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Rainforestation

Paradigm Shift in Forest Restoration
in the Philippines

PACIENCIA P. MILAN, PhD

RAINFORESTATION

PARADIGM SHIFT
IN FOREST RESTORATION
IN THE PHILIPPINES

PACIENCIA P. MILAN, PhD

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My appreciation also goes to the Foundation for the Philippine Environment (FPE), Forest Foundation Philippines, formerly known as the Philippine Tropical Forest Conservation Foundation (PTFCF), and the Rain Forest Restoration Initiative (RFRI) for sharing valuable data and information crucial to the collection of stories for this book.

There are a number of individuals who have contributed not only in the promotion of RF but also in enriching its technology: Antonio Fernandez, our passionate para-taxonomist and companion in the field; the late Marcelo Fernandez, who shared his insights about the life of a *kaingero*; Macario Romano, one of our ardent supporters; Ma. Juliet Ceniza and Marlito Bande, who continuously spread the seed of RF in different parts of the Philippines; and the nursery staff of the Institute of Tropical Ecology and Environmental Management (ITEEM).

I wish to express my gratitude to Dr. Warner Koch for helping us fine-tune some theories on agro-ecology and to Dr. Claus-Peter Hutter for supporting the implementation of RF by linking us with friends, donors, and funders in Germany, who believe that it is a sustainable farming system.

It was at first a dream to write a book despite several constraints in logistics and family concerns. The dream took shape through the encouragement of and inspiration from Atty. Jose Andres Canivel, Executive Director of the Forest Foundation, and the financial support of the Foundation.

I would do injustice not to mention Dr. Josef Margraf who impressed in me the beauty of Philippine native tree species as we were developing the concept of Rainforestation.

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Paciencia P. Milan, PhD

Foreword

Over the last 40 years, the decline and degradation of Philippine forests have reached critical proportions. Illegal and unsustainable logging practices and mining, as well as indiscriminate land use, have significantly depleted forest cover, and not without its dire consequences—the loss of wildlife habitat causing tremendous rise in cases of threatened and endangered species of flora and fauna; water insecurity because of degraded watersheds; and loss of topsoil due to soil erosion that depletes nutrients for crops and causes perennial flooding and induced landslides.

Laws were passed, policies were drawn, and new reforestation projects were conducted. A nationwide advocacy on planting trees and conserving what is left of our forests grew. Although forest conservation and reforestation projects have been undertaken, they could not overtake the rate of deforestation and its effect on the environment. One question remained: have we been planting the right trees?

A promising answer came to light in the 1990s when then Visayas State College of Agriculture—now Visayas State University (VSU)—which was headed by Dr. Milan, partnered with the German Technical Cooperation Agency (GTZ) and developed an agroforestry system called “**rainforestation farming**” or RF. It is a technology that uses native tree species to rehabilitate degraded landscapes, thereby restoring key ecosystem services. Under the partnership between Dr. Josef Margraf and Dr. Milan, RF has become a better option for forest restoration.

Former reforestation efforts were aimed at enhancing timber productivity and less on restoring original ecosystems and biodiversity; thus, exotic species such as the fast-growing gmelina and mahogany trees were commonly used. In contrast, the RF system promotes the use of native tree species, which are mostly dipterocarps (e.g., lauan, apitong, guijo, tanguile, and yakal, among other species) that thrive in tropical rain forests across the Philippines. 

Native trees, unlike exotic species, have been proven to enrich timber production and agro-ecosystems, as well as to restore and protect various forest ecosystems.

The Department of Environment and Natural Resources (DENR) was convinced of the efficacy and sustainability of the RF technology. The concept was adopted in 2004 through DENR Memorandum Circular No. 2004-06, integrating the RF strategy in the development of open and denuded areas within protected areas and other appropriate forest lands.

As part of the Biodiversity Management Bureau's (DENR-BMB) mandate on biodiversity conservation, we strongly support the advocacy of Dr. Milan and VSU in promoting RF, especially in protected areas nationwide, and in developing policies that would expand the use of native species from community-based RF initiatives to a larger scope of ecosystem development.

I see this book, "Rainforestation: Paradigm Shift in Forest Restoration in the Philippines," as a catalyst for change in forest rehabilitation systems, assuring the restoration of our forests' ecological integrity and biodiversity, and providing economic benefits for the nation and our people.

Theresa Mundita S. Lim, DVM

Former Director, DENR-BMB

Executive Director, ASEAN Centre for Biodiversity

Preface

It started in 1992 with a small demonstration plot in a Forest Research Institute site to germinate a farming technology for forest restoration. What was initially conceived as an evidence-seeking research, the 2.8-hectare (ha) laboratory plot within the campus has become a learning site. According to ecologist Dr. Josef Margraf: “Only if we restore the physical structure and species composition closer to the original local rainforest that we could restore the ecological integrity of the forest.” It was through a process of field trials, documentation, and developing typologies that we finally developed a farming system that addresses both livelihood of and ecological benefits for local communities.

In a span of seven years, our modest demonstration sites have grown to 38 ha of RF pilot farms planted with native species that were set up by cooperating farmers. It did not come easy in the beginning, as there were many roadblocks along the way. Changing the attitudes, mind-sets, and practices of both academic and local practitioners was difficult to overcome, as state-sponsored reforestation program was—and still is—promoting the use of exotic species with a promise of faster and bigger income yield, while addressing the country’s requirement for the wood industry.

After more than two decades of promoting RF, several nongovernmental organizations (NGOs) and civil society organizations (CSOs) have adopted the system all over the country, with more than 22,000 ha already planted with native tree species (between 2005 and 2017). However, what has been done is far from the much-desired target of forest restoration. Likewise, if the policy of using exotic species on reforestation programs continues, we also allow our treasured natural forest to deplete. What is urgent to all of us in the conservation sector is to influence and inform the public that we can gain more if we bring back our native tree species in all efforts of forest restoration.

This resource book shares our unique experience in promoting the RF system that we started at VSU. It provides the rationale why we need to shift our paradigm, practices, and mind-sets in the ways we restore our degraded forests. Our past reforestation projects offer many lessons

to learn from—particularly in accelerating efforts in protecting tropical forests and the ways forward.

This is a learning material that we want to share to avoid the mistakes we made in the past. Thematic suggestions, culled out from field experiences, are valuable insights to learn from. I am also enclosing an updated RF manual as part of the attachment, along with other published RF manuals, tool kits, and practical guides.

Finally, it is our impassioned call to policy makers and forestry practitioners to take decisive actions in using our native tree species in restoring our forest.

Paciencia P. Milan, PhD

Message

Rainforestation Farming: Challenges and Chances for Nature and Mankind

Congratulations to Dr. Paciencia Milan, former president of the Baybay Rainforestation Foundation, for this publication, which documents not only a pioneering idea but also a real movement that brings scientific results of sustainable use of nature at a future-oriented application level in forest ecosystem restoration.

The rainforestation farming (RF) concept was developed in the framework of a bilateral applied tropical ecology project of the Federal Republic of Germany and the Republic of the Philippines through its German Agency for Technical Cooperation (GTZ), with the involvement of the University of Hohenheim (Germany) at all levels of needed research since 1990. During a period of nearly three decades, an intensive and sustainable cooperation developed among the University of Hohenheim, Visayas State University, and EuroNatur, followed by NatureLife-International since 2007.

As a sustainable land use system, the RF strategy for forest restoration uses native tree species in combination with agricultural crops. It is a method of sustainable land use that combines climate protection, poverty prevention, mitigation of possible catastrophic impacts, protection of biodiversity, and sustainable integrated regional development.

In intensive cooperation and dialogue with the Baybay Rainforestation Foundation, VSU, and other scientific institutions in several countries, NatureLife-International was instrumental in the transfer of RF method by establishing regional networks in Java (Indonesia), Southwest China, Vietnam, Lao PDR, and Sri Lanka. It can be said that the sustainable application of the RF methodology—embedded in the philosophical understanding of stewardship for human and nature—is expanding from the Philippines and Baybay on the Island of Leyte. The well-developed and nature-proven method has the potential to not only help everyone but also to protect nature, especially in tropical regions.

Together with Dr. Friedhelm Goeltenboth, scientific advisor of NatureLife-International tropical projects, I wish you a future of successful endeavors in educating people about RF and in deepening the scientific knowledge on the sustainable use of nature. This publication is a significant contribution and a written treasure of knowledge and practical experiences.

Claus-Peter Hutter Claus-Peter Hutter, PhD

*President, NatureLife-International
Senator h.c. University of Hohenheim*

List of Abbreviations

A&D	alienable and disposable
ANR	assisted natural regeneration
BEMO	Bohol Environment Management Office
BLGU	barangay local government unit
BMB	Biodiversity Management Bureau
CADC	Certificate of Ancestral Domain Claim
CADT	Certificate of Ancestral Domain Title
CAFA	Camalanda-an Agro-Forest Association
CBD	Convention on Biological Diversity
CBFMA	Community-Based Forest Management Agreement
CENDI	Community Entrepreneur Development Institute
CENRO	Community Environment and Natural Resources Office
CHESH	Center for Human Ecology Studies of the Highlands
CIFOR	Center for International Forestry Research
CLUP	Comprehensive Land Use Plan
CRP	Contract Reforestation Program
CSOs	civil society organizations
CSR	corporate social responsibility
CSVFA	Cienda-San Vicente Farmers Association
DAO	Department Administrative Order
DENR	Department of Environment and Natural Resources
DTI	Department of Trade and Industry
EDC	Energy Development Corporation
ELTI	Environmental Leadership & Training Initiative
ENGP	Expanded National Greening Program
EO	Executive Order
EuroNatur	European Natural Heritage Fund
FLUP	Forest Land Use Plan
FMB	Forest Management Bureau
FME	Forest Management Enterprise

FPE	Foundation for the Philippine Environment
FPE3	Fostering People's Empowerment, Education and Enterprise
GTZ/GIZ	Deutsche Gesellschaft für Technische Zusammenarbeit
ha	hectare
HEPA	Human Ecology Protection Area
IDIS	Interfacing Development Interventions for Sustainability
IEC	information, education, and communication
IKSP	indigenous knowledge system and practices
IPs	indigenous peoples
IPRA	Indigenous Peoples' Rights Act
ITE	Institute of Tropical Ecology
ITEEM	Institute of Tropical Ecology and Environmental Management
KBAs	key biodiversity areas
KFA	Kaindang Farmers Association, Inc.
LABB	Luntiang Alyansa Para Sa Bundok Banahaw Inc.
LGUs	local government units
MAMACILA	Mat-i, Man-ibay, Civoleg, and Langguyod IP Communities
MC	Memorandum Circular
MENRO	Municipal Environment Officer
MOA	memorandum of agreement
MPFD	Master Plan for the Forestry Development
MTBK	Mt. Tipolog Bantay Kinaiyahan
NBSAP	National Biodiversity Strategy and Action Plan
NCIP	National Commission on Indigenous Peoples
NGOs	nongovernmental organizations
NGP	National Greening Program
NIPAS	National Integrated Protected Areas System
NTFP	non-timber forest products
PA	protected area
PALUPA	Panguandig Lumadhong Panaguandig, Inc.
PAMB	Protected Area Management Board
PDP	Philippine Development Plan

PDRF	Philippine Disaster Recovery Foundation
PEACE	Philippine Ecumenical Action for Community Empowerment Foundation, Inc.
PEF	Philippine Eagle Foundation
PEMO	Provincial Environment and Management Office
POs	peoples organizations
PTFCF	Philippine Tropical Forest Conservation Foundation, Inc.
RAFI	Ramon Aboitiz Foundation, Inc.
RF	rainforestation farming
RFRI	Rain Forest Restoration Initiative
ROAD	Rainforest Organizations and Advocates
SEC	Securities and Exchange Commission
SDGs	Sustainable Development Goals
SFM	sustainable forest management
SUCs	state universities and colleges
TK	Tapat Kalikasan
TSKC	Tulongan sa Kabuhayan sa Calawis, Inc.
UMRBPL	Upper Marikina River Basin Protected Landscape
USAID	United States Agency for International Development
ViSCA	Visayas State College of Agriculture
VSU	Visayas State University
WNPS	Wildlife and Nature Protection Society

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previous spread. Ideal overview
of a rainforest farm after 102
years (MARGRAF AND MILAN 1997).

Introduction

Rainforestation farming (RF) is a strategy that has been developed in the Philippines to counter the ongoing destruction of the natural environment in the humid tropics. It is the use of native and endemic species of trees that naturally exist in the country for forest restoration. It is supported by activities that improve the livelihood of directly engaged local communities.

RF was officially recognized through the Memorandum Circular (MC) 2004-06¹ issued by the Department of Environment and Natural Resources (DENR).

The changing paradigm in reforestation and agroforestry generates successful collaborative efforts. The adoption of this approach for a sound and sustainable rural development in more and more regions of Southeast Asia now demonstrates how ground-based, inter-linked efforts of forest-dependent communities, local agencies, and committed partners and support organizations roll well with success. Indeed, what the RF strategy entails and the extent of its practice now merit a fitting appreciation of its contributions to stronger forest governance.

The rightful paradigm in Philippine forestry must lead.

1 Guidelines in the Integration of Rainforestation Farming Strategy in the Development of Open and Denuded Areas within Protected Areas and Other Appropriate Forest Lands, 30 August 2004.

A needed paradigm shift in forestry

The Philippines has a population of 100.98 million, with a poverty rate of nearly 21.6 percent, affecting 9 of 14 basic sectors (PSA 2015). Among the nine basic sectors identified in the Social Reform and Poverty Alleviation Act² are indigenous peoples (IPs), upland farmers, fishers, and families with income below the poverty threshold and with highest incidences at 31–34 percent. These are the sectors that are heavily dependent on the country's natural capital, composed mostly of forest and marine resources. They consider many of the 128 key biodiversity areas (KBAs) identified by DENR as their home.

The continued growth of human population usually occurs in classified forestlands. The destruction of the country's natural capital affects human capital, specifically among the vulnerable sectors. Over 140 ethno-linguistic groups comprise the country's ethnic diversity, mirroring—to a great extent—the precious biological and ecological variety that the country's more than 7,000 islands host. Like the diverse flora and fauna of the archipelago, IPs and cultural communities have their abode in different ecological territories from the seas, coasts, lowlands, and the uplands.

The value of nature-people relationship is believed to be more costly than the material worth of natural assets and services combined (Sinha and Heaney 2006). Any support today for biodiversity conservation is an investment for the future, as human subsistence and development depend significantly on a country's natural capital.

The extent and health of forest ecosystems is crucial in providing sustainable supplies of forest goods and services. Understanding changes in the forest resource is necessary for investment and management actions to sustain forests for future generations.

– 2015 Global Forest Resource Assessment

2 Republic Act 8425

Let us look at the forest.

Function of forests

Forests are focal ecosystems with important ecological functions. Providing water security as base resource in watersheds, habitat for biologically diverse plants and animals, climate regulation, and as carbon sink—these are critical services of forests.

Forests mitigate harmful effects of greenhouse gas emissions. They act as a “sink” to absorb emissions and store large quantities of carbon for extended periods of time. Forests are also an important component of adaptation strategies needed to address continuing—sometimes dramatic—changes in the natural resource base that sustains livelihoods (Patosari 2007). The multiple environmental, economic, and social services that forests provide are vital to human development.

According to the *2017 Global Climate Risk Index*, the Philippines is the fourth most vulnerable country in the world, as it is hit by an average of 20 typhoons every year, among other natural hazards (Kreft, Eckstein, and Melchior 2016). Extreme weather events—such as the Ormoc flash flood in 1991, Ondoy (Ketsana) in 2009, Sendong (Washi) in 2011, Yolanda (Haiyan) in 2013—and many pockets of landslides and soil erosion have caused forest loss, siltation of rivers, destructive practices in the seascapes, and depletion of fisheries. These natural hazards and human-made disasters, likewise, caused a decline in the unique biodiversity of endemic flora and fauna.

In both climate change and normal socioeconomic contexts, biodiversity and ecosystems are critical elements to lifting people out of poverty. It is not simply commoditization of trees and by-products but the ecological functions of forests that are of more value. Tangible and intangible benefits contribute to the stabilization of the country’s economy and social security; thus, building its resilience against climate change.

Over the decades, the Philippines suffered from the most extensive deforestation in Southeast Asia. Only less than 30 percent of the entire forest area of the country remains as primary forests. Our forests were originally dominated by native dipterocarp and other tree species that support native wildlife like birds, bats, reptiles, amphibians, and other

mammals on forest floors. Many species of orchids, bryophytes, and other plant species are also associated with native trees.

However, because of the lack of foresight in policy and programs, other than the planting and harvesting of trees for timber as priority value of forests, reforestation activities are undertaken using narra (*Pterocarpus indicus*) and foreign or introduced species. Recent practice shows that more and more exotic tree species are being introduced, causing native trees to slowly disappear. For several decades, what is commonly seen are monoculture or mixed stands of mahogany (*Swietenia macrophylla*), gmelina (*Gmelina arborea*), and mangium (*Acacia mangium*), to name a few. But we have native trees like bagalunga (*Melia dubia*), kalumpit (*Terminalia microcarpa*), molave (*Vitex parviflora*), kariskis (*Albizia lebbekoides*), and many others that can be used in reforestation programs.

Reforestation has been a failure in restoring the original vegetation of the country's forest ecosystem. It further contributes to forest fragmentation because species intended for harvesting as timber are prioritized. What is unfortunate is the fact that such large-scale reforestation strategy has contributed indirectly to deforestation, landslides, and the drastic reduction of local biodiversity due to the following reasons (Milan and Margraf 1996):

- 🌿 Most of the fast-growing exotic species have low wood quality; therefore, high-quality timber from rainforest trees is still harvested.
- 🌿 Exotic tree species do not support the survival of local wildlife species, including important pollinators and seed dispersers.
- 🌿 Local farmers are dependent on seed and seedling distribution patterns not under their own control; hence, they do not protect local mother trees.
- 🌿 Growing exotic trees, mainly in monocultures, supports a management practice of repeated clear-cutting in areas prone to typhoons and landslides.

Fragmentation has important implications on wildlife conservation because many species require a certain minimum area of continuous



Stand of Bagtikan (*Parashorea malaanonan*) trees in front of the FORI Building at Visayas State University (PHOTO FROM FOREST FOUNDATION PHILIPPINES)

habitat in order to maintain viable populations. Often, these species cannot disperse across inhospitable farmland, roads, or other barriers that are “non-habitat.” Few forest animal species can traverse large non-forested areas (the exceptions being some birds, bats, and other small mammals). Up to 20 percent of bird species found within tropical forests are unable to cross gaps of more than a few hundred meters (Newmark 1993; Stouffer and Bierregaard 1995). This means that seeds dispersed by large animals are rarely transported between forest fragments.

It is about time we put ecological consideration and foresight in our reforestation program.

What have we learned from past reforestation projects?

Various efforts have been tried in order to bring back the forest by either protecting what remains of it or rehabilitating degraded and denuded lands. An early major example was the Asian Development

Bank-funded Contract Reforestation Program (CRP) in 1988 that allowed upland communities to earn money while reforesting specific areas. On this program, farmers were paid for planting trees. Private corporations, local government units (LGUs), nongovernmental organizations (NGOs), local communities, and families were encouraged to join.

However, this program failed on three aspects:

1. It did not take into account the original vegetation or forest cover of the area to be rehabilitated; thus, not giving attention to biodiversity and ecosystem functions of the original forest.
2. It did not consider the basic needs of the upland farmers doing the reforestation.
3. The foreign-funded project had high economic cost and could not be replicated at the local level. Once the contract was terminated, project sites were left without sustained implementation.

The experience laid down many lessons learned from the subsequent reforestation opportunities.

Financial assistance from foreign sources and its sustainability

Financially assisted reforestation efforts show similar results. The Philippines has invested more than USD 570 M in rehabilitating degraded forest lands starting from mid-1970s to 2000, with most funding (93%) coming from public investment including foreign loans (Chokkalingam et al. 2006). Many of these foreign-funded projects supporting farmers and community efforts came with a high economic cost. They cannot be replicated at the local level, and big loans lead to much indebtedness, particularly in the absence of operational cost recovery and reinvestment mechanisms once the projects end.

The assessment further showed that dependence on high-cost donor projects, huge loans, and ad hoc public funding from the government does not favor long-term sustainability. Because of the high economic cost of reforestation, among other reasons, forest cover continued to

decline at least until 1988, although 849,304 ha were planted (188,374 ha from 1910 to 1974 and 660,930 ha from 1975 to 1987). A high deforestation rate was ongoing simultaneously, and little is known about long-term survival of the plantations. From 1988 to 2003, forest cover registered a significant 0.7 million ha increase, which government and other actors attribute to regrowth vegetation, plantations established through reforestation projects (936,542 ha planted from 1988 to 2002), and spontaneous tree growing by farmers and others on public and private lands (Chokkalingam et al. 2006).

Local participation and derived benefits

The assessment of the CRP itself detailed the weaknesses in addressing the needs of local communities: (1) lack of tenure rights in reforested lands, (2) lack of food security components in reforestation projects, (3) lack of community participation in reforestation planning, and (4) intrusion of patronage criteria in the selection of contractors (Magno 1994).

But there were similar projects with local community participation and benefits, as well as strong technical assistance, which have been attempted with some success by certain LGUs, other government agencies, and foreign grant-supported local projects at lower costs (\leq PHP 10,000 per ha). These projects may not have undertaken intensive community organizing activities such as under the Forestry Project Loan II; yet, they appear promising. This suggests that participation, technical assistance, and deriving local benefits are particularly critical for success (Chokkalingam et al. 2006).

Huge public investments and grants are not as valued as local personal investments. Therefore, if there is an enabling environment, a little investment is often sufficient or even private investment will be undertaken as long as stable income can be generated from the activities (Chokkalingam et al. 2006).

Role of the private sector: For plantation or biodiversity conservation?

The private sector played a role in reforestation in the past. However, their reforestation efforts were generally aimed at developing plantations for production and harvesting—not for watershed protection or

biodiversity conservation. In fact, many of the reforested areas in the Philippines consist of only a few species intended to yield one or two products, rather than seeking to produce a broader range of forest goods and services that will also contribute to the well-being of local communities (Fernando 2005).

Most of these reforestation efforts used non-native species because of their fast growth and germination. But research and experiences showed that the introduction of species for fast-tracked reforestation was detrimental to the environment. As the wood quality of the introduced species was not as good as the timber of our natural forests, the pressure of extracting timber from the remaining forest was not lessened; hence, cutting and logging continued. The possibility of further damage to our forest ecosystem in using exotic species should make us seek other alternatives when implementing reforestation programs.

The rehabilitation projects have so far contributed little to meeting national timber needs and seem unlikely to do so in the near future.

Forestry management issues

Except for the private sector, most project implementers have no clear marketing plans or strategies. The government and the civil society sector have failed to create an enabling environment for timber production and income generation through rehabilitating degraded forestlands, despite engaging the community and the private sector to do so. Disincentives to forest plantation establishment include:

- 🍃 High production costs and poor markets for plantation;
- 🍃 Lack of marketing support;
- 🍃 Harvesting policy conflicts;
- 🍃 Frequent logging suspensions; and
- 🍃 Bureaucratic procedures.

In summary, it must be recalled that the actual forest cover of the Philippines is recorded at 6.8 million ha (FMB 2014). This represents 21.6 percent of the national land area, which is below the ideal forest cover of 54 percent needed to sustain the ecological balance of nature and the well-being of humans (Sajise 1996). Fortunately, this number can still be improved. Some 4.6 million ha of open forestland

Philippine forests are in steady decline. The original 27 million ha has dwindled to 6.8 million ha.

- DENR-FMB

can be reforested. We can restore the ecological balance, conserve biodiversity, and enhance our well-being.

Clearly, the challenge of forest restoration does not rest solely on the hands of the government. It calls for a concerted effort and immediate action from the

whole nation. Recent developments link the private sector closer to strengthening the forestry sector, with more and more agencies moving into green economy, specifically those with investments in renewable energy, water utilities, and ecotourism. A reality that DENR has admitted is that the government cannot do re-greening alone. It has to engage the private sector in the process.

A paradigm shift in our reforestation policies and objectives has to be considered as early as the planning process where the new strategy must combine land productivity, conservation of forest biodiversity, and maintenance of the ecosystem functions of our forest.

Current state of the Philippine forest

Policy context

The Philippine forest policy has evolved from a highly regulatory, centrally controlled, and industry-biased policy toward a more decentralized, participatory, and people-oriented approach. There is a reported total reforested area of 1.6 million ha from 1972 to 2003, averaging to about 52,000 ha per year. This does not prove to be good enough as the rate of deforestation is almost three times faster than the rate of reforestation. We need to work triple time—or more—as DENR accounted a much lower figure of 20,338 ha reforested in 2004. Though the government contributed 62.5 percent to the total reforested area, there were cases (year-to-year basis) where the private sector's contribution was higher than that of the government.

Interestingly, drafts of national plans and policies have been developed to address the protection and conservation of the country's natural

capital. Foremost among these are the Philippine Development Plan (PDP 2017-2022), National Biodiversity Strategy and Action Plan (NBSAP 2017-2028), and Master Plan for the Forestry Development (MPFD 2016-2028). The protection and conservation of the country's natural resources are central to these development plans, which recognize the interconnection of ecological and socioeconomic systems. These plans also highlight people's participation in ensuring a more resilient public in facing the effects of climate change.

International commitments that further strengthen this direction include the Convention on Biological Diversity (e.g., Aichi Biodiversity Targets, Global Strategy for Plant Conservation Targets, COP decisions), the Intergovernmental Platform on Biodiversity and Ecosystem Services, and other related instruments. Our country, being host of the ASEAN Centre for Biodiversity, has a responsibility to steer regional cooperation.

On 24 February 2011, former President Benigno S. Aquino III signed Executive Order (EO) No. 28, otherwise known as the National Greening Program (NGP). The six-year program (2011-2016) targeted 1.5 billion trees planted in 1.5 million ha of terrestrial and mangrove forests, using both exotic and native species. As a priority program, it intended to reduce poverty; promote food security, environmental stability, and biodiversity conservation; and enhance climate change mitigation and adaptation.

A commodity roadmap showing regional targets by commodities and by forest type served as NGP's target between 2013 and 2016. Of the 1,571,745 ha total target, only 14 percent or 225,638 ha were dedicated for protection forest (98,231 ha) and protected areas (127,407 ha) to be planted with native species.

The decline has tremendous impact on country's human and natural capitals that depend on forests' functions and services. Thus, forest conservation and restoration have become high on the agenda of the government and all other sectors of society.

- PTFCF

At the end of 2016, accomplishment report had shown a result of an average of 114 percent performance rate. DENR Former Undersecretary for Field Operation Marlo Mendoza shared in a forum held in November 2016 that a total of 174,000 ha were planted with both native tree species and fruit-bearing trees. However, the NGP failed to segregate data to identify which seedlings are native tree species and which ones are exotic species (see Table 1).

TABLE 1.1. NGP annual accomplishments (2013–2016)

Year	Target Area	Area Planted	Accomplishment (%)	Seedlings Planted	Jobs Generated
2013	300,000	333,160	111%	182,548,862	466,990
2014	300,000	334,302	111%	205,414,639	1,079,792
2015	300,000	360,357	120%	351,014,239	915,729
2016	247,683	284,089	115%	415,564,211	842,792
Total	1,147,683	1,311,908	114%	1,154,541,951	3,305,303

SOURCE: DENR-FMB NGP DATA

Before the end of the Aquino administration, EO No. 193 on Expanding the Coverage of NGP was signed in November 2015, mandating DENR for additional 1.2 million ha of the NGP to include remaining unproductive, denuded, and degraded forest. The EO extends NGP’s period of implementation from 2016 to 2028, with the intention of harmonizing all forest development activities, including forest parks, with greater participation of the private sector, LGUs, and upland communities. Related to this, a policy is being drafted to cover the implementing guidelines on how the expanded NGP would proceed with strong public-private sector partnership.

To date, the Expanded National Greening Program (ENGP) gets a lion share of PHP 7.1 billion from the approved 2018 DENR budget of PHP 27.1 billion. The ENGP seeks to plant some 198 million seedlings in 210,852 ha of open denuded areas and, specifically, to reforest some 1.2 million ha from 2017 to 2022.

Prior to EOs 28 and 193, enabling policies such as MC 2004-06, MC 89-17,³ Department Administrative Order (DAO) 2010-11,⁴ and other related technical bulletins were already in place. But there was weak implementation of the issuances for the following reasons:

- 🍃 MC 2004-06 was intended only for open and denuded areas within protected areas and other appropriate forestlands as deemed fit by DENR.
- 🍃 Except for protected and critical watershed areas, a clear delineation of protection and production zones based was lacking.
- 🍃 There were no implementing guidelines on how to use native tree species in DENR's reforestation projects.

Later issuances include DAO 2016-20⁵ and DAO 2017-03⁶ which aimed at accelerating the rehabilitation and reforestation of unproductive denuded and degraded areas. These policies further encourage involvement and enhanced participation of private investors and organized local communities, highlighting social entrepreneurship as a strategy to spur sustainable livelihood.

Existing DENR policies indicate that they may not be a problem anymore, but their operationalization is altogether a different story.

Clearly, the outcome of NGP was tilted toward increasing production for wood and other associated industries. The forest that has emerged is not the forest that we may not like with 85 percent vegetated by fast-growing exotics. The decrease in closed-canopy forest has led to the increase of open-canopy forest and, therefore, a fragmented forest. It is not the forest that the PDP, NBSAP, and MPFD were aiming for.

3 Prioritizing Application of Assisted Natural Regeneration Method in the Development of Watersheds, Protection, and Production Forest

4 Revised Regulations Governing Forest Tree Seed and Seedling Production, Collection, and Disposition

5 Implementing Rules and Regulations on EO No. 193: Expanding the Coverage of the NGP

6 Revised Implementing Rules and Regulations on EO No. 193: Enhancing the NGP

Forest governance and programs

While the current development plans and policies espouse the inter-connection of ecological and socioeconomic systems, the forestry program does the opposite of what is being advocated. NGP has indeed planted trees, but it did not restore the forest, as about 85 percent are planted with fast-growing exotics. The purpose of restoring forest ecosystem integrity by bringing back native tree species was, after all, a technical blurb.

The country needs around 6 million cubic meters of wood supply and wood-based products, but existing plantation could only produce a million or less wood-based products. Because of the huge demand for wood products (e.g., lumber, paper, pulpwood, veneer, and others) that plantations could not supply, the country has to import the balance from other countries; thus, adding costs to government expenditures. To meet the demands for wood products, strengthening production forest is warranted.

A balance between economics and environmental concerns is being emphasized too. As of now, DENR should complete its ground truthing to delineate protection from production forests because table maps are still being used at the Community Environment and Natural Resources Office (CENRO) level.

Protection forest should be kept permanently covered with the existing policy instruments. Marginal and denuded forestlands should be re-greened as production forest to be developed and managed by communities and private investors. A number of instruments could be used for public-private partnership under a unified tenurial instrument that DENR is currently drafting.

The data above indicate that the different bureaus of DENR share the goal of enhancing the integrity of forest ecosystems. However, operationalization may run in conflict with each other (i.e., conservation and protection vs. production and utilization). As emphasized in EO 193, all forest development efforts must be harmonized, such that sectoral concerns within and outside DENR would address socioeconomic and ecological exigencies.

To counter this, the Biodiversity Management Bureau recommends undertaking budget advocacy with the Department of Budget and

Management to look into the indicators and budget that is not only about the number of trees planted and hectares covered but also to tease out the indicators of ecosystems services by looking also at the diversity of species used. Common development goals across PDP, NBSAP, and MPFD with coherent key result areas should be the basis of budget approval of concerned agencies. Harmonizing these plans requires much improvement.

Another recurring issue raised by many communities engaged in planting native tree species is the restrictive policy on harvesting. Most farmers prefer not to plant native trees because they could not harvest what they planted if it is a native tree. Many farmers have the wrong impressions that if they plant native species, the government would take the land away from them because it would now be used for protection. Having said this, there is an urgent need to review existing policies with regard to harvesting planted native trees to engage more communities in forest restoration.

