, University of the Sunshine Coast, Maroochydore DC, QLD 4558, Australia*

ABSTRACT: In this study, we present the main agroforestry designs and agroecological farming practices adopted by landscape scale projects aimed at restoring forests in the humid tropics. Our purpose was to understand what has been experimented in agronomy for biodiversity promotion, optimization of ecosystems services, as well as crops, trees or other plant species involved in these operations. We also sought for evidence of whether these systems are fostering social benefits to its communities. Accordingly, we carried out a

database search on Web of Science and a subsequent screening methodology. More than 130 peer-reviewed papers from over 20 journals were retrieved and analysed.

Key results call for further long-term investigation on implemented systems at landscape level rather than the farm scale extent. Management type and intensity, together with low-diversity tree intercropping were the most documented topics of research. A bias for environmental sciences studies was identified, although more recent investigations have been utilizing multidisciplinary approaches, combining environmental with socioeconomic data.

This review will assist in recognizing successful applications, gaps to be addressed in future research for novel strategies, as well as humid tropical regions in the planet that require more consistent assessment.

SYNERGIES BETWEEN FOREST LANDSCAPE RESTORATION AND AGRICULTURE IN THE GRASSLANDS OF PAPUA NEW GUINEA

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ABSTRACT: If forest restoration is to succeed at a landscape scale, the example of RamuAgri Industries Ltd (RAIL) illustrates how industry and restoration objectives may be combined. In Papua New Guinea (PNG) the anthropogenic grasslands of the Ramu/Markham valley (RMV) have long been under-utilised. Uncontrolled fires have caused a continual retreat of native forest from the valley floor to steep hillsides. However, membership of the Roundtable on Sustainable Palm Oil (RSPO) has provided RAIL with the impetus to reforest a substantial amount of environmentally sensitive land adjacent to watercourses. In possibly the most species-diverse nursery in PNG, RAIL grows many seedlings. Fire protection for oil palm plantations has also protected newly planted forest, although losses have occasionally been severe. Land tenure is secured through long term leases of grass which cannot be otherwise used by traditional owners. RSPO certification also provides for monitoring, reporting and verification of reforestation activities. Although the area of land reforested is not large compared to the land which is allocated to agriculture RAIL's commitment to restoration is the biggest commitment to durable restoration in the RMV, so far.

TREES AND AGRICULTURAL CROPS PREFERENCES AMONG NATIONAL GREENING PROGRAM (NGP) BENEFICIARIES IN THE VISAYAS REGION

A Ramos¹, AN Polinar¹, AE Pasa¹, NO Gregorio², J Herbohn², KB Doria¹ and J Leysa¹

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ABSTRACT: Knowledge and preferences of farmers of what to plant are recognized in government conservation efforts recently. Preference to specific tree and agricultural crop often varies between and among farmers as they usually have different selection criteria. For successful and sustainable farming, the farmer must have the ability to select the appropriate trees and agricultural crops to grow/produce under his/her farming situation. Hence, this study was conducted to identify the preferred trees and agricultural crops currently grown, crops previously grown but are no longer planted at present and trees and crops the NGP beneficiaries intended to grow in addition to their existing trees and agricultural crops. Data were gathered by conducting face to face interview through focus group discussion among 10 members of each farmer organization in the covered region using an interview questionnaire. Data collected from the interview were validated through actual field visit in the National Greening Program sites and individual farmer's field.

Result shows a total of 16 species of trees planted in the NGP sites to include large leaf mahogany, batino, mamalis, yemani, molave, Ipil-ipil, auri, kalumpit, kakawate, smooth narra, mangium, lauan, batino, bayoko, rain tree and badlan. The species of mahogany and yemani commonly called as gmelina were found as the most commonly grown tree species in previous reforestation efforts. Geographic location, soil type, climatic factors, influence from funds provider and farmers preferences were found as few considerations.

In region 6, different kinds of agricultural crops were grown by the NGP beneficiaries including 2 cereal crops (yellow corn and lowland rice), 1 legume (peanut), 4 root crops (sweet potato, cassava, yam and gabi), 8 fruit crops (rambutan, banana, lanzones, mango, jackfruit, calamansi, pineapple and papaya), 2 plantation crops (coconut and cacao) and 6 vegetable crops (eggplant, string beans, ampalaya, ginger, okra and pegion pea). Yellow corn, banana and lowland rice were the most commonly planted agricultural crops. For region 7, the major cereal crops planted was corn in farmer's farm. The crop was intercropped with peanuts, sweet potato and vegetables. The planting of trees, fruit and agricultural crops (banana, coconut) were very common at the farm borders and residential lots.

If given the opportunity, farmer's in region 6 intend to plant mahogany, yemani, mangium, smooth narra, kamagong, lauan and rubber tree in their respective farm lots. Upland rice, some root crops particularly cassava, sweet potato and yam, many fruit crops including rambutan, lanzones and guyabano, cacao and coconut are some crops farmers want to plant if given the chance. In region 7, people's organization were now planting indigenous in favor of exotic trees. The planting of exotic to include yemani and large leaf mahogany and fruit crops were done only in their individual farm lots. The species of molave, smooth narra, batino, mamalis and magtalisai were the most preferred species for planting in their NGP sites.

Concurrent session 2: The biophysical aspects of FLR (Press Room 1)

DESIGNING MIXED-SPECIES NATIVE TREE REFORESTATION PROGRAMS IN THE PHILIPPINES

Mariya Chechina

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ABSTRACT: Mixed-species forestry is gaining popularity in the Philippines for its ability to generate a variety of timber and non-timber products for rural forest communities and provide various ecosystem services. Mixed-species plantations are ecologically superior to monoculture plantations in their ability to fight off disease, increase nutrient cycling and improve productivity of forest trees. However, lack of knowledge about site matching and seed propagation of native tree species is causing many forest trials to fail. Mixed-species plantations are also challenging to plant because certain species can inhibit growth by competing for sunlight, water and/or nutrients. In addition to silvicultural knowledge, information about spatial association of native tree species is needed for successful mixed plantations.

This project aims to fill these knowledge gaps by collecting existing information and analysing spatial association of native trees. This project will build on an ecological attribute study of 43 native tree species in North Negros Natural Park and add silvicultural data on other species collected from government reports, scientific studies, forest trials and interviews with forest communities. This project will also collect data on local timber and non-timber products and tree uses through interviews with communities. Next, this project will use data on 40 native tree species to analyse their spatial compatibility and find groups that are mutually beneficial for growth. The results of the program will be used to design a five-hectare reforestation trial to include up to 30 native species in combination based on silvicultural knowledge and spatial compatibility.

