

Carbon–forestry projects in the Philippines: potential and challenges

The Laguna Lake Development Authority's
forest-carbon development project

Raquel C. Lopez, Liberty O. Moya and Rodel D. Lasco

Southeast Asia



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Abstract

Laguna de Bay is one of the most vital inland bodies of water in the Philippines. It is surrounded by 24 sub-watersheds with an aggregate area of 2920 km². The Laguna de Bay watershed is considered a priority watershed for environmental sustainability. It was originally covered by dense tropical forest but was estimated in 2010 to have less than 5% forest cover. The area is characterised by grasslands, brush and abandoned agricultural areas that have less than 10% tree cover, thus, considered a priority for rehabilitation

The Laguna Lake Development Authority's carbon-forestry project, called the Laguna de Bay Community Watershed Rehabilitation Project, consists of two components: 1) Project 1, which covers an aggregate of 140 ha over 10 barangays within the Caliraya-Lumot Watershed. This is further subdivided into two sites (site 1 = 40 ha and site 2 = 100 ha); and 2) Project 2, which covers an aggregate of 217 ha located in four sites in Laguna province. Each site is equivalent to a small-scale forest-carbon project bundled into one project

The project aims to develop an enabling environment for a carbon market for small-scale environmental interventions in the Laguna de Bay watershed. The key activities of the project are designed to: a) build the capacity of the Authority as an intermediary; b) pilot the implementation of carbon emissions reduction projects; and c) prepare set environmental projects for emission reduction credits.

The project has the participation of local government units (Municipality of Tanay and Siniloan), an academic institution (University of Philippines Los Baños), a government-controlled corporation (National Power Corporation) and private companies (CBK Power Company and San Pablo Water District), which have jurisdiction at each site to facilitate the project.

As intermediary, the Authority was able to receive funding through a grant from the Japan Climate Change Initiative, which the World Bank implements for purchasing offsets for greenhouse gas emission reductions from small-scale Clean Development Mechanism (CDM) projects. Carbon financing is already mainstreamed in the project, which enabled the Authority to prepare a project design document following the CDM standard template. However, when submitted for validation, of the sites proposed for the forest-carbon development project, only one site—5 ha located in the municipality of Siniloan—satisfied the eligibility criteria under the CDM afforestation/reforestation framework.

While continuing their reforestation activities, the Authority is currently looking for additional sites. The project design document is being revised and other market mechanisms are being explored.

Keywords: carbon forestry, forest-carbon development, watershed rehabilitation, agroforestation, Laguna de Bay, CDM A/R

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Acronyms

A/R	Afforestation/Reforestation
CDM	Clean Development Mechanism
ERPA	Emission Reduction Purchase Agreement
UNFCCC	United Nations Framework Convention on Climate Change
UPLB	University of the Philippines Los Baños
PDD	Project Design Document
SWOC	Strength, weaknesses, opportunities, constraints

1. Introduction

Rationale of the study

Climate change brought about by massive greenhouse gas emissions is perhaps the most pressing environmental concern the world is facing. To address the impact of climate change, both mitigation and adaptation measures are necessary and interdependent (UNFCCC 1997).

Forests¹ have a critical role to play in addressing climate change (Stern 2006). In recognition of the significant role of forests in storing carbon and mitigating climate change (Lasco and Pulhin 2003), carbon-forestry projects have been included in the Clean Development Mechanism (CDM) of the Kyoto Protocol (UNFCCC 2007). The CDM provides opportunities for forestry projects to generate emission reduction credits that can be sold in a carbon market (UNFCCC 2007). This is seen as an opportunity for capital flows since developed countries can invest in emission reduction projects in developing countries (Lasco 2008).

For developing countries like the Philippines, the emerging carbon markets and payments for environmental services mechanisms are seen as funding opportunities that will encourage good forestry, sustainable agriculture and other measures on the use and management of natural resources (Neeff et al. 2007). Development efforts to enhance removal of carbon dioxide (CO₂) or to sequester carbon are intended to enhance environmental resilience and help alleviate poverty, especially amongst poor smallholder farmers.

For smallholders, carbon markets could be an additional source of income that could help them adapt to sustainable land management. So-called carbon payments could provide income while contributing to mitigation (Stern 2006, Lasco 2008). However, until now, there have been very few carbon-forestry projects. To engage in forest-carbon development, and be able to gain benefits from relevant frameworks such as the CDM, is considered as tedious and complex work (Lasco et al. 2010) for smallholders in developing countries.

This case study series set out to identify the institutional approaches, technological innovations and policy reforms necessary for carbon-forestry projects in the Philippines to participate in the carbon markets and other mechanisms and to discover ways to reduce barriers for smallholders and small-scale projects. The Laguna Lake Development Authority's ('the Authority') proposed carbon-forestry project in Laguna de Bay is provided here as a case in point.

¹ Approximately 17.4% of annual global carbon dioxide emissions are caused by deforestation and forest degradation.

Objectives of the study

This study aimed to identify the potential of, and challenges for, the Laguna de Bay Community Watershed Rehabilitation Project, based on the project design document (LLDA website). Specifically, three objectives were set.

1. Identify the strengths and limitations of the proposed forest-carbon development project to engage with carbon markets and other schemes that provide rewards in exchange for maintaining or improving environmental services.
2. Identify the key issues associated with the carbon-forestry project's development and implementation.
3. Determine the actions needed for project management and policy development to institutionalise the proposed project in relation to the carbon market and other environmental services rewards schemes and identify the research focus.

Background of the study

The Authority² proposed small-scale CDM sub-projects, bundled into the following categories.

Bundle 1: Avoidance of methane production from biomass decay through composting.

Bundle 2: Methane recovery in wastewater treatment.

Bundle 3: Watershed Rehabilitation Project, which consists of two sub-projects:

1. The Laguna de Bay Community Watershed Rehabilitation Project 1, which covers an aggregate of 140 ha over 10 barangays within the Caliraya-Lumot Watershed. This further subdivided into two sites (site 1 = 40 ha and site 2 = 100 ha); and
2. The Laguna de Bay Community Watershed Rehabilitation Project 2, which covers an aggregate of 217 ha located at four sites in Laguna province. Each site is equivalent to a small-scale forest carbon project bundled into one project.

The Authority is implementing these two initiatives in parallel through the Laguna de Bay Institutional Strengthening and Community Participation Project (LISCOP) and Laguna de Bay Community Carbon Finance Project (Carbonshed Project) (Lasco and Pulhin 2006, Santo-Borja 2007).

LISCOP has two components: 1) Co-managed Investment for Watershed Development; and 2) Strengthening Institutions and Instruments. Component 1 has a direct relationship to the Carbonshed Project. The Carbonshed Project is a parallel project to LISCOP, which aims to develop an enabling environment for a carbon market for small-scale environmental interventions in the Laguna de Bay watershed.

² The Laguna Lake Development Authority is a quasi-government agency mandated to lead, promote and accelerate sustainable development in the Laguna de Bay region.

The initiative started in 2004. The Community Development Carbon Fund and the BioCarbon Fund are the target buyers of the carbon emissions reduction credits. Both are represented and managed by the World Bank. On 30 June, 2006, an Emission Reduction Purchase Agreement (ERPA) was signed between the Authority and the World Bank. The first bundle of ERs must be at 32 323 tonne of carbon dioxide equivalent (t CO₂e) before 2017. This will be adjusted when the second bundle is formed. In July, 2007, the first PDD—the Laguna de Bay Community Watershed Rehabilitation Project 1—was prepared followed in November by the second PDD, the Laguna de Bay Community Watershed Rehabilitation Project 2. It was expected that the institutionalisation of these two projects as components of the Carbonshed Project would be completed by 2008. In 2009, the two PDDs were submitted by the Authority for validation by an independent third party, TÜV SÜD³. Of all the sites proposed for the forest-carbon development project, only one site—5 ha located in the municipality of Siniloan—satisfied the eligibility criteria under the CDM afforestation/reforestation (A/R) framework. In 2010, while continuing their reforestation activities, the Authority was looking for additional areas to meet their ERPA commitment, revising their PDD, and exploring other market mechanisms.

2. Methodology

Sources of data and method of data collection

The primary sources of information for the case study were the PDDs available on the Authority's website. While the assessment was underway, the PDDs were being revised as corrective actions were undertaken.

The assessment started in 2009, initially by conducting literature reviews of reports and research publications, drafts of the project design and activity plans, and other documents about the project sites. Likewise, we conducted field observations and unstructured, informal interviews with households and individual participants and other stakeholders as well as field personnel involved in the project planning, documentation and implementation management.

Method of analysis

With reference to the overall framework (Appendix 1) developed as a research project entitled 'Overcoming barriers to smallholder forest-carbon development in the Philippines', we analysed the potential for, and challenges to, the carbon-forestry project against three measures.

- 1) effectiveness of institutionalising the project;
- 2) efficiency of resource use and mobilisation; and
- 3) impact.

³ TÜV SÜD is an international certification organization accredited by the United Nations Framework Convention on Climate Change's CDM Executive Board. It is a designated operational entity that can validate CDM projects classified under any of the scopes (<http://www.tuv-sud.in/>).

There are several conditions that have to be met in order to participate in carbon markets and schemes that provide rewards for environmental services, especially if registering the project under the CDM A/R framework. The project proponent (intermediary of the smallholders or the smallholders themselves) should consider the conditions at the planning stage. For forest-carbon development projects to succeed, a project development plan is vital and the first step to be undertaken.

We based our assessment on the project development plan extracted from the PDDs and related documents, focusing on site development, resource use and mobilisation, socio-economic and environmental services management.

