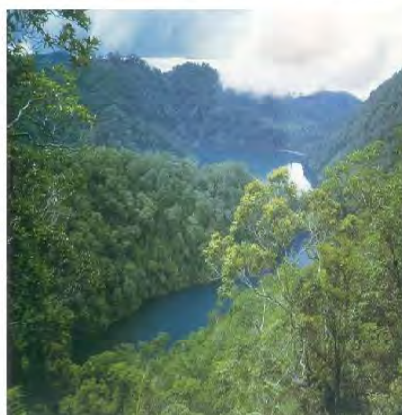


PHILIPPINE MASTER PLAN FOR CLIMATE RESILIENT FORESTRY DEVELOPMENT



January 2016

Contents

	Page
Table of Contents	i
List of Figures	iv
List of Tables	v
List of Acronyms/Abbreviations	vi
Definition of Terms	xi
Executive Summary	xiv
1. Introduction	1
1.1 Rationale for Updating and Climate Proofing the 2003 RMPFD	1
1.2 Methodology	2
2. Status of Implementation of the 2003 Revised Master Plan for Forestry Development (RMPFD)	7
3. The Forestry Scenarios	14
3.1 Climate Trends and Climate Change Scenarios	16
3.1.1 Climate Trends in the Philippines	16
3.1.2 Future Climate Scenario and Associated Hazards	18
Increased Temperature	18
More Intense Rainfall Events	20
Typhoons	23
Sea Level Rise (SLR) and Storm Surges	24
3.1.3 Climate Change Impacts	25
Impacts on Ecosystems	26
Impacts on Water Supply	26
Impacts on Communities	28
Impacts on Livelihoods	28
3.2 Demand and Supply of Forest Ecosystems-related Goods and Services	29
3.2.1 Demand and Supply of Wood and Fuelwood	30
Round Wood Equivalent (RWE) Demand and Supply of Wood	30
Demand and Supply of Fuelwood and Charcoal	36
3.2.2 Demand and Supply of Forest Ecosystems Services	38
Demand for Water	40
Demand for other Forest Ecosystems-related Services	48
3.3 Governance Scenario	54

3.3.1	Current Governance of the Forestry Sector	54
3.3.2	Projected Scenario in the Governance of the Forestry Sector	62
3.3.3	Governance Scenario for the Updated and Climate Resilient RMPFD	65
4.	The Updated and Climate Resilient Philippine Master Plan for Forestry Development	71
4.1	The Forestry Sector Vision, Goals and Objectives	71
4.2	Forestry Sector Programs and Strategies	73
4.2.1	Program to Strengthen Resilience of Forest Ecosystems and Communities to Climate Change	74
	Objectives	75
	Strategies	75
	Program Components and Targets	78
	Indicative Program Cost	92
4.2.2	Programs to Respond to Demands for Forest Ecosystems Goods and Services	93
	Objectives	94
	Strategies	94
	Program Components and Targets	101
	Indicative Program Costs	108
4.2.3	Strategies to Promote Responsive Governance in the Forestry Sector	110
	Objectives	111
	Strategies	112
	Program Components and Targets	114
	Indicative Program Costs	126
4.2.4	Other Support Programs and Strategies	127
	Objectives	127
	Strategies	127
	Program Components and Targets	128
	Indicative Program Costs	132
5.	The Master Plan Implementation	134
5.1	Implementation Schedule and Targets	134
5.2	Budgetary Requirements and Financing Program	136
5.3	Monitoring and Evaluation	141
6.	Economic Viability of the Philippine Master Plan for Climate Resilient Forestry Dev't	143

7. Carbon Benefits of the Philippine Master Plan for Climate Resilient Forestry Development	147
References	150
Annexes	151
Annex 1 Summary of Accomplishments, Problems/Issues, Facilitating Factors and Recommendations in the Implementation of the 2003 Revised Master Plan for Forestry Development	152
Annex 2 Matrix of Regional and Provincial Vulnerability to Climate-related Hazards and Poverty	163
Annex 3 Ancestral Domain Areas in the Philippines (in Hectares)	168
Annex 4 Eighteen Major River Basins in the Philippines	169
Annex 5 List of Watershed Forest Reserve (Proclaimed Watershed) and Management Plan (as of 2013)	174
Annex 6 List of Priority Watersheds with Characterization Reports and Management Plan (as of 2013)	185
Annex 7 List of Protected Areas of the Philippines	196

List of Figures

		Page
Figure 1	Framework for updating and climate proofing the RMPFD	4
Figure 2	Forest cover trends in the Philippines	14
Figure 3	Observed average temperature anomalies in the Philippines (1951-2010) based on departures from 1971-2000 normal values	15
Figure 4	Observed trends in extreme daily temperature in the Philippines based on historical weather records from 1951-2008	16
Figure 5	Observed trends in extreme daily rainfall intensity in the Philippines based on historical records from 1951 – 2008	16
Figure 6	Historical (observed) and projected annual mean temperature anomalies from 1951 to 2100 based on departures from 1971-2000 normal values	17
Figure 7	Provinces at risk to projected temperature increase	18
Figure 8	Projected change in seasonal mean rainfall (%) in the Philippines	19
Figure 9	Observed number of extreme typhoons with maximum sustained wind of more than 150 kph, 1971-2010	21
Figure 10	Map of the Philippines showing the areas vulnerable to typhoons based on Tropical cyclone frequency using 1° x 1° from 1948-2010	23
Figure 11	Regions in the Philippines with water stress or water scarcity based on water availability per capita (WAPC), 2010, 2015 and 2025	25
Figure 12	Wood supply and consumption in the Philippines, 2000-2010	28
Figure 13	General flow of woodfuel production, marketing and consumption in the Philippines	35
Figure 14	Location of existing mariculture parks (as of 2013)	51
Figure 15	Major fishing grounds in the Philippines	52

List of Tables

		Page
Table 1	Projected change in seasonal mean rainfall (%) in the Philippines based on medium-range emission scenario	20
Table 2	Areas vulnerable to landslides by region	20
Table 3	Disastrous typhoons with damages of at least Php1 billion, 1970-2010	22
Table 4	Wood supply and wood consumption account in the Philippines, 2000 – 2010 (in thousand cu. m.)	29
Table 5	Estimated harvesting area in ha. of plantation forests of total and domestic projected wood consumption	31
Table 6	CBFMA areas in the Philippines	33
Table 7	Best estimates of biomass and woodfuel consumption in the Philippines	35
Table 8	Revised estimates of woodfuel sources and their potentials for the Philippines	36
Table 9	Governance-designated entities with responsibility, accountability, and authority (RAA) for ENR, lands of the public and ancestral domains, and alienated lands	37
Table 10	Water availability in MCM	40
Table 11	The regional harvest area target (ha.) of rice production in the Philippines, 2011-2016	45
Table 12	Global agreements in which the Philippines is signatory	58.
Table 13	List of provinces potential for REDD+	87
Table 14	Indicative program cost: Strengthening Resilience of Ecosystems and Communities to Climate Change	88
Table 15	Comparative advantage of regions in providing forest ecosystems goods and services	93
Table 16	Projected targets for roundwood plantation development	100
Table 17	Projected targets for fuelwood plantation development	101
Table 18	Indicative program cost: Responding to Demands for Forest Ecosystems Goods and Services	105

Table 19	Indicative program cost: Responsive Governance in Forestry	122
Table 20	Indicative cost: Other Support Programs	128
Table 21	Schedule of implementation	131
Table 22	Total indicative costs of priority programs under the Climate Resilient Philippine Master Plan for Forestry Development	134
Table 23	Economic analysis of the Climate Resilient Philippine Master Plan for Forestry Development	141

List of Acronyms/Abbreviations

A&D	Alienable and Disposable
ADB	Asian Development Bank
ADMU	Ateneo de Manila University
ADSDPP	Ancestral Domain Sustainable Development and Protection Plan
AFP	Armed Forces of the Philippines
ALRs	Annual Log Requirements
ANR	Assisted Natural Regeneration
ARMM	Autonomous Region of Muslim Mindanao
ASEAN	Association of Southeast Asian Nations
BAR	Bureau of Agricultural Research
BCM	Billion cubic meter
BFAR	Bureau of Fisheries and Aquatic Resources
BMB	Biodiversity Management Bureau
CADC	Certificate of Ancestral Domain Claims
CADT	Certificate of Ancestral Domain Title
CAR	Cordillera Administrative Region
CBD	Convention on Biological Diversity
CBFM	Community-based Forest Management
CBFMA	Community-Based Forest Management Agreements

CC/DR	Climate Change/Disaster Risk
CC	Climate Change
CCA	Climate Change Act
CCC	Climate Change Commission
CCA/DRR	Climate Change Act/Disaster Risk Reduction
CDP	Comprehensive Development Plan
CENRO	Community Environment and Natural Resources Office
CIFOR	Center for International Forestry Research
CIS	Communal Irrigation Systems
CITES	Convention on the International Trade of Endangered Species
CLUP	Comprehensive Land Use Plans
CSDRM	Climate Smart Disaster Risk Management
DA	Department of Agriculture
DAO	Department Administrative Order
DAR	Department of Agrarian Reform
DENR	Department of Environment and Natural Resources
DILG	Department of Interior and Local Government
DOE	Department of Energy
DOTC	Department of Tourism and Communication
DRR	Disaster Risk Reduction
DRRM	Disaster Risk Reduction Management
ENR	Environment and Natural Resources
EO	Executive Order
ERDB	Ecosystems Research and Development Bureau
FAO	Food and Agriculture Organization
FDC	Forestry Development Center
FLUP	Forest Land Use Plan
FLGLA	Forest Land Grazing Lease Agreement

FMB	Forest Management Bureau
FMU	Forest Management Unit
GCMs	Global Climate Models or Global Circulation Models
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIS	Geographic Information Systems
GIZ	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit/</i> German International Cooperation Agency
HH	Household
HSC	Hydropower Service Contracts
IEC	Information Education Communication
IEM	Integrated Ecosystems Management
IEM-IWRM	Integrated Ecosystems Management-Integrated Water Resources Management
IFMA	Integrated Forest Management Agreement
INREM	Integrated Natural Resources and Environmental Management
IP	Indigenous People
IPCC	Intergovernmental Panel on Climate Change
IPM	Integrated Pest Management
IPRA	Indigenous People's Rights Act
IRR	Internal Rate of Return
ITTO	International Tropical Timber Organization
JICA	Japan International Cooperation Agency
LDRRMC	Local Disaster Risk Reduction and Management Council
LFRMU	Land and Forest Resource Management Unit
LGU	Local Government Unit
MCM	Million cubic meter
M & E	Monitoring and Evaluation

MFPC	Multisectoral Forest Protection Committee
MIS	Management Information System
MMT	Multisectoral Monitoring Team
MOA	Memorandum of Agreement
MPFD	Master Plan for Forestry Development
MRV	Monitoring, Reporting, and Verification
MTOE	Million tons of oil equivalent
MW	Megawatt
NAMRIA	National Mapping and Resource Information Authority
NAPC	National Anti-Poverty Commission
NCIP	National Commission on Indigenous Peoples
NCR	National Capital Region
NCSO	National Census and Statistics Office
NEDA	National Economic Development Authority
NFI	National Forest Inventory
NGO	Non-governmental Organization
NGP	National Greening Program
NIA	National Irrigation Administration
NIPAS	National Integrated Protected Areas System
NIS	National Irrigation Systems
NWRB	National Water Resources Board
PA	Protected Area
PACBRMA	Protected Area Community-Based Resource Management Agreement
PAGASA	Philippine Atmospheric Geophysical and Astronomical Service Administration
PAMB	Protected Area Management Board
PAR	Philippine Area of Responsibility
PAWB	Protected Area and Wildlife Bureau

PD	Presidential Decree
PDP	Philippine Development Plan
PENRO	Provincial Environment and Natural Resources Office
PES	Payment for Ecosystem Services
PMPCRFD	Philippine Master Plan for Climate Resilient Forestry Development
PNP	Philippine National Police
PP	Presidential Proclamation
PPP	Public Private Partnership
PWPA	Philippine Wood Products Association
RAA	Responsibility, accountability and authority
R&D	Research and Development
REDD+	Reducing Emissions from Deforestation and Degradation Plus
REL/RL	Reference Emission Level/Reference Level
RMPFD	Revised Master Plan for Forestry Development
RP	Republic of the Philippines
RWE	Round Wood Equivalent
SFEM	Sustainable Forest Ecosystem Management
SFM	Sustainable Forest Management
SFMA	Sustainable Forestry Management Act
SIFMA	Socialized Industrial Forest Management Agreement
SLR	Sea Level Rise
SST	Sea surface temperature
TA	Technical Assistance
TWG	Technical Working Group
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VA	Vulnerability Assessment

WEMF	Watershed Ecosystems Management Framework
WMC	Watershed Management Council

Definition of Terms

Adaptive capacity – refers to the ability of a system or stakeholder to adjust to climate change (including climate variability and extremes) to cope with or moderate its potential damage or take advantage of its opportunities or cope with its consequences.

Agroforestry - refers to a strategy for the sustainable management of lands which increases their overall productivity by properly combining agricultural crops and/or livestock with forest crops simultaneously or sequentially through the application of management practices which are compatible with the local climate, topography, slope, soil, as well as the cultural patterns or customary laws of the local population.

Climate - the average prevailing weather condition in an area over a period of time, usually 30 years.

Climate change – a condition characterized by change in average value and variability in meteorological variables such as temperature, rainfall, extreme events like typhoon, precipitation, wind speed, etc.

Climate change resilience – refers to the ability of a social or ecological system to absorb stresses and recover from the effects of climate change

Climate proofing – is incorporating appropriate response strategies or measures taking into consideration the associated climate-related hazards.

Climate scenario - the anticipated plausible average weather condition in the future caused by both natural processes and anthropogenic activities, and characterized by increased temperature, greenhouse gas emissions resulting to variable precipitation, more intense extreme events, and changes in distribution.

Exposure – refers to the nature and degree by which a system is exposed to significant climatic variations

Forest Plantation - refers to a forest stand established by planting and/or seeding in the process of afforestation and reforestation. The stand is either of introduced species (all planted stands), or an intensively managed stand of any indigenous species, which meets all the following criteria: one or two species at plantation, even-aged class, and regular spacing.

Hazard - is the intrinsic property, characteristics, or condition of a material or system that has the potential to cause harm. In essence, hazard is a physical situation with a potential for human injury, damage to property, damage to the environment, or some combination thereof.

REDD Plus - refers to a broad range of actions to reduce emissions from deforestation and forest degradation (REDD) and the role of conservation of carbon stocks, sustainable management of forests and enhancement of forest carbon stocks.

Round Wood Equivalent - the volume of round wood (wood in log form) that is required to produce a given volume of processed timber or manufactured product.

Sensitivity - is the degree by which a system is affected (either adversely or beneficially) by climate-related stimuli

Sustainable forest management – refers to the management of forests to achieve one or more clearly specified objectives of management with regard to production of continuous flow of desired forest products and environmental services without undue reduction of its inherent values and future productivity and without undesirable effects on the physical and social environment.

Vulnerability – the degree to which a system is susceptible to or unable to cope with the adverse effects of climate change including climate variability and extremes

Watershed - a topographically delineated area of land from which rain water can drain as surface run off via a specific stream or river system to a common outlet point which may be a dam, irrigation system or where the stream/ river discharges into a larger river, lake or the sea.

Executive Summary

The first Philippine Master Plan for Forestry Development was formulated in 1990 to revitalize the continuously declining forestry sector in the country. This plan was revised in 2003 after a UNDP fact-finding mission on preliminary review noted that although there were successes in the Master Plan implementation in selected areas, several major programs did not progress. Ten years after its implementation, the Forest Management Bureau (FMB) decided to update the 2003 revised master plan for forestry development (RMPFD), this time taking into consideration the potential impacts of climate change to the forestry sector.

The projected increase in global temperature, more intense rainfall events, stronger typhoons, and sea level rise will adversely impact on forest ecosystems and communities. With changing climate the ability of forests to provide the increasing and multiple demands for ecosystems goods and services will be further curtailed. Under this situation, the Philippine Master Plan for Climate Resilient Forestry Development proposes programs and strategies to a) strengthen resilience of forest ecosystems and communities to climate change, b) effectively respond to demands for forest ecosystems goods and services and c) promote responsive governance. The program on strengthening resilience of forest ecosystems and communities include the following:

1. Ecosystem-based vulnerability assessment
2. Climate change adaptation planning
3. Management of protection forests and protected areas
4. Protection of existing forests
5. Rehabilitation and conservation of mangroves
6. Livelihood support to CBFMA and CADT holders
7. Formulation of integrated watershed management and forest land use plans and

8. Implementation of REDD+ for climate change adaptation and mitigation.

Programs to respond to demands for forest ecosystems goods and services include the following:

1. Delineation and demarcation of forest management zones
2. Commercial forest plantation development for round wood production
3. Fuel wood plantation development
4. Management of grazing lands
5. Watershed management and rehabilitation and
6. Urban forestry

Responsive governance programs include:

1. Inventory of forest occupants
2. Issuance of tenure/ management instruments to close open access forestlands
3. Enhancement of forestry policies
4. Institutionalizing collaborative management
5. Mainstreaming climate change into the DENR's policy and institutional processes and
6. Capability enhancement

Other support strategies, such as the following, are also necessary to enhance implementation of the above programs:

1. Information, education and communication campaign
2. Improved data base management system
3. Sustainable financing
4. Results-based monitoring and evaluation
5. Forest certification system and
6. Forestry research support

The total budgetary requirement for implementing the Philippine Master Plan for Climate Resilient Forestry Development is 135.16 billion pesos over a period of 13 years. The bulk of the budget (about 69%) will support programs related to responding to demands for forest ecosystems goods and services while about 28% of the total budget is earmarked to strengthen resilience of ecosystems and communities to climate change. The rest will support strategies to promote responsive governance and other support programs.

The first year of implementation will require Php 8.55 billion or 6% of the total budget while from 2017-2022, about Php 60.77 billion (45%) will be needed to implement the plan. The estimated budget earmarked for 2023-2028 is Php 65.84 billion or 49% of the total budget. The summary of budgetary requirements of the Philippine master plan for climate resilient forestry development (PMPCRF) is summarized below.

Programs / Activities	Budget (thousand pesos)			
	2016	2017-2022	2023-2028	Total
A. Strengthening Resilience of Forest Ecosystems and Communities to Climate Change	3,862,847	18,448,414	15,909,880	38,221,141
B. Responding to Demands for Forest Ecosystems Goods and Services	4,410,044	40,406,444	48,022,968	92,839,456
C. Promoting Responsive Governance	52,800	688,300	676,400	1,417,500
D. Other Support Strategies	226,200	122,850	123,060	2,685,300
Total	8,551,891	60,771,659	65,839,847	135,163,397
%	6.33%	44.96%	48.71%	100.00%

Financing of the master plan programs will come from various sources (DENR, LGUs, POs, private investors and donor agencies). National government funding is estimated at 34.5% of the total budget while private sector and donor investments are estimated to be 31% and 24.6%, respectively of the total budget. In most of the program activities where communities and tenure holders have direct economic benefits, private sector investments will be encouraged. This would include forest plantation development, agro forestry

development, and management of grazing lands. However, activities related to planning, assessments and capability enhancements will be financed from public funds. This would include vulnerability assessments, adaptation planning, IWM plan formulation, forest land use planning, trainings, and other support and governance related activities. The plan is economically viable with a net present value of Php 35.54 billion, benefit cost ratio of 1.73 and internal rate of return of 47%.

The first Philippine Master Plan for Forestry Development (PMPFD) was formulated in 1990 to revitalize the continuously declining forestry sector in the country. The Master Plan contained 15 major programs under 3 umbrella programs, namely: a) man and the environment; b) forest management and products development; and c) institutional development.

Nine years after its implementation, a UNDP fact-finding mission on preliminary review noted that, although there were successes in the master plan implementation in selected areas, several major programs did not progress. Thus, in CY 2000, an action agenda was proposed which called for the government and all stakeholders to re-evaluate, revise, and promote adherence to the master plan considering other emerging issues in the forestry and environment sectors. A Revised Master Plan for Forestry Development (RMPFD) was therefore formulated starting in 2002 which was approved the following year. After ten years of implementation, the Forest Management Bureau (FMB) decided in February 2013 to update the 2003 RMPFD, this time taking into consideration the potential impacts of climate change to the forestry sector.

1.1 Rationale for Updating and Climate Proofing the 2003 RMPFD

The decision to update and climate proof the 2003 RMPFD was triggered by developments both within the Philippines and in the international community. Among others, there are emerging developments in the forestry sector which affect implementation of the 2003 RMPFD and these include:

- a. The increasing recognition of the role of forests not only as sources of wood and non-wood products, but more importantly as provider of ecosystems services such as: water sources for agriculture, energy and domestic use; protection from disasters such as flooding; and biodiversity conservation for tourism and support to fisheries;
- b. The requirement under the Climate Change Act (CCA) of 2009 which mandates all government agencies in the Philippines to integrate climate change adaptation in all programs and policies;
- c. The country's international commitments through international agreements, which among others include the following: United Nations Convention on Biological Diversity (UNCBD) in 1993; United Nations Framework Convention on Climate Change (UNFCCC) in 1994; the Kyoto Protocol to the UNFCCC (1998); and the U.N. Convention to Combat Desertification (UNCCD); and
- d. The increasing global concerns on the impacts of climate change to ecosystems and communities.

1.2 Methodology

To do the task of updating and climate proofing the 2003 RMPFD, a Technical Assistance (TA) team was commissioned by FMB. The team of consultants includes:

- | | |
|----------------------------|---|
| For. Buenaventura L. Dolom | - Team Leader |
| Dr. Ernesto Guiang | - Forestry Investment & Ecosystems Specialist |
| Dr. Antonio Contreras | - Institutional and Policy Specialist |
| Dr. Felino Lansigan | - Climate Change Specialist |

A researcher was hired to assist the team in data gathering and in organizing the various workshops in the regions. The team was tasked to:

1. re-evaluate, update, and climate proof the Philippine forestry master plan, taking into consideration the need for strong partnership with key stakeholders;
2. identify and recommend remedial measures, including further strengthening of policies and institutions, to hasten full attainment of the master plan's objectives; and
3. lay down a phased implementation of the master plan to guide DENR-FMB and DENR field offices in accomplishing and monitoring its implementation.

To assist the consultants in climate proofing the forestry master plan, a Technical Working Group (TWG) was organized composed of representatives from different divisions of the Forest Management Bureau (FMB). Representatives from the Protected Area and Wildlife Bureau (PAWB) and from the Ecosystems Research and Development Bureau (ERDB) were also invited to join the TWG.

Before proceeding with their tasks, the TA team had to agree on what is meant by updating and climate proofing. After series of discussions, it was decided that updating would include only the remaining period of the 2003 forestry master plan; that is, up to 2028. Updating would involve:

- adding recent forestry baseline information on climate change, disaster risks, and initiatives of government, NGOs and private sector to address climate change issues;
- addressing priority gaps, concerns and constraints in implementing various forestry programs;
- integrating new policy mandates related to climate change (CC) adaptation and mitigation, disaster risk reduction and management (DRRM), and poverty reduction strategies;

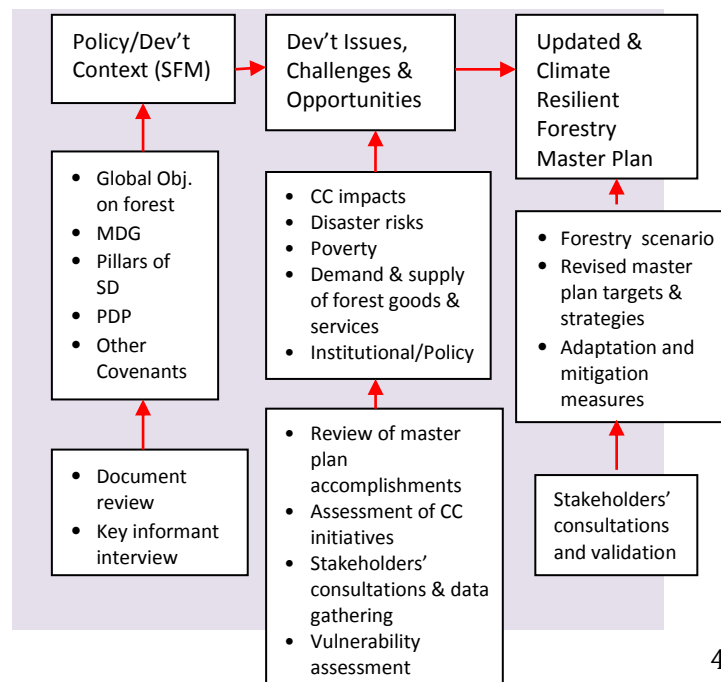
- incorporating climate change projections and vulnerability assessment of forestry; and
- enhancing the strategic programs, policies and other responses taking into consideration potential vulnerabilities to climate changes.

On the other hand, climate proofing refers to the approach for incorporating issues of climate change in the forestry master plan. Among others, it is concerned with the following:

- Reducing net emission of GHG from natural forests
- Increasing carbon stocks
- Increasing carbon sequestration
- Aligning land uses to minimize externalities
- Promoting ecosystem stability
- Improving productivity and ecosystem services
- Promoting livelihood and food security
- Enhancing water security potential of forests
- Minimizing soil losses in forest lands

Figure 1. Framework for updating and climate proofing the RMPFD

Following these clarifications, the team brainstormed on the methodological framework for updating and climate proofing of the 2003 RMPFD. Figure 1 summarizes the framework for updating and climate proofing the RMPFD.



This draft framework was presented for further enhancement during the forestry sector meeting held on May 9, 2013. The framework was again presented during the Forestry Master Plan Assessment Meeting held at the FMB conference room on June 7, 2013 which was attended by members of the TWG. After these presentations, the framework was adopted and used as guide in the subsequent activities of the team.

The team started first to define the policy and development context for sustainable forest management to which the Philippine Government has committed itself. Some of the policies that should be considered in updating and climate proofing the 2003 forestry master plan were reviewed and covered both the international commitments of the Philippine government and relevant national policies. Among others, the policies that were reviewed included the Millennium Development Goals, the Global Objectives on Forests, the Pillars of Sustainable Development, Philippine Development Plan (PDP) 2011-2016, Climate Change Act (CCA) of 2009, National Climate Change Action Plan, the Updated Philippine National Action Plan to Combat Desertification, Land Degradation and Drought and the 2003 RMPFD.

The policy review indicates some of the priority agenda that should be considered in developing a climate resilient forestry development in the Philippines, namely:

1. The role of forestry in reducing poverty and enhancing food security;
2. Promoting gender equality and empowering women in the forestry sector;
3. The need to reverse loss of forest cover through sustainable forest management (SFM);
4. Enhancing forest-based economic, social and environmental benefits, including the improvement in livelihoods of forest dependent communities;

5. Improving the conservation, protection and rehabilitation of forest resources;
6. Promoting enhanced resilience of natural systems and improving the adaptive capacities of human communities to cope with environmental hazards;
7. Improving the protection and conservation of biodiversity;
8. Increasing the areas of sustainably managed forests along with the proportion of forest products from sustainably managed forests;
9. Mobilizing new and additional financial resources from all sources for the implementation of sustainable forest management; and
10. Promoting inclusive growth in the forestry sector.