ECOLOGICAL RESTORATION OF DEGRADED LOWLAND RAIN FORESTS IN SRI LANKA: AN OVERVIEW

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ABSTRACT: Southwest Sri Lankan lowland and lower montane regions show a geomorphologically heterogeneous 'ridge-slope-valley' landscape. The Mixed Dipterocarp Forests that dominate this landscape typically exhibit strong species-habitat associations. Currently, these forests remain much degraded and highly fragmented due to indiscriminate agricultural expansion in the past. For their restoration, techniques need to be developed to connect forest fragments through ecologically designed corridors for conservation of endemic-rich biological diversity in these regions.

In addressing these critical issues, we transformed a 10-year old *Pinus caribaea* plantation near Sinharaja natural World Heritage Site through canopy manipulation and planting a mixture of framework native tree species of biological and economic value. This 25-year old study along with several others established later has successfully demonstrated the potential for their use in restoring biological connectivity of forest fragments. Our techniques using site-species matching based on applied ecological principles are now being widely used in rain forest restoration for both local and international training programs in Sri Lanka.

GROWTH PERFORMANCE AND NUTRIENT UPTAKE OF FALCATA (*Paraserianthes falcataria*) AS INFLUENCED BY CHEMICAL FERTILIZER, ARBUSCULAR MYCORRHIZAL FUNGAL INOCULATION, AND TYPES OF POTTING MIX

Angela Ferraren¹, Nestor Gregorio², Lourdes Agne³, Mayet Avela⁴ and Arturo Pasa¹

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ABSTRACT: The success in reforestation largely depends on seedling quality. Under the National Greening Program (NGP), the Philippine government spent about PhP35 M for arbuscular mycorrhizal fungi (AMF) inoculum to enhance the growth performance of tree seedlings in nurseries and those planted in restoration sites. Two factorial experiments were conducted to determine: a) the effect of potting medium, fertilizer or AMF on the growth, total dry matter production, photosynthetic rate, nutrient concentration and mycorrhizal infection of *Albizia falcataria* seedlings in the nursery, b) whether addition of small amount of chemical fertilizer can improve the effectiveness of AMF inoculation in nursery seedlings with less fertile potting medium, and c) whether the use of charred rice hull in the potting medium and higher rate of AMF inoculation can enhance seedling growth, biomass production and nutrient uptake. In the first experiment, seedlings in a soil plus rice hull potting mix had faster photosynthetic rate, better nodulation, heavier root dry weight and higher nitrogen (N) and phosphorus (P) uptake by shoots and roots than those grown in a pure soil medium. Application of 8 mg N, 6 mg P and 6 mg K per seedling also improved nodulation, biomass production, shoot and root potassium uptake and mycorrhizal infection. Twice as many nodules were formed in the fertilized soil plus rice hull potting mix compared with nodulation of seedlings grown in fertilized pure soil medium. The 5 g of Mycovam failed to positively influence the plant parameters examined and even resulted in reduced photosynthetic rate in seedlings grown in pure soil. In contrast, faster photosynthetic rate was obtained from inoculated seedlings grown in rice hull-amended potting medium. In the second experiment, carbonized rice hull in the potting mix provides greater benefits on seedling growth, biomass production, and P and K uptake than raw rice hull. AMF alone, regardless of rate and source, failed to promote growth and biomass production but improved total N in shoots was

obtained from seedlings inoculated with 5 g AMF (DASS) and grown in soil plus charred rice hull. It can be inferred that AMF inoculation does not always improve seedling growth and nutrient uptake particularly when the potting medium has low fertility and poor physical property. Hence, a recommendation of blanket AMF inoculation of seedlings in the nursery for the NGP in lieu of fertilizer application needs to be revisited.

Topic: Advancement of Science for the Sustainable Utilization and Conservation of Forest Genetic Resources of Falcata (Falcataria Moluccana MIQ)

Danilo Cacanindin: *This is for Jupiter Casas. May I know the sources of your seeds in the seed orchard development?*

Jupiter Casas: *Sources are from good mother trees. Every 300-metre distance protocol). But supposedly it should be from SPA, however it no longer exists.*

Danilo Cacanindin: *May I know the design you used in planting?*

Jupiter Casas: *The design used was RCBT taught to us in the CARAGA Region.*

Topic: Growth Performance and Nutrient Uptake of Falcate as Influenced by Chemical Fertilizer, Arbuscular Mycorrhizal Fungal Inoculation and Types of Potting Mix

A participant asked whether the researchers follow the ERDB suggestion on the use of micro balm—placing it in the lowest part of the material, or should it be placed on the transplanting to establish an immediate contact.

Angela Ferraren: *The bag has an instruction on the placement of inoculum. However, in the study, we did not follow those recommendations. What we did is bore a hole (5cm diameter) then place the inoculum. This ensures that the roots will have direct contact with the AMF inoculum. Since we did not follow the recommendation, another experiment was done. we found out that it was not really the inoculum but it is the fertility that serves as a limiting factor in order to get the benefits of the AMF.*

Riina Jalonen: *For Mariya, you said you are planning to collect the wilding seeds from the degraded area partly because you are not getting timber. It is highly recommended to go to high/large forest areas to get the wildings. The seeds you might collect in the degraded areas may also be degraded, thus not beneficial in your analysis.*

Mariya: *The wilding collections will be done in the forest. We just want to check if there might be some rare ones.*

Topic: Direct Seeding

Rhett Harrison (Comment): *We often look at ANR as an option that is cheap but you can also look at direct seeding- how successful is direct seeding? There is no topic in this conference that talked about direct seeding.*

Felixberto Lansigan: *We tried direct seeding however the experience was not that good. It was eaten by rats in the upland. There was also who assisted us in doing aerial seeding but it was not successful as well.*

Jupiter Casas: *Direct seeding is not usually part of our research because our researches are more based on what the farmers are doing. We are just doing it with the addition of knowledge on science.*

Topic: Growth Performance and Nutrient Uptake of Falcate as Influenced by Chemical Fertilizer, Arbuscular Mycorrhizal Fungal Inoculation and Types of Potting Mix

Tomas Reyes: *This is for Angela Ferraren. Why AMF did not infect the root system? Have you checked if the root system was infected? (According to Dr. Evangeline Castillo, fungus is more effective when you apply it to areas which are degraded.)*

Angela Ferraren: *AMF is a symbiotic of falcate. So, with falcate growing in an infertility soil, the biomass that it could give or the carbon that it could give to the AMF is probably not sufficient. In return, the AMF could not give the benefits that it supposedly could have given to its host which is the falcate. We did look at infection but even the ross infection was not enough to give significant effect on the biomass, growth and nutrient uptake. In other words, if the soil is infertile the AMF will not work because unlike rhizobium which can provide nitrogen from the atmosphere, AMF will only give what is present in the soil.*

Tomas Reyes: *Now, this question is for Jupiter Casas. Have you considered using the cross-breeds falcata? (not sure if it failed)*

Jupiter Casas: *That would be captured on our genetic analysis. In fact, there was already a preliminary data for that.*