The key issues of the project were identified in the strengths, weaknesses, opportunities and challenges (SWOC) analysis, specifically, the weaknesses and constraints of the technical management (site selection, definition of project area, implementation strategy for ecological services provision) and administrative management (project administration, resource use and mobilisation, socio-economic and environmental services management).

3. Results and discussion

Description of the project

Site description

Laguna de Bay is one of the most vital inland bodies of water in the Philippines. It encompasses the whole provinces of Laguna and Rizal, portions of Metro Manila and the provinces of Batangas, Cavite and Quezon (Figure 1). About 13% (approximately 11.5 million) of the Philippines' population lives in these areas.

The total surface area of the lake is around 900 km². It is surrounded by 24 sub-watersheds that have an aggregate area of 2920 km². These sub-watersheds are traversed by more than 100 streams that drain into the Lake Laguna. The lake used to have an abundant supply of different lacustrine resources.

Laguna de Bay watershed was originally covered by dense tropical forest. Its pristine state offered pleasure and recreation to explorers. At the time of writing, however, the watershed is estimated to be covered by less than 5% forest.

Laguna de Bay is considered a priority watershed for environmental sustainability for two main reasons:

- 1) it has environmental pressure from to deforestation over the past several decades; and
- 2) it provides recreation and livelihoods for nearby residents.

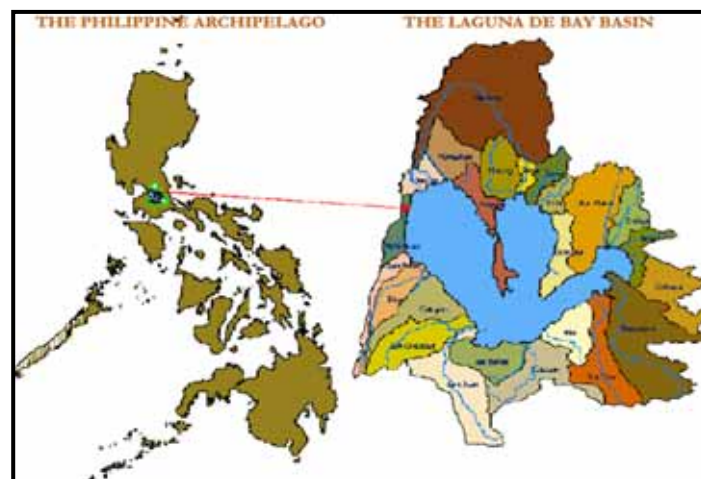


Figure 1. Location map of the Laguna de Bay Region
Source: Santos-Borja 2007

In the last five years, land degradation in these areas has contributed to severe landslides. Erosion in the watershed adds to the dense sedimentation of the lake, with the increase in bed silts resulting in overflows that cause severe flooding in nearby municipalities. The initial

deforestation in the watershed was a result of logging in the 1970s, with subsequent threat from the growing peri-urban area of Manila. Moreover, there is a strong demand by poor families on natural resources for subsistence as well as sale of extracted forest products to the growing population in the watershed.

Currently, the area contains grasslands, brush lands and abandoned agricultural areas. These have less than 10% tree cover, thus, are considered a priority for rehabilitation. Without massive rehabilitation and strict protection these areas are expected to remain non-forest owing to a combination of pressures (such as grazing, timber collection for fuel wood, poles, charcoal making and other uses; slash-and-burn agriculture) and environmental conditions (existence of pervasive grasses and other species).

Project objective

The project aims to

- 1) develop an enabling environment for a carbon market for small-scale environmental interventions in the Laguna de Bay watershed.
- 2) rehabilitate the watershed; and
- 3) demonstrate how small-scale reforestation activities can sequester carbon from, and reduce CO₂ emissions to, the atmosphere that can be measured, monitored and verified.

Overall, the key activities are designed to build the capacity of the Authority as an intermediary so that it can implement pilot projects designed to reduce carbon emissions and receive credits.

Multiple benefits are expected to accompany the project, such as

- promoting the sustainable use of natural resources in the watershed;
- adoption of soil and water conservation measures to reduce sedimentation in rivers and lakes;
- reduction of flooding and landslides;
- biodiversity conservation;
- long-term improvement of local livelihoods;
- building the capacity of various stakeholders (private groups, local governments, river councils and communities) to work together to properly manage the natural resources and to implement reforestation activities; and
- the reforestation project for ER crediting under the CDM was expected to be replicable.

Area

1. Laguna de Bay Community Watershed Rehabilitation Project 1

The project is located in the Laguna de Bay region within the Caliraya-Lumot Watershed (Caliraya-Lumot Reservation Parcel 9), encompassing barangay San Antonio, Kalayaan municipality of Laguna province (Figure 2).

The project covers an aggregate of 140 ha within two sitios (Pulo't-Bae and Magalolon) of Brgy San Antonio, Kalayaan, Laguna.

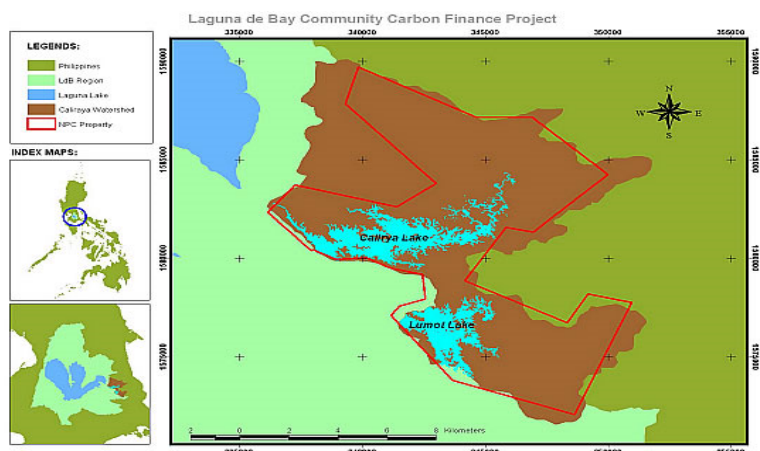


Figure 2: Location of Project 1

The project is planned for two sites (site 1 = 40 ha and site 2 = 100 ha) (Table 1), described as portions of the watershed that have been under pressure from *kaingin* practices (slash-and-burn cultivation), charcoal making and wood gathering. Pervasive grasses and weeds have become established and with the poor soil conditions limit the regeneration of perennial woody trees.

Table 1: Locations and total area of Project 1

LOCATION			BARANGAY, MUNICIPALITY, PROVINCE	AREA (has)	LAND COVER	LAND-SOIL STATUS (SOIL TYPE)
GPS Lat. and Long.	ELEVATION (masl)	SITE				
14° 19' 49.4076"E 121° 34' 12.8352" N	300 – 400	1	San Antonio Kalayan, Laguna	40	Grassland	Luisiana series and undifferentiated mountain soils
14° 19' 30.2592" E 121° 33' 30.513" N	300 – 400	2	San Antonio Kalayan, Laguna	100	Grassland	Luisiana series and undifferentiated mountain soils
Total =				140		

2. Laguna de Bay Community Watershed Rehabilitation Project 2

The proposed project covers a total of 217 ha located on four sites within Southern Tagalog, Region IV, particularly in the provinces of Rizal, Batangas and Laguna (Figure 3). Each site location is equivalent to a small-scale forest-carbon project bundled into one project (Table 2).

