

# REGIONAL ACTION PLAN FOR IMPLEMENTING THE PHILIPPINE MASTER PLAN FOR CLIMATE RESILIENT FORESTRY DEVELOPMENT

## National Capital Region (NCR)

### I. Background and Rationale

In 2003 the Forest Management Bureau (FMB) revised the first Philippine forestry master plan of 1990 in view of new developments in the forestry and environment sectors both at the local and international scenes. Ten years after its implementation, the Forest Management Bureau again decided to update the 2003 revised master plan for forestry development (RMPFD), to take into consideration the potential impacts of climate change to the forestry sector. The revision was in consonance with the Climate Change Act of 2009 requiring that all government programs and policies should consider the impacts of climate change. Hence, a Philippine master plan for climate resilient forestry development (PMPCRFD) was formulated where three strategic programs were identified for implementation to ensure that the forestry sector can respond to the adverse impacts of climate change and address varying demands for forest ecosystems goods and services from multiple clients. The three major programs include the following:

1. Program on strengthening resilience of forest ecosystems and communities to climate change;
2. Program responding to demands for forest ecosystem goods and services; and
3. Program promoting responsive governance in the forestry sector.

This plan outlines the action plan of DENR National Capital Region to support implementation of the PMPCRFD for CY 2016-2028.

### II. Regional Profile

The National Capital Region (NCR), also known as Metropolitan Manila, is the capital region of the Philippines. It is located in the southwestern portion of Luzon, directly below Central Luzon, lying along the flat alluvial and deltaic plains draining the Pasig River and Laguna de Bay. Its territory extends eastward and up the rolling hills of Marikina Valley and stops short at the lowlying edges of Rizal province.

#### 2.1 Physical features

NCR is bordered by the provinces of Bulacan to the north, Rizal to the east, Cavite to the south-west and Laguna to the south. Manila Bay lies to the west and Laguna de Bay to the south-east (Figure 1).

The region is geographically divided into 4 zones: The Coastal Margin, Guadalupe Plateau, Marikina

Figure 1. Location of the Region 7



Valley, and the Laguna Lowlands. The Coastal Margin that faces the Manila Bay possesses resources for offshore fisheries and fishpond development. The Guadalupe Plateau is the most adaptable to urban development activities not only because of its solid geographical foundations but also because of its existing infrastructure links with the rest of Luzon. The Marikina Valley has fertile land suitable for crop cultivation while the Marikina River provides water for industrial uses and discharge. The Laguna Lowlands is not only suitable for agriculture and aquaculture but also for industrial activity.

The climate of Metro Manila is categorized as Type I according to the Modified Coronas Classification. That is, dry months usually run from November to April while rains are experienced the rest of the year. The Mean Annual Temperature of the region is 30.8°C while its Mean Annual Rainfall is 152.42 mm. Humidity levels are usually very high which makes it feel much warmer. (Source: [https://en.wikipedia.org/wiki/Metro\\_Manila](https://en.wikipedia.org/wiki/Metro_Manila))

## 2.2 Socio-Economic Profile

The National Capital Region (NCR) is the only region in the country without any province. It is subdivided into 17 local government units (LGUs) comprising of 16 cities and one municipality. The 16 cities include: Caloocan, Malabon, Navotas, Valenzuela, Quezon City, Marikina, Pasig, Taguig, Makati, Manila, Mandaluyong, San Juan, Pasay, Parañaque, Las Piñas and Muntinlupa. Pateros is the lone municipality in the region.

Metro Manila is the financial, commercial and industrial center of the Philippines. Makati is the largest financial and economic hub of the metropolitan area and the country. Regarded as the metropolis' central business district (CBD), it is the base of many Philippines' largest corporations including the Ayala group of Companies, as well as the nation's major banks. Ortigas Center is the second most important business district in Metro Manila (<http://www.nnc.gov.ph>).

Based on the 2015 national census, NCR has a total population of 12,877,253. Its average annual population growth rate from 2000 to 2015 is about 1.72%. Quezon City is the most populated area but Taguig City has the highest annual population growth rate (3.63%) in the region for the period of CY 2000 to 2015 (Table 1). The other cities with high population growth rates are Mandaluyong City, Pasig City, and Paranaque City.

