



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

STANDARDS AND PARAMETERS FOR SUCCESSFUL REFORESTATION PROJECTS (ANNEX D)



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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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INTRODUCTION

The standards and parameters to ensure success of reforestation projects have evolved through time as a result of the many lessons accumulated from operationalizing various projects in the past. Realizations of what works and what does not in field implementation have driven the need to continue revising, changing, and making innovations on how reforestation should be done – from a “standard and uniform” set of rules of engagement in past contract reforestation projects to a more “site-specific” decision making based on recent guidelines. The level of “details” in compliance with existing rules and regulations depends on what is being measured through the M&E system and tools developed for the reforestation program. The cycle of reviewing and revising policy according to the changing trends, issues and concerns as well as dictated by priorities of the current administration is and will be a continuing occurrence.

The project reviewed the basis for the current standards and parameters used in measuring the performance of reforestation projects, be it by DENR, the LGUs, or other partners. The standards and parameters are contained in various laws, regulations, and policy issuances emanating from the government over the years. The content of such laws and policy issuances were reviewed along with secondary information and literature.

Some of the national laws and policy issuances as well as previous reforestation projects that serve as the backbone of recent reforestation guidelines are discussed along with the results of the key informant interviews conducted in this study.

Institutional Component

Goals and objectives of reforestation. The goal of the old reforestation programs was mainly to reforest open, degraded, inadequately stocked public forestlands and areas of the public domain such as along river banks and easements, roadsides, and critical watersheds for conservation and protection (PD 705 as amended; PD 953; PD 1153). Later on, the Program for Forest Ecosystem Management (PROFEM; LOI 423) specified such goals as: “to achieve a holistic ecosystem approach to forest resource management; to prevent irreversible consequences of human activities on the forest ecosystem; to renew and restore at the earliest possible time degraded forest ecosystem characteristics and processes; to encourage greater public participation in agroforestry activities for the production of food and wood to meet the needs of the population; to conserve water for power, irrigation and domestic use; and to minimize the effects of floods, drought, soil erosion and other manifestations of forest ecosystem deterioration.” To achieve these goals, the strategy was to mobilize all sectors and government agencies to participate in the massive reforestation under PROFEM.

The National Forestation Program (NFP) aimed to establish artificial forests covering 1.4M ha from 1988 to 2000 (Magno 1994). The Forest Sector Program I (FSP, funded by ADB and OECF from 1988-1992 under the NFP) had the goal to “accelerate reforestation, repair environmental degradation from past logging, and strengthen policies and institutions concerned with forest resources” through contract reforestation, watershed rehabilitation, and timber stand improvement (Harrison et al. 2005). Contract reforestation under NFP engaged private corporations, LGUs, local communities and families in reforestation activities.

The Forest Land Management Program (FLMP) with funding from JBIC through FSP II (1993-2003) replaced the short term contract reforestation and had the following objectives: “to use reforestation as a tool for addressing rural equity issues, creating new jobs and providing wider

opportunities for profitable self-employment, thus improving the socio-economic conditions for the rural population living within or adjacent to forest lands; to promote community-based participation in the rehabilitation, establishment, management, protection and sustainable utilization of forest resources; and to achieve optimum environmentally sound land use and sustainable productivity of forest lands and resources” (DAO 1993-23). The FLMP strategies include provision of tenure security (through 25-year renewable for another 25-year FLMA), community organization services, technical and financial assistance, and incentives for people’s participation in the implementation of environmentally sound land development and livelihood activities.

The Upland Development Program (UDP) objectives as stated in DMC 2009-03 are to “create additional and immediate employment and incomes for poor upland households and people’s organizations; pump-prime the local economy through the infusion of public investments in forestlands development; improve the productivity and soil and water conservation functions of forestlands currently cultivated as upland agricultural farms through agroforestry, reforestation, assisted natural regeneration and enrichment planting in public forestlands and protected areas; rehabilitate, effectively manage, and protect forests and forestlands, watersheds, mangroves, urban forest parks, coastal zones, protected areas, and protection forestlands considering the roles of these areas in providing water for irrigation, power, and municipal water systems, in the provision of vital forest-based goods and services, in the conservation of biodiversity resources, and in the mitigation of, and adaptation to, climate change; and demonstrate the measurable and verifiable improvements in the quality of life of upland communities, the provision of environmental goods and services, including increasing forest cover, enhancing food and fuelwood production in the uplands and coastal areas, improving water yield and quality of watersheds, soil conservation, biodiversity conservation and climate change mitigation and adaptation.”

The National Greening Program (NGP; EO 26 of 2011) aimed to consolidate all greening efforts of the country and to prioritize poverty reduction, resource conservation and protection, productivity enhancement, and climate change mitigation and adaptation. The Expanded NGP (EO 193 of 2015) had its objectives articulated in various policy issuances (i.e., DAO 2019-03) such as “(a) accelerate the rehabilitation and reforestation of unproductive, and degraded areas; (b) sustain rehabilitation and conservation of watershed areas; (c) enhance and encourage equal participation of members from the private sector, local government units, organized upland communities, and other relevant stakeholders in the sustainable management of developed plantations and protection of existing forests; (d) contribute to the development and enhancement of the socio-economic standards of local communities and provide opportunities to develop social enterprises to produce sustainable livelihood and optimize benefits through the implementation of the program; (e) involve and enhance the participation and investment of the private sector in offsetting their carbon emissions with a view towards enabling them to achieve carbon neutrality, among others; and (f) provide appropriate management arrangements and incentives to participants to ensure sustainability of the program.”

The 10-year Forestland Management Project (FMP) funded by Japan International Cooperating Agency (JICA) aims to “strengthen forestland management in three critical river basins through the implementation of collaborative and comprehensive Community-Based Forest Management (CBFM) strategies.” One of its strategies is forestland rehabilitation

through forest tree plantation development, agroforestry area development, and silvo-pasture development.

Roles and responsibilities of agencies. The inter-agency implementation that later evolved to the “convergence initiatives” in recent years started in 1976 when LOI 423 issued guidelines for the PROFEM including the roles of various agencies in the reforestation, afforestation, agro-forestation, establishment of communal forests, family orchards, and recreational parks and areas. Among them, the Department of Agriculture (DA) was instructed to raise seedlings of coconut and fruit-bearing trees for agro-forestation. The Department of Natural Resources (DNR) through its then Bureau of Forest Development (BFD) was to undertake intensive forest renewal activities in critical denuded areas and identify areas for reforestation, afforestation and agro-forestation, the type of trees to be planted, and suitable period for planting. The Department of Public Highways (DPH) was to construct the access roads leading to inaccessible tree planting sites and also plant ornamental and fruit bearing trees along the main highways of the country. The National Irrigation Administration (NIA) and National Power Corporation (NPC) were instructed to reforest the immediate vicinity of reservoirs under their jurisdiction and assist the BFD in planting trees on watersheds. The LGUs were called upon by the Department of Local Government and Community Development (DLGCD) to establish and maintain communal forest, agro-forest, parks, family and/or communal orchards within their jurisdiction. The Department of Education and Culture (DEC) was to require students to plant and care for trees and ornamental plants within areas indicated by the Council. The ROTC cadets and military unites were required by the Armed Forces of the Philippines (AFP) to plant fruit-bearing trees in military camps and reservations. The Department of Public Works, Transportation and Communications (DPWTC) was to provide vehicles for transporting personnel and seedlings by the participating agencies during planting season and assist in construction of temporary shelters and field offices. The Department of Public Information (DPI) was to develop and conduct public information programs in support to forest renewal, forest protection and conservation programs of the DNR. The Budget Commission was to release the budget to the DNR for the reforestation expenses and the operational expenses of the Presidential Council for Forest Ecosystem Management composed of the President and 13 Departments/Commissions/Board Chairs.

The NFP which was funded by ADB’s forestry sector loan program I and the OECF of Japan, was administered by DENR through the National Program Coordinating Office (NPCO) with an NFP Board and Steering Committee from 1986 to 2000 (Magno 1994; Harrison et al. 2005). The Forest Land Management Program (FLMP) which took over the contract reforestation under NFP in 1992 (under FSP II) was likewise implemented through the NFP structure under DENR while the Upland Development Program (UDP) in 2009 was implemented by the DENR and the Forest Management Bureau (FMB).

The NGP (EO 26 and its expanded form, EO 193) is a convergence initiative (through JMC No. 1 series of 2010) among the DA, DAR, and DENR as the NGP oversight committee chaired by the DENR. The DA-DAR-DENR are responsible for the following: nursery establishment and seedling production; site identification and site preparation; social mobilization; tree planting; M&E; technical support and extension service; provision of certified seeds of agronomic crops; provision of access roads and trails to planting sites; provision of post-harvest and processing facilities; technical assistance in product development and marketing. Other agencies are responsible for the following:

- Department of Education (DepEd) / Commission on Higher Education (CHED) for student mobilization; nursery establishment, seedling production and tree planting; IEC; provision of extension services; M&E;
- Department of Social Welfare and Development (DSWD) to provide Conditional Cash Transfer (CCT) to NGP beneficiaries and social mobilization;
- Department of Budget and Management (DBM) allocates funds for all NGP activities;
- Department of Interior and Local Government (DILG) for provision of transportation, security, and fire protection amenities; and IEC;
- Local Government Units (LGUs) to establish nurseries and production of planting materials; develop greening plan for urban and suburban areas; establish communal tree farms for firewood and other domestic uses; construct access roads and trails to the planting sites; provide medical support; technical assistance and extension of services;
- Department of Health (DOH) for transportation and medical support;
- Department of Public Works and Highways (DPWH) to provide transportation in the hauling of seedlings and volunteer planters;
- Department of Transportation and Communications (DOTC) to provide transport for participants; and communication facilities;
- Department of National Defense (DND) for nursery establishment and seedling productions; site preparation; provision of transportation support; and provision of security;
- Department of Science and Technology (DOST) for development and transfer of appropriate technologies; and IEC;
- Department of Justice (DOJ) for nursery establishment and production of planting materials; and provision of transportation;
- National Commission on Indigenous Peoples (NCIP) to mobilize participation of IP; identification of sites for NGP inside ancestral domains; supervision of forest protection activities inside ancestral domains; supervision of forest protection activities inside ancestral domains;
- Technical Education and Skills Development Authority (TESDA) for technical assistance in product development;
- Philippine Amusement and Gaming Corporation (PAGCOR) to provide funds for seedling production and other NGP related activities; and
- Other government agencies, instrumentalities including GOCCs, state universities and colleges (SUC) to provide full support and assistance to the NGP.

