



PARAMETERS AND INDICATORS FOR MEASURING SUCCESS
OF REFORESTATION PROJECTS IN LUZON, PHILIPPINES

ASSESSMENT REPORT ON THE PRACTICES IN REFORESTATION PROJECTS (ANNEX A)



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College of Forestry and Natural Resources
University of the Philippines Los Baños

UPLB FOUNDATION INC.

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Reforestation Projects in Luzon, Philippines**

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REFORESTATION PROJECTS**

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Acronym

ADB	Asian Development Bank
AP	Assisting Professional
AO	Assisting Organizations
CBFM	Community-Based Forest Management
CBFMA	Community-Based Forest Management Agreement
CEPA	communication, education and public awareness
CENRO	Community Environment and Natural Resources Office
CRMF	Comprehensive Resource Management Framework
CTPO	Certificate of Tree Plantation Owner
DENR	Department of Environment and Natural Resources Forest Management Bureau
eNGP	Expanded National Greening Program
EO	Extension Officer
ERDB	Ecosystem Research and Development Bureau
FAR	Family Approach Reforestation
FSP	Forestry Sector Program
FMB	Forest Management Bureau
HVC	High value crop
IEC	information, education and communication
LGU	Local Government Unit
LOA	Letter of Agreement
M and E	Monitoring and evaluation
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NGA	National Government Agency
NGP	National Greening Program
NGO	Non-government Organization
OGA	Other Government Agency
PENRO	Provincial Environment and Natural Resources Office
PGENRO	Provincial Government Environment and Natural Resources Office
PO	People Organization
SIFMA	Social Integrated Forest Management Agreement
SMP	Survey, mapping and planning
SWISS	Small water impounding system
TOR	Terms of Reference
UDP	Upland Development Project
URP	Upland Reforestation Program
WFP	Work Financial Plan

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I. Introduction

DENR defines reforestation as the planting of an area in forest land using perennial plant species, usually dominated by trees and other forest species including the attendant preliminary activities such as seedling production, site preparation, construction of trails and access roads and bridges as well as the maintenance of plantations. Esteban (2003 as cited in Chokkalingham et al. 2006) defined reforestation as a process of bringing back crop cover, usually arborescent plants, in once vegetation-rich but now vegetation-bereft lands that also includes ecological reforestation and economic reforestation or their combination.

The country has been battling the loss of forest cover since the early 60s due to the widespread practice of kaingin, logging, and forest conversion.

Traditionally, the government and private companies initiated and implemented rehabilitation activities, but since the mid-1970s international funding began to play a role and many sectors became involved (Pulhin 2006). Government reforestation program and projects include contract reforestation, agroforestry, watershed rehabilitation, and reforestation of protected areas, among others.

On the other hand, non-government reforestation is conducted by tenure instrument holders, NGOs, private tree farm holders, and private corporations. Non-government reforestation under tenure instruments includes Timber License Agreements or TLAs, Community-Based Forest Management Agreements (CBFMAs), Integrated Forest Management Agreements (IFMAs), Socialized Industrial Forest Management Agreements (SIFMAs), Tree Farm Lease Agreements (TFLAs), Agro-forestry Farm Lease Agreements (AFFLAs), Industrial Tree Plantation Lease Agreements (ITPLAs) and Industrial Tree Plantation (ITPs).

In 1980 and 1990s, a shift of reforestation strategies was seen, from reforestation by administration to contracting schemes. These programs engaged the participation of corporations, communities and families in reforestation through a contract agreement. These are the National Forestation Program (1986 to 2000); Low Income Upland Communities Project, Coastal Environment Program, Community Forestry Program (1989 to 1999); the Integrated Social Forestry Program (1982); Forestland Management Agreement (1989 to 1995); Integrated Forest Management Agreement (1993); and Socialized Industrial Forest Management Agreement (1994). It was also during the 1980s and 1990s when many foreign-funded reforestation projects emerged.

In 1995, Community-Based Forest Management was adopted as the national strategy to ensure the sustainable development of the country's forest resources, through the promulgation of EO No. 263. It integrated into one all people-oriented forestry programs being implemented by the government such as the ISFP, FOM, FAR, CEP, FLMA, NFP, and LIUCP (Sy 1998). Under the CBFM program, organized communities

or Peoples' Organizations were contracted to reforest and were given tenure over the areas they developed. The earlier contract reforestation areas were subsequently placed under the management of organized communities and issued with Forest Land Management Agreements. Despite these efforts, reforestation targets remain low.

The National Greening Program (NGP), launched in 2011, is the most recent reforestation program of the government. Its goal is to plant 1.5 billion trees in 1.5 M ha of open, degraded forestlands in 6 years. It was expanded in 2015 to cover 1.2 M ha of denuded forestlands and maintenance and protection of existing forests. It aims to achieve poverty reduction, food security, environmental stability, biodiversity conservation and climate change mitigation and adaptation (<https://ncr.denr.gov.ph/>). Later, Executive Order No 193 was issued on Nov 12, 2015 that expanded the coverage of the national greening program to include all the remaining unproductive, denuded and degraded forestlands and its period of implementation is likewise extended from 2016 to 2028.

These reforestation programs and projects may be successful or failure based on the practices and performance done by the project implementors. According to Castillo (1986), reforestation practices involve the choice of species, seed collection, seed treatment and germination, seedling treatment and handling, site selection, site preparation, outplanting, replanting, weeding, application of fertilizers, pest and disease control, fire control, thinning, harvesting and others in considering plantation establishment and development of reforestation activities.

II. Methodology

The reforestation practices were assessed and analyzed in terms of the institutional, technical/biophysical, socio-cultural, economic, and environmental components. Primary data were gathered through key informant interviews using a structured questionnaire. Secondary data (review of literature) were also gathered which were used to support the findings of the study. The key informants represented different sectors coming from the government (DENR, NIA), LGUs, POs, private sectors (Tan Yan Kee, First Gen), NGOs, the academe, tenure holders (SIFMA, CBFMA) and private individuals (CTPO). The study was conducted in Regions 1, 2, 3 and 5.

III. Assessment on the Practices of Reforestation Projects

Good practices in reforestation establish the basic environmental and operational conditions necessary in implementing reforestation programs and projects. The purpose of assessing the good practices is to generate effective and logical guidance in implementing best management practices that will contribute to a successful

reforestation. Good practices from respondents representing the DENR, CBFM-POs, academe, LGUs, and private sector in implementing reforestation projects when assessed and compiled, would help facilitate success of the next reforestation programs of the country. Reforestation activities are grouped into institutional, technical/biophysical, socio-cultural, economic, and environmental components.