**Table 1. Population and Annual Population Growth Rates of NCR**

Provinces	Population			Annual Pop. Growth Rate (%)		
	May 2000	May 2010	Aug. 2015	2000-2010	2010-2015	2000-2015
NCR	<b>9,932,560</b>	<b>11,855,975</b>	<b>12,877,253</b>	<b>1.78</b>	<b>1.58</b>	<b>1.72</b>
CITY OF MANILA	1,581,082	1,652,171	1,780,148	0.44	1.43	0.78
MANDALUYONG CITY	278,474	328,699	386,276	1.67	3.12	2.17
CITY OF MARIKINA	391,170	424,150	450,741	0.81	1.16	0.93
CITY OF PASIG	505,058	669,773	755,300	2.86	2.31	2.67
QUEZON CITY	2,173,831	2,761,720	2,936,116	2.42	1.17	1.99
CITY OF SAN JUAN	117,680	121,430	122,180	0.31	0.12	0.25
CALOOCAN CITY	1,177,604	1,489,040	1,583,978	2.37	1.18	1.96
CITY OF MALABON	338,855	353,337	365,525	0.42	0.65	0.50
CITY OF NAVOTAS	230,403	249,131	249,463	0.78	0.03	0.52

Provinces	Population			Annual Pop. Growth Rate (%)		
	May 2000	May 2010	Aug. 2015	2000-2010	2010-2015	2000-2015
CITY OF VALENZUELA	485,433	575,356	620,422	1.71	1.45	1.62
CITY OF LAS PIÑAS	472,780	552,573	588,894	1.57	1.22	1.45
CITY OF MAKATI	471,379	529,039	582,602	1.16	1.85	1.40
CITY OF MUNTINLUPA	379,310	459,941	504,509	1.95	1.78	1.89
CITY OF PARAÑAQUE	449,811	588,126	665,822	2.72	2.39	2.60
PASAY CITY	354,908	392,869	416,522	1.02	1.12	1.05
PATEROS	57,407	64,147	63,840	1.12	-0.09	0.70
TAGUIG CITY	467,375	644,473	804,915	3.26	4.32	3.63

Source: PSA, CY 2000, 2010, 2015

## 2.3 Resources

As the financial, industrial and commercial center of the Philippines, the environmental condition in NCR has deteriorated. As such it has to manage its other resources to improve its environment, promote the general welfare of its constituents and support its industries. These resources include land, forests and biodiversity resources, water, and nature-based tourism areas, among others.

### Land Resources

NCR has a total land area of 63,600 hectares. Of this, 24% or 15,368 hectares are classified as forestlands while 76% or 48,232 hectares are alienable and disposable lands (table 2).

Table 2. Land Classification in NCR

Land Classification	Area (ha)	%
Forestlands	15,368	24%
Classified Forestlands	628	1%
Established Timberlands	237	0.4%
Forest Reserves, National Park/ Prot. Areas & Other Reservations	391	0.6%
Unclassified forestlands	14,740	23%
Alienable and disposable lands	48,232	76%
Total	63,600	100%

Source: Philippine Forestry Statistics, CY 2014

### Forests Resources

Only About 3.5% (2,214 hectares) of the region's land area are still forested consisting of open forest (3.3%), and mangrove forests (0.2%). Most of the existing forests in NCR are situated in La Mesa Watershed located in the northern section of Quezon City, Caloocan and Rodriguez, Rizal. Table 3 summarizes the land cover in NCR for CY 2010.

**Table 3. Land Cover of NCR, CY 2010**

Province	Land Area	Total Forest	Close Forest	Open Forest	Mangrove Forest	% of Region's Forest
NCR	63,600	2,214	0	2,098	115	3.5%
% of Region		3.5%	0	3.3%	0.2%	

Source: Phil Forestry Statistics, CY 2014

In general, the very limited forest cover of NCR further decreased from 2003 to 2010. The decrease was registered in its open forest from 2,790 hectares to 2,098 hectares. On the other its mangrove forest increased from only 30 hectares in 2003 to 115 hectares in 2010. The forest cover change in NCR is summarized in table 4.

**Table 4. Forest Cover Change in NCR (CY 2003-CY 2010)**

Provinces	Close Forest			Open Forest			Mangrove Forest			Net Change
	2010	2003	Change	2010	2003	Change	2010	2003	Change	
NCR	0	0	-	2,098	2,790	(692)	115	30	85	(607)

Source: Philippine Forestry Statistics, CY 2004 and CY 2014.

### Water resources

Metro Manila, is located in the hydraulically complex Pasig River—Laguna de Bay—Manila Bay watershed, which includes more than thirty tributaries within the urban area. The list of rivers and tributaries in Metro Manila is provided in Annex 1.

Other major water resources of NCR are the Manila Bay and La Mesa dam. The La Mesa Dam not only supports the water requirement of Metro Manila but also serves as an ecotourism site. The Manila Bay on the other hand serves as a navigational area aside from being a major tourist destination. It has patches of mangroves that serve as nesting areas for some bird species.