However, the respondents in this study mentioned that the convergence initiative was not sustained after the first few years of the NGP. The constraining factor for the sustainability of convergence initiatives is the budget allocation. Government agencies have their own annual appropriations based on their priority programs and projects. Since the main implementer of NGP/E-NGP is DENR, then it is responsible for its budget which is approved in Congress based on the agency's performance. The same is true for the other agencies which have their own priorities. Thus, convergence initiatives is often left out in the budgeting for reforestation programs as it is under the lead agency.

Program management, supervision, and monitoring. The NGP/E-NGP program management, supervision, and monitoring and assessment was through the NGP Executive Committee as provided in DAO 2017-03 while under DAO 2019-03, the overall management

and supervision of E-NGP is now under the Office of the Undersecretary for Field Operations which oversees the Regional, Provincial and CENR field offices. Whereas in DAO 2017-03, FMB and BMB provided technical support while ERDB had oversight on bamboo plantations and beach forest and mangrove rehabilitation, DAO 2019-03 designates the FMB as provider of technical support for the Program implementation. In 2020, FMB Technical Bulletin No. 29 was issued allowing regional offices, PENROs and CENROs to hire extension officers and/or technical personnel to support the implementation of ENGP. The EO/Technical personnel are hired on a 6-month contractual basis and renewed depending on their performance, availability of NGP funds, and existing rules and regulations. They are to provide support to the DENR field offices as well as technical assistance to the E-NGP contracted partners.

According to the DENR key informants at the field level, there are NGP focal persons designated at the Regional, PENROs, and CENROs who oversee and coordinate the various activities from pre-implementation, during, and post-implementation. The major issue raised by the informants is the lack of resources (human, facilities, equipment, vehicles, etc.) given the large areas covered and the number of contracted partners that they have to supervise and oversee. The focal persons often share resources, facilities, and vehicles with other offices and programs/projects due to the limited budget of government. Hence the time they spend monitoring the activities of partners are constrained by the available time and resources and this requires them to prioritize quantity over quality of activities that need to be accomplished. Contractual EOs/Technical assistance personnel are hired to perform E-NGP functions (managing information database, finalizing shapefiles of maps, preparing and reviewing reports, attending meetings, validation and monitoring of projects, etc.) in each of the DENR field offices as well as directly assisting the contracted partners. However, the 6-month job contracts provide insecure tenure to the hired EO/Technical personnel, thus resulting to fast turn-over or changes in personnel as some of them find more long-term or permanent employment in the DENR or elsewhere.

The FMP is under the DENR's USEC for Policy Planning and FAPS while the FMB's Central Project Management Office (CPMO) oversees the project with four Regional PMOs, five Provincial PMOs, nine CENROs, and 24 SUSIMOs. The SUSIMOs provide direct technical support for POs particularly in community organizational development, planning, training and on-site coaching, and cross farm visits. However, this structure is good only during the 10-year project duration.

Respondents from other sectors such as the LGUs, other government entities, private sector, and academe, have specific reforestation units with the main responsibility over the reforestation projects of the office. These personnel spend most of their time overseeing field activities and are able to address immediate concerns and problems in the reforestation project sites. In particular, the private entities that fund their own reforestation projects (e.g. First Gen and TYKFI) have enough funds and dedicated personnel (with clear terms of employment and responsibilities) that enables them to properly implement their reforestation projects over a given area on time and with proper facilities, equipment, and vehicles. The target areas for development are well planned and managed over the long term with the participation of local communities and PO partners who are trained in all aspects of reforestation establishment, maintenance and protection to ensure the sustainability of the projects.

Meanwhile, the LGU-initiated reforestation projects (e.g. Nueva Ecija, La Union, Ilocos Norte, Camarines Norte) are under the Environment and Natural Resources Office or the Agriculture Office. Some of them employ regular reforestation personnel as well as contractual workers in their nursery and plantation activities. They have an annual budget which is devoted to establishing and maintaining their reforestation activities over a specified area and only expanding the area once the initial areas have been established.

Identification of potential reforestation sites. In the recent NGP/E-NGP, DENR field offices identify areas needing rehabilitation using technology and information from LGUs (CLUP/FLUP, community watersheds), NAMRIA (official maps), RBCO (river basins), PAGASA (climatic data), local community and stakeholder consultations and stakeholder analysis, and other sources. These information shall be verified through perimeter and site surveys and mapped with geotagged photos. Areas will then be classified by development purpose, i.e., production, protection, conservation, and special treatment (i.e., ANR, ER, densification, cover crop planting, non-plantable areas).

DENR key informants identify potential areas through map analysis of maps provided by NAMRIA and other secondary data from other agencies and LGUs. Priority areas are open/barren, denuded and areas under tenure such as CBFMAs. DENR held consultations with local stakeholders, particularly PO and LGU partners who are knowledgeable about the local situation and environment to validate the areas identified from the maps.

They said it is increasingly difficult to find open access or untenured areas to be reforested since most available sites have already been covered planted since the start of NGP in 2011. Hence, consultations with locals and LGUs could reveal which areas are still not planted and which of those previously planted through past projects have either been burned or already cut and harvested but not replanted. Tenured POs also identify areas that they have not yet been developed within their tenured area. These areas are preferable to the inaccessible and marginal areas that are left remaining after the first NGP phase. The inaccessible (by distance, elevation, slope) areas that could qualify for reforestation are problematic for the following reasons mentioned by the key informants: (1) steeply sloping areas are often highly eroded and difficult to reforest due to poor soil and site conditions; (2) distant areas in higher elevations with poor accessibility pose a challenge to local POs as well as DENR monitoring teams; and (3) overall costs of developing these marginal areas in higher elevations with steep slopes along the way naturally increase with every km as it takes more time (hours and person-days) to haul planting materials and conduct maintenance and protection activities as well as validation and monitoring activities.

Identification of potential areas in public forestlands and protected areas (e.g. PCWFR) by other entities such as private companies, NGOs, and other sectors is also done in consultation with DENR or the tenure holders (e.g. NIA, IPs with CADT and NCIP, etc.). Since DENR has surveyed and mapped the potential areas for rehabilitation, they can offer these areas to other partners through various modes of engagement. NIA, through LOI 1002 of 1990, has been reforesting the watershed areas of the Pantabangan and Magat Multi-Purpose Dams which they are mandated to manage, protect, and develop. They also partner with other groups and entities in reforesting portions of their surrounding watersheds.

In consultation with DENR, First Gen Corporation identified four reforestation projects in the watershed areas of their hydropower plant in Carranglan with organized POs that they can partner with. TYKFI consulted with DENR Central Office on which areas are challenging

enough for them to restore and rehabilitate through their Dr. Lucio C. Tan (LCT) Legacy Forest Project and they agreed on the 930-ha site in Brgy. RA Padilla and 56 ha in Brgy. Joson both in Carranglan. A private tree plantation in La Union was initiated within their private land several decades ago and the trees are now ready for harvesting.

The LGU of Piddig, Ilocos Norte identified reforestation project areas in public forestlands in consultation with the DENR. One of the sites is occupied by CBFM POs which they planted with coffee to supply their coffee processing facility. Another project site is within the degraded forestlands supporting their watershed which they planted with indigenous tree species. Meanwhile, the LGU La Union partnered with the ISF beneficiaries in its reforestation project.

The then Governor of Nueva Ecija in 1994 wanted to help restore the degraded areas in the province so they consulted the DENR which resulted in the 35-ha site in Palayan followed by the 80-ha site in Carranglan in 1997. The 200-ha site in Gabaldon was identified in 2013 together with the CADT holder (with NCIP) because the then Governor wanted to help the IP members (who kept asking for financial support from the provincial office) through an income generating project from the fuelwood plantation where the wood to be harvested will be sold as wood chips (for palay dryers/gasifiers) and charcoal briquettes.

Respondents from the academe such as NEUST in Gabaldon, Nueva Ecija identified reforestation project sites within their campus since they want to use them for educational and ecotourism purposes. The Mariano Marcos State University (Batac, Ilocos Norte) has an E-NGP mangrove rehabilitation project located in the province of Pangasinan, which is also being used for educational and research purposes.