A. Institutional Component

SMP/Planning

Survey, mapping and planning (SMP) are activities that should be conducted before the implementation of reforestation projects. The following SMP activities were conducted by the DENR: 1) identification of potential areas for NGP; 2) identification of qualified POs; and 3) consultation and orientation of POs regarding the reforestation contract.

As stated in DENR Technical Bulletin 1A, all identified planting sites shall be subjected to perimeter survey, assessment, and preparation of GIS generated map. A map is very important for planning and implementing various reforestation activities. Also included in SMP, is the preparation of an indicative plan. This plan designates which areas are for environmental protection and for production or industrial purposes as well as the commodity/species to be planted plant based on the physical characteristic of the site and available site indicators. Lastly, during this activity, the DENR also identifies the actual occupants of the land.

Further supporting the need for SMP, the DENR issued Technical Bulletin No. 1B (Revised Guidelines on Surveying, Mapping and Planning Development and Other Activities for Expanded NGP Planting Sites) to ensure that those projects under eNGP conduct site assessment and SMP activities and ensure that plantations to be established are suitable in the area to attain high success rates.

No SMP activities were conducted by DENR in CY 2011 for NGP projects because no funding was allotted for that year. In CY 2012, the DENR was able to secure funding for the conduct of SMPs. However, most DENR Field Offices were only able to do survey and mapping but not planning.

For NGP projects, concerned DENR field staff were the one who prepared the Work and Financial Plan (WFP). All scheduled activities and corresponding budgets were clearly stated in the WFP. PO members were consulted/oriented on various reforestation activities they had to participate.

As compared to reforestation projects funded by ADB loans 1 and 2 and SIFMA, pre-implementation activities such as site assessment, household survey, site species matching, and participatory approach in deciding what to plant, were conducted by the

DENR together with the POs/SIFMA holders. SMP activities were conducted as stated in their management and development plans.

Tenurial holders (CBFMA, SIFMA, IFMA) conducted site and biodiversity characterization and assessment including the forest protection plan, harvesting plan, 5-year project targets and potential market as required in the preparation of their management/development plans. Conduct of various reforestation activities depended on the available budget. The tenurial holders and private plantation owners/CTPO holders decided what species to plant which was usually dictated by market demand at the time of planting. For proper conduct of forestry activities, they consulted the DENR.

The conduct of pre-implementation activities by the private tree plantation owner (CTPO) depended on the available budget. The owner decided what species to plant which was usually dictated by market demand at the time of planting. For proper conduct of forestry activities, the owner consulted the DENR.

The research project team was not able to get information on how the old reforestation projects conducted their pre-implementation activities. DENR staff in charge of these projects were either retired or transferred to other places.

Consultation with various stakeholders is also a part of the planning process. Prior to the implementation of a forestry/reforestation project, concerned field staff together with the project implementer (CBFMA holder, NGP-PO, LGU, academe) conducted consultations/meetings with various stakeholders and local communities, to make them aware of the reforestation project that will be implemented in the area.

The goals, objectives, activities and targets of the reforestation project were also discussed as well as the involvement and benefits the POs/local communities will receive from the project. The involvement of POs and other stakeholders during the planning stage is very important to achieve participation and support for the project. Coordination with various stakeholders, like POs, barangay officials, local communities prior to consultation is also necessary in the planning stage.

For the NGP/eNGP, planning was done by the DENR Central Office with consultation with its bureaus. During the consultation, the following were discussed: 1) conduct of site mapping; 2) identification of plantable areas for NGP using secondary data/baseline information and maps collected from previous projects; and 3) the choice of species to be planted in NGP sites.

The choice of species to be planted was initially dictated by DENR as stated in the National Reforestation Road Map and depended on DENR Secretary's priorities (eg. bamboos, fast-growing species). However, at present, the use of native or indigenous species in degraded areas was already being prioritized, as contained in Technical Bulletins for reforestation and other activities. This had corrected the initial mistake regarding the wide use of bamboo and fast-growing species.

The CBFM-POs actively participated in the planning activities conducted by the DENR, The PO members joined in the identification of potential sites and markets, site assessment, household survey, and identification of species to be planted. The potential markets of CBFM products were also identified during the consultations/meetings to ensure that the species to be planted meet the market demand. The outputs of the consultations were considered in the formulation of the management plan. Baseline information were also considered.

The LGUs and the academe also actively participated in the planning process. The participation of LGUs during consultations, meetings, and workshops showcased their support in the implementation of reforestation projects in their municipalities. On the other hand, the academe was involved in the conduct of community assessment and also participated in site and species identifications.

Like CBFM holders, other tenurial holders (IFMA and SIFMA) conducted consultations with various stakeholders to make them aware of the forestry projects that will be implemented in the area. Other information and suggestions solicited during the consultations were used and considered in the preparation of their management plans.

Issuance of MOA/contract for NGP/eNGP and Tenurial Instruments.

DENR engaged the participation of private corporations, local government units (LGUs), non-government organization (NGOs), people's organizations and academe to undertake reforestation activities in the country's degraded forestlands. A MOA/MOU/tenurial instrument that serves as a legal document, was issued by the DENR to the project implementor (tenure holder, NGP-POs, CTPO holder, LGU, Academe) that participated in reforestation/forestry activities. Partnership and strong collaboration with public and private groups or institutions is one of the best practices for reforestation programs in the country, but this has to be institutionalized through the said legal instruments.

A MOA/MOU/tenurial instrument was issued by the DENR that served as a legal document that allowed the project implementor (tenure holder, NGP-POs, CTPO holder, NGOs, LGU, academe) to conduct reforestation/forestry activities in the tenured area/NGP sites. On the other hand, private tree plantation developers/owners were given Certificates of Tree Plantation Ownership (CTPO) upon registration of their plantations.

From the private sector groups such as Tan Yan Kee Incorporated (TYKI) and First Gen in Region 3 were granted contracts from DENR for them to participate in any reforestation projects. TYKI and First Gen were awarded a 10-year contract for tree plantation development of project sites. First Gen contracted four (4) farmers' association within the project site to reforest the areas within the project site.

For their involvement in reforestation projects, CBFM-POs, Timber License Agreements (TLAs), Integrated Forest Management Agreement (IFMAs) and Socialized Industrial Forest Management Agreements (SIFMAs) holders were awarded tenurial agreements with a duration of 25 years and renewable for another 25 years depending on their performance and fulfillment of their obligations and responsibilities as tenurial holders.