Florita Siapno: *This is for Angela Ferraren. According to the studies Dr. Evangelline Castillo made during her time, it is effective in marginalized or degraded soil. It is also effective in any vascular plant. But yes, maybe we can search more about it.*

Angela Ferraren: *Was it done in sterilized soil?*

Florita Siapno: *Yes.*

Angela Ferraren: *The sterilized soil is the reason why she [Dr. Castillo] had a positive result. In a sterilized soil, no indigenous will be competing the inoculum unlike in degraded soil. The inoculum might not be used adopted to the site; thus, the indigenous will overrule and fail because it is an introduced strain, the strain should adopt in the marginal condition while the indigenous strain is already adopted. So, under a sterilized condition, the story would be different. Management would that would improve the number of strains would be another strategy.*

Topic: Designing Mixed Species Native Tree Reforestation Programs in the Philippines

Eric Buduan: *This is for Mariya. In your classification, you have early, mid, and late succession. How would it fit in the pioneer and climax classification? How did you classify the Shorea contorta (dipterocarps) and Macaranga bicolour?*

Mariya: *Pioneer are early succession; climax is late succession. The middle succession particularly depends on how the species perform.*

Topic: Advancement of Science for the Sustainable Utilization and Conservation of Forest Genetic Resources of Falcata (Falcataria Moluccana MIQ); Growth Performance and Nutrient Uptake of Falcate as Influenced by Chemical Fertilizer, Arbuscular Mycorrhizal Fungal Inoculation and Types of Potting Mix

Michelle Mogilski: *This is for Jupiter Casas and Angela Ferraren. Are the falcate you both talked about same or different species?*

Jupiter Casas: *The scientific name of falcata has been changing, 4 or 5 times already. But we talked about the same species.*

Michelle Mogilski: *Do you have any information on survival in your plots?*

Jupiter Casas: *Yes. We have the data but it is still being process.*

Concurrent session 3: Financial and institutional arrangements in FLR (*Press Room 2*)

VALUING FOREST ECOSYSTEM SERVICES: THE CASE OF MOUNT NACOLOD LOCAL CONSERVATION AREA (MNLCA) IN SOUTHERN LEYTE, PHILIPPINES

Lemuel S. Preciados

Visayas State University, Visca, Baybay City, Philippines

ABSTRACT: This study aims to measure the economic benefits derived from the forest ecosystem services provided by Mount Nacolod Local Conservation Area (MNLCA) in southern Leyte. Through Focus Group Discussions (FGD) and actual surveys, the research team was able to collect relevant data for the conduct of the resource valuation study for Mt. Nacolod. Based from the initial analyses conducted, it is found out that for the two municipalities alone (Hinungan and St. Bernard), the market-based value of the products and services derived from Mt Nacolod is PhP324,442,801 (325M) per year. The products and services identified included variety of crops such as rice, coconut, banana, cassava, vegetables and other crops. Other products were timber, animal meat, herbs, and fuel wood. Another important benefit derived from Mt. Nacolod is the water provisioning services. Preliminary analysis indicated that households saved about PhP 1,195 per year on average because of the free provision of water for household use coming from Mt. Nacolod. This saving value translated to a total economic value of about PhP5,284,157 per year for the two municipalities in Southern, Leyte. As part of the main objective of this study, the team has also used contingent valuation method to determine the household's willingness to pay (WTP) for the provisioning services and for the improved protection of Mt. Nacolod. Initial results suggest that 86% of the respondents are willing to pay for the improved protection of Mt. Nacolod. It was found that on average, households are willing to pay by about PhP 1,330 per year, while thirteen percent (13%) of the respondents stated they are not willing to pay because of low income but expressed their willingness to offer voluntary labour as help for the program instead. Furthermore, another assessment on willingness to pay was also determined for the maintenance of watershed. Preliminary result indicated that about 90% of the respondents are willing to pay to improve the maintenance and protection of watershed, and that on average, they are willing to pay by about PhP 973 annually. In addition to these initial resource valuation analyses conducted, other findings highlighted from the FGDs included the importance of water from Mt. Nacolod as source of irrigation in the rice farm areas in Southern Leyte. It was noted that without Mt. Nacolod's water provisioning services, there will also be no rice farm areas in their municipalities. Given this scenario, it was mentioned that farmers might be having just root crops with no alternative sources of income. Moreover, the importance of biodiversity conservation were also discussed during the focus group and it was found out that the forest guards could play a critical role in protecting the biodiversity in Mt. Nacolod. Furthermore, it was suggested that PhP 10,000 per month be given to these forest guards rather than just 250 per day. It is important to note however that results presented here are just preliminary and may be revised as new information becomes available, and that more analyses could be done through this on-going research.

OPPORTUNITIES AND CHALLENGES IN IMPLEMENTING NGP IN THE VISAYAS

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ABSTRACT: The National Greening Program (NGP) of the Philippine Government (through Executive Order 26) is the national forest landscape restoration strategy to alleviate poverty, food security, biodiversity conservation, and climate change mitigation and adaptation. The Program aimed to plant some 1.5 Billion trees covering about 1.5 Million hectares for a period of six (6) years in the following lands of the public domain: forestlands, mangrove and protected areas, ancestral domains, civil and military reservations, urban areas under the greening plan of the Local Government Units (LGUs), inactive and abandoned mine sites; and other suitable lands. It is expanded until year 2028 through Executive Order 193 to cover all the remaining unproductive, denuded and degraded forestlands. Opportunities lies on the fact that it is a priority program of the government with a total budget from the national treasury amounting to P30 Billions for 6 years (2011- 2016) and another closely similar amount until 2028. DENR has an established organizational structure and can implement NGP effectively and efficiently. NGP employs social mobilization that harnesses the collaborative effort of public and private sector, people's organizations, non-government organizations, and civil society. However, areas for planting become farther away and it is very difficult for volunteers such as students, other government employees, military, civil societies and others to reach the said areas. Seedling production is jeopardized as many PO do not know how to produce high quality seedlings. NGP also faced scarcity of seed sources in many regions as we do not have enough Seed Production Areas (SPAs) in the whole country. The Program also lack strong support from the local people or upland communities, among others.

Topic: Forest landscape restoration: the REDD+ Experience

Stephen Elliott: *How much (carbon) per town and who's paying for it?*

Florante Sabejon: *We have a database for that... but they weren't able to reach that stage.*

In formulating the forest allocation map, it was also asked if the allocation based on tenure was considered and if the researchers have an allocation map for open access.