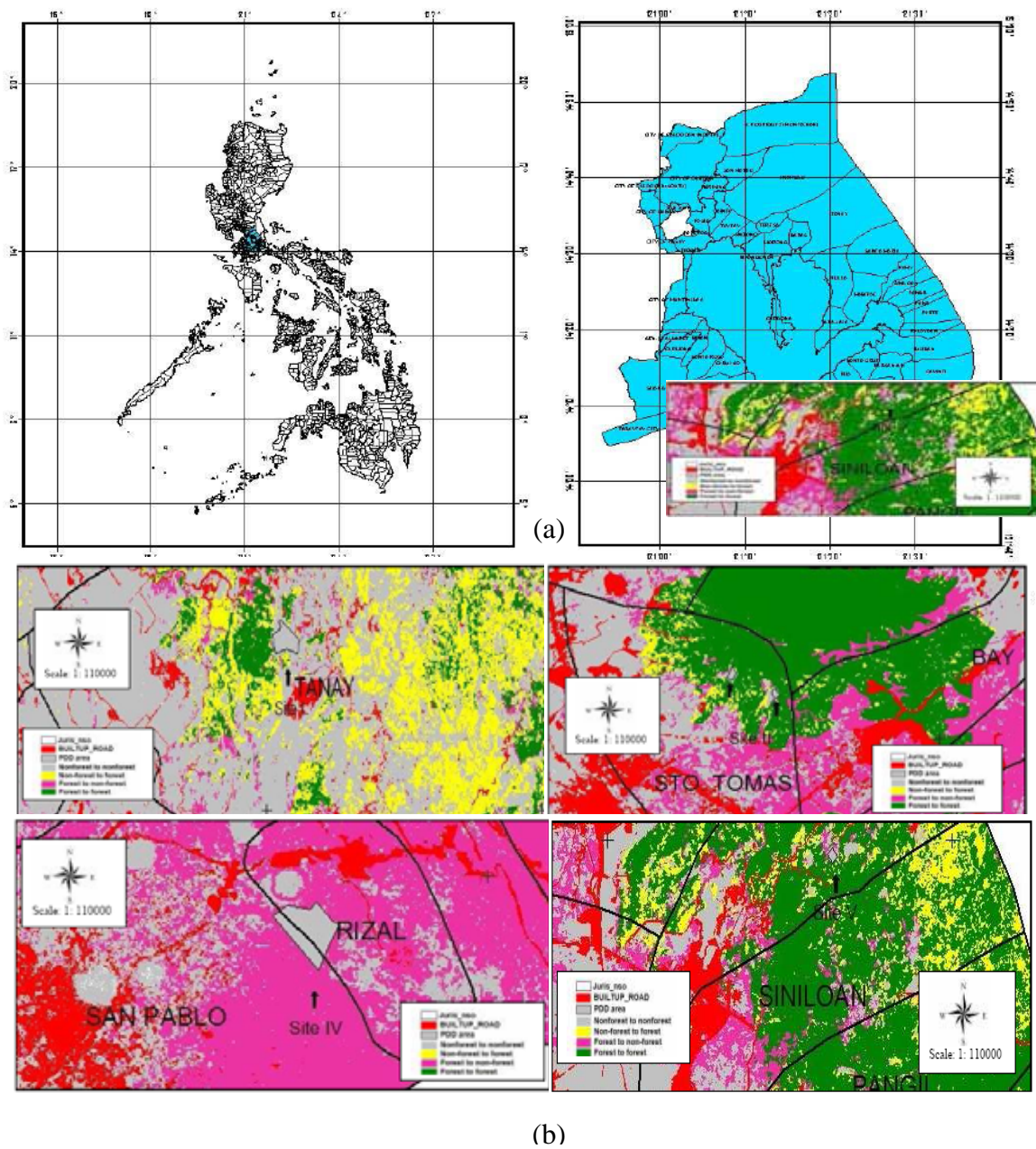


Figure 3. Location of Project 2 (a) Laguna de bay watershed; (b) UL: Site 1 Tanay; UR: Site 2, Mt. Makiling; LL: Site 3, San Pablo; LR: Site 4, Siniloan.

Site 1(52 ha): Barangay Cuyambay, Tanay, Rizal

The watershed was deforested by logging in the 1950s and then subjected to frequent slash-and-burn activities. The area is now dominated by pervasive weeds. The few trees and shrubs that can be seen rarely grow to maturity and are collected for fuel wood or charcoal by nearby communities.

Table 2. Location and total area of Project 2

LOCATION			BARANGAY, MUNICIPALITY, PROVINCE	AREA (ha)	LAND CLASSIFICATION	LAND-SOIL STATUS (SOIL TYPE)
GPS Lat. and Long.	Elevation (masl)	Site				
N 14.60 S 121.33	100–900	1	Cuyambay, Tanay, Rizal	52	Forestland	Clay Loam
N 14.12 S 121.18	400–1000	2	Sto. Tomas, Batangas San Bartolomé, Sto. Tomas, Batangas	9 5	Forestland	Clay
N 14.11 S 121.19			San Vicente, Sto. Tomas, Batangas	4		
N14.09 S 121.38	220–360	3	Sto. Angel, San Pablo City, Laguna	151	Forestland	Loam
N 14.46 S 121.48	Gradually sloping	4	Lagiuo, Siniloan Laguna	5		Clay
TOTAL				217		

The 52 ha are dominated by grasses and weed species with some woody vegetation and a few small tree species. As described in the PDD, these types of soil are considered suitable for fruit trees, upland and lowland rice, secondary forests and *cogon* (*Imperata cylindrica*) grass.

The parcel's title is under the name of the Municipality of Tanay. The municipality allocated 93 ha to the indigenous cultural community through a Sangguniang Bayan Resolution No. 2004-15 dated 12 January, 2004. The Community, in consultation with the National Commission on Indigenous People, agreed to allocate 50 ha for the project.

Site 2 (9 ha): Barangays San Vicente (4 ha) and San Bartolome (5 ha), Sto. Tomas, Batangas
Watershed management has been delineated into six zones. The 9 ha area is located within the Mt Makiling Forest Reserve, which is under the jurisdiction and management of the University of the Philippines Los Baños (UPLB) through RA 6967 of 1989. This was formerly an abandoned area for slash-and-burn agriculture in the late 1980s. For two decades, it remained as grasslands with regular occurrence of fire brought about by human activities. During the dry months the grasses withered, making the area no longer attractive to roaming wild animals. Hunters would then normally burn the grass to encourage new shoots to appear. This area has no occupants.

Site 3 (151 ha): Barangay Sto. Angel, San Pablo City

This is located within the Malabanban Watershed Reserve. The 151 ha area consists of secondary forests, agricultural cultivation, open grassland, brush land and some shrubs. The project site is a degraded area dominated by grasses. It is characterised as rocky with very shallow loam soil. The soil has to be augmented to plant trees in the area. A few trees species are growing in the area, however, it is still far from being a forest.

The watershed reserve is managed by the San Pablo City Water District. An Executive Order signed by the President of the Philippines proclaimed that the reserve was to be managed by a watershed council. Since this council never existed, the management was assigned to the local water district through a city resolution.

Site 4 (5 ha): Barangay Lagiuo, Siniloan

This site was formerly under shifting cultivation or *kaingin*. It is an open grassland dominated by *cogon* grass and other grass species.

The site is public land under the jurisdiction of the local government of Siniloan. As public land it is owned by the State and some portions of it can be put under the jurisdiction of a government unit through a specific Executive Order, with the recommendation of the Department of Environment and Natural Resources.

Technical operations

Implementation strategy

Project 1

Forest-carbon development and watershed rehabilitation activities will be undertaken as per Table 3 and planting carried out as per Table 4.

Table 3. Forest-carbon development, Project 1

Site	Location	Project scheme	Area (ha)	Spacing	Species	Remarks
1	Sitio Pulo't-Bae, Brgy San Antonio, Kalayaan, Laguna	Mixed forest-tree species	20	2m x 3m	<i>bitaog (Calophyllum inophyllum)</i> <i>narra (Pterocarpus indicus)</i> <i>marang (Litsea perrotteti)</i> <i>batino (Alstonia macrophylla)</i> <i>acacia (Acacia auricaliformis)</i> <i>malapapaya (Polyscias nodosa)</i>	Buffer strip species: <i>kakawate (Gliricidia sepium)</i> , <i>kamachile (Pithecellobium dulce)</i> , <i>kawayan tinik</i>
		fruit tree species	20	5 m x 5 m	<i>rambutan (Nephelium lappaceum)</i> <i>santol (Sandoricum koetjape)</i> ,	<i>(Bambusa blumeana)</i> <i>kawayang killing (Bambusa vulgaris)</i> , pigeon pea <i>(Cajanus cajan)</i>
2	Sitio Magalolon, Brgy San Antonio, Kalayaan, Laguna	Mixed forest tree species	100	2m x 3m	<i>bitaog (Calophyllum inophyllum)</i> , <i>marang (Litsea perrotteti)</i> <i>acacia (Acacia auricaliformis)</i>	Buffer strips species: <i>kakawate (Gliricidia sepium)</i> , <i>kawayan tinik (Bambusa blumeana)</i> , <i>kawayan killing (Bambusa vulgaris)</i> , pigeon pea <i>(Cajanus cajan)</i> .

Table 4. Planting schedule, Project 1

Site	Area (ha)	Period	Species	Spacing	Seedlings requirement (plus 20% mortality allowance)
1	20	1 st year	Forest trees	2 m x 3 m	33 333 (+8000)
	20	1 st year	Fruit trees	5 m x 5 m	8000 (+1600)
	40				
2	50	2 nd year	Forest trees	2 m x 3 m	83 350 (+16 670)
	50	3 rd year	Forest trees	2 m x 3 m	83 350 (+16 670)
	100				

The selection of species was based on tree growth, habitat of the species (endemic and introduced species for several decades with no invasive characteristics), botanical description (growth characteristic, genotype etc), environmental preferences and tolerance limits (adaptability to local environmental conditions, for example, drought resistant) and stakeholders' opinion (determined during community interview). Fast-growing and endemic

tree species, which are adapted to local environmental conditions, constituted the species that will be grown at the project sites.

It was estimated that the 140 ha project would remove or sequester a total of 56 226 t CO₂ with an annual average of 2811 t CO₂e over 20 years (2007–2026) (Appendix 2).

Field implementation in Laguna de Bay Community Watershed Rehabilitation Project 1 is presented in Box 1.

Box 1. Field activity, Project 1

<p>Field activity operation: <i>Laguna de Bay Community Watershed Rehabilitation Project- 1</i></p> <p>Nursery operation A semi-concrete nursery with a floor area of about 500 square meters will be established within the project site. Planting materials will be procured either as seeds or seedlings and will be raised using the standard nursery activities.</p> <p>Field/land preparation Site preparation includes a combination of strip brushing, ring weeding/spot clearing or any other method/strategy depending on species suitability. Staking will be done following the 2m x 3m and 5m x 5m spacing for forest and fruit trees, respectively. Stakes should be at least 1 meter in height so it can be easily located during hole digging and planting. Locally available materials can be used as stakes. A clearance of 2 inches around the seedlings should be considered in determining the hole size to fit the seedlings into the hole. The hole depth depends on the size of the bag but should have a clearance of 2 inches around the pot and 3 inches from the base to determine the hole depth.</p> <p>Forest Carbon Planting 100 ha mixed forest and fruit-tree species shall be planted at 2m x3m 20 ha mixed forest and fruit-tree species shall be planted at 2m x3m 20 ha fruit trees species shall be planted at 5m x 5m Planting shall be done at the start of the rainy season.</p> <p>Forest Carbon Maintenance Regular maintenance will be conducted as needed (e.g. strip weeding/cultivation and mulching). Replanting shall be undertaken if survival rate is less than 95% and shall be conducted on the next planting season. Preventive measures shall be conducted through pruning of infected branches, removal of infected trees, thinning and other methods to avoid the spread of pests and diseases. Pesticide and fungicide can be applied on recommended amount depending on the severity of infection. Pruning of trees will also be conducted to remove unwanted branches to achieve and maintain a desired shape or form. Light pruning shall be done before the rainy season; however, infected or damaged branches should be pruned immediately at any time</p> <p>Monitoring and Protection The reforestation sites shall be protected from illegal human activities such as cutting of the planted trees, burning and squatting through the employment of the following watershed protection: conduct of patrol, fireline/firebreak and perimeter fence construction and billboards/signboards. Accordingly: <i>Conduct of Patrol</i> – Regular and/or periodic patrol of the sites and their adjacent areas shall be conducted by forest guards. This is essential not only for timely detection but also as a deterrent and quick-response to any illegal activities. Patrols shall be conducted even during odd hours of the day or weekends, and holidays, when violators may expect that no forest officers will be around to apprehend them. <i>Fireline/Firebreak and Perimeter Fence Construction</i> – A five (5) meter wide fireline/firebreak shall be constructed around the perimeter of the plantation site to protect the area from fire.</p>
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Project 2

The forest-carbon development activities that will be undertaken are described in Table 5 and planting will be carried out as presented in Table 6.