Upon receipt of the budget for NGP, the DENR has contracted various sectors, associations and institutions to engage with NGP projects through MOAs. So far, the following MOAs were issued by the DENR: 1) MOA with academe for seedling production; 2) MOA with CBFM-PO and non-CBFM-PO for site preparation, plantation establishment and maintenance and protection; 3) MOA with LGU and PO tri-partite agreement for seedling production, plantation establishment and maintenance and protection.

In the MOA, the terms and conditions are defined like schedule of activities/workplan, quality and quantity of seedlings to be produced and planted, survival, modes of payment, etc. Also, the responsibilities of each party are stated in the contract/MOA and these need to be followed by each party.

The duration of the NGP contract is for a period of three (3) years commencing 15 days from receipt of notice to proceed issued by the DENR. The first year includes seedling production and actual planting and maintenance; the second and third years are devoted to the maintenance and protection of established plantations.

The following groups/sectors participated in various NGP activities: 1) CBFM-POs; 2) POs without CBFMA or any tenure instrument; 3) Non-government organizations (NGOs); 4) Local Government Units (LGUs); and 5) the academe.

It was reported that DENR prioritizes the POs with existing CBFMAs because they are already organized and they are the actual occupants and tillers of the forestlands. However, it was reported that the number of POs with existing CBFMAs is insufficient to cover or reforest all denuded forestlands. Hence, the DENR allows non-CBFM POs to join.

According to the DENR, for areas with no organized POs, the NGOs, LGUs and academe preferably forestry schools can also join the NGP. LGUs are allowed to participate in the Program, provided that the area that they will develop is within their administrative jurisdiction and consistent with their adopted Forest Land Use Plan (FLUP).

In 2021, the DENR issued Technical Bulletin No. 30 Implementing the Family Approach as a Strategy in the National Greening Program. The DENR has recognized the important contribution of families in managing and rehabilitating forests and therefore intended to directly engage them in developing plantations and reforestation activities under the eNGP.

The implementation of NGP is facilitated through the procurement of services under RA 9184. However, most of the POs do not have the capacity to participate in the bidding process due to the absence of required documentary requirements. Thus, the NGOs are the ones who are in contract with DENR while the POs are contracted by the NGOs as hired laborers for the project implementation. The NGO as contractor should have a good working relationship with the community to attain a successful reforestation project.

Aside from NGP/eNGP projects, some CBFM-POs were also contracted by NGOs with funding from other government agencies (OGAs) such as NPC and DPWH. DPWH contracted POs through NGO to conduct planting in assigned areas by DENR as replacement of trees cut during road widening and establishment of new roads and other infrastructure such as bridges. The DPWH provided the funding for plantation establishment including the cost of seedlings. On the other hand, NPC contracted the POs to rehabilitate watershed areas under their jurisdiction.

Provision of Technical assistance

The involvement of the assisting professionals (APs), assisting organizations (AOs), and CBFM Coordinators during the pre-implementation of CBFM reforestation projects was practiced by the DENR especially those projects funded by Asian Development Bank (ADB). Also, DENR contracted APs to assist the implementation of FMP project which is funded by Japan International Cooperation Agency (JAICA).

The APs/AOs assist, guide and train the POs in the conduct of the following activities: 1) preparation of management plan; 2) community organizing; 3) community site development (CSD); 3) identifying livelihood activities 4) IEC campaigns; 5) identification of potential markets; and 6) capacity building activities such as trainings on seed collection, seedling production, plantation establishment and maintenance, leadership, book keeping, accounting, and financial management, etc.

These said activities were conducted to strengthen the POs in managing their reforestation projects, as well as enhance their skills and technical knowledge on various reforestation activities. The technical assistance and training are key incentives for adopting community-based forest management (Borlagdan et al. 2001).

Regular visit to the CBFM project sites was a practice done by the CBFM coordinators. In this way, they could immediately address the problems faced by the POs in the implementation of reforestation projects assigned to them.

At present, no APs/AOs are hired by the DENR for community organizing. This is because community organizing is not the priority of NGP. Instead, the DENR hired Forest Extension Officers (FEOs) to assist the POs etc. in conducting NGP activities as specified in the Work and Financial Plan (WFP). In seedling production, the EOs

will have to visit the sites to inspect and take geo-tagged pictures as proof of compliance.

On the other hand, LGUs did not hire APs/AOs/NGOs. Instead, the Municipal Environment and Natural Office (MENRO) hired foresters to supervise all forestry/reforestation related activities of the LGUs and provide technical assistance to the local community.

SIFMA, CTPO and other private sector groups seek technical assistance from the DENR and the academe in relation to their reforestation projects. To enhance their technical and managerial skills and knowledge on various reforestation activities, they attended trainings offered by DENR and the academe.

Conduct of Monitoring and evaluation

Different activities falling under monitoring and evaluation were undertaken by DENR contributing to the success of reforestation. These included: a) closely monitoring seedling production by weekly monitoring to ensure completeness of targets, to be done by extension officers); b) requiring PO/BODs to do internal monitoring and evaluation; c) monitoring nursery activities; d) monitoring planted seedlings' survival rate and area planted; e) undertaking external M&E by site coordinators and forest extension officers (FEOs) on weekly basis. FEOs reported the accomplishment of POs and checked them against the Work and Financial Plan (WFP). Validation was done by checking completed staff work.

Some good practices included the active role of PENRO in conducting M&E and the use of assessment tools to monitor and evaluate CBFMA performance. It was also desired that the M&E tool included qualitative assessment, e.g. quality of established plantation. DENR-PENRO and composite team conduct monitoring of reforestation projects two times a year.

To closely monitor seedling production and planted seedlings' survival rate and area planted to ensure completeness of targets, the DENR hired Forest Extension Officers (FEOs). Usually, the FEOs visit the reforestation sites weekly. These FEOs reported the accomplishment of POs and checked them against the Work and Financial Plan (WFP). Validation was done by checking completed staff work. The targets outlined in the WFP serve as the indicators for monitoring the project.

The LGU through its MENRO, helped in monitoring and evaluation through the joint monitoring by DENR and LGU. Using GPS the LGU also conducted ocular inspections, especially on the survival rate of planted seedlings. Sample height measurements were also monitored.

SIFMA submitted quarterly accomplishment reports to the DENR. They also undertook a composite ocular visit at the end of each quarter and at the end of the year.

IFMA holders like TYKFI and First Gen established their tree plantations in Nueva Ecija. As tenure holders, they are required by the DENR to conduct internal monitoring and submit accomplishment reports as part of their compliance to their contract. It was learned that First Gen was able to develop standards used as basis for evaluating its reforestation activities.