Reforestation planning. Under the E-NGP, site assessment of potential reforestation sites is part of the survey, mapping and planning (SMP). DENR Regional offices/PENROs are required to prepare 5-year reforestation/ rehabilitation/ restoration plans while CENROs prepare the operations plans which serve as guide for the preparation of individual PO operations plans. Prior to DAO 2019-03, indicative plans were prepared as part of the SMP done by DENR field offices in consultation and coordination with local stakeholders and partners. The said plans indicate the program goals, objectives, development activities, and targets following the forest landscape restoration approach (as provided in DAO 2019-03) or previously, the area management approach with the watershed as planning unit (stipulated in DAO 2017-03). The targets are stated based on the overall program goal of planting 1.5 billion seedlings in 1.5 million ha. The field offices generally base their targets on the potential areas identified through site surveys, maps, and consultations with stakeholders. These targets are then submitted to the Central Office for approval and budgeting purposes. The approved annual targets at the provincial level become the basis for individual partners' targets for development.

After identifying the areas that need rehabilitation, DENR regional offices prepare the reforestation/rehabilitation/restoration plans based on 5-year plans submitted by the PENROs which specify the area, location, and availability for each purpose (i.e., production, protection, etc.) in each province. The PENROs then prepare the operations plans which guide the CENROs in identifying potential partners for the targeted areas.

The DENR key informants said that they are supposed to identify annual target areas for approval by the Central Office. However, there were times when the Central Office ask the regional offices to revise (increase or decrease) their targets depending on the available

budget for the year. Increasing targets is often more challenging as they have already exhausted all available areas to be planted in the field. They prefer to use the available budget for maintenance and protection of the already established forest plantations or the so-called graduated NGP sites. In the regions where there is extreme summer heat and drought, they need to invest in technologies to produce drought and fire resistant species or to capacitate local communities to prevent or suppress wildfires that threaten the survival of established plantations. In contrast, regions that are along the paths of strong typhoons and prolonged rainy season, they need to invest in adaptation measures (e.g. planting of pioneer species to cover the open and degraded lands before planting climax tree species; upland slope stabilizing techniques) to reduce the adverse impacts of typhoons.

Partner POs are required to formulate their operations plans following the approved Regional reforestation/rehabilitation/restoration plans with the help and support of DENR personnel. It is important that they incorporate in the operations plan, measures to mitigate the impacts of extreme weather conditions and poor site characteristics. In reality, most POs' involvement during planning are limited to participation in consultations since they lack technical capability to prepare the required plans. The operations plans and work and financial plans (WFP) of POs are physical targets-oriented based on the contracted area to be planted, number of seedlings raised and planted, and standard maintenance and protection activities during the contract period.

Most of the PO plans do not include wood harvesting, utilization and marketing plans because these cannot be realized within their three- or five-year contracts. At the most, they can only harvest the fruits of fruit trees and high value crops that can be harvested during their contract period or if the established plantations are within their tenured areas.

LGUs and other government entities also prepare indicative reforestation plans based on their medium or long term goals and objectives and realistic targets are guided by their budget allocations.

Private entities that fund their own reforestation projects do comprehensive site assessment and planning that are guided by their long term goals, whether these are for protective or productive purposes. Hence, they are able to incorporate in their comprehensive development plans the strategies to address the climate-related or poor site conditions for the long term survival and growth performance of the species they will plant in the reforestation sites. Plans to partner actively with local communities and POs is likewise an integral part of their strategies to ensure success of their reforestation projects. Rather than quantity, they focus on quality of performance of their reforestation projects since they have the funds and resources to accomplish them in the long term. One SIFMA holder hired private consultant to do the SMP with the assistance of DENR.

Respondents from the academe prepare indicative reforestation plans guided by the master plan for their campus development as learning laboratories for students. Available budget is also a factor in the target setting for their reforestation projects. Other respondents reported that planning for their reforestation project was conducted in consultation with DENR and LGUs and a team composed of various expertise.

Bidding of project sites. The foreign-funded (ADB, OECF, JBIC) contract reforestation projects under the NFP were awarded to qualified corporations, communities and families

through competitive bidding or negotiated bidding in case of failed public bidding. The three-year contracts amounted to PhP 20,000/ha at that time (Harrison 2005).

For NGP, DAO 2013-06 provides that the areas identified and verified as potential reforestation project sites with an area of 100 ha to 1,000 ha are posted publicly to invite bidders to develop them. The bidding procedure follows the Government Procurement Act (RA 9184) which includes the following: (1) posting and publication of identified NGP sites duly reflected in a GIS-generated map indicating suitable species; (2) procurement of bid documents; (3) pre-bid conference which shall include discussion on the terms of reference; (4) submission of bid proposal and indicative development plan; (5) evaluation of bid proposals should highly consider the proposed area (in hectares) to be developed and the submitted development plan; (6) post-qualification; (7) award shall be given to the winning bidder that offers the lowest calculated and responsive bid. When there are no bidders or the bidders are deemed not qualified and two failed biddings are declared, then a negotiated procurement is resorted to by the DENR field offices.

According to the DENR respondents, they follow the government's procurement process in bidding of the areas identified for reforestation. Most of the time however, failed biddings are declared since there are not many qualified POs and local entities who are interested in NGP projects. For the past decade that NGP has been implemented, the field officers already know which POs and other partners are good performers and thus they are invited time and again to enter into contract reforestation projects. In most cases, DENR field officers prefer to award contracts to tenured POs (CBFMA/PACBRMA holders), NGOs, or LGUs that are able to comply with the requirements of registration and financial and technical capability to undertake development projects. There are cases where NGOs are the contracted partner and they work with POs and local communities that are unable to comply with DENR requirements for reforestation contracts. Negotiated procurement is also practiced with NGOs, LGUs, private sector, and academe since there are very few of them who are interested to bid on NGP projects or specific activities.

Modes of implementation. The NFP (1988-1992 under FSP I) awarded three-year reforestation contracts to corporate, local government, community and family contractors for seedling production, site preparation, plantation establishment, and maintenance and protection. After the contracts, the reforested sites were turned over to DENR. These later became part of the areas covered under FSP II by 25-year renewable for another 25-year FLMAs (DAO 93-23) issued to individual families, community organizations, or former reforestation contractors who successfully implemented reforestation in the area.

DAO 2013-06 defines the modes of engagement in NGP as three-year MOAs between DENR and POs/IPs; LGUs and other government entities; and foundations/NGO-CSO/private corporations. The DENRO signs MOA/Contract for areas less than 500 ha while the RED signs for 500 ha and above. The qualified partners are CBFMA/PACBRMA POs, non-CBFM POs, (ICC/IP were included in DAO 2013-06 and DAO 2017-03 but not in DAO 2019-03), CSOs, LGUs, and private sector (sole proprietorship, partnership, corporation or cooperative). DAO 2013-06 lists the responsibilities of parties wherein the DENR conducts survey, mapping, and planning (indicative plan); ensures compliance of the development partners to the terms and conditions of the MOA/contract; provides funds for the comprehensive site development subject to the approved work and financial plan (WFP); and conducts regular monitoring and evaluation. Meanwhile, the partners are responsible for the following: submission of WFP for

DENR approval and forms part of the MOA/contract; produce planting materials following DENR prescribed standards; establish, maintain and protect the plantations; ensure at least 85% survival of established plantations; prioritize employment of IPs and members of local organized upland communities; provide equal opportunities for both men and women in the development process; conduct photo documentation (before, during and after) and geo tagging of established plantations; submit monthly physical and financial accomplishments to DENR; and submit annual audited financial report and notarized accomplishment reports.

The current modes of E-NGP implementation are through 5-year MOA between DENR and qualified partners such as CBFMA/PACBRMA POs, non-CBFM POs, (ICC/IP were included in DAO 2017-03 but not in DAO 2019-03), CSOs, LGUs, and private sector (sole proprietorship, partnership, corporation or cooperative) or 3-year Letter of Agreement (LOA) between DENR and PO which engages with individual families under the family approach.

The Family Approach to NGP is a recent modality provided for in FMB TB 30-2021. It states that DENR shall enter into a 3-year Letter of Agreement (LOA) for CSD with a PO which shall engage families as beneficiaries and managers of portions (1-10 ha each) of the engaged area for various modes of site development. These modes include establishment of plantations, establishment of agroforestry, rehabilitation, or beach forest and mangrove rehabilitation. The PO shall pay the families by accomplishment following the annual schedule of payment. SMP for the area to be developed by PO (and families) and the PO's reforestation/rehabilitation/restoration operations plan should be consistent with the Regional/Provincial reforestation/rehabilitation/restoration operations plan. The MOA and LOA detail the expected roles and responsibilities of both parties including the requirements and schedule for progress billing/payment of accomplishments.

For POs and NGOs, the most common mode of engagement is through MOA with DENR which used to be annual (for specific activities, e.g. social mobilization, seedling production, planting, or maintenance and protection) then it became three years (from site establishment to maintenance and protection) and since 2019, had a duration of five years (from seedling production to planting to maintenance and protection). LOA is the mode for POs that engage with individual family partners. The key informants said that the MOAs specify the following: specific activities, cost per activity, and schedule of payments.

MOA is also the implementing agreement for other partners from the LGUs, private sector, and academe who were contracted to implement DENR NGP-funded reforestation projects. Tripartite agreements are also forged among DENR, PO, and LGU/Academe.

For the private companies which fund their reforestation projects, they enter into MOAs/MOUs with DENR and other tenure holders (e.g. NIA and others) for the use of the land if it is within a public forestland or protected area (e.g. PCWFR and other critical watersheds). They also have contracts with local community members or PO partners. However, in the PCWFR, the E-NIPAS Act requires partners to apply for the Special Use Agreement in Protected Areas (SAPA). This is the tenure instrument being issued by DENR for the use and/or development of land, resources or facilities within protected areas. The E-NIPAS Act requires developers to pay annual user fee which is equivalent to 5% of the zonal value of the nearest LGU plus 1% of the value of improvement as premium while the one-time Development Fee shall be agreed upon by the concerned government agencies.