There is much to be desired, too, in changing the mindset of foresters who are used to the old forestry school (Lim 2017). Most of them are stuck to the old ways of reforestation that prefer fast-growing exotics—such as mahogany, gmelina, and mangium—for the value that these create in the wood industry market. It does not come as a surprise why almost 85 percent of NGP areas are planted with exotics.

Culled from the testimonies of some NGP contractors are stories of problematic transactions, as some DENR personnel would delay processing of documents to facilitate fund releases. The Rain Forest Restoration Initiative (RFRI) noted that the people's organizations (POs) are at the core of the implementation of the agreement. They are the ones who communicate and negotiate with DENR local offices—whether they are prepared or not—yet they are always susceptible to the corrupt practices of some government employees. If not properly guided with correct principles and measures, PO leaders could be used or be abused. POs also have the tendency to remain silent about alleged corruption practices in DENR local offices, just to maintain their contacts and working relationship with local DENR units, especially in terms of availing the payment for the NGP and for future programs as well (RFRI 2016).

Meanwhile, a total of 179,000 ha have been planted using 100 million native trees mixed with fruit-bearing seedlings (Mendoza 2016). This is barely 12 percent of the total 1.5 million ha of NGP-targeted area, most of which are covered by partnership agreements between DENR and state universities and colleges. Ground validation would be part of the ongoing assessment to be conducted by a group commissioned by DENR.

It is about time that operational programs and governance reflect the mandates of PDP, NBSAP, and MPFD, and call for a balanced ecological and socioeconomic response in all development efforts.

CSO partnerships

When EO No. 28 on NGP was signed in 2011, CSOs considered it as opportune time for constructive engagement with the government—both at the national and local levels. Many CSOs believe that NGP implementation would take off from the lessons learned from previous reforestation practices. Besides, it was a much-awaited push from the government to restore ecosystem integrity and mitigate and adapt to climate change.

A number of CSOs active in promoting RF have registered early successes in influencing the use of native species at policy and program levels. Awareness raising and capacity building are key functions provided by CSOs. However, their strategic influence is still at a low level and requires scaling up to strengthen the RF network and build broad-based public support.

The Forest Foundation Philippines and the Foundation for Philippine Environment (FPE) have given initial funds to RFRI to mobilize and capacitate RF adopters across regions. Likewise, the Environmental Leadership & Training Initiative has sponsored a series of RF training to different groups, such that RF could be adapted to specific contexts. Research and more information, education, and communication campaigns have been conducted to increase the awareness of the public on the importance of native tree species in forest restoration.

Rain Forest Restoration Initiative's member NGOs through PTFCF and FPE forged an agreement with DENR in 2012. It was a welcome development with the belief that the NGP partnership agreement

has opened opportunities for CSOs to be involved in other important components of the program, such as in planning and setting the targets. Most CSOs were engaged individually—in the local or regional scope—mostly in mobilizing community participation, capacity building, or in monitoring the program. Based on the 2012 targets, CSOs committed to provide a total of 45,608,000 seedlings for upland areas (see Table 1.2).

TABLE 1.2. Identified targets for the 50 million native seedlings (2012)

Partner organization	For upland	For mangrove	Total
Forest Foundation Philippines	38,638,000	5,560,000	44,198,000
FPE	6,970,000	100,000	7,070,000
Total	45,608,000	5,660,000	51,268,000

SOURCE: NGP SUMMIT PROCEEDINGS

Likewise, CSOs helped partner POs to produce about 14.4 million seedlings or about 35.7 percent of the original target of 51,268,000—but 12 percent over the reduced target of 11,472,000. For planting, the partnership agreement was able to cover 25,271 ha of land. These targets were not fully realized because of implementation issues, such as unclear and changing terms and conditions of the agreement with NGP partners.

Another important result that could have not happened in the NGP if there was no partnership is the promotion of Philippine native tree species, where an estimate of more than 10 million seedlings was produced. It is a significant number that the budget for it could have been used for exotic species. The NGP partnership agreement emphasizes the potential of the country to shift its strategy in reforestation, even gradually, and prioritize the planting of Philippine native tree species. This triggered RFRI's research to determine whether there is a change in prioritizing native tree species under DENR. The NGP agreement does not clearly indicate that the target provided to the POs were actually deducted from the entire NGP targets, or whether the supposed 50 million native tree seedlings were meant to replace exotic species target.

As earlier pointed out, NGP reforestation efforts are mostly planted with fast-growing exotic tree species. The usage of such species has, in some cases, succeeded in reestablishing tree cover, but these species do not deliver the same level of ecosystem services (i.e., biodiversity conservation, carbon storage, water purification, pollination, and soil erosion control) as mixed stands of native species do. Moreover, they do not provide the range of timber and non-timber forest products that are valued by local communities. As a result, the conventional reforestation programs have not had a significant influence both in recovering good quality forests and in reducing the pressure on the already threatened remaining forests.

On 17 December 2015, a network of CSOs wrote a letter to the DENR commending the passing of EO 193 and, at the same time, expressing continuing commitment toward genuine and appropriate restoration of forest. The CSOs reiterated their strong position that no government funds should be used to procure and to maintain exotic species for any reforestation programs. Highlighted in the same letter was the network's vehement objection to MC 2011-01 or EO 26 that released implementing guidelines that targeted only 10 percent of native species.

Issues and concerns raised during the NGP Summit in February 2014 were reiterated. Technical recommendations, to be integrated in EO 193, were brought to the attention of DENR. The environmental CSOs that entered the agreement on cooperation with DENR did not have a participation when the NGP Roadmap was drawn and when the NGP Experts Panel was constituted, despite the provisions of sections 1.8 and 4.6 of the partnership agreement. Accordingly, the CSOs could only focus on fulfilling their responsibility to monitor NGP implementation with only their PO partners. The substance of reforestation according to the ecological functions of forests—not just “greening”—remains a major goal.





previous spread. The nursery with seedlings
(PHOTO FROM FOREST FOUNDATION PHILIPPINES)

The Imperative: Bringing Back Native Tree Species

Rainforestation farming and biodiversity conservation strategy

The Philippines is one of the most megadiverse countries in the world in terms of flora and fauna. It is home to 6,091 endemic species of plants and almost 591 endemic species of animals. However, the country's forests are also one of the most threatened biodiversity areas in the world. This alarming state can be attributed to the influx of infrastructure and mining projects, agricultural expansion, and rapid population growth.

This brings to mind the question: **What is the basic intent of reforestation programs in the Philippines?** If our idea of reforestation is merely planting trees “to green” our denuded uplands or plant trees to provide lumber for plywood factories, fruit crates, chopsticks, or other purposes, then, perhaps, tree plantation using any tree species—even introduced ones—will suffice. But if the reforestation program is directed toward restoring the forest ecosystem, then, foreign species have no place in our forests. Our initiatives to rehabilitate degraded forests and save the biodiversity of the Philippine rainforests will be in vain if we repeatedly argue that we need to have fast-growing trees in order to fast track reforestation.

Indeed, we are at a tipping point: We see the importance of trees as carbon sinks, and we know the role of trees for carbon sequestration to mitigate climate change. However, based on experience, there are native trees whose performance in terms of growth and ability to recruit wildlife are far better than introduced species. We have native trees cited in Chapter 1 that can be used in our reforestation program, instead of the commonly seen exotic species. It is about time we put ecological consideration and foresight in our reforestation program.

There have been various efforts to bring back the forest by protecting what remains of it or by rehabilitating degraded and denuded lands. In the past three or more decades, the focus of the government was on the conservation and rehabilitation of our degraded forests. One such example is the Contract Reforestation Program (see Chapter 1).

A paradigm shift in our reforestation policies and objectives should be considered in planning, wherein the new strategy should combine land productivity with the conservation of forest biodiversity and maintenance of the ecosystem functions of our forest. An attempt to do this is now popularly called “**rainforestation farming**” or **RF**.

The concept of “rainforestation” was an offshoot of a joint bilateral project between Germany and the Philippines thru the Applied Tropical Ecology project of the Visayas State University (VSU) formerly Visayas State College of Agriculture (VISCA). The objective of the concept of Rainforestation was not only to meet the demand of food and timber production but also to conserve the biodiversity and maintain the ecological functions of our forest ecosystems.

The concept of RF is to plant trees native to the forest. Forests become more sustainable and increasingly diversified if local trees are planted instead of foreign species. To save and protect the biodiversity of our rainforests, the strategy is to use local tree species because they are resistant to pest and typhoon damage. Because native tree species are better adapted to the local setting and they have a greater chance of survival, they will also more likely bring the forest back to its original ecological integrity. Although some argue that native trees species are difficult to propagate, local farmers in Leyte are knowledgeable in rearing them in growth chambers.

Because RF uses local tree species, this strategy brings back the once flourishing, dominant vegetation of our rainforests—the dipterocarp and other native trees. It also protects our native wildlife (both plants and animals) from extinction. As a result, local biodiversity is protected and rehabilitated.

In trial sites in Leyte, local fauna has been seen to quickly recolonize. Birds and fruit bats, initially, and then larger mammals including the Philippine tarsier (*Carlito syrichta*) and flying lemur (*Cynocephalus volans*) were seen in the sites just after four years. Furthermore, with the adoption of a farming system, RF with agricultural crops and fruit trees incorporated in between stands of timber trees in the tree farm ensures food security and increases farmers' income.

RF scheme includes the planting of sun-demanding tree species (e.g., bagalunga, anabiong, kalumpit, and molave, among others), followed by the planting of premium tree species that require shade (e.g., red lauan, yakal, mayapis, and tangile, among others). Fruit trees such as lanzones, durian, mangosteen, and others may be incorporated in the tree farm. Consideration of canopy of the trees shall be taken into account in determining the distance between trees.

As the tree farm gets established, agricultural crops can be incorporated to provide farmers with additional income. A farming system familiar to the farmer can be very useful. Root crops such as sweet potato, climbing yam, and cassava can grow in between spaces. Pineapple and vegetables like okra, eggplant, ginger, and pepper can also be planted.

If one has to assess the benefits of the RF strategy or the change in mind-set from the use of the traditional method of reforestation, one should strive to understand the interplay between the potential of improving farmers' income and the ecological function of keeping biodiversity within our forests. Most of the time, economic valuation of forest ecosystem and its components does not factor in the non-monetary value of the ecosystem. This limiting practice must be addressed.

There is a need to advocate innovative strategies and policy reform that allow sustained growth not only for our forest ecosystem but also for the well-being of our people. RF can be the answer to sustainable development of upland communities and forest ecosystems.

An appeal to bring back Philippine native tree species

Forest restoration should go beyond satisfying human needs in terms of income, livelihood, wood products, and food security. It must be able to survive abiotic and biotic pressures, including social ones, in order to be self-sustaining and to generate the products and services vital to the survival of people and the environment.

A tree living for 50 years:

- 🌿 generates PHP 1,593,750 worth of oxygen;
- 🌿 provides PHP 2,652,000 worth of air pollution management;
- 🌿 controls soil erosion and increases soil fertility to the tune of PHP 1,593,750;
- 🌿 recycles PHP 1,912,500 worth of water; and
- 🌿 provides a home for animals worth PHP 1,592,768.

All in all, a mature tree has an estimated ecological value pegged at PHP 5.1 million. This figure still does not include the value of its fruits, other minor products with industrial or medicinal application, or even the beauty derived from that tree (Oposa 2003).

Unfortunately, that same tree is being sold for its timber for as low as PHP 6,000 per cubic meter at the local market (FMB 2005). The unwarranted undervaluation has led to the overexploitation of these limited resources. The benefits incurred from unsustainable resource management practices equate to lump-sum and short-term profit for a few stakeholders. However, the adverse impacts of such practices will negatively affect the well-being of the present and future generations.

People usually have no concept of exhaustion and replacement of natural resources. They do not realize that trees, unless replaced by humans or nature, are a non-renewable resource. The general notion is that humans can always go to the forest and cut trees without the need to replenish and maintain it until no substantial forest is left. Indeed, high priority must be given to the development of innovative RF technology supplemented by educational measures at all levels (Göltenboth, Hanssler, and Hutter 2003).

Exploitation and conversion of many ecosystems are causing widespread biodiversity loss and degradation in the ecosystem condition. The Philippines—as a signatory to intergovernmental platforms on biodiversity and ecosystems services such as the Convention on Biological Diversity (CBD) and the Sustainable Development Goals (SDG)—should make these platforms operational in sectoral development plans. By increasing the use of native species in restoration activities, environmental and livelihood benefits would eventually help reduce poverty.

In a 2010 conference and a 2016 policy forum, Dr. Mark Ashton of Yale University pointed out that there is a growing call for a paradigm shift to use native tree species primarily for their role in biological resilience. He highlighted that native species could increase productivity because of the value of their services (e.g., watershed stabilization, carbon sequestration, ecosystem resiliency, diversification of non-timber forest products). What is needed at present is to work toward diversifying the products derived from native trees for the market. Related to this, he provided seven guiding principles to consider when using native species that build upon each other from basic functional and physical considerations to structural and composition components:

1. Site productivity changes across landscapes.
2. Disturbances change across landscapes.
3. Initial floristic dominates.
4. Regeneration guilds are diverse.
5. There is reliance on advance regeneration with native species.
6. There are high numbers of relatively site-restricted species among native trees.
7. Stratification processes are important.

RF, indeed, attempts to integrate biodiversity conservation and sustainable development. It is a strategy that optimizes forest benefits and ecosystem services, enhancing sustainable livelihood options for forest-dependent households. It is used both in tree plantation establishment for production, as well as in protection forest, by recreating an ecosystem as close as possible to the original to recover biodiversity and forest function and enhance productivity.

Since 1994, RF has successfully reforested 1,200 ha of degraded lands in Leyte, Palawan, Bohol, and Mindanao.

With the establishment of a near-to-nature environment upon using native and endemic species, all the essential ecological functions like improvement of water retention capacity, prevention of soil erosion and run-off, reestablishment of soil fertility, and provision of habitats for the local endemic and even endangered species were restored. In 2004, the RF approach also became a key feature in the integrated project to use abaca, one of the major commodities of the country, in the automotive industry as replacement for glass fibers in composites.

Moreover, RF contributes to the restoration of degraded areas and worn-out plantations to highly diverse forest areas, with an opportunity for an economical and sustainable forest management approach. There are two main components in this strategy:

Establishment of community-based “closed canopy and high diversity farming system” in former degraded areas and old coconut stands

After 11 years of RF, most farms had an increase in income of about 8–10 percent. But a main income can be expected from the 12th to 15th year onward because some of the highly valuable hardwood can be harvested by then. Income from the first year onward came from enrichment planting with annual crops like pineapples and anthurium flowers, and perennial crops like ginger and abaca. Starting in the fifth year, the first fruit trees were bearing fruits, (e.g., rambutan and durian by the 6th year and mangosteen after the 8th year). The pioneer fast-growing trees can be sold as posts or firewood.

Protection and rehabilitation of the environment and biodiversity

There is a need to know that what was originally growing in the forest must be brought back. In doing so, we are not simply bringing back anything that would entirely alter its original composition. Instead, we should look into the original biophysical attributes of the forest through site assessment and characterization. This must include soil analysis where the restoration will be done.

To illustrate, the ecological functions were measured in terms of total reduction in significant soil erosion in rainforested areas. Soil improvement and productivity were measured in terms of the growth of crops. Migration and settlement of birds, reptiles, and mammals were noted and, consequently, had played a crucial role in the enrichment of the area through pollination and seed dispersal. Notably, the tarsier, an endangered species, migrated and found a home in one of the rainforestation sites in Leyte. As early as five years, some species of local hardwood had already produced their first batch of seeds.

In an extensive cost-benefit analysis comparing three different systems of land use in Leyte, it was concluded that the alternative of rainforestation is by far the most profitable land use system (Gölsenboth 2005). Rainforestation claims its success from being a product of a bottom-up project development, recognizing the participation of local people in all of the stages of forest and tree resource management (Margraf and Milan 2004).

In addition to the given economic benefits of RF, one of its primary incentives and investment opportunities is the establishment of nurseries. Seedling production is an integral part in reforestation programs. This is in most part done by government nurseries. Seedlings in the government nurseries are distributed for free to landholders and small-scale nursery operators, but the extension scheme does not reach the majority of the interested parties (Gregorio et al. 2004). Therefore, there is a need to establish independent communal nurseries to expand the supply chain.

In the same study (Gregorio et al. 2004), capital outlay, sources and supply of seedlings, technical knowledge in nursery management and site-species matching, and low sales were identified as major challenges in the sustainability of small-scale nurseries. Most of the communal nurseries cease operation after the withdrawal of funding agencies. Scaling up forest restoration projects offers a market for communal nurseries and, in the long run, provides seedling stocks from mother trees in the reforested areas. This shifts the situation of communal nurseries from being subsidized to self-sustaining.

With strong policy backing by DENR through MC No. 2004-06, the use of RF strategy in the development of open and denuded areas within

protected areas and other appropriate forestlands was promoted. This opens a window of opportunity for the private sector to invest in restoring the country's native tree species and to save our best natural capital, the Philippine rainforest.





previous spread. Rainforestation nursery
(PHOTO FROM FOREST FOUNDATION PHILIPPINES)

The Start of Rainforestation Farming

Humble beginning

The Philippine forest resources continue to decline at an alarming rate. From 21 million hectares (ha) in 1990, it has fallen to less than 6 million ha in 1996 (DENR 1997). The reduction of old growth forest in the country by 70 percent in less than a century is one of the fastest and worst in the world. In the case of Leyte, the forest cover in 1972 was 87 percent of the total forestland. However, it drastically decreased in size to up to only 35 percent in 1987 (Yambot 1975). In 2001, the forest cover in Leyte was less than 5 percent. This was commonly found in rugged mountain peaks (DENR 2005, as cited by Asio and Bande 2005).

According to Lasco and Pulhin (2007), the reduction of forestland greatly brings down the ability of the forest to sequester carbon. Carbon density often declines immediately after logging by about 50 percent compared to pre-logging values. Kummer (1992) cited that such loss had been the result of large-scale logging operations and the expansion of upland agriculture to the residual forest.

The destruction of the forestland has detrimental impacts on the Philippine environment, including watershed deterioration, massive erosion, biodiversity loss, increasing frequency of floods and/or droughts, sedimentation, and groundwater depletion (Lamb and Gilmour 2003).

Who will forget the catastrophic flashflood in Ormoc in 1991 that claimed the lives of 8,000 people? How about the massive landslide in Guinsaugon in Southern Leyte that killed 3,000 people and destroyed millions-worth of livelihood and properties? These are only few of the many examples of the disastrous outcomes of deforestation.

Over the years, the initiative of the government to restore and preserve the Philippine forests using fast-growing, well-known species like mahogany, acacia, and *Eucalyptus* spp failed. Exotic species are a poor substitute to our native tree species in terms of wood quality; hence, people still need to harvest quality timber from the rainforest (Milan 2005).

Moreover, monoculture of fast-growing stand is vulnerable to pest and diseases. Exotic species also have negative effects on biodiversity because they are planted outside of their natural habitat, so they lack fruits and flowers required by native wildlife. In addition, the failure of government-sponsored forestry programs can also be attributed to the lack of involvement of local communities in reforestation projects.

In the efforts to arrest the continuing decline of forest cover in Leyte after several catastrophic events, the concept of rainforestation farming (RF) came into being.

Mt. Pangasugan: Cradle of rainforestation

Some of the remaining forests in the Leyte region can still be found at the higher elevations and on the slopes of Mt. Pangasugan. The mountain is home to one of the few remaining forests in the Philippines that is less disturbed and still provides diverse and varied habitats for “arthropod communities,” amphibians, reptiles, birds, and flora.

The island of Leyte is characterized by the Leyte Cordillera—a high mountain range that traverses longitudinally from north to south. This is part of the Philippine fault line. The island shows the typical rugged relief of young land surfaces. Occasional earthquakes and existence of hot spots show that the island is still volcanically active (Langerberger 2001).

Home to a number of extremely rare species and endemic life forms, Mt. Pangasugan is located north of west coastal town of Baybay, Leyte.



The majestic Mt. Pangasugan, the cradle of Rainforestation
(PHOTO FROM FOREST FOUNDATION PHILIPPINES)

It has an area of 150 square kilometers or more, lying on and between the principal ridges that run north-south down the west coast and the center of the island.

Cyclones are a typical feature of Mt. Pangasugan. They often occur as typhoons, which often result in heavy damage to the forest. Moreover, heavy rainfalls connected to most typhoons trigger landslides. Due to easy access, the forest cover damaged by these typhoons also experiences anthropogenic destruction, such as logging and shifting cultivation—both slowly replacing the surrounding forest.

The western side of the mountain is composed of parallel ridges that descend gradually to the narrow alluvial plain. The northern and southern ridges are generally steep, giving rise to young rivers, such as Pangasugan, Lago-lago, and Calbigaa.

Mt. Pangasugan is an abundant source of spring water for the inhabitants of Baybay City and some nearby towns. This spectacular mountain is one of Leyte's most photographed natural wonders. The

Visayas State University (VSU)⁷ takes pride in having the picture-perfect mountain as the natural backdrop of its campus. During the dry season, one can witness the mountain's lush greenery, while several waterfalls on the mountain slopes are visible from the campus during the wet season. It is also home to diverse endemic flora and fauna that are worthy to be protected and cared for.

Richness of biodiversity in the VSU campus

Scientists and researchers from VSU passionately protected Mt. Pangasugan. In the mountain, they found numerous plant and animal species listed by the International Union for Conservation of Nature in the Red List of Threatened Animals (IUCN Red List). It includes the Philippine tarsier, Philippine flying fox, and the Fischer's pygmy fruit bat. Researchers discovered new records of the microbat (*Hipposideros obscurus*), with a length of 5.5 centimeters and body weight of



VSU (PHOTO FROM FOREST FOUNDATION PHILIPPINES)

7 VSU was formerly called Visayas State College of Agriculture (VISCA).

10 grams; a type of skink (*Tropidophorus grayi*); and two new species of the Gobiidae fishes (*Stiphodon olivaceus* and *Stiphodon surrufus*).

Nestled in the down slopes of Mt. Pangasugan is the main campus of VSU, which is located 8 kilometers north of Baybay and 34 kilometers south of Ormoc.

The 1,099-ha campus hosts 195 buildings, housing academic departments, research and training centers, residential facilities for staff and students, and other infrastructures that offer basic services. VSU is also home to faculty and academic staff obtaining most of their national and international recognition in research and development.

VSU's Natural History Museum collected 43,000 arthropod specimens from 377 families and 500 genera from the mountain. A new species of orchid (i.e., *Dendrobium milaniae*) and a tiger beetle (i.e., *Thopeutica milaniae*) were named in honor of the author, who also served as president of the University from 1999-2007.



Philippine flying lemur, locally known as the *kagwang* or *colugo*. Many mistake this animal as a giant bird. It flies from one tree to another.
(PHOTO BY ANDY COOTES)

The Federal Republic of Germany (through the ViSCA-GTZ Applied Tropical Ecology Program) funded a VSU study to collect, identify, describe, and document the existing species of aroids (Araceae) and orchids in Mt. Pangasugan. Twenty-five species of aroids representing 12 genera were documented at elevations of up to 350 meters above sea level. Classified as erect ground dwellers or climbers, the most dominant aroid (a plant) belongs to *Pothos* and *Epipremnum*. The orchid species represent 16 genera, with the most dominant belonging to *Phalaenopsis* (moth orchids).

Mt. Pangasugan is also a habitat to the Herpetofauna (reptiles and amphibians), which are endemic species that are diverse and slightly distributed.

History of rainforestation farming at the University

The original concept of rainforestation farming (RF) is to plant trees native to their forest. The term “rainforestation” refers to a different way of finding a solution to arrest the continued decline of our forest cover and save our forest ecosystem. Likewise, the term differentiates this approach from other reforestation program using fast-growing and introduced or exotic species.

In the early 1990s, ViSCA in partnership with the German Technical Cooperation Agency (GTZ now GIZ) developed a strategy for the restoration of the Philippine forest. This was first called the “closed canopy and high diversity farming system,” which was later on called rainforestation. To address the needs of our farmers in terms of food and timber and other forest products, the RF technology was developed under the assumption that a farming system is increasingly more sustainable the closer it is in its species composition and physical structure to the local rainforest ecosystem.

An area of 2.8 ha of denuded forestland within the forest reservation section of the campus was used as research plot in 1992. In this area (see *Figure 3.1*), different experiments observed the performance of a mixture of native trees planted together. A nursery of native trees was established under the shade of existing trees. An arboretum was also established near the nursery, hoping that it will become a seed source in the future.

Different demonstration farms were likewise established to test the acceptability of RF. Several cooperating farmers and landowners in the neighboring areas and a community cooperative that served as pilot sites were those of Macario Romano of *Barangay Mailhi* and Manuel Posas of *Barangay Marcos*. Of all community-based RF, only the *Cien-da-San Vicente RF* is functional up to the present (Bande et al. 2016).






The introduction of RF and its promotion had birth pangs. After two years of trial-and-error in an old slash-and-burn farm of banana, root crops, and coffee maintained by Antonio Fernandez, the technology was introduced to several barangays around VSU. An RF orientation was undertaken in various venues, such as barangay halls, during farmers' meetings, and in chapels after Sunday services. During these orientations, barangay chairpersons and other officials were invited.

In most RF orientations, 50–60 participants usually signed up. Lectures on the importance of trees and forest ecosystem, biodiversity protection, and the destruction caused by slash-and-burn farming were held. Toward the end of each orientation, the advantage of the use of native trees in rainforestation was the focus.

Farmers were intrigued when they are invited. They often hesitated to attend trainings with the thought that they will be barred from going back to their *kaingin* and the land they tilled would be taken by DENR when trees are grown.

Of those who attended RF orientations, only 5–10 farmers committed to further training. Only one farmers' group was organized based on the interest they exhibited. Full support was given to them initially (Bande et al. 2016).

BOX 3.1. Common concerns raised by farmers about RF

-  It is difficult to procure native tree seedlings.
-  Farmers fear that they will not be able to enjoy the trees they planted.
-  Fruit tree seedlings and other agricultural crops are costly.
-  Most of the farmers are of age, hence, they might be able to enjoy their trees
-  *Kaingineros* do not own the land they are tilling; hence, there is no need to plant perennial crops except coconut.

CLOSED CANOPY and HIGH DIVERSITY
FOREST FARMING SYSTEMS AREA MAP
(Mt. Pangasugan Fori, Baybay, Leyte)

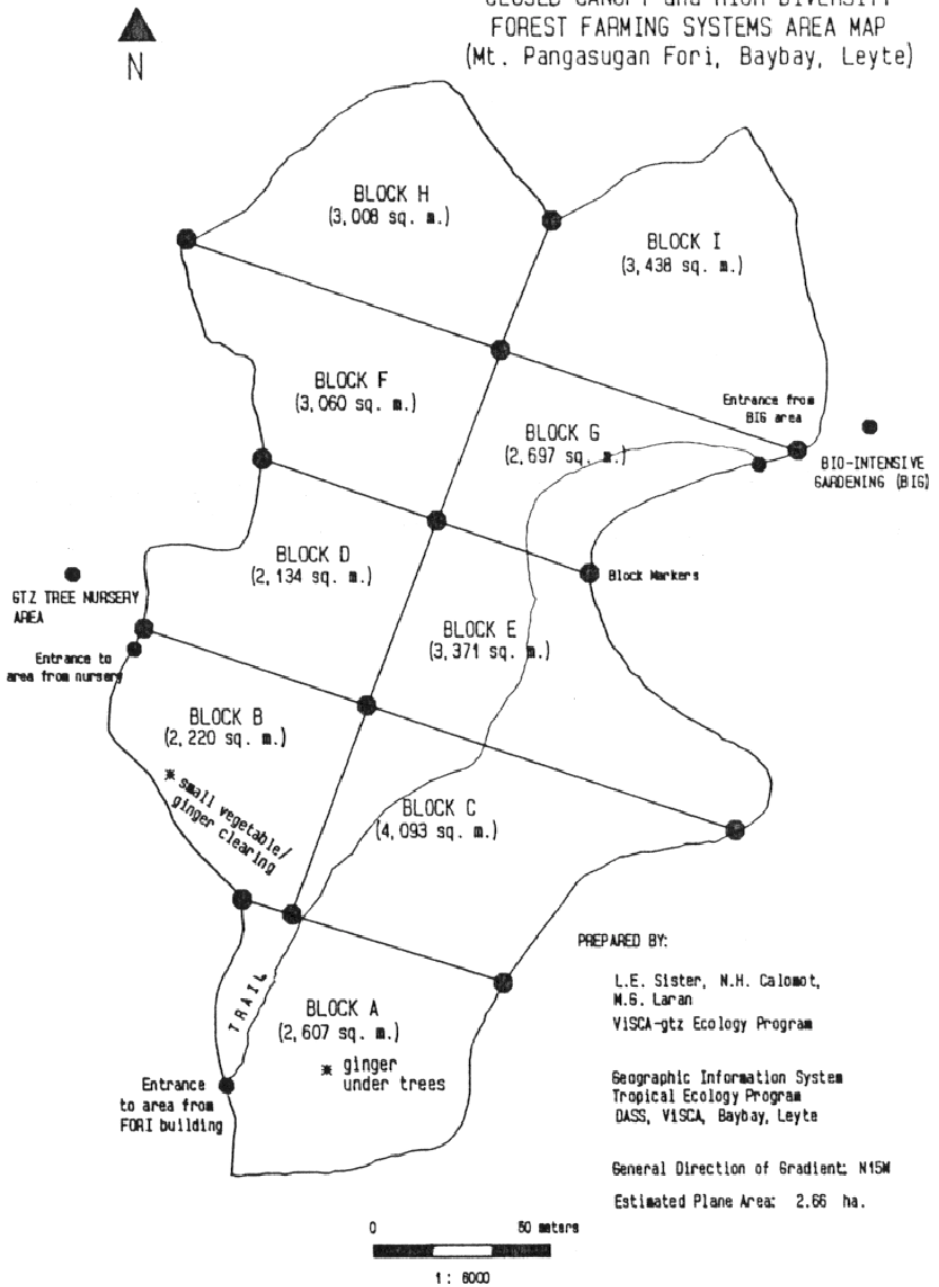


FIGURE 3.1. Demonstration farms located on the foothills of Mount Pangasugan (1993-1994)

From 1992 to 1996, efforts were made to analyze the constraints presented by farmers in the implementation of RF. The planting schemes were also fine-tuned, and the performance of different native tree seedlings with regard to shading and the type of soil was incorporated in the farmers' guide to reforestation.

In 1996, the first *Reforestation Farming Farmers' Guide to Sustainable Forest Biodiversity Management* was published. It underwent several editions; the latest of which is in Annex 3 (Margraf and Milan 1996). Consideration on the different native tree species that require shade and those that are sun-loving was integrated (see Figure 3.2). The planting scheme was based on this list. The initial planting of sun-loving native tree species was done; they will later on provide shade to shade-loving species (see Figure 3.3).

In the first few years, the results of observation on the performance of trees in different types of soil were consolidated. Some tree species performed well on volcanic soils, and others showed promising results. Few trees were listed initially, but more were added based on the research of academic staff and thesis students (see Table 3.1). Table 3.2 shows the list of birds identified at the VSU reforestation site.