Table 5. Forest-carbon development, Project 2

Site	Location	Project scheme	Area (ha)	Spacing	Species	Remarks
1	Cayumbay, Tanay, Rizal	Mixed forest tree	52	2 m x 3 m	<i>Narra</i> (<i>Pterocarpus indicus</i>) <i>Dao</i> (<i>Dracontomelon dao</i>) <i>Ipil</i> (<i>Intsia bijuga</i>) <i>Molave</i> (<i>Vitex Parviflora</i>)	A combination of trees, shrubs, bamboo and vines may be planted in the reforestation area to serve as fire and wind breaks as well as buffer strips to reduce soil erosion. Among the recommended species are <i>kakawate</i> (<i>Gliricidia sepium</i>), <i>kamachile</i> (<i>Pithecellobium dulce</i>), <i>kawayan tinik</i> (<i>Bambusa blumeana</i>), <i>kawayang kiling</i> (<i>Bambusa vulgaris</i>) and pigeon pea (<i>Cajanus cajan</i>)
		and Fruit trees		5 m x 5 m	Cashew (<i>Anacardium occidentale</i> L)	
2	San Bartolome and San Vicente, Sto. Tomas, Batangas	Mixed endemic (pioneer and drought resistant) forest tree species	9	2 m x 3 m	<i>Amugis</i> (<i>Koordersiodendron pinnatum</i>) <i>Betis</i> (<i>Madhuca betis</i>) <i>Dao</i> (<i>Dracontomelon dao</i>) <i>Ipil</i> (<i>Intsia bijuga</i>) <i>Kalantas</i> (<i>Toona calantas</i>) <i>Kalomata</i> (<i>Clausena brevistyla</i>) <i>Kalumpit</i> (<i>Terminalia microcarpa</i>) <i>Makaasim</i> (<i>Syzygium nitidum</i>), <i>Malugai</i> (<i>Pometia pinnata</i>) <i>Narra</i> (<i>Pterocarpus indicus</i>) <i>Supa</i> (<i>Sindora supa</i>) <i>Balakat</i> (<i>Zisiphus talanai</i>) <i>Bolong-eta</i> (<i>Diospyros pilosanthera</i>) <i>Bolon</i> (<i>Platymitra arborea</i>) <i>Tamayuan</i> (<i>Strombosia philippinensis</i>) <i>Tuai</i> (<i>Bischofia javanica</i>) <i>Kalimutain</i> (<i>Dysoxylum arbrescens</i>) <i>Bitaoag</i> (<i>Calophyllum inophyllum</i> L).	
3	Sto. Angel, San Pablo City, Laguna	Mixed endemic hardwood forest tree species	151	2 m x 3 m	<i>Piling liitan</i> (<i>Canarium luzonicum</i> [Blume] A. Gray) <i>Binunga</i> (<i>Macaranga tanarius</i> [L] Muell-Arg) <i>Balete</i> (<i>Ficus balete</i> Merr.) <i>Antipolo</i> (<i>Artocarpus blancoi</i> (Elm) Merr.) <i>Batino</i> (<i>Alstonia macrophylla</i>) <i>Igio</i> (<i>Dysoxylum decandrun</i> [Blanco] Merr.) <i>Tibig</i> (<i>Ficus nota</i> [Blanco] Merr.)	
4	Lagiuo, Siniloan Laguna	Forest tree species	5	2 m x 3 m	<i>Narra</i> (<i>Pterocarpus indicus</i>) with <i>kakawate</i> (<i>Gliricidia</i> [Jacq.] <i>sepium</i>)	
		and Fruit tree species		5 m x 5 m	Cashew (<i>Anacardium occidentale</i> L) <i>Lanzones</i> (<i>Lansium domesticum</i> corr.), <i>Nangka</i> (<i>Artocarpus heterophylla</i> Lam) <i>Rimas</i> (<i>Artocarpus communis</i> J.R.G. Forst)	

Table 6. Planting schedule, Project 2

Site	Area (ha)	Period (years)	Species	Spacing	Seedlings requirement (plus 20% mortality allowance)
1	52	3	Indigenous forest trees	2 m x 3 m	86 684 (+17 336)
			Fruit tree species	5 m x 5 m	20 800 (+4160)
2	9	1	Indigenous forest trees	2 m x 3 m	15 003 (+3000)
3	151	3	Indigenous forest trees	2 m x 3 m	251 717 (+50 343)
4	5	1	Indigenous forest trees	2 m x 3 m	8335(+1667)
			Fruit trees	5 m x 5 m	2000 (+400)
217					

It was estimated that the 217 ha would remove or sequester a total of 84 104 t CO₂ with an annual average of 4205 t CO₂ e over 20 years (2008–2027) (Appendix 3).

Field activity for Project 2 is presented in Box 2.

Field activity operation: Laguna de Bay Community Watershed Rehabilitation Project- 1

Nursery operation

A semi-concrete nursery with a floor area of about 500 square meters will be established within the project site. Planting materials will be procured either as seeds or seedlings and will be raised using the standard nursery activities.

Field/land preparation

Site preparation includes a combination of strip brushing, ring weeding/spot clearing or any other method/strategy depending on species suitability. Staking will be done following the 2m x 3m and 5m x 5m spacing for forest and fruit trees, respectively. Stakes should be at least 1 meter in height so it can be easily located during hole digging and planting. Locally available materials can be used as stakes. A clearance of 2 inches around the seedlings should be considered in determining the hole size to fit the seedlings into the hole. The hole depth depends on the size of the bag but should have a clearance of 2 inches around the pot and 3 inches from the base to determine the hole depth.

Forest Carbon Planting

100 ha mixed forest and fruit-tree species shall be planted at 2m x3m
20 ha mixed forest and fruit-tree species shall be planted at 2m x3m
20 ha fruit trees species shall be planted at 5m x 5m

Planting shall be done at the start of the rainy season.

Forest Carbon Maintenance

Regular maintenance will be conducted as needed (e.g. strip weeding/cultivation and mulching). Replanting shall be undertaken if survival rate is less than 95% and shall be conducted on the next planting season. Preventive measures shall be conducted through pruning of infected branches, removal of infected trees, thinning and other methods to avoid the spread of pests and diseases. Pesticide and fungicide can be applied on recommended amount depending on the severity of infection. Pruning of trees will also be conducted to remove unwanted branches to achieve and maintain a desired shape or form. Light pruning shall be done before the rainy season; however, infected or damaged branches should be pruned immediately at any time

Monitoring and Protection

The reforestation sites shall be protected from illegal human activities such as cutting of the planted trees, burning and squatting through the employment of the following watershed protection: conduct of patrol, fireline/firebreak and perimeter fence construction and billboards/signboards. Accordingly:

Conduct of Patrol – Regular and/or periodic patrol of the sites and their adjacent areas shall be conducted by forest guards. This is essential not only for timely detection but also as a deterrent and quick-response to any illegal activities. Patrols shall be conducted even during odd hours of the day or weekends, and holidays, when violators may expect that no forest officers will be around to apprehend them.

Fireline/Firebreak and Perimeter Fence Construction – A five (5) meter wide fireline/firebreak shall be constructed around the perimeter of the plantation site to protect the area from fire.

Project development approach

The two projects will be implemented under the overall management of the Authority. It will be conducted with the facilitation of the respective project partners. The institutions, who have jurisdiction over the project sites will use manual labour from nearby communities and volunteer organizations.

Technical arrangements

Project 1

At this site, there are three government-owned and -controlled corporations sharing the management of the watershed: Laguna Lake Development Authority, National Power Corporation (NPC)⁴ and the CBK Power Company⁵.

The NPC has jurisdiction, authority and control over watershed reservation areas supporting power-generating plants and properties, including the Caliraya-Lumot Watershed.

CBK Power Company owns three power plants (Caliraya, Botocan and Kalayaan) that sell their power to the NPC. The Caliraya-Lumot Watershed supports the Caliraya Power Plant.

Based on a Memorandum of Agreement, NPC together with the Authority and CBK Power Company have the rights of access to the sequestered carbon. Since the project sites are uninhabited, the tenure rights of local communities are not an issue.

To meet amount of the required seedlings (249 600 including 20% mortality) for the 140 ha project, seeds will be purchased from certified seed producers and also produced on-site following standard nursery procedures.