LGUs may participate in NGP in areas that are within their administrative jurisdiction, consistent with their adopted FLUP (Section 6.3 DAO 2019-03). Priority areas for LGUs are their communal forests and community watershed areas. Meanwhile, private sector participation could be in the following activities: (1) establishment of new NGP plantations in tenured (through MOA with tenure holder) or untenured areas (MOA with DENR) as provided in DENR MC No. 1998-08; (2) maintenance and protection of existing NGP plantations through appropriate management arrangements; and (3) protection of existing forests aside from NGP areas through MOA with DENR.

Some of the LGU respondents entered into MOA with DENR for NGP projects within their localities, mainly for development of communal forests and community watershed areas. However, there are also LGUs (e.g. PG Nueva Ecija) funding their own reforestation projects but have MOA with DENR for the development of the public forestland or protected area. In protected areas (e.g. PCWFR), LGUs also have to apply for SAPA and pay the user fee or one-time development fee which is quite costly. LGU-implemented reforestation projects depend on the local government's development fund (e.g. 20% of their GAA) and paying a one-time development fee or annual user fee will be a challenge since they do not generate income from the project to be able to pay for these fees.

Another mode of implementation that is included in DAO 2019-03 is Reforestation by Administration where DENR field offices directly hire laborers and workers instead of entering into a MOA with qualified partners. This mode is implemented mainly in proclaimed and critical watershed areas without tenure (Section 6.4).

Most of the key informants interviewed have little or no idea if the Reforestation by Administration is already being implemented. However, a few DENR respondents prefer the Reforestation by Administration mode instead of the current contract reforestation where DENR deals with so many partners who are contracted for a limited time before the established reforestation sites are turned over to DENR. The process of bidding the turned over areas to interested developers is quite lengthy and there are very few interested bidders. Hence, there is a noticeable time gap between the establishment of these contracted reforestation sites before they are awarded to other developers. In that time gap, it is DENR's responsibility to maintain and protect them as part of their regular forest protection functions. However, DENR field offices are constrained by inadequate human and other resources for monitoring and protecting these established reforestation sites on top of their regular forest protection functions and other responsibilities. Thus, the DENR respondents prefer the Reforestation by Administration mode where regular employees and contractual workers are hired to maintain and protect reforestation areas for the long term. Other respondents also recommend the Reforestation by Administration mode complemented by partnership with CBFMA/PACBRMA POs or other POs/IPs in the nearby surrounding areas to maintain and protect the graduated NGP sites.

Capability building. The NFP under FSP II incorporated community organizing as part of building the capacity of the contracted POs. NGOs were contracted to assist the POs in CO and community development. SUSIMOs were also established in the field offices to provide technical support to the POs and partners. The SUSIMOs were revived under the 10-year (2012-2022) Forestland Management Project (FMP) funded by JICA to provide support to PO partners.

Prior to 2019, NGP did not include community development for POs based on the assumption that most of the PO partners were already organized prior to being issued tenure instruments such as CBFMA or PACBRMA. However, the need to build capacity of partner POs was realized so that DAO 2019-03 provides for capacity building of POs (on organizational development, technical skills development, project management, and gender development) and all designated project managers, staff and laborers in Reforestation by Administration projects.

According to the key informants, technical assistance and support are provided by contracted assisting professionals or organizations (through other projects such as FMP) while contractual forest extension officers (FEOs) are hired by DENR field offices to oversee field implementation by partners during the contract period. DENR staff reportedly conduct training on project management, technical skills development, gender and development and organizational development. Some respondents, however, mentioned that not all DENR staff have enough knowledge and capacity to train POs on enterprise development and marketing to develop enterprise plans.

Some LGUs sought assistance on technical matters from DENR, academe, NGOs, and other government agencies in capacitating the beneficiaries of reforestation projects. The key informants from academe provide training on seed collection, propagation, proper handling and planting of seedlings to their partner POs.

Other sectors that are implementing their own reforestation projects incorporate capability building of their partners in all aspects of reforestation as well as in livelihood projects such as agroforestry farms (i.e., TYKFI's model agroforestry farms and First Gen's employment of local community members in their reforestation projects).

Funding and payment scheme. Under the ADB and OECF-funded NFP, the three-year contracts amounted to PhP20,000/ha covering the cost for seedling production, site preparation, plantation establishment and maintenance/protection. The contract payments were performance-based where contractors were paid in full after three years if they comply with the required survival rate of 80% of trees planted (DAO 91-31; Magno 2004).

Funding of the NGP/E-NGP comes from DENR's Annual Appropriations which is allocated to cover support mechanisms including capacity building, monitoring and assessment, development and maintenance of plantations (DAO 2019-03). Payments for contracted activities follow the progress billing scheme based on accomplishment/performance of the engaged partners from seedling production, site preparation, soil amelioration, planting and maintenance and protection activities in accordance with the approved WFP. The contract payments varied by activity, species raised or planted, maintained and protected. However, the contract amount remains the same for all sites irrespective of the conditions such as soil characteristics, accessibility, and climate type, among others.

The FMBTB 10A (2019) lists the per hectare cost for SMP as PhP550 with PhP450 allotted for community consultation/IEC campaign, site assessment and mapping, travelling expenses, staff meetings, and supplies, while PhP100 is for soil collection and analysis and refill of chemicals for soil test kit. The cost of developing a reforestation plan and operations plan is PhP200,000. Plantation establishment costs PhP650/ha while maintenance and protection is PhP2,000/ha for the first year and PhP5,000/ha/year for years 2–5. Cost of seedling production and maintenance and protection varies by commodity due to the different spacing

and density from PhP3.00–8.00/seedling of fuelwood, timber, mangrove species; PhP12.00 for indigenous species; PhP12.00–35.00 for high value crops and non-timber forest products. Hired extension officers (with a ratio of 1:300 ha) are paid PhP20,404/month. Maintenance of SPAs/IPTs (individual plus trees) amounts to PhP500,000 while maintenance of clonal nurseries totals PhP350,000. The total amount for the operations and maintenance of modernized and mechanized nurseries is PhP5M. The cost for ground delineation of production forests is PhP6,500/km (FMBTB 5A).

The percentage release of contract payments for seedling production (1st 6mo before onset of rainy season Q3) are: 1st payment: 15% (upon approval of agreement); 2nd payment: 75% (upon delivery and inspection); last payment: 10% (cert of completion and acceptance). Meanwhile, payment for site preparation and seedling production are: 1st payment (upon approval of agreement): 15%; 2nd payment (upon completion of strip brushing, hole digging, and staking according to the agreed density and planting standards): 50%; 3rd payment (upon completion of hauling and planting of seedlings according to the agreed density and planting standards): 40%; and 4th payment (upon planting the target number of seedlings): 10%.

The retention fee of 10% is released after an evaluation and assessment of NGP plantation by the concerned Regional Office that the engaged party has complied with the terms and conditions of the MOA. Prior to the payment of the 10% retention fee to contracted partners, Section 16 of DAO 2019-03 mandates the Regional Offices to conduct evaluation and assessment of each NGP plantation to determine whether the terms and conditions in the MOA between DENR and the partner were complied with. If the partner has fully complied with the terms and conditions (i.e., minimum of 85% survival rate, 100% area/seedlings planted), then the PENRO shall process and release the 10% retention fee.

In DAO 2013-06, the NGP project areas are subjected to third party performance evaluation before it is turned over to the DENR. All areas turned over to DENR are then bid out to interested parties (following RA 9184 regulations) for long term development through an appropriate legal instrument issued by DENR. In case the partner fails to comply with the terms and conditions of the contract, the area will be turned over to DENR but the partner forfeits the unreleased funds and retention fee (10% of the contract amount) and may be subject to filing of appropriate sanctions by DENR as well as disqualification in any future similar activity or project. Other interested parties may be invited to continue the development of said area. PO/IP-managed areas with established plantations through NGP will remain with them, co-terminus with their tenure instrument issued to them. Likewise, LGUs may avail of co-management agreement with DENR for the established NGP plantations. Currently, established/graduated NGP sites (100 ha and above) have yet to be bid out to interested parties while the policy issue on bidding of government assets is still being addressed at the national office.

DENR key informants said that payments for contracted activities are followed based on the progress billing scheme for NGP projects as indicated in the WFPs. However, since NGP is government funded, the main problem is on the delays in release of funds from DBM which also waits for the approval of the annual General Appropriations Act (GAA) in Congress. The delayed release of funds cascades down to the regional and field offices affecting the processing and awarding of contracts as well as the scheduled activities such as seedling production and planting which are dependent on the rainy season calendar. Payment is

released only after monitoring and assessment of accomplishments show that the partners have complied with the requirements stipulated in their MOAs.

For the respondents who fund their own reforestation projects, they have the advantage of timely release of funds and contract payments based on approved WFPs. Contracted partners are also paid based on agreed schedule of accomplishments (validated on the ground by contractor's representatives) along with their accountability for unmet performance indicators (e.g. low survival rate or burning of the planted site due to the partner's irresponsibility will cost them to replant on their own).