### Biodiversity Resources

Being an industrial and commercial center, NCR has very limited biodiversity resources. One of the important biodiversity resources in NCR is the Las Piñas-Parañaque Critical Habitat and Ecotourism Area (LPPCHEA) which was declared as a critical habitat by the Government of the Philippines in 2007. In 2013, LPPCHEA was listed by the Ramsar Convention as a Wetland of International Importance. This area is composed of the Freedom Island in Parañaque and the Long Island in Las Piñas that covers 175 hectares and features a mangrove forest of eight species, tidal mudflats, secluded ponds with fringing salt-tolerant vegetation, a coastal lagoon, and a beach. An important resting and refueling stop for migratory birds using the East Asian–Australasian Migratory Flyway, LPPCHEA hosts around 41 species of migratory birds in the area, with some coming from as far as China, Japan and Siberia. (<http://ncr.denr.gov.ph/index.php/component/content/article/89-webpage/338-brochure>).

Another important biodiversity resource is the 22.7 hectare Ninoy Aquino Parks and Wildlife Center (NAPWC) in Quezon City where various species of flora and fauna can be found in a

highly urbanized environment. Originally dominated by grassland, the Park is now covered with various species of plants, which includes both endemic and introduced species. It has more than 4,000 trees, which may be attributed to tree planting activities for the past years. Based on the 2008 survey by the Philippine Native Plants Conservation Society, Inc. (PNPCSI), out of 135 plant species recorded in the Park, seven (7) are found to be endemic to the country, including katmon (*Dillenia philippinensis*), kamatog (*Sympetalandra densiflora*), and niyog-niyogan (*Ficus pseudopalma*). It also recorded 73 bird species, 11 reptile species, five (5) mammal species and three (3) amphibian species. Nine (9) species of fish can also be found in the lagoon, which includes tilapia, carp, mudfish, gouramy, sand goby fish (biya), catfish and silver theraponid (Biodiversity Management Bureau. 2015).

The La Mesa Watershed, situated in the northern fringes of Quezon City, Caloocan and Rodriguez, Rizal also comprises a variety of ecosystems that is home to many indigenous and endemic species of flora and fauna. Several portions of the La Mesa reservoir are shallow with exposed mudflats, swamp forest, reed and other swamp vegetation. Its forest serves as an important breeding area for a variety of wildlife species and birds such as the little heron, black-crowned night heron, osprey, Japanese sparrowhawk, plain bush-hen, common moorhen, Eurasian coot, Philippine coucal, Philippine nightjar, island swiftlet, spotted wood kingfisher, common kingfisher, white-collared kingfisher, Philippine pygmy woodpecker, barn swallow, pied triller, ashy minivet, Philippine bulbul, black-naped oriole, Oriental magpie robin, Arctic warbler, grey-streaked flycatcher, pied fantail, yellow-bellied whistler, grey wagtail, brown shrike, olive-backed sunbird, and lowland white-eye ([https://en.wikipedia.org/wiki/La\\_Mesa\\_Watershed\\_Reservation](https://en.wikipedia.org/wiki/La_Mesa_Watershed_Reservation)).

### Ecotourism Areas

Tourism is a vital industry of NCR. Metro Manila is the main gateway to the Philippines and trade and tourism represents 31.4% of share of NCR's output by industry according to Brookings Institution. Although most of the tourist destinations in Metro Manila are the shopping malls, casinos and other historic sites (such as Rizal Park and Intramuros), nature-based tourism are also available in some areas of the region for both local and foreign tourists.

La Mesa Eco Park is a 33-hectare well-developed sanctuary around the La Mesa Watershed. It was established through a joint partnership between the Metropolitan Waterworks and Sewerage System, ABS-CBN, and the Quezon City Government. La Mesa Ecopark, along with the Ninoy Aquino Parks & Wildlife Center, are important nature reserves in the Philippines frequently visited by local tourists (Source: [https://en.wikipedia.org/wiki/Metro\\_Manila](https://en.wikipedia.org/wiki/Metro_Manila))

Apart from La Mesa Eco Park and the Ninoy Aquino Parks and Wildlife Center, the Manila Bay is also a major tourist destination for both local and foreign tourists. A major attraction in this area is the beautiful sun set and the calm sea in the afternoon. In addition, the Las Piñas-Parañaque Critical Habitat and Ecotourism Area (LPPCHEA), situated south of Manila Bay, offers visitors a welcome respite from all the buzz and fuss of urban living, all without leaving the city. With its verdant landscape, calm lagoons, and diverse collection of wild birds, the area gives visitors a chance to commune with nature, study, or simply marvel at life's majestic creations. Guests are introduced to a diverse variety of ecosystems as they take a trek inside the area, where more than 36 hectares of mangrove forest exist which is

regarded as the region's last coastal frontier (<https://ncr.denr.gov.ph/index.php/component/content/article/89-webpage/338-brochure>).

## 2.4 Vulnerability to Climate Change Hazards.

Climate projections by PAGASA (2011) indicate that there will be increasing temperature in 2050. In terms of rainfall, rainy season will have more rainfall while dry season will become drier. For NCR, the estimated increase in temperature will range from 1.8°C to 2.1°C, with higher temperature increase during the months of March to May. Meanwhile, decrease in rainfall is estimated to range from -17.3% to -38.5%. These reduction in rainfall is mostly expected from December to May, while up to 21.3% increase in rainfall is expected during the rainy months of June, July and August. (table 5 and 6).