Field implementation will be conducted by contracting the activities (for example, nursery operations, planting and maintenance) to a local people's organization that will sub-contract some of the activities to local residents.

Project 2

Site 1: Tanay, Rizal: The local government unit of Tanay Rizal will assist the local people (presumably these are indigenous people: the Dumagat and Remontado tribes) with planting by providing technical input and managing the plantation during the crediting period.

Site 2: Sto. Tomas, Batangas: UPLB will directly manage the reforestation activities. The local community will be contracted per activity through the assistance of the local government at barangay level.

⁴ National Power Corporation is a government-owned body mandated to construct power plants and transmission lines in the country. By virtue of Proclamation No. 573, 26 June, 1969, and Executive Order Nos 224 and 258, both dated 16 July 1987, the NPC has complete jurisdiction, control and regulation over watershed areas and reservations surrounding its power-generating plants and properties (NPC 1996).

⁵ CBK Power Company Ltd produces and sells hydroelectricity. It operates hydropower stations in Caliraya, Botocan and Kalayaan in southern Luzon. The company is based in Laguna.

Site 3: San Pablo City, Laguna: The local water district will undertake reforestation of the area in cooperation with various communities.

Site 4 - Siniloan, Laguna: The local government unit of Siniloan Laguna will allocate funds and solicit assistance from various organizations to reforest the grassland area.

As for the planting materials, the Authority will provide forest and fruit tree seedlings. These will be purchased by the Authority, raised or solicited from philanthropic organizations (for example, Bantay Kalikasan, a non-government organization, or provided by volunteers collecting seeds of indigenous forest trees).

Local people, especially farmers, will be encouraged to establish nurseries at the sites to grow the seedlings. The Authority will buy the plants with the assurance that the seedlings will be of high quality. Training and study tours will also be provided to farmers. Aside from the potential cash payment, plastic bags will be provided for every seedling produced by a farmer, a *balik-punla* strategy introduced by the hired community organizer of the Authority⁶.

Socio-economic arrangements

Project 1

Nearby residents will be employed as labourers during the planting period and up to the third year for the maintenance required to establish the tree crops. They will also benefit from the harvests from the planted fruit trees such as grafted *rambutan* (*Nephelium lappaceum*) and *santol* (*Sandoricum koetjape*) as early as five years after establishing the plantation.

Project 2

The proposed sharing arrangement of carbon payments follows.

Site 1: Payments will be shared by the local government units of Tanay and the indigenous cultural communities of Dumagat and Remontado tribes.

Site 2: No mention of arrangements for carbon payments.

Site 3: Payments will be solely received by the San Pablo City Water District, which has signalled the intention to return any earnings from emission reductions to the communities by undertaking projects that will benefit the communities.

Site 4: Payments will be solely received by the Municipality of Siniloan. Harvests from the fruit trees and other crops will be for the benefit of the farmers.

⁶ Personal interviews, 7 November 2009, by N Varcas, A Faraon and R Angeles of the Authority.

Management operations

Administrative support

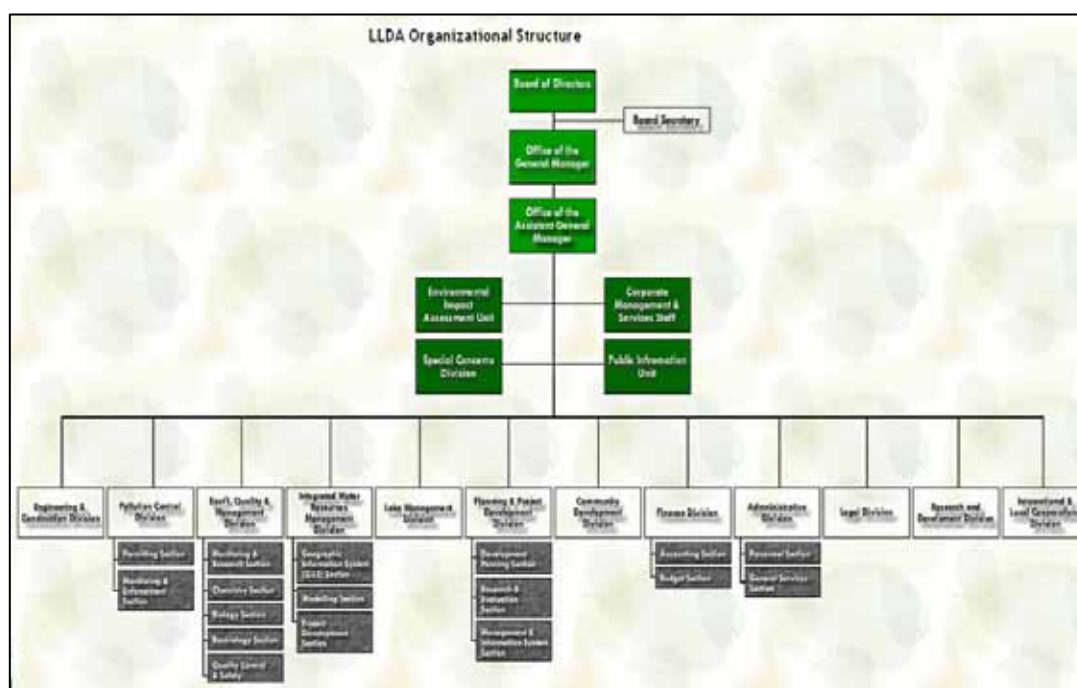


Figure 4. Laguna Lake Development Authority organizational structure

Source: Laguna Lake Development Authority website, www.llda.gov.ph, accessed 5 December 2009.

The Authority will coordinate the project proponents and provide technical services for both projects⁷.

- Supervise and implement the activities
- Arrange training for farmers and communities
- Organize a group to monitor project performance and impacts, measure and monitor actual greenhouse gases removal by sinks
- Work closely with the project proponents by providing technical guidance for the monitoring work, jointly undertaking field measurements and other surveys as well as analysing data
- Document and archive

The proponents (Project 1: NPC and CBK. Project 2: local government units of Tanay and Siniloan, UPLB and San Pablo City Water District) have specific responsibilities.

- Undertake routine measurements, data collection and documentation according to the monitoring plans.

Each site will have a special group to oversees the project's operations and field implementation. This will include personnel and financial management (scheduling of people

⁷ Torres, 2009.

and logistics in the reforestation projects), technical aspects (planning the reforestation) and work assessments based on targets (monitoring and evaluation).

Technical support

For both projects, aside from the Authority, which extends technical support, multi-sectoral teams composed of representatives from the project proponents, local government units, Department of Environment and Natural Resources and the communities will assume the bulk of the responsibilities of patrolling the sites to protect them from illegal occupation or intruders. Appropriate deputation appointments will be prepared for the members of the team. Each member will undergo basic training on forest policies pertaining to watershed conservation and protection.

For Project 2, seedlings will also be secured through Bantay Kalikasan⁸ and UPLB will provide technical assistance to residents in raising good quality plants.

Public and policy support

A Memorandum of Agreement will be created between the local government units and the Authority. Relevant municipal ordinances will also be established.

Financial support

The projects are funded through a grant from the Japan Climate Change Initiative, which is implemented by the World Bank, for purchasing offsets for greenhouse gas emissions reductions from small-scale CDM projects.

Potential and challenges of the project

There are several conditions that have to be fulfilled in order to participate in the carbon market and payments for environmental services' mechanisms, especially if registering the project with the CDM A/R. The project proponent (intermediary of the smallholders or directly from the smallholders) should consider those conditions at the planning stage (IGES 2009).

The formulated and documented project development/operational plan (that is, PDD, project development plan or any documents about the proposed project and field activity reports) were primarily used in this assessment.

The potential and challenges of the project are presented in Table 7.

⁸ Bantay Kalikasan is an organization established by ABS-CBN that promotes awareness in nature and advocates the preservation of the environment.

Table 7. Potential and challenges

INDICATORS	POTENTIAL	CHALLENGES
(1) Effectiveness of institutionalising the forest-carbon project at Laguna de Bay		
Site suitability	Sites are within the watershed areas. Parcels are characterised as shrublands/grasslands, with invasive weeds and previously under slash-and-burn cultivation	As per validation conducted by a designated operating entity (third party) only 5 ha passed the eligibility criteria under the CDM A/R framework Identifying the other eligible parcels and justifying the additionality since the projects are within the watershed/ forest reservation area.
Operations	Prepared two PDDs for the two watershed rehabilitation projects following the CDM A/R standard template and submitted for third-party validation	Projects have not been submitted to the designated national authority (Department of Environment and Natural Resources CDM Secretariat) or to the Department of Environment and Natural Resources Forestry Management Bureau's Technical Evaluation Committee for evaluation, approval and endorsement for registration
Environmental services marketing	Already signed an Emission Reduction Agreement (ERPA)	The Authority needs to meet the ERPA commitment
(2) Efficiency of resource use/mobilisation		
Technological	Presented agroforestation scheme as implementation strategy	Is the project development approach feasible?
Social	Identified that the institutions who have jurisdiction over the sites are the direct project participants	To engage and facilitate the involvement of the local community considering that they don't have a direct legal stake (not as landholders with tenure) in the land
Financial	The project is funded through a grant from the Japan Climate Change Initiative, administered by the World Bank.	The ERPA sets the conditions for the payment of the verified emission reductions and also penalty provisions in case of non-delivery
(3) Impact		
Social acceptance	Engaged the participation of the indigenous cultural community	Engaging the involvement of residents whose landholdings are suitable for the project and/or needing rehabilitation and partly support watershed functions.
Political response	Has the collaboration of institutions (local governments, university, government corporation) at each site to manage the project	Ensuring the active support of the major stakeholders

Economic considerations	Can provide potential income from production of seedlings, yield from fruit trees and other food crops	Assured cash income is only from labour payments for the tree planting
Ecological services	Aside from rehabilitation to enhance the watershed's functions, the project will also increase its carbon sequestration potential	Ensuring appropriate measurement and valuation of environmental services

Effectiveness of institutionalising the project

Site suitability

Does the proposed project meet the eligibility criteria and fulfil the 'additionality' condition under the CDM A/R project standards and/or comply with the standards of the voluntary market? The standards for CDM A/R projects follow the EB 35 report Annex 18: 'Procedures to define the eligibility of lands for afforestation and reforestation project activities' (UNFCCC 2010).