Reforestation costs for activities contracted by EDC to local communities such as seedling procurement, site preparation and planting, and monitoring and protection amounts to PhP45,000/ha/3 years. The established reforestation areas are then turned over to EDC for protection through foot patrol/forest guards. For First Gen Corporation, the estimated contract cost for enrichment planting in their reforestation project sites range from PhP20,800 to PhP28,400/ha for 2,500 density. The contract cost includes seedling maintenance, establishment (collection of sticks, lay-outing and staking, spot brushing and ring weeding, hole digging, seedling transport/hauling, outplanting and fertilization, mulching), labor cost, administrative cost (15%), and withholding tax (2%). The cost of maintenance and protection of the reforestation projects of First Gen is integrated in their operations cost which includes forest protection among other activities.

As mentioned above, the standards costs vary according to the implementer of reforestation projects. Government (DENR) funded reforestation projects are standard across all regions with little or no consideration of the site conditions such as distance and accessibility of sites, elevation, slope, and other characteristics such as climatic type and soil conditions. Private-funded projects have standard costs that are applicable to the site conditions and local wage rates. LGUs and academe base their standard costs on the available budget as well as allowable costs mandated by their organizations. It is necessary for cost standards to be based on actual field conditions to ensure that reforestation activities are properly implemented.

Information, education and communication (IEC). The 2012 NGP Manual of Implementation provides a list of advocacy, communication and social mobilization (ACSM) materials for dissemination at the national, regional, provincial and municipal levels. DAO 2019-03 incorporates IEC as part of the pre-implementation activities particularly in the conduct of stakeholder consultations in the identification of potential reforestation sites. During project implementation, signages about the contracted NGP projects are supposed to be put up in the project sites.

DAO 2019-03 requires DENR to install signages in every plantation site with a size of 1.2 m x 1.2 m indicating project name, location, funding source, implementing agency, development partner, and brief description of the project (DAO 2019-03). Most DENR and PO respondents have installed signages in the reforestation projects during the contract period but these are not maintained after the projects end.

Most of the non-DENR reforestation implementers said they have signages installed in their reforestation projects which are secured and maintained. These help to ward off the entry of illegal occupants or poachers and hunters. Some even installed technologies such as CCTV and drones to monitor the reforestation sites.

Reforestation program monitoring and assessment/evaluation (M&E). Previous contract reforestation projects under the NFP were monitored and assessed by DENR composite teams while third parties were contracted for external evaluation of selected projects.

In the earlier implementation of the greening program, the 2011 NGP Validation Guide was issued for the conduct of Regional field validation of NGP by composite monitoring and inspection teams. It provides comprehensive guidelines on data collection, processing and analysis, and report format for NGP validation. The M&E framework and scheme are likewise presented to guide documentation of NGP gains as well as generate feedback on NGP policies and implementing guides so that issues and concerns are adequately addressed. The M&E scheme covers the various stages of NGP implementation such as planning and targeting; social mobilization; site identification; seedling production, plantation establishment; to plantation maintenance. Meanwhile, the Validation guidelines provide for the methodological framework from data gathering and analysis to reporting and feedbacking. The scope of validation covers: NGP physical and financial accomplishments; inventory of supply (seedlings); participation of partner agencies and volunteers; field validation and inspection of plantations and nurseries; and readiness of support services. The validation was to be done for the 1st, 3rd, and 5th years of program implementation in randomly selected PENRO and CENRO per Region.

FMB Technical Bulletin No. 23 (issued in 2018 and amended in 2019) provides the guidelines for third-party performance evaluation (TPE) of NGP areas established from 2013 to 2016. The third-party evaluation is intended to assess the compliance of contracted partners to their MOA after its duration before the project is turned-over to the DENR. The cost of each TPE is PhP1,600/ha to cover costs of transportation, planning, hiring of laborers, and report writing.

Currently, the NGP/E-NGP monitoring and assessment is spearheaded by the Office of the Undersecretary for Planning, Policy, and International Affairs (OUPPIA). PENROs and CENROs are required to submit updated geotagged photos and shapefiles of developed NGP plantations to OUPPIA through the NGP Coordinating Office while quarterly and annual physical accomplishment reports (with notarized CSD and attachments) are submitted to the Regional Offices. Annual Program review and assessment is undertaken by a composite team made up of representatives from the DENR Regional Office, FMB, and LGU. External review and assessment of the Program is done every five years by a third party, which was previously defined under DAO 2017-03 to include external auditors, giving priority to state universities and colleges and civil society organizations. It is assumed that the annual and 5-year monitoring and assessment of the Program is based on the indicative plans (prior to DAO 2019-03) and the regional 5-year reforestation/ rehabilitation/ restoration plans and the provincial operations plans from which individual PO operations plans are formulated for their contracted areas.

The main issue with TPE of NGP contracted projects is that the evaluators are contracted by the implementing agency, DENR. The third-party evaluators may be burdened by the expectation from the contracted partners to “pass” the evaluation so that they will be paid the 10% retention fee. Also, “failed” or non-compliant contracted partners will reflect on the performance of the NGP focal persons and extension officers in overseeing the field level project implementation. Instead of a tool to improve the program implementation, the TPE could become a biased evaluation since the evaluator’s results could jeopardize payment of his/her contract if the findings are unfavorable to the contracting party.

The private sector, LGUs, and academe have their own internal M&E which are embedded in their reforestation projects and are designed to achieve the goals and objectives as well as annual target accomplishments. Because they have defined and relatively small areas for reforestation, they are able to closely monitor and assess the performance of their projects. They also have dedicated project staff overseeing implementation at the field levels and providing technical support to their partner communities which facilitates the feedbacking system. The academe use their reforestation projects for instruction, research, and extension, hence these are regularly monitored and assessed.

Sustainability of established reforestation projects. After the first phase of the NFP (FSP I), the contracted reforestation projects were turned-over to the DENR, which found that maintaining them is costly (Magno 2004). Hence, under the FSP II, reforestation projects were contracted to communities who were issued FLMAs after the contracts were done, to ensure that the FLMA holders will maintain the plantations for the long term.

Likewise for the FMP sites, the partner POs are awarded tenure instrument such as CBFMA/PACBRMA for long term management of the rehabilitated forests and watersheds in their respective areas. The program includes agroforestry and tree plantations as sources of livelihood for the PO in the short and long term. Problem is lack of assurance that the POs can harvest the planted trees with an assured market for the final products.

The graduated NGP sites could be adopted by qualified entities (for areas 10 ha and below) or bidded out (for areas 100 ha and above). Bidding of developed plantations under NGP has yet to be implemented due to policy concerns. There are reportedly adopted graduated NGP sites in some of the sites within the regions in this study.

The short planning horizon (5 years) for NGP at the regional and field levels is designed to establish reforestation projects mostly on a piecemeal basis depending on availability of annual target areas and qualified partners onsite. The contract reforestation scheme has a major flaw in that contract payment is limited to the 3- or 5-year project duration from establishment to maintenance and protection. After the contract duration and the established plantations are turned over to DENR, there is a time gap before the graduated project sites could be adopted or bidded out for long term management. During this time gap, most of the established plantations are neglected or inadequately maintained and protected and many of them do not reach the expected growth performance due to anthropogenic or natural causes such as fires, droughts, strong rainfall and typhoon events, illegal tree cutting, and other destructive agents.

For the private sector respondents, the capacitation and training of their partner local communities in all aspects of reforestation and enterprise development is integral to their long term planning for their reforestation projects. Ensuring that their partner communities have long term income generating projects such as agroforestry and high value crops production that include processing and marketing is a practical way to ensure their commitment to protect and maintain the established reforestation sites. These are reinforced by the awareness raised through training of the local communities on the importance and need to protect the forests and reforested sites as part of protecting their habitat and the ecosystem services that people derive from forests. With project staff dedicated to support and assist the local communities and farmers, it is expected that the reforestation projects established are on the way to being sustainably maintained and protected in the long term.

Certification system (DAO 2017-03) was to be developed to ensure the legality and sustainability of forest products from NGP plantations, however this mandate is deleted in DAO 2019-03. Most of the key informants mentioned that there is no certification system in place yet. A few respondents welcome the certification system if it will ensure the legality and sustainability of forest products harvested and lessen the illegal harvesting or timber poaching in many established reforestation project sites.

Technical and Biophysical Component

Areas covered. Presidential Decree (PD) 705 of 1975 (Revised Forestry Code, as amended), PD 953 (1976), and PD 1153 (1977 – PROFEM) provide that reforestation and afforestation can be done in both public forestlands (bare or grass-covered, brushlands, open, denuded, inadequately stocked, portions of pasture leases or permits, river banks, easements, road-right-of ways, swamps, deltas, former river beds, beaches), public domain areas (plazas, schools, markets, roadsides, parks), and private lands (family owned lots, along roads and areas intended for common use of owners of lots in subdivisions at least 30% of total area, land adjoining river banks).

In 1988, contract reforestation under the NFP was undertaken in “denuded forest lands, underdeveloped portions of reforestation projects not covered by DENR development plans, and areas within Timber License Agreement (TLA) sites with poor reforestation program” (Magno 1994). Meanwhile the FLMP (DAO 93-23) listed the areas where FLMPs may be issued: land previously reforested or developed under the FMP or other DENR programs intended to produce timber and other forest products; denuded uplands in the public domain including designated watersheds, reservations, parks or reserves; residual and second growth natural forests adjacent to lands planted under FLMP; and naturally-grown and planted mangroves.