Table 5. Seasonal temperature increases in 2050 under medium-range emission scenario, NCR

NCR	Observed Baseline in °C (1971-2000)				Change in 2050 in °C (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Metro Manila	26.1	28.8	28	27.4	2	2.1	1.8	1.9

Source: PAGASA, 2011

Table 6. Seasonal rainfall change (in %) in 2050 under medium-range emission scenario in NCR

NCR	Observed Baseline (1971-2000)				Change in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Metro Manila	107.5	198.5	1170.2	758.7	-17.3	-38.5	21.3	3.7

Source: PAGASA (2011)

With more rains during the rainy season, flooding, already a major problem in Metro Manila, may be aggravated endangering lives and properties of communities and disrupting classes and work in major cities of NCR. On the other hand, with less rains during the dry season, water availability for domestic use will be adversely affected. The region is already a water stressed region, hence, water availability is expected to worsen with climate change. The flood-prone areas is comprised of the cities of Manila, Navotas, Malabon and parts of Caloocan. Land subsidence and rising sea levels are seen as the cause of flooding in these areas, particularly in Navotas and Malabon City. On the eastern part, the flood prone towns are Pasig City, Marikina City, Municipality of Pateros and Taguig City. Heavy flood damage is experienced in these areas due to recurrent flooding caused by the overflow of Pasig and Marikina rivers. The town of Pateros and parts of Taguig City, specifically, can remain flooded for months.

Increasing temperature in 2050 will also affect the health condition of the constituents of the region specially the aged persons. It also threatens biodiversity resources in the mangroves of LPPCHEA and those in La Mesa Watershed due to higher risk of forest fires

Metro Manila is likewise prone to storm surge and to earthquakes because it is surrounded by active faults including the Marikina Valley Fault System. Other distant faults such as



the Philippine Faults, Lubang Faults, Manila Trench and Casiguran Faults, are a threat as well.

### **III. Development Challenges in the Forestry Sector of NCR**

Interrelated environmental concerns such as air and water pollution, waste management, health and sanitation, and adequacy of land and water resources are just some of the challenges facing Metro Manila residents. Further complicating these issues is climate change which brings forth bigger problems such as extreme weather conditions, and flooding.

1. The remaining forests in La Mesa Watershed must be protected and if possible additional forest plantations should be established to alleviate the environmental condition of Metro Manila. This area is the only significant area of remaining forests in the region that absorbs most of the air pollution in Metro Manila. However, due to increasing population in Metro Manila, informal settlers will continue to threaten these forests.

2. Apart from protecting the remaining forests, urban greening in major cities must be intensified. LGUs should be encouraged to develop open spaces as green belts/ parks to help absorb most of the carbon dioxide emitted by vehicles and industries. Subdivisions should also be encouraged to develop green belts and parks as measure to improve air quality in residential areas and mitigate temperature increase.

3. There is a need to establish closer collaboration with other regions in the protection and rehabilitation of watersheds that contribute water to La Mesa Dam. About 12 million residents of NCR are dependent on La Mesa Dam for domestic water and if the upper watersheds are not adequately protected, water supply to the Metro Manila residents may be disrupted

4. Reducing the impacts of climate change hazards is a pressing concern in NCR. With more rains during the wet season, flooding would be intensified while water availability could be a problem during the dry season due to lesser rainfall. The projected higher temperature in 2050 combined with the worsening pollution in Metro Manila, could also lead to more illnesses among the residents of NCR. In addition, the projected increase in temperature could adversely affect the mangrove ecosystem in LPPCHEA and could lead to more incidence of forest fires particularly in the La Mesa Watershed resulting to loss of important biodiversity resources in these areas.

5. Collaborative arrangement is necessary to address the overlapping mandates of different agencies in the enforcement of forest laws and regulations. Being the destination or transit point of forest products, DENR-NCR can only be effective in forest law enforcement if it is able to establish collaborative mechanisms with other agencies. In addition, to be effective the capabilities of members of the collaborative management bodies must be upgraded.

### **IV. Regional Comparative Advantages and Competitive Goods and Services: Opportunities for Forestry Development**

While lots of challenges exist in the forestry sector, the region has inherent comparative advantages and competitive goods and services which can be strengthened to maximize the

forestry sector's contribution to regional development. The comparative advantages of NCR include the following:

1. It is the center of commerce and trade in the Philippines and therefore is frequently visited by tourists
2. Presence of watershed reservation (La Mesa Watershed) that provide water for La Mesa dam which is the source of potable water for the residents of Metro Manila.
3. Presence of mangroves that serve as nesting areas for migratory birds and provide attractions to tourists;
4. Presence of processing equipment and established markets for various wood products such as furniture and wood tiles among others;
5. Existing mangroves and coastal resources that support fisheries and other biodiversity resources
6. Presence of parks and available green spaces that provide recreational areas and enhances environmental conditions;
7. Well develop infrastructure services for tourism, and marketing of other products; and
8. Several businesses that adopts corporate social responsibility programs.