The Authority used SPOT satellite imagery from 1987, 1990, 2003 and 2007 to establish the non-forest status of the parcels and project locations. The delineated project area is characterised as not forest, with stocks already below the threshold of the Philippines' 'forest' definition. The area was originally deforested between the 1960s and 1980s, which was confirmed through ground verification and field interviews.

Of all the sites proposed for the project, only one site—the 5 ha located in the municipality of Siniloan—satisfied the eligibility criteria of the CDM A/R framework. The eligibility of the parcels was questioned. There were few trees and shrubs observed within the area (Appendix 3). Although some patches are infested with invasive weed species, the sites are generally surrounded with secondary forests and have some woody perennial regrowth. However, regrown trees rarely grow to maturity and are collected for timber, fuel wood or charcoal by nearby communities (Appendix 4) or burnt (Appendix 5) for either land preparation or hunting.

Since there are still existing secondary forests in the surroundings, fulfilling the 'additionality'⁹ condition was also an issue. The surrounding secondary forests are seen as potential sources of seeds since open forest patches can regenerate. The presence of a few tree species regrowth and shrubs was a manifestation that it was possible to regenerate the forest if they were not cut or harvested as poles or fuel wood. If provided with appropriate protection and management by the institutions that have mandates over the watershed and forest reservations, the area can potentially regenerate even without the forest-carbon project. What more, the project sites are generally inhabited.

⁹ The concept of additionality addresses the question of whether the project would have happened anyway, even in the absence of revenue from carbon credits. Only carbon credits from projects that are 'additional to' the business-as-usual scenario represent a net environmental benefit. Source: http://en.wikipedia.org/wiki/Carbon_credit#Additionality_and_its_importance

Development operation

To institutionalise the project in order to participate in the carbon market requires endorsement and approval of voluntary participation. This includes project application submission for evaluation by the Department of Environment and Natural Resources (the Philippines' designated national authority) and third-party validation by a designated operational entity (DENR 2005).

The Authority was able to prepare the PDDs of both project components following the CDM standard template. The first PDD, for Project 1, was prepared in July 2007 and the PDD for Project 2 in November 2007. The two PDDs were submitted for validation by an independent third party, TÜV SÜD, the designated operational entity contracted to do so under the CDM.

The PDD presented the baseline measurements and the estimate of potential CO₂ equivalent that would be sequestered in 20 years time. However, the proposed sites have not been approved. Also, the PDD have not yet been submitted to the Department of Environment and Natural Resources CDM Secretariat nor to the Department's Forest Management Bureau's Technical Evaluation Committee.

Corrective actions and redesigning the project need logistics and time.

Environmental services marketing

The project must be able to negotiate an agreement for support with potential carbon and environmental services' buyers either under the CDM framework or the voluntary carbon market and/or generate source support for its operations, including field implementation, through other mechanisms.

An ERPA was signed between the Authority and the World Bank on 30 June, 2006. The prospective buyer of carbon credits was the BioCarbon Fund represented by the Bank. To comply with the ERPA, the Authority is looking for other locations for the forest-carbon development project.

Efficiency of resource use and mobilisation

Technological

If referring to the CDM A/R framework, this means conducting A/R project activity on deforested lands (for at least 50 years or before 1990), where 'deforested' (< 10%–30% forest stock) means the vegetation has been below the thresholds adopted by the host country for its definition of 'forest'. The Philippines Government defines 'forest' as land having trees with tree-crown cover or equivalent stocking level of > 10%, an area of more than > 0.5 ha, and the trees should be able to reach a minimum height of 5 m at maturity in situ. The 'forest' consists of either closed forest formations with trees at various storeys and undergrowth cover of a high proportion of the ground or open formation with continuous vegetation cover in which tree-crown cover exceeds 10%. Suitable areas under the CDM framework are those below the forest threshold (FMB 2007).

The proposed project will be conducted as a CDM A/R project. It will employ an agroforestation scheme that establishes forest (2 m x 3 m planting distance) and fruit trees (5 m x 5 m). Species selection was based on the following criteria: indigenous, desirable growth characteristics, adaptability, the choice of on-site stakeholders, prevents soil erosion, enhances biodiversity and the potential economic value of the tree and its by-products.

At 2 m x 3 m distance, Project 1 with 120 ha aggregate area will have potential tree stock of 200 040 forest trees and Project 2 with 217 ha aggregate area will have potential tree stock of 361 739 forest trees (1667 trees per hectare). Since this is intended for permanent forest, the issue of 'permanence'¹⁰ for the entire crediting period can be addressed.

At 5 m x 5 m distance, the 20 ha of Project 1 planted with fruit trees will have a potential stock of 8000 trees (400 trees per hectare). In Project 2, the 57 ha will have 22 800 fruit trees.

With reference to the potential stocking level of the forest tree area as the reforestation component, the agroforestry farms will have an equivalent stocking level of fruit trees of > 10% but < 30%, so the question still remains if this is to be considered a forested area. Fruit tree species selected can reach heights above 5 m at maturity. The issue of 'permanence' for the entire crediting period can be addressed only when the fruits are ready for harvest.

Total area to be planted with forest trees is wider than that with fruit trees. The carbon sequestration and storage potential of the two land-use schemes will be different, favouring the forest tree area because the trees are more densely planted, if only aboveground biomass is included in the measurements.

Social

This refers to whether the project has local people's involvement, particularly the main stakeholders (people dependent on the land), and has addressed the issue that there should be no people displaced (if the land is occupied); the term also refers to the type of technical and socio-economic arrangements as well as the administrative structure for project operations and field activities.

'Local community participation' means adopting community-based forest management, which is the national strategy in the Philippines in managing the country's forest resources, by virtue of Executive Order No. 263, 1995.

The Authority takes charge of the overall operation while specific field implementation will be conducted through the institutions that have jurisdiction over the site: Project 1 are NPC and CBK power company; and for Project 2 are the indigenous cultural community within the Municipality of Tanay, UPLB, San Pablo City Water District and the local government unit of Siniloan.

The local community's involvement is through the facilitation of the institutions that have jurisdiction over the site. But to engage the involvement of the local community is a challenge

¹⁰ One of the issues affecting carbon markets is that of 'permanence'. In essence, it is difficult to guarantee the permanence of forests, which may be susceptible to clearing, burning or mismanagement. However, the proposed forest is intended to be controlled 'permanent forest', that is, not plantation timber that will be cut, which sufficiently addresses the 'permanence' criteria.

considering that the residents don't have any direct legal stake (they are not landholders with tenure instruments) in the land.

There are no clear technical and socio-economic arrangements presented by the project proponents. For example, there is no information about how project activities will be coordinated between the institutions which have jurisdiction over the sites and the people who will be directly involved in the field activities. Nor do the documents address the questions who will pay, who are to be paid and how much will be paid.

The documents only mention that the Authority will encourage local residents to produce good quality seedlings, which the Authority will buy, and the harvests from the fruit trees will be given to the local farmer who planted the area.

An ad hoc' group undertakes the project development process, which consists of personnel from different management divisions of the Authority. Two members are from the Integrated Water Resources Management Division and the rest from the Community Development Division.

Personnel composing the team were temporarily assigned from their respective units.

Financial

The project must be able to generate funding for its operations and/or negotiate successfully with potential buyers of carbon credits or environmental services.

The project is funded through a grant from the Japan Climate Change Initiative, which the World Bank manages, for purchasing offsets for greenhouse gas emissions reductions from small-scale CDM projects. The prospective buyer of carbon credits is the BioCarbon Fund represented by the World Bank (Santos-Borja and Lasco 2005, Santos-Borja 2007). Representatives of the Bank provided technical assistance and funding for data gathering and packaging of the project. Training in preparing the project design document for the project was provided to Authority personnel. Consultants were also hired to assist the Authority in the project design and documentation.

Impact of the proposed project

Social acceptance

For a holistic approach to rehabilitation, conservation and sustainable development, the participation of the community within and surrounding the Laguna de bay watershed must be ensured.

Consultation and stakeholders' perceptions surveys were conducted and the indigenous cultural community in Tanay have indicated their interest to support the project. This is with the understanding that involvement in the project will provide employment opportunities (for example, payments for labour during the planting period), potential income from raising seedlings and from fruit harvests, apart from any environmental protection issues.

Political/public response

The project sought cooperation from all sectors to provide technical and logistic support, including policy measures.

Aside from the Authority as the main proponent, the institutions involved at each site are the direct project participants who will manage implementation. All of them potentially have pools of expertise and are capable of mobilising resources.

Economic considerations

The project provides sources of income aside from the carbon payment or environmental services incentives.

Potential livelihood and income opportunities that can be provided for the local residents are from the sales of quality seedlings, which the Authority has guaranteed to buy, payment of labour services during plantation establishment and the harvested fruits that will be given to the field participants.

Ecological services provision

Carbon sequestration and storage potential (actual net greenhouse gas removal by sinks) and other ecological benefits are essential elements of the project.