Under the UDP, reforestation targets grassland areas, degraded areas in priority watersheds and protected areas while assisted natural regeneration (ANR) is implemented in priority watersheds and protected areas, enrichment planting (EP) in sparsely-wooded grasslands, mangroves, and tidal flats, and revegetation of streambanks through ANR or EP; and development of urban forest parks.

EO 26 of 2011 lists the public domain areas covered by the NGP such as: forestlands, mangrove and protected areas, ancestral domains, civil and military reservations, urban areas under the greening plan of LGUs, inactive and abandoned mine sites, and other suitable lands. The NGP targets 1.5 million ha for the 6-year period from 2011 to 2016. EO 193 of 2015 (Expanded NGP) covers all remaining unproductive, denuded and degraded forestlands to be reforested from 2016 to 2028.

Identification of potential reforestation sites. Under the E-NGP, DENR field offices identify areas needing rehabilitation using technology and information from LGUs (CLUP/FLUP, community watersheds), NAMRIA (official maps), RBCO (river basins), PAGASA (climatic data), local community and stakeholder consultations and stakeholder analysis, and other sources. These information are verified through perimeter and site surveys and mapped with geotagged photos. Areas are then classified by development purpose, i.e., production, protection, conservation, and special treatment (i.e., ANR, EP, densification, cover crop planting, non-plantable areas).

DENR key informants reportedly identify potential areas through consultations with local stakeholders, particularly PO and LGU partners who are knowledgeable about the local situation and environment. They said it is increasingly difficult to find open access or untenured areas to be reforested since most available sites have already been planted since the start of NGP in 2011. Hence, consultations with locals and LGUs could reveal which areas are still not planted and which of those previously planted through past projects have either been burned or already cut and harvested but not replanted. Tenured POs also can identify areas that they have not yet been developed within their tenured area. These areas are preferable to the inaccessible and marginal areas that are left remaining after the first NGP phase. The inaccessible (by distance, elevation, slope) areas that could qualify for reforestation are problematic for the following reasons mentioned by the key informants: (1) steeply sloping areas are often highly eroded and difficult to reforest due to poor soil and site conditions; (2) distant areas in higher elevations with poor accessibility pose a challenge to local POs as well as DENR monitoring teams; and (3) overall costs of developing these marginal areas in higher elevations with steep slopes along the way naturally increase with every km as it takes more time (hours and person-days) to haul planting materials and conduct maintenance and protection activities as well as validation and monitoring activities.

Site assessment, survey and mapping. Under the FLMP (DAO 93-23), SMP involved the conduct of pre-feasibility studies on the proposed project sites. It includes perimeter survey; sectioning and blocking; monumenting and marking of corner posts; contour mapping/slope classification; proposed control and operations maps; benchmark information and demographic and socio-economic data gathering; estimates of financial/economic rate of return; initial environmental examination; proposed project development plan, schedule and cost estimates.

Potential NGP areas for development undergo SMP where soil analysis is done to determine species to be planted and identify interventions to improve soil conditions (DAO 2019-03). Areas to be developed are identified according to purpose and category: for production; protection; conservation; and special treatments (ANR, EP, densification, cover crop planting, non-plantable areas). The areas for development are subjected to perimeter survey with geotagged photos, mapped, and recorded in the database at the local and national offices. Soil analysis is conducted (TB 1B for 2019 areas, DAO 2019-03) to determine soil properties and interventions to improve the soil, and determine appropriate species. A number of the DENR informants said that they submitted the soil samples collected from the potential reforestation sites to ERDB for analysis but it took a long time for them to release the results and some are still not released. The reason mentioned for the delayed release of soil analyses was that ERDB soils laboratories were inundated with soil samples, more than they can process with their limited resources. Some soil samples were also submitted to the DA soils laboratories for analysis but it seems they have to pay for the services. The DENR key informants said that they use ocular observation of soil properties which by experience, they and most PO members are able to note if the soil is clayey, sandy or loamy or are poor in nutrients by color and texture. Indicator species also help in determining the productivity of the site and usually helps in selection of species to be planted. The need to fast track SMP in time for the planting season led some to do away with soil analysis. Hence, the clamor is to give ample time for pre-implementation activities before actual planting.

For the FMP, SMP includes watershed characterization, vulnerability assessment and socio-economic baseline survey; conduct of ground survey and mapping of potential areas for site

development and issuance of land tenure instruments; preliminary study on community-based enterprise development; and preparation of rehabilitation, protection and development plan. Existing secondary data (watershed characterization, site index, site-species-market matching, etc.) were reportedly not used in some NGP/E-NGP sites due to time constraints to accomplish the targets required.

Reforestation planning. After identifying the areas that need rehabilitation under E-NGP, DENR regional offices prepare the reforestation/rehabilitation/restoration plans based on 5-year plans submitted by the PENROs (prior to 2019, indicative plans were formulated) which specify the area, location, and availability for each purpose (i.e., production, protection, etc.) in each province. The PENROs then prepare the operations plans which guide the CENROs in identifying potential partners for the targeted areas. The DENR key informants said that they are supposed to identify annual target areas for approval by the Central Office. However, there were times when the Central Office ask the regional offices to revise (increase or decrease) their targets depending on the available budget for the year. Increasing targets is often more challenging as they have already exhausted all available areas to be planted in the field. They prefer to use the available budget for maintenance and protection of the already established forest plantations or the so-called graduated NGP sites.

As for the private and other entities funding their own projects, they spend time and effort to assess the reforestation project sites and even commissioned experts or their own technical staff to prepare the comprehensive development and management plans (e.g. TYKFI hired consultants to prepare their CDMP; First Gen used EDC's BINHI model for their reforestation projects; NIA prepared reforestation plans in line with their master plan for their project site in Carranglan). The plans are prepared based on comprehensive site assessment using technology-driven methods for collecting and analyzing data on the various site characteristics including technical, biophysical, socio-cultural, and environmental aspects. The plans integrate all aspects of reforestation for both protective and productive purposes including strategies for long term management of the established plantations and business plans for the products to be harvested in due time. They also put premium in hiring security and forest protection personnel to protect their established reforestation project sites as a way to address the threats and vulnerabilities identified during the assessment and planning stage.

Species selection and spacing. Previous contract reforestation projects (DAO 91-31) promoted the planting of timber and non-timber species for production forests, fuelwood crops, and fruit trees (not to exceed 20% of the total project area).

Appropriate species for planting under NGP are supposedly chosen based on: suitability to prevailing conditions; purpose for which the area will be developed; availability and sources of planting materials; and available market for plantations to be developed for production or commercial purposes (DAO 2019-03). Indigenous species are encouraged but preference of qualified partners are also considered. The commodity road map for NGP includes the following: timber; fuelwood/wood biomass; hedgerow crops; bamboo; rattan; mangrove species; beach forest species; high value crops such as cacao, coffee, rubber; agroforestry species; and other commodities such as non-timber forest products. The FMBTB 10A lists the recommended planting density per ha for the various commodities.

DAO 2019-03 also allows the use of pioneer species in degraded and marginal areas during the first year and the preferred climax species are to be planted in the second year. However

as previously mentioned, many of the key informants in the study have not yet used pioneer species in their project sites since this is a relatively new policy.

In the selection of species to be planted in the reforestation sites, the decision of DENR partners is often dictated by availability of planting materials for procurement; by fund release for seed collection and nursery propagation; sometimes by their preference for high value crops and fruit trees, the fruits of which could be harvested for consumption or for commercial purpose. The key informants said they usually do not include scanning the available market as basis for species selection but they intrinsically know which crops can grow locally and be sold in the market. Thus, the operations plans formulated by partners do not include a business plan for marketable products to be harvested from the reforested sites since their contract period does not cover the time for harvesting them.

The private entities funding their reforestation projects select multi-species that can be used for production and protection purposes. For protection, most of them choose native species including pioneers to establish forest cover by noting indicator species within the sites before planting climax species. A number of the respondents also survey existing vegetation particularly those that are endangered and threatened and make the effort to propagate and plant them in the reforestation project sites (e.g. BINHI projects of EDC and First Gen). For production, wood, fuelwood, and agroforestry crops are selected for planting because of the marketability of these products that would help in generating livelihood and income for their PO/IP partners (e.g. TYKFI's agroforestry model farms for training locals; PG NE for their CADT holder partner to market fuelwood products to local palay dryers and markets for charcoal briquettes).

Development activities. Under the E-NGP, development components following the forest landscape (FLR) approach (DAO 2019-03) include establishment of new plantations through comprehensive site development including site preparation and soil amelioration; nursery establishment and seedling production (use of quality seedling materials from clonal nurseries, mechanized and modernized forest nurseries, produced by POs on-site; use of organic fertilizers); plantation establishment in accordance with approved Regional/Provincial operations plans (planting of preferred species in year 2 while site preparation, soil amelioration and planting of pioneer species in year 1); maintenance and protection for 5 years (ring weeding or strip brushing, application of organic fertilizers, replanting, maintenance of established plantations, foot patrolling, watering; with minimum annual survival of 85%). Rainwater harvesting facilities are to be put up near plantations as source of water during dry season.

Not many of the DENR and PO respondents understand and apply the forest landscape restoration approach yet but they are more familiar with the area management (watershed unit) approach since it has been used for a long time already. However, the respondents are mostly familiar with the checklist of development activities shown to them as they have been practicing most of these over the years. Exceptions to these are the planting of pioneer species in year 1 since they have been used to planting the reforestation species in year 1 in previous projects. Where there are clonal, mechanized or modernized forest nurseries, the planting materials are reportedly more costly than those produced by POs in their temporary or permanent nurseries. The use of organic fertilizers is also practiced where the POs are trained and already producing these while others still use inorganic fertilizers for convenience. With regards to maintenance and protection, contracted activities such as foot patrolling,

construction and maintenance of firelines and fire breaks are only undertaken during the contract period. The PO partners are not obligated to maintain and protect the established plantations but are encouraged to do so for their future benefit. However, these activities take time away from PO members which they could use to earn income elsewhere especially after their contracts with DENR are completed and this income stream ends.