Florante Sabejon: *We consider all tenurial documents, like CBFM, available in the locality. They are actually about 30 maps generated, including one for the tenure maps. Yes, there are allocation maps for open access, ready to be applied. It will now depend on the LCEs if they will apply those allocations on specific POs.*

Topic: Economic Valuation for Forest Ecosystem Services: The Case of Mt. Nacolod and Mahagnao Volcano Natural Park in Eastern Visayas, Philippines

A participant asked: *"It is one thing to identify the values for ecosystems but WTP doesn't necessarily mean willing to pay. So, where do you take all these?"*

Lemuel Preciados: *(Agreement/s) WTP is a proxy for the demand or value. This is the value one is willing to pay in order for these benefits to be sustainable. However, there are still other ways to value ecosystems. (Proposed Action/s) This study was done in collaboration with DENR since they are developing a scheme to try to help the POs in the PA generate revenues. In Mahagnao's case, they were already receiving tourist but without collecting any fee. Although through the ENIPAS act, there is a standards fee for tourists, which, based on the determined WTIP, can be an entrance fee of Php 30, Php 75 for environmental fee, or an additional Php 170 for traveling with a tour guide. Through the PAMB, they are already adopting a local policy to collect about 30 or 34 pesos, based on the valuation study. These collections have also been agreed as one way of a sustainable source for POs to hire more forest guards in the PA. There is a difference between LCA and PAs. The valuations can be used to declare the Mt. Nacolod as a Protected Area.*

Jerome Montemayor: *Have you also looked into differentiated costing? e.g. How much would you charge locals? How much are locals/visitors willing to pay?*

Lemuel Preciados: *(Proposed Action/s) This can be done through travel cost method as a way of determining the value of willingness of the tourist to come. For example, a tourist willing to sacrifice their time in Mahagnao, the amount of money they would be willing to spend for it could be the proxy value. But during their surveys, they did not have data for international tourists going to Mahagnao. DENR has different standard fees available. But there are other ways valuing of these things can be done.*

Topic: Opportunities and challenges in implementing NGP in the Visayas

Besides restoring mangroves, a participant asked whether the researchers also replant other plant species and also asked information (if any) on how to recover forests after a typhoon.

Jonathan Hijada: *(Agreement/s)* *The focus of development is not only for mangroves but also on developments in the upland. There are actually ongoing upland tree planting activities wherein people and international organizations are also invited to join.*

Eduardo Mangaoang: *(Proposed Action/s)* *There's a just completed research on mangrove which introduces a very simple local-based system of clustering for producing and planting stocks in nurseries, instead of in the sea. This strategy was found to be better in improving survival. There is a manual on this coming up.*

Philippine Peñablanca Sustainable Reforestation

Irineo Talosig Jr.
Conservation International

Where: Peñablanca, Cagayan, Luzon Island

Area of influence: 2900 ha

Area of intervention: 2500 ha

Funded by: Corporate funding

Implemented by: Conservation International Philippines

Aimed at: Biodiversity conservation; livelihood; and watershed management

Important lessons for making FLR happen

“The project targeted to establish a sustainable financing for the landscape and watershed management. There were lessons in engaging local stakeholders especially local government and community organizations. Resilience of species use for the agro-forestry livelihood within the landscapes is also important.”

Demonstration of capacity building of forest restoration and sustainable forest management in Vietnam

Trung C. Luu
Vietnam

Where: Districts of Tan Son and Thanh Son, Phu Tho Province.

Area of intervention: 100 ha

Implemented by: Phu Tho Department of Forestry

Aimed at: Maximizing the contribution of forests to hunger elimination, poverty alleviation, environmental services and livelihood improvement.

Outcomes

Although the project was finished in 2013, the demonstrations of 100 hectares have been protected and tended and local communities have harvested NWFPs such as bamboo shoots and rattan, thus generating income for communities; the local authorities also use the models to demonstrate to other communities in the districts.

Important lessons for making FLR happen

“The project shows a very promising approach of community based integrative forest restoration that takes into account of both local needs and ecological requirements. Besides technical aspects, the project also shows that strengthening capacity in institutions for all level in forest restoration planning, implementation and monitoring and benefit sharing plays important roles in FLR, especially, local forestry authorities and rangers.”

Forest landscape restoration through Assisted Natural Regeneration in Carood Watershed Model Forest in the Philippines

Patrick Dugan
FAO Philippines

Where: Carood watershed, Bohol Province

Area of intervention: Carood watershed total area is 101,887 ha

Aimed at: Strengthened and sustained partnership among stakeholders; improved ecological conditions of the watershed; sustained healthy supply of water; created upland, lowland and coastal enterprise; increased preparedness and resilience to climate change; good governance and efficient use of resources

Funded by: Government of a foreign country

Implemented by: FAO and Carood Watershed Model Forest Management Council

Outcomes

Unlike conventional restoration approaches, FLR aims to integrate forest restoration into broader environmental and socio-economic objectives within a landscape. Active participation of stakeholders at different levels is necessary to address competing land use interests in order to achieve both social and ecological objectives. And these integral factors for FLR to be successful has been demonstrated in the Carood Watershed Model Forest.

Important lessons for making FLR happen

“The project provides an inspiration for cross-sectoral mechanism and institutional partnership, particularly the cooperation of municipal officers within the watershed, to create a platform and harmonize different land use interests.”

Water Producer Forest Restoration in Brazil

Ricardo Viani
University of Sao Paulo

Where: Joanopolis and Nazare Paulista, State of Sao Paulo. Both cities are within the Cantareira System, which provides water for São Paulo city metropolitan region.

Area of intervention: 18,006 ha

Funded by: National government, Subnational/regional government, Foundation, Watershed committees, NGOs

Implemented by: The Nature Conservancy



A forest restoration site at the PCJ Water Producer project in the Atlantic Forest, Brazil

Important lessons for making FLR happen

“The main objective of this project was to test the PES as a way to promote FLR, with a main goal of conserving natural resources (biodiversity and especially water) within critical watersheds. We tested it. We aggregated several institutions around this goal. And we learned from it! Thus, this goal was achieved. Besides, PES was made for the first time, for rural landowners in São Paulo State, Brazil. This is the successful part of this project. However, the project showed us how difficult it is to implement a PES in the way we planned. There were many stakeholders involved, absence of local institutions leading the project, no guarantee of continuity of the project in the long term, a lot of paperwork for landowners participation, non-flexible institutions funding the project with difficulties to reallocate resources according to changes in the demand coming from landowners interests, low PES value, etc. All these factors contributed to a lower-than-expected participation of landowners in the project.”

Multi-function forest restoration and management of degraded forest areas in Cambodia

Thea So

Institute of Forest and Wildlife Research and Development

Where: Siem Reap and Kampong Thom provinces

Area of influence: 500 ha

Area of intervention: 50 ha

Funded by: Government of a foreign country

Implemented by: Institute of Forest and Wildlife Research and Development (Forestry Administration)

Aimed at: Biodiversity conservation

Stakeholders involved: Institute of Forest and Wildlife Research and Development (Forestry Administration), Provincial Forestry Administration and Local communities

Activities undertaken

Native species tree planting, development of community / regional plant nurseries, capacity building / training / educational activities.