The following are the region's competitive forest goods and services which can be supported through its regional action plan for PMPCRFD implementation, to maximize the forestry sector's contribution to regional and national development.

1. Ecotourism ;
2. Potable water production;
3. Various wood products such as furnitures, door jambs, wood tiles, etc;
4. Fisheries products

The matrix of comparative advantages and competitive goods and services of NCR as identified by DENR NCR is attached as annex 2.

## **V. Regional Action Plan for Implementing the Philippine Master Plan for Climate Resilient Forestry Development**

The NCR action plan for implementing the PMPCRFD addresses the forestry challenges and maximizes the opportunities provided by the comparative advantages and competitive forest goods and services of the region. It focuses on ensuring the health and resiliency of forest ecosystems and communities to climate change hazards so that forest resources can sustainably provide and meet the increasing demands for forest ecosystems goods and services. Equally important is the institutionalization of climate responsive governance where various stakeholders collaborate and participate in making decisions in the management of forest resources and ecosystems and in enforcing forestry laws and regulations.

### **5.1 The Forestry Sector Vision**

The region adopts the vision of the Philippine master plan for climate resilient forestry development as follows:

*Climate resilient and sustainably managed watersheds and forest ecosystems,  
providing environmental and economic benefits to society*



To achieve the vision and address the challenges in the forestry sector, the region has adopted the following goals of the PMPCRFD:

1. To place all protected areas and mangroves under sustainable management in order to improve biodiversity, enhance tourism and meet demands for other forest goods and services and promote resilience to climate change;
2. To strengthen resilience of communities to climate change hazard;
3. To sustainably manage watersheds in partnership with stakeholders;
4. To effectively enforce forestry laws and regulations in partnership with stakeholders and other agencies

## 5.2 Strategic Programs

Considering the identified issues and the region's comparative advantages and competitive forest goods and services, the forestry programs in NCR will focus on the following:

1. Protection of existing forests to support ecotourism, hazard mitigation and watershed management for potable water supply;
2. Rehabilitation of other protection forests to mitigate climate change hazards such as flooding;
3. Rehabilitation of degraded mangroves for fisheries, ecotourism and disaster risk reduction, particularly related to storm surge;
4. Enhance urban greening to improve air quality and alleviate environmental condition
5. Institutionalizing collaborative mechanism for forest law enforcement and environmental protection and management

### a. Program to Strengthen Resilience of Forest Ecosystems and Communities to Climate Change Hazards

Effective climate change mitigation and adaptation strategies will be integrated into the regional forestry action plan to meet the multiple objectives of preventing further forest degradation, reducing disaster risks, and reducing vulnerability to climate hazards.

#### Objectives

1. Integrating the urban greening plans of 17 LGUs into their comprehensive land use plans;
2. To undertake biophysical and vulnerability assessment in LPPCHEA and in La Mesa dam;
3. To protect 2,100 hectares of existing open forests and 115 hectares of mangroves;
4. Rehabilitate 64 hectares of degraded mangrove areas;
5. Implement the area based management plan of Manila Bay

#### Strategic Activities, Targets and Period of Implementation

The activities that will be implemented to strengthen resilience of forest ecosystems and communities to climate change hazards, and their implementation period and targets are summarized in table 7.

**Table 7. Summary of Activities and Period of Implementation to Strengthen Resilience of Communities and Ecosystems to Climate Change Hazards**

Strategic Programs and Activities	Targets and Implementation Period			
	2016	2017 -2022	2023 -2028	Total
1. Biophysical and Vulnerability assessment LPPCHEA and La Mesa watershed (no.)	0	2	0	2
2. Integrate urban greening plans into the LGUs' CLUP (no.)	0	17	0	17
3. Protection of existing forests including mangroves (ha)	2,215	2,215	2,215	2,215
4. Mangrove rehabilitation (ha)	0	64	0	64
5. Implement the area based management plan of Manila Bay (no. Of plan)	1	1	1	1
6. Training on vulnerability assessment, adaptation planning, integrated pest management, IWM, FLUP (no. of training)	0	6	6	12

**b. Program to Address Increasing Demands for Forest Goods and Services**

Considering the regional comparative advantages, and its competitive forest goods and services, the regional action plan of NCR will give more focus on enhancing urban greening to mitigate air pollution, watershed protection and rehabilitation for potable water supply; biodiversity conservation for ecotourism, and the need to reduce disaster risks and improve environmental conditions especially in urban centers..