As mentioned in previous sections, non-DENR implementers of reforestation are actually practicing FLR approach as four of the respondents have project sites in degraded watershed areas that contribute to water quality and quantity in downstream areas. One of the respondents uses vegetative materials reproduction or automated tree nurseries in propagating native tree species and distribute the planting materials to the various reforestation project sites (e.g. First Gen and EDC).

M&E of reforestation projects. Monitoring and evaluation of NGP sites as discussed earlier is done in three phases: (1) internal validation and assessment of accomplishments of DENR's contracted partners as basis for progress billing scheme; (2) composite team assessment of partners' compliance with the terms and conditions of their MOA as requirement for release of 10% retention fee prior to turn-over of the established project to DENR; and (3) annual and five-year third party assessment of the NGP program as provided in DAO 2019-03.

DENR conducts the internal and composite team assessment of partners' accomplishments during the contract period where most of the PO partners are able to comply with the required performance indicators. However, for the third party evaluation of the Program at the regional and local levels, the DENR and PO respondents are not so aware of the results of the evaluation. In most cases, the issues and concerns that they raised during the evaluation (e.g. 3-year contracts are not enough to maintain and protect the established plantations; perennial problems of wildfires and marginal site conditions causing low survival and growth of established plantations) were already addressed in the recent revisions of guidelines such as DAO 2017-03 and DAO 2019-03. The contract duration was extended to 5 years. The use of pioneer species during year 1 and planting of climax species during year 2 now address the poor growth in marginal areas.

One of the problems also raised by the DENR and PO informants was the delay in the conduct of composite team assessment of the partners' accomplishments prior to turn-over of the project sites to DENR. The main reason cited is the difficulty of scheduling the assessment as the team is composed of representatives from the Central Office/FMB, regional office, and other stakeholders. Hence, the PO partners are stretching their funds for protecting the established plantations just to ensure that they get the 10% retention fee after the assessment.

For the private sector, the First Gen Corporation has its own standards and guidelines for the POs to follow in the implementation of plantation establishment, replanting and maintenance activities under their BINHI projects. The standards and guidelines cover the following: hardening of seedlings at the nursery prior to planting; site preparation (mapping, blocking, or compartmentalization of planting sites; establishment of baseline for planting strips by species); weeding/clearing of planting spots; hole digging; planting (timing of planting; selection of good seedlings for planting; hauling from nursery to planting sites; planting and fertilizer application by species; mulching); replanting and maintenance (ring weeding, cultivation or loosening soil surface, fertilization by species, mulching); and M&E. The farmers' associations (FA) create an M&E group that is capacitated and trained by the project technical staff of FGC. The M&E group is tasked to check the work of the FA laborers based on the

guidelines and standards. Members of the monitoring and evaluation group assigned to each specific activity will report daily (written) to FA management. The report is validated in the field by the project staff through

random sampling or 100% if possible and if needed. This will serve as the attachment for billings. The M&E reports of the FAs form part of the overall internal project monitoring and evaluation by the company where adjustments are made to address implementation issues and problems.

Socio-cultural component

For the pre-implementation phase, DAO 2019-03 requires the DENR to conduct of IEC campaign to consult and inform the partners and the surrounding communities about the program objectives. A socio-economic profile (sex-disaggregated data) of upland communities and stakeholders' analysis incorporating gender analysis are likewise required as part of the SMP. Potential qualified partners are engaged during the assessment, survey, mapping and planning. POs are to be capacitated by DENR on organizational development, technical skills development, project management, and gender development.

Previously, DAO 2017-03 required the assessment of readiness of POs and upland communities in the gathering of baseline information through socio-economic survey or participatory rapid appraisal. POs also had to conduct value chain analysis for the identification of relevant and viable social enterprise which shall be funded by their forced savings from nursery and plantation development activities. This is no longer required in DAO 2019-03.

Most of the DENR respondents said that they conduct EIC campaigns (posting of announcements and posters on NGP projects) and consultation meetings (face to face, house to house visits, etc.) to inform the stakeholders about the available areas for reforestation, including site assessment, survey and mapping activities. They also conducted stakeholder analysis (including gender differentiated profiles) as required to determine the potential partners and their capability to undertake reforestation. Although a full-blown socio-economic survey would be helpful, they instead make use of secondary data such as the barangay LGU and DSWD data and information gathered during census. The requirement for value chain analysis has not been done by any of the DENR and PO key informants of this study.

The earlier NGP implementation guidelines did not include community organizing and other capacity building component on the assumption that tenured PO partners (i.e., CBFMA, PACBRMA) have been trained and organized prior to the NGP. However, the recent guidelines (DAO 2019-03 Section 8.11) provides for all qualified POs to undergo capacity building activities to be conducted by DENR, to include organizational development and technical skills development, project management, and gender and development.

However, a number of the key informants from the contracted POs have not received adequate training on community organization and other technical skills. Some mentioned that many extension officers hired by the DENR lack the capacity to train the POs particularly on community development and enterprise development. Also, the POs have minimal participation in the decision making from project planning to implementation and M&E as the DENR field staff prepare all the operations and work and financial plans. Thus, their indigenous knowledge and practices are often not taken into consideration since the POs have to abide by the target activities defined in their contracts with DENR.

One of the objectives of NGP (DAO 2019-03 Section 2) is to “provide appropriate management arrangements and incentives to ensure sustainability of the program.” The key informants mentioned that one of the incentives for POs is being a priority for engagement with new contracted activities if they perform well in the previous contracts.

Other key informants, particularly those funding their own reforestation projects, said that stakeholder analysis and community profiling are necessary in identifying their potential partners. It helps them design project activities that address the needs of their community partners as well as identify areas of collaboration with DENR, LGU and other government agencies, NGOs, and academe. One of the private sector informants mentioned that ensuring that the POs are trained in social enterprise is one way of ensuring the sustainability of their reforestation projects. Having income generating projects allows the local communities to value the forests by protecting and maintaining them.

Economic component

During the SMP, selection of species to be planted in the potential NGP areas includes scanning for available market for the commodities to be produced, particularly for areas to be developed for commercial and production purposes. In DAO 2017-03, POs were to determine the most relevant and viable social enterprise through value chain analysis and planning. The funding for the social enterprise will come from the PO’s forced savings from the income from nursery and plantation activities. This is no longer included in DAO 2019-03 but it states that CBFM POs can enter into MOA with private entities in the development of their tenured areas under NGP.

CBFM PO partners have the potential to earn income from the harvesting of the fruits of high value crops, agroforestry fruits, and non-timber forest products such as bamboo and rattan, but only if these are explicitly stated in their tenure instrument and MOA with DENR for NGP projects. This, however, is not clearly mentioned in DAO 2019-03 or earlier policy issuances.

Developing plantations for commercial production or social enterprise is not explicitly stated in many of the operations plans of POs. However, there are still active POs maintaining their income generating projects (IGPs) even after their DENR contracts ended, such as nursery propagation of seedlings for sale to DENR and other buyers, involvement in other reforestation contracts, and a few harvesting and marketing the produce from high value crops and fruit trees they planted. They are able to continue these IGPs through the savings from their previous contract payments where a certain percentage is set aside by the PO – these were learned through their CBFMA backgrounds.

Most DENR key informants said that harvesting and utilization plans are not yet included in their 5-year reforestation plans since timber harvesting takes years beyond the 5-year duration of the plans. Although harvesting of high value crops and fruit trees could happen within the plan duration, there are no business plans prepared for these. Also, most DENR personnel view reforestation projects for protection and conservation purposes and not for production, hence there is little preparation for the time that the established plantations will be harvested. They said that the turned over NGP plantations will be bidded out anyway to long term developers who are expected to include the harvesting component in their MOA and management plans.

The private sector key informants have strong background in business plan preparation because they need to recoup their investments (financially or environmentally) where possible,

especially if the reforestation project is for production purposes. Hence, most of the respondents said that they include harvesting, utilization and marketing plans for reference in computing for returns on their investment for the company and for their PO partners engaged in commercial production through their livelihood projects. Environmental costs and returns are also part and parcel of their business model for rehabilitation projects, especially those funded from their corporate social responsibility.

As for the LGU, OGA and academe key informants, they have no plans to harvest and utilize the tree crops since the main purpose of their reforestation projects is for forest protection and conservation as well as for educational and ecotourism purposes (academe).

Generation of employment is one of the accomplishments reported by DENR in NGP implementation. However, the employment of local community members is mostly done during the establishment of the reforestation projects by the POs and less after the projects are turned over to DENR.

Benefit sharing between government and contracted partners is defined for those with long term tenured but not for partners who have turned over the established reforestation projects and no longer have legal claims over the said areas without tenure given to them.