Outcomes

Secured land tenure; communities gained knowledge and skill on forest restoration, and they keep reforesting their forests.

Livelihood and Landscape Strategy in China

Li Jia
IUCN

Area of influence: 1,578,000 ha

Area of intervention: 30,000 ha

Funded by: Subnational/regional government; Government of a foreign country;
Corporate funding

Implemented by: IUCN

Aimed at: Watershed protection and livelihood improvement

Outcomes

The project has both success and failures. The project is successful in restoring some of the areas such as critical riparian zones, as well as setting up demonstration community-based restoration models. It also managed to set up new mechanisms to fund watershed protection but the attraction of new funding into the fund remains limited.

Important lessons for making FLR happen

The case provides a number of lessons learnt for making future FLR happen:

- 1. A leader or a leading institution is essential to initiate, implement and continue the restoration work required, and to over-come the initial phase of no or slow return. The leader needs to have a long-term vision, flexibility to adapt to temporary challenges and capacity to steer a consortium of stakeholders on the right course.*
- 2. The key obstacle for long term sustainability remains to be the lack of self-sustaining restoration economic models. In this regard, more efforts are to engage private sector to learn from their expertise in terms of developing new economic models, as well as expanding the investment base.*
- 3. The sustainability of funding and leadership remains an issue.*

Pilot community-based forest restoration project in Biliran Province, Philippines

Nestor Gregorio
University of the Sunshine Coast

Where: Barangay Kawayanon, Caibiran, Biliran
Area of influence: 1000 ha
Area of intervention: 30 ha
Funded by: Government of a foreign country
Implemented by: Kawayanon Farmers Association
Aimed at: Rehabilitating watershed and improving livelihoods



Four-year old *Acacia mangium* in the production zone of the FLR project

Outcomes

Successful tree and crop establishment and growth, enhanced food security and provision of additional income, improved human and social capitals, increased networks and access to financial and material support from government agencies.

Challenges

Ineffective mother tree protection program, nursery seedling as a livelihood enterprise has not been materialised, less effective management of crops in the expanded agroforestry zone, low survival of seedlings in the new NGP project of the PO.

Use of the framework species method to restore forest ecosystems to the Upper Mae Sa Valley, Northern Thailand

Stephen Elliott
FORRU, Chiang Mai University

Where: Mai Province

Area of influence: 2000-3000 ha

Area of Chiang intervention: 32 ha

Funded by: National government, Foundation, Private donations, Corporate funding, Carbon offsets

Implemented by: Chiang Mai University (FORRU), Department of National Parks, Ban Mae Sa Mai village community.

Aimed at: Different stakeholders had different goals; FORRU's goal was to determine the best forest restoration techniques for that particular landscape; the villagers wanted to strengthen their right to remain living in a national park (which is illegal) and; secure a reliable water supply for agriculture; the national park wanted to reclaim encroached land to boost forest cover in a national park to meet national policies.

Important lessons for making FLR happen

“FLR cannot happen unless effective restoration tools are developed and made available. Even if the political will and local support exist, practices that are proven to be effective must be used. Otherwise villagers local support vanishes if the trees eventually die. This project provided a sound body of scientifically tested practices that enable FLR to be successful. Even though we came into this project as scientists, we learned much about the socio-economic/political side of restoration from a unique perspective along the way and I believe these lessons as just as valuable as our technical outputs are. So we would welcome the opportunity to share them.”

Supporting watershed restoration through institutionalization of communities in Ethiopia

YitbarekTibebe
UNDP Ethiopia

Where: Amhara region

Area of influence: 111,800 ha

Area of intervention: 130 ha

Funded by: Government of a foreign country

Implemented by: Watershed organisational and livelihoods affairs

Aimed at: Restoring degraded landscapes; livelihood development through restoration products; institutionally supporting sustainability of achievements

Outcomes

The restoration efforts have improved the livelihood of the local beneficiaries by increasing their income to more than 50%. Moreover ensured the equitable and sustainable utilization of the restoration outputs by institutionalizing beneficiaries in to organisations with formal bylaws.

Important lessons for making FLR happen

“Many FLR efforts focus on the biophysical success which is important but it has to be basically supported with social and economic sustainability efforts. My project comes up with one of these strategies going beyond the restoration.”

Forest and Landscape Restoration: Making It Happen

INTERNATIONAL CONFERENCE

25-27 February 2019

New World Hotel, Makati City, Philippines

Day 1. February 25, Monday	
8:00-9:00	Registration
9:00-10:00	Opening and Welcome —Arturo Pasa (VSU) DENR Sec. Roy Cimatu PCAARRD—Dr. Leila America Forest Foundation Philippines—Atty. Jose Andres Canivel ACIAR Canberra—Dr. Jayne Curnow USC—Professor John Herbohn
10:00-10:30	Coffee Break
10:30-12:15	Keynote plenary: The Forest and Landscape Restoration Context Moderator: Rhett Harrison
10:30-11:00	The Essence of Forest and Landscape Restoration: Beyond Bandwagons and Business as Usual Robin Chazdon
11:00-11:30	Main challenges on the ground for practitioners Patrick Durst
11:30-12:00	Community capacity and FLR progress John Herbohn
12:00-12:30	Questions and discussion
12:30-1:30	Lunch
1:30-3:00	Panel: Advances in science, practice and policy to inform FLR and improve outcomes Moderator: Bob Fisher
1:30-1:45	Capacity building for FLR David Neidel
1:45-2:00	Silviculture for FLR Jerry Vanclay
2:00-2:15	No seeds, no trees: building up the seed supply for meeting multi-million hectare restoration targets Riina Jalonen
2:15-2:30	ERDB - A national strategy of the Philippine government to improve the quality of seedlings in forest restoration Sofio Quintana
2:30-2:45	FAO's FLR related initiatives in Southeast Asia Karl Villegas
2:45-3:00	Questions and discussion
3:00-3:30	Coffee break + Group Photo
3:30-3:55	Keynote plenary

3:30-3:40	Global FLR case study database: Robin Chazdon		
4:00-5:30	CONCURRENT SESSIONS		
	Enabling conditions for Forest Landscape Restoration (FLR) in Bukidnon / Misamis Oriental, Philippines Moderator: FFP	Approaches and practices for FLR Moderator: Arturo Pasa	Designing, monitoring and managing adaptively for success Moderator: Eduardo Mangaoang
4:00-4:15	Forest Foundation Results Framework 2017-2021: Sustainable Forest Landscape Approach in Bukidnon / Misamis Oriental: <i>Forest Foundation Philippines</i>	Tropical peat swamp forest restoration: Natural, assisted or direct re-vegetation?: <i>Laura Graham</i>	To guide or not to guide FLR? Analyzing proposed guidance and standards: <i>Marcel Starfinger</i>
4:15-4:30	Scientifically-sound forest ecosystem assessment: Land cover mapping: <i>Environmental Science for Social Change</i>	Can natural regeneration be a cost-effective restoration strategy in the upland Philippines?: <i>Sharif Mukul</i>	Developing success indicators for SFM: <i>Priscila Dolom</i>
4:30-4:45	Scientifically-sound forest ecosystem assessment: Mangrove assessment: <i>Macajalar Bay Development Alliance</i>	Accelerating restoration through selective thinning: <i>Tom Swinfield</i>	Participatory rainforestation and monitoring system: The Bohol Island State University Experience: <i>Tomas Reyes</i>
4:45-5:00	Capacity strengthening, partnership building and enhancing governance: <i>Xavier Science Foundation</i>	Provision of adequate tree seed portfolios to enhance productivity and resilience of FLR in Ethiopia: <i>Cathy Watson</i>	Revision of the ITTO restoration guidelines: <i>Cesar Sabogal</i>