**Objectives**

The specific objectives of this program are:

1. To formulate and implement the ecotourism operational plan of La Mesa Eco Park, LPPCHEA Tanza and Navotas ;
- 2.
3. To protect, conserve and rehabilitate La Mesa watersheds to ensure adequate supply of potable water in Metro Manila;
4. To develop forest parks, and green belts in key cities of the region

**Strategic Activities, Targets and Period of Implementation**

The activities, targets and their period of implementation to address demands for forest goods and services are summarized in table 8.

**Table 8. Summary of Activities, Targets and Period of Implementation to Address Demands for Forest Goods and Services**

Strategic Activities	Targets and Implementation Period			
	2016	2017 -2022	2023 -2028	Total
1. Demarcation of forestland boundaries & forest management zones (ha.)	0	15,368	0	15,368
2. Establishment/ maintenance of mechanized nurseries (no.)	1	1	1	1
3. Maintenance of other existing nurseries (no.)	2	2	2	2
4. formulate and implement ecotourism operational plan	0	3	3	3

Strategic Activities	Targets and Implementation Period			
	2016	2017 -2022	2023 -2028	Total
5. Watershed rehabilitation and protection	1	1	1	1
6. Organization and capacitation of watershed management bodies , such as the watershed management council (no.)	1	1	1	1
7. Ground validation of the required green spaces based on WHO standards (ha)	0	1,126.38	0	1,126.38
8. Implement urban greening (LGUs assisted)	0	17	17	17

### c. Institutionalizing Responsive Governance in Forestry

The different demands for forest ecosystems goods and services from multiple clients, which often times are conflicting, requires collaborative management of forests and forestlands. In view of this situation, the forestry sector in the region will enhance the skills and capabilities of its personnel so that it can effectively collaborate with other stakeholders in implementing programs on strengthening resilience to climate change hazards and respond to demands for forest ecosystems goods and services.

#### Objectives

The primary objectives of this program are the following:

1. To establish clear accountability in the management of forestlands;
2. To promote active participation of stakeholders in the management of forests and forestlands;
3. Keep track of progress in the implementation of the Philippine forestry master plan and
4. Strengthen the capabilities of DENR and other stakeholders in implementing forest management programs related to enhancing resilience to climate change and responding to demands for forest ecosystems goods and services from multiple clients.

#### Strategic Activities, Targets and Implementation Period

The activities, targets and their implementation periods to institutionalize responsive governance in the forestry sector in NCR are summarized in table 9.

**Table 9. Summary of Activities, Targets and Period of Implementation to Institutionalize Responsive Governance in NCR**

Strategic Programs and Activities	Targets per Implementation Period			
	2016	2017 -2022	2023 -2028	Total
1. Inventory of forest occupants in La Mesa watershed(No. Of site)	0	1	0	1
2. Organization and capacitation of multi-sectoral collaborative management bodies (no.)	0	1	1	1
3. Capability enhancement for DENR/ LGUs (no. of trainings)	2	12	12	26
4. Semi-annual / annual monitoring and evaluation of PMPCRFD implementation (No.)	2	12	12	26
5. Policy enhancement (Policy forum)	0	6	6	12

#### d. Support programs

Cross cutting support programs will focus on facilitating implementation of the three major forestry programs in the region. These are designed to inform the public of the important role of forest ecosystems in mitigating the adverse impacts of climate change and in securing water supply and other forest ecosystems goods and services. These are also intended to develop sustainable financing mechanisms, promote science based decision making and improve accountability through forest certification and improved data base.

#### Objectives

The support programs aim to:

1. Generate stakeholders' support in the implementation of the Philippine master plan for climate resilient forestry development;
2. Develop a data base management system to establish appropriate baseline data as basis for management decisions and monitoring and evaluation
3. Identify sustainable sources of financing for implementing the forestry master plan
4. Institutionalize a system for certifying sustainably managed forests and industries
5. Provide research based information for forest management decision making, vulnerability assessment and climate change adaptation planning

#### Strategic Activities, Targets and Period of Implementation

The strategic activities, targets and period of implementation to achieve the objectives of this program are summarized in table 10

**Table 10. Summary of Support Program Activities, Targets and Implementation Period**

Strategic Activities	Targets per Implementation Period			
	2016	2017 -2022	2023 -2028	Total
1. Information, education and communication campaign (no. of LGUs)	2	17	17	17
2. Upgrading of regional MIS facilities (no.)	0	1	1	1
3. Implementation of forest certification (region)	0	1	1	1
4. Identification and assessment of sustainable sources of financing in forestry projects (No. of sites assessed)	0	2	2	4
5.Forestry research (no. of studies)	0	2	2	4

## VI. Plan Implementation

his regional action plan shall be implemented by DENR NCR in collaboration with LGUs, MWSS, private investors, and other relevant stakeholders. Orientation/ information campaign about the regional action will be undertaken for LGUs and key stakeholders to encourage them to participate in its implementation.