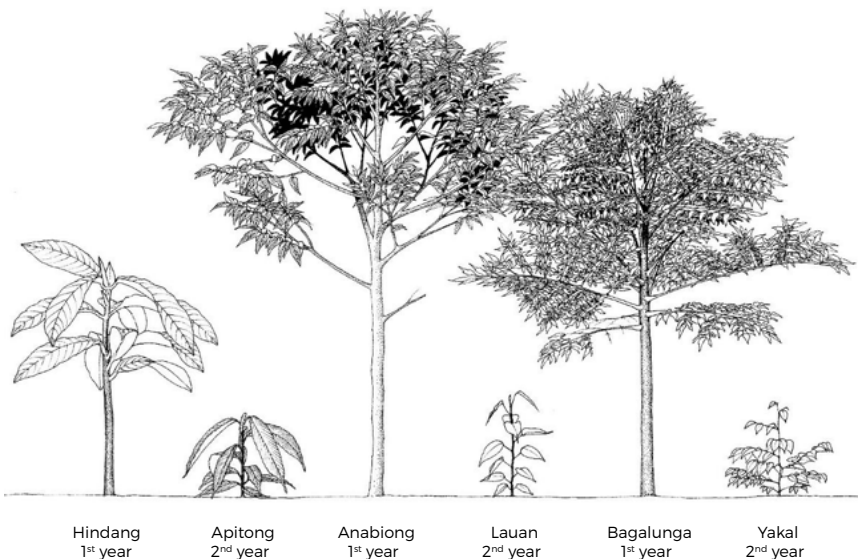


FIGURE 3.2. Combination with shade-tolerant hardwood species [MARGRAF & MILAN, 2004]

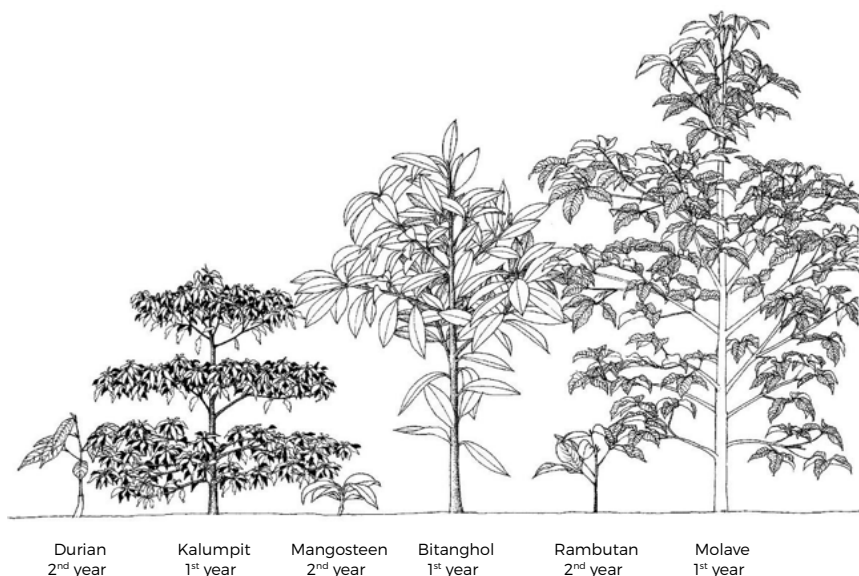


FIGURE 3.3. Combination with shade tolerant fruit tree species [MARGRAF & MILAN, 2004]

After almost two decades of RF promotion, a listing of native tree species that were planted in RF was consolidated (Annex 1).

TABLE 3.1. Some recommended timber species for reforestation on islands with no pronounced dry season

Sun-demanding local forest tree species of Leyte recommended for RF on volcanic soils	Shade-tolerant local forest tree species recommended on volcanic soils
Agoho (<i>Casuarina equisetifolia</i>)	Almon (<i>Shorea almon</i>)
Akleng-parang (<i>Albizia procera</i>)	Apitong (<i>Dipterocarpus grandiflorus</i>)
Amugis (<i>Koordersiodendron pinnatum</i>)	Bagtikan (<i>Parashorea malaanonan</i>)
Bagalunga (<i>Melia azedarach</i>)	Balobo (<i>Diplodiscus paniculatus</i>)
Bahay (<i>Ormosia calavensis</i>)	Yakal-kaliot (<i>Hopea malibato</i>)
Banai-banai (<i>Radermachera pinnata</i>)	Dungon (<i>Heritiera sylvatica</i>)
Bitangol (<i>Calophyllum blancoi</i>)	Gisok-gisok (<i>Hopea philippinensis</i>)
Bogo (<i>Garuga floribunda</i>)	Guijo (<i>Shorea guiso</i>)
Danupra (<i>Toona sureni</i>)	Hagakhak (<i>Dipterocarpus validus</i>)

Dao (<i>Dracontomelon dao</i>)	Kamagong (<i>Diospyros discolor</i>)
Gumihan (<i>Artocarpus sericarpus</i>)	Kulatingan (<i>Pterospermum obliquum</i>)
Hindang (<i>Myrica javanica</i>)	Manggachapui (<i>Hopea acuminata</i>)
Ipil (<i>Intsia bijuga</i>)	Mayapis (<i>Shorea palosapis</i>)
Kalumpit (<i>Terminalia microcarpa</i>)	Palosapis (<i>Anisoptera thurifera</i>)
Kamagong (<i>Diospyros blancoi</i>)	Red lauan (<i>Shorea negrosensis</i>)
Kariskis (<i>Albizia lebbekoides</i>)	Talakatak (<i>Castanopsis philippinensis</i>)
Lamio (<i>Dracontomelon edule</i>)	Tangile (<i>Shorea polysperma</i>)
Lingo-lingo (<i>Viticipremma philippinensis</i>)	Ulaian (<i>Lithocarpus solerianus</i>)
Malabayabas (<i>Tristaniaopsis decorticata</i>)	White Lauan (<i>Shorea contorta</i>)
Malogai (<i>Pometia pinnata</i>)	Yakal-kaliot (<i>Hopea malibato</i>)
Molave (<i>Vitex parviflora</i>)	Yakal-malibato (<i>Shorea malibato</i>)
Mountain agoho (<i>Gymnostoma rumphianum</i>)	SOURCE: MILAN (2009)
Narra (<i>Pterocarpus indicus</i>)	
Talisay gubat (<i>Terminalia foetidissima</i>)	
Tindalo (<i>Azelia rhomboidea</i>)	
Toog (<i>Petersianthus quadrialatus</i>)	

The use of native tree species in reforestation program has received limited support in the past decades because of the notion that native species, especially dipterocarps, grow slow and that not enough seedling materials can be produced in short time and some seedlings require shade and cannot be used to reforest open areas.

To address the problem of sourcing native tree seedlings, a nursery was established in the forest reservation area. A growth chamber was used as a method to raise wildlings in the nursery. This method increases the availability of native tree seedlings for reforestation in a shorter time. See Annex 2 for the instructions on how to build a growth chamber.

It took about three to four years to gather additional data to support the RF technology as a feasible option for forest biodiversity



Dr. Milan and a growth chamber (PHOTO FROM FOREST FOUNDATION PHILIPPINES)

protection—replacing the destructive practices of slash-and-burn farming—and to help maintain the water cycle from the buffer zone around our primary forest.

Various studies showed RF efforts in forest biodiversity (Box 3.2), in site quality (Box 3.3), and in climate change mitigation (Box 3.4). Box 3.5 further shows the advantages of using native tree species compared to the exclusive use of non-Philippine species in our forest ecosystem.

BOX 3.2. Effects of reforestation on forest biodiversity

1. Restoring original vegetation structure of the forest, which attract forest fauna
2. Improvement of physical stand to support wildlife
3. Recruitment of wildlife in RF sites

BOX 3.3. Effects of reforestation on site quality

1. Improvement of soil chemical properties
2. Improvement of soil structure and water holding capacity
3. Improvement of soil organic matter and soil color
4. Improvement of nutrient status
5. Improvement of biological activity
6. Improvement of microclimate

BOX 3.4. Effects of reforestation on climate change mitigation

1. Second-growth forests accumulate more than ten-fold carbon than young forests.
2. A tree absorbs up to 20 kg of CO₂ per year or about 1 ton of carbon by the age of 40.
3. Services provided by restoration areas increase exponentially in 60 years.

BOX 3.5. Effects of the exclusive use of non-Philippine tree species on the remaining Philippine Forest Ecosystem

1. Fast-growing exotics have low wood quality; hence, high quality rain-forest trees still need to be harvested from their natural environment, so timber poaching and illegal logging continue.
2. Local lumber species, as their wood quality is much higher, are sought after but not propagated; such that the mother trees become very rare and seed material is even less available.
3. Fast-growing exotics are mostly pioneer species with short life span. They support a management of repeated clear cutting and exhaustion of soil nutrients, making reforestation more and more difficult.
4. Monoculture stand of forest trees is vulnerable to pest attack, which can lead to the complete failure of reforestation, as documented for Brazil and Indonesia.

Sustainable development vis-à-vis rainforestation

RF was originally designed to replace the destructive form of slash-and-burn agriculture and to address environmental problems (i.e., decline in water supply, flooding, erosion) experienced by the farmers in Leyte. Because forest resources in the country are disappearing at an alarming rate, changes in land use, logging, and mining practices are necessary..

It is imperative that a new paradigm in forest restoration and rehabilitation must be sustainable, can enhance our forest ecosystem services, and must consider the needs of our upland dwellers and those that depend on our forest for their basic needs. No amount of forest restoration would succeed if the people were taken out of the picture when we speak of sustainable development. How we balance people's needs, the conservation of our biodiversity, and the maintenance of the ecological function of our forest is key to any sustainable forest management strategy.

As an option for rural development and biodiversity conservation, RF can be the answer. It considers a farming system that supports livelihood as an innovation. Here, farmers are provided with a stable and high income not only from the trees but also from agricultural crops (Milan et al. 1993).

TABLE 3.2. Birds identified at the VSU RF site

Family name	Scientific name	Common name
Alcedinidae	<i>Halycon smyrnensis</i> <i>Todiramphus chloris</i>	White-throated kingfisher White-collared kingfisher
Apodidae	<i>Collocalia esculenta</i> <i>Mearnsia picina</i> <i>Hirundapus celebensis</i> <i>Cypsiurus balasiensis</i>	Glossy swiftlet Philippine needletail Purple needletail Asian palm-swift
Bucerotidae	<i>Penelopides samarensis</i>	Samar tarctic hornbill
Capitonidae	<i>Megalaima haemacephala</i>	Coppersmith barbet
Caprimulgidae	<i>Lyncornis macrotis</i>	Great-eared nightjar
Cuculidae	<i>Cacomantis merulinus</i> <i>Centropus bengalensis</i>	Plaintive cuckoo Lesser coucal

Columbidae	<i>Treron verdans</i> <i>Phapitreron leucotis</i> <i>Ptilinopus occipitalis</i> <i>Macropygia phasianella</i> <i>Streptopelia chinensis</i> <i>Chalcophaps indica</i>	Pink-necked green pigeon White eared brown dove White eared brown dove Reddish cuckoo dove Spotted dove Common emerald dove
Dicaeidae	<i>Dicaeum bicolor</i> <i>Dicaeum australe</i>	Bicoloured flowerpecker Red keeled flowerpecker
Laniidae	<i>Lanius cristatus</i>	Brown shrike
Meropidae	<i>Merops philippinus</i>	Blue-tailed bee-eater
Muscicapidae	<i>Hypothymis azurea</i>	Black-naped monarch
Nectariniidae	<i>Anthreptes malacensis</i> <i>Leptocoma sperata</i> <i>Cinnyris jugularis</i>	Plain-throated sunbird Purple-throated sunbird Olive-backed sunbird
Oriolidae	<i>Oriolus chinensis</i>	Black naped oriole
Psittacidae	<i>Loriculus philippensis</i>	Philippine hanging parrot
Pycnonotidae	<i>Pycnonotus goiavier</i> <i>Hypsipetes philippinus</i>	Yellow-vented bulbul Philippine bulbul
Sturnidae	<i>Aplonis panayensis</i> <i>Sarcops calvus</i>	Asian glossy starling Coleto
Timaliidae	<i>Macronus striaticeps</i>	Brown tit babbler

SOURCE: CENIZA, ET AL. (2004)

RF has been used in various typologies or innovative approaches. It can be used in enhancing protected areas, rehabilitating landslide-prone areas, highway beautification, critical watershed areas, and urban areas using eco-parks. It can also be used in production areas or in *kaingin* areas to protect primary and secondary forests.

As part of the project, the RF approach was applied in areas where catastrophic events occur. After the Guinsaugon landslide, RF was introduced in five barangays in Southern Leyte: it was funded by Euro-Natur. After Haiyan, Lufthansa Help-Allianz funded a 30-ha RF project in Barangay Barayong in Palo, Leyte, and a separate 10-ha farm in Lawaan, Eastern Samar, supported by NatureLife-International.

Shift from old to new paradigm in forest restoration

The past decades of reforestation practices served as an eye opener. From an exotics-driven, highly regulatory, and centrally managed reforestation, valuable lessons taught us to explore other approaches. The old reforestation paradigm targeted bigger areas because it required higher budget allocation for contracting. Planting and harvesting cycle of exotic species were faster, had higher yields, and met the increasing demand of wood products and wood-based industries (see *Figure 3.4*).

The traditional “contract reforestation” implemented by the government involved families, local communities, NGOs, LGUs, and the private sector—based on a contract fee for restoring and maintaining particular area for three years, with an expected survival rate of ≥ 80 percent and an average height of 0.8 meter. After the contract period, the area was turned over to DENR.

It was more of a labor-seeking partnership between local communities and the government. The upland communities served merely as laborers or—worst—they were ejected to give way to bigger government reforestation projects awarded to the private sector, mostly from the wood producers’ association. Such an arrangement caused great animosity between the government and upland communities, particularly with indigenous peoples. It contributed substantially to the failure of past reforestation initiatives.

Thus, most of the reforestation projects initiated by DENR were implemented by tapping local communities for only temporary employment. Foreign-funded projects gained most from cheap labor arrangement among farmers and local communities. Yet, the sustainability of the projects, given the limited timeframe and budget, continued as a challenge.

In a community-managed forest restoration work, the first three to five years is dedicated solely to social preparation, including community organizing, site identification and assessment, training, seedling/wildling collection, establishment of nursery, and planting and establishing the reforestation area. Monitoring of the forest being restored only comes after the third and succeeding years.

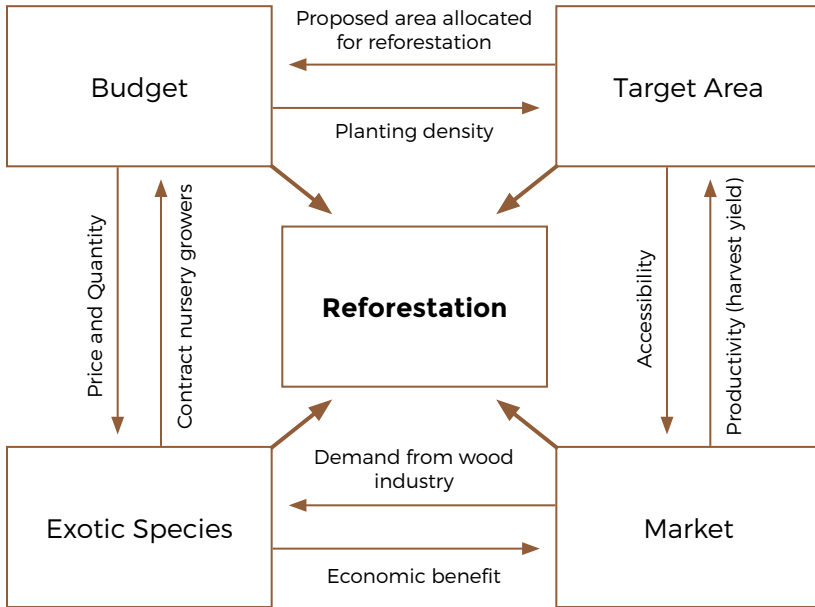


FIGURE 3.4. Schematic diagram of traditional reforestation in the Philippines. (SOURCE: BANDE, M. ET AL (2016))

In the early 1990s, the RF system shifted to a community-managed, decentralized, and more bottom-up arrangement. Farmers were encouraged to choose what and where to plant, provided land tenure is secured. Because they were given the options to decide, they had the responsibility to take care of what they planted because of its socioeconomic value to them.

An RF participatory approach and its implementing strategies were developed after more than 20 years of field-testing. VSU served as catalyst by introducing the RF technology and extending technical assistance to communities. The role of LGUs included technical and administrative tasks, while DENR took on the specific role of providing policy, legal, and technical support. CSOs provided technical support and the much-needed assistance in social preparation. This collaboration was geared toward capacitating local communities in developing a rainforestation farm.

Figure 3.5 shows that the strong participation of stakeholders was a function of their common understanding of their social, political, economic, and local environmental issues and concerns, particularly among those who experienced the effects of extreme weather events. There was a sense of common responsibility to address the problems that affected all of them. They understood that the ecological benefits of restoring the forest would mitigate climate change. As a result, there was a clamor to address both economic and environmental concerns. RF, hence, gradually evolved by combining the essential elements of forest and subsistence farming.

RF has proven to be less costly and can be managed by a community. RF has less economic cost of only PHP 58,750 per ha, compared to contract reforestation that costs about PHP 100,000 per ha. They also produce seedlings with better quality and at higher quantities.

The use of the RF technology allows reforestation of degraded areas and old coconut plantations with a highly diverse and economically future-oriented, tree-based farm (Göltenboth and Hutter 2004). If a system of balanced fading out of the presently existing land use and a system of fading in into a tree-oriented farming system are achieved, the preservation of nature with its ecosystem functions and the stabilization of a good farming income might both be realized.

Adjustments are certainly needed, as well as a steady refocusing on the respective local situation. It should therefore be the farmer's choice to select single elements of the RF scheme to combine this with the compartmentalization of the agricultural system familiar to them. Since 1994, 22 RF sites have been using the technologies on about 24.4 ha in various locations throughout Leyte, where more than 20,000 trees are planted.

Some more sites are on the islands of Palawan, Bohol, and Mindanao. Many farmers and cooperatives from these sites have been generating substantial income from selling tree seedlings. DENR recognized these activities and has issued certificates for the planted trees to ensure the right to harvest these trees in the future. It also submitted policing power to some of the cooperatives in the form of a stewardship certificate or Community-Based Forest Management Agreement (CBFMA) to ensure the protection of watershed areas in the vicinity of these RF sites (Göltenboth, Milan, and Margraf 1999).

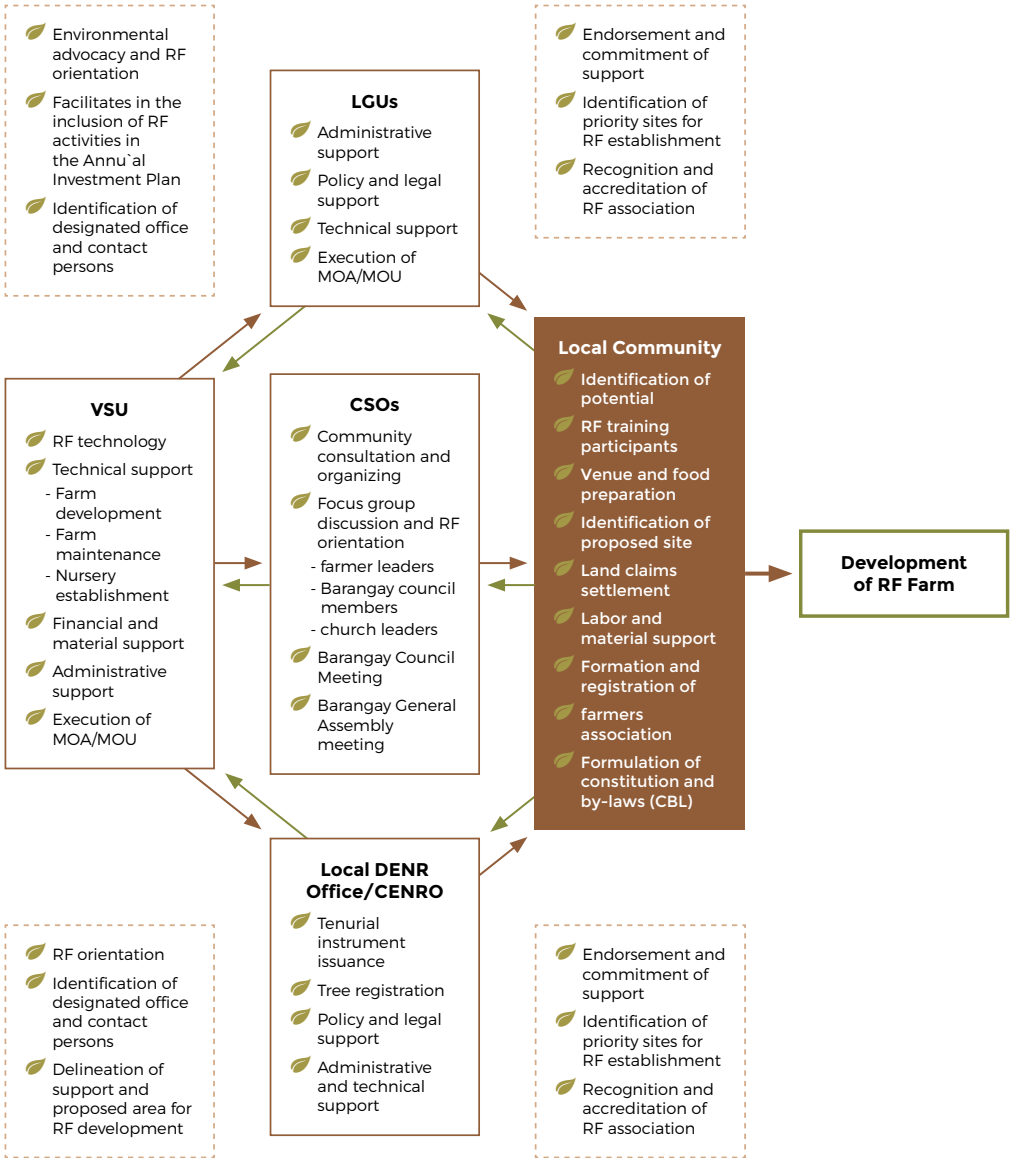


FIGURE 3.5. Schematic diagram showing RF participatory approach.
(SOURCE: BANDE, M. ET AL (2016))

In the following cases, pioneer species were used to provide the needed shade for those tree species forming the climax canopy. By following this approach, the two main components below are combined:

Establishment of community-based “close canopy and high diversity farming system” in former degraded areas and old coconut stands

The first farms were started in 1994. On the average, most farms have an increased income of about 8-10 percent by now. Due to economical investigations, a main income can be expected from the 12th to 15th year and onward because some of the hardwood and highly valuable Dipterocarpaceae species can be harvested (Waibel et al. 1997). Enrichment planting with annual crops like pineapples and anthurium flowers and perennial crops like ginger and abaca has provided farmers with income from the first year onward. In the fifth year, the first fruit trees started bearing fruits (e.g., rambutan and durian in the 6th year and mangosteen after the 8th year). The pioneer trees can be sold as posts and firewood. To adjust the respective socioeconomic effects in the right way, further research and investigations have to be paralleled with the ongoing process.

Protection and rehabilitation of the environment and biodiversity

The ecological functions are measurable by computing the total reduction of any significant soil erosion in the RF areas (see Tables 3.3 and 3.4). The improvement of the soil is demonstrated by the mulch layer and humus, serving the growth of the annual and perennial crops (Daub 2002; Bande 2004). The first users of the area are birds and small hymenopterans, followed by reptilian and mammals. The droppings of birds and bats contribute to the enrichment of the area because seeds are coming into the region together with the droppings. Flying lemurs (*Cyanocephalus volans*) have been recorded as visitors during their night-time activities in search for foliage of jackfruits.

TABLE 3.3. Soil changes

Site	1994	1998	2002
Rainforestation site (VSU) - acidic soil			
Soil pH	4.2	4.8	5.2
Rainforestation site (Punta) - calcareous soil			
Soil pH	8.2	7.4	7.2
Secondary forest (VSU) = soil pH 4.5 - 4.7			

SOURCES: ASIO (1996), ASIO AND MILAN (2002)

TABLE 3.4. Nutrient calculations for the RF site at VSU

Nutrient	1994	2002
OM (%)	2.06	3.25
Total N (%)	0.22	0.33
Avail. P (ppm)	0.40	1.05
Exch. Ca (me/100g)	4.60	9.47
Exch. Mg (me/100g)	2.80	8.32

SOURCE: ASIO (1996)

The nocturnal, insectivorous *Carlito syrichta* migrated in the RF site in the Leyte State University campus. Birds, bats, and insects are all valuable pollinators and are needed in the future to secure fruits and seeds. After only five years, some *Dipterocarpus validus* already produced their first batch of winged seeds. Further research on the production of seeds, composition of trees, thinning, pruning, and the interactions between trees and crops is needed to optimize the technology (Göltenboth 2005).

The Energy Development Corporation (EDC 2016) pointed out that there are two main reasons why mahogany and gmelina were—and continue to be—favored over the native species. First, the seeds and propagules of the native species are hardly available, therefore, difficult

to procure. Second, native species are slow growers, lagging behind the exotics, and one needs to wait at least 20 years before the first flowering or fruiting. Such view, however, is not the simplistic explanation why exotic species are not good for restoration of the ecological services in our tropical forest ecosystem, which is what the RF strategy is prioritizing.

Roadblocks to promoting rainforestation farming

RF evolved gradually. It was not a perfect technology, but it went through the rigors of field-testing and research, and hurdled roadblocks on many fronts. From a small Forest Research Institute demonstration farm to pilot sites expansion, convincing people to use native species was a slow process. However, this did not weaken the resolve to continue because the demonstration sites were showing positive results that both forest restoration and productivity enhancement among farmers could be addressed. The many roadblocks took on different forms, such as the following:

Changing mind-sets as a daunting task

RF came at the height of DENR's massive campaign on promoting exotics for their reforestation projects. Changing mind-sets to use native species instead of exotics is difficult to hurdle. This created a bandwagon that if it is something exotic and imported, it would yield a higher income. It took a while to convince people to use native species; many would say *"mas maayo ang imported nga kahoy kay mas daku ang abot o kita"* (imported trees yield higher income). To go against the promise of earning a million pesos out of 1 ha of gmelina plantation after 8 to 10 years is a challenge. RF, as a proposition, did not stick in the minds of farmers at the beginning.

Organizational hurdle

RF was seen as university extension work. The academe should provide only technical support and must not directly implement at the ground level. Hence, RF was not given academic priority. Consequently, budgets were not enough to defray cost of community extension work, and RF had remained dependent on external partners. In 2017, it got only PHP 250,000 for its annual budget, which was not even enough

to pay for the salaries of field technicians. An in-house research and development arm of the university was wanting.

Workload and turfing issues

Juggling between teaching job and community extension work encumbers faculty members engaged in RF. Some would work during weekends without additional pay. In RF sites outside Baybay, some of them have to spend extra time and money for their monitoring activities. Others are concerns related to the difficulties of trekking to sites with harsh terrain and impassable roads by vehicles, lack of personnel to monitor demonstration sites, not to mention “turfing” issue within an academic community.

Local partner level issues

The failures of previous reforestation projects contributed to the mistrust and nonparticipation of PO members in alternative reforestation schemes, including those initiated by the academe and CSOs. PO members felt that they were being used. There were also reports of competition in seedling productions among POs contracted by DENR for their reforestation projects, as well as mismanagement due to poor management and leadership within the association. The assigned extension workers have noted such observations, but they can only do so much because of their limited time and resources.

Dealing with the forestry-mandated agency

Some regional officers would assert that forest restoration, particularly the use of native tree species, is under DENR’s jurisdiction—and not under the scope of academic or CSO work. DENR issued MC 2011-01 indicating the role of state universities and colleges in NGP, specifically on social mobilization, nursery operation, and production of planting materials. However, a clear set of implementing rules and regulations is still needed.

Past lessons from reforestation projects should guide field operation (e.g., new ways of contracting, sourcing of planting materials, monitoring, releasing of funds, and other protocols). Other challenges include the recurring issues of conflicting tenurial rights in almost all RF sites, unclear harvesting policies, and lack of DENR’s field personnel to

monitor projects. Delineation of protection and production forests is urgently called for.

Engaging LGUs

The change of local leadership affects RF project implementation. A number of local chief executives are not supportive of forest restoration because they consider it long-term and would last beyond their term. Moreover, there were instances where qualified project staff were not supported by the incumbent administration, or vice versa. These affect the implementation of RF projects because, for instance, the incumbent executive would prefer his/her own staff.



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INVESTIGATION PROJECT
(R.P.)
CE AND NURSERY
as. Baybay, Leyte
assisted project
TROPICAL ECOLOGY PROGRAM



previous spread. Dr. P. Milan with women members of CSVFA, Baybay, Leyte (PHOTO BY FOREST FOUNDATION PHILIPPINES)

RF Adoptors in Different Management Typologies

Rainforest farming (RF) is a strategy in forest restoration that uses native and endemic tree species to strengthen forest ecosystem. This is the shared understanding and practice of adoptors in the Philippines. RF is being implemented in different stages:

- 🌿 Social and site preparation (community organizing, site identification and assessment, training, seedling/wildling collection, establishment of nursery)
- 🌿 Planting and establishment of the RF site
- 🌿 Maintenance and monitoring of the restored forest

The social and site preparation stage up to the establishment of the RF site may take two years; the maintenance and monitoring of the restored forest is done in the succeeding years.

The elements of RF as forerunner of the needed paradigm shift characterize its difference with the still dominant practice of using fast-growing, introduced species in reforestation projects. The following elements imbued with the spirit of participation of appropriate stakeholders are dynamically interlinked in rainforestation:

- 🌿 Lead governance role and major technical support of the mandated agency (i.e., DENR) through executed government policies and opportune programs

- 🍃 Lead role in devolved functions and support of the local government units (LGUs) through local policies, administrative and technical support, and execution of agreements
- 🍃 Direct engagement of the local forest dependent community as RF manager—from site preparation to the establishment and monitoring of the rainforestation farm (hence community-based)
- 🍃 Committed partners and support organizations (civil society organizations, academic institutions, the private sector, and other agencies) for awareness raising, participatory decision making, capacity building, financial support, facilitation, and volunteer services
- 🍃 RF adopters' livelihood improvement with long-term direction, taking off from agroforestry and farm enhancement to food security and social entrepreneurship

These elements that make RF work well have been demonstrated in diverse upland contexts over the past three decades. The following cases offer a glimpse of the processes involved in implementing an RF, some lessons learned, and some challenges and opportunities. Case highlights are shared as examples of how the RF practice is being enhanced, as new opportunities are created to address new challenges.

These stages and elements of the RF strategy are demonstrated in the highlights of the various cases compiled in this chapter:

1. Family-based approach as core mode of community participation
2. Social mobilization in protected area multiple use zones
3. Rainforestation and watershed rehabilitation
4. Rainforestation in ancestral domains
5. Rainforestation and conservation trade-offs
6. Rainforestation in a privately owned tree farm

The case studies serve as aspirations to amplify and, hence, scale up forest restoration efforts from individual or small farmers' association initiatives to the ecosystem level in larger landscapes. They show

the diversity of RF experiences, where forest restoration is viewed with an understanding of the interaction of people, forest, and ecosystem integrity.

Family-based approach as core mode of community participation

The case of the Cienda-San Vicente Farmers' Association

Location	Barangay Kilim, Municipality of Baybay, Leyte Province
Population	3,318 in at least 100 households
Lead in RF	Cienda-San Vicente Farmers' Association (CSVFA) and Visayas State University (VSU)
Local economy background	Charcoal making was the primary livelihood, but it has been under regulation; replaced by water-rafting eco-tourism of the barangay local government unit (BLGU)
Partners	Institute of Tropical Ecology and Environmental Management (ITEEM)

In the early 1990s, VSU conducted the first training of 67 CSVFA members, with 27 individuals pursuing the RF project. The Institute of Tropical Ecology and Environmental Management (ITEEM), formerly known as Institute of Tropical Ecology (ITE), assigned field staff involved in training, documenting, and research work to help. It was the catalytic role of a community organizer in the person of Marlito Bande that ensured strong farmers' participation.

The CSVFA site covers a total area of 2,236 ha; it is the biggest in terms of area size among the eight RF pilot sites in Leyte. The accessibility of the CSVFA site facilitates regular VSU monitoring. The site also served as field laboratory for the students and faculty of the University. Being the nearest site to the campus, one could reach the site by walking or by riding on a tricycle, jeep, or motorcycle.

The RF participatory model was tested and developed in CSVFA after more than two decades of VSU's extension work. The model is now being used as a guide in setting up new RF sites not only in Leyte but also in other areas.

During its early successional stage, CSVFA planted 3,434 trees of 32 species. The planting of high-value cash crops and root crops at the early stage of reforestation suppressed the growth of grasses. Each member's devoted voluntary work was recorded and considered as individual capital build-up used as basis for sharing the benefits of on-farm income.

RF implementation

What is unique with the CSVFA site is its family-based approach. Engaging both parents and children in the different stages of RF implementation has become a mode of community participation that has worked well.