5:15-5:30	Question and discussion	A Smallholder-based Seedling Production System to Improving Forest Restoration Outcomes in the Philippines: <i>Nestor Gregorio</i>	Is seeking perfection in FLR outcomes achievable or desirable?: <i>Bob Fisher</i>
5:30-5:45		Question and discussion	Question and discussion

Day 2. February 26, Tuesday			
8:30-9:00	Keynote plenary: Restoration and monitoring framework in the State of Sao Paulo, Brazil Rafael Chaves		
9:00-10:30	Panel session: Lessons learned: Case studies of FLR design, implementation and outcomes Moderator: Robin Chazdon		
9:00-9:15	Pilot reforestation program in Biliran, Philippines Nestor Gregorio		
9:15-9:30	Livelihood and Landscape Strategy in China Li Jia		
9:30-9:45	Supporting watershed restoration through institutionalization of communities in Ethiopia Yitbarek Tibebe		
9:45-10:00	Multi-function forest restoration and management of degraded forest areas in Cambodia Thea So		
10:00-10:15	Use of the framework species method to restore forest ecosystems to the Upper Mae Sa Valley, northern Thailand Stephen Elliott		
10:15-10:30	Water Producer Project in the Atlantic Forest in Brazil Ricardo Viani		
10:30-11:00	Coffee break		
11:00-12:30	Panel session: Lessons learned: Case studies of FLR design, implementation and outcomes (continuation)		
11:00-11:15	Forest landscape restoration through Assisted Natural Regeneration in Carood Watershed Model Forest, Philippines Patrick Dugan		
11:15-11:30	Demonstration of capacity building of forest restoration and sustainable forest management in Vietnam Trung C. Luu		
11:30-11:45	Philippine Peñablanca Sustainable Reforestation Project Irineo Talosig		

11:45-12:00	Selected case studies from Latin America Cesar Sabogal		
12:00-12:30	Panelist: Victoria Gutierrez, Patrick Durst, TBA		
12:30-1:30	Lunch		
1:30-2:00	Keynote plenary: Managing private sector for FLR Lee Ming Enn		
2:00-2:45	Panel session: Engaging the private sector in FLR: From smallholders to international corporations Moderator: Grahame Applegate		
2:15-2:30	The BINHI project Atty. Allan Barcena		
2:15-2:30	The concept of Investment in FLR Brian Sharp		
2:30-2:45	Questions and discussion		
2:45-3:15	Coffee break		
3:15:4:00	Keynote plenary: Forest landscape restoration and hydrological recovery in the humid tropics: what can be expected realistically? Sampurno Bruijnzeel Soil and water impacts of reforesting fire-climax grasslands on Leyte Island, the Philippines Jun Zhang		
4:00-5:30	CONCURRENT SESSIONS		
	Challenges and opportunities for FLR Moderator: Emma Castillo	Forest restoration and livelihoods. Moderator: Danny Cacanindin	A people-centred approach Moderator: Dennis Peque
4:05-4:20	Anthropogenic fires in the Ramu-Markham Valley: Underlying causes and motivations: <i>Nathan Wampe</i>	Revitalization of livelihoods through paddy cultivation as an approach for tropical peatland restoration: <i>Eli N. Sari</i>	Assessment of roles and participation of local communities and line government agencies in the implementation of NGP in Biliran Province, Philippines: <i>Eduardo Mangaoang</i>
4:20-4:35	Forest landscape restoration in a global production network: The case of the Brazilian Amazon.: <i>Danilo Ignacio de Urzedo</i>	The effect of the National Greening Program on the socioeconomic status of smallholders in the Philippines: <i>Henry Goltiano</i>	Empowering women through forest landscape restoration: <i>Lilian Nunez</i>
4:35-4:50	Status of local knowledge and practices of	Contributions of community-based	Local Stakeholders and interests for Forest

	communities on pest and disease management in tree nurseries in Biliran Province, Philippines: <i>Yolanda Mangaoang</i>	resource management project as a strategy for upland community development and forest Restoration in Usmad, Argao, Cebu: <i>Archiebald Baltazar</i>	Landscape Restoration: Case studies of the Philippines and Papua New Guinea: <i>Kanchana Wiset</i>
4:50-5:05	Review of Reforestation in PNG: suitable tree species: <i>Gedisa Jeffery</i>	Forestry livelihoods: <i>Casimiro Olvida (Alsons Power)</i>	Gender, agroforestry and forest landscape restoration in the Ramu-Markham Valley: <i>Melinda Thom</i>
5:05-5:20	Prediction of forest cover change using remote sensing and GIS: <i>Huong Thanh Thi Nguyen</i>	Mangrove Plantation and Disaster Risk Reduction: <i>Nguyen Cuc</i>	Sustainable forest rehabilitation and management through community-based approach: A case study in Northern Shan State, Myanmar: <i>Inkyin Khaine</i>
5:20-5:30	Question and discussion	Question and discussion	Question and discussion
4:20-4:35	Forest landscape restoration in a global production network: The case of the Brazilian Amazon.: <i>Danilo Ignacio de Urzedo</i>	The effect of the National Greening Program on the socioeconomic status of smallholders in the Philippines: <i>Henry Goltiano</i>	Empowering women through forest landscape restoration: <i>Lilian Nunez</i>

Day 3. February 27, Wednesday	
8:30-9:00	Keynote plenary: DENR initiatives Usec Jonas Leones
9:00-10:30	Panel session: Key interventions and directions for FLR Moderator: Dominique Cagalan
9:00-9:15	Status, opportunities, and challenges of the NGP implementation in the Philippines FMB Director
9:15-9:30	Scaling up FLR across Africa through embedded learning Rhett Harrison