As stipulated in their tenurial agreement, a third-party M and E will be conducted before the end of its 25-year operation as one of the requirements of its renewal for another 25 years.

On the part of the CBFM-POs, they are required to conduct internal monitoring either monthly or quarterly aside from the required monitoring by DENR. Before the DENR monitoring team visits the project sites, the POs cleaned the area. They also prepared photo documentation and geotagged the planted seedlings. These served as proof of their compliance in attaining eight-five percent (85%) survival rate. To assist the PO, the FEO did supervision and monitoring, three times a week.

This indicated how DENR worked hand in hand with the POs. However, during field visits, some FEOs aired their concerns/problems in exercising their duties and responsibilities. Problems like limited access to laptops/computers to be used in the preparation of reports and unavailability of transport vehicles when visiting the assigned areas were raised by the FEOs.

As stipulated in the NGP policy, at the end of the term of the NGP contract, the project site shall be subjected to performance evaluation by a third party to be identified by the DENR as stipulated in the NGP policy. However, it was not conducted on the ground. It was reported that no monitoring and evaluation tool is available and used in assessing the NGP projects. Only validation of accomplishments by composite team was conducted and is based on physical targets stipulated in the work and financial plan as a requirement for payment of billing. To avoid bias, a third-party evaluation of reforestation programs should be conducted.

The retention fee amounting to 10% of the contract was given to those POs who get at least 85% survival of established plantations. If conditions in the contract have been complied, the area shall be turned-over to the DENR.

On the other hand, a third-party M&E was conducted in tenure areas (IFMA, SIFMA) at the end of its 25-year operation and before their renewal for another 25 years.

B. Technical/Physical Component

SMP/Planning

The formulation of management or development plan covers the following: statement of project goals and objectives as well as targets (areas to be planted, survival rate),

selection of planting sites, site accessibility, identification of suitable species, indication of cost of seeds/seedlings, identification of site preparation activities, schedule of planting, maintenance and protection, tree plantation plan, forest protection plan, work and financial plan, stakeholder analysis, among others. These activities are mostly in accordance with the guidelines set by the DENR.

Site assessment and species site matching were also conducted before the implementation of the reforestation projects. Information gathered from these activities were used in the formulation of management plan.

Baseline information/data about planting site conditions such as existing tenure, accessibility of the project site, climatic type, topography, elevation, soil characteristic, identification of existing flora and fauna including stakeholders, identification of existing vegetation and species, biodiversity assessment, identification of potential threats, and vulnerability assessment will be collected to help determine where and what to plant, and what special methods are needed to prepare the site and reduce conflicts due to existing site constraints.

For reforestation to succeed, species to be planted should be suited to the conditions of the site, preferred by the community, and with high market demand. Species suitability to the site is dominant consideration because the species should be adaptable to the actual site condition like climate, soil and biotic environment. Respondents recommended that the selection of appropriate species to be planted needs to be included in planning

In the NGP contract for activities, the objectives, roles and responsibility of the parties involved, scope of work, work and financial plan, among others are indicated. The NGP has a shorter contract period of 3 or 5 years compared to the tenurial instrument (IFMA, SIFMA, CBFMA) which has a duration of 25 years and renewable for another 25 years depending on their performance and fulfillment of their obligations and responsibilities. The CBFM POs, SIFMA and IFMA holders prepared their management plans for their tenured areas.

On the other hand, private corporation such as TYKFI and First Gen, has a 10-year contract period with the DENR to develop their area for production and reforestation purposes. A longer contract period ensures that the plantations will undergo a longer period of maintenance and protection until the seedlings are well established.

The reforestation projects conducted by the DENR, LGU, POs and private companies have undertaken most of the pre-implementation activities mentioned above. In some sites, activities like biodiversity assessment, site-suitability-market matching, soil analysis, socio-economic profiling, identification of market were not undertaken by some of the respondents.

The Forestland Management Project (FMP) which is funded by JAICA, on the other hand, conducted watershed characterization, vulnerability assessment, and socio-economic baseline survey, preliminary study on community-based enterprise development and preparation of rehabilitation, protection and development plan in the reforestation sites. In addition, it has assisted in community organizing where it engages in PO formation and strengthening and facilitating the acquisition of tenure instruments (e.g. CBFMA, PACBRMA).

The DENR coordinated with the barangays on ground validation activities, mapping and survey. According to the respondents, site assessment is an important pre-implementation activity particularly in cases of overlapping tenurial instruments and boundary conflicts. All of the reforestation projects being implemented have either management plans, reforestation plans or work and financial plans.

Nursery Operation Practices

Nursery operation activities include the production of seedlings through seed collection or procurement, storage, treatment, sowing and germination, potting, hardening, and outplanting. DENR had a lot to do with the successes of reforestation projects. One of these was through assistance in the production of planting materials, i.e., seedlings. It had also established nurseries in various DENR offices to produce seedlings for distribution to interested individuals and the general public.

In its NGP projects, seedlings were raised in nurseries within the project areas, mostly from seeds. Very rarely, wildlings were used to supplement seedlings so that the target number of planting materials is met. According to respondents from DENR, LGU and academe, seeds are best obtained from the areas or nearby mother trees because they are already adapted to the area and have the desirable characteristics. Also, there is high potential of survival of the seedlings because of the same climatic type and edaphic conditions. Seed source is a major factor in determining the success of most reforestation programs.

The NGP guideline for the establishment of a nursery is that it should be constructed on-site, or in a strategic NGP sites, just near the planting site to save the seedlings from stress during transport. As well, seedlings of indigenous species were raised mostly in clonal nurseries.

Allowing time for seedling production indicated that the DENR was giving importance to ensuring that only good planting materials were used. In its ADB-funded reforestation projects, one year was allotted for seedling production before planting.

Good quality seedlings were also needed for replanting when in the second year, maintenance and protection are conducted and planted seedlings that die or did not grow well were discovered and had to be replaced. Trees out planted seedlings should attain the required height and diameter based on the terms and condition stipulated in the MOA. If otherwise, they had to be replaced, and DENR ensured they were replaced by more superior quality seedlings.

Funding was important in having nurseries that would raise quality seedlings. DENR provided funds for NGP and CBFMA toward establishment of nurseries. Also, DENR provided seedlings to interested sector (tenure holders, LGU). Private sectors involved in reforestation including SIFMA, IFMA and private tree plantation developers produced their own seedlings from own funds. DENR produced seedlings and distributed them to interested individuals or groups.