The older male members are usually involved in the site assessment and preparation, collection of seedling/wildlings from the forest, planting of seedlings, and maintenance and monitoring. The female members (usually mothers) are mobilized in preparing and maintaining the nurseries, including potting of seedlings and preparing food for a common community activity locally known as *pintakasi*. The younger members (sons and daughters usually 9–13 years old) of the family are tapped to help in potting, collecting of seedlings/wildlings, and watering the potted seedlings in the nursery. When a family member is not available or unable to do his or her tasks, any other family member/s can fill in. This family and community dynamics in cooperation and shared tasks made local knowledge known to all—regardless of gender and age—which is an important aspect of sustainability.

About 30 percent of the more than 100 households in Barangay Kilim are directly involved in RF implementation. According to Victorino Calatraba, president of the association, CSVFA survived because of the members' commitment to the organization, their accountability, and good leadership.

Based on Dr. Bande's assessment, the following are among the most critical elements in the CSVFA success (Bande 2017;⁸ Bande et al. 2016):

8 Personal communication



CSVFA members at their native tree seedlings nursery
(PHOTO BY FOREST FOUNDATION PHILIPPINES)

- ✔ Empowerment and capability building
- ✔ Volunteerism, commitment, dedication, hard work, and honesty among members
- ✔ Household scheme of membership
- ✔ Unique benefit-sharing scheme (utilization of labor inputs as individual capital build-up and basis for the benefit-sharing scheme of income derived from forest restoration activities like sales from production of seedlings)
- ✔ Use of local knowledge
- ✔ Attainable and manageable area, restored with high species diversity and quality stand for wildlife recruitment

Challenges faced

Just like in any other people's organization (PO), managing and sustaining members' participation is considered a challenge. For CSVFA, upland farmers do not easily join unless the benefits are already being experienced. Eventually, members realized the importance of

protecting the forest, as they are now reaping its tangible and intangible benefits: steady supply of water; cooler local climate; food security; and higher income from the sale of seedlings, fruits, and other crops.

Conversely, they expressed that such contribution in protecting the forest should also be matched with government's support in terms of providing better health and social services, as well as education and livelihood opportunities for the growing population of the area.

Opportunities for sustainability

Between 1997 and 2013, CSVFA sold over PHP 1.6 million-worth of native seedlings to different organizations, agencies, and individuals. Under the current National Greening Program (NGP), they are also paid for their labor in planting and maintaining the seedlings. The members have developed skills and are proud to share that they are now considered as RF farmer-trainers, and can extend their services to other RF adopters.

To date, the association's members have increased to more than 100. Through the years, they are now more confident that they can directly forge partnership with other agencies (i.e., DENR-NGP, PTFCF, FPE) even without direct assistance from VSU. CSVFA has also garnered several recognitions from national and international bodies for their exemplary performance:

- 🌿 Best Community-Managed Forest Warden
- 🌿 Replication of CSVFA's experiences in six interior communities
- 🌿 Best CBFM holder (2005 and 2010 regional evaluation)
- 🌿 National Rainforestation Trainer (DENR MC 2004-06)
- 🌿 Paradise regained (BBC Documentary 2002)
- 🌿 Equator Initiative Finalist (2002)
- 🌿 FAO Search of Excellence (2003)
- 🌿 United Nations Innovative Communities (2005)

The RF strategy development, testing, and refinement of CSVFA over 15 years serve as a model for all other tropical forests that need restoration. The core elements in the strategy and the technology guidelines

laid-down by CSVFA and VSU—along with supportive academic links and sources of funding—have been adopted and enhanced in other kinds of contexts, as the succeeding case experiences demonstrate.

Social mobilization in protected area multiple use zones

Funds from the government and support organizations for forest restoration are often insufficient. Social mobilization of local players and tapping of other resources are opportunistically undertaken in RF in protected areas, with highlights from the different aspects of stakeholder engagements.

BLGU-managed reforestation project

Location	Barangay Tanauan, Municipality of Real, Quezon Province
Population	2,194 in 443 households; 90% are upland farmers
Lead in RF	BLGU
Local economy background	Charcoal making was primary livelihood, but it has been under regulation; replaced by BLGU water-rafting ecotourism
Partners	Haribon Foundation as RF initiator, no PO as entry point, corporate social responsibility (CSR) site of Honda Foundation, Aquabest, and LBC Express

In 2011, Haribon Foundation started a partnership with DENR Region IV, Barangay Tanauan, and the municipal LGU. Together, they signed a memorandum of agreement (MOA) based on Presidential Proclamation No. 1636. For financial support through separate agreements, Haribon partnered with different corporations’ CSR programs to finance and participate in the forest restoration.

RF implementation

The Protected Area Management Board (PAMB) of DENR led the site selection; the area chosen for the planting of native seedlings was 10.48 ha. In the absence of POs, community members are involved

in nursery establishment and planting (on rotation basis). Under the management of BLGU, the rotation basis is used to involve more residents. There is a small nursery in the site with few available seedlings. However, community residents are too busy to manage a nursery, and there are limited mother trees in their area. Hence, a partner PO in Gen. Nakar (also a town in Quezon) supplies them with more seedlings. Based on the community's observation, if the purchased seedlings do not come from Mt. Irid-Angelo, tree growth is slower. Thus, the BLGU and the Municipal Environment Office ensure that the purchased seedlings are coming from their area.

Maintenance is done on a per seedling approach based on their MOA. During the rainy season, brushing and cleaning are the primary activities of the LGU managing the RF sites. During the dry season, cleaning is done. On a case-to-case basis, if it will only contribute to the mortality of seedlings, cutting is delayed depending on the season. To ensure quality in technology transfer in environmental management, two regular lead persons monitor the whole process and manage the participating residents, even without assistance from Haribon and the BLGU.

The funding support mobilized by Haribon from different CSR programs is used for planting and maintenance. Each seedling of native tree species (e.g., narra, dao, kamagong, and makaasim) costs PHP 350. Haribon has paid this amount to the BLGU for three years; the seedlings are then distributed to community members. Additional incentives (i.e., high-value crops, vegetables, and fruit-bearing trees for the community) are released if the trees were planted in 2016 and onward. This setup aims to instill the values of forest conservation as a collective and multiagency undertaking with long-term goals, as well as the institutionalization of the undertaking toward sustainability.

Through the MOA, the BLGU and municipal LGU recognized the contributions of the funding organization by ensuring the monitoring and quarterly maintenance of the project. Haribon underscored that the MOA is not just a "contract of labor" but a partnership building for forest protection; hence, LGUs are not treated as workers but partners for environmental protection.

During monitoring, seedling growth of at least 80 percent is required before the full payment of services is released to community members.

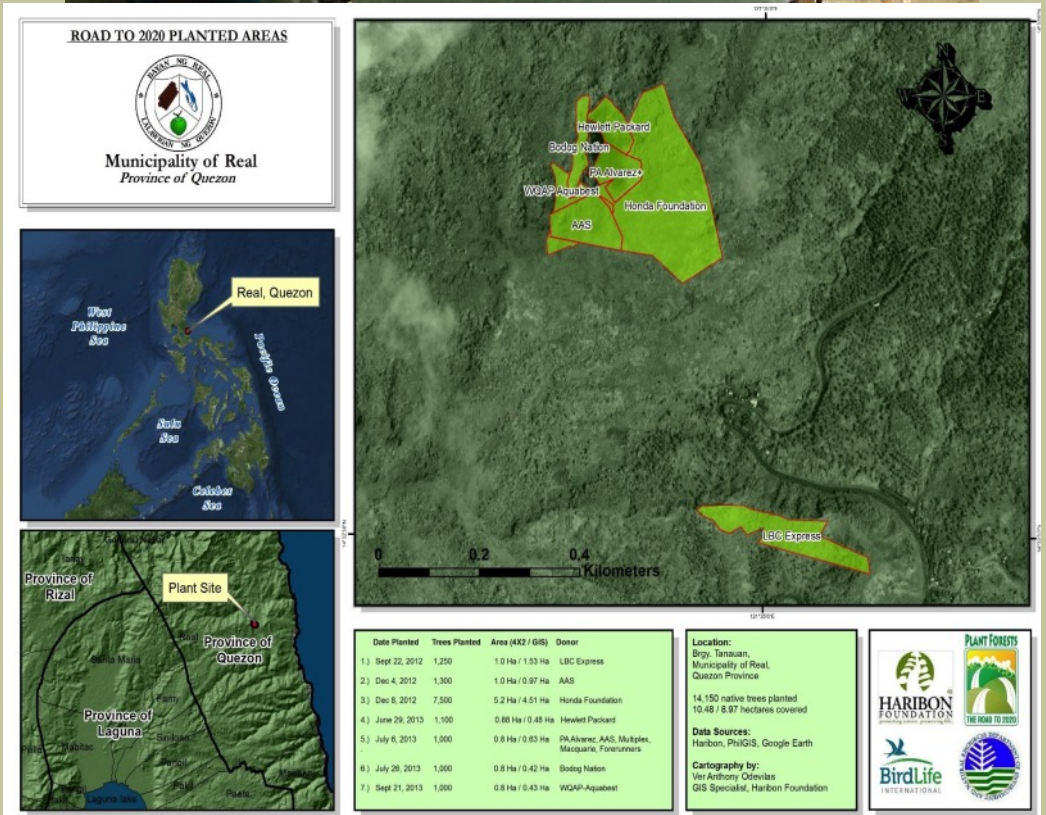


FIGURE 4.1. RF in Barangay Tanauan and the water-rafting site (PHOTO BY J. TOLIBAS; MAP BY HARIBON FOUNDATION)

If growth only reaches 75 percent, only 80 percent of payment is released. The remaining payment will be disbursed after a year.

Challenges and opportunities

Haribon projects a possible expansion of the RF in Barangay Tanauan. This is consistent with the goals of Rainforest Organizations and Advocates (ROAD to 2020) to restore 1 million ha of rainforest by 2020, alongside Presidential Proclamation No. 1636 to ensure forest protection in the area. Haribon has continuously intensified its initiatives to look for other partner-corporations to support the barangay in its forest protection activities.

Despite substantive success, the RF faced the following challenges:

- 🍃 Haribon recognizes the possibility that community members may be burdened by the project's payment scheme. For instance, the BLGU sometimes borrows money for maintenance, especially if the funds are not yet released. Thus, it is recommended that a mobilization fund be available to support the BLGU.
- 🍃 The CSR programs of corporations tapped by Haribon require close coordination. There are two layers of partnerships: (1) between the corporations and Haribon and (2) between Haribon and the BLGU. This setup has to be nurtured to ensure that co-managed RF will be maintained. Fortunately, the absence of a formal agreement between the BLGU and corporations does not hinder the community to be committed in their goal to restore the forest.
- 🍃 Other challenges concerning the settlement area near the RF sites are being anticipated. If the settlers will not be properly oriented on forest conservation, forest resources might be abused again.
- 🍃 There is a need to complete the Forest Land Use Plan (FLUP) to achieve a more systematic, organized, and sustainable RF. This shall provide an overarching plan for forest protection and management.
- 🍃 The Comprehensive Land Use Plan (CLUP) has to be updated as well to support the FLUP and other initiatives related to forest protection and management.

LGU-led RF needs to have a strong backing in legislations and ordinances to support RF initiatives, especially because elected officials are not permanent in their positions.

Lessons learned

In this setup, the BLGU is a partner and not an employee of the CSR programs. This is an important lesson that Haribon wants to instill in the minds and hearts of the residents of Barangay Tanauan. The mutual respect developed between the LGU and Haribon has made the partnership more effective, in terms of giving supplemental livelihood and improving for the environment.

In return, the RF has made the BLGU more innovative in packaging their local green tourism (i.e., rafting) and forest conservation activities to send a clear message that water and trees are connected. Moreover, the BLGU has increased appreciation of the benefit of forest conservation not only in terms of natural protection and safety but also in providing additional sources of income.

Nurturing volunteerism in a reforestation project

Location	Barangay Lalo, Municipality of Tayabas, Quezon Province
Population	4,800 (in 2016); 70% are farmers
Lead in RF	Luntiung Alyansa para sa Bundok Banahaw (LABB)
Local economy background	Farming is the primary livelihood activity, but local people are also engaged in charcoal making and wildlife poaching—both are now under regulation.
Partners	Tapat Kalikasan (TK) for volunteer service, Foundation for the Philippine Environment (FPE), US Agency for International Development (USAID), DENR-PAMB

Volunteerism is the distinct feature of the RF in Barangay Lalo in Tayabas, Quezon. Most households are focused on their own income-earning activities. Majority or 70 percent of the households are dependent on farming with a monthly income of PHP 5,000 during peak season and less than PHP 2,500 during lean months. Another 20

percent of the households are involved in both formal and informal occupation, such as teaching, construction and mason work, carpentry, and other daily-wage labor. Few households own variety stores (*sari-sari*), while about 2 percent are in subsistent fishing. The lack of or insufficient income obliges uplanders to engage in charcoal making and wildlife poaching.

Barangay Lalo is in Southern Luzon and is situated on the foot of Mt. Banahaw-San Cristobal, which is regarded by the religious sect as mystical mountains. Environmental protection is intertwined with the religious worldview of local people, as well as their cultural appreciation of the resource. It is not surprising that the concept of RF works consistently with such beliefs that regard their forest as a sacred place. Sacredness is manifested by the deep faith of the people living along the periphery of the protected area.

FPE—through LABB—introduced RF in Barangay Lalo. LABB led a local environmental summit in September 2012, with support from USAID and FPE (through the Up-Scaling Forest Restoration Efforts in Key Biodiversity Areas Project, which ran from 2011 to 2013). The term “social



TK members in action (FPE, UNDATED)

fencing” was introduced to communities living within the periphery of the protected areas. Conservation, livelihood opportunities, participatory resource management, and equitable sharing of benefits are the critical elements of social fencing.

RF implementation

FPE and LABB started the advocacy and orientation of RF in 2009. As a protocol, close coordination at the municipal and barangay levels was established. In addition, because Mt. Banahaw is a protected area, coordination was sought with DENR-PAMB. The boundaries and delineation were identified, consistent with the existing protected area management plan.

Volunteers, particularly from TK, were tapped for the different stages of reforestation. For site preparation, there were only a few TK volunteers in Barangay Lalo, with only 26 members at the start. Understandably, other community members were a bit skeptical on RF because it seemed to be like the traditional tree planting initiatives done in the past where exotic trees were planted.

TK members and resident farmers were trained in identifying mother trees and propagating seedlings. The process introduced by the RF was quite new to TK members; their previous tree planting work involved planting seedlings provided by external partners. The seeds from the mother tree were placed in a plastic and, then, in a chamber. Preparing and monitoring the chamber to ensure quality growth was part of the training of TK members. Residents—who eventually joined the pool of RF volunteers—slowly imbibed such training.

Volunteers are also involved in monthly monitoring activities. The LGU gave them standard monitoring forms, which are submitted to the Community Environment Office. Volunteers also meet monthly to give feedback on the status of the project. General meetings are held with support agencies and facilitators on a quarterly basis.

Building up sustainability

The RF provided the community a deep sense of appreciation—not just of forest protection but also of social protection. The interplay of economic gain, sociocultural protection, and nature preservation was

evident. Hence, the RF has provided them partnership opportunities and sources of additional income.

Volunteer tree-farmers earn PHP 2 per seedling in the nursery and seedling preparation. If digging is included, the rate is PHP 25 per seedling. Again, this is distinct in the RF because the PO now provides the seedlings from the mother tree. Although it would take six months before the volunteers can dispose the seedling and earn from it, it has been a better option for them because they do minimal work within those months. Corporations who have engaged with TK also bring financial augmentation. Japan Foundation, for instance, would pay PHP 40 per seedling if they opt not to plant onsite, hence, passing on the on-the-ground task to the local people. In this scheme, hauling, brushing, digging, and planting are included.

Monitoring is TK's counterpart in volunteer work. They bring their own food, as well as travel to the site using their own resources. There are instances when the LGU gives them budget for food during monitoring periods. With or without such food support, however, TK members take turns in doing the task.

Guiding mountaineers, trekkers, and nature lovers in climbing Mt. Banahaw is another source income for TK volunteers. They guide trekkers up to the peak of the mountain for PHP 500 (for a maximum of five climbers). For TK volunteers, guiding climbers is not just about touring the mountain; it is their way of advocating the protection of Mt. Banahaw.

The RF in Barangay Lalo is an instructive example of how a core group of local volunteers undertook cooperative efforts to protect Mt. Banahaw-San Cristobal. In this case, the strong watchdog function of volunteers in response to communal concerns of a protected area insulates the area from further degradation. A sense of civic pride and spiritual well-being is nurtured with the help of volunteers.

Challenges and opportunities

One of challenges faced by the volunteers involved the settlers living within the protected area. For instance, one claimant wanted to do tree planting all by himself. The concern had to be processed with DENR with the facilitation of TK. DENR executed an agreement with

the claimant to ensure the sustainability of rainforestation. Continuous dialogue with the facilitation of volunteers has been an effective way to achieve an amicable settlement.

Second, the implementation of the National Integrated Protected Areas System (NIPAS) Act of 1992, specifically in delineation, still confuses the local people. Unregulated accessing of forest resources is the result of the absence of a clear delineation of boundaries of protected areas and zones, which should have been provided for by the NIPAS Act.

Lessons learned toward sustainability

The recognition of volunteerism and the increasing public awareness on forest protection are the values the RF in Barangay Lalo has achieved. The acceptance of citizens' civic duty to cooperate is, likewise, an important lesson learned surfaced by the RF.

Implementing the RF has given TK volunteers renewed appreciation and understanding of nature protection. They fully recognize that their life revolved around the forest, as it gives them food, water, and shelter.

It is a fact that some local residents and TK volunteers had engaged in illegal activities, such as illegal hunting and using charcoal for commercial purpose. Some of them had deliberately cut off trees to make charcoal, and some had hunted and sold stray animals. It changed when the concept of RF was introduced to them, at a time when Mt. Banahaw was already denuded. Hunting and charcoal making were lessened, while the connection of the people with the mountain is strengthened.

The symbiotic relationship between the people and Mt. Banahaw works well where mutual protection is present. Since the RF has been implemented, people have been hearing good feedback and compliments. As they say, when the area was full of grass, they cannot put up a tent because of the heat. Now, they still cannot put up big tents for an entirely different reason—because there are so many trees. The growing trees now become their natural tent and shade.

The dominant view among community members now is that RF is for the next generations. They want the young people to be more aware

and be more involved in nature protection. In fact, RF has invited volunteers who would plant and give their respective contribution to environmental protection. Volunteerism is so strong in Barangay Lalo. Community members continue to work and mobilize their own resources to ensure program continuity, with the goal of increasing their membership by 100 percent.

Rainforestation and watershed rehabilitation

Rehabilitation after a disaster: The case of *Tulungan sa Kabuhayan sa Calawis*

Location	Barangay Calawis, City of Antipolo, Rizal Province
Population	5,882 (2007); 80% are upland farmers
Lead in RF	FPE and Fostering People's Empowerment, Education, and Enterprise (FPE3)
Local economy background	Small-scale mining and charcoal making were the primary livelihood activities, but they have now been reduced.
Partners	DENR, BLGU, Manila Waters, Nestle Philippines, Philippine Business for Social Progress (PBSP), Department of Trade and Industry (DTI), Philippine Disaster Recovery Foundation (PDRF), Philippine Ecumenical Action for Community Empowerment Foundation, Inc. (PEACE), Education for Life, and Rotary Club of San Lorenzo-Makati

Barangay Calawis in Antipolo City is part of the Upper Marikina River Basin Protected Landscape (UMRBPL). It gained much attention from the government and the private sector after the onslaught of Typhoon Ondoy in September 2009 wrecked havoc in downstream Metro Manila (Haribon Foundation 2012). Interventions focused on rehabilitating critical watersheds located at Boso-Boso and Tayabasan—two of the four sub-watersheds of UMRBPL.

The UMRBPL serves as one of Metro Manila's sources of water, which is used for primary production, domestic and industrial consumption, and transportation. In addition, watersheds are ecologically important because of their role in carbon sequestration and nutrient cycling.

They also provide timber, forage, fuel wood, agri-silvicultural crops, rattan, wildlife, and other minor forest/plant products. These areas also offer opportunities for recreational activities (FPE 2012).

As a response to the devastation brought by Typhoon Ondoy (International Name Ketsana), the Philippine Tropical Forest Conservation Foundation through a grant with the Fostering People's Education, Empowerment and Enterprise (FPE3), provided support to rehabilitate parts of the Upper Marikina Watershed Reserve. The project supported the establishment of Punlaang Bayan in Sitio San Joseph, Barangay San Jose and in Barangay Calawis, Antipolo City and are covered under Grant Agreement numbers 2009-32 and 2009-34 respectively. The project facilitated the conduct of training on Rainforestation and the establishment of nurseries (Punlaang Bayan). The nursery in San Joseph produced 16,000 seedlings and another 16,000 seedlings in Calawis for the 1st production cycle and similar quantities of seedlings in the 2nd cycle. The seedlings were sold to generate income for communities, as part of the rehabilitation and reforestation in the Marikina Watershed after the Ondoy flooding. The efforts on Punlaang Bayan led to more support on Rainforestation in Barangays of San Jose and Calawis, Antipolo City.

In 2010, FPE in collaboration with PEACE initiated a project invoking the Supreme Court's landmark Writ of *Kalikasan* as instrument for the protection and preservation of the Marikina Watershed Reservation. The project aimed to organize communities and form an ecological social movement to protect UMRBPL. Data showed that further degradation of the watershed may trigger another tragedy similar to Ondoy.

The devastating effects of Ondoy prodded the government and some NGOs to once again look into the state of UMRBPL. Among those that responded are Manila Waters, PDRF, PBSP, United Coconut Planters Bank Foundation, and Olympia Violago Water and Power, Inc., among others. DENR and the Metropolitan Waterworks and Sewerage System are the government agencies mandated to rehabilitate watershed reserves.

Consultations and rapid assessments were conducted; one of these is the "*Resource and Socioeconomic Assessment in the Boso-Boso and Tayabasan Sub-Watersheds in the Marikina Watershed Reservation,*"

conducted by Haribon Foundation in 2012 with funding support from the FPE.

Haribon Foundation (2012) recommended coming up with a management plan that is anchored on local governance and co-management arrangement with the communities. This entails the active participation of LGUs, communities, and indigenous peoples, and the coordination of different stakeholders as crucial elements in watershed management. Combined with information dissemination, community monitoring, and suitable term livelihood projects, interventions should address the economic needs of communities.

Beset with overlapping tenurial rights and ownership arrangements, the 26,125-ha UMRBPL has always been vulnerable to open access brought about by pressures from agricultural expansion, human settlements, textiles manufacturing, tourism, mining-related industries, construction, and road widening projects within and nearby the reserve. Government regulations (e.g., Proclamation No. 26, series of 2011) have not been consistently enforced, making it difficult to control further degradation of the area.

Thus, the idea of a public-private partnership surfaced during a board discussion to kick off the initiative. FPE, in collaboration with PDRF, was at the forefront of partnership.

Early beginnings

Initially, setting up RF sites for the Tulungan sa Kabuhayan sa Calawis (TSKC) was difficult because almost all of the watershed reserve, except the ones in the higher elevation areas, have claimants. The community volunteers who recommended sites for the RF had to negotiate with private claimants by forging agreements with them. It would have been easier to identify and implement RF in an area owned by a TSKC member. Even then, TSKC ensured that the landowners are committed to rehabilitate the area.

In September 2011, FPE facilitated a seven-day RF training. A total of 150 participants attended the training, with detailed discussions of the following RF steps:

- 🌿 Watershed resource inventory
- 🌿 Nursery establishment
- 🌿 Seed collection
- 🌿 Wildling collection
- 🌿 Growth chamber construction
- 🌿 Community monitoring and maintenance

A more detailed site assessment was done in an initial RF site of 500 ha. The distance and size of the site gave FPE ideas on the activities and the intensity of work required to implement the RF.

Immediately after the training, FPE started the RF with only 20 volunteer-guards (*tanod*) through a “food-for-work” arrangement. This ran until the first group was able to mobilize more volunteers in November 2012. The sensitizing effect of CSOs’ environmental awareness



Tulongan sa Kabuhayan sa Calawis, Antipolo (TSKC) Volunteers in setting up RF Nursery (FPE, UNDATED)

activities developed a commitment to protect the reserve, as participants fully understood the devastating effect of Ondoy not only on their community but on the entire Metro Manila as well.

Composed mostly of former barangay *lupon*, *tanods*, *kagawads*, and women’s association coming from the different sitios of Barangay Calawis, a total of 11 farmers’ associations were organized. TSKC is one of those. It started with more than 300 active members.

TSKC was initially organized as a livelihood group. Majority or 75 percent of its members were engaged in subsistence farming, 20 percent were small sari-sari store owners, and a few were hired laborers dependent on daily income.

Developing partnership

Private-public partnership mattered. The success of the RF project depended on the support coming from other interest groups through funds, livelihood opportunities, and initial capital for agroforestry. Without these complementary services, it would have been difficult to motivate local participation in the RF project, as economic benefits were not immediately felt by the people.

TABLE 4.1. Agencies supporting TSKC

Agency	Forms of support
PRDF	Livelihood and fund support
FPE and FPE3	Funding, capability building, and resource mobilization
PEACE	Capability and community building
PBSP	Agroforestry and livelihood
DENR	NGP contract and technical assistance
BLGU and LGU	Technical assistance and livelihood
Education for Life	Capability and community building

Despite collaborating with the government and CSOs on rehabilitating degraded areas, the introduction of analogue forest by SMART/PLDT somehow resulted in confusion among TSKC members because

they already started RF. Introduction of new forest restoration concept did not come easy to farmer-members, as they were already familiar with RF. Hence, TSKC decided to continue planting native tree species, at least in the 500 ha supported by FPE.

Earning while rehabilitating the watersheds

TSKC was able to forge a contract with FPE covering more than 500 ha of RF area; another 7 ha with Manila Waters in Barangays San Jose and Calawis; and an annual contract with DENR-NGP covering a total of 600 ha.

TSKC took upon itself the responsibility of assuming an umbrella contract with DENR-NGP because it is the only qualified PO among the 11 farmers' associations in Barangay Calawis that is registered in the Securities and Exchange Commission (SEC). Understandably, all post-Ondoy contracts forged by TSKC focused on climate mitigation and adaptation initiatives, providing alternative livelihood, food security, and reducing poverty.

As shown in Table 4.2, TSKC and the rest of the POs in Calawis were able to forge a contract with DENR-NGP, with a total contract price of PHP 9,024,993 in a span of four years. This covered a comprehensive site development that included plantation establishment, seedling production, and monitoring and maintenance.

TABLE 4.2. TSKC RF area coverage by year, location, contract price, and components

Year	Area cover (ha)	Location	Contract price (PHP)	Components
2013	115	Sitio Kinapuín, Brgy. Calawis	1,980,000.00	Comprehensive site development
2014	135	334,3 Sitio Lam-ao, Brgy. Calawis 02	1,134,000.00	Comprehensive site development
2015	200	Brgy. Puray, Rodriguez, Rizal	2,862,000.00	Comprehensive site development 1st year maintenance
2016	150	Sitio Kinabuan, Brgy. Sta. Ines, Tanay, Rizal	3,048,993.00	Establishment 2nd year maintenance

Contracts covering 2013–2014 already ended, while the 2015 contract is still completing its third-year maintenance. Currently, an amount of PHP 2,599,080 out of the total 2016 budget of PHP 3,048,993 has already been released to farmers' associations led by TSKC. A fund balance of PHP 449,913 intended for second-year maintenance has yet to be released this year.⁹

Income derived from selling planting material at PHP 10–15 per seedling was an additional cash source. NGP contract did not come easy, as its terms and condition have not been strictly followed by DENR. Nonetheless, TSKC believed that their NGP contract was a source of income for them.

Aside from this, they also earned a minimum of PHP 250 per day from guiding and assisting private companies (i.e., Nestle Philippines, Manila Waters) in organizing tree planting activities in the Boso-Boso watershed. They were able to mobilized 24 out of 35 active members in preparing sites for the said tree planting activities.

TSKC saved 15 percent of the total income earned from NGP contract for capital build-up; the rest of the income minus government tax was shared among members based on their performance. NGP rate for maintenance work was priced PHP 2,000 per hectare. Fund management was based on TSKC's written guidelines. For example, any member who will be absent from communal activities for three times will be warned verbally; those with four absences will be summoned in writing; and those with five absences will automatically be delisted from membership.¹⁰

In addition, the PBSP introduced agroforestry using fruit-bearing trees, such as pomelo, pili, rambutan, guyabano, and lanzones. This was supplemented by a training on product and enterprise development aimed at adding value to TSKC's readily available harvests.

9 Personal communication. 3 May 2017. Phone interview with Supervising Ecosystem Management Specialist Mario Lagtican and NGO/PENRO Rizal-Assistant NGP Project Coordinator Nestor Arriola Jr.

10 Personal communication. 3 May 2017. Interview with TSKC President Virginia Banaga.

A processing machine was donated by DTI to help improve product development of fruit jams and wine made out of local fruit. In adjacent lots nearby the RF site, root crops such as sweet potato, cassava, gabi, and banana were planted to augment their daily food needs. Excesses from their household consumption were sold in nearby markets.

Resource use and other ecological benefits

Small-scale logging and charcoal making are now reduced, as members of the community are fully aware of their degrading effects on watershed. TSKC observed that river tributaries are slowly showing some changes during raining season—from murky brown to clear water and cooler temperature compared to the adjacent areas of Boso-Boso, which have no forest cover. Some women-members also observed that there are fewer incidences of common cough, fever, and cold among their children, which they attribute to cleaner air.

Challenges met

Tenurial issues coupled with weak organizing and consolidation of members resulted in insufficient maintenance and monitoring of planted trees. Some other challenges include:

- 🌿 Security problem because TSKC needs to coordinate regularly with AFP whenever activities are to be done in the RF sites
- 🌿 Security problem due to conflicting land claims in the Boso-Boso sub-watershed
- 🌿 Claimants selling their area after being developed and planted with native trees
- 🌿 Declining number of members from 300 to less than 100 as of 2016.
- 🌿 Increasing mortality rate of seedlings produced and planted
- 🌿 Difficulty in controlling stray animals pasturing in the RF site with newly planted seedlings

Lessons learned and prospects for sustainability

“Isinapuso ang lahat na natutuhan sa RF training dahil sa pag-mamalasakit sa kalikasan.” A woman-leader emphasized the need to apply the knowledge and skills learned from RF training to protect the watershed and the environment as a whole. The camaraderie nurtured among members was strengthened through regular gathering during FPE-initiated activities.

TSKC indicated its desire for RF to be implemented in other areas of the watershed. For RF to be sustained, future capacity building should address:

- Backyard farming (vegetables, medicinal, and herbal plants)
- Product and enterprise development
- Local research on native tree species
- Follow-up training to improve nursery establishment (to determine if single is better than mixed species seedling production)

Rehabilitating riverbanks to protect Davao watersheds: The case of Mt. Tipolog Bantay Kinaiyahan

Location	Barangay Tanauan, City of Davao, Davao Province
Population	100 members from four cluster of sitios along the river
Lead in RF	Mt. Tipolog Bantay Kinaiyahan (MTBK)
Local economy background	Subsistence agroforestry is their source of seasonal income. Cash crops are mostly from cacao, durian, lanzones, rambutan, banana, and coconut.
Partners	Davao City Watershed Management Council, FPE, Interface Development Interventions, UCARE-SAID, Department of Agriculture-Comprehensive Agrarian Reform Program (DA-CARP), CENRO, DENR

Touted as one of the best community rainforestation farms in Davao City, MTBK members are proud to share their experience of riverbank rehabilitation using native species along the Panigan-Tamugan Rivers



Panigan-Tamugan rivers (IDIS)

of Baguio District in Davao City. The award was given by the University of Southeastern Philippines in 2016 “for having the most number of healthy native and fruit trees flourishing beside the river.” With more than 100 members living within and nearby Mt. Tipolog, MTBK, which was organized as a farmers’ association, divided themselves into four clusters to undertake riverbank rehabilitation.