Financing of the regional action plan for implementing the PMPCRFD will come both from the government and the private sector. Government financing will primarily come from existing programs/ projects of the DENR and to some extent from existing programs of the LGUs, especially those related to disaster risk reduction, climate change adaptation and the

formulation/ updating of the comprehensive land use plans which integrates the urban greening plans and the watershed management plans as mandated under existing guidelines. Fund sourcing will be undertaken for activities and programs which are not included in existing programs and projects of DENR, LGUs and other agencies. Where there are opportunities for donor assistance, unfunded programs and projects will be submitted for possible financial support.

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# ANNEXES



## Annex 1. List of Rivers and Estuaries in Metro Manila, Philippines

(Source: [https://en.wikipedia.org/wiki/List\\_of\\_rivers\\_and\\_estuaries\\_in\\_Metro\\_Manila](https://en.wikipedia.org/wiki/List_of_rivers_and_estuaries_in_Metro_Manila))

Name of Rivers	Description
Alabang River	Drains water from <u>Alabang</u> (up to <u>Ayala Alabang Village</u> and <u>Festival Supermall</u> ). Dumps water into <u>Laguna de Bay</u> via <u>Pasong Diablo River</u> .
Amorsolo Creek	Drains water from <u>Amorsolo Street</u> in <u>Makati</u> starting from the area around the <u>Makati Medical Center</u> . A section of has been built over by the developers of the Amorsolo on-ramp of the <u>Manila Skyway</u> . Passes through San Lorenzo Village and Don Bosco Church. Dumps water into Estero de Tripa de Gallina.
Batasan River	Drains water from <u>Malabon</u> and <u>Navotas</u> . Dumps water to Tanza River which leads to <u>Manila Bay</u> via <u>Tangos River</u> .
Bayanan Creek	Drains water from <u>Muntinlupa</u> . Dumps water into <u>Laguna de Bay</u> .
Canal de la Reina / Estero de la Reina	Drains water from <u>Manila</u> as far as <u>Tayuman Street</u> , <u>Recto Avenue</u> , and <u>Binondo</u> . Ends in Binondo and there is a <u>floodgate</u> or <u>pumping station</u> in that end at Muelle de Binondo. Dumps water into <u>Pasig River</u> at its southern tip. Dumps water into Manila Bay via Estero de Vitas in its northern tip.
Dampalit River	Drains water from <u>Malabon</u> and <u>Navotas</u> and dumps it to Tangos River.
Estero de Aviles	
Estero de Binondo	
Estero de Maypad	Drains water from <u>Manila</u> , <u>Navotas</u> and <u>Caloocan</u> . Dumps water to Navotas River.
Estero de Paco	Drains <u>Paco</u> and <u>Pandacan</u> . Leads to <u>Pasig River</u> .
Estero de Pandacan	Drains Pandacan and Paco. Dumps water into Pasig River.
Estero de Sampaloc	
Estero de San Miguel	Located in the Manila district of <u>San Miguel</u> along its boundary with <u>Quiapo</u> , <u>Sampaloc</u> and <u>Santa Mesa</u> . Drains into Pasig River.
Estero de Sunog Apog	Drains water from Manila. Dumps water to Manila Bay via Estero de Vitas.
Estero de Uli-Uli	
Estero de Tripa de Gallina	Drains water from Manila (Paco and <u>San Andres</u> ), <u>Makati</u> as far as <u>Forbes Park</u> and <u>Fort Bonifacio</u> and then through <u>Gil Puyat Avenue</u> in Makati and <u>Pasay</u> (including Bangkal and <u>Don Bosco Makati</u> ) and then in <u>Parañaque</u> . Dumps water into <u>Manila Bay</u> via the <u>Parañaque River</u> at an intersection near western side of the <u>NAIA</u> runway.
Estero de Quiapo	
Estero de Valencia	
<u>Estero de Vitas</u>	Drains water from Manila (as far as <u>Tayuman Street</u> ). Dumps water directly to Manila Bay.
Laguna River	Major channel. Drains water from <u>Makati</u> , <u>Pateros</u> and <u>Taguig</u> . Dumps water into <u>Laguna de Bay</u> .
Las Piñas River	Major channel. Drains water from <u>Las Piñas</u> and dumps it directly to Manila Bay.
Magdaong River	Drains water from <u>Muntinlupa</u> . Dumps water into Laguna de Bay.
<u>Mangangate River</u>	Drains water from <u>Alabang</u> and <u>Ayala Alabang</u> in <u>Muntinlupa</u> and empties into the <u>Laguna de Bay</u> .