It was estimated that Project 1 would potentially sequester 56 226 t CO₂e in 20 years (2007–2026) and Project 2 would sequester 84 104 t CO₂e in 20 years (2008–2027). The projects' primary targets in planting trees is to rehabilitate the watershed to regulate the flow of water downstream (reduced flooding), reduce erosion and siltation in the lake, and enhance water quality and supply (improved ground water recharge) (Santos-Borja and Lasco 2005).

With appropriate land management and protection, the risk of fires, pest and diseases can be significantly reduced and dependence on chemical fertilisers can be avoided. Further deforestation and land degradation through the invasion of invasive weed species can be controlled or prevented.

Strengths and limitations of the project

We have assumed that the technical and administrative plans reflect the institutional capacity of the proponent to undertake the project and ensure its sustainability.

The SWOC analysis is based on the PDDs and other documents related to the project. The assessment of the project focuses on the following indicators: site development, resource-use and mobilisation, socio-economic management and environmental services management.

The strengths and limitations (Table 8) of the operational aspects are extracted from the SWOC analysis.

Site development

This pertains to area (land-cover status of the project's sites, delineated area for the project), the strategy of forest-carbon implementation (specific land management scheme) and the project development approach (how the project's operations and specific field activities are to be carried out).

Table 8. Strengths and limitations

	STRENGTHS	LIMITATIONS
A. Site development		
1. Area identification	The sites are within the critical watersheds of Laguna de Bay	Parcels delineated for the project show signs of forest regeneration, except for one parcel (5 ha) that is grassland
2. Implementation strategy	Indicated an agroforestation scheme to rehabilitate deforested/open portions within the watersheds	No economic valuation to determine the viability of the agroforestation scheme, especially for the indigenous cultural community's field implementers
3. Project development approach	Identified the institutions who have jurisdiction over the sites	Community involvement is not explicitly presented
B. Resource use/mobilisation		
1. Administrative support	The Authority facilitates and supervises the project's operations and field activities	The Authority's personnel involved in the project were only pulled from different divisions and pooled to function as an ad hoc team
2. Technical support, public and private	The Authority mainly provides technical support. Multi-sectoral teams were also involved, drawn from institutions with jurisdiction over each site	There is an obvious confusion over which land qualifies under the CDM A/R criteria Only one member from the Authority's team underwent formal training in CDM A/R project development
3. Political support	Engaged support from local government units (Tanay and Siniloan)	It has not yet elaborately drawn the specific activities of engagement of other the local government units (provincial, municipal/barangay) including policies to support the project
4. Financial support	There is assured funding support	ERPA sets the conditions for the payment of the VERs.
C. Socio-economic		
	Planting materials will be provided and community residents are encourage to produce quality seedlings that the Authority will buy	The specific mechanisms are not presented. There are no existing written agreements and work activity plans as to who will conduct what and when at each site

D. Environmental Services Management

The project is designed to rehabilitate the watershed areas in the Laguna de Bay Region

There is no estimated measurement or quantification of the other potential benefits that can be derived from forest carbon development

Strengths

1. The sites that have been delineated are within the critical watersheds of Laguna de Bay and designated as forest reservations.

Initial deforestation in the watershed has been attributed to logging conducted in the 1970s. This threats was aggravated by the increasing population and growing peri-urban area of Manila. Expanding urban areas, poverty and illegal trading in forest products contributed to the degradation of the Laguna de Bay watershed.

Several factors inhibit watersheds from regenerating naturally and keep them in their present non-forest condition: extraction of forest products as a source for subsistence livelihoods (that is, charcoal making, grazing, hunting, timber collection for fuel wood and poles) of poor families living within and near the watershed; inappropriate land-use practices (that is, slash-and-burn agriculture) and the resulting environmental conditions (that is, existence of pervasive grasses and other invasive species).

Given the current environmental conditions and lack of forest cover, watershed functions have become affected and, indeed, imperilled and may not be sustainable. Thus, forest and watershed rehabilitation activities are necessary.

2. The strategy for watershed rehabilitation is through forest-carbon development. This will be deployed by planting mixed forest trees endemic to the area as well as fruit tree species.

Field activities (nursery operations, planting, maintenance and protection) are indicated.

3. The project involves the institutions that have jurisdiction over the sites. Communities will be involved in the field implementation through the institutions' facilitation.

Limitations

1. Only the 5 ha in Siniloan satisfied the CDM A/R eligibility criteria.
2. There is no map showing the changes of land cover of the entire Laguna de Bay watersheds from forest to non-forests before 1990.
3. It is not clearly indicated how many hectare will be planted with purely forest trees of mixed species (as the reforestation component) and how many hectare will be planted with fruit trees (as the agroforestry component).
4. Although consultations were conducted, the Authority makes the final decision about the scheme. However, between the two land-use systems, most landowners prefer the agroforestry component, planting fruits and agri-crops in-between fruit trees.
5. Land-cover characterisation of each site does not include land-soil characterisation (except the geology and soil type)—pH, soil fertility—to check the soil conditions to support whether it can still or no longer support natural regeneration.

6. There is no clear ownership or direct property right holder of the parcels, except that they are under the jurisdiction of local government units, a university, a local water district, a government-controlled corporation and a private company.
7. There is no tri-partite agreement between the Authority, the institutions in charge of each site and local communities who will engage in the field activity.
8. There is no information indicating who are the local people and who will be conducting the field activities (land preparation, planting, maintenance, monitoring and protection).
9. There are lands transferred to the indigenous cultural community but there are also areas that remain unclear whether there are executed memoranda of agreement with the municipal government.

Resource use and mobilisation

This pertains to the administrative support (administrative set-up, including the rules and functions of each stakeholder), technical support (who will obtain and provide the technical support), public and private support, financial support (how financial support is sourced or what are the innovative funding schemes) and political support (if the operational plan considers the existing policies as well as identifying the needed policy support for its implementation).

Strengths

1. The Authority has been able to engage the major stakeholders in the watersheds. These institutions can potentially mobilise resources to support the project.
2. There is assured funding. Initial projects undertaken are funded through a grant from the Japan Climate Change Initiative. Carbon sequestration projects are specifically funded under the BioCarbon Fund.

Limitations

1. The Authority created an ad hoc team for the project. Training was insufficient.
2. There is no mention of active involvement and cooperation from the national agencies (for example, Department of Environment and Natural Resources) and its local implementing office in the project's planning and design.
3. There is a high turnover rate among Municipal Environment and Natural Resources Officer officials, which causes delays in implementation of the project.

Socio-economic management

This pertains to the field-level technical and socio-economic (how these are facilitated) and benefit-sharing (identification of the potential benefits that can be derived from the project and how these will be distributed among the participants) arrangements.

Limitations

1. At each site, the respective institutions management may have different approaches.
2. The payment schemes and the benefit-sharing arrangement is not clear.
3. There was no mention of the sharing arrangements for carbon credits and project participants (the institutions involved) nor any mention of benefits provision to the actual field implementers.
4. It is not clear who are the local people (individuals and households) who will be directly involved in the project, to avoid leakage or displacement (if applicable).
5. There are no work or budget plans presented so that the stakeholders to have idea can understand the whole project.

Environmental services management

This pertains to the potential for carbon sequestration for ecological benefits. How watershed rehabilitation and protection, habitat restoration and biodiversity conservation management, land-soil quality improvement, and landscape scenic beauty enhancement are considered in the project planning and field-plot design.

Strengths

1. Project 1 will potentially sequester 56 226 t CO₂e in 20 years (2007–2026) and Project 2 will sequester 84 10 t CO₂e in 20 years (2008–2027).
2. The projects were designed to rehabilitate the watershed areas around the Laguna de Bay Region.

Limitations

1. There is no estimated measurement of the other potential benefits that can be derived from forest-carbon development. This could be attributed to the lack of technical capacity, knowledge and skills of the technical support team.

4. Conclusion

Rehabilitating the denuded and deforested portions of the Laguna de Bay watersheds through forest-carbon development by agroforestation is highly significant given the region's strategic importance in the Philippines and the opportunities for income flows.

The Laguna Lake Development Authority is mandated to lead, promote and accelerate sustainable development in the Laguna de Bay region, specifically, to catalyse integrated water resource management. The Authority has the support of the institutions who are major and direct stakeholders. This is the primary strength of the project. The Authority acts as the intermediary entity, with its pool of technical staff and proven resource mobilisation capacity. Financial issues are not considered a big challenge.

The project team was initially trained by the World Bank Task Team Leader and the Carbon Finance Unit of the World Bank helped prepare the PDD. The Authority's team and the project participants underwent training and were given technical assistance from local consultants.

If applying again for registration under the CDM, justification must be provided for the eligibility of the selected areas and the 'additionality' condition of the selected project zone. The PDD must be revised accordingly. The challenge is to identify eligible parcels, ensure that activities that constitute CDM A/R sub-projects are implemented, meet the commitments of the ERPA as principal proponent, and that the project participant at each site meet their commitments to the sub-ERPA.

The proposed sites are generally surrounded by, or near to, secondary forests. Although large portions are already deforested and critically need rehabilitation, some woody perennials can still be observed on the deforested and open patches. This is seen as a potential source for regeneration if the watershed and forest reservations are given appropriate protection.

Another constraint is the proponents' lack of technical knowledge and skills regarding the criteria of CDM A/R projects. The Authority was the first entity in the Philippines to attempt to participate in the carbon market under the CDM and to prepare a PDD following the standard template.

The site selection indicates a misunderstanding or misinterpretation of the CDM forestry rules and guidelines. If this was not a misunderstanding on the part of Authority then it could be seen as 'taking a chance' and hoping that the Philippines' forest definition would be changed to a higher threshold or that the CDM criteria would not be as stringent as it seemed.