TABLE 4.3. MTBK area clusters and total land area covered

PO cluster around Mt. Tipolog	Area covered
Cluster 1: Sitio Ubay	10 hectares
Cluster 2: Sitio Gading	10 hectares
Cluster 3: Sitio Panigan	25 hectares
Cluster 4: Sitio Sumpitan	10 hectares
Total	50+ hectares target

The clusters are far from each other. Tramline is the only way to transport people and agricultural products from farm gate to the barangay

proper. Because of this, only about 40–50 percent of the total members are active in RF implementation across clusters. Most of the active members are also barangay tanod, who are mobilized to maintain peace and order in their respective sitios.

The area covered by MTBK under a community-based forest management agreement (CBFMA), which allows access to forest products, is 626 ha inside Mt. Tipolog. Mt. Tipolog is the headwater of the Panigan-Tamugan Davao watersheds. Of the total area covered, 50 ha are targeted to be planted with dipterocarps, interspersed with fruit-bearing native trees. MTBK has received technical and organizational assistance from both government agencies and NGOs. The assistance mainly focused on capacitating members to secure forestland tenure, community organizing, IEC (information, education, communication) production, capacity building, and RF implementation. MTBK is also a DENR-NGP contractor in other watershed reforestation sites.

Majority of their members are dependent on subsistence agroforestry farming. Cash crops are mostly from cacao, durian, lanzones, rambutan, banana, and coconut. To increase members' income, the following agencies have collaborated to support MTBK.

TABLE 4.4. Agencies supporting MTBK

Agency	Type of support
Davao Watershed Management Council	Deputation of forest guards and provision of seedlings
DENR Regional Office	Provision of seedlings (fruit trees and cacao) and budget for native tree planting materials
UCARE/USAID	Monitoring implements (two-way radio, mobile phones, raincoat)
DA-CARP	Provision of seedlings (cacao, durian, mangosteen) and tree planting materials (malibago)
CENRO	Planting materials of both dipterocarps and fruit-bearing trees
Interface Development Interventions	Community organizing and capacity building
FPE/USAID's project	Funds and technical assistance

harvesting cacao. Increased income derived from fruit-bearing trees has become a motivating factor in their active participation in the reforestation project. They made it clear that they just could not survive by planting dipterocarps for watershed protection; they also have to earn by planting fruit-bearing trees.

During site assessment, farmers were consulted on the land allocation of their individual agroforestry farm lot to avoid boundary conflict. Cooperation is borne out of their common desire to improve their agroforestry farm lots and, thus, increase their income.

Members also have a sense of fulfillment because of the opportunities afforded to them, such as RF training, knowledge and skills in identifying mother trees, wildling/seedling collection, growth chamber construction, seedling production, and establishment of RF farm along riverbanks.

Due to the steep-slope feature of Mt. Tipolog, the local people were taught to plant seedlings starting from the riverbanks to higher elevation, with specific distances meant for the intercrop with fruit-bearing trees. They also learned techniques on mitigating soil erosion. Cross-visits to similar projects in other sites, attendance to trainings and conferences sponsored by the city LGU and NGOs, and acting as farmer-trainer were cited as their achievements from being RF adopters.

Challenges and lessons learned

One of the challenges faced by MTBK members is having unsustainable allowance for the maintenance of the RF. Some members are not motivated to render maintenance work when they are not paid. It affected the growth of some planted trees, as clearing and brushing have stopped particularly in far-flung areas. Also, the collection of seedlings and wildlings is considered difficult because it requires a day (or more) of foot trail walk to reach mother trees.

MTBK officials observed that organizational leadership matters. Motivating its members to participate is, hence, a function of good leadership. MTBK members expressed that some of their cluster leaders would not consult their members on matters involving partnerships and project contracting.

To strengthen MTBK, they need to conduct organizational audits, regular assemblies, and capacity-building activities. Some of the members have expressed that developing young leaders, strict enforcement of policies, and instilling proper values through education and training are important to sustain their organization.

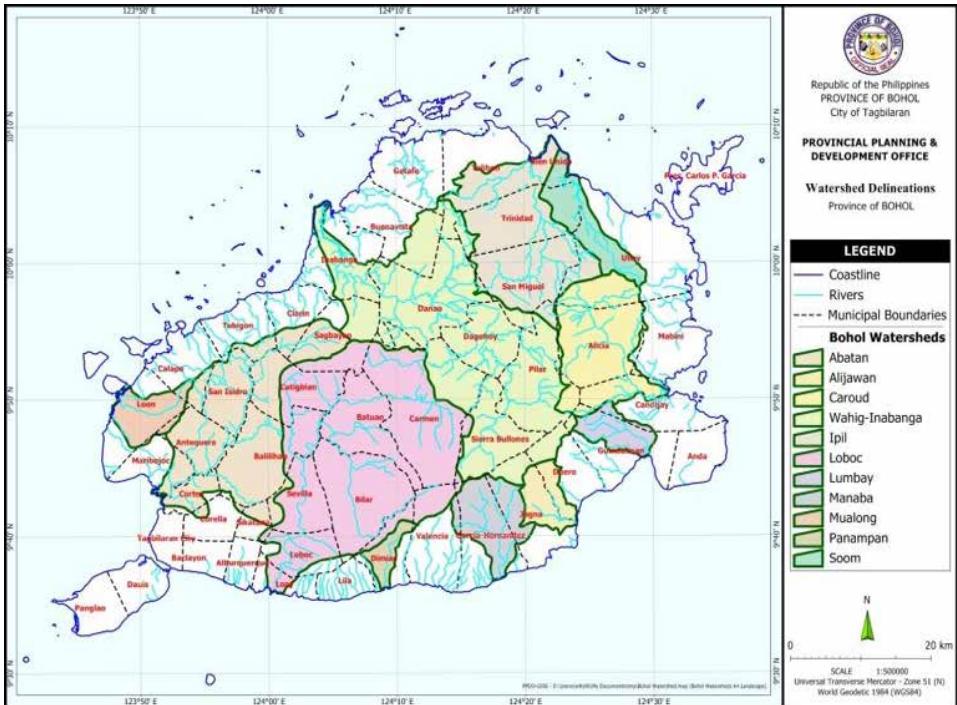


FIGURE 4.3. Watersheds Delineation Map, Bohol PPDO.

Opportunities for sustainability

There is no doubt that MTBK has become an active partner of the City Watershed Management Council in protecting the headwater of the Panigan-Tamogan watershed. They were able to minimize illegal activities, as people have seen them planting native trees and monitoring their growth. Some observed changes include: cleaner and increased water volume in the river, cooler local climate as compared to nearby

Calinan district, and sightings of wildlife (warty pigs, hornbills, and wild doves, among others).

MTBK cluster leaders have likewise expressed their desire to expand RF sites in the CBFM area in partnership with the Watershed Management Council, NGOs, the private sector, and—possibly—DENR, provided there is a clear partnership agreement. Immediate incentives commensurate to their work rendered are wanting.

Creating “pocket forests” for Bohol watersheds

Water provision through a well-managed watershed system is an important ecological service of forests. Small islands in the archipelagic setting of the Philippines now commonly need pocket forests as a way to undertake forest restoration, with Bohol as a model through RF.

Location	Province of Bohol with 101,271 ha forestland
Lead in RF	Soil and Water Conservation Foundation, Inc. (SWCF)
Local economy background	Agriculture and ecotourism are the main sources of income in the province, with local people engaged in assisted natural regeneration (ANR)
Partners	Provincial Local Government Unit (PLGU), Bohol Environment Management Office (BEMO), Watershed Management Councils, Bohol Island State University, local communities

For a small island like Bohol, the targeted forest cover should have been 40 percent to maintain its ecological integrity, according to the PLGU. As mandated by the Bohol Environmental Code 2016-008, the city and municipal LGUs must maintain a forest cover that is 40 percent of the total land area of each city or municipality, contingent on the review of their respective CLUPs. Considering the state of watersheds in Bohol, the CLUP indicates that the upland ecosystem (forest lands) to be maintained may not be necessarily contiguous (PLGU Ordinance No. 2016-008, Sec. 8 a1-a5).

With a total land area of 411,726 ha, Bohol has 101,271 ha of classified forestland with only 19,410 ha established as forest reserves (PSA 2016).

The classified forestland does not translate into public forestland, but is now under multiple uses: agricultural land, eco-cultural tourism areas, and portions alienable and disposable (A&D) areas. It is in this land tenure regime that the PLGU is bent on implementing sustainable forest resource management legislation.

The rallying point is water. With the increasing demand in water due to the growing ecotourism industry, water source becomes everyone's business in Bohol. The PLGU may have learned its lessons from neighboring Cebu City, hence, its desire to institute water sector reform. Eleven watershed management councils were created corresponding to the total number of watersheds in the island.

Water conservation awareness in Bohol was nurtured in the early 1980s, when several NGOs and POs were actively involved in biodiversity conservation work in the province. One of these NGOs is SWCF, which started implementing natural resource management project in Bohol in the early 1980s.

Years later, SWCF ventured in agroforestry-related livelihood activities, established and managed community water systems, and assisted



Nemrod Dolotina (Soil & Water Conservation Foundation staff) showing seedling of dipterocarp produced in the domestication facility in Bilar, Bohol. (PHOTO CREDIT: SWCF)



Bohol Assisted Natural Regeneration (PHOTO CREDIT: SWCF)

natural regeneration (ANR). It conducted biophysical assessments and geological and water inventories, as well as established communal forest parks using native species. Watershed protection has always been SWCF's priority not only in Bohol but also in Cebu and Negros Oriental and Occidental.

In 2009, SWCF identified 16 species of dipterocarps found in the lowland forest of Bohol. This initiative paved the way for the creation of the Dipterocarp Domestication Facility, in collaboration with the Forest Foundation Philippines, DENR, and the Central Visayas State College of Agriculture, Forestry, and Technology. The Foundation aimed to bring back native species through ANR. When SWCF's ANR project was formally closed in 2010, the planted dipterocarps were turned over to the BEMO.

Considering that the areas available for rehabilitation are limited, BEMO developed a "pocket forest" strategy, whereby farmer-cooperators are encouraged to go into ANR by planting native tree species in smaller areas until pockets of forests are connected. BEMO learned from earlier reforestation projects that mahogany forest and the "plant-and-forget" mentality will not help restore and protect the watersheds and biodiversity of the area. According to BEMO, depending on

management objectives, RF can be used to bring back valuable native trees, while ANR can be adopted as a restoration strategy. A combination of the two would be better.

The enhanced ANR has been introduced in the 11 watersheds. To date, 4 out of the 11 watersheds have active watershed management councils created by PLGU-BEMO, with strong multi-sectoral participation from local water district utilities, the Bohol Island State University, CSOs, and local communities. It is their aspirations that the “pocket forests” they initiated will achieve their target of restoring forest cover by at least 40 percent.

Rainforestation in ancestral domains

IP-managed rainforestation for CADC protection: The Mat-i, Man-ibay, Civoleg, and Langguyod IP communities

Location	Misamis Oriental
Population	Four Higaonon indigenous peoples (IP) groups under the Certificate of Ancestral Domain Claim (CADC) are in the RF.
Lead in RF	Mat-i, Man-ibay, Civoleg, and Langguyod IP communities (MAMACILA)
Local economy background	Livelihood sources include root crops, fruit-bearing trees, citronella, as well as RF and NGP, including the selling of tree saplings
Partners	Anthro Watch and FPE

MAMACILA is an organization of Higaonon from four different IP areas of Misamis Oriental with a CADC of about 17,000 ha. Higaonons, who are described as the “people of the living mountains,” derived their name from *higa* (to live or reside), *goan* (mountain), and *onon* (people). For them, the forest is sacred. They protect and manage the forest based on indigenous knowledge system and practices (IKSP). Their lives are linked to forest because it is where they get their food, medicine, and water—everything they need to survive. The forest is also

their place of ritual. Higaonons observe changes in forest on a daily basis. This is why they have intimate knowledge about the resource.

MAMACILA was organized in 2002 and registered at SEC in 2005. It has a total of 20 ha of RF sites divided into four small areas that are distributed across their ancestral domains. The Council of Elders decided that each ancestral domain area should have 5 ha of RF. Having an intimate knowledge of the forest, MAMACILA knew where and when to collect quality seedlings from mother trees. Common among trees planted are Dipterocarpaceae species, such as white and red lauan, and other native trees locally known as *sagimsiman*, *bitaog*, *gatasan*, and *ulayan*. Moreover, it has an organized *Bantay Lasang* group whose role includes patrolling their ancestral domain.

To augment their income, MAMACILA members ventured in an agroforestry project with native tree species interspersed with fruit-bearing trees, root crops, and citronella (a plant known for its essential oil). Citronella provides alternative source of income for the local community once processed or sold as raw material. The young trees that they planted have an average height of more than six feet.



IPs collecting wildlings. (PHOTO BY MAMACILA)

Based on the performance of each member, an increase of income from seedling production is being noted. With the assistance of Anthro Watch, FPE, and the Forest Foundation Philippines, they are now capacitated to deal with NGP contracting. They cited positive experiences on NGP contracting because of the additional income they earned. However, there were also reports of negative experiences, specifically on DENR's delayed fund releases.

For every contract forged, they have to allocate 10 percent of the total price to the association, under a common fund. As an IP group, communal work is easy to organize, as members are used to *Pintakasi*—a voluntary work when a household or the community requires such a response from community members.

Anecdotal data indicate birds and mammals are repopulating the MAMACILA RF areas. Sightings of Philippine warty pig, woodpecker, hornbill, and other bird species—which they have not seen for a long time—are now more often. There are also indications that during long drought, rivers and creeks within the RF areas are not drying up compared to adjacent areas where creeks had dried up and the quantity of water in the river had been significantly reduced.

In addition, some of MAMACILA members have undergone training in biodiversity monitoring system and are now equipped with knowledge and skills on how to monitor changes in forest cover, as well as document trends and patterns in timber and non-timber resource use, sightings of birds and mammals, and species distribution. They also function as Bantay Lasang to do regular patrolling in the forest. They claim that their local knowledge has widened because of the training and seminars they attended.

Challenges and lessons learned

IPs consider the forest as a source of their cultural identity. Because their culture and survival traditionally depend on the natural environment, their link to the forest is highly intimate, and they know when changes are happening.

Among IPs, forest protection is based on IKSP. Even before the reforestation projects, IPs had long been practicing sustainable harvesting. It was at the height of big logging concessions when IPs were practically



MAMACILA CADC Area (SOURCE: M. MARASIGAN/FPE)



MAMACILA Nursery (MAMACILA)

driven out from their ancestral domains and settled in residual areas to eke out a living. It is unfortunate that their plight is being exploited by profit-seeking investors, leaving them in abject poverty. A tribal leader shared that he is embarrassed and angry every time IPs are blamed for the illegal cutting of trees that caused forest degradation.

Most of the fragmented close canopy forests are now found in ancestral domain areas. One tribal leader asked what the government could do, in return, to pay back their effort of protecting the forest. They are fully aware that everyone benefits from a healthy forest, but their work and commitment in making this possible are not recognized.

Opportunities for sustainability

MAMACILA looks forward to another 100 ha of RF expansion in an area with a cogonal vegetative cover. Based on the tentative plan, the following have to be undertaken:

- 🍃 Conduct a study on species matching suited for cogonal areas, available mother trees, and seedlings found in the nearby protected area
- 🍃 Assess the terrain where planned expansion site will be located
- 🍃 Appraise the patches of fragmented forest and come up with a restoration strategy on how to link patches of forest through a technical map
- 🍃 Collaborate with the LGU in crafting a FLUP covering the expansion area
- 🍃 Draft a project proposal indicating MAMACILA's role in forest restoration

The Ganatan case: PO-lead rainforestation project in Arakan, Cotabato

This rainforestation farm is located in Barangay Ganatan in the Municipality of Arakan, Cotabato. The barangay is a known habitat of the endangered Philippine eagle. The decline in the number of eagles in the area has pushed not only the community but also experts and foreigners to protect the forest area. Saving the second largest raptor in

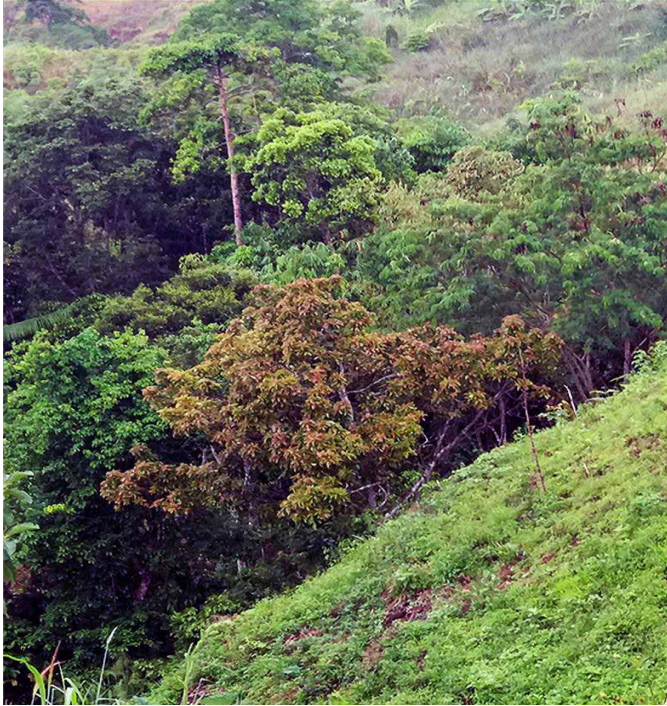
the world is the main motivation to prevent—if not totally stop—illegal logging and the conversion of forests to agricultural land.

Location	Barangay Ganatan, Municipality of Arakan, Cotabato (with 2,000 ha under CADC)
Population	Manobo
Lead in RF	Kaindang Farmers Association, Inc. (KFA) and Panguandig Lumadhong Panaguandig, Inc. (PALUPA)
Local economy background	Agroforestry and sustainable agriculture are the primary sources of livelihood; poaching is being controlled
Partners	Philippine Eagle Foundation (PEF) as RF initiator, with FPE support and coordination with LGU

The alarming biodiversity threat and the disenfranchisement of IPs are serious concerns. To address forest denudation, the creation of patches of forest is used as a strategy. For instance, there were already forest islands created in Mt. Apo, Mt. Sinaka, and Mt. Kitanglad. At present, forest remnants are in Mt. Mahuson, Mt. Apo, Mt. Sinaka, and in the Kabalantian-Binoogan-Kulaman Valley in Arakan Valley in North Cotabato.

In line with this, PEF—in collaboration with FPE and the LGU—organized two IP organizations from the Manobo ethnic group. This collaboration ensures a community-based approach in biodiversity conservation without compromising the idea and practice of community self-reliance, which is stipulated in the Ancestral Domain Management Plans. Further, PEF initiated the “forest corridor concept” that refers to patches or manmade forest that would connect forest strips. This is also called a stepping stone approach where species are influenced to move to the core areas and support ecosystem functions. The strategy is expected to create high-value areas that will restore ecological functions and the wildlife.

The said IP organizations—KFA and PALUPA—are both based in Barangay Ganatan. They were organized in 2001 and 2002, respectively. They have almost 2,000 ha of land under CADC. They work together to safeguard their remaining tribal territory.



View of Mt. Sinaka (PHOTO BY ESTER BATANGAN)



FGD with PALUPA members (Philippine Eagle Foundation)

KFA and PALUPA are also managing a 2-ha agroforestry farm lot. They have their own farm tools, livestock, and a demo farm. They also have their own finance management scheme. PALUPA, in particular, observes check and balance in the utilization of resources. Although limited in terms of organizational management, networking, and leadership, KFA and PALUPA are cooperating with each other not only in protecting their CACD but also in steering the overall direction of their organizations.

Implementing resource management initiatives

Affirmation of the rights of IPs in accordance with the Indigenous Peoples' Rights Act of 1997 (IPRA) was observed in ancestral domain delineation and toward achieving a Certificate of Ancestral Domain Title (CADT). The processes included the following:

- 🌿 The resource management started with an ancestral domain conference for all members of the IP group. This facilitated the leveling off of management initiatives for forest conservation and protection vis-à-vis their delineation for the ancestral domain.
- 🌿 An IEC campaign on IPRA and CADT was necessary to ensure that legal processes and organizing are observed.
- 🌿 Census on the claimants/residents was a vital component to prevent dispute and disagreements. Landmarks and other important documentation were considered.
- 🌿 Genealogy was revalidated and finalized. This protects the IPs in their ancestral domain areas, as well as the scope of their forest management area. An initial construction of a CADT claim book was done.
- 🌿 Boundary conflict resolution was done for claimants.
- 🌿 Collaboration between IP organizations and the National Commission on Indigenous Peoples (NCIP) was strengthened.
- 🌿 Passage of resolution on unified CADT and boundary conflict within the territory was resolved.

Having undertaken these steps, the link to rainforestation followed:

- 🌿 Agroforestry and sustainable agriculture in Kiapat and Panguandig were maintained and replanted.
- 🌿 A nursery in Panguandig was set up, and a regular *Bantay Gubat* that will prevent poaching was established.

The strengthening of the resource management scheme for the Forest Corridor Project, meanwhile, included the following with the guidance of PEF and FPE:

- 🌿 *Community organizing and institutional building.* This is a continued capacity building for technical, financial, management, and marketing aspects of IP organizations. Local organizers are being developed toward continued constituency building.
- 🌿 *Resource management.* Biodiversity monitoring and evaluation and continuous CADT processing are done with community resource planning.
- 🌿 *Livelihood.* This involves economic planning and cooperative development.
- 🌿 *Advocacy.* The development plan is being integrated in the Barangay Development Plan, which entails consultations, policy research, and policy planning.

Challenges and opportunities

- 🌿 The IP organizations still have some issues and concerns, which is natural in any organizational process. They have the tendencies to be over dependent to partner NGO. They are also reluctant to coordinate with other agencies in the enhancement of CADC conversion. This may hamper their conservation initiatives to have wider networking and linking opportunities.
- 🌿 NCIP delays on the conduct of activities have always been challenging for CADT. As a result, IEC campaigns and surveys—as preliminary steps in forest conservation—are likewise delayed.

- There is no cooperation in the maintenance of AF and SA demo farms. This may cause lack of synchronization in the stepping stone approach for forest management.
- Low market of castor beans affects the interest of IP organizations; they are not interested anymore to plant.

Lessons learned toward sustainability

- The internal and external resource generation has to be intensified to ensure the continuity of support in the implementation of forest management.
- A simple planning, monitoring, implementation, and evaluation that is consistent with IKSP and covering the forest corridor has yet to be considered, so that a more strategic forest management can be done.
- For supplemental livelihood through forest management, a skills training in microenterprise development and management should be done among IP organizations to prepare them in reaching possible markets in the future.
- There is a need to further strengthen the coordination and partnership with academic institutions, church-based groups, corporations, and other foundations that can support continuous forest restoration. A multistakeholder analysis and forum is vital to provide support to forest conservation.

Rainforestation and conservation trade-offs

This case is about a conservation trade-off model developed by FPE. It is a unique and innovative conservation approach in which the community is engaged to secure and enhance the remaining forests in exchange for solar energy home systems and livelihood enterprise.

Location	Cauayan Forest and Watershed Reserve, Municipality of Cauayan, Negros Occidental
Population	2,194 in 443 households; 90% are upland farmers
Lead in RF	FPE and LGU

Local economy background	Illegal cutting and timber poaching were the primary sources of livelihood, but they have been under control and were replaced with RF tasks and crops
Partners	FPE, LGU, Ecological and Agricultural Development Foundation (EADF), Camalanda-an Agro-Forest Association (CAFA), Globe Telecommunications Foundation, Bantay Lasang Volunteers, DENR-CENRO, PEMO

The project is located in the Cauayan Forest and Watershed Reserve. With a total land area of 6,000 ha and with existing forest patches, the said watershed reserve is the habitat of several native and premium—but critically—endangered tree species. Existing trees include: red lauan (*Shorea negrosensis*), white lauan (*Shorea contorta*), red nato (*Palaquium luzoniense*), bagtikan (*Parashorea malaanonan*), tanguile (*Shorea polysperma*), light red meranti (*Shorea almon*), and almaciga (*Agathis philippinensis*).

The remaining forest is abode to several known endemic but critically endangered animal species like the Philippine spotted deer (*Cervus alfredi*), Visayan warty pig (*Sus cebifrons*), Tarictic hornbill (*Penelopides panini*), Walden’s hornbill (*Aceros waldeni*), Flame-templed babbler (*Stachyris speciosa*), white-winged cuckoo shrike (*Edolisoma ostentum*), spotted wood-kingfisher (*Actenoides lindsayi*), blue-naped parrot (*Tanygnathus lucionensis*), Philippine hawk eagle (*Spizaetus philippensis*), and Philippine cockatoo (*Cacatua haematuropygia*).

Like other critical watersheds in the country, the biodiversity resources in the area are in the hotspot list. This is because the area experiences continuous pressure from unsustainable farming, timber poaching, illegal logging, wildlife hunting and gathering, charcoal production, small-scale mining, and other pressures.

In 2012, FPE, in partnership with EADF and in coordination with the LGU, piloted a conservation trade-off project in Barangay Camalanda-an. The project aimed to enhance the capacity of CAFA in the implementation of natural resource conservation and protection to secure and enhance the remaining forests and biodiversity in the area.

Conservation trade-off scheme

After the conservation trade-off agreement was forged, support for the installation of at least 27 solar home systems was provided by FPE to the Bantay Lasang Volunteers (Forest Wardens) of CAFA. The beneficiaries were then trained on the proper operation and maintenance of the installed units. EADF provided technical support, specifically on livelihood enterprise development, to the community. Buy-back mechanisms were also established to ensure the market of local commodities and lemon grass oil. However, the community has the option to sell their products to other buyers offering a higher price. In addition, Globe Telecommunications through its foundation provided cellular mobile phone units to Bantay Lasang Volunteers to augment the communication system in place during their regular and emergency foot patrols.

As a trade-off, the community had to develop 1.5 ha of rainforestation farm in exchange for every solar home unit installed, ensure the use of native trees in reforestation efforts, adopt organic farming systems, gradually reduce the charcoal production practices, and protect the seven forest patches.

Forest enhancement using the RF strategy

Prior to rainforest farm development and forest enrichment activities, the community conducted site identification, assessment, and planning. As a result, RF sites and forest enrichment areas are strategically located to form a buffer zone and create a corridor effect to the remaining seven forest patches in the area.

At least 23,560 of native and fruit-bearing tree species were locally raised at the community nursery. The native tree seedlings were collected during foot patrols in nearby forests.

Using the intercropping method of RF systems, the farmers were able to enhance their cropping area using coffee, native berries, and other fruit trees and cash crops mixed with native trees. The native tree species were also used in forest enrichment activities to expand forest patches. With this, a total of 50.20 ha of RF and forest enrichment areas were established, which is 18 ha more than the agreed target.

The community members also planted lemon grass (*Cymbopogon citratus*) and citronella grass (*Cymbopogon winterianus* Jowitt.) in their farms. They were likewise capacitated to locally process the grasses by extracting essential oil. The produced oil has a market value—at farm gate with a premium price—of PHP 1,500 per liter, and PHP 250 per container of hydrosol or organic distillate. The continuous operation of the lemon and citronella grass oil extraction has provided community members with additional and sustainable source of income, aside from crops harvested for consumption and/or marketing.

Forest protection and awareness

As part of the agreement, CAFA committed to protect the remaining seven forest patches. The Bantay Lasang Volunteers regularly conduct foot patrols to maintain their presence in the forest and to keep track of any violations, especially in forest areas with excellent tree stands. Emergency foot patrols are also facilitated to check and verify on the spot the reported sightings of forest violators. Currently, there are 57 Bantay Lasang members, who are voluntarily working to enforce forest laws and implement resource management activities in the forest reserve.

With the active participation of the community and its collaboration with DENR to pursue forest conservation and protection, apprehensions made by Bantay Lasang Volunteers had resulted in at least two cases of illegal cutting and timber poaching. These were endorsed to DENR for legal action.

With the active support of DENR-CENRO Kabankalan and PEMO, the conduct of conservation awareness activities is regularly done during community assembly meetings (*pulong-pulong*). The strict implementation of environmental protections laws within the watershed area has gained favorable results. Signages were put up in strategic places in the watershed area to augment and sustain the dissemination of relevant information to the residents and other visitors of the area.

Rainforestation in a privately owned tree farm

The case of the Liptong Woodland

A source of pride in Bacong, Negros Oriental, the Liptong Woodland story is an excellent model of how private forest and agroforest lands can become RF sites needed in watershed protection. Private citizens are successful RF practitioners, too.

Rene Vendiola, fondly called by friends as *Tatay Eti*, is the owner of Liptong Woodland. He was a former field technician in the Biology Department of Silliman University. Prior to joining Silliman University, he was a hunter and a slash-and-burn farmer. A symbol of hard work, *Tatay Eti* once said: “Tough times never last, but tough guys do.”

Location	Barangay Liptong, Municipality of Bacong, Negros Oriental
Population	36,527 (2015)
Lead in RF	Rene Vendiola for watershed rehabilitation in Barangay Liptong
Local economy background	Small-scale farms are expanded through <i>kaining</i> . Other residents engage in poaching. RF practitioners showed favorable results, putting an end to <i>kaingin</i> , poaching, and planting of exotic trees.
Partners	LGU, the academe, the private sector, Friends of Environment in Negros Oriental (FENOR)

In 2004, *Tatay Eti* attended an RF training at VSU. With the knowledge and skills acquired, he started scouring patches of forest in Negros to search for native trees. In 2005, he was able to collect 18 different species including hairy-leaf *apitong*, *yakal*, *lawaan*, *narra*, and *guisok*. Being a field technician, he used his local knowledge in observing the changes in both flora and fauna in his tree farm. He experimented on many things, including innovating techniques to produce quality seedlings.

Tatay Eti converted the 6-ha family farm lot into a tree farm, where he planted native tree species, intercropped with root crops, fruit-bearing trees, vegetables, and ornamental plants. Between 2005 and 2012,

when he was just starting his tree farm, he was criticized by his neighbors for making his farm lot “unproductive” and “idle” because they thought that by planting native tree species, he would not generate immediate income. He was unfazed by their criticisms because he was determined to recreate a mini-forest, planted with native trees that could be seen and touched by his children and grandchildren. For Tatay Eti, this could not be bought by money and is a priceless legacy.

Eight years later, Tatay Eti was already imparting knowledge on Philippine native trees to Negros-based mountaineers and environmentalists. Through a trail walk, he teaches the important functions and regulating services of forests. He shares the common and scientific name of each tree, and the practical and medicinal values of the plants in Liptong Woodland. For example, *lawaan* has thick leaves that catch rain and whose tips turn fat raindrops into needles. A carpet of fallen *lawaan* leaves also help trap rainfall. *Takip-asin* similarly acts as an umbrella with its flat round leaves. *Almaciga*, a prehistoric tree, has resin that is used by locals to make incense and to ignite fire. Indeed, Tatay Eti is a skilled para-taxonomist with local, common, and scientific names of native trees at his disposal.

Tatay Eti is now helping the municipal LGU of Bacong to rehabilitate their watersheds by planting native trees within the 20-meter easement from the upland riverbank to the downstream river. This initiative has generated support from the academe and the private sector, as well as from FENOR—a local NGO advocating environment-friendly local policies and program in the City Development Council.