In identifying the development issues, challenges and opportunities in the forestry sector, the team together with the TWG and other stakeholders, assessed the status of implementation of the 2003 RMPFD. Accomplishment reports, forestry statistics and other previously conducted studies were also reviewed to supplement the assessment. Regional consultations were then undertaken to validate the assessment, appraise forest-based livelihoods of upland communities, determine comparative advantages of each region in relation to the forestry sector, and generate recommendations to address the identified problems, issues and challenges. The regional consultations served as an avenue for linking forestry with other sectors such as water, energy, agriculture, tourism and the LGUs, especially in terms of reducing disaster risks associated with climate change. Based on these assessments, document review and regional consultations, the TA team drafted the Philippine master plan for climate resilient forestry development for 2015 - 2028.

Status of Implementation of the 2003 Revised Master Plan for Forestry Development (RMPFD)

2

The 2003 RMPFD focuses on sustainable forest management, poverty alleviation and food security in upland communities in the Philippines. It envisions a “sustainably managed watershed and forest resources providing environmental and economic benefits to society with globally competitive industries contributing to the national economy and upliftment of upland communities’ welfare.” The 2003 forestry master plan aims to:

1. sustainably manage the watershed/forests by capable institutions with active participation of capable stakeholders;
2. rationalize forest-based industries with sustainable sources of raw materials;
3. provide globally competitive forestry education and training;
4. enhance protective and biodiversity values of forests;
5. improve quality of life of upland communities;
6. enhance decision-making processes through improved MIS, relevant M&E, continuing forest resources assessment, forest resources accounting, criteria and indicators and forest certification;
7. enhance forestry institutions’ effectiveness, efficiency and competence in forest administration, conservation and management, forest protection, forestry research and extension; and

8. enhance policy situation to provide the right environment for sustainable forest management.

The strategic targets of the 2003 forestry master plan include:

1. One hundred fifty (150) watersheds prioritized and characterized within two years, integrated management plans prepared and management body in place within 5 years;
2. Forestry and related policies harmonized within 5 years;
3. Responsible forest-based industries within 5 years;
4. All regions starting to implement strategies towards sustainable forest management within 1-5 years;
5. Productive collaboration among DENR, LGUs and other watershed stakeholders in responsible forest management within 5 years;
6. At least 300,000 ha. of permanent grazing land sustainably managed by 2010;
7. Philippine forest administration fully capable and responsive within 10 years;
8. Forestlands boundary relocated and demarcated, production and protection forests delineated within 10 years;
9. Sustainable management of 1.5M ha. of residual forests, self-sufficiency in wood in 10 years;
10. Establishment, maintenance and renewal of 460,000 ha. of commercial forest plantations within 12 years;
11. All forestlands under sustainable management by capable managers, all open areas closed within 12 years; and
12. Poverty in the uplands minimized by 50% within 15 years.

To achieve the strategic targets, ten strategic priority programs were identified:

1. Policy reforms and institutions development
2. Prioritization of watersheds, integrated land use planning with forest boundary delineation
3. Enhancement of MIS, IEC & R&D
4. Sustainable management of residual forests and other natural forests and forest protection
5. Forest area expansion through plantation development, ANR and other means
6. Protected area and biodiversity conservation
7. Forest industries rationalization and development
8. Sustainable management of grazing lands
9. Full development of M & E system and the C & I for all forest types and management systems
10. CBFM as a cross cutting strategy in all forest management systems

The TA team facilitated a workshop to assess the status of accomplishments of the 2003 forestry master plan targets. The workshop was attended by members of the TWG composed of representatives from the FMB, PAWB and the ERDB. The national assessment was followed by regional consultations where results of the national assessment were validated and problems, issues and facilitating factors were further drawn from the workshop participants. The summary of accomplishments, problems/ issues, facilitating factors and recommendations in the implementation of the 2003 revised master plan for forestry development is presented in Annex 1.

The assessment revealed that the forestry sector has so far achieved two of the 12 targets in the 2003 RMPFD. All regions continue to implement sustainable forest management strategies as identified in EO 318 entitled "Promoting Sustainable Forest Management in the Philippines." Among the SFM strategies

being implemented now in all regions include: community-based forest management, forest land use planning, forestlands boundary delineation, adoption of the watershed ecosystem management framework, establishment of protected areas, and co-management of forestlands between DENR and LGUs. The DENR has also established productive collaboration with the LGUs and other watershed stakeholders as evidenced by their active participation in forest management programs such as the national greening program (NGP) and through various management bodies such as the Watershed Management Councils (WMC), Multisectoral Forest Protection Committees (MFPC), Anti illegal Logging Task Force, Protected Area Management Boards (PAMB), co-management steering committees, and many others. With active collaboration among stakeholders, forestry and environmental concerns are no longer perceived as the sole responsibility of DENR but as common concerns of every stakeholder, particularly the LGUs, peoples' organizations, indigenous peoples, and other agencies.

Significant achievements were also attained in another two areas. Forestlands boundary in 75 out of 80 provinces were delineated while 114 of the 150 target watersheds were characterized & prioritized, most of them (99) with integrated management plans prepared. Accordingly, the achievement of these targets was facilitated by donor assistance, existing policies and mechanisms are already in place in the DENR which facilitate stakeholders' collaboration (such as forest land use planning, co-management, and the organization of multi sectoral bodies related to forest resource protection and management), the increasing awareness on the value of forests especially in terms of reducing disaster risks, and the fact that most of these programs are already included in the general appropriations of the DENR.

Although there were significant achievements in four areas of the 2003 RMPFD, gaps were also identified which have to be addressed to sustain initial gains and to improve implementation of the forestry master plan. Among these are the following: the need to secure congressional approval of draft bills defining forestland boundaries so that demarcation of production and protection forests could be undertaken; the need to strengthen advocacy for the passage of the SFMA to harmonize forestry and related policies; institutionalizing the implementation of criteria and indicators for SFM; harmonizing governance of public lands covered by overlapping tenure instruments such as the certificate of ancestral domain title/claims (CADT/CADC), community based forest management agreements (CBFMA) and protected areas (PAs); the need to organize and mobilize watershed management councils in priority watersheds; and the need to expand forest land use planning to cover all relevant LGUs.

The assessment also indicated that 8 of the 12 targets in the 2003 forestry master plan were either not significantly achieved or their attainment could not be determined due to lack of baseline data and agreed indicators. For instance, only 72,925 hectares have approved forest land grazing agreements compared to the 300,000 ha. target grazing lands sustainably managed. The main reason for this dismal performance is the non renewal of expiring pasture leases due to increased transaction costs associated with securing free and prior informed consent, the centralized approval of leases and permits and the entry of squatters in most pasture areas.

While a recent study by ERDB shows that the average annual income of selected CBFM farmers significantly increased by about 26%, their average annual income is still below the poverty threshold. Thus, poverty in the uplands did not improve as targeted in the forestry master plan. At the same time, not all forestlands are under sustainable management by capable managers since

about 4 million hectares remain open access. Some of these open access areas have residual forests which are continuously under threat due to illegal cutting, *kaingin* making and other destructive activities by local communities.

Self sufficiency in wood is still to be realized. Over the last decade, the country has been dependent on imports to meet its wood requirements. With the issuance of Executive Order 23, forest plantations will become the main source of wood for the Philippines. But due to disincentives in the development of commercial forest plantations as a result of the highly centralized approval and the many requirements in granting tenure instruments and harvesting permits, the private sector has been reluctant to invest in commercial forest plantation development. The 2013 Philippine forestry statistics indicate that from 1993 to 2010 timber lease agreement (TLA) holders was able to develop 104,475 hectares of forest plantations. For the same period, IFMA, SIFMA, CBFMA and tree farm lease agreement holders only established 43,339 hectares of forest plantations resulting in total plantations of about 147,814 hectares, way below the forestry master plan target of 460,000 hectares. Fortunately, the National Greening Program (NGP) accelerated forest plantation development by establishing 229,168 hectares from 2011 to 2014. However, the status and condition of these established plantations have not been assessed to ascertain their potential to meet the country's increasing demand for wood. Even assuming that NGP plantations are properly maintained, existing commercial forest plantations is still short by about 83,000 hectares of the target. However, it is most likely that plantations developed by TLAs had been illegally harvested while those established by IFMA, SIFMA and CBFMA holders may not have been properly maintained or renewed after harvesting. Meanwhile, timber plantations established under the NGP will have to be closely monitored and evaluated to ensure that they are properly maintained to provide the necessary volume and quality of wood raw materials for forest based industries. NGP

plantations would also require on-site managers who could continuously provide adequate protection, maintenance and renewal of these established plantations to ensure continuous supply of wood products in the future.

In terms of harmonizing policies, although a number of guidelines were signed to harmonize existing forestry policies, the Sustainable Forestry Management Act (SFMA) was not passed by Congress. The SFMA was supposed to harmonize conflicting forestry laws and policies but due to weak advocacy its passage has been by passed several times in Congress.

The two remaining targets, the achievement of which are difficult to determine, pertain to developing a fully capable and responsive Philippine forest administration and responsible forest based industries. DENR does not have standard indicators to measure these targets. Also, there are no baseline data upon which achievement of targets may be gauged.

The Forestry Scenarios

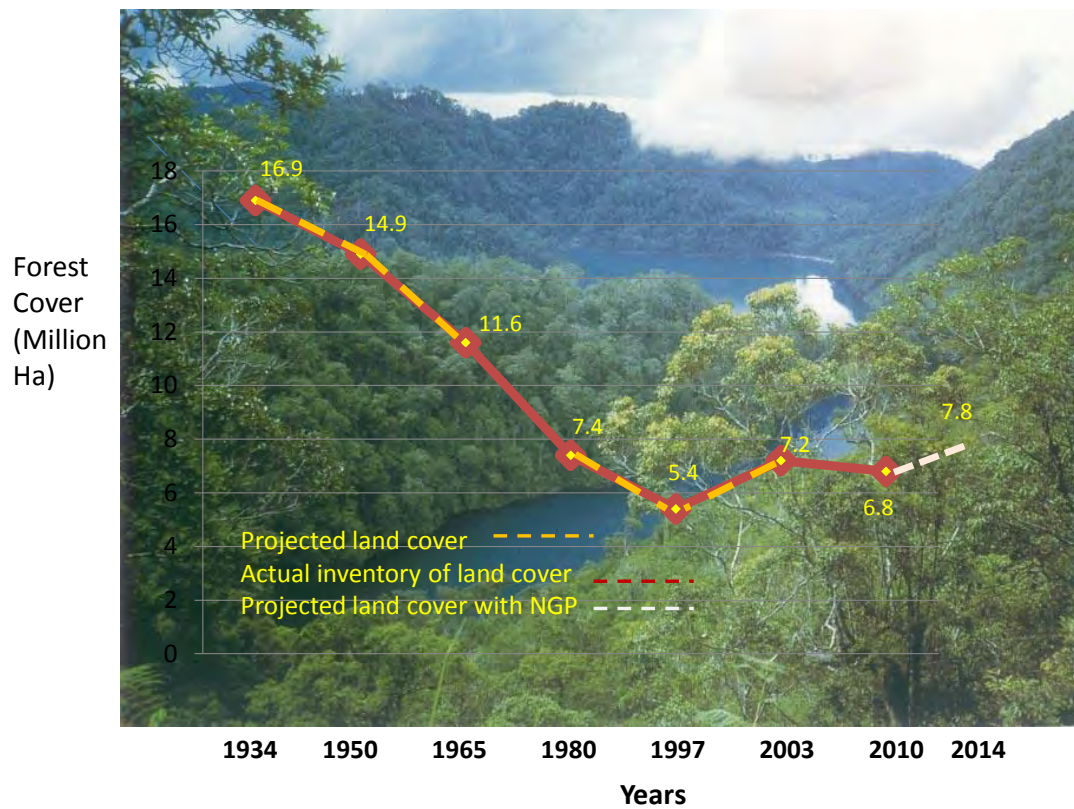
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The forestlands of the Philippines which include those considered as protection forests, comprise about 52% of its total land area or approximately 15.8 million hectares. Of the total forestlands, 6.8 million hectares remain forested as of 2010, which is significantly lower than the 1934 forest cover of 17 million hectares. However, while there was continuous decline in forest cover from 1934 to 1997, a significant increase in forest cover has been observed in 2003 with slight decrease again in 2010 (Figure 2). It should be noted that actual inventory of forest cover were undertaken only for 1965, 1980, 2003 and 2010. The rest (which include the forest cover estimate in 1997) were mere projections based on past forest cover data. It is therefore possible that the sharp decline in forest cover from 1980 to 1997 did not actually happen for two reasons: 1) it is highly improbable that forest cover would increase by 1.8 million hectares in six years (from 1997 to 2003) and 2) the trend in forest cover loss up to 1980 was mainly influenced by the logging operations of timber license agreement (TLAs) holders while from 1980 to 1997 most of the TLAs have ceased operations due to cancellation, suspension or expiration of TLAs. Taking these into consideration, and if we ignore the 1997 forest cover projection and use the 1980, 2003 and 2010 actual inventory of land cover, the forest cover loss in the Philippines between 1980 and 2010 would range from 20,000 to 62,000 hectares per year or an average of 40,000 hectares per year. The planting, protection and forest rehabilitation activities being undertaken under the NGP is expected to improve forest cover in the country if initial accomplishments are sustained.

Forest resources in the country is mainly threatened by unregulated use and conversion to other uses as a result of increasing demand for forest goods and services from expanding population. This situation will be aggravated by climate

change which is expected to adversely affect the ability of forests to provide the necessary ecosystems goods and services to communities. Thus, effective governance will be very crucial in the forestry sector to promote sustainable use of resources and ensure resilience of ecosystems and communities to climate change. In essence, climate change, demand for forest goods and services and governance situation will have profound implications in the management of forestlands in the Philippines. An assessment of their current conditions, trends and scenarios is therefore necessary in crafting the Philippine Master Plan for Climate Resilient Forestry Development (PMPCRFD).

Figure 2. Forest cover trends in the Philippines



3.1 Climate Trends and Climate Change Scenarios

Climate change is now a reality. There are growing observational evidences at the global, regional and local levels supporting the claim that climate has changed. Climate change and climate variability have profound effects and impacts on ecosystem production systems, ecological stability, and socioeconomic activities. They alter the hydrologic regime of watersheds, and therefore, change the spatial and temporal distribution and availability of water resources.

3.1.1 Climate Trends in the Philippines

Available long-term historical records of climate data in the Philippines show that climate is changing. PAGASA (2011) revealed that, based on data from 1951 to 2010, the mean temperature in the Philippines has increased from 26.75°C to 27.4°C or an increase of about 0.65°C over a span of 60 years (Figure 3). Time series of observed mean temperature in the country is increasing at the rate of 0.0108 °C /year over the 60-year period (1951-2010), and at the rate of 0.0164 °C/year during the last 30 years (1981-2010).

Figure 4 shows the general trends in extreme daily temperature in a number of locations in the Philippines from 1951-2008. Historical data show that warm nights and hot days are generally increasing. Climate change has also brought erratic and changing rainfall patterns characterized by more intense extreme rainfall events. Figure 5 shows the general observed trends in extreme rainfall intensity in a number of locations based on the amount of rainfall exceeding the highest four rain events in the year. While increase in frequency as well as in intensity of extreme rainfall events are already being experienced in many areas, the observed changes in some areas are not statistically significant due to observed

large variability in the dataset (PAGASA, 2011). In recent years, however, changes in rainfall patterns in many locations have been observed.

Figure 3. Observed average temperature anomalies in the Philippines (1951-2010), departures from 1971-2000 normal values. There has been an increase of 0.65°C from 1951-2010 (PAGASA, 2011)

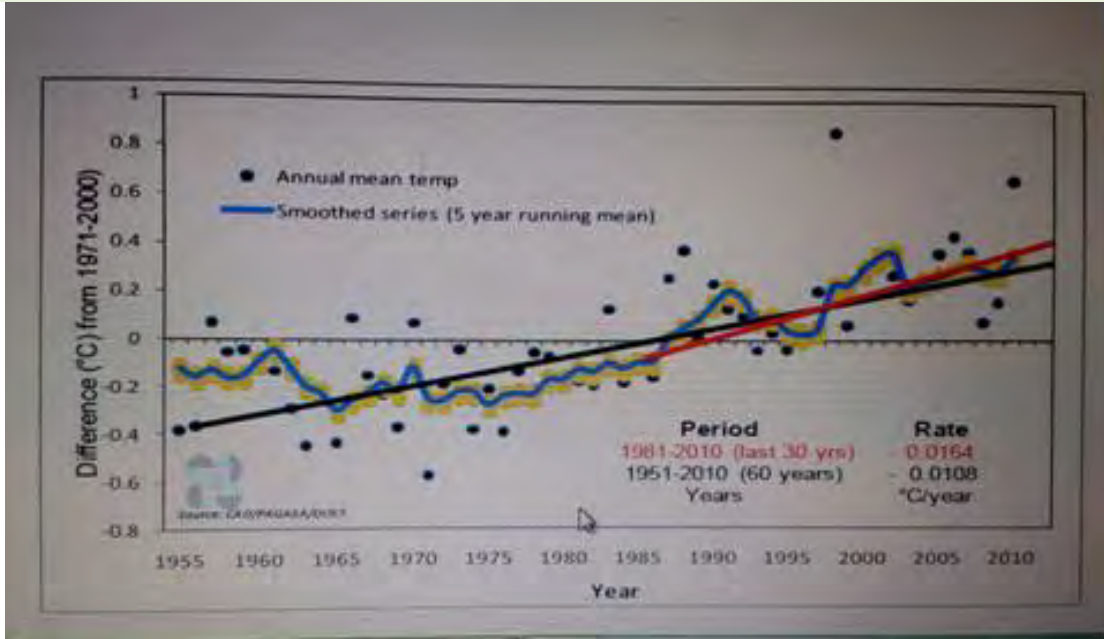
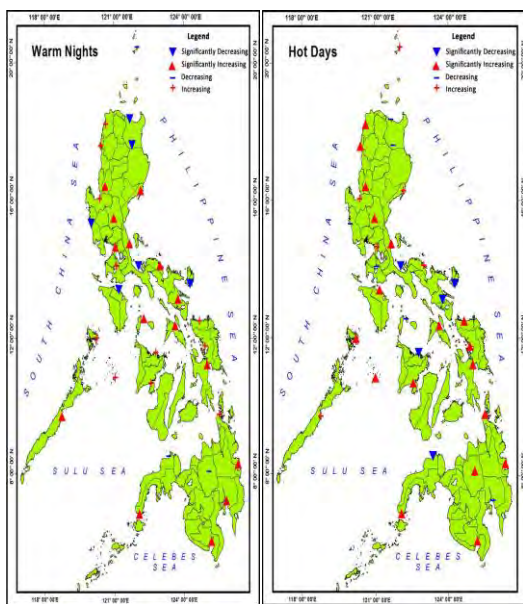
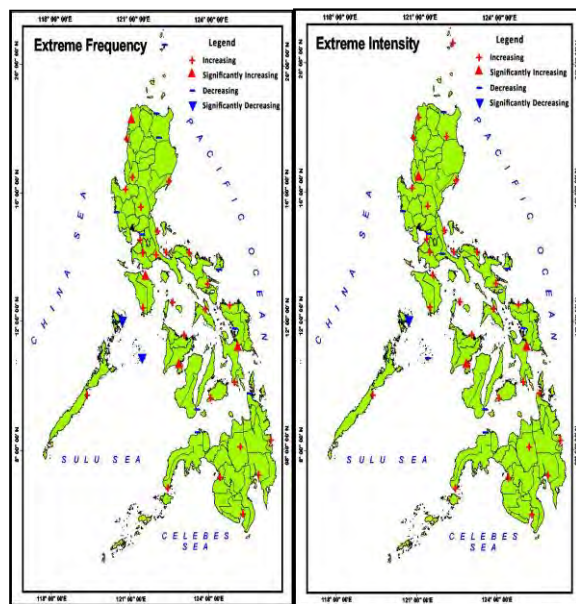


Figure 4. Observed trends in extreme daily temperature in the Philippines based on historical weather records



Source: PAGASA, 2011

Figure 5. Observed trends in extreme daily rainfall intensity in the Philippines based on historical records from 1951-



Source: PAGASA, 2011

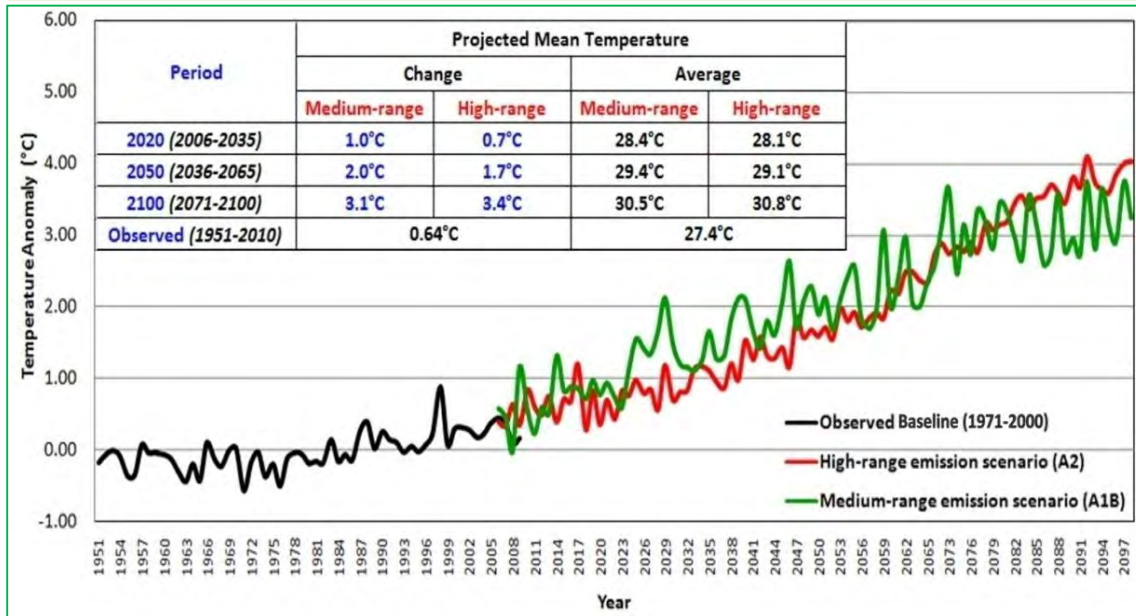
3.1.2 Future Climate Scenario and Associated Hazards

Future climate scenarios are defined based on storylines that consider both global versus regional development, as well as economic versus environmental development. Among the family of climate scenarios, two IPCC SRES (2001) climate scenarios, namely, the medium-range emission scenario (A1B), and the high-range emission scenario (A2) have been defined for the Philippines. The plausible scenarios have been rationalized for the Philippines considering the economic and environmental processes and factors at the global and regional levels, as well as the identified driving forces (population increase, economic growth, technological development, energy sources, land use, and agriculture) that determine future climatic conditions in an area. These plausible climate scenarios are translated to future climate using a number of global circulation models or global climate models (GCMs).

Increased Temperature

Figure 6 shows the observed and the projected climate change in the Philippines in terms of mean temperature for the baseline period (1971-2000), for 2020, 2050, and 2100 for two SRES climate scenarios, namely: the medium-range emission scenario (A1B), and the high-range emission scenario (A2) from PAGASA (2011). Increase in average temperature is expected to range from 1.0 to 3.1°C and from 0.7 to 3.4°C for the period 2020 to 2100 under the A1B and A2 scenarios, respectively. This means that from an average temperature of 27.4°C in 2010, mean temperature is projected to increase to 28.4°C in 2020 and to about 30.5°C in 2100 under the medium range scenario. For a high range scenario, the projected average temperature is about 28.1°C in 2020 and 30.8°C in 2100.

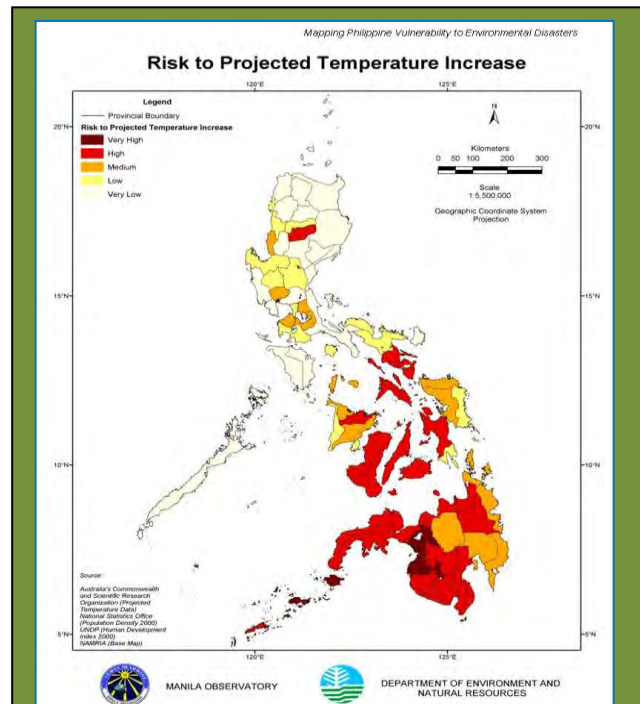
Figure 6. Historical (observed) and projected annual mean temperature anomalies for the Philippines from 1951 to 2100 based on departures from 1971-2000 normal values.



Source: PAGASA, 2011

The increase in seasonal mean temperature will have significant effects and impacts in various sectors across regions and provinces. Figure 7 maps the risks by province associated with the projected temperature increase. In general, areas in central and southern Philippines (i.e. Visayas and Mindanao regions) are expected to experience increased or extreme temperature. Areas in Luzon will have low to very low risk of experiencing projected temperature extremes. This

Figure 7. Provinces at risk to projected temperature increase.



Source: Manila Observatory & DENR, 2010

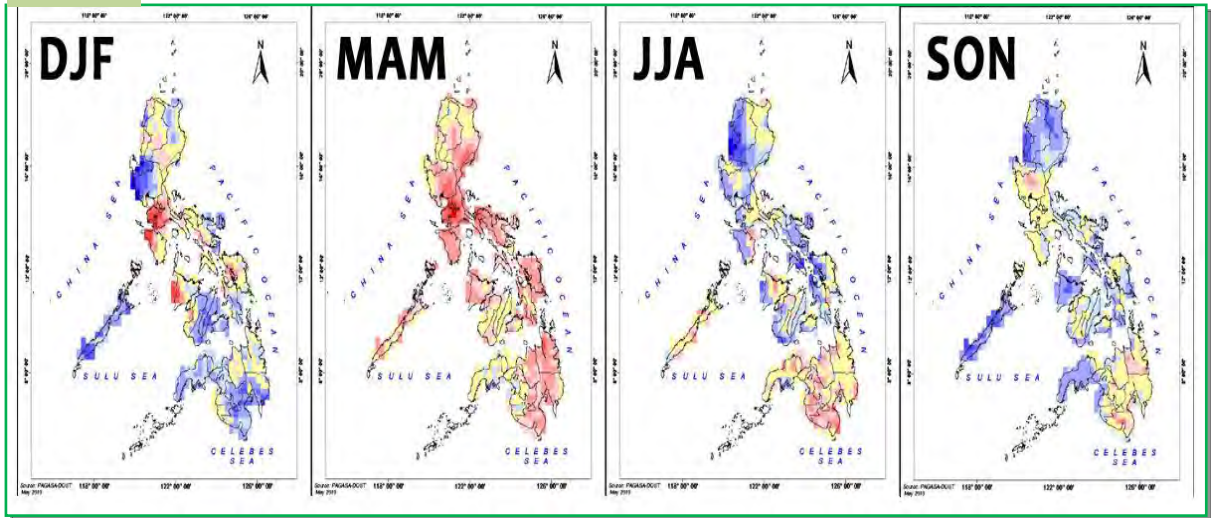
phenomenon has great implications on various sectors including agriculture and food, water resources, health, livelihood, and many others.