All above practices of DENR and imposed upon reforestation projects were aimed at preventing the POs to produce or buy seedlings from non-accredited nurseries, resulting to the problem of poor quality of seedlings leading to a low survival rate and compromising the quality of wood from the planted trees.

The Provincial LGU also understood the need for nurseries for reforestation to succeed. Despite not having received funds from NGP for seedling production, the LGU was able to produce quality seedlings to ensure that the first steps in successful reforestation was taken. The seedlings that the LGU produced were in addition to the seedlings given by DENR during the first year of operation of the project of LGU.

Another good practice of LGU was the collection of seeds and wildlings from mother trees (inside DMMSU areas and parks). These were raised in the five provincial nurseries. Seedlings for replanting were also raised in the nursery. To help other reforestation projects in the province, La Union had a Provincial Greening Program for seedling production and dispersal. LGUs produced seedlings and distributed them to interested individuals or groups.

For POs, good practice in seedling production consisted of establishing a nursery located near water sources like springs. In the nursery, the necessary steps in seedling production were followed, including, potting, watering, and fertilization. Potting medium is also carefully prepared. The soil medium used in seedling production consisted of topsoil and compost, in a 1:1 proportion. So that there would be no shortage of seedlings, in raising the total number of seedlings, a 10% allowance for mortality is factored in. In an inevitable case of seedling production shortage, the PO bought seedlings from DMMSU nurseries. This was acceptable, because these nurseries were the best sources of seedlings especially so that these nurseries have already been accredited by DENR.

Furthermore, the DENR assisted the PO in identifying good planting materials and provided technical support in seedling production. When seedlings produced in the nurseries are limited during planting, POs are allowed to buy seedlings from accredited nurseries. Unfortunately, some seedlings were bought not from accredited nurseries. The requirement that they can only buy from PhilGeps registered bidders became a problem. Sometimes, the winning bidders come from other regions or provinces. Buying from suppliers from far suppliers makes transport and handling difficult, resulting in stress on the seedlings.

The academe's good practice in seedling production had contributed also to the success of reforestation projects in the province. These practices must have been based on research and good practices that the academe had learned from other projects locally and abroad. DMMSU maintained nurseries properly managed. Seedling production involved the following activities: potting, watering, and fertilization. It also ensured that seeds were coming from good seed production areas or SPA. Seeds and wildlings were collected from mother trees inside the DMMSU campus. Being accredited, the university's nursery was able to sell properly raised seedlings to POs and interested individuals.

Some forestry schools adopted clonal technology to mass produce planting materials from indigenous and native species. Their developed technology provided the PO, DENR, private sectors and others stakeholders to utilize their good quality planting materials for a successful reforestation project.

The private sector also contributed to good practices in seedling production. SIFMA's good practice in seedling production was the raising of quality seedlings in its constructed temporary nursery. First Gen produces its own seedlings which are mostly indigenous tree species, HVC, fast growing species and bamboo. At present, it has four reforestation projects under the BINHI project located in Pantabangan, Nueva Ecija in Region 3.

CTPO holder also established a temporary nursery (not functional at present) to raise its seedlings for the establishment of its plantations. When the nurseries stopped operating, the CTPO resorted to buying from DA and DENR for its planting material requirements. Mahogany was very popular during the time of planting and thus was chosen for the plantation establishment.

The NGP guideline for the establishment of a nursery is that it should be constructed on-site, or in a strategic NGP sites, just near the planting site for easy accessibility of the planting materials to save them from stress during transport. Also, the location of the nursery established should be located near available water source.

Production of quality planting materials

Seed source is a major factor in determining the success of most reforestation programs (Castillo 1986). All sectors practiced the use of seeds from nearby mother trees if available because they are already adapted to the area with potential high survival due to the same climatic type and edaphic condition.

The quality and condition of seedlings are based on the species and source of planting materials (wildlings, nursery raised, clonal), average height to be planted, kind of species (indigenous, fast-growing or exotic), and others.

In general, to produce quality and good condition planting materials which is a prerequisite to successful reforestation, there must be close monitoring of seedling production to produce good seedlings. Assessment of planting materials has to be a requisite to be undertaken strictly.

Good characteristics of plantable seedlings of different crops or species like narra and coffee seedlings would vary. Some species were considered good, at one foot tall, and 1 cm in diameter. In the case of wildlings, those that were 3 months old were considered good. Upon reaching a height of 6 inches, seedlings from wildlings are ready for outplanting. Seedlings that are overgrown were those that were more than 50cm in height and were not good for planting anymore.

Seedlings from greenhouse nursery which are considered good quality and ready for outplanting without any presence of any pest and diseases, should be at least 1 to 3 ft in height and 1 cm in diameter (pencil size).

Buying seedlings from non-accredited nurseries should not be allowed, because they are usually the sources of poor-quality seedlings.

Another success-enhancing practice was ensuring or requiring proponents to achieve low mortality, e.g. below 10% of total seedlings outplanted. In addition, before outplanting, the seedlings should be validated to ensure the complete total number of seedlings were outplanted. Condition and quality of seedlings were also checked and validated.

Site preparation practices

Good preparation of planting sites was a big contributor to the success of reforestation. Corollary, poor site preparation had been an important contributor to low survival rates of planted trees and poor tree growth performance. Site preparation aims to secure high seedling survival and rapid early growth by controlling competing vegetation.

It also followed that location of suitable sites was important. DENR followed accepted procedures in site location. It took upon themselves as their duty to properly identify the sites for planting and the species to be planted by doing site-species matching.

For site preparation, DENR conducted activities, following the steps and procedures in preparing the sites for reforestation as specified in a technical bulletin it issued for site preparation. The bulletin recommends among others the appropriate procedures depending upon considerations like the species to be planted, the present vegetative cover, and the current site condition.

To prepare the NGP site, the POs need to conduct the following activities: strip brushing, holedigging, and staking. Once these activities are done, the POs will have to wait for the rainy season before planting the seedlings.

Application of organic fertilizer (Agola and Viva, vermicompost), inorganic fertilizer, and nitrogen fixing to enhance the soil during the site preparation was practiced by DENR, PO and LGUs to help increase the survival of planted seedlings.

For the LGU, good practice was the conduct of training and orientation in site preparation attended by personnel before planting for at least 1-2 days. LGU personnel who attended the training, re-echo the knowledge learned to the farmers. In cogonal areas, spot clearing was done. Nitrogen-fixing trees, kept for almost one year, were used to enhance the soil.