Name of Rivers	Description
<u>Marikina River</u>	Major channel. Drains water from <u>Marikina</u> , <u>Cainta</u> , <u>Rodriguez</u> , <u>San Mateo</u> and <u>Antipolo</u> in <u>Rizal</u> . as well as some parts of <u>Quezon City</u> . It leads to Pasig River.
Marilao River	Major channel. Drains water from <u>Marilao</u> , <u>Meycauayan</u> and as far as the northwestern side of the <u>La Mesa Dam</u> area. Two other rivers, the Meycauayan River and Polo River that drains Malabon and <u>Valenzuela</u> dump their water here. Another great rivers, the Santa Maria River and Balagtas River meet up with the Marilao River in the <u>Obando</u> area before reaching Manila Bay.
Maytunas Creek	Drains <u>Mandaluyong</u> and <u>San Juan</u> . Dumps water into <u>San Juan River</u> .
Meycauayan River	Major channel. Drains water from <u>Valenzuela</u> and <u>Meycauayan</u> in <u>Bulacan</u> . Dumps water into <u>Manila Bay</u> via Marilao River.
Muzon River	Drains water from <u>Malabon</u> and Bulacan. Dumps water to Manila Bay via the entrance of Marilao River in Bulacan.
Navotas River	Major channel. Drains water from <u>Navotas</u> , <u>Caloocan</u> and <u>Manila</u> . Intersects with <u>Tullahan River</u> at the middle. Dumps water directly to <u>Manila Bay</u> (southern end) and to Tangos River (northern end).
<u>Parañaque River</u>	Major channel. Drains <u>Parañaque</u> , <u>Pasay</u> and Manila areas. Dumps water directly into Manila Bay.
<u>Pasig River</u>	Major channel. Drains water from <u>Laguna de Bay</u> and <u>Marikina River</u> , and also <u>Makati</u> , <u>Mandaluyong</u> , <u>Manila</u> , <u>Quezon City</u> and <u>San Juan</u> (including <u>San Juan River</u> ). Dumps water directly to <u>Manila Bay</u> .
Pasong Diablo River	Drains water from <u>Alabang</u> , <u>Muntinlupa</u> . Dumps water into Laguna de Bay.
Pateros River	Major channel. Drains water from <u>Pateros</u> and <u>Makati</u> area ( <u>Guadalupe</u> and <u>Bonifacio Global City</u> ). Dumps most of its water into Laguna de Bay via Laguna River at its southeastern tip. Dumps some of its water into <u>Pasig River</u> in Guadalupe.
Poblacion River	Drains water from <u>Muntinlupa</u> ( <u>Poblacion</u> ). Dumps water into Laguna de Bay.
Polo River	Drains water from <u>Malabon</u> , <u>Valenzuela</u> and <u>Bulacan</u> . Dumps water directly to Manila Bay.
<u>San Juan River</u>	Major channel. Drains water from <u>Quezon City</u> (including Tandang Sora and as far as Sauyo and Fairview), <u>San Juan</u> and Manila. Dumps water into Pasig River.
<u>Sapang Baho River</u>	Its headwaters are in the <u>Sierra Madre</u> in <u>Antipolo</u> crossing the northern portion of <u>Marikina</u> and nearby municipalities in <u>Rizal</u> before emptying into the <u>Laguna de Bay</u> .
Sucat River	Major channel. Drains water from <u>Parañaque</u> and <u>Muntinlupa</u> . Dumps water into <u>Laguna de Bay</u> .
<u>Taguig River</u>	
Tangos River	Drains water from <u>Navotas</u> . Dumps water directly to Manila Bay.
Tanza River	Drains water from <u>Navotas</u> . Connects with Dampalit River. Dumps water to Tangos River.
<u>Tullahan River</u>	Major channel. Drains water from <u>La Mesa Dam</u> , as well as the northern part of <u>Quezon City</u> , <u>Valenzuela</u> , <u>Novaliches</u> , <u>Malabon</u> and Navotas. Mouth is at Navotas.
<u>Tunasan River</u>	Drains water from <u>Muntinlupa</u> . Dumps water into Laguna de Bay.
Zapote River	Major channel. Drains water from <u>Las Piñas</u> and parts of <u>Bacoor</u> , <u>Cavite</u> . Dumps water into Manila Bay directly.

## Annex 2. Comparative Advantages and Competitive Forest Goods and Services, NCR

Comparative advantages	Competitive Forest Goods and Services			
	Eco Tourism	Wood products	Potable Water	fisheries
Watershed & dam	La Mesa		La Mesa	
Established markets		Valenzuela, Caloocan, Quezon City	La Mesa	Navotas
processing plants		Valenzuela, Caloocan, Quezon City		
Parks	Mainly Manila, Quezon City, Caloocan but also in all cities			
Migratory birds	Las Pinas, Paranaque			
Mangroves	Las Pinas, Paranaque			Navotas
Green spaces	All LGUs			
Developed infrastructure services	All LGUs	Valenzuela, Caloocan, Quezon City	La Mesa	Navotas
Manila Bay	Las Pinas, Paranaque, Manila			Las Pinas, Paranaque, Manila