Aside from the issue of site selection, the PDD for the two projects did not clearly specify the roles of the local communities.

The technical and socio-economic arrangements of local involvement are not clear except that the management will be under the jurisdiction of local government units, a university, a local water district, a government-owned controlled corporation and a private company.

Generally, the project development approach and the mechanisms for project management and field implementation were not well presented.

5. Recommendations

Administrative issues

1. To meet the ERPA commitment and apply for registration under the CDM, the Authority must ensure land eligibility, satisfy the additionality condition and revise the PDD. When revising the PDD or proposal, the Authority's team, consultants and other stakeholders should consider alternative options.

Technical issues

1. The Authority has to secure historical baseline land-cover and land-use maps and maps of the extent of areas needing rehabilitation. This includes the extent of still-forested areas that need to be protected and conserved, areas that only need enhancement (that is, secondary forest, understocked forests) and deforested, open areas and degraded lands that critically need rehabilitation by revegetation, reforestation or afforestation.
2. Consider redesigning the project as part of a comprehensive project for the entire Laguna de Bay watersheds.
3. Identify and clarify the mechanisms for local community involvement.
4. The project plan should include cost estimates.
5. Detailed information on the financial aspects (work and budget estimates) is necessary to serve as a determining factor for investors to invest in the project as well as for transparency for the participants.
6. The financial plan will show the feasibility of the project and should indicate whether there are alternative funding sources (other innovative sources) that could help the project become sustainable.

Policy issues

1. Clarify the land status within the watersheds and explore legal arrangements and acceptable agreements that can be made with residents who are expected to engage in the project.
2. Ensure that a land-use assessment and land-soil characterisation appraisal are conducted to determine the degradation status of the area.
3. Ensure from the beginning the technical and socio-economic arrangements, especially as to who is directly responsible for the management and supervision of the project, the specific roles of each participant, who provides what to who and what support is needed.
4. Identify the government institution that should be responsible for identifying suitable areas.

Research issues

1. To ensure the feasibility of the project, conduct studies on the viability of the choice of species and the economic feasibility of the land management schemes.
2. Examine the viability of selected forest tree and fruit tree species, including integrated crops, considering the land-soil and whole landscape characteristics.
3. Conduct an economic valuation of the two land-use management systems (purely tree-based plantations and agroforestry farms).
4. The Authority should bear in mind that inadequate and unstable household income to support food and basic needs can lead project participants to divert their attention to other sources and may lead to project abandonment.
5. The Authority should consider incentives and rewards mechanisms that are feasible and acceptable to project participants.
6. Conduct a land assessment, including soil-quality analysis of the parcels, to determine the feasibility of the multi-cropping agroforestry farms.
7. Learn cost-effective measurement, monitoring, verification and valuation of carbon and other environmental services.
8. Establish baseline or reference data that will serve as the basis of claim for carbon credits. Use simplified methods of carbon estimation.
9. Establish a database on the biometrics of the tree species (for example, biomass and carbon content at certain ages) to be planted and registered for carbon credits. In this way, landholders can also monitor and estimate carbon storage based on the number and types of their trees.
10. Develop low-cost and effective systems for monitoring and verifying carbon sequestration that are farm specific and with landholders' participation.

6. Lessons learned

1. When setting up a forest-carbon development project that can participate in the carbon and other environmental services markets, locating the specific area where the project will be conducted is not enough. Special attention should be given to identifying the project area to ensure eligibility and fulfilment of 'additionality' conditions set by the buyer.
2. Baseline maps are vital to identify suitable sites. For CDM forestry, the guidelines are explicit. These include land-cover and land-use maps showing deforested areas with less than 10% forest stock before 1990 and/or degraded lands needing rehabilitation by revegetation (reforestation and/or afforestation), historical maps (that is, 1990, 2000, 2010) showing that there has been no improvement over time and a land-soil assessment to characterise the degraded condition.

3. Clarify who are the project participants, and most especially the actual field implementers, and the tenure status of the parcels comprising the project.
4. The role of intermediary body is crucial, especially in facilitating planning and documentation and in institutionalising the project.
5. Securing funding support from the buyer at the start of the project development process is helpful to hasten the process and the creation of a project design document. However, this is not an assurance that the project can be institutionalized. The political will, proper information and understanding of the project development process, including the rules and guidelines of the carbon and environmental services rewards markets, are crucial.
6. In this case, the World Bank shouldered all the costs associated with the design and documentation of the project. This included the preparation of the PDD and validation costs.
7. The cost will be much higher when highly paid consultants are involved, when project documents need to be revised, corrective actions need to be undertaken and reassessment is conducted by the validator.
8. Since not all people, even technically qualified people, have firsthand information about carbon and environmental services rewards mechanism, it is a matter for service providers (governments, international and research communities) to inform the public.
9. It is only when information is properly disseminated about this mechanism can we expect that the project development process is fully understood, appropriate documents are prepared, compliance with the standards is assured and, most importantly of all, there is acceptance from the target constituencies.

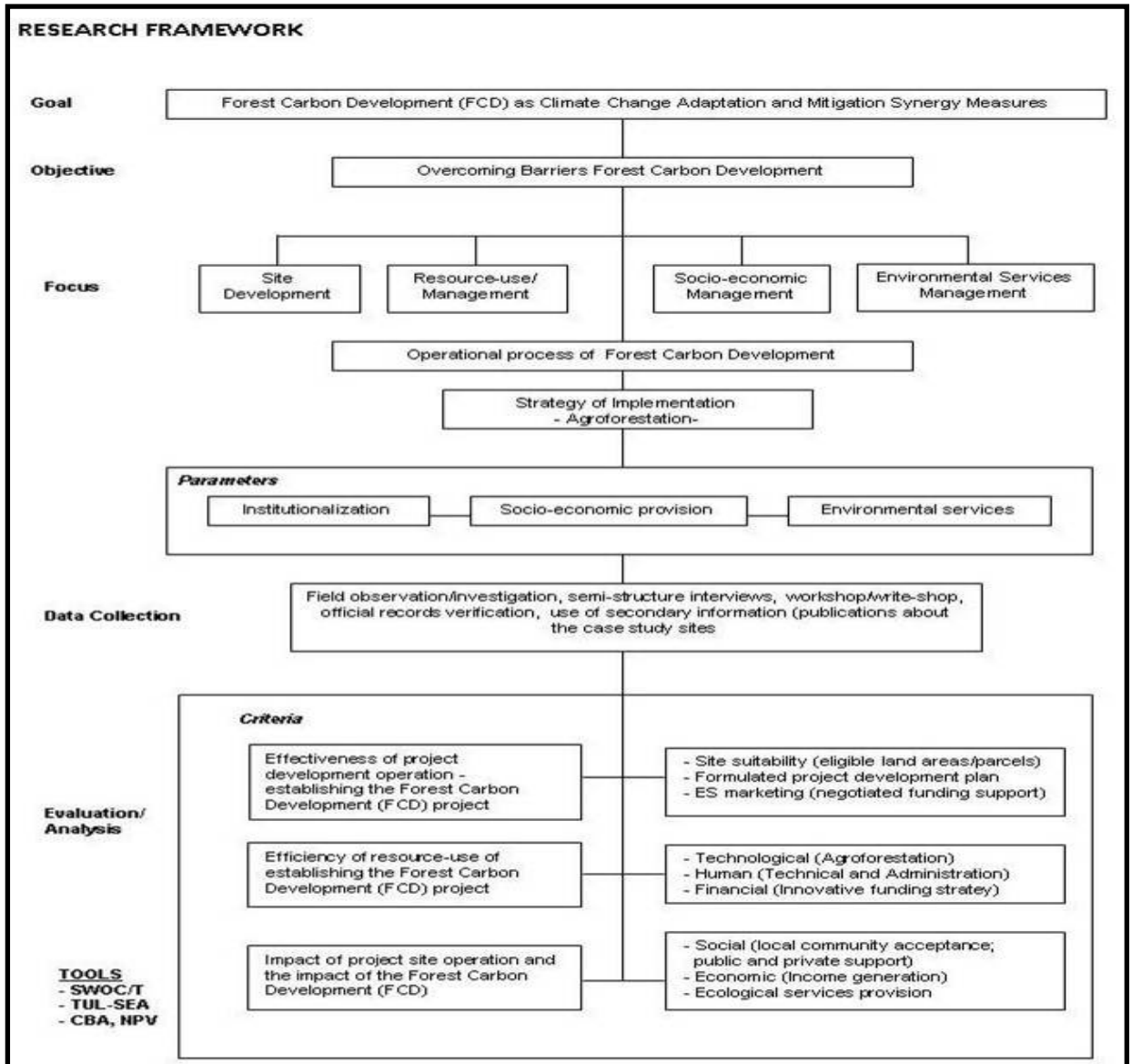
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Appendices

Appendix 1. Research project framework: ‘Overcoming Barriers of Smallholder Forest Carbon Development in the Philippines’



Appendix 2. Project 2, Site location 4 (5 ha), Lagiyo, Siniloan Laguna



Appendix 3: Project 1 –San Antonio, Kalayan Laguna

Photo 1 (August 2009) – planted area



Appendix 4: Photo 2 (August 2009) - illegal cutting activities



Appendix 5 Photo 3 (August 2009) - stockpiled illegally cut poles



Appendix 6 (August 2009) - burning within the watershed, this parcel near to project site-1 location



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Our mission is to advance the science and practice of agroforestry to help realize an 'Agroforestry Transformation' throughout the developing world.



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