More Intense Rainfall Events

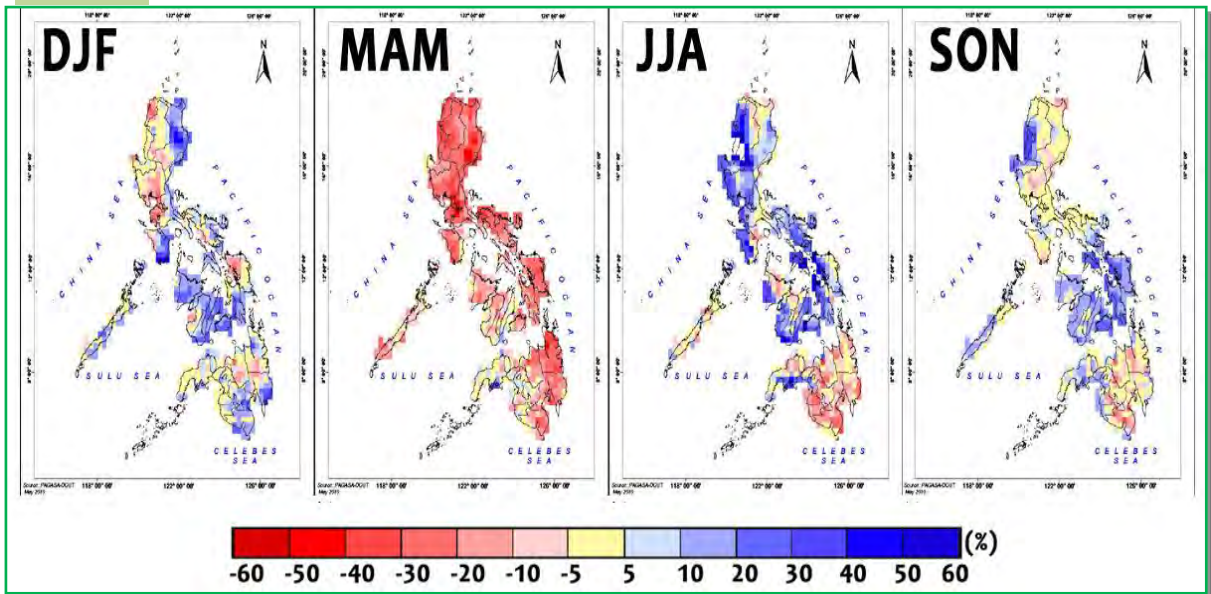
Seasonal change in mean rainfall in the Philippines shows wide spatial variability across locations as shown in Figure 8 for 2020 and 2050 both for the A1B and A2 scenarios. As summarized in Table 1 for the medium emission scenario, dry months are expected to be drier and the wet months wetter (Lansigan, 2013). This has important implications in forestry and in terms of availability and dependability of water from rainfall particularly for agriculture, energy and domestic use. This is also expected to intensify disaster risks associated with flooding and landslides that would affect both upland and lowland communities. Indeed, adaptation strategies and measures will have to be implemented to reduce the adverse effects and impacts of climate change. More intense rainfall events will trigger landslides and the occurrence of floods especially in low lying and flood prone areas. Cumulative rainfall of more than 120 mm. during a rainfall event favors possible occurrence of landslides, followed by flashfloods. Table 2 presents the top 20 provinces that are susceptible to floods and landslides in the Philippines. The fragile and steep highland areas in CAR and the mountainous areas in Nueva Vizcaya, Southern Leyte, and Abra are on the top rank in terms of vulnerable areas to landslides. Meanwhile, the low-lying areas of Region 3 and Pangasinan in Region 1 are most vulnerable to flooding.

Figure 8. Projected change in seasonal mean rainfall (%) in the Philippines: (a) 2020 medium-range emission scenario; and (b) 2050 medium-range emission scenario.

(a) 2020



(b) 2050



Source: PAGASA, 2011

Table 1. Projected change in seasonal mean rainfall (in %) in the Philippines based on medium-range emission scenario.

Season	Medium-range Emission Scenario	
	2020	2050
Dec-Jan-Feb (DJF)	-0.4 to 54.3 %	-0.1 to -25.1-%
Mar-Apr-May (MAM)	-0.2 to -33.3%	-1.4 to -39.8%
Jun-Jul-Aug (JJA)	-0.4 to 43.1%	-0.7 to 72.5%
Sep-Oct-Nov (SON)	-0.4 to 30.0%	-0.5 to 39.0%

Source: PAGASA, 2011.

Table 2. Top 20 provinces susceptible to floods and landslides in the Philippines

Rank	Provinces Susceptible to Floods	Area Susceptible to Flooding (%)	Provinces Susceptible to Landslide	Area Susceptible to Landslide (%)
1	Pampanga	79.5	Benguet	90.3
2	Nueva Ecija	51.2	Mountain Province	87.1
3	Pangasinan	48.1	Nueva Vizcaya	86.7
4	Tarlac	47.1	Kalinga/Apayao	84.7
5	Maguindanao	42.5	Southern Leyte	82.6
6	Bulacan	39.9	Abra	82.1
7	Metro Manila	33.2	Marinduque	78.6
8	North Cotabato	30.1	Cebu	77.6
9	Oriental Mindoro	28.7	Catanduanes	77.4
10	Ilocos Norte	27.9	Ifugao	77.3
11	Iloilo	26.7	Antique	74.5
12	La Union	26.3	La Union	74.4
13	Cagayan	25.5	Quirino	72.9
14	Sultan Kudarat	24.4	Batanes	71.5
15	Ilocos Sur	23.4	Bukidnon	70.9
16	Bataan	23.1	Davao Oriental	70.1
17	Leyte	20.8	Samar (Western Samar)	68.9
18	Davao del Norte/ Compostela Valley	20.2	Aurora	67.9
19	Compostela Valley/ Davao del Norte	20.2	Ilocos Sur	67.4
20	Camarines Sur	19.2	Sarangani	67.0

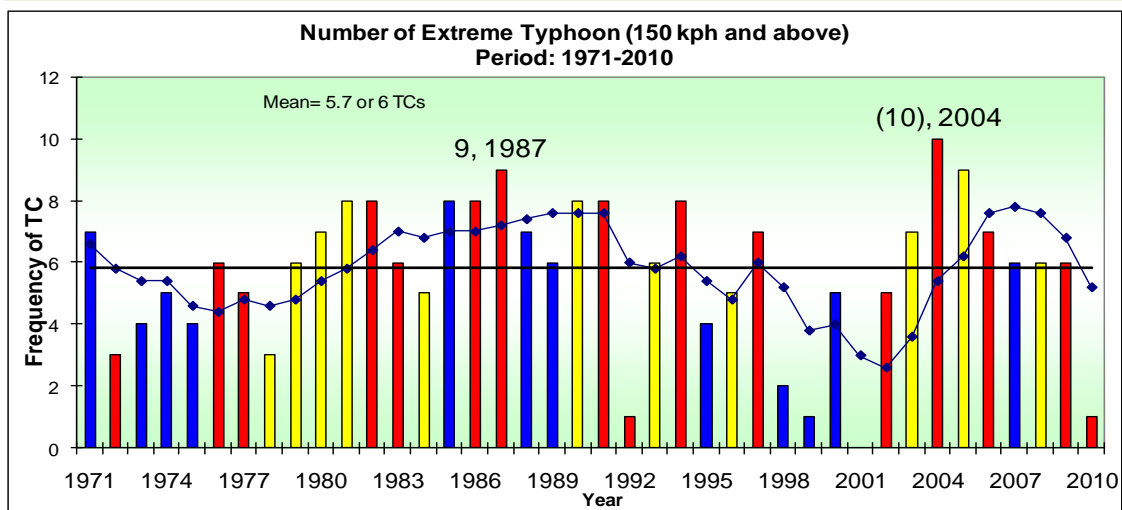
Source: DENR-MGB, 2010 & 2011 cited in Phil. Development Plan 2011-2016

Typhoons

The Philippines is along the typhoon path of the Pacific Region. An average of 20 typhoons occur in the Philippine Area of Responsibility (PAR) which significantly affect the lives, economic activities, and livelihood in the country. In recent years, a significant number of strong typhoons hit the Philippines resulting to tremendous losses and damages to lives, properties, and economic activities as well as the environment and natural resources including the forestry sector.

Figure 9 shows the number of extreme typhoon occurrences in the PAR from 1971-2009. There were 9 to 10 tropical cyclones that occurred in 1987 and 2004, respectively, which happened to be both El Niño years.

Figure 9. Observed number of extreme typhoons with maximum sustained wind of more than 150 kph, 1971-2010.



Source: PAGASA, 2011

Table 3 summarizes the reported losses and damages due to most intense typhoons during the last several years. Future climate projections indicate occurrence of stronger typhoons characterized by more intense rainfall and strong winds which are expected to cause more losses and damages. Typhoon paths tend to occur more often along

the central part of the Philippines with some typhoons also occurring in the southern part of the country.

Table 3. Disastrous typhoons with damages of at least Php1.0 billion.

Name of Tropical Cyclone	Date of Occurrence	Total Damage (in Php Billion)
TY_PABLO (Bopha)	Dec 3 –9, 2012	Php 36.95 B
TY_PEPENG (Parma)	Sep 30 - Oct 10 2009	Php 27.30 B
TY PEDRING (Nesat)	SEP 24- 28, 2011	Php 15.55B
TY FRANK (Fengshen)	Jun 18 – 23, 2008	Php 13.50 B
TY JUAN (Megi)	Oct16 – 21, 2010	Php 11.5 B
TS_ONDOY (Ketsana)	Sep 24 – 27, 2009	Php 10.95 B
TY YOLANDA (Haiyan)	Nov. 8, 2013	Php 35.24 B

Source of data: NDRRMC, 2011 & 2013.

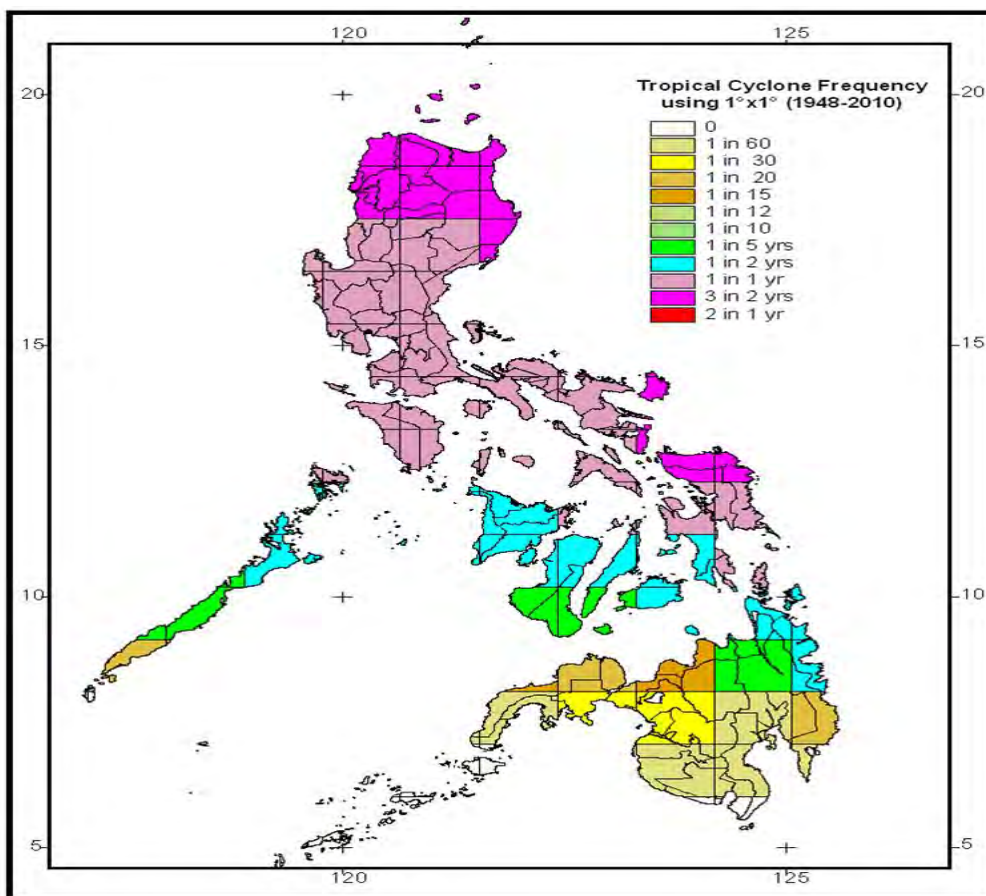
Figure 10 presents the different areas in the Philippines vulnerable to typhoons based on their frequency of occurrence from 1948 to 2010. Areas in the Eastern Visayas and the regions in Luzon are most vulnerable to typhoons. Provinces in other parts of Visayas have low vulnerability, while Mindanao has very low frequency of occurrence with 5-7 percent based on the recorded data period. The eastern seaboard of the Philippines (from the provinces of Eastern Visayas to Bicol Region up to Northern Luzon) is vulnerable to typhoons.

Sea level rise (SLR) including storm surges

Recent study of the World Bank (2013) on global sea level rise has shown that sea level in the Philippines can rise from 0.9 m. to 1.1 m. under the RCP 8.5 climate scenario. SLR associated with global warming also enhances storm surges. UP MSI (2010) reported that sea surface temperature (SST) in representative points in the Philippine archipelago has increased, ranging from 0.20°C to 0.30°C per decade. SST increase will translate to sea level rise which will inundate the coastal areas resulting to salt water intrusion of the crop production areas. SLR affects the mangrove areas in coastal regions. It drowns

mangroves while increased salinity of low lying crop production areas in the coastal regions reduces crop yields. Ocean acidification destroys the coral reefs which are the habitats of many commercial fish species, thus threatening food security. Vulnerability of the forestry sector to climate change is climate hazard-specific. As temperature increases, more intense rainfall and typhoons will often pose as common hazards.

Figure 10. Map of the Philippines showing the areas vulnerable to typhoons based on tropical cyclone frequency using 1° x 1° from 1948-2010.



Source: PAGASA, 2011.

3.1.3 Climate Change Impacts

Each of the climate hazards has specific effects and impacts on different sectors or sub-systems such as biodiversity (both flora and fauna), plantation

forests, natural forests, watersheds, mangroves, forest communities, and on forest-based livelihood activities.

Impacts on Ecosystems

Climate change has profound effects and impacts on the flora and fauna. Certain species are very sensitive to increased temperature, erratic rainfall distribution, and more intense typhoons which have significantly reduced their respective populations. A number of species of flora and fauna in protected areas are rarely found nowadays, and some have already become extinct (Gruezo et al., 2013). Forest ecosystems located above 1,000 meters in elevation are most vulnerable to temperature change since species in this ecosystem have nowhere to go to seek their desired temperature range. Meanwhile, mangroves will be most vulnerable to sea level rise. Some species of fruit trees in agroforestry have reduced productivity due to increased temperature brought about by global warming.

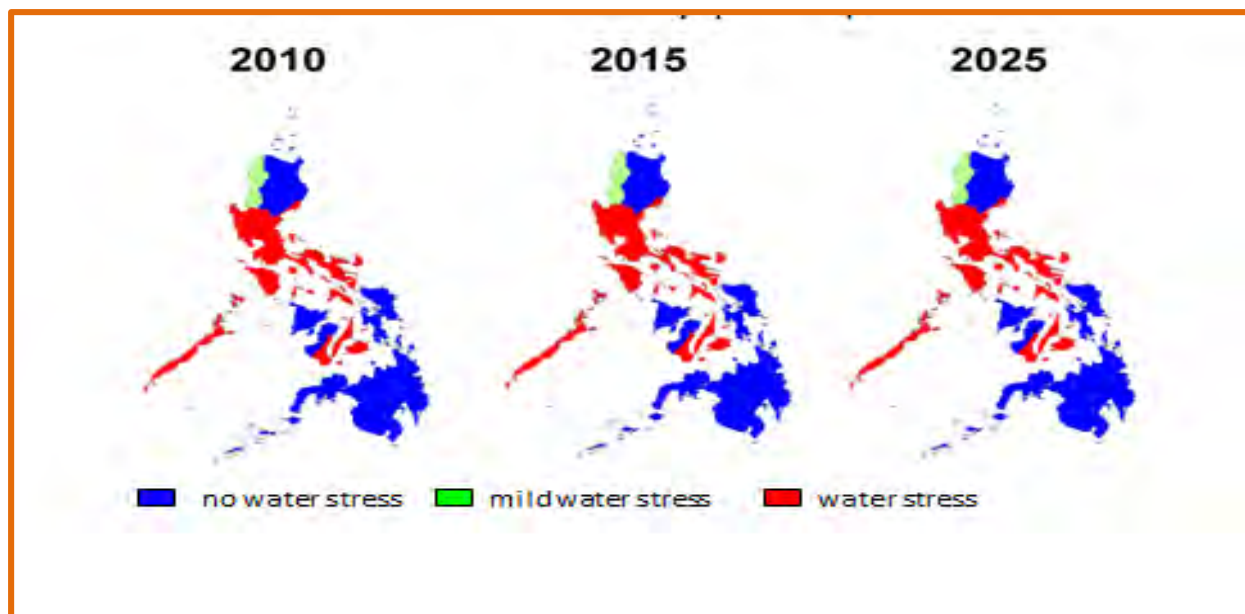
Impacts on Water Supply

Climate change, including accelerated population growth, rapid urbanization, and land use change exert pressure on available water resources in an area. Demand for water resources for various purposes such as irrigation for food production, municipal and domestic use, power and energy, industrial use, and environmental services are expected to increase through time. However, the dependability of water supply may change due to temporal and spatial variability of rainfall distribution, as well as due to change in land use. The change in temporal and spatial variability of climate variables such as temperature and rainfall is expected to result to changes in the hydrologic regimes of watersheds. Specifically, the dependability of runoff will depend on the seasonal distribution and variability of rainfall in the area. Under climate change, dry periods tend to be drier while wet periods tend to be wetter.

Climate change effects on watersheds can be observed too in the shifts in hydrograph. With climate change and change in land use, significant changes in peak flows and time-to-peak will be evident (Lansigan, 2009).

Figure 11 reveals the regions in the Philippines with water stress or water scarcity based on water availability per capita (WAPC) for the periods 2010 and 2025. Densely populated regions will continue to experience water stress. However, the rapid population growth rate in the water stressed regions will continue to exert pressure despite water availability which remains nearly constant unless certain infrastructure developments are initiated to address economic water scarcity in the country (Lansigan and Rillera, 2009).

Figure 11. Regions in the Philippines with water stress or water scarcity based on water availability per capita (WAPC), 2010, 2015, and 2025.



Source: Lansigan and Rillera, 2009

Water demand which is available only at the national level for various water uses continue to increase due to rapid population growth (ADB, 2012). While

irrigation in agriculture continues to be a major use, water demand for municipal and domestic use increases due to increasing population.

Impacts on Communities

Forest communities are vulnerable to climate change inasmuch as goods and services and products from the forests provide source of income and livelihoods to local stakeholders. However, climate change affects these forest activities and resources thereby threatening food security and socio-economic stability. Annex 2 consolidates and summarizes the regional and provincial vulnerability to different climate hazards. Also shown is the poverty incidence which tends to be highly correlated to vulnerability. That is, poor provinces are also highly vulnerable. However, there are also provinces with low poverty level but with high vulnerability to climate hazards. The poor communities are the most vulnerable to climate change since they have the least or no adaptive capacity to cope with or minimize its adverse effects and impacts. Climate resilience of vulnerable communities can be enhanced if the capacity of stakeholders can be built up. Adaptive capacity can be enhanced through training workshops and seminars, facilitating access to timely and accurate information, and providing the necessary institutional options (e.g. insurance, subsidy, calamity fund, etc.) to the poor.

Impacts on Livelihoods

Climate change hazards are expected to greatly affect the forestry sector in terms of the livelihood activities dependent on forest products. Global warming will adversely affect the availability and access to forest resources and products that are being traded. Agroforestry products such as fruits, honeybee by-products, herbal medicinal plants, etc. may no longer be sustainable as their supply may be threatened by climate-related hazards.

However, other livelihood activities or opportunities may come up amidst climate change as part of adaptation options. For example, some plant species and fruit trees may flourish in the vulnerable areas which can later evolve as sustainable enterprises. The effects and impacts on forest structures and composition also lead to changes in the forest-based livelihood activities. Thus, adaptive capacity may be enhanced by providing or improving access to adaptation options.

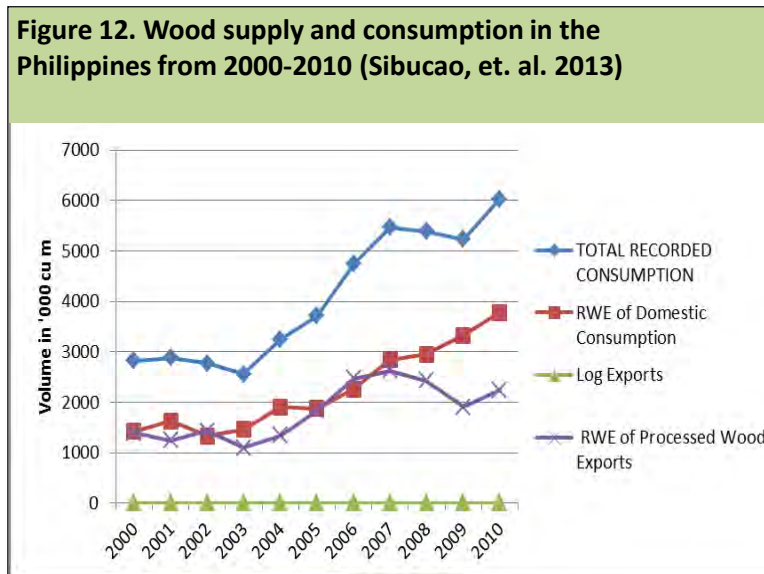
3.2 Demand and Supply of Forest Ecosystems-Related Goods and Services

With increasing population, demand for forest ecosystems goods and services is expected to increase. And as climate change intensifies, there will be increasing pressures from different clients and customers of the forestry sector to meet all or most of the domestic needs for wood, fuelwood, major / minor forest products, and other forest ecosystem-related goods and services. For instance, with the moratorium in harvesting natural forests, forest-based processors and the furniture making industries continue to raise concerns about their viability and their ability to sustainably supply round wood and related products to meet existing capacity and local demand for construction. The recent landslides and floods brought about by Ondoy in 2009, Sendong in 2011, Pablo in 2012 and Yolanda in 2013 have sounded alarms and intensified advocacy to rehabilitate and reforest denuded watersheds and conserve remaining forests. The increase in fuel prices has forced many households to shift towards the use of fuelwood for cooking and other domestic activities. All these recent events and trends point to an urgent need for the forestry sector to be a major player not just as a direct source of wood and fuelwood, but more importantly as a major provider of indirect ecosystems goods and services.

3.2.1 Demand and Supply of Wood and Fuelwood

Round Wood Equivalent (RWE)¹ Demand and Supply of Wood

Figure 12 and Table 4 show the 11-year average annual supply and consumption data of round wood equivalent in cubic meters. At least 66.6 % of the total RWE average annual supply



of 4,194,000 for the last 11 years (2000-2010) came from imports (Sibucayo, et. al. 2013). Only 17.3% of the total average annual supply came from domestic log production. At least 16.1% of the annual supply came from substitute - coconut palm timber. Of the total supply, 55% were used to meet domestic needs with the majority of the rest exported as finished products. Over the years, the Philippines continued to depend on imports to meet its domestic wood requirements.

From 2000 to 2010, the supply of local log production mostly came from plantation forests with a minimal volume percentage from the natural forests. For instance, in 2011, only 1.7% of the total production of naturally-grown and planted logs came from natural forests (FMB/DENR, 2012). The 17.29% of the average annual that came from local domestic log production from 2000-2010 is equivalent to only about 4,834 hectares of cutting area if the average volume

¹ Round Wood Equivalent (RWE) is the volume of round wood (wood in log form) that is required to produce a given volume of processed timber or manufactured product.

per hectare is 150 cubic meters. This is just 1.5 % of the available broad-leaved forest plantations of 324,554 hectares in public lands (277,009 hectares) and private lands (47,545 hectares) that was reported in 2003 (FMB/DENR, 2004). Most of these forest plantations were established using donor funds and were not designed to supply the raw materials needs of the domestic market.

Table 4. Wood supply and wood consumption account in the Philippines, 2000-2010 (in thousand cu. m.)

Accounts	Average for the last 11 years (2000-2010)	Percent Share
Supply	4,194.36	
• Domestic log production	725.27	17.29
• Log imports	234.77	5.60
• RWE of processed wood imports	2,559.32	61.02
• RWE of coconut palm	675.00	16.09
Consumption	4,077.59	
• RWE of domestic consumption	2,254.57	55.29
• Log exports	1.37	0.03
• RWE of processed wood exports	1,821.65	44.68
Supply and Consumption Balance	116.77	

Source: Adjusted figures from Sibucan, et al. 2013

To fully meet the domestic needs of the country in 2025 from local supply of logs, about 44,404 hectares of plantation forests will have to be programmed for development starting in 2015 if the consumption remains at its present average level. This only represents 14% of the established broad-leaved plantations in public lands and private lands which if properly maintained, protected and allowed to be harvested could easily meet local consumption. However, this is not likely to happen since these were intended to maintain ecological stability, greening, and rehabilitation of watersheds (Acosta, 2004). This means that government may need to allow imported logs for local processing to meet

domestic demand for and re-export of high value finished products such as those from the furniture manufacturing industry in Cebu City.

At present, the existing capacities of regular and mini-sawmills, veneer and plywood mills with a total annual log requirements (ALRs) of about 2.8 million cubic meters are adequate to process both logs and semi-processed wood products from domestic and imported sources (FMB/DENR 2012). Most of the imported wood for further processing is already in processed or semi-processed forms. The location of these existing capacities for forest products processing may need further review in relation to existing and future supply of raw material from forest plantations.

From 2000-2010, the average rate of growth of consumption (both for domestic use and export market) grew by at least 8%. If this trend continues, even at 5% per annum of growth, the total future supply requirement in cubic meters of RWE to meet the total (domestic and export needs) requirements is almost 10 million cubic meters per year in 2028 as shown in Table 5.

The total annual projected demand will require a total harvesting area of forest plantations from more than 40,000 hectares in 2011 to about 94,000 hectares in 2028. This is assuming that the harvestable volume of cubic meters per ha will average at 100 cubic meters. The total harvestable area of forest plantations to meet domestic demand (55% of the total demand) will be more than 22,000 hectares and will almost be 52,000 hectares in 2028. This means that at the minimum, the annual target planting area of forest plantations to supply domestic consumption will be at least 27,000 hectares in 2015 and gradually increasing in area by at least 5% per annum. To meet the wood requirements for the export market, imported wood maybe allowed as long as they are locally processed into high value finished products for the export markets.