Environmental component

Environmental stability, biodiversity conservation, enhancing climate change mitigation and adaptation, are among the State policies that NGP/E-NGP should address in the long term. The pre-implementation activities related to the gathering of baseline information on environmental conditions are SMP which includes site characterization and soil analysis, biodiversity assessment, identification of existing vegetation and indicator species, identification of potential threats, and natural/anthropogenic vulnerabilities. The indicative (DAO 2017-03) and reforestation/rehabilitation/restoration plans and operations plans (DAO 2019-03) are supposed to address the site conditions, threats and vulnerabilities through appropriate species, site development with soil amelioration, maintenance and protection, and IEC campaigns (including signages). The post-implementation program assessment (every 5-years) can then evaluate the outcomes and impacts of the program by measuring specific parameters and indicators using on the baseline information gathered during site assessment.

Although most of the DENR key informants mentioned environmental goals including climate change mitigation and adaptation and ecosystem services in their plans, there is very little to show how they intend to measure these in their reforestation plans which are mostly target driven (i.e., physical accomplishments such as area planted and survival). As discussed earlier, while biodiversity assessment and soil analysis, among other site characterization components are required in the SMP, the resource limitations (i.e., time, budget, human, technology, etc.) are too challenging such that DENR field personnel said that they prioritize the currently measurable performance indicators over establishing baseline information required for future post-evaluation purposes. However, there really is a need to establish baseline information even through simple checklists that field staff and even POs can accomplish during the pre-implementation and planning phase. The data can be processed and included in the database for reforestation projects.

In contrast, private funded reforestation projects invest in establishing baseline information not only for planning purposes but for measuring project impacts in the medium and long term. With the advantage of having enough budget to regularly monitor and evaluate reforestation

projects, the private sector implementers can respond appropriately to address problems arising during project implementation in real time as well as have third party monitoring and evaluation. One of the respondents (TYFKI) commissioned third parties to: (1) conduct an assessment survey of the flora and fauna in their project sites resulting in an improved biodiversity index of existing natural forest patches in the area; and (2) estimate the carbon stock and sequestration potential of the project site which showed an average of 77.80 MT/ha or 0.59 t/tree (<http://www.tanyankee.org/environment/tykfis-legacy-forest-project-ensures-biodiversity-watershed-protection>).

RECOMMENDED STANDARDS AND PARAMETERS

The review and assessment of the current standards and parameters reveal that there are still gaps, issues, and concerns particularly in the pre-implementation to the post-implementation phases that need to be addressed to ensure that reforestation initiatives are sustained and that the goals are achieved. Table 1 lists the recommendations to address the gaps, issues and concerns regarding the current standards and parameters for measuring reforestation performance.

Table 1. Recommendations to improve current standards and parameters for measuring the performance of reforestation projects.

Standards and Parameters by Component	Recommendations
Institutional component	
<i>Goals and objectives of reforestation</i>	Should be site-specific with measurable criteria and indicators for short, medium, & long term evaluation
<i>Roles and responsibilities of agencies</i>	Define sectoral/agency responsibilities that could be sustained in the short, medium, & long term
<i>Program management, supervision, and monitoring</i>	Provision of adequate support & resources for implementing field offices – manpower should be permanent items instead of contractual; provision of equipment, facilities, vehicles for field offices dedicated for reforestation projects
<i>Identification of potential reforestation sites (target-driven)</i>	Instead of piecemeal project sites, concentrate on priority areas and maintain/nurture them until the reforested areas are established; target new areas only as expansion of the previously established sites
<i>Reforestation planning</i>	Reforestation plans should be integral to the Master Plan for Forestry or Forest Land Use Plan of the region, province, or municipality. Hence, the reforestation plans should be formulated following the long term Master Plan of FLUP which already indicate the areas for protection (e.g. critical watersheds or river basins, protected areas, mangroves, etc.), production (e.g. timber, fuelwood, agroforestry, water, carbon trading, ecotourism, etc.). Hence,

	<p>in the SMP, ample time should be given to gather needed data and information on the potential sites before reforestation activities are implemented from seed collection, nursery seedling production, infrastructure development, site preparation & planting, maintenance & protection, and harvesting/utilization (for production areas), etc. Budgeting for these activities should be included in the plans, not only for contracted activities but also for long term overall operations.</p>
<i>Bidding of project sites</i>	<p>Enough time should be given for the bidding, processing and awarding of contracts and provide a workable schedule for implementation of contracted activities</p>
<i>Modes of implementation</i>	<p>The time gap between completion of contracted activities and bidding/provision of long term tenure over the “graduated sites” should be addressed. A combination of Reforestation by Administration in partnership with local POs or communities can be considered.</p>
<i>Capability building of DENR staff & POs</i>	<p>DENR field staff (not just those involved with Reforestation by Administration) and POs need to be continuously trained not only on project implementation but also on community development and enterprise development. M&E staff should be hired and able to train local communities to do M&E activities.</p>
<i>Funding and payment scheme</i>	<p>Adequate funds should be allotted for DENR field offices to be able to hire permanent and qualified extension officers, procure and maintain equipment, facilities, and vehicles needed for the reforestation program.</p>
<i>Information, education and communication (IEC)</i>	<p>The required communication plans for IEC should be developed and implemented and the field staff trained to prepare materials and conduct training for the partners.</p>
<i>Reforestation program monitoring and assessment/evaluation (M&E)</i>	<p>Validation of accomplishments and program M&E should be done by third parties within the agency and not by the project field implementers themselves. Program evaluation should be funded and implemented by another agency or institution to achieve realistic (unbiased) program performance evaluation results. M&E tools should be developed at the start of the program so that performance C&I are properly measured during the short, medium and long term.</p>

<i>Sustainability of established reforestation projects</i>	Factors that affect the sustainability of reforestation projects should be prioritized during the planning stage. Drivers such as poverty and other threats and vulnerabilities need to be addressed. Institutional factors such as capacity of existing field offices to maintain and protect the graduated reforestation sites have to be considered in target setting.
Technical and Biophysical component	
<i>Areas covered</i>	The field offices should be given the responsibility to decide on priority areas (e.g. for protection, production, etc.) to be reforested based on the forest landscape rehabilitation approach as stipulated in the policies.
<i>Identification of potential reforestation sites</i>	Piecemeal reforestation sites should not be the norm but rather focus on areas that can be developed for a certain period and later on expanded once the plantations/forests are already established and growing.
<i>Site assessment, survey and mapping</i>	Ground validation of secondary data from existing maps and other information should be conducted properly with enough logistics and resources. Database should be maintained and updated as references for addressing issues and problems in field implementation.
<i>Reforestation planning</i>	The planning horizon should go beyond the 3 or 5 years required for reforestation projects. This requires visioning for the long term, whether the projects sites are to be developed for protection, production, or any other purposes (as determined in the Master Plans for Forestry or FLUPs or other plans in the locality). Thus, planning should include harvesting plans (i.e. infrastructure for processing, transport, marketing, etc.) or development of ecosystem services (i.e. ecotourism, water use, carbon trading, biodiversity conservation, etc.) and the requisite support services to implement these in the future. Thus, technical, environmental, financial and other aspects should be planned at the onset to prepare for future land uses of the reforestation sites to be established.
<i>Species selection and spacing</i>	Depending on site conditions, species selection should be based on the future land uses of the reforestation site, whether it be for production

	(type of products and services) or protection (type of ecosystem services) or other uses.
<i>Development activities</i>	Development activities should be geared towards achieving the end products of the reforestation project (i.e. production of timber, high value crops, or other ecosystem services). Silvicultural practices should be identified and implemented to achieve the desired end products. Infrastructure development should also be included in preparation for M&E and silvicultural practices (e.g. ANR, EP, replanting, pruning, thinning, etc.).
<i>M&E of reforestation projects</i>	The M&E tool should be developed and aligned with the purpose of reforestation projects, be it for production or protection and the quality of the desired end products. The M&E results at different periods of time should be used to adopt improvements needed to achieve the desired end products of the reforestation projects.
Socio-cultural component	
<i>Socio-economic profiling & stakeholder analysis</i>	The DENR can partner with LGUs, academe, and local communities to conduct SE profiling and stakeholder analysis since the main reason for not doing these is lack of capability and resources.
<i>IEC campaigns</i>	The communication plans should be developed in consideration of the needs of local communities and partners. Hence, training programs and IEC materials should be focused on developing capacities for both the short and long term. Regular assessments of IEC campaigns need to be incorporated in the program M&E in order be responsive to the needs of local partners.
<i>Capacity building of PO partners & participation in project activities</i>	Capacity building of PO partners and local stakeholders should cater to their specific needs so that they are able to meaningfully participate in project activities as well as sustain them after the reforestation contracts are completed.
Economic component	
<i>Market scanning for species selection</i>	Available and potential markets (demand trends) for the species to be planted should be identified and pre-feasibility studies done to determine the viability of establishing plantations of certain species for specific end products.
<i>Social enterprise</i>	Improving the welfare of local communities and reducing poverty need to be translated through income generating projects that will allow them to be partners in maintaining and protecting the reforested areas even after their contracts end.

<i>Planning for harvesting, utilization, & marketing of products</i>	Pre-feasibility studies for production reforestation projects serve as basis for planning and implementing harvesting, utilization and marketing of products to be derived from the project sites.
<i>Incentives for partners</i>	More innovative incentives need to be identified and implemented for the local partners to sustain and maintain the reforested projects (e.g. annual awards for best performers, provision of long term tenure or certificates of “rights to planted trees”, etc.)
Environmental component	
<i>Baseline information gathering & monitoring</i>	Ecosystem services derived from reforestation project sites should be identified from the pre-implementation phase. This means gathering baseline information as basis for monitoring to achieve the desired end products (e.g. ecosystems services such as water, carbon, biodiversity, ecotourism, etc.)