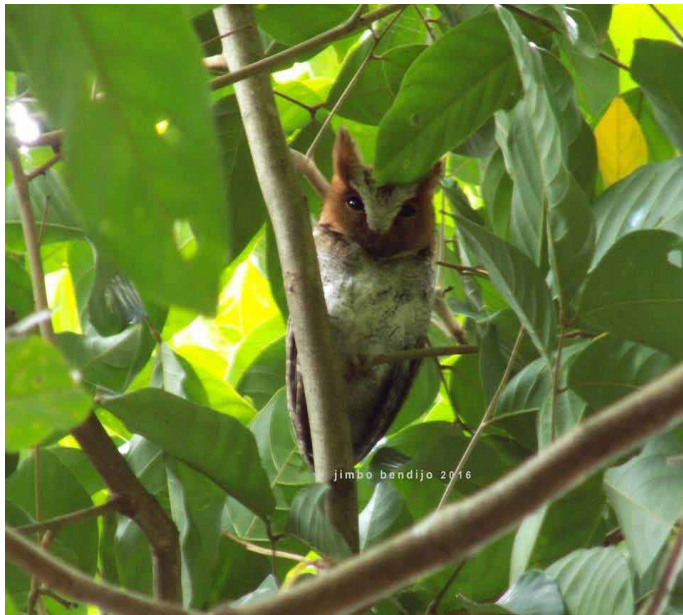
Outcomes of Liptong Woodland RF

The success of Liptong Woodland is now duplicated in other areas. Tatay Eti’s services are sought by LGUs and the private sector. At present, he is extending help to two RF sites managed by the municipal LGU of Bacong. These are the watershed rehabilitation projects in Barangay Lawigan and Barangay Mapaz, which cover more than 100 ha. He also influenced a number of individuals and groups in Negros Island who are interested in converting private landholdings—or even foreclosed properties—to native tree plantation. More than 20 of them have now established RF of varying area coverage, from 0.5 to 50 ha.

Private companies and individuals interested in tree planting activities are buying planting materials from Liptong Woodland. In return, Tatay Eti could train them for free. Recently, SMART purchased 5,000 planting materials for the minimum cost of PHP 10 for each material.

A 2016 initial assessment of the area (Bande 2016) revealed the following the outcomes:

- 🍃 The owner's capital investment was recovered after seven years of RF implementation.
- 🍃 On-farm income—mainly from fruit trees—started increasing at the 5th year up to the 11th year.
- 🍃 The appreciation and utilization of endemic and critically endangered birds that repopulated in the restored forest opened opportunities for a bird-enthusiasts attraction, which became another source of income.
- 🍃 The Liptong Woodland received of several awards, including the Ramon Aboitiz Foundation, Inc. (RAFI) Triennial Awards.



Negros scops owl

Challenges and lessons learned

The experience of Tatay Eti showed that he can only plant trees that he could take care of, specifically during the first three years. In fact, 10 seedlings a day are enough if these are planted properly. In an impassioned talk, he opposed reforestation projects with high contract cost and those that use mechanized seedling production.

With an additional 10 ha of watershed areas in Barangay Lawigan, which will be planted with native tree species, Tatay Eti's advice is to do it slowly because the trees will die if their group would not be able to take care of them properly.

Evicting families occupying the 20-meter easement declared as A&D areas is also considered a challenge. Due to the increasing number of settlers from Dumaguete City who are relocating to Bacong, farm owners are opening *kaingin* near water source. This triggered the LGU to conduct a dialogue and to negotiate a "no take zone" within the easement areas. The LGU has been successful in persuading farm owners, but it would require additional budget for community policing and onsite monitoring. Existing tenure instrument has to be reviewed to ensure proper watershed management.

Opportunities for sustainability

Liptong Woodland is now a nature-based ecotourism site in the province. Foreign and local bird watching enthusiasts regularly visit Liptong Woodland, as it became a newly found nesting site of the Negros scops owl (*Otus nigrorum*)—an owl endemic in the Negros Island. There is no entrance fee, but as soon as bird watchers could take a photograph of the owl in the wild, an amount of PHP 1,000 is paid to Liptong Woodland. Most bird watchers prefer the May–December period.

Local schools and universities are regularly sending their students to Liptong Woodland as their learning area for environmental education. Onsite exposure motivates students to actively participate in LGU-initiated tree planting activities in watershed rehabilitation areas. Also, some groups of college students help mobilize funds for similar tree planting activities in other areas.

It has become a tradition of Liptong Woodland to celebrate yearly anniversary every 2nd week of June. In 2017, Liptong Woodland celebrated its 11th anniversary. This yearly event becomes a venue for continuing education, updating, and planning of common environmental-related activities in the province. Volunteerism in community service is a value nurtured by Liptong Woodland's regular fellowship.

Tatay Eti is a game changer. He has received many awards because of his exemplary performance. He was recognized as an Exemplary Individual in Visayas and Mindanao by RAFI. The RAFI Triennial Awards was given with a cash prize, which he used to buy a multi-cab for his mobility needs.





In the Company of Conservation Advocates

From its academe-based beginnings in Leyte, rainforestation farming (RF) initiatives spread to the rest of Visayas and beyond. More and more conservation nongovernmental organizations (NGOs), civil society organizations (CSOs), and academic and research institutions are coming for training and exchange visits to RF sites nearby the campus. Likewise, more and more existing RF projects are being supported by environmental NGOs, development networks, and academic institutions. While many of these projects are small in scale and directly managed by local communities, there are now a number of local government units (LGUs) integrating RF into their forestland use and program plans.

The Forest Foundation also supported 24 State Colleges and Universities that offer Forestry course through the Philippine Forestry Education Network (PFEN). From 2011 to 2015, a nursery of native forest trees and a 1-hectare Rainforestation area were established in these PFEN-member SUCs namely 1) Mariano Marcos State University, 2) Don Mariano Marcos Memorial State University, 3) Isabela State University, 4) Nueva Vizcaya State University, 5) Benguet State University, 6) . Kalinga - Apayao State College, 7) Apayao State College, 8) . Ifugao State University, 9) Ramon Magsaysay Technological University, 10) Pampanga Agricultural College, 11) UP Los Banos, 12) Southern Luzon State University, 13) Western Philippines University, 14) Bicol University, 15) Cebu Technological University, 16) Bohol Island

State University, 17) Central Philippines State University, 18) Negros Oriental State University, 19) West Visayas State University, 20) University of Eastern Philippines, 21) Central Mindanao University, 22) Mindanao State University, 23) Western Mindanao State University, and 24) Caraga State University. The Visayas State University was engaged to provide training and technical assistance on Reforestation. The established nurseries and Reforestation areas serve as areas for learning of the faculty and students, and were correspondingly integrated in appropriate courses (e.g. silviculture).

Local collaborators



Baybay Rainforestation Foundation, Inc. (BRFI)

Organized in 1999, BRFI was the first organization that supported and promoted RF. It was established to design, promote, facilitate, implement, and evaluate reforestation as a strategy to rehabilitate, conserve, and protect the Philippine ecosystem. Since its creation, the organization has coordinate with the private sector, NGOs, CSOs, POs, and the government to develop projects and programs designed to uplift the socio-ecological condition of local communities. BRFI was the first recipient of the grants provided by EuroNatur and NatureLife-International.



Haribon Foundation

Of the leading collaborators within the Philippines, Haribon Foundation took the initiative of promoting RF among environmental NGOs. In 2005, it launched a campaign titled Rainforest Organizations and Advocates to 2020—known popularly as ROAD to 2020. With a track record spanning 45 years, Haribon Foundation is the first and oldest biodiversity conservation CSO in the country. Its campaign platform aims to mobilize an environmental conservation movement to restore 1 million ha of Philippine rainforests using native tree species. The call is to plant native tree species in order to recover and conserve biodiversity, optimize supply of forest benefits and ecosystem services, reduce the risks of natural hazards such as landslides, and enhance options for sustainable livelihood.

Today, Haribon develops the livelihood component of the program as a key element to successful RF implementation. Developing livelihood opportunities derived from RF implementation depends on site-specific assessment. Income streams, meanwhile, are derived from protection forests based on the said assessment. A study on the economics of subsistent living has to be conducted in areas where indigenous peoples (IPs) and poor communities are directly engaged in RF. These communities should be assisted in developing entrepreneurship and value chain analysis and ensure that such products would be linked to fair trade markets.

TABLE 5.1. Total RF sites supported by Haribon Foundation (2006-2016)

Island region	Province	Location	Area (ha)	Year
Luzon	Pangasinan	Bolinao	74.00	2007
Luzon	Pangasinan	Mangatarem	23.62	2007-2009
Luzon	Zambales	Masinloc	7.00	2007
Luzon	Zambales	Subic	0.28	2009
Luzon	Zambales	Palauig	2.30	2011-2012
Luzon	Bulacan	Norzagaray	2.11	2009
Luzon	Batangas	Nasugbo	1.00	2007
Luzon	Cavite	Maragondon	2.00	2007
Luzon	Laguna	Multiple sites	99.13	2006-2016
Luzon	Quezon	Gen. Nakar, Infanta, Real	77.68	2006, 2012, 2013
Luzon	Rizal	Tanay, Baras	45.65	2009-2012
Luzon	Mindoro	Sablayan	63.02	2009
Visayas	Antique	Pandan	5.00	2007
Visayas	Iloilo	Sta. Barbara	0.70	2009

Visayas	Cebu	—	1.30	2009
Mindanao	Bukidnon	Malaybalay City	3.00	2008
Mindanao	Surigao del Sur	Multiple sites	196.83	2009–2011
Total			604.62	

Rainforestation activities in the Caliraya-Lumot Watershed in Laguna is one example of the many benefits of RF toward biodiversity conservation and climate resilience. Since the tree-planting initiative started in 2009, local inhabitants have reported changes in their environment, such as cooler microclimate; fresher air; increased presence of birds, insects, and smaller plant species; and a moist and more fertile soil. The improvements in soil conditions have resulted in increased productivity in farming activities, which, in turn, increases farmers' income.



Forest Foundation Philippines

Formerly called the Philippine Tropical Forest Conservation Foundation, Inc. (PTFCF), the fund-granting agency was established under a bilateral agreement between the governments of the United States of America and the Philippines, following the US Tropical Forest Conservation Act. The grants extended by the Forest Foundation since 2005 have been used for projects that aim to conserve, maintain, or restore tropical forests in the Philippines. The agency has supported over 450 projects aimed at improving the management of approximately 1.5 million ha of forestlands. For more than a decade now, the Forest Foundation has restored approximately 4,200 ha of forest through the reintroduction of native tree species, established over 40 community-conserved areas in key biodiversity and critical watershed areas, instituted more than 60 community-level sustainable enterprises that provide additional income to community members, and increased awareness of forest conservation issues, particularly the ecosystem services provided by the forests.

TABLE 5.2. Total area planted with Dipterocarps approved by Forest Foundation Philippines (2005–2015)

Region	Protected (ha)	Reforestation (ha)
Luzon	183,472	982.90
Visayas	114,518	891.50
Mindanao	376,730	804.00
Palawan	753,012	235.00
Total	1,427,731	2,913.40



Foundation for the Philippine Environment (FPE)

FPE has been instrumental in promoting RF to local partners operating in key biodiversity areas. The NGO produced a number of knowledge products, such as an RF manual in English and Tagalog, generated from field experiences through its KALIKASAN BCSD Knowledge Series. FPE was founded in 1992 through a debt-swap scheme between the governments of the Philippines and the United States. Since then, the NGO has remained dynamic and relevant, and it continued to grow as a leading organization in biodiversity conservation and sustainable development.

TABLE 5.3. List of FPE-supported RF projects (2002–2016)

Location	Year implemented	Implementing partners	Area covered (ha)	Estimated seedlings planted
Nagcarlan, Laguna	2011–2013	USAID/LABB	30	18,750
Polilio Island, Quezon	2011–2013	USAID/PBCFI	60	37,500
Kabankalan, Negros Occidental	2011–2013	USAID/NEDF	60	37,500
Tubo, Abra	2011–2014	FUNDES0/TIPON	30	20,000
Arakan, North Cotabato	2011–2013	FPE/USAID/PEFI	60	37,500

Baguio District, Davao City	2011-2013	FPE/USAID/IDIS	60	37,500
Antipolo City	2011-2013	FPE/FPE3/MWC	500	353,038
Claveria, Misamis Oriental	2010-2011	FPE/EU/MAMACILA	10	6,250
Balingasag, Misamis Oriental	2010-2011	FPE/EU/PAMALIHI	5	3,125
Naguilian, Pangasinan	2014-2015	FPE/HEED	30	18,750
Irosin, Sorsogon	2007-2008	FPE/LGU	2	1,250
Cawayan, Negros Oriental	2014-2015	ECO-AGRI	2	1,250
Cebu	2011-2014	USAID/CBCF	60	37,500
Sibuyan, Romblon	2011-2014	FUNDESO/ATSMATA	30	18,200
North Negros	2011-2013	USAID/MUAD	60	37,500
North Negros	2002-2006	MUAD	12	19,000
Arakan, North Cotabato	2014-2015	PEF	36	22,500
Total			1,048	707,113

An estimated 1,048.47 ha have been planted with 707,113 native trees from 2002 to 2016. FPE continues to support partners' initiative in enhancing and restoring forest ecosystems across Luzon, Visayas, and Mindanao.



Rain Forest Restoration Initiative (RFRI)

RFRI is a network of 14 national and international organizations and individuals from the academe, peoples' organizations (PO), NGOs, and the private sector—all promoting reforestation and agroforestry through the use of native tree species. Through environmental conservation, research, and development, RFRI rehabilitates degraded landscapes and restores key ecosystem services and functions, while providing forest-dependent communities with an alternative source of livelihood.

RFRI has conducted hundreds of tree-planting activities in provinces, such as Rizal, Quezon, Zambales, Laguna, and Surigao del Sur. At present, it implements the ROAD to 2020 campaign, which focuses on forest protection and restoration in the mountains of Banahaw-San Cristobal Protected Landscape in Laguna and Quezon. Banahaw-San Cristobal is home to endemic fauna such as the Philippine eagle, Luzon fruit bat, Philippine cockatoo, as well as to unique palms, ferns, and native trees. The nearby forests also help store and purify fresh water that flows downhill toward towns like San Pablo, Laguna.

International dimension in rainforestation farming

The expansion of the RF Strategy

The first ideas were developed in 1992 to combine necessary subsistence in securing rural development and efforts on environment protection and rehabilitation in the island of Leyte, Philippines. Nobody imagined then that these ideas would gain momentum and become a model on a regional and even global scale. The very basic strategy and definition of RF was expressed by the author in the following posters:



❖ A farming system that closely resembles the structure of a natural Philippine rainforest ecosystems or home gardens that promotes the use of native or local trees commonly growing in the area.



❖ It considers farming systems to support livelihood as an innovation.

Definition and goals of the echnology (MILAN 2014)

International dimension

Since its beginning, RF technology has spread from Leyte to almost all of the other islands in the Philippines. This flexible and highly adaptable technology for subsistence improvement and landscape restoration has, likewise, reached other areas in the South and Southeast Asian regions.

Adoption and support by international organizations

A large number of Philippine-based NGOs that adopted the RF strategy (between 1994 and present) had—and, in some cases, continued to have—the support of the following international organizations that funded RF activities in the country.

EURONATUR European Nature Heritage Fund (EuroNatur)

EuroNatur, an NGO based in Germany, was founded and—in many years—chaired by C. P. Hutter. It supported numerous local reforestation and rehabilitation projects of local agencies in the Philippines via

the Baybay Rainforestation Foundation, housed in the VSU campus. When it decided to later on concentrate on the European continent only, the international engagement was transferred to a newly established foundation, NatureLife-International.



NatureLife-International

Also based in Germany, NatureLife-International supported the research component of RF, making it one of the leading promoters of the RF strategy. Its activities are focused on education for sustainable development; responding to knowledge erosion concerning nature, environment, agriculture, and nutrition; protection of resources and promotion of preparedness in climate change; conservation of biological diversity as indispensable natural heritage; sustainable food production to address health issues and protect natural and cultural environments; and protection of coastal areas and rehabilitation of depleted landscape.



Environmental
Leadership &
Training Initiative

Environment Leadership and Training Initiative (ELTI)

ELTI is a program created and established by Yale University, where environmental leadership is promoted through workshops, seminars, and conferences. RF technology was included into ELTI's program, of which activities are ongoing across the Southeast Asia region.

RF adopters among Southeast Asian NGOs

Southeast Asian NGOs are successfully adopting and applying RF strategies in their locale. For instance, the application of RF technology in Central Java, Lao PDR, Sri Lanka, Vietnam, and China offers good experiences that attest to the appropriateness of using native tree species in forest restoration. These experiences also include livelihood support, protection of the sustainable practices of IPs (e.g., maintaining herbal medicine for health), and capacity-building activities like cross-country exchange among RF practitioners and advocates. Below are specific examples:

The **Indonesian Rainforest Foundation** adopted the RF technology as one of its strategies to improve the subsistence of the rural poor. RF provides the poor with an alternative to destructive agricultural practices (i.e., slash-and-burn). Conducting training, workshops, and conferences is crucial to involve more and more groups of people, and to put in place more and more models of sustainable development in the rural areas of the humid tropics.



Ongoing depletion of the last remaining forest spots in the volcanic mountain area (left) terraced slopes with a protective umbrella of various trees



Project information (left) marking a model site of sustainable development by members of the farmers cooperative in the presence of representatives of NaturLife-International and the Indonesian Rainforest Foundation

In 2017, a newly created seal to certify proper RF practices and farms was developed by NatureLife-International, which was handed out to the first recipients in the Philippines, Indonesia, Lao PDR, and Vietnam.



Rodel and project site Punthuk Setumbuh and Karanganyar in Central Java, Indonesia.
(PHOTO FROM DR. GÖLTENBOTH)

For about six years, the main focus and advocacy is to have a decentralized training program, working toward a society where IPs have social justice, gender equality, and equal access to natural resources through equitable social and economic systems across the Mekong Region. With knowledge carried from one generation to another, one can learn so much from IPs on how to live in harmony with nature, how to protect it, and how to nurture it (Lanh 2016).

In Lao PDR, meanwhile, the countryside is under threat of being transformed into undesirable agricultural monocultures. In response, the **Center for Human Ecology Studies of the Highlands** (CHESH) in Vietnam and Lao PDR started a research on the social structures and functions of three villages in the area: Xieng Da, a Lao Loum village; Long Lan, a Hmong village; and Nam Kha, a Kho Mu village. To meet the needs of the farmers in the three target villages, a key farmers' network on sustainable community development was established. The network has control over the program activities at the village level. In June 2002, CHESH in Lao PDR established a representative office in Luang Prabang (Lanh, 2014).



Reforested hilly area in the Northern Province of Lao. The area is leased to a Chinese investor for the production of banana. (PHOTO FROM DR. GÖLTENBOTH)

The **Human Ecology Protection Area (HEPA)** has a center established to train mainly indigenous young farmers coming from various IP communities living in the Mekong Region. HEPA has actively adopted the RF technology, which it started in 2014 in various sites and model farms managed by young local farmers' families and cooperatives. The collection of seeds, organization of workshops, running of tree nurseries, and planting native tree species are important to counter the ongoing destruction of the environment.

In 2016, the project "Promoting Livelihood Sovereignty of Young Indigenous Farmers by Reforestation/Rainforestation Measures" started in Long Lan Village in Lao PDR. Through this project, farmers and communities in upland Vietnam implemented RF with the facilitation of the Social Policy Ecology Research Institute and its allies (e.g., Community Entrepreneur Development Institute and NatureLife-International). This initiative has shown its effectiveness and sustainability in greening and restoring degraded forest, as well as in enriching natural forests, while local communities and families are getting better incomes.

Moreover, a portion of the original native forest is protected by the Hmong community as site for the collection of herbal medicine by



Collection of seeds from local tree species (upper left) certificate of an outstanding subsistence farmer (upper right) participants a seminar and workshop in HEPA (lower left) land use in the area of the ethnic group of Dao. (PHOTO FROM DR. GÖLTENBOTH)



Mountain area of the Luang Prabang Province in Lao 1549 natural forest area belonging to the Hmong village of Long Lan. (PHOTO FROM DR. GÖLTENBOTH)



Monocultures of *Acacia mangium* plantations in Northern Vietnam.
(PHOTO FROM DR. CÖLTENBOTH)

acknowledged healers and knowledgeable elders. These sacred forests are a main source of seeds of endemic trees and shrubs needed for the rehabilitation of deforested areas and the replacement activities in monoculture plantations.

Supported by NatureLife-International, two more RF projects are underway in 2017 in Luang Prabang Province, Lao PDR: (1) Khan Thuang Village, Nam Bac District (covering over 10 ha) and (2) Ban Thapene Region (covering 10 ha).

Other RF experiences are documented in the monolithic forest restoration in Vietnam through the **Community Entrepreneur Development Institute**, livelihood improvement in Sri Lanka through the **Wildlife and Nature Protection Society (WNPS)**, and the implementation of the TianZi RF in the Bulang Shan Mountains of Southern China.

Moreover, since 2008, a grassland area of up to 6 square kilometers in the Bulang Shan Mountains—along the border to Myanmar—is rehabilitated. The tribal group of the Akha-inhabited mountain also planted more than 150,000 native tree species using RF technology.



Hmong healer Maiv Txos Lis of the Hmong community of Long Lan shrub with medicinal properties. (PHOTO FROM DR. GÖLTENBOTH)



Commercially-run tree nursery in a village in Northern Vietnam in 2016. (PHOTO FROM DR. GÖLTENBOTH)



Site of the mid-mountain region of the Singaradja region in Sri Lanka.
(PHOTO FROM DR. CÖLTENBOTH)



Tree seedling in the Area in the of the Singaradja National Park in Sri Lanka.
(PHOTO FROM DR. CÖLTENBOTH)



Dr. Josef Margraf, founder of the TZ Biodiversity Center in Jinghong, during a botanical expedition in the Bulan Shan Mountains. (PHOTO FROM DR. GÖLTENBOTH)



Newly-established seedling circles in the project area of the TR Project. (PHOTO FROM DR. GÖLTENBOTH)



Young people from the ethnic minority of Akha during the inauguration ceremony for the TR Project (PHOTO FROM DR. GÖLTENBOTH)



Inauguration of a Project site to reestablish tea forest areas in the Bulan Shan Mountains in Southern China (from left to right: Prof. Dr. Göltenboth University of Hohenheim, Mrs. Minguo of TZ Biodiversity Center, Mr. Lutz Lämmerhold Lufthansa Executive, Mr. C.P. Hutter NatureLife-International. (PHOTO FROM DR. GÖLTENBOTH)

Rainforestation champions



Josef Margraf (Dr. Sc. Tropical Agriculture). Dr. Margraf served as technical consultant of the ViSCA-GTZ Applied Tropical Ecology Program at VSU. He was instrumental in establishing a demonstration plot in FORI that was developed into a “closed canopy and high diversity farming system,” which is now known as rainforestation farming. It was through field trials, documentation, and development of models of forest restoration that he was able to generate evidence-based data. His works were regarded by the

European Union and the United Nations as models for biodiversity conservation and forest restoration. The cooperation program of the German Government brought Dr. Margraf to Southeast Asia and China, where he was bestowed the “Green Hero of China Award.” He has a master’s degree in ecology and a doctorate in tropical agriculture from the University of Hohenheim, Stuttgart, Germany.



Friedhelm Göltenboth (Dr. Sc. Biology). Dr. Göltenboth has extensive experience in landscape ecology, biodiversity, tropical forestry and agro-ecology, aquatic and terrestrial natural resources, and project management, with more than 25 years of experience in Southeast Asia. He has a wide range of experience in the scientific and practical development of forest

farming systems for secondary forest crops in tropical landscapes, as well as in carbon sequestration issues, evaluation and environmental assessment, political level negotiations, scientific teaching and guidance, and intercultural management training. He was involved in academic exchange program coordination between the University of Hohenheim and many other institutions, such as the University of Halle, VSU, and Universitas Kristen Satya Wacana. He holds degrees in both biology and geography-geology, and has published numerous research and scientific publications on tropical agriculture and ecosystem management.



Claus-Peter Hutter of Nature Life International.

Mr. Hutter designed the concept of numerous environmental projects for the protection of nature, environmental education, and sustainable development. He was the founding president of Euronatur from 1987 to 2007. Since 2007, he serves as the president of NatureLife-International. Under Hutter's watch,

NatureLife-International became one of the leading promoters of RF, bringing its technology to Europe and other parts of Asia through the organization's engagement in education for sustainable development, mitigation of climate change impacts, and protection of biodiversity and natural resources. NatureLife-International supports several RF projects in the Philippines, particularly the ones in devastated and typhoon-stricken areas in Southern Leyte, Leyte, and Samar. Hutter is the author, co-author, and editor of numerous publications.



Marlito Jose M. Bande (Dr. Sc. Agriculture).

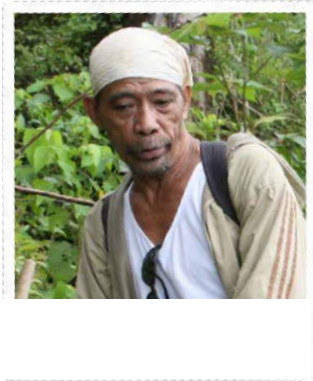
Dr. Bande started as a community organizer in one of VSU's pilot sites, managed by the San Vicente Farmers' Association. He is an associate professor in agro-ecology, with concurrent function as director of the Institute of Tropical Ecology and Environmental Management, at VSU. He contributed significantly in conducting capacity-building activities attended by more than 200 RF adopters and promoters across the country. His teaching pedagogy is based on the field experiences he gathered from years of implementing RF. He holds degrees in agro-ecology from the University of Hohenheim, Stuttgart, Germany.



Cherylon Aivan Herzano.

Mr. Herzano is a field-based rainforestation trainer, and an advocate with extensive experiences in forest restoration and watershed management. He has more than a decade of on-site involvements in RF, biodiversity conservation, and sustainable development, as well as in developing

benefit-sharing schemes to actualize trade-offs between forest conservation and improved social services. He has worked with FPE for many years, serving local communities and advancing the rainforestation agenda in the country. His involvement in the VSU-housed RF projects has honed his skills in strategic partnership and project development. He holds a master's degree in Tropical Ecology from the Visayas State University.



Antonio Fernandez. Mr. Fernandez is a self-made man who rose from among the kaingineros in Mt. Pangasugan to become one of the most ardent and passionate champions of RF. He knows his trees very well, especially those that can be found in Mt. Pangasugan where he has been cultivating his kaingin farm for more than 20 years. He later worked as a nursery caretaker of the ViSCA-GTZ and ITEEM up until his retirement.



Edwino Fernando (PhD Botany). Dr. Fernando is Professor Emeritus at the College of Forestry and Natural Resources at the University of the Philippines - Los Baños. He is a forest botanist and plant taxonomist, who has done extensive research on Philippine forests and forest plants, and is a keen advocate of native plant conservation and forest restoration using native species. He has been a familiar lecturer and resource person on many rainforestation training courses. He has authored and co-authored more than a hundred scientific and technical papers and books. He earned his doctorate degree in botany from the University of New South Wales, Australia.








previous spread. Handling of tree seedlings before transferring from nursery to field (PHOTO FROM FOREST FOUNDATION PHILIPPINES)

Postscript: Where Are We at Now?

Although recognized for its forward-setting direction in restoring degraded forestlands (through MC 2004-06), rainforestation farming (RF) is still young in terms of influence. Compared to the accomplishment of the National Greening Program (NGP), which rehabilitated 1.5 million ha of forests between 2011 and 2016, the 179,000 ha of forests planted with 100 million native tree species mixed with fruit-bearing seedlings (Mendoza 2016) shows that rainforestation still has a long way to go (11.9%).

Yet, with one and a half decade of development and testing by the academe and support networks from the government and the public and private sectors in the Visayas State University (VSU) community in Leyte, RF implementation areas of adopters in different parts of the Philippines and in participating Southeast Asian countries affirm the positive performance of the strategy because of its elements. These elements are present in the Philippine case experiences included in the book (see Chapter 4), which show the range of RF engagement in different contexts. These elements explain why the paradigm works well. The experiences in RF expansion areas in Southeast Asia similarly show promising results—whether RF is adopted only for the forestry sector or still partially in their comprehensive rural development programs.


The factors or elements that serve to facilitate and support the RF strategy are the following:

-  Direct engagement and capacitation of local communities at all stages, which promote a sense of ownership of RF (long-term view), with sharing of forest restoration responsibilities in exchange for incentives and accrued benefits (e.g., paid value of collecting seedlings from mother trees, nursery preparation and maintenance, planting and maintenance, ecotour guiding, and the like)
-  Participatory planning and decision making to quickly reach consensus, with transparency as guide
-  Being appropriate in scale that can be creatively and flexibly managed by local communities, facilitated by civil society organizations (CSOs), funded and supported by the private sector, and in direct coordination with the local government unit (LGU) and the Department of Environment and Natural Resources (DENR) for local policy and technical support.

RF practitioners see the strategy as an innovative approach in sustainable reforestation that is strategically linked to appropriate rural development programs. Subsistence farmers clearly understand not only the economic aspects of RF but also the value of preserving the local culture and biodiversity by restoring their forest using their local plant species. An intact forest ecosystem does not only provide them timber but other forest products as well that contribute to their well-being. Because RF focuses on farmers' needs, the relatively low-cost input in starting a farm and the income farmers derive from nurseries are considered additional incentives.

Development of good baseline information through farmer's guide (see *Annex 3*) made the concept easy to follow for farmers and decision makers. Lastly, nongovernmental organizations (NGOs) and other support groups see that RF projects are easy to manage because communities are united in restoring their forestlands and farm lots.

Not without challenges, the practice of the RF strategy in the Philippines and in Southeast Asian countries faced the following difficulties:

-  It was difficult to change the mind-set of officials implementing reforestation, especially when timber products are the priority good.

- Existing land-use conflicts and categorization of agricultural and forest areas are also hindering progress in forest restoration.
- The lack of information and knowledge about native tree species and suitable species for reforestation—coupled with limited planting materials—slows down the pace of reforestation.
- Subsistence farmers do not have access to marketing opportunities of some shade-tolerant crops like fruits and spices.

These constraints emphasize why a paradigm shift is needed. The hindering factors are not inherent in the RF strategy; they are conditions set by the dominant traditional forest restoration view that we hope to change.

RF investments are impressive only for the partners of the three lead NGOs in RF advocacy in the Philippines (i.e., Haribon Foundation with 604 ha, Foundation for the Philippine Environment with 1,048 ha, and Forest Foundation Philippines with 4,200 ha), with a total of 5,852 ha reached within a timeframe of two to three years as of 2016. As committed by CSOs, the Rainforest Organizations and Advocates (ROAD) 2020 project is expected to bring about 1 million ha of rainforested areas. This is indeed a big input in the country's goal to improve forest condition.

In the case of VSU's Institute of Tropical Ecology and Environmental Management (ITEEM), 18 trainings were held between August 2014 and October 2017 (see *Table 6.1*). These were attended by a total of 413 participants from CSOs, LGUs, the academe, and peoples' organizations (POs). The earlier trainings conducted from 1992 to 2013 by the VISCA-GTZ Tropical Ecology Program and later ITE were unfortunately not well documented and some records were lost during the transition of leadership. To gauge the effectiveness of RF trainings, monitoring and evaluation are warranted.