Table 5. Estimated harvesting area in hectares of plantation forests of total and domestic projected wood consumptions

Item	2011 11-year ave. annual consumption in cubic meters of RWE (2000-2010)	2015	2020	2025	2028
1. Projected consumption in '000 cubic meters of Round Wood Equivalent (RWE)	4,077.6	4956	6,326	8,073	9,346
2. Estimated harvesting area of total projected consumption in ha of plantation forests with an average 100 cubic meters per ha of harvestable volume	40,776	49,563	63,257	80,734	93,459
3. Estimated harvesting area of total projected domestic consumption (55% if total projected consumption) in ha of plantation forests with an average of 100 cubic meters per ha of harvestable volume	22,427	27,260	34,792	44,404	51,403

Note: For conservative estimate, the total projected consumption values are assumed to increase at 5% per annum, lower than the 8% from 2000-2010.

(Extrapolated from Sibucan, et.al 2013)

As will be discussed in the next section, the allocations of lands of the public domain under IFMAs and CBFMAs have the dominant objective of forest production under co-production sharing agreements. There are now 140 IFMA holders with a total area of 1,005,951 hectares. At least 65% (672,612 has.) of the total IFMA holders' areas is in Mindanao, where ideal agro-climatic conditions

exist for fast growing hardwoods. The IFMA holders were only able to supply an average of “96,000 cubic meters per year from 2005 to 2011” (Sibucan, et al., 2013). The forestlands under the responsibility of these tenure holders have great potentials for forest plantations if given the right policy incentives, and business-friendly regulatory environment. The forestlands under the CBFMA holders which now total to more than 1.6 million hectares (Table 6) are also potential areas for smallholder forest plantation development combined with complementary agroforestry production systems (FMB/DENR 2012; Braganza, 2012). Together with the areas under CADTs, the CBFMA areas offer opportunities to reduce poverty and contribute to the government's current thrust for inclusive economic growth (NEDA/PDP 2011). At least 50% (810,576 ha) of the total CBFMA areas is located in Mindanao (Regions 9, 10, 11, 12, 13 and ARMM). With more than 2.6 million hectares of tenured areas under IFMA and CBFMA, 94,000 hectares per annum of harvestable area (to meet total demand for round wood) with an average rotation of 10-15 years will only require a total combined planting area of close to one million hectares or only 40-60% of their total area. This area does not even include the plantable areas under the ancestral domains, those under DENR-LGU jointly managed areas, and those in the private lands.

It should be noted that given the lack of institutional and long-term financing for smallholder tree farms for CBFMA and CADT holders and the relatively limited extension capacities of DENR to assist upland communities, most of the “plantable areas” in these land and forest resource management units (LFRMUs) are relatively undeveloped. Most IFMA holders are hesitant to use their own equity capital to finance industrial forest plantations despite the growing profitability of tree plantation ventures. Moreover, CBFMA and IFMA tenure instruments cannot be used as collateral to access bank financing for tree farm, agroforestry or industrial tree plantations.

Table 6. CBFMA areas in the Philippines

Region	No. of CBMA Issued	Project Area Awarded (ha.)	No. of families/HH
Total	1,815	1,604,662.00	225,535
CAR	57	51,182.68	10,454
R1	140	39,107.32	13,202
R2	99	263,869.36	45,955
R3	120	79,154.32	11,703
R4-A	47	17,524.52	3,957
R4-B	78	93,944.04	9,252
R5	112	51,253.74	8,330
R6	104	34,053.61	8,775
R7	197	56,600.75	13,862
R8	143	107,393.43	9,175
R9	145	93,152.04	15,605
R10	292	211,635.98	28,257
R11	99	206,571.10	12,762
R12	56	97,892.17	17,969
R13	126	201,326.93	16,277

Simple calculation, however, will demonstrate that the total IFMA and CBFMA areas (1,482,000 ha) in Mindanao will be adequate to supply the total domestic demand for wood products in the Philippines. That is if policies and incentives combined with sound regulatory governance are in place (Tesoro and Angeles 2010). Besides, in Mindanao, yield may be doubled from the initial assumption of 100 cubic meters over a 10-year rotation. Smaller harvesting area may be needed if plantations are developed in Mindanao. As stated by Nuevo (1999), Mindanao has the potential to supply the total wood requirements of the

Philippines and could even produce surplus for exports. Mindanao has ideal agro-climatic conditions for fast growing hardwoods. Most upland farmers, communities, and wood processors have gained experience and learned the technologies under their contract growing arrangement with PICOP and other companies. This started in the '70s with the World Bank's Smallholder Tree Farm Loan to the Development Bank of the Philippines. In addition, portions of the areas that are currently under CADTs and ancestral domain claims are also ideal for fast growing hardwoods.

Demand and Supply of Fuelwood and Charcoal

From various estimates between 1992 to 2001, the average per capita consumption of fuelwood and charcoal ranges from 373 to 1,300 kg per capita per year in rural areas, and about 140 to almost 700 kg per capita per year in urban areas (Remedio, 2005). In the updating of the 2003 RMPFD, at least 400 kg per capita per year appears to be conservative estimate. This is roughly equivalent to about 0.5 cubic meter per capita per year of fuelwood. The estimates for charcoal per capita are highly variable from the compilation of estimates. This means that with the population in 2010 of more than 92 million (NCSO, 2012), the estimated consumption of fuelwood was about 46 million cubic meters. Bensel and Remedio (2002) provided a higher estimate of wood fuel consumption with a total of more than 57 million metric tons per year as shown in Table 7. This is equivalent to at least 70 million cubic meters of wood per year.

Table 7. Best estimates of biomass and woodfuel consumption in the Philippines.

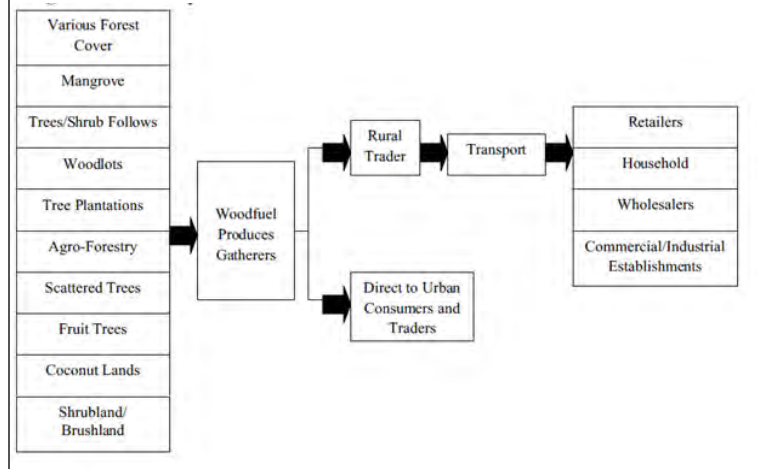
Sector/Fuel	Estimates Range (million metric tons/year)	Best Estimate (million metric tons/year)
Household Fuelwood Consumption	15-20	18
Household Charcoal Consumption	1-2	1.2 (7.2 mil metric tons wood equiv.)
Household Biomass Residues Consumption	2-4	4
Commercial/Industrial Fuelwood Consumption	5-10	7
Commercial/Industrial Charcoal Consumption	1-2	1.5 (9 mil metric tons wood equiv.)
Commercial/Industrial Biomass Residues Consumption	10-15	12
Combined Fuelwood Consumption	20-30	25
Combined Charcoal Consumption	2-4	2.7 (16.2 mil metric tons wood equiv.)
Combined Biomass Residues Consumption	12-19	16
Overall Biomass Fuel Consumption (after converting charcoal to wood equivalent)	44-73	57.2

Source: Bensel & Remedio, 2002

The wood fuel consumption of 46 - 70 million cubic meters per year will roughly require an average harvesting area of 50,000-70,000 hectares every year or a total aggregate planting area of 150,000-210,000 hectares to meet estimated consumption. This estimate is based on average yields of the two ideal species for fuelwood – *Gliricidia sepium* and *Leucaena leucocephala* which is estimated at 1,000 to 3,000 cubic meters per year through coppice method. These species can easily be established (either by cuttings or seeds) even at 10,000 trees per ha, coppice profusely, nitrogen-fixing, and suitable even in relatively acidic areas (Elevitch & Francis, 2006; Remedio, 2005).

The supply chain of biofuels (fuelwood and charcoal and other related products) is shown in Figure 13. The flow from the sources and end-users of biofuels is very

Figure 13. General flow of woodfuel production, marketing, and consumption in the Philippines (Remedio 2006)



much driven by the market. The different sources indicate that fuelwood and charcoal come from agricultural, forest lands, protected areas, and mangroves; and from naturally-growing trees and crops in backyard, farms, and plantations. Remedio (2006) provided an estimate of the possible sources of woodfuels in the Philippines (Table 8). Most of the sources are in forest lands. The brushlands and secondary forests have the highest potential to provide wood fuels yielding 8 and 6 tons per ha per year, respectively. With EO 23 however, harvesting fuelwood in secondary forests is no longer allowed.

Table 8. Revised estimates of woodfuel sources and their potentials for the Philippines.

Land Use	Estimated Area (*000 ha)	Productivity (t/ha/yr)	Accessibility	Total Annual Yield (*000 MT)
Brushland	4,000	8	100%	32,000
Other Extensive	4,000	5	100%	20,000
Grassland	2,000	1	100%	2,000
Tree Plantations	1,000	2	80%	1,600
Secondary Forest	4,500	6	50%	13,500
Agriculture	4,000	2	100%	8,000
Coconut, Crop/Coconut*	4,000	2	100%	8,000
Total	23,500			85,100

* Woody biomass from intercropped trees and shrubs

Source: Remedio, 2006

3.2.2 Demand and Supply of Forest Ecosystems Services

Over the years, the increasing demand for forest ecosystems “goods and services” that are considered to be “non-timber or non-forest in nature” has resulted in the increased allocation of lands of the public domains and ancestral lands for these services (see Table 9). The country also increased allocations for watershed reservations to secure water supply for various uses and to provide natural protection and buffering from extreme weather conditions resulting in natural disasters. Also, more protected areas, conservation zones and critical

habitats, and unique natural landscapes and attractions have been set aside (Molinyawe, 2012).

Table 9. Governance-designated entities with responsibility, accountability, and authority (RAA) for ENR, lands of the public and ancestral domains, and alienated lands.

Allocation of Lands in the Philippines	Governance-Designated Land and Forest Resource Management Units (LFRMUs)	Percent
1. Protected areas and reservations	DENR (Biodiversity Management Bureau and Forest Management Bureau) and other government agencies (DOE, DA/NIA, local water utilities)	26% (or 4+ million ha) of 15 million ha of the total land of the public domains
2. Allocation to civil and military reserves	Recipients of reservations (military, state universities, export processing zones, others)	2% of 15 million ha of land of the public domains
3. Allocations to local government units (LGUs)	Communal forests, communal watersheds and co-managed forestlands with local government units	Minimal
4. Allocations to community forestry and ancestral domains	Communities with community-based forest management agreements (CBFMAs), IPs with certificate of ancestral domain titles (CADTs) and recognition of ancestral domain claims	35% (more than 5.5 million) of 15 million ha of land of the public domains
5. Allocations of forest lands to the private sector	Private sector tenure holders in forestlands (industrial forest management agreements, socialized industrial forest management agreements, other tenure systems)	10% (or 1.5 + million) of 15 million ha of land of the public domains
6. Unallocated lands of the public domains	DENR (as the de-facto agency with RAA)	19% (or more than 3 million ha) of 15 million ha of land of the public domains
7. Unclassified lands of the public domain	DENR (as the de-facto agency with RAA)	8% (or more than one million ha) of 15 million ha of land of the public domains
8. Agricultural lands (which may be alienated)	Holders of private land titles	47% of the total land area of the Philippines (or 14+ million ha)

(Extrapolated from FMB, 2011)

Lands of the public domains have also been allocated as “reservations” for research and academic pursuit, geothermal energy generation, and other needs of ENR-related enterprises and industries. More than 4.3 million hectares have been awarded to various indigenous peoples as their “ancestral domains and claims” to ensure that their culture and indigenous knowledge and practices are conserved (NCIP, 2012 and Annex 3). The purposes for the allocation of the lands of the public domain and for the ancestral lands are not

mutually exclusive. Many protected areas serve as watersheds for major multi-purpose dams that generate energy, irrigate agricultural lands, supply water for domestic and industrial use, and serve as areas for water recreation and fish culture. There are overlaps in the areas covered with ancestral domains and claims with those of protected areas, tenured forest lands, and watershed reservations.

As shown in Table 9, the allocations of lands to protected areas and reservations, civil and military reservations, and to a certain extent, to LGUs are the mechanisms to “supply” the increasing demand for the indirect goods and services from forests and forestlands ecosystems management. A portion of these allocations such as the multiple-use zones of protected areas and watersheds may be devoted to address direct and marketable goods from the forest ecosystems. The allocations for IFMAs and CBFMAs are dominantly intended to increase forest productions and reduce poverty in the uplands. Depending on the location and content of the ancestral domain sustainable development and protection plan (ADSDPP) of the ancestral domain holders e.g. CADTs, designated zones or portions of the ancestral areas may be devoted to address the need for indirect or non-timber forest ecosystems services – habitat and local conservation areas, cultural sites, mini-watersheds, among others. Table 9 also highlights the fact that there are other governance-designated entities and institutions that have the responsibility, accountability, and authority to manage, develop, and conserve certain land allocations that will redound to improved or increased supply of forest ecosystems indirect services.

Demand for Water

Water is one of the most important forest ecosystems goods and services in the Philippines. Forests in watersheds must be managed to play a major role in

water-cycle regulation. The alteration of precipitation and runoff patterns due to erratic weather conditions resulting from climate change demands that the forest ecosystems in upper watersheds are able to:

“reduce storm runoff and erosion, and forests adjacent to water bodies help stabilize river banks, reduce the amount of sediments entering the water and filter pollutantsMaintaining healthy forests and restoring degraded ones in the watershed will help to reduce erosion, to increase slope stability and to ensure the availability of clean and regular water supplies.” (FAO 2013).

Greenpeace (2007) enumerated the various uses of water such as:

- for domestic purposes - water is used for drinking, washing, bathing, cooking, or other household needs, home gardens and watering of lawns or domestic animals;
- for municipal purposes – to address water requirements of the community;
- for irrigation - water is used for agricultural crops production;
- for power generation – water is used for producing electrical or mechanical power;
- for fisheries - water is used for the propagation of culture of fish as a commercial enterprise;
- for livestock raising - water is needed for large herds or flocks of animals raised as a commercial enterprise;
- for industrial purposes - use of water in factories, industrial plants and mines, including the use of water as an ingredient of a finished product; and

- for recreational purposes - water is used for swimming pools, bath houses, boating, water skiing, golf courses, and other similar facilities in resorts and other places of recreation.”

Table 10. Water availability in MCM (World Bank of Manila 2003)

Water Resources Region	Groundwater Potential	Surface Water Potential	Total Water Resources Potential
X Northern Mindanao	2,116	29,000	31,116
XII Southern Mindanao	1,758	18,700	20,458
VI Western Visayas	1,144	14,200	15,344
XI Southeastern Mindanao	2,375	11,300	13,675
IX Western Mindanao	1,082	12,100	13,182
VIII Eastern Visayas	2,557	9,350	11,907
II Cagayan Valley	2,825	8,510	11,335
III Central Luzon	1,721	7,890	9,611
IV Southern Tagalog	1,410	6,370	7,780
I Ilocos	1,248	3,250	4,498
V Bicol	1,085	3,060	4,145
VII Central Visayas	879	2,060	2,939
TOTAL	20,200	125,790	145,990

With more than 70% of the country's total land area that falls in watershed-dominated topographic landscapes and a rainfall that ranges from 1000 to 4000 mm per year, at least 1,000-2,000 mm are collected as runoff and drained into 18 major river basins, more than 421

principal river systems (Annex 4), some 59 natural lakes and numerous small streams (DENR/RBCO 2007, NWRB 2003, Greenpeace 2007). As shown in Table 10, the estimated total available freshwater resource is at least 145,990 MCM/year (or 145 BCM/year) based on 80 percent probability for surface water, and groundwater recharge or extraction at 20,000 MCM/year (WB, 2003; Greenpeace, 2007).

The management of water needs a win-win approach as the country further becomes highly urbanized and industrialized (Rola and Francisco 2004). With the climate change impact on water supply, scarcity would become a major issue especially when it comes to negotiating shares of water for different purposes. The JICA (Water Dialogues, Greenpeace 2007) estimated that with the current population and development trajectory, water use and demand in the country will increase from 30 BCM in 1996 to 86.5 BCM in 2025. This will be

more than 50% of the 145 BCM/year available water supply and will have the potential to meet other water requirements. The breakdown of the total demand (www.waterdialogues.org/documents/PhilippinesCountryContext.pdf) is as follows:

- Domestic use demand - 7.27 % (63% comes from groundwater and are mostly used to service at least 86% of the piped-water supply). Demand will increase from 1.95 BCM/year in 1995 to 7.43 BCM/year by 2025 (or 3.8 times the 1995 level).
- Agricultural demand - 85.27 % mainly for irrigated agriculture (17% from groundwater with big bulk from surface water). Demand will increase from 25.53 BCM/year in 1995 to 72.97 BCM/year by 2025 (or 2.8 times the 1995 level).
- Industrial demand - 7.46% mainly for processing purposes e.g. bottling companies (13% from groundwater). Demand will increase from 2.23 BCM/year in 1995 to 4.99 BCM/year by 2025 (or 4.48 times the 1995 level under a high growth scenario of 8.7%) or 3.31 BCM/year (or 2.4 times the 1995 level under a low growth scenario of 5.9%). Industrial water consumption in cities is expected to rise seven times especially in major cities in the Philippines.

From the forestry sector, the supply and demand of freshwater is going to be partly responded to by properly managing and protecting the current allocations of the lands of the public domains for protection forests, protected areas and watershed reservations. These are intended to “secure” a major portion of the supply of surface and underground water to respond to the various demand and uses of water. Annex 5 lists the declared watersheds in the Philippines that are designated to be managed, developed, and rehabilitated to ensure water supply for domestic, irrigation, and other uses. The declared watersheds have a total estimated area of more than 1.56 million hectares.

Increasingly, these areas that are set aside for watersheds including those in protected areas will have to be managed to meet the increasing demand for forest ecosystems goods and services. Improved forest cover helps regulate water flow downstream, improves water re-charge, and reduce evaporation from exposed soil.

The projected demand will result in several parts of the Philippines experiencing severe water stressed conditions as shown in Figure 11 and annex 2. The urbanized centers in various areas of the country are also heavily water stressed – Metro Cebu, Iloilo, Metro Manila, among others. The NWRB-identified urban areas that are highly water stressed are: Davao, Baguio City, Cagayan de Oro City and Zamboanga City.

The impending water scarcity implies the need to manage the watersheds in most of Central Luzon, National Capital Region, Southern Tagalog, Bicol Region, Palawan, and Central Visayas that need immediate actions – protection, rehabilitation, and alignment of land uses in the uplands and lowlands, and management. The Ilocos region is projected to experience mild water stress and will need immediate mitigation action measures. Overall, however, the rest of the Philippines will need to improve the management of its watersheds and continue measures that will increase their resiliency with the worsening impacts of climate change.

- **Water for Domestic Use**

Using the Philippine standard for access to potable water, the per capita daily use of water is at least 50 liters per capita daily (lcpd), accessible no more than 250m from the user's residence and affordable (The Water Dialogues, undated). At least 80% of the Philippine population has access to potable water supply from different sources – local water districts, communal sources, independent

and NGO providers, self-operated systems, wells, springs, among others. As of 2003, there are more than 500 local water districts in the country. With increasing population and improving local economies, it is expected that direct house connections of water from improved sources will increase in both the urban and rural areas. This means gradual reduction of the current practice of using wells, springs, communal faucets, and others (Greenpeace, 2007, Water Dialogues) for many households especially in gradually urbanizing localities. Increasing pollutants in the aquifer will increasingly discourage the use of ground water as a source of safe water.

Providing safe water and sanitation to urban population is a growing concern in the Philippines especially in water stressed areas such as Metro Manila and nearby towns and cities. An estimated 455 municipalities nationwide have been identified by the National Anti-Poverty Commission (NAPC) as waterless areas (NCSO 2012). Managing the smaller watersheds and sub-watersheds in these areas in collaboration with LGUs, local water districts, and other water service providers are crucial in terms of supply and sustaining domestic water supply. In these localities, there will be an increasing reliance on both underground and surface water to meet the domestic demand.

- **Water for Hydropower Generation**

A key use of water is for hydro-generation of energy from multi-purpose dams such as Magat, Pantabangan, Binga, Ambuklao, San Roque, Muleta-Manupali, and others. The series of Agus hydropower facilities in Lanao del Norte are largely dependent on Lanao Lake as the natural dam. The watersheds of these multi-purpose dams are managed and protected to reduce soil erosion and siltation and control of forest and grassland fire. The resilience of the forests in the upper watersheds can spell difference on the water-cycle regulation especially on smaller watersheds and during extreme weather events. Most

multi-purpose dams are largely dependent on the conditions and management effectiveness of their watersheds.

Although hydro energy only supplied 6% of the total energy need of 39.40 million tons of oil equivalent (MTOE), DOE plans to develop run-of-river hydros that will generate at least 250 MW. DOE has already awarded a total of 34 RE Service Contracts for Hydropower with total estimated capacity of 811.74 MW, broken down into: 18 hydropower service contracts (HSC) in Luzon with aggregate capacity of 724.90 MW; two (2) HSC in Visayas with a total capacity of 13 MW; and, 14 HSC in Mindanao with a total capacity of 73.8 MW (DOE 2012).

- **Water for Irrigation**

The Department of Agriculture (DA 2012) has planned to increase total production of rice from 15.77 million metric tons (M mt) in 2010 to 22.73 M mt by 2016 at an average growth of 6% per year. Harvest area is expected to expand by 2% annually while yield would increase by 4% yearly. The projected increase is going to be mainly from the 3.01 million hectares of irrigated rice lands and 1.35 million hectares of non-irrigated areas. As earlier mentioned, the irrigated rice lands consume about 85% of the total water supply even though only 47 percent of the potentially irrigable area of 3.16 million hectares is irrigated (Dayrit 2001). Using the average water footprint of green, blue, and grey water in the Philippines for paddy rice of 1,163 cubic meter/ton, the total water requirements of the projected increase in rice production from 15.77 million metric tons to 22.73 million metric tons will increase from 18 B cubic meter to at least 26 billion cubic meter (Chapagain and Hoekstra 2010).

Water is key in the overall DA strategy to “accelerate the expansion of irrigation services through frontloading of investment, prioritizing rehabilitation, restoration,

and quick-gestating construction projects (DA 2012). DA noted that from 2000-2010, the overall, 81% of the increase in area harvested was due to expansion of irrigated areas while 19% on non-irrigated ecosystems. However, the cropping intensity in irrigated farms is not much higher than in rainfed lowland farms, 1.56 versus 1.32. This has indirect implication with respect to adequate supply of water from the irrigation systems or lack of farm management support for the rice farmers.

Table 11 shows the regional harvest target area in hectares of rice production in the Philippines. This combines both irrigated and non-irrigated areas. Matching watershed management in support of the target areas for increasing rice production will be a major ENR service to the agricultural sector from the forest ecosystems.

Table 11. The regional harvest area target (ha) of rice production in the Philippines, 2011– 2016.

REGION	2011	2012	2013	2014	2015	2016
CAR	121,062	122,447	125,044	127,665	131,030	135,556
1	385,480	388,440	410,197	442,463	446,415	449,348
2	524,583	533,312	557,348	570,195	577,051	584,923
3	740,696	738,257	747,433	751,281	752,787	755,502
4a	108,005	108,633	113,397	114,353	115,213	116,471
4b	267,053	271,395	279,167	281,883	284,327	286,770
5	303,729	309,957	320,382	328,639	337,282	340,237
6	617,178	642,676	653,132	667,626	706,582	733,493
7	97,720	99,347	101,644	102,951	103,583	104,514
8	264,028	271,052	282,190	286,668	289,827	293,208
9	148,903	152,371	158,850	160,997	162,589	164,839
10	145,227	148,654	156,088	161,252	165,001	172,933
11	95,688	98,234	102,438	106,054	109,455	113,146
12	332,316	350,435	367,524	379,502	380,505	382,029
13	137,192	141,717	151,204	155,332	159,475	164,039
ARMM	198,314	203,591	212,305	215,318	217,692	220,443
PHILIPPINES	4,487,173	4,580,518	4,738,343	4,852,178	4,938,813	5,017,451

Source: DA, 2012

Part of DA's strategy to increase rice production in irrigated areas is rehabilitation of facilities that will hopefully include a serious look at the conditions of the watersheds. It should be noted that NIA/DA and DENR have prioritized watershed characterization of at least 143 watersheds that support the national and communal irrigation systems (CIS) in the Philippines. The list of 143 watersheds is shown in Annex 6. The list of watersheds however, covers only more than 481,000 hectares that are covered by national irrigation systems (NIS). DA, DENR, DAR, NIA, and DILG should put more focus in managing, developing, and rehabilitating the declared watersheds and NIS-related watersheds in support of DA's future plan to increase and stabilize rice supply and other food crops in the Philippines especially in water stressed areas.

Demand for Other Forest Ecosystems-Related Services

As earlier discussed, forest ecosystem-related services provide indirect services. In most cases, these are simply the "by-product" of managing the forests and other natural resources or the natural services that emanate from natural beauty, attractions, or uniqueness. Many of the areas that have been set aside - 135 declared watersheds (Annex 5) and 240 protected areas (Annex 7) - are now becoming major attractions to local and foreign visitors, indirectly providing or serving as "ecological buffer", source of food, and support to many fishing grounds and marine and bird sanctuaries.

Part of the management objectives of the "set asides" and other reservations are to ensure that the indirect forest ecosystems services they provide are going to be sustainable and create higher value of socio-economic importance to ecotourism and fishery industry (municipal open fishery, mariculture, aquaculture). The indirect forest ecosystems contribute to providing stability over watershed-dominated landscapes, help regulate water flow during storms

and rainy periods which eventually reduce soil erosion, landslides and other natural disasters.

The “attractions to local and foreign visitors” create economic opportunities while the indirect services for the mariculture/aquaculture/municipal fishery and the contribution to disaster risk reduction at the local level enable huge operational savings of small and medium entrepreneurs and downstream communities. These perspectives should be strongly considered in the management of the “set asides” – protected areas and watershed reservations – and incorporated in the local investment and development plans of local government units and land and forest resource management units.