The PO conducted proper site preparation activities to ensure planting success. These activities include strip brushing along the contour. In doing this, the shade was provided to the seedlings. Planting along the contour also enabled the PO to easily observe and assess the condition of the seedlings. Holes (1 ft. deep and 8-10 cm wide) were dug and marked with stakes, and were planted with seedlings.

The academe contributed to practicing good site preparation by maintaining demonstration areas for educational purposes. Here, they did site preparation, planting, and maintenance. With MOAs with DENR and LGU, DMMMSU also engaged in seedling production.

SIFMA prepared its planting site by spot brushing, staking, hole digging. Other site preparation activities are as detailed in the management plan. Meanwhile, CTPO prepared their plantations by strip brushing, hole digging, and staking.

Planting practices

All the respondents mentioned that plantation establishment should be done during the onset of rainy season based on the project's site climatic type. Planting of seedlings at the right time is crucial because this directly affects the survival of the seedlings in the field. Typically, the most appropriate time to plant tree seedlings is at

the beginning or in the middle of the rainy season. However, many factors, such as the late arrival of seedlings, or delayed release of the project budget, can mean that seedlings are planted at an inappropriate time of year (e.g. at the end of rainy season or during the dry season). This greatly affected the survival of seedlings planted.

Hauling of seedlings from the nearby nurseries to the planting sites in the early morning is practiced by POs to minimize stress on the planting materials. POs used “bayong” and sacks if the site is not too far while they used carabao sled, “habal-habal”, jeep or truck for project sites with further distance.

SIFMA/CTPO holder and private managed reforestation projects used crates/kolong-kolong (motorcycle with sidecar) while LGU used tractor or carabao to haul planting materials to the project site. Furthermore, some LGUs hired laborers to bring the seedlings to the planting site using sacks.

PO prefer bareroot seedlings for planting in their assigned reforestation area. According to literature, bareroot seedlings are the **most economical planting stock** for large planting projects. Bareroot seedlings were lifted from the fields, and sold dormant, without soil surrounding the roots. They are the best performers in open field plantings where competition is high.

The DENR Bulletin strictly adhered to observing the right spacing for different planting materials. For example, for timber species, the spacing observed was usually 4m x 5m, and for bamboo and other agricultural crops, spacing is variable. To plant the seedlings, holes with a size of 4cm x 6cm were dug. LGU also adopted spacing depending on the species to be planted, e.g. narra – 4m x 5m; coffee – 2m x 3m; fuelwood (kakauate) – 2m x 2m.

Planting of seedlings depends on the terrain of the project area and proper spacing is required to attain higher survival rate. Different sectors implemented their practices in terms of spacing as follows:

Sector	Species	Spacing
DENR	Mahogany and Narra	4m x 5m
	Fruit trees	5m x 5m or 7m x 7m
CBFM-PO	Mahogany and Narra	3m x 3m
	Fruit trees (monocrop)	5m x 5m
LGU	Fruit trees	10m x 10m
	Timber species	2m x 2m
	Narra	4m x 5m
	Coffee	2m x 3m
	Kakauate	2m x 2m
Private		1m x 1m

Sector	Species	Spacing
		2.5m x 2.5m (based on topography) 2m x 2m or 3m x 3m based on sloping

All sectors practiced of intercropping in reforestation projects for the local community to have additional income or other sources of livelihood.

In Region 5, a NGO established a demonstration site to show the correct spacing, staking and other planting activities to the PO members and local community.

For private sector specifically the TYKI, planted pioneer species like alibangbang before planting premium species in their plantation. First Gen on the other hand, scheduled planting by block based on their development management plan.

Maintenance practices

Maintenance of established plantations including silvicultural treatments applied at the establishment and early growth phase of forests were particularly important to reforestation success.

It was learned from the interviews that all sectors conducted all maintenance activities such as ring weeding and mulching, replanting and fertilizing. They appreciated the importance of conducting these activities, especially during the early growth phase of reforestation to ensure success and survival of planted seedlings.

All respondents stated that these activities are best done during rainy season. With abundant rains, weeds tend to grow fast thus plantation areas need frequent brushing and weeding.

As soon as the seedlings are planted, the POs are required to take care of the NGP site for at least three (3) years. This activity requires the execution of three (3) contracts, one contract for each year, between the DENR and the POs.

DENR had specified activities to be conducted as part of maintaining the planted sites and these are detailed in a technical bulletin. DENR for example practiced the following in the reforestation projects and may have contributed to the success of the projects:

- a) Ring weeding and mulching which were done usually starting in July. Weeding was done two times, e.g. during 3rd and 4th quarters of the year.
- b) Seedlings that died were replaced in replanting. This is done during the 1st cycle – 3rd quarter; 2nd cycle – last quarter. During replanting, cleaning is also done to

protect the established plantation free from unwanted vines and avoid competition during fertilizer application.

- c) Fertilizer was applied twice, once during the onset of the rainy season, and second after planting up to the second year.

The LGU also adhered to good maintenance activities of planted sites. These activities were especially needed and conducted in plantations during the early various early stages of its growth. These activities included a) strip brushing for fire-prone areas; b) ring weeding three times a year; c) fertilizer application in the 2nd year. Fertilizer was applied upon planting and applied again during the rainy season. Some projects used urea. For nursery-grown seedlings, Bio-N fertilizers were used during outplanting and when the root system was already established; and d) replanting after 1 month which was usually done before M&E and validation.

PO was also much aware of the importance of maintenance activities and thus diligently conducted the following activities, namely: a) strip and ring weeding which was done twice a year during the rainy season; b) fertilization using urea or complete fertilizer which was done three times a year on the 1st year (1st application was done after planting; 2nd application was done in September and the 3rd application done in November) and then done yearly for 4 years using complete fertilizer; and) replanting which was usually done before M&E and validation.

For needed maintenance of plantations, the academe did ring weeding, removing barnacles, and replanting.

SIFMA, in undertaking maintenance work in plantations conducted ring weeding, organic fertilization (1st year) and replanting, while CTPO hired labor to maintain the planting sites. On the other hand, a standard for its maintenance activities was developed by First Gen for its reforestation projects.

Replanting was conducted in areas with low survival rates. This is practiced by the POs for M and E and validation purposes. Replanting is done to meet the target output based on the WFP.

After turn-over of reforestation sites, DENR practices minimal maintenance activities based on budget availability while for private sectors with sufficient budget, continuous maintenance activities were conducted.

Forest Protection practices

Forest protection activities helps prevent and mitigate illegal harvesting, forest fire, presence of pest and diseases, influx of settlers, new kaingin firewood gathering, charcoal making and others forest destruction. In some successful CBFM projects, their success is commonly attributed to the protection activities of POs like creation of

forest patrols composed of deputized forest guards and fire brigades. Foot patrolling of the whole reforestation project is done to prevent the occurrence of fire and illegal activities in the area.