9:30-9:45	Restoration and preventing FL degradation in a refugee setting in NW Uganda Cathy Watson		
9:45-10:00	Smallholder forestry in Melanesia as a means for resource and landscape restoration Tony Page		
10:00-10:15	Integrating FLR into the post-2020 global biodiversity agenda Jim Hallett		
10:15-10:30	Questions and discussion		
10:30-11:00	Coffee break		
11:00-12:00	Special session on FLORES Guidelines for FLR and whitepaper from FLORES Victoria Gutierrez		
12:00-1:00	Lunch		
1:00-1:55	Panel session: Funding and Financing of FLR Moderator: Rotacio Gravoso		
1:00-1:15	Scale matters: models of payments for ecosystem services for FLR in the Philippines Dominique Cagalanan		
1:15-1:45	Private partnerships in implementing NGP Prof and Former Usec Marlo Mendoza		
1:45-1:55	Questions and discussion		
2:00-3:15	CONCURRENT SESSIONS		
	Agriculture and FLR Moderator: Priscila Dolom	The biophysical aspects of FLR Moderator: Teresa Aquino	Financial and institutional arrangements in FLR Moderator: David Nidel
2:00-2:15	Theobroma Cacao (Cocoa) in the Ramu Markham Valley: A Strength, Weakness, Opportunities and Threats Analysis: <i>Clifford Single</i>	Designing mixed-species native tree reforestation programs in the Philippines: <i>Mariya Chechina</i>	Forest landscape restoration: the REDD Plus experience: <i>Florante Sabijon</i>
2:15-2:30	Agroforestry and Ecological farming practices to improve Landscape Restoration initiatives in the humid tropics: <i>Camila Ribeiro</i>	Ecological Restoration of Degraded Lowland Rain Forests in Sri Lanka: An Overview: <i>Nimal Gunatilleke</i>	Economic Valuation for Forest Ecosystem Services: The Case of Mt. Nacolod and Mahagnao Volcano Natural Park in Eastern Visayas, Philippines: <i>Lemuel Preciadós</i>
2:30-2:45	Trees and Agricultural crop preferences among	Advancement of Science for the Sustainable Utilization and	Public-corporate community-based forest landscape restoration

	NGP beneficiaries in the Visayas Region: <i>Anatolio Polinar</i>	Conservation of Forest Genetic Resources of Falcata (<i>Falcataria moluccana</i> Miq): <i>Jupiter Casas</i>	approach in Northwestern Leyte, Philippines: <i>Eduardo Mangaoang</i>
2:45-3:00	Review of presentations	Growth performance and nutrient uptake of falcata (<i>Paraserianthes falcataria</i>) as influenced by chemical fertilizer, arbuscular mycorrhizal fungal inoculation, and types of potting mix: <i>Angela Ferraren</i>	Opportunities and challenges in implementing NGP in the Visayas: <i>Arturo Pasa</i>
3:00-3:15	Question and discussion	Question and discussion	Question and discussion
3:15-3:45	Coffee break + Group Photo		

3:45-4:30	CONCURRENT WORKSHOPS		
	<i>Room 1</i> 1) Principles and Criteria (Moderator: Victoria Gutierrez) 2) Funding and financing (Moderator: Brian Sharp)	<i>Room 2</i> 3) Obstacles for FLR (Moderator: Jim Hallett) 4) Project, program and process (Moderator: TBA)	<i>Room 3</i> 5) Stakeholder engagement (Moderator: Tony Page) 6) Sustaining FLR beyond projects and programs (Moderator: TBA)
4:30-5:00	Synthesis of conference and final message Robin Chazdon		



Participants of 2019 FLR International Conference



Representatives from DENR, ACIAR, FFP, and PCAARRD.



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Miguel Cuna



FFP
Executive
Director
Jose Andres
Canivel



PCAARRD
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Professor
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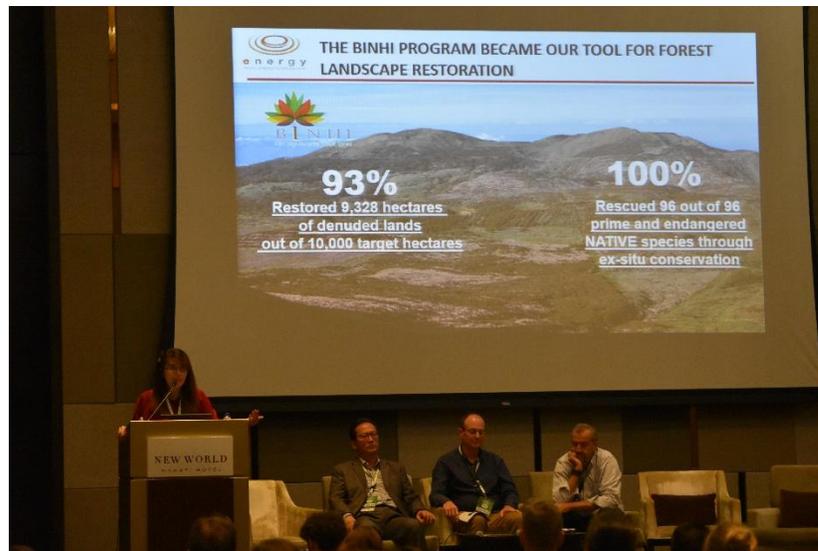














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MYANMAR

Chumthiomai, Banhan

Khaine, Inkyin

Myat, Aye

NETHERLANDS

Bruijnzeel, Leendert

Zhang, Jun

PAPUA NEW GUINEA

Jeffery, Gedisa

Single, Clifford

Thom, Melinda

Wampe, Nathan

PERU

Melendez, Cesar Sabogal

PHILIPPINES

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America, Leila

Aquino, Teresa

Bagui, Diane Estephanie

Baradas, Tina

Barcena, Allan

Barsomo, Melissa

Baustita, Ma. Terry

Bautista, Eugenia
Benabon, Myra
Bertulfo, Roselle
Buduan, Eric
Bugarin, Ed
Cacanindin, Danilo
Canivel, Jose Andres
Canlas, Ruth
Canto, Wilfredo
Carig, Elizabeth
Casas, Jupiter Castillo, Emma
Doria, Kenneth Bryan
Duay, Chev Benedict Roldan
Dugan, Patrick
Dulom, Precy
Edulan, Rad Marc
Etulle, Jeomar
Fallarcuna, Brent
Faylon, Mara
Ferraren, Angela
Garcia, Carlo
Goltiano, Henry
Gonzales, Gilbert
Gravoso, Rotacio
Hijada, Jonathan
Ignacio, Jose Andres
Jabagat, Leah
Karwolski, Jeffrey
Lansigan, Felixberto
Leones, Jonas
Leysa, Jhan Rey
Lumacad, Anecita
Malaki, Archiebald
Mangaoang, Eduardo
Mangaoang, Yolanda
Maputi, Benjamin
Mariano, Bryan Joel
Maya-Anda, Grizelda
Mendoza, Heidi
Mendoza, Marlo
Modequillo, Rhel
Mollena, Mercedita
Montebon, Zoilo