- **Forest Ecosystems as Attractions in Nature-Based Tourism**

As one of the world’s 18 mega diverse countries, the Philippines continue to attract local and foreign visitors. The tourism sector which has adopted “*It’s more fun in the Philippines*” as campaign and promotion slogan is indirectly supported by the country’s unique attractions, natural park, reserves, landscapes, seascapes, and warm cultural practices. The 78 sites that are being promoted for local and foreign visitors include most of the 238² protected areas and reservations in the Philippines (Annex 7). Forested areas, mangroves, and highly diverse habitats that may all be located in watershed landscapes offer a mix of ecotourism services – water rafting, canopy walk, zip lines, among others. Given the expected contribution of the tourism sector by at least 7.8 percent of GDP by 2015 from the current 6.7 percent, it is strategic for DENR to include “tourism” as a major consideration in the conservation, management, and regulation of the PAs and reservations (Cahiles-Magkilat 2013). The DOT is currently strategizing to attract at least 5 million visitors in 2013. DENR, the LGUs and other national agencies can also support the community and ancestral

² This information came from discussions with Director Mundita Lim of PAWB, DENR.

domain holders to develop their forest lands and domains with high value crops, fruit trees, and forest plantations that may directly or indirectly respond to the demands from local and foreign visitors. These could be fruits, handicrafts, mementos, spices, and others that could be marketed through the hotel and restaurant associations and other providers.

- **The Forest Ecosystem's Regulatory and Protection Functions**

The Philippines' geographic location makes it highly vulnerable to a variety of natural disasters. Every year, the country suffers from high frequency of typhoons (an average of 20 per year), storms, high levels of rainfalls, droughts and other natural hazards (WB 2009). More than 50% of the country's total area have slopes of more than 18 degrees or greater. At least 90% of the country's land area is located in watersheds that have forest cover of less than 50% (Walpole 2005, Bautista 2000). These biophysical characteristics expose at least 60% of the country to multiple hazards resulting to 74% of the total population highly vulnerable. Communities and their livelihoods in coastal areas where 60% of total country's population resides and those in the uplands are the most economically affected and further marginalized from natural disasters (WB 2005, DENR and DA/BFAR 2010).

From 1990-2008, the average annual damage caused by disasters amounted to Pesos 19.7 billion, which is equivalent to an average of 0.5 percent of the Philippines GDP. This percentage is even larger compared to the overall contribution of the forestry sector to the national economy. The average annual damage to agriculture was estimated to be at Php12 billion per annum. During this period, at least 35 million were affected by typhoons, storms, and floods with an average annual death of 1,008 people (WB 2009, NEDA/PDP 2011, ADMU 2011).

In a watershed-dominated landscape, illegal logging, rampant logging, deforestation, and degradation of forest lands have always been blamed as the major contributors to the increasing damages from flashfloods, floods, and landslides in the uplands, lowlands, and coastal areas. In reality, however, damages to lives, property, ecosystems, infrastructure, livelihoods, and crops in a watershed-dominated landscape are much more complex. Natural forests in sub-watersheds and catchments can minimize and regulate downstream water. With large scale flooding, extreme rainfalls which soak and liquefy the soil and sloping lands, the role of forests in regulating water flow in downstream areas is almost minimal (CIFOR and FAO 2005). The existing land uses and zoning regimes, the intensity of rainfall, soil types, forest cover, and inadequate understanding and preparation for the occurrence of extreme natural disasters were deemed to be the major factors (Walpole 2005). This was confirmed during the Aurora-Quezon in 2004 that resulted to more than 2000 deaths. Analyses showed, however, that in areas that have existing natural forests, the occurrence of landslides was less. In Ormoc City in 1991, land uses, inappropriate zoning in resettlement and urbanized areas, prolonged and intense rainfall, and lack of early warning system were the major factors for the major landslides and flashfloods that resulted to at least 8,000 people dead (Walpole, 2010).

Increasingly, the management of the watersheds, sub-watersheds, protected areas, habitats, and other forest-related ecosystems to increase their regulatory and protection capacities is crucial in the Philippines because of the country's high vulnerability to the impacts of climate change and extreme weather conditions. The "end-users" or "clients" of this system of forest management are the LGUs, upstream, downstream and coastal communities, industries, and the residents themselves.

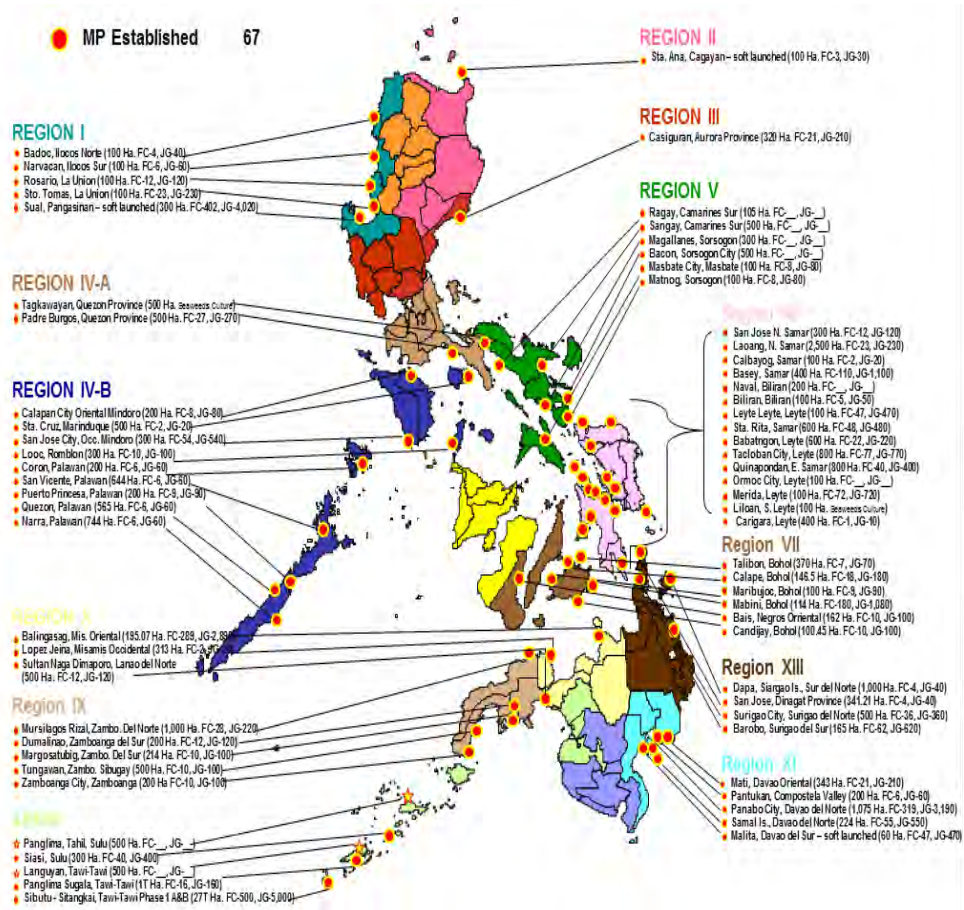
- **Forest Ecosystems as Support to Other Ecosystems**

The productivities of municipal and coastal fisheries, mariculture, and aquaculture are partly dependent on the continuous nutrient cycling, interactions, and exchange of the different ecosystems between the uplands, lowlands, and coastal areas. Forest ecosystems play significant role in nutrient cycling, linking the food chains, providing habitat at certain stages of the reproductive cycles of species, buffering, water flow regulation, coping up with increasing siltation, pollutants, and deposits of toxic materials. The country's coastline of at least 17, 460 km and 26.6 million ha of oceanic water is a haven to about one million fishers. Inland resources of at least 338,000 ha of swamplands, 253,000 ha of freshwater and brackish water fishponds, and another 250 ha of lakes, rivers and reservoirs are evidences of the vastness of this country's fishery resource (BAR/DA, 2012).

It should be emphasized that the productivity of most of these fishery resources are directly and indirectly connected with the effectiveness of forest ecosystems management in the upper and middle parts of the watersheds, riverbanks, shorelines and coastal areas, including the marsh and mangrove areas. Forests in wetlands, marsh, freshwater lakes, riverbanks, coastal and near shore areas are key in stabilizing and maintaining the health and resiliency of municipal open fisheries, aquaculture, and mariculture. For instance, some studies have demonstrated that a hectare of managed mangroves in Central Visayas provides US\$500 to US\$1,550 per year from fisheries and wood production (FISH, 2007). In Ligawasan and Agusan marsh, the woody-shrub forests are critical habitats of certain fish species. Mangroves, wetland forests, and forests in the river banks, middle and upper watersheds contribute to the overall health and resiliency of the fishing grounds and marine, fish, and bird sanctuaries in the wetlands, marsh, and near shore areas.

A view of the 67 mariculture parks and major fishing grounds (Figures 14 and 15) shows that most of them greatly benefit from the energy and nutrient flows in a ridge to reef dominant landscapes of the Philippines. The West Palawan waters, Sulu Sea, Visayan Sea, and Moro Gulf are the major commercial fishing grounds in the Philippines. At least 60% of the total commercial fishing catch comes from these areas with the rest from the Bohol Sea which is the major source of fish catch from municipal fisheries (BAR/DA, 2000). The immediate major beneficiaries of improved forest ecosystems management in key river basins, watersheds, protected areas, and mangroves are the operators in municipal fishery areas.

Figure 14. Location of existing mariculture parks, as of 2013



Source: BFAR, 2013

Figure 15. Major fishing grounds in the Philippines



Source: BFAR, 2013

3.3 Governance Scenario

3.3.1 Current Governance of the Forestry Sector

Philippine forestlands are governed under a policy regime that includes the 1987 Constitution, PD 705 and EO 192. In addition, the Local Government Code of the Philippines of 1991, the NIPAS Act, the Mining Law and the IPRA Law also

contain provisions that have direct impacts on forest land management. Several Executive Orders (EOs) were also issued in relation to forest governance.

Box 1. The Constitutional, Legal and Policy Framework for Forest Governance

The 1987 Constitution

Article II, Section 16 of the 1987 Constitution states that:

“The state shall protect and advance the right of the people to a balanced and healthful ecology in accordance with the rhythm and harmony of nature.”

Article XII, Section 2 further states that:

“All lands of the public domain, water, minerals, coals, petroleum and other mineral oils, all forms of potential energy, fisheries, forests and other natural resources are owned by the State. The exploration, development and utilization of natural resources shall be under the full control and supervision of the state.”

Section 4 of the same article also states that:

“The Congress shall, as soon as possible, determine by law, the specific limits of forest lands and national parks, marking clearly their boundaries on the ground.

“Thereafter, such forest lands and national parks shall be conserved and may not be increased nor diminished; except by law, the congress shall provide, for such period as it may determine measures to prohibit logging in endangered forests and watershed areas.”

PD 705

While the 1987 Constitution provided the fundamental legal framework for forest and natural resources management, it is PD 705, earlier issued in 1975, that provides the basic and enabling legal framework. PD 705 provides for a system of land classification, even as it spells out a basis for utilization and management, including reforestation and protection, as well as a system of penalties for illegal logging and other acts leading towards forest degradation. However, even as PD 705 remains as the basic law, it is increasingly becoming apparent that it is now insufficient to handle the changing realities. It is very much utilization oriented, even as the contribution of the forestry industry to the economy has waned.

EO 192

In the same year that the 1987 Constitution entered into force, the environment and natural Resources bureaucracy was reorganized by virtue of EO 192 which created the Forest Management Bureau (FMB) as a staff bureau whose main function is to recommend policies pertaining to the protection, development, occupation, management and conservation of forestlands and watersheds. In addition, the formulation and recommendation of policies, guidelines, rules and regulations for the establishment and management of an integrated

protected area systems (IPAS) such as national parks, wildlife sanctuaries, marine parks, wildlife sanctuaries, marine parks and biospheric reserves was taken out of the forestry bureaucracy and formed as the main function of the Protected Areas and Wildlife Bureau (PAWB).

Local Government Code, the NIPAS Law and the IPRA Law

Since 1987, several laws and policies were passed that have had implications on forest management. These included RA 7160 or the Local Government Code of 1991 which devolved some forest management functions to the Local Government units, and RA 7586 or the National Integrated Protected Areas System (NIPAS) Law, enacted in 1992, which supported the government's mandate to delineate and sustainably manage all protected areas in the country, which was part of the thrust to delimit the final forest line by delineating the protection from the production forests.

In 1997, the Indigenous People's Rights Act (IPRA) was enacted. This act recognized the rights of indigenous and cultural communities to their ancestral domains to ensure their social, economic and cultural development.

EO 263 and EO 318

In 1995, the government issued EO 263 integrating all the people-oriented forestry programs and established Community-Based Forest Management (CBFM) as the national strategy to ensure the sustainable development and management of the country's forestlands and resources to achieve social justice. Key to this strategy is the promotion of active and productive partnership between the government and forest communities in developing, rehabilitating and managing forestlands. This is achieved by giving importance to the principles of social equity, sustainability and community participation in forest management and biodiversity conservation.

In 2004, Sustainable Forest Management (SFM) was promoted through the issuance of EO 318. The order established the following as the key principles for sustainable forest management: delineation, classification and demarcation of state forestlands; holistic, sustainable and integrated development of forest resources; community-based forest conservation and development; incentives for enhancing private investments in forestry; proper valuation of forestry resources and financing SFM; and institutional support for SFM.

Forestlands are governed both in the context of political-administrative units as well as landscape ecosystems. There are about 18 river basins in the country, and hundreds of watersheds and sub-watersheds, 142 of which have been identified as priority watersheds. Under the 1987 Constitution, lands are classified as agricultural, forest, protected areas and mineral lands. This creates the impression that only those legally classified as forest lands are to be covered by any national sustainable forest management plan. This perception was further

institutionalized with the separation of the protection function of forests that are classified as protected areas from the forestry bureaucracy and lodging the management and supervision of these in a separate bureau (PAWB), through the multi-stakeholder Protected Areas Management Boards (PAMBs).

The passage of the IPRA also added a new governance dynamics when forest lands within Ancestral Domain areas were placed under the manageable control of holders of CADT. LGUs now perform administrative functions relative to devolved functions in managing forest lands within their jurisdictions, as prescribed in the Local Government Code. Thus, while forest management within the DENR cascades from the Central Office through the FMB, as a staff bureau, to the regional, provincial and community levels, in their respective forest management division, sections and units, the dynamics of forest land management and governance goes beyond the manageable interest of FMB and the forest management-related subdivisions.

However, there is now recognition that sustainable forest management needs to be applied even in agricultural lands in the form of private forestry, plantations and urban forestry; within protected areas, particularly in multiple-use zones; in ancestral domain areas, and in mineral lands particularly in the context of rehabilitation and protection. Despite this complex and multi-stakeholder administrative landscape, the Philippine forests are still governed under the principle specified in the 1987 Constitution. While it states that all natural resources are state-owned, it also recognizes the need for partnerships and cooperation among all stakeholders. This is highlighted when the state adopted sustainability, equity and social justice and partnerships as the guiding principles in forest management:

- *Sustainability*. Forestlands and resources shall be managed on sustainable basis in order to meet the needs of the present and the future generations for forest products and other vital ecological services;
- *Equity and social justice*. Access to and use of forest resources for production, livelihood, or other services are to be equitably granted by the State, consistent with the principles of social equity and environmental justice;
- *Partnerships*. The management of forestlands and resources shall be a shared responsibility among all stakeholders consistent with the rule of law and international commitments, and the principles of transparency, accountability and public participation

These principles were, in the past, captured in the elevation of CBFM and SFM as core strategies. The spirit and intent of these strategies remain in place even in the two major policy thrusts which the DENR adopted since 2011 in relation to forest management. These are as follows:

- EO 23 – Moratorium on the cutting and harvesting in natural forests nationwide and creating the Anti-Illegal Logging Task Force (Issued 1 February 2011)
- EO 26 – National Greening Program (NGP) for sustainable development for poverty reduction, food security, biodiversity conservation, climate change mitigation and adaptation (Launched in 13 May 2011)

Pursuant to EO 23, the DENR forged a partnership agreement, through the signing of a MOA, with the Armed Forces of the Philippines (AFP) and the Philippine National Police (PNP) on Anti-Illegal Logging Campaign in Mindanao.

As of the end of 2012, this led to the confiscation of 21.798 million board feet of forest wood products. Confiscated and seized illegally-harvested forest products were donated to the Department of Education (DepEd). As of the end of 2012, this has been used to build 117,459 chairs, 9,907 desks, 7,021 other school furniture and 295 cases of school building repairs. The campaign resulted to the filing of 921 cases of violation, which led to the conviction of 109 persons and the dismissal from the service of 202 persons. This also led to the reduction of the number of provinces that are considered as illegal logging hotspots from 51 to 12. This translated into the reduction of the number of hotspots municipalities from 197 to 31.

The National Greening Program, for its part, is envisioned not just as a tree planting program, but as an integrated approach to ecosystems management and governance. Its main goal is to plant some 1.5 billion trees covering about 1.5 million hectares from 2011 to 2016. The program rested on the framework of convergence between DENR and the Department of Agriculture (DA) and the Department of Agrarian Reform (DAR). Selection of species to be planted is based on site. For the production zones, the species was identified based on site and marketability considerations, while for protection zones, indigenous/native/endemic species were prescribed.

Pursuant to its integrated and holistic approach, the NGP adopted the following implementing strategies:

- Social mobilization
- Harmonization of initiatives
- Provision of incentives to people's organizations
- Maximization of available science and technology, such as the use of clonal nurseries, bio-fertilizers and pesticides, and GIS mapping and geo-tagging

The budget allocation for the NGP was Php 1.33 billion in 2011 and Php 2.68 billion in 2012. This rose by more than 100 % in 2013, where a total of Php 5.80 billion is allocated to the program. FMB reports that in 2011, 89.6 million seedlings were planted in 128,558 hectares. It was reported that this generated 364,088 jobs, which included 267,088 from seedling production and 97,000 from plantation establishment. On the other hand, in 2012, 125.6 million seedlings were planted in 221,763 hectares, generating 384,000 jobs for PO partners engaged in seedling production and/or plantation establishment. It also led to the hiring of 625 extension workers.

In addition to local policies, the Philippines is a signatory to many International and Regional agreements which have implications on forest governance. In being a signatory to global agreements, we are making a commitment to reflect such agreements to our own policies. The following table presents these agreements.

Table 12. Global agreements in which the Philippines is signatory

Global Agreement	Year Entered into Force	Objective
Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES)	1975	To protect certain endangered species from overexploitation by means of a system of import/export permits
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar)	1975	To stem the progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value

Global Agreement	Year Entered into Force	Objective
International Tropical Timber Agreement	1983	To provide an effective framework for cooperation between tropical timber producers and consumers and to encourage the development of national policies aimed at sustainable utilization and conservation of tropical forests and their genetic resources
Convention on Biological Diversity (CBD)	1993	To develop national strategies for the conservation and sustainable use of biological diversity
International Tropical Timber Agreement	1994	To ensure that by the year 2000 exports of tropical timber originate from sustainably managed sources; to establish a fund to assist tropical timber producers in obtaining the resources necessary to reach this objective
United Nations Framework Convention on Climate Change	1994	To achieve stabilization of greenhouse gas concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system
Kyoto Protocol to the United Nations Framework Convention on Climate Change	1998	To further reduce greenhouse gas emissions by enhancing the national programs of developed countries aimed at this goal and by establishing percentage reduction targets for the developed countries

Furthermore, as an active member of the Association of Southeast Asian Nations (ASEAN), the Philippines is also signatory to all the ASEAN Agreements, Declarations, Accords and Resolutions on the Environment, which are as follows:

- Jakarta Declaration on Environment and Development (1997)
- Bandar Seri Begawan Resolution on Environment and Development (1994)
- Singapore Resolution on Environment and Development (1992)

- The Kuala Lumpur Accord on Environment and Development (1990)
- Jakarta Resolution on Sustainable Development (1990)
- Agreement on the Conservation of Nature and Natural Resources (1985)
- Bangkok Declaration on the ASEAN Environment (1984)
- ASEAN Declaration on Heritage Parks and Reserves (1984)
- Manila Declaration on the ASEAN Environment (1981)

3.3.2 Projected Scenario in the Governance of the Forestry Sector

Current trends not only within the Philippines but globally, point to a scenario that sees shifts in politics that would have significant implications in policies and institutional processes in the governance of the forestry sector. Already seen and expected to remain is the increasing number and level of complexity of players and processes that would be involved. Furthermore, this would involve a more-vigilant and politically active set of stakeholders, even more empowered by developments in social media, and emboldened by the unravelling of corruption in governance institutions and processes. Finally, governance at the national level will be matched by an increasing power and role of local government units.

These shifts in the external political landscape is currently matched by the prevalence of weak institutional capacity and governance mechanisms within the forestry bureaucracy that tend to affect its ability to navigate these changing political landscape that has become more complex since they now involve an increasing number of players and stakeholders. This is compounded by the fact that forestry is now getting less attention from political leaders, compared to biodiversity and climate change. The clout of forestry is further weakened by the perceived decline of its role to national productivity and development. This may have resulted from the undervaluation of the

contribution of forestry to national income and productivity, and the associated under-estimation of its role in the overall development, due to the inherent difficulty in measuring these.

In 2010, the FAO conducted a Global Forest Assessment which resulted to the identification of the following four global objectives for Forest Management:

- Global Objective 1: Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation
- Global Objective 2: Enhance forest-based economic, social and environmental benefits, including by improving the livelihood of forest-dependent people
- Global Objective 3: Increase significantly area of protected forests worldwide and other areas of sustainably managed forests as well as the proportion of forest products from sustainably managed forests
- Global Objective 4: Reverse the decline in official development assistance for sustainable forest management and mobilize significantly increased, new and additional financial resources from all sources for the implementation of sustainable forest management

As the forestry sector attempts to attain these global objectives, it is likewise facing serious and difficult challenges. It is banking on the NGP as its flagship policy intervention, and hence is concerned in how to sustain it and make it achieve its holistic and integrated goals. Technological innovation offers both an opportunity and a challenge, particularly on how the sector can improve forest protection on the ground through the use of advanced technology (GIS, remote sensing, aerial photogrammetry).

Beyond technical capacity, however, the sector is also faced with the challenge of how to improve the capacity of forest management in the field at the PENRO and CENRO levels not only in technical skills for forest management, protection and law enforcement, but in socio-political analysis and marketing to enhance their capacity to partner with stakeholders from other government agencies, local government units, the private sector, civil society and the various communities. Associated with this is the ability to move away from the regulatory framework of forest governance of the past, and move into a more development-oriented paradigm that would encourage and enable investment in large scale plantations, backyard plantations and agroforestry. This would need a balancing of the protection and utilization functions that would further be challenged with the entry of new legal frameworks such as REDD+ and forest certification. Also expected to become crucial are the simultaneous consideration of forests as sites for biodiversity conservation, as source of sustainable energy, and as places to achieve food and economic security not only of forest-based occupants beyond their subsistence needs and transform them to surplus producers, but also for the larger society.

The onset of the rationalization plan of the bureaucracy is also expected to have impacts on the capacity of the forestry sector to manage forestlands. While this can be seen as a challenge, it can also provide opportunities and openings to innovate and create new processes and functions that can be more consistent with the skills that will now be required. Specifically, the abolition of the position of a Forester and converting this into a Community Development Officer may in fact be a positive scenario, as it provides an opening to really go beyond the technical confines of traditional forestry to now accommodate a broadening and deepening of the functions which naturally would no longer be just concerned with forest management, but with a holistic

development process of forest lands, the ecosystems they contain, and the political economies they support.

3.3.3. Governance Scenario for the Philippine Master Plan for Climate Resilient Forestry Development (PMPCRFD)

In 2009, RA 9729 or the National Climate Change Act was passed. It aims to systematically integrate the concept of climate change in the policy formulation and development plans of all government units. The Climate Change Commission was created tasked to formulate the Framework Strategy on Climate Change, and the National Climate Change Action Plan. The DENR was tasked to oversee the establishment and maintenance of a climate change information management system and network, which included information on climate change risks, activities and investments, in collaboration with other government agencies, institutions and the Local Government Units (LGUs)

In 2012, DENR, NEDA, and the UNDP contracted the services of consultants to update the ENR Sectoral Framework Plan. One of the key goals was to integrate critical national issues in the framework, one of which is climate change.

The updated plan enumerates the following general adaptation strategies which was applicable to all of the seven sectors of DENR, including the forestry sector.

- Build capacities of implementing organizations/agencies on climate change impact assessment, planning, implementing and monitoring strategies and programs for adaptation.

- Mainstream climate change adaptation strategies in sectoral development policies, plans, programs and projects.
- Develop understanding on climate change impacts on ENR sectors (forest, water, biodiversity, coastal and marine lands, minerals, geohazards and environment) through IEC.
- Document and package best practices both local and foreign on climate change adaptation for replication by the different sectoral agencies and partner organizations.
- Localize and mainstream the efforts to address climate change through the involvement of LGUs and local organizations.
- Develop data base and networking system to share information on climate change adaptation measures and conservation strategies.
- Develop local scenarios and conduct training on decision-support tools for climate change adaptation.
- Develop and disseminate to concerned organizations the tools and models for vulnerability assessment, climate change impact prediction and adaptation measures determination.
- Establish and operationalize an M&E system for climate change at the sectoral level.
- Enforce intensively environmental laws and regulations that are supportive to climate change mitigation and adaptation.
- Develop and adopt creative financial instruments and financing mechanisms to promote the adoption of climate change adaptation measures and clean technologies.
- Incorporate climate change vulnerability maps produced by PAGASA in mapping Environmental Critical Areas.
- Conduct assessment/identification of vulnerable/risk areas at the local level including threatened biological components such as endemic flora

and fauna species, forest and protected areas, mangrove, marine and other coastal resources.

- Produce integrated base maps (1:50,000) for all sectors to facilitate vulnerability, risk and disaster management planning and mapping.
- Prepare maps showing areas presently affected and also those highly vulnerable to climate change and its attendant effects such as flooding, landslides, storm surges, sea level rise, and drought.

The updated plan listed the following strategies which are applicable to the forest management sector, and which should be incorporated into the forest sectoral plan to make it responsive to the challenges brought about by climate change:

- Mainstream CCA/DRR in forestry management through the conduct of CC/DR vulnerability assessment for forestry management units as SOP in policy making and program development.
- Use resilient native species and of forest in the reforestation of critical watersheds, protected areas and agroforestry in cooperation with the ERDB and other sectors.
- Promote the planting of fast-growing, indigenous and endemic species in production forest areas.
- Adoption of multiple cropping system and integrated pest management (IPM) in agroforestry areas.
- Adopt soil conservation, erosion control and sediment control measures in steep and unstable slopes.
- Vegetative and mechanical measures to control erosion and stabilize denuded slopes fronting settlements and infrastructures such as roads.
- Adopt REDD+ program and implement the “no-logging” policy in all protected areas and critical watersheds

- Install fire lines and firebreaks to prevent the spread of brushfires. Areas affected by prolonged drought should establish green breaks using fire-tolerant species.
- Chart climate change patterns in localities and develop planting calendars for dissemination to CBFM holders and DENR field personnel involved in supervising reforestation projects to ensure better survival of seedlings.
- Incorporation of PES in the management of public lands.
- Conduct research studies on the impacts of climate change on forest species, phenology, behavioural adaptation and overall survival.

Cognizant of the fact that DRRM and climate change are closely linked, the updated ENR plan identified its present strategies that are relevant to the forestry sector that should be sustained and improved to support both. These are as follows:

- Establishment of industrial forest plantations through the IFMA program and other forest plantations within private lands.
- Reforestation of denuded watersheds and protection of forest resources from any form of destruction such as forest fires and illegal logging.
- Issuance of tenure instruments to upland farmers for the adoption of CBFM/PACBRMA approach in the rehabilitation of degraded forest lands through forest plantation and agro-forestry.
- Vegetative and mechanical measures to control erosion and stabilize denuded slopes fronting settlements and infrastructures such as roads.
- Establishment of strict protection zones and monitoring and protection of biodiversity centers (e.g., Biodiversity corridors and key biodiversity areas) in forest lands. The establishment of buffer zones protects the biodiversity centers from direct encroachment by informal settlers.