TABLE 6.1. RF trainings conducted by VSU (2014–2017)

Date	Title of training	Training site	Agency	Participants	Total no. of participants
16-17 August 2014	Rainforestation Farming	VSU-ITEEM	Liptong Woodland	Hayskul '70 of Guihulngan, Negros Oriental	25
18-22 May 2015	7th National Rainforestation Trainer's Training	VSU-ITEEM	ELTI and VSU	NGOs, POs, LGUs, NGAs, academe	34
18-22 May 2015	Rainforestation Farming	Liptong Woodland, Liptong Bacong, Negros Oriental	Institute of Environment Rehabilitation and Conservation (ERECON)	NGOs and POs	20
29-31 May 2015	Rainforestation Farming	Barangay Barayong, Palo, Leyte	VSU and NatureLife-International	POs	15
21-26 June 2015	Rainforestation Farming	Barangay Dumarao, Roxas, Palawan	Katala Foundation, Inc. and VSU	POs	25
4-5 August 2015	Rainforestation Farming	Barangay Tagaytay, Kananga, Leyte	ERECON, National Land Afforestation Promotion Organization (NALAPO), and VSU	POs	20
4-8 November 2015	8th National Rainforestation Trainer's Training	VSU-ITEEM	ELTI and VSU	NGAs, private/business sector, academe, NGOs, LGUs, church	30
30 November-4 December 2015	Rainforestation Farming	Cateel, Davao Oriental	Foundation for These-abled Persons, Inc.	NGOs	10
23-29 March 2016	Rainforestation Farming	VSU-ITEEM	Institute of Environment Rehabilitation and Conservation	NGO International Volunteers	23





15-16 April 2016	Rainforestation Training for Climate- Resilient Recovery	Barangay Iberan, Salcedo, Eastern Samar	ELTI	LGU and PO	35
15-18 June 2016	Sustainable Land Use, Rainforestation, and Biomonitoring Organisms	Barangay San Vicente, Roxas, Mindoro	Department of Biology, Ateneo de Manila	Community- based organizations	20
18-20 July 2016	Rainforestation Training and Cross-visitation	VSU-ITEEM	FARMCOOP	Farmers' cooperatives	10
16-18 December 2016	Balinasayao Twin Lakes Natural Park Rainforestation Training and Seminar	Balinasayao Twin Lakes, Sibulan, Negros Oriental	GIZ	NGOs and POs	30
19-21 April 2017	Rainforestation Training	VSU-ITEEM	Center for Environmen- tal Concerns	NGO and POs	20
28 April 2017	Rainforestation Farming and Coastal Resource Management Seminar	Cabucgayan, Biliran	VSU and the Municipal LCU of Cabucgayan	LGU and PO	30
18-20 May 2017	Rainforestation Training for Climate- Resilient Recovery	Inopacan, Leyte	ELTI	LGUs, POs, and private individuals	25
11-13 August 2017	Rainforestation Training for LGUs	VSU-ITEEM	ELTI	LGUs	20
11-13 October 2017	Rainforestation Training for Ridge-to-Reef Restoration Strategy	VSU-ITEEM	NatureLife- International, Guiuan Development Foundation, Inc. (GDFI), ITEEM	LGU, PO, and NGO	21
Total					413

As of 2016, 174 individuals were already certified as **RF trainers** all over the country; they came from POs, NGOs, academic institutions, LGUs, and watershed and energy agencies, among other sectors. RF adopters trained by IEEM were reported to have planted a total of 1,353.73 ha with native tree species in the areas where they operate (ITEEM 2016).

Luzon

 NPC watershed managers	22
 POs	4
 NGO	23
 LGU	6
 Academic institution	14
Subtotal	69

Visayas

 Religious organization	1
 NGO	13
 LGU	13
 Academic institution	10
Subtotal	37

Mindanao








 PO	4
 Government agency	1
 NPC watershed managers	5
 NGO	16
 LGU	5
 Academic institution	6
 DENR (PASu)	31
Subtotal	68
Total	174



FIGURE 6.2. Certified RF adopters as of 2016 ITEEM

RF Adopter's Farms

🌿	Luzon	257.18 ha
🌿	Visayas	768.26 ha
🌿	Mindanao	328.29 ha
	Total	1,353.73 ha

Challenges and opportunities

Facilitating factors

- 🌿 The flexibility of the RF technology is fascinating for most supporters of appropriate rural development, village well-being, and sustainable reforestation.
- 🌿 RF has a clear concept of including the economical aspects of subsistence farmers from the very beginning and focusing on local plant species, therefore, contributing to local biodiversity.
- 🌿 Starting RF requires a relatively low input cost and offers an income-generating approach through nursery implementation.
- 🌿 Farmer's guides that provide good baseline information were edited and published over time.
- 🌿 RF is easy to explain for decision makers at all levels.
- 🌿 RF is a concept that is easy to manage for NGOs.

Challenges and opportunities

The dependence on highly priced reforestation projects with funding from the government is not sustainable. Huge public investments and grants are not as valued as local personal investments. From the experiences of RF adopters, a change of perspective and a little investment are often sufficient, as long as stable income is generated. Local communities and farmers may need modest financial support from LGUs and government agencies like DENR or even foreign donors for the initial rehabilitation. After this, the efforts can be self-sustained through production, income generation, and reinvestment. For this scenario to be realized, social entrepreneurship is required. It can be done by showcasing model projects already implemented by successful farmers and communities.

Some pointed out that to respond to the changing times, reforestation, enrichment planting, and hiring forest guards, among others, may not totally address deforestation. The direct solution to deforestation, forest degradation, and lack of forest protection is to assign, capacitate, and empower managers of forest management enterprises (FME) who are

motivated to practice sustainable forest management (SFM) simply because SFM provides farmers with sustainable benefits. In practicing SFM, FME managers plant trees in deforested sites, do enrichment planting in light forest stands, and protect their forest crops because farmers can see the future benefit streams coming.¹¹

According to the Center for International Forestry Research (CIFOR) assessment, in 2016 state-run forestry had not been effective in the Philippines. Is it because foresters are used to the same state reforestation and other forestry programs that they no longer have the capacity for out-of-the-comfortable-usual-box thinking.

Indeed, DENR's field officers must help organize entrepreneurs or cooperatives to restore forestry-business trees and agricultural crops. Likewise, forestry schools must help DENR in developing entrepreneurs and cooperatives both in the production and protection forestry. Research and development must be geared toward supporting entrepreneurs.

At this point, tapping the corporate social responsibility (CSR) of the private sector in forest restoration is vital. With an immense budget deficit for reforestation and conservation, the government needs all the help it can tap. All industries rely on natural resources—whether directly or indirectly—and their usage plays a critical role in all production processes. Therefore, the sustainable use of these resources is a key feature in any supply chain.

As earlier cited, forests should not be seen simply as supplier of economic goods. Forests must be merited for their equally important indirect use as source of environmental services. The Energy Development Corporation (EDC) has proven a strong business case for integrating biodiversity conservation into core management systems to manage risk, capitalize on opportunities, and meet corporate social responsibilities (Biodiversity and Business 2003). The incorporation of environmental and social concerns into business plans and processes is an agenda that companies need to consider as an integral part of their CSR and sustainability program.

11 Personal communication. 22 July 2017. Interview with Manuel Bonita

The increasing number of RF adopters is a positive sign. Because CSOs' volunteered forest restoration through native species has not been significantly scaled up across regions, the paradigm shift that is called for has, likewise, yet to influence DENR to use native tree species for the long-term legacy of the NGP. Rainforestation, even if it was originally designed for smallholder farmers, has to be scaled up at the national level by urging DENR to adopt RF as a national strategy.

To date, more and more private companies are heeding the call of creating CSRs for a greener future. They are gearing toward the greener future by developing and enhancing existing businesses that would contribute to the country's commitment of lowering carbon emission by 70 percent in 2030. Forestry has been identified as one of the major sectors that would help fulfil such commitment. One of these CSRs is EDC whose flagship program called 'BINHI Tree for the Future' is aimed at rescuing and securing 96 of the most threatened premium native tree species in the country. As of 2015, EDC has covered 1,226 ha with premium native tree species across its project sites (EDC 2015). Other notable companies whose CSRs are helping restore forests are the Honda Foundation Inc., Toyota Motor Philippines Foundation, Ramcar Battery Corporation, *Bantay Kalikasan* (ABS-CBN *Lingkod Kapamilya* Foundation's environmental arm), and Philam Foundation, among others.

Recommendations

Forest restoration requires long-term investments, with most of our primary forests degraded and fragmented by overexploitation. Interventions in many aspects of forest management are needed. State policies and programs must ensure a steady flow of ecological and socioeconomic benefits to people and prepare them to be resilient to face the challenges of climate change.

Below are specific recommendations for policy and governance, socioeconomic, research and development, and financing.

Policy and governance direction

- Explicitly harmonize the Philippine Development Plan, National Biodiversity Strategy and Action Plan, and the

Master Plan for the Forestry Development with strategies and key result areas coherent with the avowed goals of (1) conserving biodiversity in the country's tropical forests, (2) enhancing the provision of ecosystem services to support sustainable development, and (3) reducing poverty.

- 🍃 Revisit NGP and its commodity roadmap to accelerate the use of native tree species in both protection and production forest. To reiterate, DENR should scale up RF at the national level. No government fund should be used to procure exotic species.
- 🍃 Complete the delineation of protection and production forests to address recurring issues of conflicting tenurial rights in most of reforestation sites.
- 🍃 Ensure the tenurial security of the area prior to implementation of forest restoration. At present, protected areas, watershed areas, mangrove, important bird areas, Community-Based Forest Management Agreement, Industrial Forest Management Agreement, Socialized Industrial Forest Management Agreement, and Certificate of Ancestral Domain Claim/Title, among others, are examples where the tenure security is addressed and where forest communities have a sense of ownership of and responsibility on the land.
- 🍃 Ensure an appropriate management plan based on the type of tenurial instrument and biophysical assessment of the site. The management plan specifies short- and long-term strategies that should guide the whole process of achieving the end goal of restoring the forest in the open and denuded areas.
- 🍃 Long-term management interventions and institutional arrangements with the private sector—particularly in the proposed NGP expansion areas—should be explored. With almost all industries relying directly or indirectly on natural resources, private sector partnership plays a critical role.
- 🍃 Develop coordinative mechanisms and use existing tools to explicitly evaluate conservation trade-offs of coexisting objectives for optimizing production on the same land

base (e.g., multi-component of bioenergy, food, and forest restoration).

- 🍃 Strengthen regulatory and safeguard measures within specific sectors (e.g., contract or investment arrangements that balance ownership, reward and risk-taking between landholders and investments).
- 🍃 Through a third party, conduct a review and/or assessment of DENR's existing policies on harvesting forest resources, and propose to incentivize planting of native tree species. Work toward coherent policies that would ensure equitable sharing of benefits.
- 🍃 DENR should use native tree species for the long-term legacy of the NGP by adopting RF as a national strategy, not confined to protected areas.
- 🍃 Forestry schools should help DENR in developing entrepreneurs and cooperatives both in the production and protection forest. Research and development should be geared toward supporting entrepreneurs
- 🍃 LGUs should integrate Forest Land Use Plan (FLUP) in their sectoral plan and ensure that enabling policies and budget should be part of their annual investment plan. Related to this, there is a need to professionalize the implementation of FLUP by creating permanent staff position at the municipal, city, and provincial levels.
- 🍃 Organize a political lobby group that shall advocate building the capability of sustainable production that would create much-needed economic power to implement conservation, protection, and livelihood-generation activities using native species.

Socioeconomic

- 🍃 Mobilize and engage more meaningful facilitators from the academe, NGOs, and larger networks or alliances, and deploy more people in planning activities (not only for individual farms but also in relation to larger landscapes).
- 🍃 Have short- and long-term income-generating options for the communities who have a stake in rehabilitating and

managing the forest. Providing only short-term benefits results in wasted effort because people return to their former livelihood activities afterward. A combination of employment opportunities, livelihood schemes, and long-term benefits from the sale of agroforestry and timber and non-timber products may be explored.

- 🌿 Develop social entrepreneurs from the ranks of organized communities. Inspirational stories of innovative small RF adopters must be shared.
- 🌿 Scale up RF strategy from small farmers/communities to larger landscapes and ecosystem level when addressing issues affecting human well-being (livelihood, social services, access, and mobility).
- 🌿 Gather support from both the public and private sectors to capacitate local communities in developing social entrepreneurship and similar convergence initiative that would help improve people's well-being.
- 🌿 Communicate effectively RF adopters' inspirations and aspirations.
- 🌿 Amplify educational awareness campaigns about the value of ecosystems (forest, water, land, mangrove, and wetlands, among others).

Research and development

- 🌿 Conduct research on biological, ecological, economic, and social value of native species. These studies should look at the landscape, identify what crops are suited in the area, and demonstrate the ease of RF technology.
- 🌿 Research on fast growing native tree species that have potential for production.
- 🌿 Conduct science and market incentive research.
- 🌿 Species-site matching is vital to ensure good survival and growth of native tree species.
- 🌿 Government, academic institutions, and even private agencies could provide technical guidance through extension services and materials to project managers and

entrepreneurs, and make quality planting materials of appropriate species more available.

Financing

- 🌿 Incentivize private sector initiatives in forest restoration by optimizing business operations in the sectors of energy, water utilities, ecotourism, and even in production forests. Connect small pockets of forest to a larger areas addressing economic needs of the people and ecological needs of ecosystems by providing financial and technical support to indigenous peoples, local communities, and RF adopters.
- 🌿 Support the appropriate product development and sustainable use of non-timber forest products (NTFP), such as fruits, coffee, and cacao, and link NTFP-dependent communities to local and international markets.
- 🌿 Academic institutions and CSOs should help develop enterprising and marketing opportunities for the products of farmers and their communities. To adopt this strategy, the networks of farms and communities must be linked.
- 🌿 Develop and implement a socially and culturally appropriate capacity-building and mentoring program on social entrepreneurship, particularly entrepreneurial leadership, including both soft skills and technical skills (ASEAN Social Forestry).
- 🌿 Develop and support programs, trainings, and initiatives at local and national levels that support indigenous knowledge and skills; focus on a marketing strategy that is driven by return of investments; nurture entrepreneurial leadership, capacity, and innovation.

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ANNEX 1

List of Trees and Plants used in RF or has potential for use in RF

TABLE 1. Sun-demanding indigenous tree species recommended in production, restoration and urban areas in volcanic soil.

Family name	Local name	Scientific name
Anacardiaceae	Dao	<i>Dracontomelon dao</i> (Blanco) Merr.
Anacardiaceae	Lamio	<i>Dracontomelon edule</i> (Blanco) Skeels
Anacardiaceae	Amugis	<i>Koordersiodendron pinnatum</i> (Blanco) Merr.
Annonaceae	Yellow lanutan	<i>Huberantha flava</i> (Merr.) I.M.Turner
Apocynaceae	Batino	<i>Alstonia macrophylla</i> Wall. ex DC.
Apocynaceae	Dita	<i>Alstonia scholaris</i> (L.) R.Br.
Bignoniaceae	Banai-banai	<i>Radermachera pinnata</i> (Blanco) Seem.
Burseraceae	Pagsahingin bulog	<i>Canarium calophyllum</i> Perk.
Burseraceae	Dulit	<i>Canarium hirsutum</i> Willd.
Burseraceae	Bogo	<i>Garuga floribunda</i> Decne.
Cannabaceae	Anabiong	<i>Trema orientalis</i> (L.) Blume
Casuarinaceae	Agoho	<i>Casuarina equisetifolia</i> L.
Casuarinaceae	Mountain agoho	<i>Gymnostoma rumphianum</i> (Miq.) L.A.S.Johnson
Chrysobalanaceae	Liusin	<i>Maranthes corymbosa</i> Blume
Clusiaceae	Bitanghol	<i>Calophyllum blancoi</i> Planch. & Triana

Clusiaceae	Paguringon	<i>Cratoxylum sumatranum</i> (Jack) Blume
Combretaceae	Kalumpit	<i>Terminalia microcarpa</i> Decne.
Combretaceae	Talaisai gubat	<i>Terminalia foetidissima</i> Griff.
Euphorbiaceae	Gubas	<i>Endospermum peltatum</i> Merr.
Fabaceae	Ayangile	<i>Acacia confusa</i> Merr.
Fabaceae	Tindalo	<i>Azelia rhomboidea</i> (Blanco) S.Vidal
Fabaceae	Kariskis	<i>Albizia lebbekoides</i> (DC.) Benth.
Fabaceae	Akleng parang	<i>Albizia procera</i> (Roxb.) Benth.
Fabaceae	Salingkugi	<i>Albizia saponaria</i> (Lour.) Blume ex Miq.
Fabaceae	Anii	<i>Erythrina fusca</i> Lour.
Fabaceae	Ipil	<i>Intsia bijuga</i> (Colebr.) Kuntze
Fabaceae	Bahai	<i>Ormosia calavensis</i> Azaola
Fabaceae	Narra	<i>Pterocarpus indicus</i> Willd.
Fagaceae	Ulaián	<i>Lithocarpus celebicus</i> (Miq.) Rehder
Lamiaceae	Dangula	<i>Teijsmanniodendron ahernianum</i> (Merr.) Bakh.
Lamiaceae	Lingo-lingo	<i>Viticipremna philippinensis</i> (Turcz.) H.J.Lam.
Lamiaceae	Molave	<i>Vitex parviflora</i> Juss.
Lauraceae	Kalingag	<i>Cinnamomum mercadoi</i> S.Vidal
Lecythidaceae	Toog	<i>Petersianthus quadrialatus</i> Merr.
Malvaceae	Dungon	<i>Heritiera sylvatica</i> S.Vidal
Malvaceae	Kulatingan	<i>Pterospermum obliquum</i> Blanco
Malvaceae	Taluto	<i>Pterocymbium tinctorium</i> (Blanco) Merr.
Meliaceae	Kalimutain	<i>Dysoxylum arborescens</i> (Blume) Miq.
Meliaceae	Igyo	<i>Dysoxylum gaudichaudianum</i> (A.Juss.) Miq.

Meliaceae	Bagalunga	<i>Melia dubia</i> Cav.
Meliaceae	Lanipga	<i>Toona philippinensis</i> Elmer
Meliaceae	Danupra	<i>Toona sureni</i> (Blume) Merr.
Moraceae	Antipolo	<i>Artocarpus blancoi</i> (Elmer) Merr.
Moraceae	Kubi	<i>Artocarpus nitidus</i> Trec.
Moraceae	Gumihan	<i>Artocarpus sericicarpus</i> F.M.Jarrett
Moraceae	Baleteng ibon	<i>Ficus sumatrana</i> Miq.
Moraceae	Tangisang bayawak	<i>Ficus variegata</i> Blume
Myrtaceae	Malaruhat	<i>Cleistocalyx operculatus</i> (Roxb.) Merr. & Perry
Myrtaceae	Malabayabas	<i>Tristaniopsis decorticata</i> (Merr.) Wilson & Waterhouse
Phyllanthaceae	Subiang	<i>Bridelia insulana</i> Hance
Podocarpaceae	Malakawayan	<i>Podocarpus rumphii</i> Blume
Putranjivaceae	Bato-bato	<i>Drypetes littoralis</i> (C.B.Rob.) Merr.
Sapindaceae	Malugai	<i>Pometia pinnata</i> J.R.Forst. & G.Forst.
Strombosiaceae	Tamayuan	<i>Strombosia philippinensis</i> (Baill.) Rolfe

TABLE 2. Sun-demanding forest tree species recommended in limestone areas.

Family name	Local name	Scientific name
Anacardiaceae	Dao	<i>Dracontomelon dao</i> (Blanco) Merr.
Anacardiaceae	Liba	<i>Spondias pinnata</i> (L.f.) Kurz
Apocynaceae	Salibotbot	<i>Tabernaemontana pandacaqui</i> Lam.
Apocynaceae	Bayag-usa	<i>Voacanga globosa</i> (Blanco) Merr.
Araliaceae	Malapapaya	<i>Polyscias nodosa</i> (Blume) Seem.
Cannabaceae	Anabiong	<i>Trema orientalis</i> (L.) Blume
Casuarinaceae	Mountain agofo	<i>Gymnostoma rumphianum</i> (Miq.) L.A.S.Johnson

Combretaceae	Kalumpit	<i>Terminalia microcarpa</i> Decne.
Ebenaceae	Kamagong	<i>Diospyros discolor</i> Willd.
Fabaceae	Ayangile	<i>Acacia confusa</i> Merr.
Fabaceae	Tindalo	<i>Azelia rhomboidea</i> (Blanco) S.Vidal
Fabaceae	Kariskis	<i>Albizia lebbekoides</i> (DC.) Benth.
Fabaceae	Salingkugi	<i>Albizia saponaria</i> (Lour.) Blume ex Miq.
Fabaceae	Ipil	<i>Intsia bijuga</i> (Colebr.) Kuntze
Fabaceae	Bahai	<i>Ormosia calavensis</i> Azaola
Fabaceae	Narra	<i>Pterocarpus indicus</i> Willd.
Fagaceae	Ulaián	<i>Lithocarpus celebicus</i> (Miq.) Rehder
Lamiaceae	Alagao	<i>Premna odorata</i> Blanco
Lamiaceae	Molave	<i>Vitex parviflora</i> Juss.
Lamiaceae	Lingo-lingo	<i>Viticipremna philippinensis</i> (Turcz.) H.J.Lam.
Malvaceae	Anilao	<i>Colona serratifolia</i> Cav.
Malvaceae	Balobo	<i>Diplodiscus paniculatus</i> Turcz.
Malvaceae	Dungon	<i>Heritiera sylvatica</i> S.Vidal
Malvaceae	Kulatingan	<i>Pterospermum obliquum</i> Blanco
Meliaceae	Bayanti	<i>Aglaiia rimosa</i> (Blanco) Merr.
Meliaceae	Igyo	<i>Dysoxylum gaudichaudianum</i> (A.Juss.) Miq.
Meliaceae	Bagalunga	<i>Melia dubia</i> Cav.
Moraceae	Antipolo	<i>Artocarpus blancoi</i> (Elmer) Merr.
Moraceae	Kubi	<i>Artocarpus nitidus</i> Trec.
Moraceae	Balete	<i>Ficus balete</i> Merr.
Moraceae	Baleteng pagong	<i>Ficus forstenii</i> Miq.
Moraceae	Baleting ibon	<i>Ficus sumatrana</i> Miq.
Phyllanthaceae	Inyam	<i>Antidesma tomentosum</i> Blume

Phyllanthaceae	Banitlong	<i>Cleistanthus pilosus</i> C.B.Rob.
Phyllanthaceae	Anislag	<i>Flueggea flexuosa</i> Müll.Arg.
Sapindaceae	Malugai	<i>Pometia pinnata</i> J.R.Forst. & G.Forst.
Urticaceae	Alagasi	<i>Leucosyke capitellata</i> (Poir.) Wedd.

TABLE 3. Shade-tolerant local forest tree species recommended in production, restoration and urban areas in volcanic soils.

Family name	Local name	Scientific name
Anacardiaceae	Dao	<i>Dracontamelon dao</i> (Blanco) Merr.
Combretaceae	Kalumpit	<i>Terminalia microcarpa</i> Decne.
Dipterocarpaceae	Palosapis	<i>Anisoptera thurifera</i> (Blanco) Blume
Dipterocarpaceae	Hairy-leaf apitong	<i>Dipterocarpus alatus</i> Roxb. ex G.Don.
Dipterocarpaceae	Apitong	<i>Dipterocarpus grandiflorus</i> Blanco
Dipterocarpaceae	Malapanaw	<i>Dipterocarpus kerrii</i> King
Dipterocarpaceae	Hagakhak	<i>Dipterocarpus validus</i> Blume
Dipterocarpaceae	Manggachapui	<i>Hopea acuminata</i> Merr.
Dipterocarpaceae	Yakal kaliot/ Dalingdingan	<i>Hopea malibato</i> Foxw.
Dipterocarpaceae	Gisok-gisok	<i>Hopea philippinensis</i> Dyer
Dipterocarpaceae	Yakal saplungan	<i>Hopea plagata</i> (Blanco) S.Vidal
Dipterocarpaceae	Bagtikan	<i>Parashorea malaanonan</i> (Blanco) Merr.
Dipterocarpaceae	Almon	<i>Shorea almon</i> Foxw.
Dipterocarpaceae	Yakal	<i>Shorea astylosa</i> Foxw.
Dipterocarpaceae	White lauan	<i>Shorea contorta</i> S.Vidal
Dipterocarpaceae	Guijo	<i>Shorea guiso</i> (Blanco) Blume
Dipterocarpaceae	Yakal malibato	<i>Shorea malibato</i> Foxw.
Dipterocarpaceae	Red lauan	<i>Shorea negrosensis</i> Foxw.

Dipterocarpaceae	Mayapis	<i>Shorea squamata</i> (Turcz.) Benth. & Hook.f. ex DC.
Dipterocarpaceae	Tanguile	<i>Shorea polysperma</i> (Blanco) Merr.
Dipterocarpaceae	Narig	<i>Vatica mangachapoi</i> Blanco

TABLE 4A. Indigenous tree species and other plants for wetlands [Villa Imelda, Danao, McArthur, Leyte, Bito Lake].

Family name	Local name	Scientific name	Reproductive Part	Animals
Combretaceae	Talisai	<i>Terminalia catappa</i> L.	Fruit	Bats/bees
Dilleniaceae	Katmon	<i>Dillenia philippinensis</i> Rolfe	Flower/fruit	Bee
Lecythidaceae	Putat	<i>Barringtonia racemosa</i> (L.) Blume ex DC.	Flower	Insects
Malvaceae	Anilao	<i>Colona serratifolia</i> Cav.	Fruit	Birds/bees
Malvaceae	Malubago	<i>Talipariti tiliaceum</i> (L.) Fryxell	Flower	Bees
Moraceae	Anubing	<i>Artocarpus ovatus</i> Blanco	Fruit	Bats/bees
Moraceae	Hagimit	<i>Ficus minahassae</i> (Teijsm. & de Vr.) Miq.	Fruit	Bats/lizards
Pandanaceae	Pandan	<i>Pandanus</i> spp.	Inflorescence	Insects
Phyllanthaceae	Banitlong	<i>Cleistanthus pilosus</i> C.B.Rob.	Fruit	Birds/bees
Poaceae	Tambo	<i>Thysanolaena latifolia</i> (Roxb. ex Hornem.) Honda		
Rubiaceae	Bangkal	<i>Nauclea orientalis</i> (L.) L.	Fruit	Bats/bees
Sapotaceae	Malak-malak	<i>Palaquium philippense</i> (Perr.) C.B.Rob.	Fruit	Bats/bees

TABLE 4B. Indigenous tree species and other plants for wetlands [Imelda Lake, Milagro, Ormoc City].

Family name	Local name	Scientific name	Reproductive Part	Animals
Combretaceae	Malaputat	<i>Terminalia darlingii</i> Merr.	Fruit	Bats/bees
Combretaceae	Talisai	<i>Terminalia catappa</i> L.	Fruit	Bats/bees
Fagaceae	Ulaián	<i>Lithocarpus celebicus</i> (Miq.) Rehder	Fruit	Wildlife, wild pigs
Meliaceae	Bayanti	<i>Aglaia rimosa</i> (Blanco) Merr.	Fruit	Bats/bees
Moraceae	Anubing	<i>Artocarpus ovatus</i> Blanco	Fruit/Flower	Birds/bees
Moraceae	Hagimit	<i>Ficus minahassae</i> (Teijsm. & de Vr.) Miq.	Fruit	Bats/bees
Myrsinaceae	Saging-saging	<i>Aegiceras corniculatum</i> (L.) Blanco	Flower	Bees
Pandanaceae	Pandan	<i>Pandanus</i> spp.	Inflorescence	Insects
Poaceae	Cogon	<i>Imperata cylindrica</i> (L.) Raeusch.		
Poaceae	Talahib	<i>Saccharum spontaneum</i> L.		Bees
Rhizophoraceae	Pototan	<i>Bruguiera sexangula</i> (Lour.) Poir.	Fruit	Bats/bees
Sapotaceae	Malak-malak	<i>Palaquium philippense</i> (Perr.) C.B.Rob.	Fruit	Bats/bees

TABLE 5. Indigenous trees in coastal areas [Coastal Inopacan, Leyte and Coastal Tangka-an, Burgos, Leyte]

Family name	Local name	Scientific name
Clusiaceae	Bitag	<i>Calophyllum inophyllum</i> L.
Combretaceae	Talisai	<i>Terminalia catappa</i> L.
Lamiaceae	Alagao	<i>Premna odorata</i> Blanco
Lamiaceae	Molave	<i>Vitex parviflora</i> Juss.
Lecythidaceae	Putat	<i>Barringtonia racemosa</i> (L.) Blume ex DC.
Malvaceae	Bayok	<i>Pterospermum diversifolium</i> Blume
Moraceae	Antipolo	<i>Artocarpus blancoi</i> (Elmer) Merr.
Pandanaceae	Pandan	<i>Pandanus</i> spp.
Rhizophoraceae	Bakawan babae	<i>Rhizophora mucronata</i> Lamk.
Rhizophoraceae	Bakawan lalake	<i>Rhizophora apiculata</i> Blume
Rhizophoraceae	Malatagal	<i>Ceriops zippeliana</i> Blume
Rhizophoraceae	Pototan	<i>Bruguiera sexangula</i> (Lour.) Poir.
Rhizophoraceae	Tagal	<i>Ceriops tagal</i> (Perr.) C.B.Rob.
Rubiaceae	Lino-lino	<i>Morinda bracteata</i> Roxb.

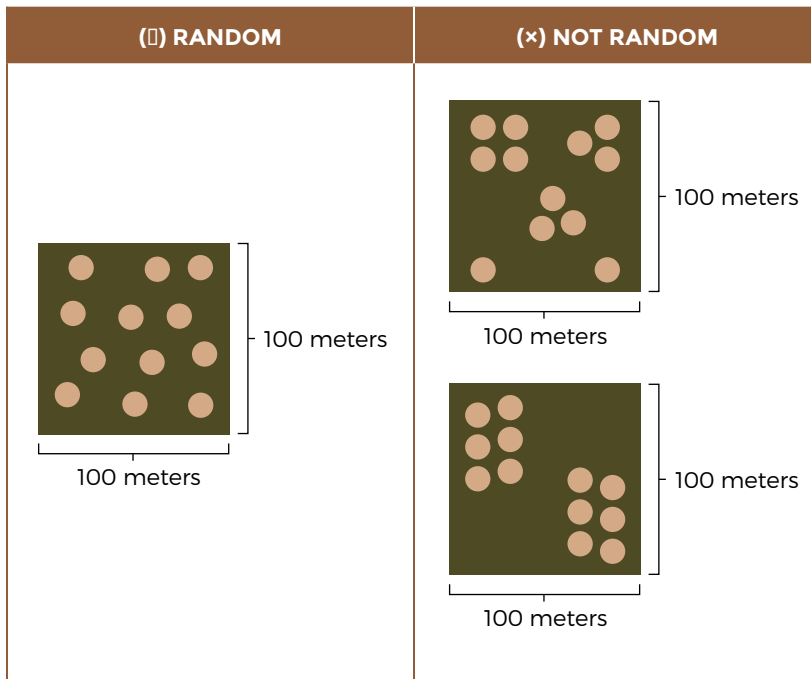
ANNEX 2

Guidelines to Establish Rainforestation Farming Areas

STEPS TO BE UNDERTAKEN

1. Forest Resource Inventory and Site Selection

Step 1. Conduct a Forest Resource Inventory and/or Rapid Site Assessment (RSA) to determine the existing vegetation and other biophysical characteristics of an area.



Step 2. Determine the typology of RF you are going to establish and Identify the type of area to be restored.

Types of Area to be restored:

-  Grassland
-  Brushland
-  Forest Gaps

Step 3. Determine the original forest type and the tree species that existed in the area.



You can obtain the information by conducting an interview to the old local people who are knowledgeable about native trees and forest in the area.

Step 4. Compute the seedling requirement per hectare.

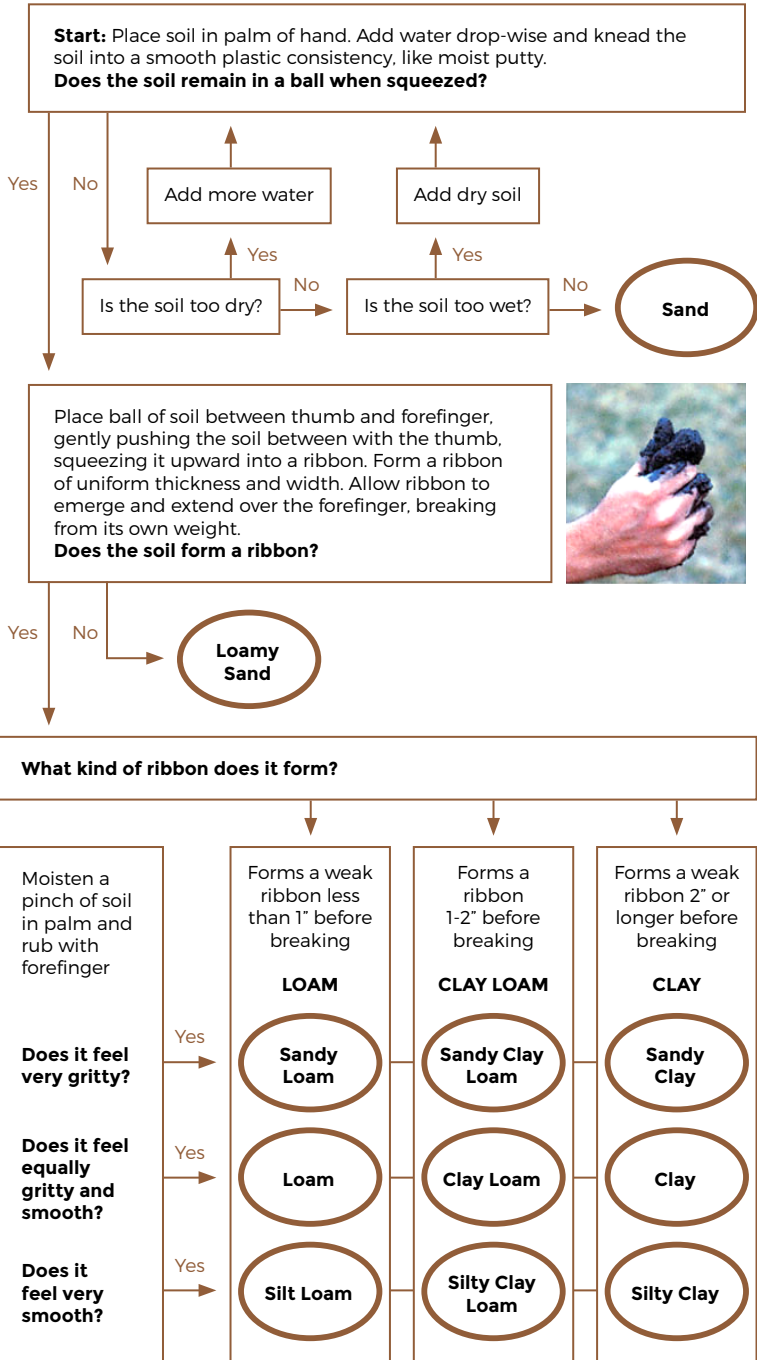
Based from the VSU experience, it is required to plant 2,000 - 2,500 seedlings per hectare at 2x2 meters spacing distance.