CBFM-PO's protection activities included foot patrol three times a month. PO members also continuously monitored planted areas, especially during the wet season because of stray carabaos. Each patrol group consisted of 3-5 persons. There are 3 groups being scheduled.

One of the duties and responsibilities of tenure holders (IFMA, SIFMA and CBFMA) is to protect their tenured areas from uncontrolled grazing and fires illegal cutting/logging and charcoal and kaingin making. To address these problems, tenure holders established firelines (at least 10 m in length), firebreaks and lookout towers in their reforestation sites. The width of a fireline depends upon the size of the area. For firebreaks, banana and kakauate were used because of their fire-resistant quality.

For the private sector, the SIFMA in La union and TYKFI hired security personnel/plantation/forest guards to protect their areas from illegal activities and from fire occurrence. IEC campaign was continuously practiced to inform local communities about potential causes of fires but they have their own trained fire protection teams as well as fire fighting facilities. They also used drone and LAWIN application for monitoring and protection purposed. In addition,

First Generation has also developed its own forest protection plan with necessary protocols developed. Aside from hiring forest guards, the SIFMA holder fenced the whole SIFMA area to prevent entry of stray animals that are destroying the planted seedlings.

Protection works undertaken by LGUs include foot patrolling and the establishment of firelines and firebreaks.

The establishment of firelines and firebreaks during dry season was practiced by NGO to control forest fires. The NGO established firelines with spacing of 3m x 10-20 m wide depending on the size of the project site. The NGO also used banana and kakauate as fire breaks because of its fire-resistant quality.

DENR hired forest protection officers to regularly conduct foot patrol together with PO and other forest protection officers (Bantay Gubat, voluntary forest protection team). DENR also used LAWIN application as part of their forest protection tool especially in NGP/eNGP areas. DENR field staff, CBFM coordinators and FEOs conducted IEC campaigns to educate those people living inside and nearby forests on the danger of throwing cigarette and conduct charcoal and kaingin making inside the plantations. These activities may cause incidental fires and thus destroy the plantations.

Harvesting Practices

Not allowing forest production and in particular harvesting of forest products will affect the long-term sustainable management of reforestation projects, especially by communities and the private sectors (FMB-FAO 2003). DENR has to have a clear and consistent policy on forest production.

In NGP sites, the DENR allowed only fruits and high value crops (HVC) such as coffee and cacao to be harvested at the moment, usually for family consumption within the community. If abundant, the excess harvests are sold in nearby markets.

DENR allowed tree harvesting in reforestation projects supported by ADB loans 1 & 2, within CBFMAs. In these areas, POs were already harvesting the trees they had planted before. Also, POs are allowed to harvest coffee (twice a year), cacao, fruit trees usually for home consumption.

The SIFMA in La Union only harvested mature trees for home consumption only.

The ISF beneficiaries of LGU Piddig, Ilocos Norte have already harvest coffee and other agroforestry crops in their agroforestry farms.

The CTPO holder in La Union already harvested matured mahogany and ipil-ipil trees and fruit trees. He is selling harvests from fruit trees through “pakyaw” system where the buyers or “mamakyaw” were the one in-charged of harvesting using their own harvesting tools. In harvesting mature trees, selective cutting was applied but this was stopped because the buyers thought that this system is expensive. The owner identified and determined which trees were ready for harvest. In harvesting, labor was hired, or done by job order, to ensure that trees were not cut by other people. Ipil-ipil wood was used as fuel for curing tobacco. Ipil-ipil were harvestable and cut in the 3rd or 4th year. After cutting, the owner just let them grow and coppiced. Livestock were also raised for sale and home consumption.

Infrastructure

For DENR, infrastructures are needed to undertake various tasks in reforestation. They were also constructed to facilitate the delivery of goods and services to project implementers and beneficiaries. The DENR allowed the construction of the infrastructures in reforestation sites like nurseries, firelines and firebreaks, small water impounding system (SWIS), bunkhouses, and lookout towers and road network. SWIS tanks are constructed to take care of the water requirement of plants.

The infrastructures constructed by LGUs to be able to contribute to the task of reforestation were guard houses for protection works and a network of roads like farm-to-market roads for access and also to serve as firelines.

All sectors constructed a temporary nursery, firelines and firebreaks. PO relied upon the LGUs in road development and farm-to-market roads. Firelines and firebreaks are used for fire prevention and control.

SIFMA constructed concrete water canals for soil erosion control, SWIS for watering the planted trees and agricultural crops and look-out tower with a viewdeck. All these would have contributed to undertaking various tasks in reforestation.

C. Socio-cultural Component

Consultation, Orientation and Participation of Stakeholders

Active community and stakeholder participation in planning, management, implementation, and monitoring is needed for reforestation to succeed. The involvement of the community in planning builds confidence and creates a sense of ownership on the outputs of reforestation activities, thus enhancing participation.

The stakeholders participated in various reforestation activities. The local communities, LGUs, academe and the private sectors, together with the DENR conducted occupancy or household survey, stakeholder analysis and site assessment in the reforestation areas. They were also closely involved in planning, decision making, monitoring and evaluation with the DENR. The private sectors also identified potential markets for their agroforestry produce and livelihood initiatives. Forest protection was conducted in coordination with the local Army detachment at the project site. The Barangay was also involved in forest protection by issuing local ordinances to monitor and control stray animals in the project area.

The local communities/POs were mostly involved as hired labor for such activities as seedling production, site preparation, planting, maintenance and forest protection and monitoring in the NGP areas of DENR/POs and reforestation projects of LGU, SIFMA, CTPO and of other government agencies.

Participation in trainings and seminars

Various trainings and skills development were provided to the POs to capacitate them and equip them with the knowledge and skills to manage their reforestation projects that covered technical, financial and management aspects. These trainings were conducted to ensure the successful establishment of the plantations.

In CBFM projects like those funded by Asian Development Bank (ADB) loans, trainings were given to POs on seed collection, seedling production, plantation establishment and maintenance, leadership, book keeping, accounting, and financial management. NGOs also provided training to POs on proper nursery operation, plantation establishment, maintenance and protection. The private sectors, on the other hand, trained their CSR beneficiaries/farmer associations in terms of entrepreneurship and product development. The private sectors also regularly conduct orientation to inform the communities POs about the reforestation project and development activities to be implemented as well as the possible benefits they will receive with their participation.