These policy recommendations remain valid and have to be pursued. It is recommended that these should be integrated not only in the Forestry Master Plan, but also in the revised version of the long overdue Forestry Code that will be resubmitted to Congress for its consideration.

From among the goals enumerated in The 2003 Forestry Master Plan, four (4) goals are aimed at strengthening policies and institutions. These are as follows:

- Goal 2: Forestry and related policies harmonized within 5 years
- Goal 5: Productive collaboration among DENR, LGUs and other watershed stakeholders in responsible forest management within 5 years
- Goal 7: Philippine forest administration fully capable and responsive within 10 years
- Goal 11: All forestlands under sustainable management by capable managers, all open areas closed within 12 years

There is no doubt that the attainment of these goals would enhance the capacity of the sector to consider and implement updated strategies and mechanisms that would integrate climate change considerations in the policies, programs and operations of the sector.

However, it has been observed that there are impediments in the attainment of these goals, such as:

- Absence of a central data base management system and of mechanisms for internal quality assurance and compliance regarding its own policies within the sector;
- Problems on data availability, completeness and reliability particularly on socio-economic data of upland communities;

- Weak advocacy/lobbying emanating from different views within the DENR;
- Weak mechanisms for external linkages with LGUs and other stakeholders; and
- Ineffective information, education and communication (IEC) campaigns

Problems of data availability, and of weak linkages within and externally with other agencies and players, can be rooted to institutional inertia and incapacity which may stem not only from weak human agents, but also from flawed institutional design. It is in this context that there is a need to adopt innovative measures to address these impediments. This can be done simultaneous to considering how to integrate into the system the issues of climate change and DRRM.

The Philippine Master Plan for Climate Resilient Forestry Development

4

4.1 The Forestry Sector: Vision, Goals and Objectives

The Philippine master plan for climate resilient forestry development (PMPCRFD) retains the 2003 forestry sector vision with some modifications as follows:

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

The forestry sector goals to pursue this vision are the following:

- To place all forestlands under sustainable forest management in order to meet demands for forest goods and ecosystems services and promote climate resilience;
- To sustainably manage watersheds in partnership with stakeholders;
- To strengthen resilience of forest dependent communities to climate change hazards;
- To place all forestlands under appropriate management arrangements;
- To enhance decision making through improved systems on information management and monitoring and evaluation.

The strategic objectives identified to attain the forestry sector's goals are as follows:

- 143 priority watersheds with approved Integrated management plans, with functional management bodies in place & with investments in at least one priority watershed per region within 5 years;
- Other watersheds supporting irrigation facilities identified and assessed in coordination with concerned agencies;
- Sustainable forest management act (SFMA) and bills defining forestland boundaries passed within six years;
- Forest based industries with sustainable source of raw materials by 2028;
- Methodologies for assessing SFM of FMUs using criteria and indicators finalized by 2016 and implemented in 2017;
- At least 111,000 hectares of grazing lands sustainably managed by 2028;
- Boundaries of forestlands demarcated within 5 years after legislation;
- Production and protection forests delineated in 5 years;
- 1,439,298 hectares of commercial forest plantations established, maintained and renewed within 13 years;
- 297,234 hectares of bio energy/ fuelwood plantations developed and maintained to support the national renewable energy program
- 6.8 million hectares of existing forests protected, conserved and sustainably managed in 10 years;
- Existing established plantations protected and maintained;
- 75% of all open access forestlands placed under appropriate management arrangements by 2028;
- Average annual income of upland communities increased by 50% by 2025;
- REDD+ operational guidelines established in three years and REDD+/ forest carbon payment schemes implemented in at least 20 provinces by 2028;
- National, regional and provincial multi-sectoral forest management governance structures organized within five years; and

- Guidelines for implementing payment for ecosystem services established within five years.

4.2 **Forestry Sector Programs and Strategies**

The 2003 RMPFD used the integrated wood balance model, among other approaches to help understand the future outlook of the forestry sector. Many of the proposed technical strategies in the 2003 RMPFD are still applicable – prioritization of watershed combined with integrated land use planning, database development, sustainable management of residual forests, increasing forest cover through plantation development and assisted natural regeneration, biodiversity conservation, rationalization of forest-based industries, and community-based strategy. In updating and climate proofing the 2003 RMPFD, however, the lens that have been used are the following:

- The increasing values of forest ecosystems in providing indirect goods and services in support of other sectors vis-a-vis their direct values of timber, minor forest products, and others;
- Changes in governance framework and policies that impinge on sustainable forest ecosystem management (SFEM);
- The increasing concern on the contribution of the forestry sector to the national economy, despite the huge areas that are under lands of the public domains and ancestral lands; and
- The need for improving resilience of the forest ecosystems, communities, livelihoods and enterprises in response to climate change impacts and the predicted occurrence of erratic and extreme weather patterns.

Accordingly, in formulating the programs and strategies for a climate resilient forestry development, the primary consideration is to strengthen health and resiliency of forest ecosystems and communities with proper mitigation and

adaptation measures so that these resources can sustainably provide and meet the increasing demands for forest ecosystems goods and services for the current and future generations. Due to the issuance of Executive Order 23 timber harvesting will no longer be allowed in natural forests, unless covered by the exemptions indicated in said Executive Order. This means that the country's wood requirements will be mainly sourced from forest plantations to be developed by private investors in partnership with local communities and with support from the government. Climate responsive governance is also necessary where various stakeholders collaborate and participate in making decisions in the management of forest resources and ecosystems. A major focus in promoting responsive governance is the allocation of forestlands to responsible on-site Managers. Thus, untenured forestlands will be placed under appropriate management agreements with local communities, indigenous peoples, LGUs, private investors and other stakeholders. Other support strategies will be equally important to address the increasing demand for various goods and services from expanding clients.

4.2.1 Program to Strengthen Resilience of Forest Ecosystems and Communities to Climate Change

Forest ecosystems provide a range of ecological as well as social and economic benefits ranging from forest products, forest ecosystems good and services, and as source of livelihoods for local communities. However, forests are threatened by various anthropogenic activities - including accelerated population growth, unregulated land use change, landscape fragmentation, degradation of habitats and over exploitation of forest products. These threats are further aggravated by climate change. This has significant implications to climate systems as forests degradation also contribute to substantial carbon emissions into the atmosphere. Thus, forests are considered to have an

important role in addressing climate change challenges at the global, regional, and local levels. However, in the past, forests are considered only in the framework of climate change mitigation considering their CO₂ emissions that contribute to global warming. In recent years, it has been recognized that forests have significant role in climate adaptation. While they are vulnerable to climate change, their biodiversity composition and ecosystems services also contribute to reducing vulnerability of communities/stakeholders across sectors and scales. Ecosystem-based adaptation approaches can therefore complement other adaptation measures and other related infrastructure investments to address climate change impacts. Hence, effective climate change mitigation and adaptation strategies will have to be integrated in the Philippine Master Plan for Climate Resilient Forestry Development (PMPCRFD) to meet the multiple objectives of preventing forest degradation, reducing disaster risks, maximizing productivity, and reducing vulnerability to climate hazards.

Objectives

The specific Objectives of this program are as follows:

- To align/ harmonize resource uses within watersheds and forest ecosystems;
- To identify areas within priority watersheds, protected areas and other forest ecosystems which are vulnerable to climate change;
- To mitigate and reduce adverse impacts of climate change and enhance resilience of forest ecosystems and communities to climate change hazards;
- To promote collaboration among stakeholders in climate change mitigation, adaptation and disaster risk reduction management; and
- To implement REDD+ in at least 19 provinces

Strategies

To achieve the objectives of this program, DENR CENRO, PENRO and Regional field offices will initially identify areas vulnerable to climate change hazards by

conducting vulnerability assessments in collaboration with LGUs and stakeholders. These assessments will be undertaken for priority watersheds/protected areas and other forestlands to determine vulnerability of the forestry sector components to different climate hazards vis-à-vis the exposure, and sensitivity as well as the adaptive capacity of ecosystems and communities.

While in general, forests and communities are vulnerable to climate change, vulnerability is location-specific. Thus, participation of LGUs and local communities/ stakeholders in the vulnerability assessment process is crucial in promoting understanding by concerned LGUs and stakeholders on the importance of forestry in terms of reducing disaster risks, sustaining forest ecosystem services and in securing livelihood of local communities and forest based enterprises.

Results of the vulnerability assessment will be used in planning appropriate adaptation strategies/ measures at the ecosystems, LGU/ institutional and forest management units (FMUs) such as tenure holders, ancestral domain holders, protected areas, and watershed reservations level to reduce adverse impacts and take advantage of opportunities due to climate change. Similar to vulnerability assessment, local stakeholders will participate in identifying location-specific responses to reduce vulnerability, and to enhance adaptive capacity of forest ecosystems and communities. Local government units are required under the Climate Change Act of 2009 and the Philippine DRRM Act of 2010 to prepare local climate change action plans and local disaster risk reduction and management plans. Results of the ecosystem vulnerability assessment and the agreed adaptation measures can be integrated into these plans to develop a more holistic and comprehensive climate change and disaster risk response strategies among LGUs. This mainstreaming process would institutionalize forestry adaptation strategies within LGU plans, programs and

budgets and eventually lead to more effective implementation as local stakeholders get involved in implementing the identified adaptation measures. DENR field offices at the CENRO and PENRO level can facilitate mainstreaming of forestry adaptation strategies into LGU plans by disseminating results of the vulnerability assessment and organizing climate change adaptation planning among members of the local disaster risk reduction and management council (LDRRMC).

Results of the vulnerability assessment and identified adaptation strategies/measures will be part of the inputs in developing integrated watershed management (IWM) plans for watersheds which will be adopted as one of the primary strategies of the PMPCRFD. This approach provides an opportunity for aligning resource uses across landscapes to prevent inappropriate uses in one ecosystem (such as the upland forests) that could adversely affect other ecosystems such as the agricultural, mangrove and coastal ecosystems. Eventually, this will lead to overall increase in productivity and mitigation of disaster risks associated with climate change such as flooding, landslide, drought and sea level rise. The integrated watershed resource management (IWRM) processes also provides an opportunity for aligning/integrating forest land use plans (FLUP) with the LGUs' comprehensive land use plans (CLUP) and barangay development plans (BDP), as well as with the indigenous peoples' (IP) ancestral domain sustainable development and protection plan (ADSDPP) and other related plans within a watershed.

The process of developing IWRM plans does not only address the need for aligning resource uses to reduce disaster risks and degradation of forest ecosystems. It allows various stakeholders to work together and map out strategies to address multiple demands for forest ecosystem goods and services

which will further strengthen forest ecosystems' and communities' resilience to climate change impacts.

Aside from the ecosystem, LGU and FMU climate adaptation strategies previously discussed, a national forestry sector approach to building resilience to climate change hazards will be adopted by participating in the international initiatives for Reducing Emissions from Deforestation and Degradation Plus (REDD+). As a signatory to the UNFCCC agreement, the Philippines' participation in REDD+ is a step forward with the added benefit of sustainable management of existing forests, conservation and enhancement of degraded forests to improve carbon stocks and biodiversity, and forest expansion through reforestation. Overall, these will ensure sustainable supply of ecosystems goods and services which in turn will contribute to building resilience of ecosystems and communities to climate change hazards.

Program Components and Targets

- **Ecosystem Based Vulnerability Assessment**

Vulnerability assessments will be undertaken in priority watersheds, protected areas and other critical ecosystems to identify areas within these ecosystems and in other interrelated ecosystems, including communities which are vulnerable to climate change hazards. The ERDB has completed vulnerability assessments in 82 of the 143 priority watersheds and so 61 additional watersheds will be targeted for vulnerability study up to 2016. Additional 97 new watersheds supporting NIA's irrigation systems will also be identified for vulnerability assessment including about 87 protected areas which will need to undergo vulnerability assessment to identify vulnerable species, habitats and ecosystems. These assessments should be able to identify specific areas which are vulnerable to specific hazards, such as landslide, severe erosion, forest fire, flooding,

temperature change, rainfall intensity, storm surge, sea level rise, and other extreme climate variations. In addition, the study should identify the impacts of these hazards to specific communities and ecosystems. This may include damage to crops and properties, water stress, loss of lives, and habitat destruction among others.

A number of vulnerability assessment studies have used different analytical frameworks and tools. Initially, DENR can use the ERDB methodology or the proposed procedural guidelines for mainstreaming climate change adaptation and disaster risk reduction prepared by Cabrido and Lorenzo (2012) as part of the final report under the ENR CORE and Technical Assistance Support for the Updating of the ENR Sectoral Framework Plan project. The vulnerability assessment tools described in these reports are consistent with the Intergovernmental Panel on Climate Change (IPCC) framework which involves evaluation of exposure, sensitivity and adaptive capacity to determine vulnerability.

- **Climate Change Adaptation Planning**

Apart from vulnerability assessment, mitigation and adaptation strategies will be developed for identified vulnerable areas. Adaptation planning will be undertaken in the 240 priority watersheds and 87 protected areas in the country in collaboration with LGUs, NIA and local stakeholders to generate consensus on location specific measures and strategies to reduce vulnerabilities of communities and ecosystems to climate change hazards. Some of the adaptation strategies that may be identified during the adaptation planning may be forestry-related. Depending on site locations and the type of hazards and anticipated impacts, this may involve effective management of protected areas, protection of existing forests, rehabilitation and conservation of mangrove resources, adoption of soil and water conservation measures,

management of hazard areas and catchments which are important in hazard mitigation and livelihood support to CBFMA and CADT holders through agroforestry. The use of resilient native forest tree species in the reforestation of critical watersheds and protected areas and promotion of multiple cropping and integrated pest management in agro forestry will be encouraged. The proposed measures will have to be coordinated with the provincial and local disaster and risk reduction management councils so that they can be included in the LGUs' disaster preparedness plans. In all cases, an intensive information and education campaign must be conducted for all stakeholders to explain their vulnerability to climate-related hazards and the importance of forests, forestlands and protected areas in mitigating the adverse impacts of these hazards.

Because of the urgency of putting in place the necessary adaptation and mitigation measures, adaptation planning will have to be completed within four years. As adaptation plans are completed, identified adaptation measures will be implemented immediately by the LGUs with support from the DENR and other agencies.

- **Enhanced Management of Protected Areas and Protection Forests**

Protected areas and protection forests play important role in improving resilience of communities and ecosystems to climate-related hazards is widely recognized. They contain biodiversity resources which provide various ecosystems services essential for development and human survival. Aside from being the head water of rivers and creeks providing water for domestic use, irrigation and power generation they also mitigate flooding downstream that damages agricultural crops, properties and at times leads to loss of lives. They also support fisheries downstream and are potential for ecotourism

development. As climate change intensify, it is important to protect and effectively manage these areas and conserve their biodiversity.

Hence, protected areas and protection forests will be managed mainly for the ecosystems services they provide. However, limited production activities may be allowed in multiple use zones consistent with an approved management plan. To sustain ecosystems services provided by protected areas and protection forests, support will be provided to protect existing forests in these areas. Management enhancement trainings will be provided to strengthen the capabilities of PAMB members and PASu staff in managing protected areas. At the same time, degraded areas within PAs and protection forests will be rehabilitated through assisted natural regeneration involving local communities and indigenous peoples. The use of fire and drought tolerant indigenous tree species will be promoted in forest rehabilitation activities. Except for 2016 where the target for rehabilitation is about 68,000 hectares, roughly 17,000 hectares of degraded areas will be rehabilitated each year to improve forest cover and enhance ecosystem services in protection areas.

- **Protection of Existing Natural Forests and Established Plantations**

With the issuance of Executive Order No 23 timber cutting in natural forests is now prohibited except in the following, subject to the conditions set in section 2, item 2.2 of E.O. 23 and the memorandum from the Executive Secretary dated 20 October 2011:

- Clearing of road right of way by the DPWH; site preparation for tree plantations, silvicultural treatment and similar activities, provided that all logs derived from said cutting permits shall be turned over to the DENR for proper disposal;
- Renewable energy projects such as geothermal, hydrothermal, dendrothermal, solar, and wind projects;

- Construction of transmission lines, telecommunication sites, sub-station sites and other power generation projects, including maintenance activities on existing lines;
- Road right of way, rehabilitation/ widening of roads, airstrips and other infrastructure projects undertaken by government entities through private contractors;
- Trees in public and private places that pose danger to the human lives and/or properties as evaluated by the DENR;
- Mining operations with approved Environmental Protection and Enhancement Program (EPEP) for the construction of mining facilities and conduct of mineral exploration/ extraction and
- Other priority activities of government and government approved projects and programs approved and certified as a priority project by the President.

The above policy is in recognition of the role of forest in disaster risk reduction and the other ecosystems services they provide. Thus, the protection of all natural forests (about 6.8 million hectares) in protected areas, priority watersheds, and other tenured and untenured forestlands is of paramount consideration in the Philippine forestry master plan.

The forest protection programs to be implemented under the Philippine master for climate resilient forestry development will be anchored on the National Forest Protection Program (NFPP) crafted by the DENR-FMB. This approach contains “menu of options” for effective and efficient forestry law enforcement involving adoption of state-of- the-art technology such as forest surveillance thru aerial unmanned vehicle. This will be complemented by forest certification and effective timber tracking systems to ensure legal movement, transport,

processing and marketing of timber and timber products. The “menu of options” under the NFPP includes the following:

- Provision of full logistic and material support that are essential in forestry law enforcement;
- Improvement of infrastructures, provision of institutional support in investigation, filing of information, and/or criminal complaints and prosecution of forestry cases;
- Active collaboration and involvement of forest communities and other stakeholders in forest protection and law enforcement;
- Capacity building for DENR field personnel to enhance their skills and competence for effective protection of forests and plantations for biodiversity conservation;
- Sustained information, education and communication (IEC) campaign;
- Consistent confiscation and mandatory administrative adjudication and confiscation of undocumented forest products including conveyances and implements;
- Effective forest fire, pest and diseases management measures and
- Sustainable forest management mechanisms, initiatives, practices and other institutional reforms in forestry.

The forest protection strategies that will be employed will no longer focus on DENR alone as the primary enforcement unit. The role of Local government units, communities and tenure holders in forest protection will be further strengthened. Within tenured forestlands, greater responsibility in the protection of existing forests will be lodged on tenure holders. Closer monitoring of tenure holders' performance through the multi sectoral forest protection committee and similar bodies is therefore crucial to ensure protection of natural forests in allocated forestlands. In untenured forestlands, the role of LGUs and other stakeholders will

be underscored through joint implementation of the forest land use plans formulated for each LGU with forestlands.

Apart from natural forests, established plantations particularly those developed under the national greening program will be protected and maintained. Due to threats of forest fires as a result of projected temperature increase and drier months, fire lines/ firebreaks will be established. These developed plantations will be placed under appropriate management arrangements in partnership with LGUs, organized local communities and interested private investors. Towards this end, DENR-FMB will formulate an enhanced NGP program to ensure that the initial gains of the NGP are sustained.

- **Rehabilitation and Conservation of Mangroves**

Mangrove conservation and rehabilitation will be a major adaptation measure particularly in coastal communities which are exposed to coastal hazards like storm surge and tsunami. The role of mangrove forests in mitigating the impacts of storm surges has been highlighted by typhoon Yolanda which struck Tacloban city and adjoining municipalities in 2013. Aside from protecting coastal communities, this activity also contributes to sustaining fisheries resources of coastal communities. Based on 2010 vegetative cover map priority areas for mangrove conservation, protection and rehabilitation would include region 4-A particularly the province of Quezon, region 4-B most especially Palawan, regions 5, 6, 7, 8, 9, 10, 11 (particularly Davao Oriental), 13 (except Agusan del Sur).

The existing mangroves estimated at 310,531 hectares will be the focus of protection. The priority provinces are Palawan (with about 20% of the existing mangroves in the Philippines), Quezon, Samar, Zamboanga Sibugay, Surigao del Norte, Sulu and Tawi-Tawi. Since this activity is crucial in terms of the livelihood of local communities and in protecting them from coastal hazards, mangrove

protection will be undertaken jointly with municipal and barangay LGUs and as appropriate with Provincial LGUs. In terms of mangrove rehabilitation, the target is at least 3,000 hectares per year with about 31,000 hectares targeted in 2016 under the NGP.

- **Livelihood Support to CBFMA and CADT Holders**

The livelihood of upland communities is likewise threatened by climate change. With more rains expected during the rainy season and the dry season becoming drier, upland farming will be vulnerable to soil erosion, drought and pests, adversely affecting farm productivity. In response to this, upland farmers, particularly the CBFMA and CADT holders will be assisted in developing agroforestry farms following multi storey cropping schemes. This approach will diversify their crops and reduces the risk of total crop failure. Within production zones planting of high value crops such as bamboo, coffee, cacao, rubber and other fruit trees will be encouraged. Use of fire and drought tolerant species in agroforestry farms will be promoted. Indigenous tree species may be planted also especially along boundaries of individual farms to improve biodiversity and as source of fuelwood for individual households. In addition, assistance will be provided in installing soil and water conservation measures to reduce soil erosion, conserve water and prevent declining land productivity.

As the forestry sector diversifies its “clients and customers”, DENR in collaboration with other agencies, NGOs, and the private sector has to strengthen the CBFM strategy by revitalizing support to CBFM and CADT holders. There is a need to explore opportunities for supporting the CBFMA and ancestral domain holders by promoting partnership among them and the private investors/ processors to enable them to diversify livelihood sources and participate in the value chains of competitive goods and services – especially in making furniture and handicrafts, identifying and setting up ecotourism-related

services, and aligning various agroforestry products (fruit trees, minor forest products, high value plantation crops, essential oils, and medicines) with the needs of the market. To do this DENR field staff will provide more assistance in linking them to markets of agroforestry products, brokering agreements with forest products processors, LGUs and other sectors for the supply of raw materials and provision of other ecosystems services as well as in forging production sharing agreements for the development of forest plantations.

The provision of support services to CBFMA and CADT holders is part of the measures to increase average income of upland communities by at least 50%. To properly monitor the achievement of this target, baseline study on the average income of upland farmers will be undertaken. Regular follow up studies will be conducted at least every three years to track changes in income of upland communities and as basis for improving support services to CBFMA and CADT holders.

- **Integrated Watershed Management Planning and Integration of Forest Land Use Plans into the LGUs' Comprehensive Land Use Plans (CLUPs)**

A major adaptation strategy that needs to be underscored in strengthening resilience of ecosystems and communities to climate change hazards is the formulation of integrated watershed management plans complemented by forest land use plans (FLUPs) integrated into the LGUs' CLUPs. This strategy allows the alignment of land uses so that negative externalities of upland activities are avoided. The IWM plans and the FLUPs can promote forest ecosystem stability and sustainable supply of environmental services by defining protection forests, conservation areas, and high hazard zones, where certain land and resource uses and investments may be highly regulated. In watersheds, protection forests will be delineated to address the need to reduce exposure to risk and natural

disasters of ecosystems, communities, livelihoods, and enterprises. These areas will have to be managed, regulated, enforced and rehabilitated as part of the LGU FLUP-based CLUPs. They will have to be clearly linked with the ecosystems goods and services that they provide to the lowlands, urban, and coastal areas. Thus, LGUs will be supported in enforcing agreed zones especially in easements of water bodies and coastal areas where the risks to climate change hazards (such as flooding and storm surge) are high. The production-oriented use and management of forestlands outside the protection forests will be part of the tenure holders' plans which are intended to support forest based livelihood/enterprises and local industries.

Integrated watershed management plans will be prepared for all priority watersheds and river basins while FLUPs will be developed for all LGUs with forestlands as part of their CLUPs. Existing protected area (PA) management plans will be reviewed and updated to make them climate change compliant. In all these plans, results of vulnerability assessments and climate change adaptation planning will be incorporated into the LGUs' comprehensive land use plans. It is important therefore that LGUs update their CLUPs to allow integration of IWM plans, FLUPs and PA plans.

All IWM plans and FLUPs within priority ecosystems will be completed within five years. About 1,300 LGUs have forestlands and with an estimated 438 LGUs already with completed FLUPs supported by regular DENR funds and foreign donor funding (GIZ, USAID, EU), 862 LGUs will be targeted for FLUP formulation or an average of 150 FLUPs per year starting in 2016.

- **REDD+ for Climate Change Mitigation and Adaptation**

Based on IPCC framework (Meridian, 2011) and key principles for integrating climate change in forestry (USAID-CIFOR-ICRAF, 2009), the Philippines can

effectively participate in REDD+ programs and reduce its emissions by focusing on the following key approaches:

- Minimizing forests that are converted to other lands (equivalent to deforestation);
- Managing degraded forests to remain as forests (covering degradation, conservation, enhancement of carbon stocks in existing forests, and sustainable management of forests);
- Supporting the rehabilitation and reforestation of forestlands with no cover to become forests (covering afforestation, reforestation).

The land and forest cover data from the 2003 and 2010 NAMRIA digital maps will serve as sufficient basis in formulating and implementing REDD+ programs for the Philippines. REDD+ has to be consistent with the overall Philippines National REDD+ Strategy that is being coordinated by the Climate Change Commission (CCC 2010). It is recommended that the following major steps be adopted for pilot implementation of REDD+ in the Philippines.

- a. **Estimate initial baseline Reference Level (RL)** based on 2003 and 2010 land and forest cover activity data (for estimating historical forest carbon emissions);
- b. **Determine Reference Emission Level with REDD+ (REL+)** implementation;
- c. With RL and REL, estimate (based on historical emissions and other factors) **doable target emission reduction** in 4-5 years;
- d. **Use 2002-2004 National Forest Inventory (NFI) carbon stock estimates**, default values, Lasco and Pulhin (2003) and others for calculating RL, REL, and target emission reduction;
- e. **CCC to establish Provincial REDD+ Council** for each pilots as an oversight body;

- f. **Assess current programs and formulate future programs** to achieve the emission reduction target;
- g. **Modify** target emission reduction, if necessary;
- h. **Agree on what Monitoring, Reporting, and Verification (MRV) methodology to be used** for comparability with other pilots;
- i. Facilitate **adoption of target emission reduction** with proposed MRV method and program strategies by the Provincial REDD+ Council (to be created);
- j. Facilitate **preparation of work and financial plans** by each governance-designated unit and each local forest resources management units (LFRMUs) that will achieve target emission reduction;
- k. **Develop and pilot test governance-based REDD+ database generation, updating, analysis, and management** at different levels (LFRMU, city or municipality, province, DENR, NCIP, watershed, region);
- l. **Accreditation** of 3rd party certifiers of achieved target emission reduction at the sub-national level or regional level; and
- m. **Document** lessons learned, refine technical and implementation approach, as needed.

The target provinces and regions should be matched with the land use and forest cover data from the 2003 and 2010 NAMRIA maps – either for REDD, + or REDD+ sub-strategies. Based on the 2010 land cover map of the Philippines, the priority provinces for REDD+ implementation should include those with large areas of remaining forests. A listing of these provinces with their corresponding forest areas is provided in table 13. Three provinces will be piloted for REDD+ up to 2016 and expanded to additional 10 provinces up to 2022 and another 7 provinces between 2023- 2028.