Step 5. Conduct a soil analysis and identify the following:

-  Soil organic matter

Color			
Organic matter content	High	Medium	Low

Soil texture



🌿 Soil moisture content

Soil Moisture	Soil Moisture Indicator	
	Ball Formation	Feels When Crushed
Dry	No	Dusty or hard
Moist	Yes	Not dusty; sticky
Wet	Drops of water come out	Drops of water come out

2. Site Selection

Step 1. Know your Area.

- 🌿 Delineate the boundaries
- 🌿 Prepare the map of your target restoration site.

Step 2. Clean the area through spot brushing. Spot brushing is the removal of grasses on the target spot where you intend to plant the seedlings.

Clean the target spot area of about 0.5 meter radius.

Step 3. Establish firebreaks, 5 meters wide to prevent the spreading if there is fire. Planting of rootcrops bananas, pineapple or any crops species that enables grass to regrowth along the boundaries may also serve as firebreaks. Plant the most convenient crops as your firebreaks.

To avoid damage caused by fire, make 5 meters wide fireline around the restoration site to prevent fire generated from the outside enter in to the planted area. It must be done especially in cogonal areas.

Reminder: Start your restoration activity near the old growth forest or near forest patches if possible. If there is no surrounding forest patches in your area, start your restoration activity on the most accessible portion of the site.



A typical rainforestation farm showing agricultural crops intercropped

Step 4. Site Preparation

- 🌿 Prepare the site 1- 2 weeks before the onset of rainy season or doing your planting. It is better if you do your site preparation during drier months.
- 🌿 Take a picture of your site before the establishment of RF. This is for recording and documentation of your farm.
- 🌿 Intensive vegetative remediation must be done if the area is heavily degraded or grassland areas with no vegetative cover.

Step 5. On the first year of planting, plant the fast-growing native tree species such as Kalumpit, Bitaog, Molave, Bagalunga, Bitanghol, Dao, Narra, and other sun demanding trees. You can also integrate with sun demanding fruit trees like Mango, Avocado, Santol, etc.

Step 6. When the first year planted trees starts to give shade to the soil, plant the shade- tolerant tree species tree species such as *dip-terocarp* trees. You can now also integrate shade loving fruit trees like Durian, Mangosteen, Rambotan, Lanzones, etc.



Hindang Laparan (<i>Myrica javanica</i>) 1 st year	Apitong (<i>Dipterocarpus Grandifloras</i>) 2 nd year	Anabiong (<i>Trema orientalis</i>) 1 st year	Lauan (<i>Pentacme contorta</i>) 2 nd year	Bagalunga (<i>Melia dubia</i>) 1 st year	Yakal (<i>Shorea astylosa</i>) 2 nd year
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Combination with shade-tolerant hardwood species [MARGRAF & MILAN, 2004]



Durian (<i>Durio zibethimus</i>) 2 nd year	Kalumpit (<i>Terminalia Microcarpa</i>) 1 st year	Mangosteen (<i>Garcinia mangostana</i>) 2 nd year	Bitanghol (<i>Calophyllum blacoi</i>) 1 st year	Rambutan (<i>Nephelium lappaceum</i>) 2 nd year	Molave (<i>Vitex parvilora</i>) 1 st year
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Combination with shade-tolerant fruit tree species [MARGRAF & MILAN, 2004]



Staking and layouting in preparation of tree planting

3. Planting

Step 1. Staking and Lay outing.

Recommended distance must be 2x2 m based from the previous RF establishment experience of VSU and their pilot areas.

Use bamboo stakes, grass stalks or any available materials in marking your planting spots

Remove grasses, stones, dead branches and any obstructions in your area.

Step 2. Dig a hole in each staked area to plant one seedling. The hole must be big and deep enough to accommodate the seedlings.

- 🍃 Recommended size of the hole is 12 square inches and measures 12 inches deep.
- 🍃 Separate sub soil from top-soil. The top soil usually darker than the sub-soil.
- 🍃 If your area has poor soil nutrients, dig a bigger hole and add some compost or dried goat manure or about 1-2 kilos vermicast is recommended on to the soil and add 10g NPK complete fertilizer.

Step 3. Transplanting.



Remove the plastic or potting bag out from the seedling before it is planted.



Before putting the seedling in to the hole. Fill the hole with little top soil then put the seedling and then cover the hole completely using sub-soil. This is to ensure that the nutrients from the top soil have good contact with the roots.



Press the soil firmly after the seedling was planted.

4. Farm Maintenance

Step 1. Visit your farm frequently.

Step 2. Remove vines on your plants.

Step 3. Ring weeding

Ring weeding must be done every 2 weeks for the first two years and every three months on the succeeding years.



Step 4. Branch cutting if necessary. Branch cutting can only be done only if a young shade tolerant tree disturbed by leaves and branches of fast growing trees.

5. Nursery Establishment

When doing RF, it is ideal if you start with your own nursery.

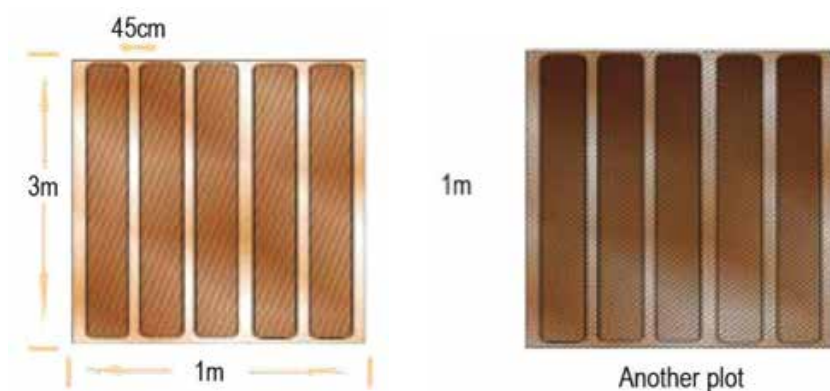
Step 1. Scout an area with lower temperature and near to a good source of water.

Must be near to the site for planting to facilitate the transfer of seedlings.

Step 2. Clean the area of solid waste and non-biodegradable materials.

Step 3. Make a seed plot.

- 🌿 Seed plot must be measured 1 x 4 meters.
- 🌿 In between plot have a distance of 45 cm.
- 🌿 In between rows should be measured 1 meter.



Seed plot model

Step 4. Make a shed house.

- 🌿 Measure 5 m wide and 8 m long as the base in constructing your shed house.
- 🌿 Your shed house must have two parts, the first part is for tool and storage room and the other one is open as a working area.

5. Potting Medium and Bagging

Step 1. Prepare garden soil or forest soil and river sand and rice hull/ organic fertilizer.

Step 2. Mix forest soil or garden soil or forest soil, river sand and rice hull or organic fertilizer thoroughly.

Ratio must be 2 forest soil: 1 river sand: 1 rice hull/ organic fertilizer

Step 3. Bag prepare potting media on a 4"x10" polybags or seed bag. Pack the soil firmly and place the prepared bag into the seed plot or potting bed.

You can also use cellophane, abaca bracts.

7. Seeds and Wildlings Collection and Treatment

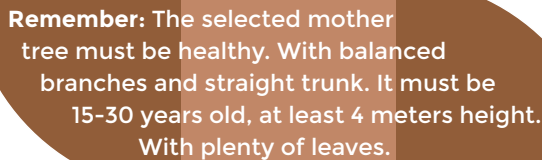
Step 1. Know the mother trees in your area.

Step 2. Collect fruits and seeds from the ground or from standing mother trees.

Most trees in the Philippines produce fruits and seeds during the rainy season.

Visit your selected mother trees every week during the fruiting season, since some of the seeds have short viability (e.g. dipterocarps)

Record the months or years when the mother trees bear flowers or fruits. This will be useful for appropriate timing of collection of seeds for the succeeding years.



Remember: The selected mother tree must be healthy. With balanced branches and straight trunk. It must be 15-30 years old, at least 4 meters height. With plenty of leaves.

Step 3. Remove seeds from the fruits and clean the seeds.

Step 4. Separate viable seeds through floatation test and physical test.

Step 5. After thorough cleaning and test of viability of the seedling, it is now ready for the seed treatments. Seeds such as Dipterocarp seeds should be sown immediately after collection hence these kinds of seeds already germinated before seed off. There are different types of seed treatment for non-dipterocarps seeds depending on the type of seeds such as:

- 🌿 Alternate soaking and drying (e.g. Dao)
- 🌿 Hot water treatment (e.g. Kalumpit)

- 🌿 Cold water treatment (e.g. Tindalo)
- 🌿 Scarification (e.g. Ipil)
- 🌿 Breaking using nails (e.g. Bagalunga)
- 🌿 Complete removal of seed coat (e.g. Narra)

Step 6. Sow the collected seeds on the prepared bags or seed beds. This is only applicable for large seeds. For fine seeds, prepare a perforated seed box.

Seed box must be measured 24 inches in length, 12 inches in width and 6 inches in deep

Seed boxes preferably 75% river and 25% garden or forest soil.

Step 7. If you are out of timing for the seed collection, planting materials may be done through wildling collection. Collect wildlings that are under the crown of the mother tree. Use bolo to uproot the wildlings.

Seedlings must be 10-20 cm in height (varies depending on the species)

Having 2-3 leaves

Must be healthy with no signs of disease

Step 8. Place soil along with the wildlings in a banana stalk. Make sure that the roots of the wildlings are intact so the damage is minimal.

Step 9. Transplant your collected wildlings and seedling to the prepared seed bags.

Make a hole at the center then press the seedlings or collected wildlings firmly to the prepared seed bags

Remember: Seedlings must be transplanted immediately as soon as they unfold their two first leaves.

Step 10. Install a recovery/growth chamber for wildlings and newly transplanted seedlings from seed beds to ensure the 99% seedling recovery. Install the recovery/growth chamber through the following:

- On your prepared seed plot mount 5 dome shape bamboo slat with 1 meter distance on the top of the potting bed.
- On the top tie 7 pieces of bamboo slats at 4 meters long to strengthen the chambers frame.
- Cover with gauge 14 transparent plastics. Seal the ends of the plastic cover by digging a shallow canal around the chamber. Cover the ends of plastic with soil. Make sure that no air could escape the chamber. Remember to water the seedlings before they are covered.



Gradually opened the chamber at the following intervals:

One- week interval for a period of one month

Lift the remaining cover for one month

Fully open and expose to the natural environment after 2 months



Step 11. Record the date it was covered.

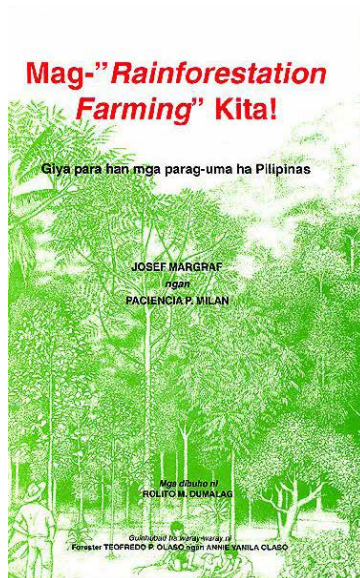
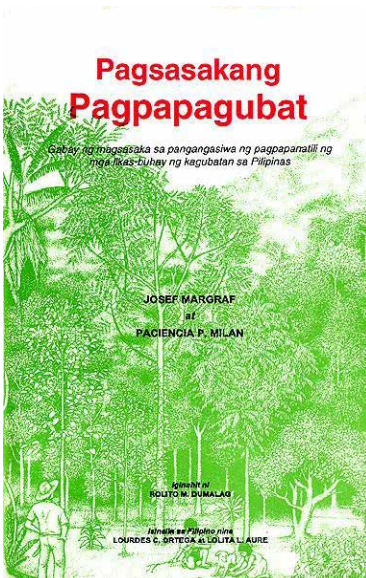
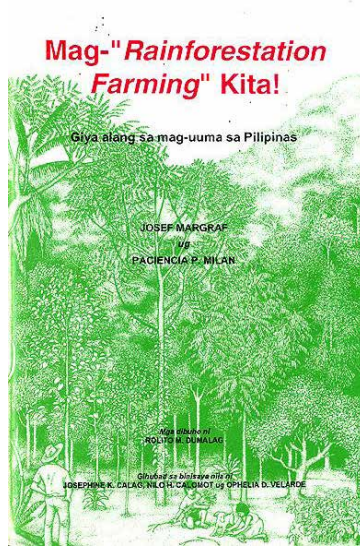
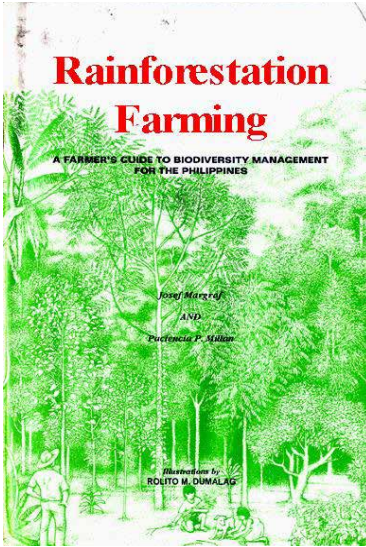
Step 12. Prepare the seedlings for hardening

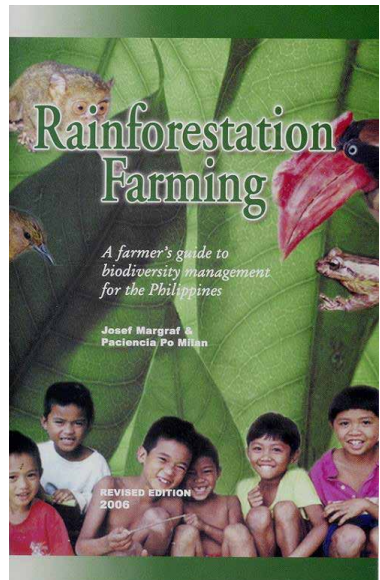
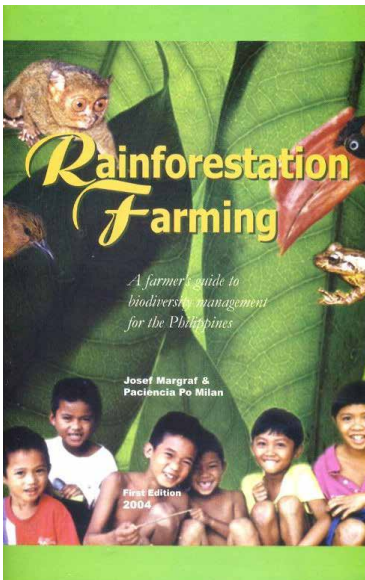
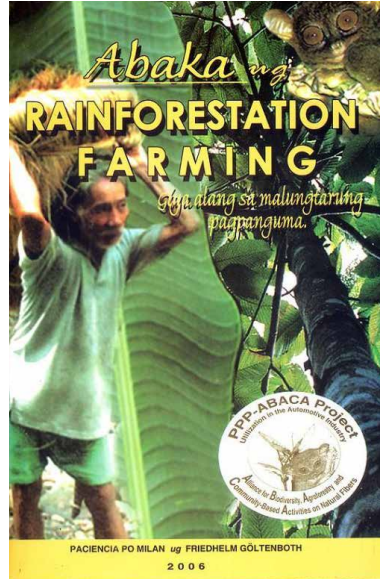
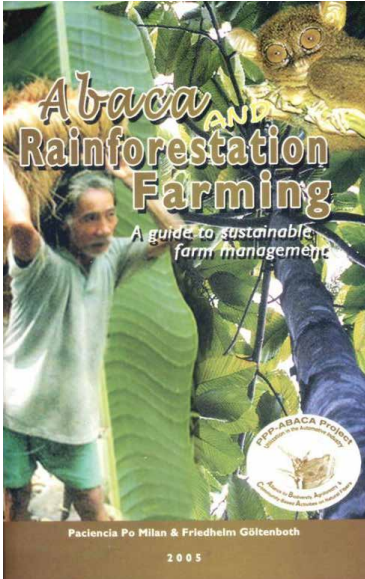
- Pre-harden the seedling by gradually exposing the seedlings to sunlight for two months. Continue watering.
- For final hardening before it is ready for planting, expose the seedling to full sunlight for another three months. Place 2-3 seedling in a row to lessen the competition between seedlings

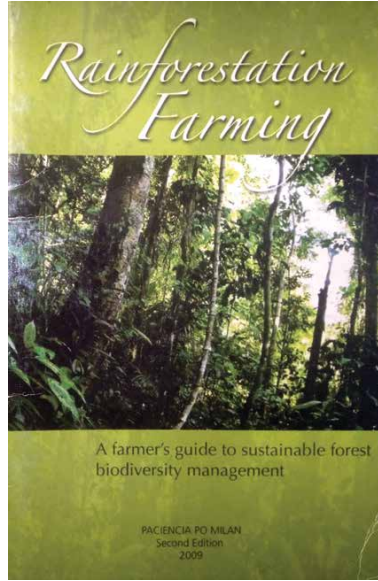
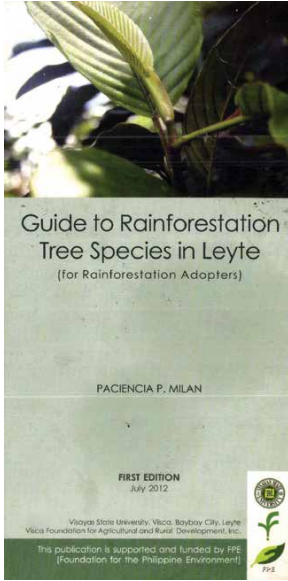


ANNEX 3

RF Guides produced







References

Official Documents

Department of Environment and Natural Resources-Forest Management Bureau (DENR-FMB) Master Plan for the Forestry Development (MPFDP 2016-2028)

Department of Environment and Natural Resources (2014). Philippine Forest at a Glance

Department of Environment and Natural Resources (2015). Philippine Master Plan for Climate Resilient Forestry.

Department of Environment and Natural Resources DAO 2010-11. Revised Regulations Governing Forest Tree Seed and Seedling Production, Collection & Disposition

Department of Environment and Natural Resources 2017-03. Revised Implementing Rules & Regulations of EO No. 193 series of 2015: Enhancing the NGP

Department of Environment and Natural Resources DAO 2016-20. Implementing Rules & Regulations on EO No. 193 of 2015: Expanding the Coverage of the NGP

DENR Memorandum Circular No. 99-20 Policies on Tree Registration, Harvesting, Transport & Marketing

DENR Memorandum Circular 2011-01 Guidelines and Procedures in the Implementation of NGP

DENR Memorandum Circular No. 2013-06. Guidelines & Procedure for Plantation Development for the NGP with Area Coverage of 100 Hectare and Above within Public Forestlands Through the Engagement of Services of Private Sectors, CSOs, POs, IPs, LGUs & Other Government Entities

Publications

Asio, V.B. 1996. Characteristics, weathering, formation and degradation of soils from volcanic rocks in Leyte, Philippines. Hohenheimer Bodenkundliche Hefte 33, Stuttgart, Germany.

Asio, V.B. and Milan, P.P. 2002. Improvement of soil quality in degraded lands through Rainforestation farming. Paper presented at the International

Symposium on Sustaining Food Security and Managing Natural Resources in Southeast Asia: Challenges for 21st Century, Chiang Mai, Thailand.

- Bande, MJM, Pogosa, JO, Orias, AB, Consunji, HT, Niedel, D, Milan, PP (2016). Rainforestation Field Guide. Unpublished.
- Bande, M., Consunji, H, Bloomfield, G., and Labastilla, P., 2016. Rainforestation Case Study: the Cienda-San Vicente Farmers Association Experience. New Haven, CT: Yale University; Panama City: Smithsonian Tropical Research Institute
- Ceniza, M.J.C., Milan, P.P. and Sabejon, M.,2004. Artificial Nesting Sites for Insects and Birds in the Rainforestation Sites of Mount Pangasugan. Terminal Report. ViSCA Applied Tropical Ecology Project. 50 pp.
- Chokkalingam, U, Carandang A. P., Pulhin J. and Lasco R. 2006. Review of Forest Rehabilitation Lessons from the Past. One Century of Forest Rehabilitation in the Philippines: Approaches, Outcomes & Lessons. CIFOR, UP Los Banos-CFNR, DENR-FMB
- Cienda -San Vicente Farmers' Association. Community Resource Management Framework. Sitio Cienda, Baybay, Leyte
- Dargantes, B., Koch W., Case study on the occupation and cultivation of the forestlands in Leyte, Philippines. Center for Social Research VISCA, Baybay, Leyte, Philippines, University of Honhenheim, Germany
- Deutscher Tropentag 1999 in Berlin Session: Biodiversity, Nature Conservation and Development "Rainforestation" farming for biodiversity conservation and rural development in the Philippines
- Fernando, E., Habitats of Philippine Dipterocarps. Fact Sheet Series # 1-26
- Elliott, S. D., D. Blakesley and K. Hardwick, 2013. Restoring Tropical Forests: a practical guide. Royal Botanic Gardens, Kew; 344 pp.
- Energy Development Corporation (2016). BINHI Tree for the Future
- Executive Order (EO) No. 23 series of 2011. Declaring a Moratorium on the Cutting & Harvesting of Timber in the Natural & Residual Forests & Creating the Anti-Illegal Logging Task Force
- Executive Order (EO) No. 26, series of 2011. DENR's National Greening Program
- Executive Order (EO) No. 193, series of 2016. DENR's National Greening Program
- Food and Agriculture Organization of the United Nations (2015). Global Forest Resources Assessment 2015: How are the world's forest changing? Second Edition

- Goeltenboth, F. et al (2015) Rainforestation Farming: A Farmer's Guide to Sustainable Organic Farming and Agro-Forest Biodiversity Management
- Goeltenboth F., Milan P., & Margraf J. (1999) Biodiversity, Nature Conservation and Development "Rainforestation" farming for biodiversity conservation and rural development in the Philippines
- Goeltenboth, F, Hutter Claus P., Hanssler M. "Paths to Sustainable Development, New Experiences in the Philippines". Euronature Edition. Volume 1
- Goeltenboth, F. (2005) "Ecosystem Approach for Landscape Rehabilitation Review and Perspective of Rainforestation Farming" technology in the Philippines. Conference on International Agricultural Research for Development. Tropentag 2005. Stuttgart-Hohenheim.
- Goeltenboth, F. Hutter Claus P. (March 2004). New options for land rehabilitation and landscape ecology in Southeast Asia by "rainforestation farming" Journal for Nature Conservation 12 (2004) 181–189
- Goeltenboth, F., Hutter Claus P. (2004). New options: for land rehabilitation and landscape ecology in Southeast Asia by "rainforestation farming". Journal for Nature Conservation 12. pp 181–189.
- Haribon Foundation. 'Resource and Socio-Economic Assessment in the Boso-Boso and Tayabasan Sub-Watersheds in the Marikina Watershed Reservation.' September 2012.
- Haribon Foundation. ROAD to 2020 Project Profile
- Kummer, D. 1992. Deforestation in the Postwar Philippines. University of Chicago.
- Lamb, D. and Gilmour, D. 2003. Rehabilitation and Restoration of Degraded Forests. IUCN, Gland, Switzerland and Cambridge, UK and WWF, Gland, Switzerland.
- Milan, P. 2005. Rainforestation : A Paradigm Shift in Forest Restoration in the Philippines for Sustainability and Climate Change Mitiation.
- Milan, P. Rainforestation Farming (2009). Rainforestation Farming- A farmer's guide to sustainable forest biodiversity management. Second Edition
- Milan, P. 2009. Rainforestation farming: A farmer's guide to sustainable forest biodiversity management (2nd ed.). Baybay, Leyte, Philippines: Visayas State University. Retrieved April 3, 2012, from http://www.rainforestation.ph/resources/pdf/howto/Milan_2009_Rainforestation_Farming.pdf
- Margraf, J. and Milan, P. 1996. "Ecology of Dipterocarp Forests and its Relevance for Island Rehabilitation in Leyte, Philippines." In Dipterocarp Forest Ecosystems: Towards Sustainable Management.

- Margraf, J; Milan, P., (2006). Rainforestation Farming- A farmers' guide to biodiversity management for the Philippines. Revised Edition
- National Economic Development Agency (2017). Philippine Development Plan (PDP 2017-2022)
- Newmark, W.D. 1993. Conserving Biodiversity in East African Forests: A Study of the Eastern Arc Mountains. ISBN 3-540-42429-6. Springer-Verlag, Berlin, Heidelberg, New York.
- Outcomes & Impacts 2015 1.0: The NGP Partnership – a Review of Policy, Implementation and Milestones. 2016. Rain Forest Restoration Initiative, Philippine Tropical Forest Conservation Foundation and the Foundation for the Philippine Environment.
- Pekka Patosaari, Director, UN Forum on Forests Secretariat (September 2007). Forests and Climate Change: Mitigation and Adaptation through Sustainable Forest Management. 60th Annual DPI / NGO Conference "Climate Change: How it Impacts Us All" Roundtable on Coping with Climate Change: Best Land Use Practices United Nations, New York.
- Rain Forest Restoration Initiative. 2016. "Case Study" in Outcomes & Impacts 201: The NGP Partnership: a Review of Policy, Implementation & Milestones
- Sajise, P. 1996. The State of the Philippine Environment : Baseline Assessment. Quezon City: UP Press.
- Sinha, C. and Heaney, L. 2006, Philippine Biodiversity: Principles and Practice. The Philippines: Haribon Foundation.
- Soenke, K., Eckstein, D. and Melchior, I. (2016) Global Climate Risk Index 2017 Who Suffers Most From Extreme Weather Events?
- Department of Environment and Natural Resources- Biodiversity Management Bureau. Philippine Biodiversity Strategy and Action Plan (NBSAP 2017-2028).
- Stouffer, P. and Bierregaard, R. 1995. "Effects of Forest Fragmentation on Understorey Hummingbirds in Amazonian Brazil." In Conservation Biology. Vol. 9, No. 5 (Oct.). Published by Wiley for Society for Conservation Biology
- Sueta, J.P. 2003. Chemical dynamics of a highly weathered soil under native tree species in Mt. Pangasugan, Leyte. Unpublished Thesis, Leyte State University, Baybay, Leyte.
- Yambot, E., (ed.), 1975. Philippine Almanac and Handbook of Facts. Philippine Almanac Printers, Inc., Quezon City

Department of Environment and Natural Resources-Forestry Management Bureau. (January 2016) Philippine Master Plan for Climate Resilient Forestry Development

Department of Environment and Natural Resources-Memorandum Circular No. 2011-01. Guidelines and Procedures in the Implementation of the National Greening Program

Monographs

DENR/USAID/FPE. Rebirthing Philippine Forests: Best practices and lessons learned in more than two decades of VSU's Rainforestation implementation. Kalikasan BCSD Knowledge Series 10

FPE (2012) Waters Flowing or Flooding? Working for the future of the Upper Marikina Watershed. Kalikasan BCSD Knowledge Series Sixteen

DENR/USAID/FPE/LABB (2013). The Banahaw-San Cristobal Social Fence: Linking Organized Communities in Quezon and Laguna. Kalikasan BCSD Knowledge Series Twelve

DENR/USAID/FPE/IDIS (2013). Convergence-Building Towards Sustainable Management of Watersheds: A case study of Panigan-Tamugan and Talomo-Lipadas Watersheds in Davao City. Kalikasan BCSD Knowledge Series Six

Bande, M. Consunji, H., Bloomfield, G., & Labastilla, P. (2016) Rainforestation Case Study: the Cienda-San Vicente Farmers Association Experience. New Haven, CT: Yale University; Panama City: Smithsonian Tropical Research Institute

Haribon Foundation (September 2012) Resource and Socio-Economic Assessment in the Boso-Boso and Tayabasan Sub-Watersheds in the Marikina Watershed Reservation'

Foundation for the Philippine Environment. 'Waters Flowing or Flooding? Working for the Future of the Upper Marikina Watershed'. Kalikasan BCSD Knowledge Series Sixteen.

Environmental Leadership Training Initiative (ELTI). (November 8, 2016) Technical and Policy Forum on Mainstreaming Native Species for Restoration and Production

Conference Proceedings

Neidel, J.D., Consunji, H., Labozetta, J., Calle, A. and J. MateoVega, eds. 2012. Mainstreaming Native Species-Based Forest Restoration: ELTI Conference

Proceedings. New Haven, CT: Yale University; Panama City: Smithsonian Tropical Research Institute.

Haribon Foundation (November 2005) 1st National Consultation on Rainforest Restoration. Imperial Palace Hotel. Quezon City

Interviews

Phone interview with Forester Mario Lagtican, Supervising Ecosystem Management Specialist, and Nestor Arriola, Jr. Assistant NGP Project Coordinator, NGP/PENRO Rizal, May 3, 2017

Interview with Virginia Banaga, President TSKC, Inc., May 3, 2017

Interview with M. Bande, 2017

Interview with Manuel Bonita, July 22, 2017

Webliography

<http://www.denr.gov.ph>. Congressional Approval of 2018 DENR's Annual Budget

<http://www.psa.gov.ph> 2015. Philippine Statistical Authority. Population statistical figures as of August 2015

<http://www.napc.gov.ph> RA 8425 (1997) Social Reform & Poverty Alleviation Act and its IRR

<https://www.euronatur.org>

<https://www.rainforestation.ph>

<http://www.haribon.org.ph/index.php/road-to-2020>

http://portal.calabarzon.denr.gov.ph/ecotourism/Protected_Quezon.html

<http://www.manilatimes.net/quezon-folk-tackle-vital-issues-on-mt-irid-angelo/340880/>

<http://www.birdlife.org/worldwide/projects/forests-hope-site-mount-irid-angelo-philippines>

<http://www.officialgazette.gov.ph/1987/12/10/proclamation-no-196-s-1987/>

<http://www.officialgazette.gov.ph/1940/07/08/proclamation-no-582-s-1940/>

<http://calabarzon.dilg.gov.ph/realquezon>

<http://fpe.ph/news>

http://portal.calabarzon.denr.gov.ph/ecotourism/Protected_Banahaw.html

<http://www.haribon.org.ph/index.php/road-to-2020>

http://portal.calabarzon.denr.gov.ph/ecotourism/Protected_Quezon.html

<http://www.manilatimes.net/quezon-folk-tackle-vital-issues-on-mt-irid-angelo/340880/>

<http://www.birdlife.org/worldwide/projects/forests-hope-site-mount-irid-angelo-philippines>

<http://www.officialgazette.gov.ph/1987/12/10/proclamation-no-196-s-1987/>

<http://www.officialgazette.gov.ph/1940/07/08/proclamation-no-582-s-1940/>

<http://calabarzon.dilg.gov.ph/realquezon>

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