Montemayor, Jerome
Moreno, Opelia
Navarro, Jerry
Nuñez, Lilian
Olvida, Casimiro
Parcia, Nova
Pasa, Arturo
Peque, Dennis
Polinar, Anatolio
Prag, Anat
Preciados, Lemuel
Quintana, Sofio
Ramos, Arsenio
Rashed, Al
Ravanera, Roel
Reyes, Tomas
Rife, Katty
Rosales, Dennis
Siapno, Florita
Talon, Annabelle
Tamayo, Nonito
Tripoli, Rogelio
Tutor, Ariel
Verdijo, Thieza
Vicente, Grace Dorothy
Villegas, Karl
Vita, Ryan
Ygaña, Mark Florence

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Swinfield, Tom

SRI LANKA

Gunatilleke, Nimal

THAILAND

Durst, Patrick
Elliot, Stephen
Harrison, Rhett
Jia, Li

UNITED KINGDOM

Guitierrez, Victoria

USA

Chazdon, Robin

Cagalanan, Dominique

Laestaduis, Lars

Neidel, David

VIETNAM

Doan, Minh Trung

Hang, Phan Thi

Nguyen, DucDinh

Nguyen, Thi Thanh Huong

Trang, LuuCanh

Tropical Forests and People Research Centre

Smallholder and community forestry in the tropics

Our Vision

To help forest-dependant people to make better use of their forest resources to improve livelihoods and the environment

The Context

Close to 1.6 billion people – more than 25% of the world's population – rely on forest resources for their livelihoods and most of them (1.2 billion) use trees on farms to generate food and cash. Moreover, many countries in the developing world draw on fuelwood to meet as much as 90% of energy requirements (FAO 2015). The Tropical Forests and People Research Centre brings together researchers interested in the interactions between people and tropical forests. The Centre is based around multidisciplinary projects and a desire of its members to work collaboratively to address complex problems associated with reforestation and forest management in the tropics. Our members include social and biophysical scientists with expertise in forest restoration and rehabilitation, ecology, forest science, silviculture, hydrology, soil science, anthropology, livelihood systems, economics, supply chains, finance and policy

Some Current Projects

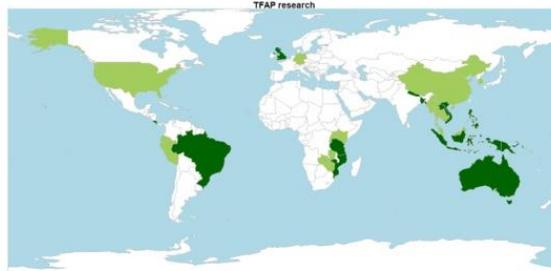
- Improving livelihoods through forest and landscape restoration in the Philippines (ACIAR \$3.01 M, 2017-2022)
- Community forestry in Papua New Guinea (ACIAR \$3.0 M, 2017-2021)
- Improvement and management of teak and sandalwood in Papua New Guinea and Australia (ACIAR, \$1.27M 2015-2019)
- Enhancing community-based commercial forestry in Indonesia (ACIAR, \$1.2M, 2016-2019)
- Indigenous forestry and restoration of mine sites in tropical northern Australia (\$2.0M, Greencoast Mining, Wik Timbers, Qld State Government, Rio Tinto 2017-2020)
- Understanding peat fires in Indonesia (NASA, 2016-2019)
- Understanding and managing secondary tropical forests – restoration of the world's oldest tropical forest permanent plot network



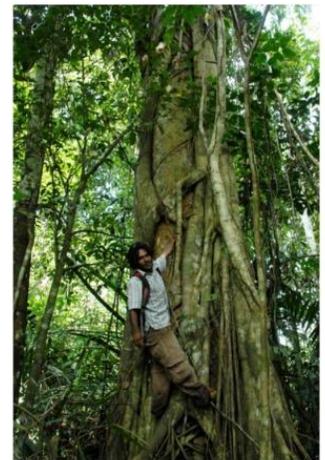
Her Majesty Queen Elizabeth II recognises USC forestry research in PNG

More than three years of forestry research by the University of the Sunshine Coast in Papua New Guinea has been formally acknowledged by Her Majesty Queen Elizabeth II at a reception at Buckingham Palace. The \$2.2 million community forestry project, now nearing completion, was led by USC's Tropical Forests and People Research Centre in partnership with Papua New Guinea organisations and funded by the Australian Centre for International Agricultural Research. Australian Minister for Foreign Affairs Julie Bishop announced on 17 November that the project, 'Enhancing the Implementation of Community Forestry Approaches in Papua New Guinea', had been showcased at Buckingham Palace in London and awarded accreditation under the Queen's Commonwealth Canopy (QCC) initiative. The QCC was launched at the Commonwealth Heads of Government Meeting in Malta in 2015 as a network of outstanding forest conservation initiatives involving the 52 countries of the Commonwealth.

Where We Work



(Dark green – major research focus; Light green – others projects)



Large kwila tree in clan forest in PNG

Research themes

Restoring Tropical Forests

- Tropical forest restoration
- Mixed species systems
- Peatland restoration

Forests for People

- Small-scale forestry and community
- People, money and policy
- Rural sociology
- Indigenous forestry

Managing Tropical Forests

- Forest silviculture
- Forest ecology hydrology



Kawayanon Farmers Association involved in implementing best practice in community forestry as part of ACIAR project led by USC researchers in the Philippines

Our Research Team

The Tropical Forests and People Research Centre brings together around 50 researchers interested in the interactions between people and tropical forests. The Centre is based around multidisciplinary projects and a desire of its members to work collaboratively to address complex problems associated with reforestation and forest management in the tropics. Our members include social and biophysical scientists with expertise in forest restoration and rehabilitation, ecology, forest science, silviculture, hydrology, soil science, anthropology, livelihood systems, economics, supply chains, finance and policy



Centre researchers during field work in north Queensland to restore the world's oldest permanent plot network in tropical forests

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Excellence in agriculture, aquatic, and natural resources innovation



OUR VISION

A sustained dynamic leadership in science and technology (S&T) innovation in the agriculture, aquatic, and natural resources (AANR) sectors.

OUR MISSION

To provide strategic leadership in promoting S&T as a platform for AANR products innovation and environment resiliency.



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DEPARTMENT OF SCIENCE AND TECHNOLOGY (DOST)
PHILIPPINE COUNCIL FOR AGRICULTURE, AQUATIC AND NATURAL RESOURCES RESEARCH AND DEVELOPMENT (PCAARRD)

<http://www.pcaarrd.dost.gov.ph>



FOREST LANDSCAPE RESTORATION PROJECT

ACIAR ASEM/2016/103 Enhancing Livelihoods through Forest & Landscape Restoration
College of Forestry and Environmental Science, Visayas State University, Visca, Baybay City ,
Leyte 6521-A Phil. Telefax: 053-563-7069



ACIAR Forest Landscape Restoration

www.flr2019.weebly.com