Table 13. List of Provinces Potential for REDD+ Implementation.

Provinces	Forest Type			Total Forest
	Closed Forest	Open Forest	Mangrove	
Abra	43,316	103,384	-	146,700
Apayao	118,982	99,358	-	218,340
Benguet	3,196	116,430	-	119,626
Cagayan	206,475	131,341	5,179	342,994
Isabela	69,444	308,106	723	378,272
Nueva Vizcaya	122,615	71,093	-	193,708
Quirino	86,729	40,986	-	127,714
Aurora	132,548	85,518	521	218,588
Zambales	30,862	66,432	139	97,433
Palawan	86,877	541,590	63,821	692,288
Quezon	63,838	148,285	18,374	230,497
Eastern Samar	21,828	156,539	7,834	186,201
Western Samar	3,748	147,835	13,880	165,463
Bukidnon	125,361	76,961	-	202,322
Davao Oriental	78,258	82,198	1,868	162,325
Compostela Valley	54,106	90,338	209	144,653
Sultan Kudarat	18,111	85,945	760	104,815
Lanao del Sur	80,245	69,442	464	150,151
Surigao del Sur	27,606	190,127	9,072	226,805
Agusan del Sur	57,208	285,529	-	342,736

Source: DENR-FMB, Philippine Forestry Statistics, CY 2012

A summary of the climate related hazards, their potential impacts on forest ecosystems and communities and proposed forestry related adaptation and mitigation measures is shown in table 14. It should be noted that in general most forestry activities may be considered part of climate change adaptation strategies. The identified programs to strengthen resilience of forest ecosystems and communities to climate change as indicated in the PMPCRFD are those that are directly addressed to mitigate climate change impacts. Other forestry programs which may be considered adaptation measures but which are designed to address demands for specific forestry goods and environmental services are included in the programs to respond to demands for forest ecosystems goods and services. In addition, implementation of these

adaptation measures and strategies will be focused on areas that will be under high risk to identified climate change hazards.

Table 14. Summary of Climate Hazards, Potential Impacts in forestry and Proposed Adaptation and Mitigation Strategies

Climate change	Related Hazards	Impacts on forest ecosystems & communities	Adaptation & mitigation measures/ strategies
			General strategies: Ecosystem based vulnerability assessment; Participatory climate change adaptation planning; REDD+ implementation; integrated watershed management planning with FLUP integrated into the LGUs' CLUPs.
Temperature increase	Forest fires	Diminishing forests; biodiversity loss; damage to forest plantations	Use of fire tolerant species in forest rehabilitation; establishment of fire lines and firebreaks in existing plantations; Allocation of existing plantations to responsible on-site Managers
	Sea level rise	drowning of mangroves; submerged settlements & agricultural lands	Mangrove protection, conservation and rehabilitation; enforcement of easement through LGUs
	species extinction	bio diversity loss	Enhanced management of protected areas and protection forests
Erratic Rainfall (dry months are drier and wet months wetter)	Drought	Erratic water supply; decreased water supply for irrigation, domestic use & power generation;	rehabilitation and protection of priority watersheds; Adoption of soil and water conservation (SWC) measures and small water impounding structures;
		damage to crops; adverse impacts on livelihood	Agroforestry and livelihood support to CBFMA/ CADT holders ; use of drought tolerant species

Climate change	Related Hazards	Impacts on forest ecosystems & communities	Adaptation & mitigation measures/ strategies
	flooding	Damage to crops, properties and loss of lives; Adverse impacts on livelihood downstream	Integration of FLUP into the LGUs' CLUPs; protection of existing forests & rehabilitation of degraded catchments draining to flood prone areas
	landslide	Damage to properties and loss of lives; Forest damage	Integration of FLUP into the LGUs' CLUPs;
	soil erosion	reduced land productivity ; siltation of rivers/ water channels; reduced service life of dams	Forest rehabilitation; agroforestry and livelihood support to CBFMA & CADT holders; establishment of SWC measures
Extreme climate events	typhoon	Damage to crops, properties and loss of lives; Forest damage	Use of indigenous species tolerant to strong winds in forest rehabilitation;
	Storm surge	Damage to crops, properties and loss of lives; damage to mangrove forests	mangrove protection/ reforestation in appropriate coastal communities; establishment of beach forests

Indicative Program Costs

The cost of the program towards strengthening resilience of ecosystems and communities to climate change is presented in Table 15. The total program cost is 38.2 billion pesos for the next 13 years. Roughly 48% of the costs or Php 18.4 billion will support climate smart livelihoods such as multiple cropping in agroforestry areas of CBFM and CADT holders to diversify their sources of income. About 32% will also defray the cost of protecting the 6.84 million hectares of existing forests while 10% will be used in rehabilitating degraded portions of protection forests. In addition, Php 1.7 billion will be needed to rehabilitate mangrove forests to enhance protection of coastal communities from storm surge and support fisheries production. The rest of the cost will be used for vulnerability assessment, adaptation planning, IWRM and forest land use planning, trainings, support to soil erosion control, and REDD+ implementation.

On a yearly basis, almost half of the program cost (48%) or 18.4 billion pesos will be incurred between CY 2017-2022 while 10% of the costs or 3.9 billion pesos will be required in 2016. From 2023 to 2028 the required funding is 15.9 billion pesos or 42 % of the program costs.

Table 15. Indicative Program Cost: Strengthening Resilience of Ecosystems and Communities to Climate Change.

Programs / Activities	Budget (thousand pesos)				%
	2,016	2017-2022	2023-2028	Total	
A. Strengthening Resilience of Forest Ecosystems and Communities to Climate Change					
Watershed Management Planning and Forest Land Use Planning Program	204,800	1,372,900	104,000	1,681,700	4.40%
1 Training on vulnerability assessment, adaptation planning,, IWM, FLUP	10,200	83,100	0	93,300	0.24%
2. Vulnerability assessment	61,000	237,000	80,000	378,000	0.99%
3. Adaptation planning	30,600	89,400	24,000	144,000	0.38%
4. Identification/ assessment of other watersheds	0	504,400	0	504,400	1.32%
5. Formulation of integrated watershed management plans	28,000	103,000	0	131,000	0.34%
6. FLUP formulation w/ LGUs	75,000	356,000	0	431,000	1.13%
Forest protection and rehabilitation	3,649,047	17,015,514	15,683,880	36,348,441	95.10%
1. Protection of existing forests and Plantations	813,214	5,385,660	6,129,804	12,328,678	32.3%
2. Rehabilitation of degraded areas in protection forests	613,134	1,785,756	1,530,000	3,928,890	10.3%
3. Mangrove rehabilitation/ plantations development	720,751	683,022	288,000	1,691,773	4.4%
4. Agroforestry development	1,501,948	9,161,076	7,736,076	18,399,100	48.14%
REDD+ Implementation	9,000	60,000	122,000	191,000	0.5%
Total	3,862,847	18,448,414	15,909,880	38,221,141	
	10%	48%	42%		

4.2.2 Programs to Respond to Demands for Forest Ecosystems Goods and Services

For many years, the governance and administration of forests have mainly focused on the extent of forest resources, their productive functions, and

strengthening regulatory and institutional framework. Thus, the theory and practice of forest inventory, harvesting, integrated forest-based processing systems, forest regulation, enforcement, and administration systems flourished. These systems were mainly developed for managing natural forests for timber and related products. The government played a significant role as a regulatory body while the private sector focused on extraction, utilization, and management of their leased areas. Over the years, however, the role of biodiversity, health and vitality, the forest's protective functions, ecosystems services, and socio-economic considerations have become more dominant. From timber and wood-driven use of the forest ecosystems, the value of forests and forestlands as the key provider of direct and indirect ecosystems goods and services has gained significant momentum, better understood, and advocated by the public and private sectors including the civil society. Thus, in preparing the PMPCRFD, current strategies were re-directed, and re-focused to be responsive to the current mix of clients and customers.

Objectives

The specific objectives of this program are:

- To demarcate on the ground within six years the production, multiple use and protection zones in forestlands and protected areas;
- To develop and maintain at least 1,439,298 hectares of commercial forest plantation for round wood production by 2028;
- To develop at least 297,234 hectares of fuel wood plantation by 2028;
- To sustainably manage at least 88,609 hectares of grazing lands by 2016 and gradually increasing to 111,063 hectares by 2028;
- To protect, conserve and rehabilitate priority watersheds for irrigation, energy and domestic and industrial use.

Strategies

Because of competing demands for forest products/goods and services (water supply for irrigation, domestic use and power; disaster risk reduction, fisheries

and other livelihood support and biodiversity conservation), the use of forest ecosystems will have to be harmonized guided by the integrated watershed management plan and the approved FLUP. As discussed in the previous program, this is necessary to harmonize land uses across landscape and in the process maximize productivity and avoid or minimize adverse impacts of land use in one ecosystem to another ecosystem. Hence, an important component of the strategy is the delineation and demarcation of production and protection zones in forestlands and the strict protection and multiple use zones in protected areas.

Accountability of onsite Managers or tenure holders will be emphasized in the management of forestlands and protected areas. All forestlands will be allocated to responsible onsite Managers or tenure holders guided by the allocation process through consensus building during the FLUP formulation. Since forestlands and protected areas are now mostly occupied and claimed either by migrants or indigenous peoples, they will be given priority in the development of forestlands and protected areas to meet demands for forest goods and services. Community and individual tenure instruments such as community based forest management (CBFM) agreement, certificate of ancestral domain/ land title (CADT) and protected area community based resource management agreement (PACBRMA) will be issued to provide land tenure security to these communities. DENR in partnership with LGUs and other agencies will provide the necessary financial and technical assistance to communities in preparing resource management plans and in the protection, rehabilitation and development of their allocated areas. As appropriate, capability building trainings will be undertaken to improve their skills in managing and developing forest ecosystems. In cases where private investors are interested to develop forest plantations, in areas currently occupied or

cultivated by forest communities or IPs, they will be assisted in forging partnership agreement with these communities.

The management, development and conservation of forest resources will be guided as well by the region's comparative advantage. The present approach of almost "one size fits all" approach in PPAs and national strategy formulation and implementation for improving forest ecosystems management, development, and regulation does not take advantage of the strengths and assets of each region. Under the PMPCRFD, the programming and allocation of public investment funds in support of a region's comparative advantages is highly recommended provided that this is consistent with the IWRM plan. These investments will ultimately strengthen the region's comparative advantage that will redound to the competitiveness of various environment and natural resources (ENR)-dependent goods and services. A regional strategy, however, will have to be prepared and approved by DENR and endorsed by the Regional Development Council, each provincial government and concerned cities and municipalities as a road map for investments in sustainable forest ecosystem management (SFEM).

Depending on their natural resource, physical, human and socio-economic assets, each region in the Philippines has a different set of comparative advantages in supplying or providing the increasing demand for various forest ecosystems goods and services. Table 16 summarizes the comparative advantage and competitive goods and services of different regions in the Philippines based on results of the regional consultations that were participated by multi-sectoral groups from all regions in the country. A region's comparative advantage to provide forest ecosystems goods and services refers to its "edge" based on "natural endowment", socio-cultural resiliency and capacities as a

result of accumulated experience in managing a resource or in producing a forest product that is of excellent quality (adapted from Porter 1985).

Table 16. Comparative advantage of regions in providing forest ecosystems goods and services (FMB/DENR Regional Workshops, 2013).

Comparative Advantages	Competitive Forest Ecosystems Goods and Services						
	Round Wood	Fuel wood	Processed Forest Products – primary, secondary, tertiary	Water for multiple uses (irrigation, domestic use, industrial and energy)	Attractions for Ecotourism services	Climate resiliency, DRR and support for fisheries	Training, research and capacity building
Suitable agro-climate for Round Wood	Reg 10, 11, 12, 13, 9, 7, 6, 2, 3						
Suitable agro-climate and markets for fuelwood		Reg 1, 2, 3, 4a, 4b, 5, 6, 7, 12, ARMM					
Biodiversity, Unique Natural and Cultural Attractions & Landscapes					CAR, Reg 4b, 2, 4a, 8, 5, 6, 7, 11, 12, 10, 13, 1, 3		
Provider of Forestry Training, Models & Practices							Reg 4a, 2, 1, 10, ARMM, 8, 7
Local capacities for Forest Products Processing – primary, secondary, tertiary			Reg 11, 13, 10, 7, 2, 3				
Watersheds for supplying water for various uses				<ul style="list-style-type: none"> • Irrigation - Reg 3, 2, 12, 4b, 6, 8, ARMM, 9 • Domestic and industrial use – NCR, Reg 4a, 3, 7, 6, 11, 10, 12, 1, CAR, 4b • Energy – Reg 2, 3, 4a, 10, ARMM, 11, CAR 			
Natural forests for mitigating climate change						• Mitigation - CAR, Reg 2, 3, 4b, 8,	

Comparative Advantages	Competitive Forest Ecosystems Goods and Services						
	Round Wood	Fuel wood	Processed Forest Products – primary, secondary, tertiary	Water for multiple uses (irrigation, domestic use, industrial and energy)	Attractions for Ecotourism services	Climate resiliency, DRR and support for fisheries	Training, research and capacity building
						13 • DRR – Reg 5, 3, 4a, 4b, 6, 7, 11, 10, 12 • Fisheries support – ARMM, Reg 13, 4b, 9, 6, 5, 4a, 8, 12	
Available extensive area of shrublands and grasslands for roundwood and fuelwood production	Reg 2, 4a, 10, ARMM, 12	Reg 4a, 4b, 10, ARMM, 9,					

The ultimate value of a region’s forest ecosystems-based comparative advantage will be its capacity to support and sustain the development, growth, and sustainability of livelihoods, enterprises, and industries that produce economic goods and services. The comparative advantages play a significant role in making a “forest ecosystems good or service” competitive with respect to the cost per unit, availability of supply, and differentiation of a good or service. Supporting and focusing investments on the region’s comparative advantages in managing forest ecosystems will allow each region to properly strategize and align programs that will ultimately enhance its “edge” in producing forest ecosystems goods and services.

For example, a suitable agro-climatic condition for growing fast growing hardwoods will have shorter rotation and better quality of wood. That inherent comparative advantage is further strengthened with a culture, practice, and accumulated skills in establishing nurseries, planting, and maintenance activities.

Further investments in strengthening property rights, improving road access, and technologies for multi-cropping systems will further reduce the cost of production per unit that will enable the producers to compete with lower prices, better quality, and selling a highly differentiated lumber from fast growing hardwood if that species is only found in a given area. In a similar vein, the cost of irrigated rice production may be lower in areas where the watersheds are able to sustain water supply through the irrigation systems. That production is made more competitive if the farmers do not experience massive pests and diseases because of the indirect ecological stabilizing factor of biodiversity from the nearby forests.

Based on Table 16, it is obvious that most regions will have to manage their forests and forestlands ecosystems for different purposes and objectives. The ecosystems goods and services in each region are not mutually exclusive. In most cases, the management of a watershed may not only supply water but also serve as “attractions” to visitors, reduce emission, provide fuelwood and yield agroforestry products. The following ecosystems goods and services are emerging to be the results of enhancing the region’s comparative advantages:

- Conserve, preserve, and restore the biodiversity, natural attractions, unique natural and cultural landscapes of protected areas and reservations as “local attractions “of local and international visitors. To a varying degree, almost all regions will have to focus certain forest ecosystem management for this objective.
- Protect, restore, and manage watersheds and habitats in support of the increasing demand for water for various uses – mainly for irrigation, increasingly for domestic and industrial use, and to a certain extent for energy generation and recreational uses.

- Reduce carbon emission under REDD+ as an approach for mitigating climate change in regions where there are still extensive areas of natural forests. This is especially applicable in CAR, Region 2, 3, 4b, 8 and 13.
- Focus the production of round wood in regions where they have the comparative advantage – mainly in Mindanao and, to a certain extent, in Northern Luzon and Region 4b.
- Support fuelwood production in regions where highly urbanized cities and municipalities continue to expand – mainly in area near Metro Manila, Region 3, 4a, 6, 7, 11, 10, CAR.
- Manage ridge to reef watersheds in support of the fisheries industry. This is a major forest ecosystems management in watersheds and coastal areas where forests play a major role in sustaining the health, resiliency, and productivity of marine, fish, and bird sanctuaries and major fishing grounds.
- Promote strategic and value chain-oriented forest-based products processing – primary, secondary, and tertiary- in regions where they have the comparative advantage for establishing forest plantations and where there are existing capacities, expertise, technology, and capital for private sector investments for improving the value chains of forest-based products and services. Regions 7, 3 and NCR, for instance, remain to have the edge in processing and making high value furniture for local and the export markets. Regions 11, 13 and 2 continue to have the advantage for primary and secondary forest-based processing. Access to ports and relatively low cost of transport are needed for these processing centers.
- Promote and link the region's major ecosystems goods and services with livelihoods and enterprises that will help the communities and entrepreneurs to become players in the market place especially in areas where there are increasing demand for fuelwood, supplying high quality

fruits, food products, services for ecotourism, and handicrafts for visitors. For instance, there will be an increasing need for well-trained local guides in protected areas and reservations that are often visited.

Program Components and Targets

To meet varying demands from multiple clients, the following program components will be implemented:

- Delineation and demarcation of forest management zones
- Forest plantation development for round wood production
- Fuel wood/ bio energy plantation development
- Management of grazing lands
- Watershed management and rehabilitation
- Urban forestry

• Delineation and Demarcation of Forest Management Zones

DENR has completed the delineation of forestland boundaries in almost all provinces (75 out of 80 provinces) but has not demarcated them on the ground, pending congressional approval of the delineation survey. Thus, forestland boundary demarcation will be completed to clearly mark on the ground the extent of forestlands that need proper management and protection. Once forestland boundaries are approved by Congress and ground demarcation commences, delineation of protection and production forestlands will be undertaken immediately. Meantime, demarcation of multiple use and strict protection zones within protected areas will be initiated. Cost-effective means of demarcating management zones will be implemented such as the use of vegetative boundaries or of natural boundaries and markers like rivers, ridges and mountain peaks. Determination of management zones on the ground is important to identify areas for private sector investment (production zones and to some extent multiple use zones) and those areas where government can

focus its resources for protection and conservation activities (protection zones). This is likewise necessary to define appropriate activities and uses in forestland areas. To maximize flow of forest goods and services and minimize externalities, this determination must be based on an integrated watershed management plan, complemented by an LGU- based forest land use plan. The IWM plan harmonizes land uses from ridge to reef while FLUP ensures LGU support in the implementation and enforcement of agreed measures and zones in the IWM plan as they complement local development priorities (DENR-ENRMP, 2013).

Demarcation of forestland boundaries and management zones will cover the 15,805,325 hectares of classified forestlands. This activity is targeted to be completed within five years after congressional approval of the delineation survey.

- **Development of Commercial Forest Plantations for Round Wood Production**

With the issuance of EO 23 in 2011, it is apparent that the existing plantation forests in the public and private lands will continue to supply the needs of the forest-based industries combined with imports and substitutes including coconut lumber. In the long term, the most reliable source of wood supply for the forest-based industries and enterprises will be the plantations under the industrial forest management agreements (IFMAs), those under the community-based forest management agreements (CBFMAs), and those under ancestral domains outside the protected areas and declared watersheds. The initial support of previous DENR and NGO programs for the holders of CBFMAs and ancestral domains are expected to partly meet future demand.

To meet the projected demands for round wood and to reduce threats in the remaining natural forests, DENR shall support development of commercial forest plantations within IFMAs, CBFMAs, and applicable areas in ancestral domains. This strategy should be discussed with the industry players, financiers, the

processors, the tenure and domain holders, and local governments in regions where this strategy is consistent with their comparative advantages. There will be a need to design and make the necessary arrangements for the provision of a complete investment support package to communities such as bank financing, technical assistance, starting capital, tenure strengthening, deregulation, improved governance measures, and one-stop shops in the LGU and DENR offices for forest-based enterprises and livelihood systems (Tesoro and Angeles 2010). Part of the NGP funds may in fact be leveraged with private investors who may be interested to partner with CBFMA and CADT holders for developing commercial forest plantations for round wood. The projected volume to be harvested from plantations and the existing plantations in each region should be the starting point in reviewing and incentivizing the establishment or expansion of forest-based enterprise, processing facilities, and plants as markets for forest plantations. The annual log requirements (ALRs) of the regular and mini-sawmills, veneer and plywood mills will have to be properly matched in terms of location, requirement, capacities, supply and distribution chains.

The forestry sector would target to meet the Philippines' total demand for round wood. This means that in the next 13 years about 1,439,298 hectares of commercial forest plantations will have to be developed to meet total demand for round wood from CY 2026 to CY 2038. The NGP reports indicate that about 530,792 hectares of timber plantations were developed from 2011 to 2014. In 2015, another 372,140 hectares were also targeted for timber plantation development. There is a need to assess the conditions of these plantations to determine whether they can supply timber requirements of the country starting in 2021. But even assuming that these plantations are in good condition, there will still be a deficit in round wood supply at least up to 2022. Proper

implementation of the PMPCRFD would lead to self sufficiency in wood supply starting in 2025.

With wood consumption increasing annually at 5%, about 598,315 hectares of commercial forest plantations will have to be established between 2017-2022 and 811,335 hectares between 2023-2028 (Table 17). These plantations can be situated in existing IFMAs, CBFMAs, Co managed areas, CADT areas and even in private lands. The primary regions for plantation development will be in regions 6, 7, 9, 10, 11, 12, and 13 which have comparative advantage for this activity because of their suitable agro climate and the available extensive areas for round wood production. Regions 2 and 3 are also potential areas for round wood plantation development because of the presence of wood processors and the extensive areas of brush lands and grasslands.

Table 17. Projected targets for round wood plantation development.

Consumption years	CY 2026	CY 2027-2032	CY 2033-2038	Total
Plantation development years	CY 2016	CY 2017-2022	CY 2023-2028	
Required total plantation area (hectares)	29,648	598,315	811,335	1,439,298

To be able to produce good quality round wood, seed production areas for selected wood species will be established and maintained in strategic locations nationwide. Likewise, mechanized forest nurseries will be developed to supply seedling requirements of the commercial forest plantations including those needed by various forest and landscape restoration activities.

- **Fuel Wood/ Bio Energy Plantation Development**

With rising costs of fuel, demand for fuel wood and charcoal is expected to rise. In the absence of legal source of fuel wood, natural forests will be continuously threatened from fuel wood gathering and charcoal making which are major

sources of income for local communities. Development of fuel wood plantations is therefore a key component strategy to meet this particular demand. NAMRIA's recent land and forest cover data in 2010 show that a major portion of the other wooded lands (especially the shrublands and wooded grasslands) which has a total of least 7.2 million hectares may be developed or inter planted with fuel wood species. Shrub lands and wooded grasslands in near urban centers and highly urbanized areas³ (Metro Manila, Metro Cebu, Metro Davao, Central and Southern Tagalog, Cagayan de Oro-Iligan Corridor) may be partly devoted to the plantings of legal sources of fuel wood and charcoal.

The area targeted under the NGP for fuel wood plantations in 2016 is 12,575 hectares. From 2017-2022 additional fuelwood plantations of about 125,683 hectares will be established while 158,977 hectares will be developed between 2023 and 2028. These plantations will be managed through coppice methods with a rotation period of three years. Three coppice periods will be observed after which new plantations will be established in 2023 to supply fuel wood demands for the next three coppice periods (Table 18). Forest communities, particularly CBFM and CADT holders will be mobilized to develop fuel wood plantations. Appropriate technical, marketing and financial support will be provided by DENR and LGUs together with other partners to encourage these communities in developing fuelwood plantations. The priority regions for this activity will include regions 1, 2, 3, 4-A, 4-B, 5, 6, 7, 11, 12 and ARMM.

Table 18. Projected targets for fuelwood/ bio energy plantation development.

Consumption years	CY 2019	CY 2020-2025	CY 2026-2031
Plantation development	CY 2016	CY 2017-2022	CY 2023-2028

³ **Highly Urbanized Cities** - Cities with a minimum population of two hundred thousand (200,000) inhabitants, as certified by the [National Statistics Office](#), and with the latest annual income of at least five hundred million pesos (₱500,000,000) based on 2008 constant prices, as certified by the city treasurer (LGC 1991; NSCO 2012).

years			
Fuelwood plantation area (ha) target	12,575	125,683	158,977

Sustainable Management of Grazing Lands

The current areas devoted for grazing will continue to be managed to meet existing demands for meat estimated at 186,079 tons starting in 2016. However, instead of depending on natural grass for fodder, forest land grazing lease agreement holders will be encouraged to develop improved fodder sources and practice cut and carry system of raising livestock. At the same time, lease holders will be encouraged to raise improved breed of cows / livestock which produce more meat per hectare.

Following improved grazing practices, the requirement for commercial grazing lands will amount to 177,218 hectares up to 2016 gradually increasing to 208,326 hectares in 2022 and to 233,232 hectares by 2028. The forestry sector will provide 50% of these grazing land requirements. The remaining meat requirements of the country will be satisfied through backyard cattle fattening, which has been supplying most of the meat requirement of the country in the past. Thus, the initial target of the forestry sector for grazing land management is 88,609 hectares in 2016, gradually increasing to 99,203 hectares in 2022 and to 111,063 hectares in 2028. Based on their comparative advantage for pasture management, the priority regions would include regions 2, 3, 4-B, 5, 10, and 12.

- **Watershed Management and Rehabilitation**

Priority watersheds will be protected and rehabilitated to ensure continuous supply of water for irrigation, energy and domestic and industrial uses. Preparation of integrated watershed management plans incorporating vulnerability assessments and adaptation plans addressing climate change hazards will be completed for the remaining 44 watersheds while multi-sectoral

watershed management bodies, such as the Watershed Management Council will be organized for all these priority watersheds. Rehabilitation through assisted natural regeneration (ANR) or reforestation of degraded areas within these watersheds will be undertaken in collaboration with LGUs, local communities and other stakeholders.

Initially, 143 priority watersheds are targeted in all regions for assistance in protection and rehabilitation. Existing forests in these watersheds will be protected through tenure holders, LGUs and conventional forest protection measures. With an initial target of 90,937 hectares in 2016 funded under the current NGP, about 17,000 hectares each year are targeted to be reforested in existing watersheds. The lower target in succeeding years starting in 2017, is in anticipation of the expected funding gap due to the completion of the NGP in 2016. a lower target of 20,000 hectares is proposed in 2017 increasing to 110,000 hectares

Other priority watersheds will be identified and characterized with corresponding management plans formulated. This activity will be undertaken in collaboration with NIA, DA, DAR and other concerned agencies to protect and rehabilitate water sources that supply water for irrigation, energy, domestic and industrial uses. Initially, other watersheds identified by NIA as part of the 240 priority watersheds essential for irrigation will be prioritized for characterization and formulation of watershed management plans. Multi- sectoral watershed management councils will also be organized in these areas to oversee implementation of the approved management plans.

- **Support to Urban Forestry**

Urbanization has contributed to the degradation of environmental conditions in major cities of the country. With expanded transportation facilities and

established factories, air and noise pollution has worsened posing health hazards to local populations. In this context, the PMPCRFD will implement urban forestry in major cities in various regions. This will involve establishment and management of patches of forests in urban environments to enhance the physiological and psychological well-being of local people. In essence, urban forestry may refer to the development of forest park, greenbelts, nature center or road side planting including the planting of trees and ornamentals in vacant lots. A good example of a forest park is the public park in Davao city.