Aside from the POs and local communities, EOs and LGU/MENRO personnel were the also the beneficiaries of trainings initiated by the DENR, in coordination with the academic sector, related to reforestation. The EOs and LGU/MENRO applied what they learned from these trainings during the conduct of various NGP and other reforestation activities

Conduct of Information education and communication campaign

IEC activities like setting up billboards, and distribution of pamphlets or brochure, were implemented by DENR to inform concerned stakeholders and local communities about the existence of reforestation and other forest projects. The IEC materials produced by the implementors such as billboards, signages, and posters show the important details of the reforestation project. DENR's communication, education and public awareness (CEPA) aims to educate the PO members and non-members in the community of the goals, objectives, and targets of the reforestation project. The past reforestation projects also produced and disseminated various IEC like billboards, signages, and posters. Education, information or awareness building campaigns that provide technical assistance and training are key to reforestation success, particularly those projects involving community-based forest management (Borlagdan et al. 2001 cited by Le et al. 2013).

DENR together with LGUs give lectures to educate the project implementors and communities people living inside and nearby forests on the danger of throwing cigarette butts and practices that are prohibited such as charcoal and kaingin making inside the plantations. These activities may cause incidental fires and thus destroy the plantations. However, these lectures are not regularly conducted due to budget constraints.

D. Economic Component

Employment generation for local community

Availability of local employment opportunities is one of the most common indicators used for measuring socio-economic success of reforestation. Employment generation

for local communities is identified as an important activity that should be considered during planning.

Reforestation conducted by NGP, SIFMA, IFMA, NGOs, CTPO, academe, and LGU usually hire local residents as laborers in conducting various reforestation activities such as seedling production, site preparation, planting, maintenance and protection. Community involvement as a labor force is essential for the success of the project. However, this type of involvement is not sustainable since the participation of the local communities is short-term and limited.

Aside from hiring laborers in the implementation of reforestation projects, some sectors such as IFMA and CTPO holders, employ the following: 1) concession guards who are in-charge in monitoring and protection of the reforestation areas from illegal activities; and 2) managerial and administrative staff who are doing administrative works.

As practice, all project implementers prioritized the hiring of local people in the community.

Livelihood/social enterprise opportunities

Livelihood-enhancing activities must be part of reforestation plans, and projects developed should address the needs of people in the area in order to ensure their participation and interest in sustaining the project (de Jong et al. 2006; Chokkalingam et al. 2006a).

NGP addresses the socio-economic needs of its beneficiaries. Aside from the payment of the POs as hired laborers for conducting various reforestation activities (e.g., seedling production, site preparation, plantation establishment, maintenance and protection) all proceeds from agroforestry plantations are shared among NGP beneficiary communities. Agricultural crops like fruits and high value crops (HVCs), were planted in reforestation sites usually for home consumption while waiting for the timber crops to grow and be harvested. Also, NGP beneficiary communities are also considered priority in the Conditional Cash Transfer Program.

The CBFM-POs are also engaged in non-timber forest products collection, livestock and fish farming aside from timber and agroforestry crops.

The SIFMA holder in La Union is engaged in agroforestry, livestock production and tourism project. The holder's private land and a part of the SIFMA area became a tourist destination where some amenities (swimming pool, picnic tables, playground) are available for rent by visitors.

IFMA and SIFMA holders, CBFM-POs, private tree planters and CTPO holders had already harvested timber from their areas and sold these to wood processing plants in nearby provinces and in Metro Manila.

Harvesting Practices

Only mature trees ready for harvesting are cut and harvested in SIFMA, CBFM, IFMA and private tree farm areas. Application of harvesting permit such as Resource Use Permit (RUP) from the DENR is necessary before harvesting is to be conducted in the area. DENR allowed tree harvesting in reforestation projects supported by ADB loans 1 and 2, within CBFMAs. In these areas, POs were already harvesting the trees they had planted before.

Harvesting of trees planted is not yet allowed in NGP sites. The respondents from DENR, POs, and NGO mentioned that harvesting is only limited to cash crops, and fruit trees in production area. The project implementors especially the POs are already harvesting their agricultural crops, fruits trees and high-value crops (HVC) in the project area. The sharing scheme practiced by the PO is 60:40; 60% goes to the member while the remaining 40% goes to the organization. For the DENR, the shared income of the organization was 5% and the rest goes to the PO member. This practice was done by the PO for their reforestation projects that used fruit trees and HVC. Thus, this provided opportunity for the farmers and PO members to increase their farm income.

For private individual/group like the CTPO, one of its good practice in harvesting timber is the “pakyaw” system where the buyers or “mamakyaw” are in-charge in harvesting using their own harvesting tools.

E. Environmental Component

Monitoring

The private sectors, TYKFI and First Gen Corporation conducted biodiversity and carbon stocks assessment with the assistance of the academe to determine the impact of their reforestation project. They also had the help of the academic sector in the conduct tree inventory and stand and stock assessment. They were able to conduct these activities due to availability of funds.

For the other project implementors, environmental assessment is through ocular observation, whether there is improved water quality and quantity, soil fertility, microclimate, increase in biodiversity, less soil erosion, and others.

Forest protection

Integrated pest management is one of the forest protection measures done in the plantations with the support of an NGO. Natural remedies were used to control the pest and diseases in planting materials and closely monitored to ensure healthy planting materials with a higher chance of survival.

The private sector has specified in their comprehensive site management plan pest and disease control and fire management. Standards on fire management were also developed by First Gen in Region 3. Forest protection by the private sector also involves deployment of forest guards/volunteers in the reforestation sites and the use of drones.

III. Recommendation

Based on the assessment on the practices from different regions implementing reforestation programs and projects and review of literature, the following are hereby recommended:

- 1) Clear and precise objectives, activities and targets for the reforestation programs and projects to attain its success and sustainability.
- 2) Mandatory conduct of survey, mapping and planning prior to the implementation of the reforestation program and project.
- 3) Site species matching and quality seedling shall be determined to assess and ensure high survival and growth of planted materials.

- 4) Involvement of the local community, people's organization and other concern stakeholders during the planning stage of the reforestation program and projects in the area.
- 5) Provision of technical assistance and capacitation of the members of People's Organization to improve their skills and knowledge on proper nursery operation and plantation establishment for reforestation projects.
- 6) Frequent maintenance, protection and monitoring of the established reforestation by DENR personnel.
- 7) Extend number of years in maintenance and protection of the established reforestation to attain successful reforestation activity.
- 8) Third party validation every 5 years of the reforestation program and projects to assess the actual impact of the reforestation project.

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