The local government units have the mandate under the Local Government Code to establish tree parks, greenbelts and similar forest development projects. The DENR will therefore support LGUs in their urban forestry activities involving the following:

- Establishment of mini forests
- Organizing tree planting events in schools, military camps, and government centers, including main streets and other open spaces
- The development of LGU nurseries and
- Conduct of intensive information, education and communication campaign to educate the people on the importance of and benefits from urban forestry.

Due to limited resources, at least 2 cities in each region may be assisted by DENR in their urban forestry activities.

Indicative Program Costs

The total cost to support strategies for meeting demands for forest goods and services is estimated at 92.84 billion pesos for the entire duration of the plan (Table 19). Almost 69% of the cost (Php 63.99 billion) will support forest plantation development for round wood production while the development of fuelwood

plantation and rehabilitation of watersheds comprise 10.4% of the budget equivalent to 9.63 billion pesos. The rest of the budget will support demarcation of forest management zones, development and maintenance of seed production areas, establishment and operation of mechanized nurseries, capacitation of the watershed management councils and support to urban forestry.

Table 19. Indicative program cost: Responding to Demands for Forest Ecosystems Goods and Services.

Programs / Activities	Budget (thousand pesos)				%
	2,016	2017-2022	2023-2028	Total	
B. Responding to Demands for Forest Ecosystems Goods and Services	4,410,044	40,406,444	48,022,968	92,839,456	
Forest Plantation Development					
1. Demarcation of forestland boundaries	0	3,840,694	0	3,840,694	4.1%
2. Development and maintenance of seed production areas	75,000	450,000	450,000	975,000	1.1%
3. Establishment of mechanized nurseries (regions)	120,000	0	0	120,000	0.1%
4. Operation and maintenance of mechanized nurseries	55,000	330,000	330,000	715,000	0.8%
5. Commercial forest plantation development for round wood production	1,827,972	25,401,063	36,764,876	63,993,912	68.9%
6. Fuelwood/ bio energy plantation dev't	388,454	4,189,587	5,057,673	9,635,714	10.4%
Sub-total	2,466,426	34,211,344	42,602,549	79,280,320	85.4%
Watershed management and rehabilitation					
1. Rehabilitation of degraded watersheds (ha)	1,273,118	2,432,622	2,040,000	5,745,740	6.19%
2. Watershed rehabilitation (structural measures and instrumentation)	170,000	680,000	0	850,000	0.92%
3. Organization and capacitation of watershed management bodies , such as the watershed management council	27,900	173,100	144,000	345,000	0.37%
Sub-total	1,471,018	3,285,722	2,184,000	6,940,740	7.48%
Grazing lands management	446,590	2,863,478	3,205,819	6,515,886	7.02%
Support to urban forestry	26,010	45,900	30,600	102,510	0.11%
%	4.8%	43.5%	51.7%		

In terms of yearly allocation, the planning period between CY 2023-2028 has the biggest share of the budget at 51.7% (Php 48.0 billion). From CY 2017-2022 the required funding is 40.4 billion pesos or 43.5 % while the first year of plan implementation would need 4.4 billion pesos or less than 5% of the total program cost.

4.2.3 Strategies to Promote Responsive Governance in the Forestry Sector

The governance of forestlands and protected areas has been confusing, characterized by overlapping institutional mandates at the national level and overlapping tenure at the forest management unit level. This situation was brought about by different policies issued over the years which are all attempts at improving the management or enhancing the value of specific resources of forest ecosystems. With these policy issuances, DENR no longer has exclusive jurisdiction over forest ecosystems. The National Commission on Indigenous Peoples (NCIP), National Power Corporation, National Irrigation Administration, and the Local Government Units, among other agencies have gained jurisdiction in the management of forestlands. Even within the DENR there is overlapping mandates among the different sectors (i.e Biodiversity Management Bureau, Forest Management Bureau and the Mines and Geosciences Bureau) in the management of forestlands. At the forest management unit level, governance is complicated by overlapping tenure instruments issued by DENR and other agencies, such as the NCIP, over the same parcel of forestlands. In many instances, CADTs, protected areas, watershed reserves, and CBFMAs overlap with each other, leading to confusion on who is accountable for the management of the allocated forestlands and protected area.

With the implementation of the current rationalization plan within the Department, DENR has initiated its restructuring into functional units, doing away with sectoral divisions especially in the field. This restructuring in the department is expected to fully operationalize the IEM framework as provided in the rationalization plan, allow DENR to respond to demands for forest ecosystems goods and services in a holistic manner and enhance the department's capacity to deal with multiple clients and adapt to the challenges of climate change. However, apart from internal restructuring, DENR will have to enhance its forestry policies, institutionalize collaborative management mechanisms and improve the skills and capabilities of its personnel so that it can effectively implement programs on enhancing resilience of forest ecosystems and communities to climate change hazards and programs designed to respond to demands for forest ecosystems goods and services.

Objectives

The following are the specific objectives of this program:

- Establish clear accountability in the management of forest resources and ecosystems;
- Enhance the policy environment to encourage investment in forestry and promote collaborative management;
- To promote active participation of stakeholders in the management of forest resources and ecosystems; and
- Strengthen the capabilities of DENR to adapt to climate change impacts in the forestry sector and respond to demands from multiple clients.

Strategies

To achieve the foregoing objectives, accountability in the protection, conservation, development and rehabilitation of forestlands and PAs should be clearly established. Pursuant to this, tenure based accountability will be pursued where on site management will be the main responsibility of tenure holders. Thus, every hectare of forestlands will be placed under tenure with DENR providing the right policy environment, appropriate standards of performance, technical guidance and where possible financial assistance. Hence, development of forest plantations, rehabilitation of denuded forestlands, protection of natural forests, conservation of priority watersheds, and other on site resource management activities will be lodged on tenure holders, such as the IFMA, FLGLA, CBFMA, and CADT holders including the PAMB. DENR together with LGUs and other stakeholders shall provide policy directions and oversight functions through collaborative management mechanisms to be institutionalized in the forestry sector.

Collaborative management bodies will be organized and made operational at the national, regional, provincial, city and municipal level. The provisions of DENR-DILG Joint Memorandum Circular (JMC) 98-01 and JMC 2003-01 can be the starting point for the formation of collaborative management bodies. Under these joint circulars, national and regional steering committees and provincial, city and municipal technical working groups may be organized to strengthen and institutionalize DENR-DILG-LGU partnership on devolved and other forest management functions. This partnership arrangement can be expanded to include other agencies such as the NCIP, DA, DAR, and other stakeholders to improve collaboration in forest resources management. The establishment of collaborative management structures can potentially resolve many of the operational issues arising from overlaps in institutional mandates and overlaps in tenure issuances within public forestlands and protected areas. This will allow

various agencies/ institutions, communities and stakeholders to work together and clarify roles and responsibilities in the management of forestlands and protected areas.

To promote investment in forestry and encourage tenure holders to invest in the protection and development of their allocated forestlands, DENR will have to streamline its forestry policies to guarantee secured tenure and ensure enjoyment of benefits as a result of good on site management. This would mean simplifying and standardizing the requirements and procedures for securing tenure instruments and harvesting permits as well as decentralizing their approvals. Investor-friendly regulations will be crafted and issued so that the private sector, communities, and domain holders can enter into win-win arrangements for co-investments and joint ventures in forest plantations, tree farm and agroforestry development, and wood-based processing facilities to meet domestic demand for round wood, fuelwood and other services.

In the face of new developments in the forestry sector brought about by challenges posed by climate change, the shifting priorities in demands towards forest ecosystem services and the resulting multiple clients in forestry, institutional transformation is indeed inevitable for DENR. This will require mainstreaming climate change concerns into the DENR's policy and institutional approaches and enhancing further the skills and capacities of its personnel especially in the field offices. Hence, capability enhancement trainings will be part of the strategies for effective implementation of the climate resilient Philippine forestry master plan. Among others, DENR personnel will have to be trained on their new roles as development facilitators, conflict mediators, IEM and forest land use planners, and as service providers in vulnerability assessment and climate change adaptation planning.

Program Components and Targets

To pursue the above strategies, the following program components will be implemented:

- **Tenure Issuance to Place Open Access Forestlands Under Appropriate Management Arrangement**

As part of implementing forest land use plans developed for each LGU, all open access forestlands will be placed under appropriate management arrangements. The proposed allocation and management instruments and potential on site managers as identified in the FLUP will be considered in the allocation process. Currently, it is estimated that about 4 million hectares of forestlands are still open access or without formally recognized on site managers. However, the actual situation is that these areas are occupied, cultivated or claimed either by migrants or by indigenous peoples. By 2028 seventy five percent (75%) of these open access forestlands will be issued with tenure/ management instruments so that accountable on-site managers can be put in place that would be responsible for the protection, development and rehabilitation of the allocated areas. Actual settlers and occupants of public forestlands and protected areas, especially the indigenous peoples will be given priority in the issuance of tenure/ management instruments. Community and individual tenure instruments such as community based forest management (CBFM) agreement, certificate of ancestral domain title (CADT) and protected area community based resource management agreement (PACBRMA) will be issued to provide land tenure security to these communities. DENR in partnership with LGUs and other agencies will provide the necessary financial and technical assistance to communities in preparing resource management plans and in the protection, rehabilitation and development of their allocated areas. Local and indigenous practices in managing public forestlands will be respected. For instance the “Muyong system” practiced in the Cordillera may be adopted by

local on-site Managers (tenure holders) as part of their management strategy in the allocated lands. Community watersheds may be reserved by local communities as part of their protection forests.

To facilitate proper identification of qualified on site managers, a nationwide census of forest occupants will be undertaken. This activity will be undertaken jointly with LGUs where there are forestlands. Current estimates indicate that around 1,300 LGUs still have lands classified as forestlands. The most recent census data of barangays which are completely within forestlands will be utilized to estimate forest occupants in these areas while enumeration may be undertaken in barangays which are partially located inside classified forestlands.

LGUs who want to have an area which they can develop as local sources of forest products may also apply for communal forests while those who intend to manage their water sources for domestic, irrigation or power development may request DENR to declare these areas as community watersheds. These proposed tenure instruments must be indicated in the proposed allocation plan of the approved FLUP consistent with the provisions of DENR-DILG Joint Memo Circular 2003-01.

- **Enhancement of Forestry Policies**

One of the frequently mentioned problems during the regional consultations which impede private sector investment in forestry is the highly centralized approval process and the numerous requirements in the issuance of tenure instruments/ permits. This increases the transaction costs of potential investors and the risk of recovering capital investment. Hence, there is a need to streamline administrative policies so that the processes are simplified, requirements standardized and approvals decentralized. The Forestry Development Center (FDC) which is tasked with forestry policy studies and

formulation should be tapped to harmonize and streamline existing forestry policies. Regular policy fora / consultations may be organized jointly by DENR and FDC at least two times a year to review and assess important policy requirements in the forestry sector. Considering the high investment cost and the long gestation period of forest plantations, it may be necessary also to liberalize documentary requirements for the issuance of permits to harvest fast growing planted tree species to provide assurance that investors can harvest what they planted and in the process recover their capital investments. Initially, DENR can liberalize harvesting of at least 2-3 fast growing tree species to encourage development of commercial tree plantations.

The passage of key legislations is also crucial to the proper management of forests resources. Two of the most important legislations are the congressional approval of various bills declaring the forestland boundaries and the sustainable forest management act. The former defines the extent and scope of DENR's jurisdiction and are necessary before DENR could demarcate the forestland boundaries on the ground. The latter provides the framework for sustainable management of demarcated forests and forestlands including protected areas and associated biodiversity resources. Indeed, DENR will have to mount a well organized information, education and communication program, mobilizing key stakeholders, particularly LGUs, to ensure the passage of these important legislations.

- **Institutionalizing Collaborative Management**

Because of overlapping institutional mandates, overlapping tenure instruments, the multiple stakeholders and competing demands for forest ecosystems goods and services, DENR has to institutionalize collaborative management arrangements with DILG, DA, DAR, DOT, NCIP, LGUs and other stakeholders. This approach is part of the strategy to provide venue for harmonizing operational

policies, and management arrangements especially in areas with overlapping tenure instruments. This is also part of the strategy in terms of developing consensus in prioritizing the “ENR servicing” function of forest ecosystems to supply water for various uses, supporting the enhancement of tourism attractions, supporting the productivity and sustainability of the fisheries sector, and reducing the exposure to risks and disasters of communities in affected LGUs. To facilitate the setting up of collaborative management bodies, DENR may maximize the use of technical approaches such as:

- FLUPs as inputs to CLUPs,
- Convergence through the IWRM strategic planning and implementation,
- REDD+ and forest plantation development,
- MOA and partnership arrangements,
- Valuation of ENR services and externalities, and
- Contracting and outsourcing ENR services.

The national convergence initiatives and the partnership arrangements for devolved and other forest management functions as provided in DENR-DILG JMC 98-01 and JMC 2003-01 can be expanded to include other stakeholders in the collaborative management bodies. Within the next five years, the formation of national and regional multi-sectoral collaborative management bodies and provincial, city and municipal forest management technical working groups (TWG) / steering committees will be initiated by DENR. These committees/ technical working groups will be multi sectoral in composition with members coming from representatives of national agencies, LGUs, NGOs, POs, IPs, and other relevant stakeholders. These collaborative management structures will also strengthen the external convergence mechanism or horizontal integration between DENR and other national government agencies (NGAs) on issues of climate change adaptation in the context of the ENR sector. At the local level,

the provincial, city and municipal committees or TWGs can serve as clearing house, a feedback mechanism, as well as a consultative forum to discuss climate change issues and interventions taking into consideration local realities, and to provide a venue to foster collective action among different stakeholders. They will also serve as venue for assessing the climate change implications and impacts of programs and projects at the local level. Support to regional collaborative management bodies will be focused during the first two years while organization and capacitation at the provincial and municipal level will be given emphasis in the next three years.

To further strengthen the partnership between DENR, DILG and LGUs, community-based forest management projects/areas and other ENR functions may be fully devolved to LGUs following the guidelines under DENR Administrative Order (DAO) 2010-07 concerning phased/ continuing devolution of ENR functions. This process can be done as LGUs develop their capacities in forest resources management through capability building trainings and active participation in activities of the multi sectoral technical working groups/ committees. It is anticipated that a synergistic relationship between these two processes can further enhance the capacity of both the multi-stakeholder platforms on climate change that will be created, and the institutionalization of an environmental management culture among the Local Government Units.

- **Mainstreaming Climate Change into the DENR's Policy and Institutional Processes**

In a policy brief entitled "Reshaping policy and institutions for integrating climate and disaster resilience," the Institute of Development Studies (IDS) through its program on Strengthening Climate Resilience (SCR) developed the Climate Smart Disaster Risk Management (CSDRM) approach, the principles of which

can be adopted and adapted by the forestry sector in the Philippines to strengthen its policy and institutional processes.

As the policy brief points out, the approach is cognizant of three important realities, which while based on the experience of other countries, are similar to what we in the Philippines face in the context of climate change, namely: uncertainty, adaptive capacity and poverty and vulnerability. To address these realities, the approach recommends the following:

- Cognizant of uncertainty, the approach seeks to improve the information on how hazards are changing with detailed risk assessments from diverse sources of knowledge, which includes local sources in addition to knowledge from the sciences, both natural and social.
- Cognizant of the inherent adaptive capacity of systems, the approach seeks to enable institutions and networks to develop new skills, knowledge and resources needed to enhance capacity to adapt to climate change.
- Cognizant of the prevalence of poverty and vulnerability in communities, the approach seeks to empower and support communities to address the root causes of vulnerability through challenging injustice, increasing access to resources and services and through environmentally sound development.

Attendant to these are four key strategies that have implications on policy and institutional processes in the forestry sector. These are as follows:

- Build flexibility for learning and change: The sector should begin to institutionalize a mechanism by which partnerships within and with external players are harnessed to address the uncertainty and fluidity in the context of social learning. This is enabled by a more flexible process, in which reflexivity, constant evaluation, monitoring and evaluation are

mobilized, and where policy is treated not as comprehensive-rational solutions, but as experiments.

- Localise national policy: The sector, cognizant of the complexity of local realities, and conscious of the fact that resilience can be optimized when the strategies are responsive to the specific challenges and opportunities which local communities face, should enable a more devolved process for fine-tuning policies that are issued at the national level.
- Connect knowledge for integrated responses: The use of data and information in the formulation of policies and processes should be strengthened. However, the strengthening of the policy-science connection must be holistic and integrative, and should not be limited only to scientific data, but must accommodate the indigenous knowledge of local communities.
- Changing context requires innovation: Building resilience in relation to climate change, not only of communities, but also of institutions like those in the forest management sector, would require a continuous process of innovation where learning, development and adjustments occur.

The policy brief offers specific recommendations to operationalize this. Some of these, with appropriate revisions, can be directly adopted by the DENR, through the leadership of the FMB, in order to strengthen its capacity to integrate climate change considerations in its policies and institutional processes. These are as follows:

- Facilitate horizontal integration through cross-government collaboration and engagement with local government units, civil society, business and citizens to develop integrated policy and action on disaster risk, climate change and poverty reduction.

- Provide incentives for collaboration between the different players and stakeholders, both state and non-state, national and local, recognizing that bringing different sectors together requires resources.
- Integration at the national level should be supported by specific guidelines and resources to support its implementation at the local level.
- Vertical integration between the national and local levels should be supported by appropriate systems and structures to enhance the flow of information that can ensure that local knowledge and realities are taken into consideration in the policy process.
- The role of knowledge mediators that are both technically and socially prepared should be enabled and institutionalized at the local level.
- The linkages between local governments and communities should be harnessed, and accountability mechanisms should be strengthened to promote a more informed disaster and climate risk intervention.

One other consideration, which was pointed out by Tom Harrison in his short article entitled “Towards a Climate-Resilient State,” is to consider climate change adaptation as not just a technical issue, but one that considers the total political and social system. Thus, in his words, “shaping relevant adaptation policies would involve going beyond the direct environmental consequences, linking them to their impact on the political and social realities. It would require focus on the linkages between development, peace and climate resilience in order to address the multi-dimensional aspects of vulnerability.”

Adopting this stance entails a consideration of climate change as an integral component of human environmental security, which in turn is part of the larger human security framework. This would entail the FMB, and DENR, to go beyond their geophysical, institutional and functional comfort zones. It is strongly recommended that this should be expressed as one of the key principles that

should be enshrined In the Forestry Master Plan, and in the new and updated draft of the Forestry Code.

It is pursuant to these considerations that the following institutional innovations need to be established in the forestry sector. These innovations take into account the multi-sectoral and multi-disciplinary nature of the problem, the multiple sources of knowledge, the fluidity of the policy process, the uncertainty of climate change information, and the need for inclusivity and flexibility, and to provide venues for a healthy interaction between and among these different players. These innovations would provide an appropriate context for a more inclusive, participatory policy process which is conducive for social learning for all sectors concerned.

A point that needs to be considered, however, in the context of the Forestry Sector, is that these institutional innovations would require going beyond FMB, and would entail an expansion of the scope for the operational coverage of policies and institutions for climate change. FMB can only take the initiative, but would have to now consider the involvement of other bureaus and offices in DENR at the national level, and other offices other than those directly connected with Forest Management Services at the Regional, Provincial and Community Environmental Offices.

Within DENR, it is therefore, recommended, that the ENR Sector, with FMB taking the lead, should take steps towards:

- *Creation of a National Technical Working Group (NTWG) on Climate Change.* Establish and strengthen an internal convergence mechanism or horizontal integration at the national level within DENR, among its bureaus and attached agencies, on issues of climate change adaptation, by creating within DENR a National Technical Working Group

on Climate Change by the end of 2015. This would be in pursuance of the Climate Change Act, where DENR is mandated to establish and maintain climate change information management system and network including on climate change risks, activities and investments in collaboration with other concerned national government agencies, institutions and LGUs. It is proposed that this TWG will be chaired by FMB.

- *Creation of Regional/Provincial/Community Technical Working Group on Climate Change.* Replicate the horizontal integration within DENR at the regional, provincial and community environmental levels, and create Regional/Provincial/Community Technical Working Groups on Climate Change by the end of 2017. This shall serve under the Office of the Regional Director/ PENRO/ CENRO and shall coordinate with the NTWG. All the key services and sectors of the DENR, at each level, should be represented in these Technical Working Groups. This may also require the issuance of a Department Administrative Order.
- *Creation of a Climate Change Focal Person at all levels and the Creation of a Climate Change Adaptation Budget.* Establish climate change key focal persons within local levels of the DENR (Regional, Provincial and Community) and set-aside a "Climate Change Adaptation Budget" which shall be a portion of the budget of the offices at each level by the end of 2016. This budget would be ear-marked for activities of the Councils and Working Groups related to the mainstreaming of DRRM and Climate change, which shall include but not limited to the conduct of localized vulnerability assessment for all programs and projects, capacity building, IEC and other related activities. This key focal person shall be the convenor of the Regional/Provincial/Community Technical Working Group. This can be contained in the DAO that creates the Technical Working Groups at the sub-national levels.

- *Creation of a Coordinating Body for Climate Change Within FMB.* Establish and strengthen the vertical integration between national players and local players, by creating a coordinating body in FMB by the end of 2015. This would facilitate and provide support to the link between national and local policy and processes in the context of climate change adaptation strategies within the Bureau, cognizant of the fact that it is not a top-down mechanism but serves as a venue for a healthy interphase between the local and the national. This body shall serve as the FMB's focal point in Climate Change issues.

- **Capability Enhancement**

The adoption of institutional reforms in the forestry sector will require significant amount of capacity building/ strengthening for all relevant personnel of the DENR, particularly at the local level. To support functional forestry as embodied in the DENR rationalization plan, the capabilities of front line forestry personnel will be strengthened in terms of integrated management of forest resources from ridge to reef, integrating forest land uses into the plans of LGUs and other sectors, promoting multiple uses of forests to satisfy demands from various clients, facilitating multi sectoral collaborative management of forestlands and adapting to climate changes to minimize impacts to ecosystems and communities, among others. Thus, the capability strengthening program would include the following:

- Capacity building for technical concerns in climate change and DRRM for key personnel at all levels, not only within DENR, but at the LGUs and other potential partners
- Capacity building for LGUs for environmental management
- Capacity building of ENR personnel in political literacy, particularly on the familiarity with laws, and on processes such as legislative procedures, legal procedures and remedies, mediation and conflict resolution

- Training of ENR Personnel on political analysis, especially on the conduct of stakeholder analysis and the establishment of multi-stakeholder platforms
- Internal levelling off of messages among all relevant units within the ENR bureaucracy that would be involved in forestry issues, and not only FMB
- Capacity building for social marketing, and in development communication

In addition, DENR will have to enhance the capabilities of its personnel in terms of IEM planning, forest land use planning, vulnerability assessment, political communications, conflict resolution, and other skills related to development management. A strong human resources development program is therefore necessary in implementing the Philippine master plan for climate resilient forestry development. As such, intensive capability enhancement trainings will be undertaken for DENR personnel especially during the first two years of the plan period or up to 2016. Capability strengthening programs will continue to be implemented annually to keep DENR and LGU staff abreast of recent developments in forestry and on climate change adaptations.

Part of the capacity building component would be to also influence the colleges and universities that offer forestry and forestry related courses to reorient their curricula to have the following attributes:

- To be more consistent with an integrated environmental management approach where climate change and disaster risk reduction management is integrated and
- To have a component on social marketing and strategic communication

Indicative Program Costs

Table 20 presents the indicative costs to support the program on promoting responsive governance in forestry. A total of 1.42 billion pesos will be needed for the entire master plan period to promote responsive governance in forestry. About 51% of the total costs or Php 729.0 million will be required to place open access forestlands under appropriate management arrangement through the issuance of land tenure instruments to responsible on site Managers. Capability enhancement trainings will also need Php 136.0 million (9.6% of total costs) to prepare DENR personnel in their new tasks as development facilitators and service providers in climate change vulnerability assessments, adaptation planning, forest land use planning and IWRM formulation.

In terms of yearly allocation, most of the costs (49% or Php 688.3 million) are concentrated in 2017-2022 with the first year (CY 2016) requiring Php 52.8 million and the last 6 years from 2023-2028 needing about Php 676.4 million.

Table 20. Indicative program cost: Responsive Governance in Forestry.

Programs / Activities	Implementation Period & Targets			Total	
	2016	2017-2022	20123-2028		
C. Promoting Responsive Governance					
Inventory of forest occupants	0	130,000	0	130,000	9%
2. Issuance of mgmt agreements for open access forestlands	24,300	267,300	437,400	729,000	51.43%
3 Forest policy Enhancement & devt ((Policy fora & review)	3,000	12,000	9,000	24,000	2%
3. Organization and capacitation of multi-sectoral collaborative management bodies	8,500	211,000	179,000	398,500	28%
5. Capability enhancement for DENR/ LGUs	17,000	68,000	51,000	136,000	9.59%
Total	52,800	688,300	676,400	1,417,500	
%	3.72%	48.56%	47.72%	100.00%	

4.2.4 Other Support Programs and Strategies

Support programs are cross cutting strategies geared towards facilitating achievement of the objectives of the primary programs on strengthening resilience of forest ecosystems and communities, programs on responding to demands for forest ecosystems goods and services as well as on promoting responsive governance in forestry.

Objectives

The support programs aim to:

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

Strategies

The following strategies will be pursued to achieve the foregoing objectives:

- Intensive information, education and communication campaign especially on climate change and its impacts on forest ecosystems and communities;
- Establishment and maintenance of a central data base management system and regional management information system (MIS);
- Regular monitoring and evaluation of tenure holders/ on site managers;
- Identification of and formulation of guidelines on sustainable sources of financing forest protection, rehabilitation and development;
- Formulation and implementation of guidelines for certifying sustainably managed forests and industries; and
- Intensifying forestry research on vulnerability to climate change, climate change adaptation measures, sustainable financing sources and other relevant researches.

Program Components and Targets

- **Information, Education and Communication (IEC)**

A well organized information, education and communication program will be developed to inform stakeholders and the general public on climate change and its impacts on forest ecosystems and communities. At the same time the role of forests in mitigating the adverse impacts of climate change such as in reducing disaster risks and securing water supply will be emphasized in IEC activities. The DENR will establish linkages with local and national advocacy groups in disseminating these information and other messages related to sustainable forest management. The use of web advocacy and other kinds of media will be enhanced further to generate wider public support and stakeholders' participation in forest resources management. Related to this, the public affairs office at the national and regional offices of DENR will be strengthened by providing capability enhancement training on climate change

vulnerability assessment, adaptation planning and other forestry related activities. Part of the IEC advocacy will be to mobilize key stakeholders, particularly LGUs, to ensure the passage of important legislations such as the sustainable forest management act and the proposed bills delineating the boundaries of forestlands in each province.

- **Database Management System**

Forestry data base management system will be designed, developed and maintained in FMB and in DENR regional offices. This system is crucial as depository of forestry and related information which are necessary in vulnerability assessments, adaptation planning, IWRM plan formulation, forest land use planning as well as in forest management decision making. This is also important in monitoring performance of tenure holders or FMU managers, including performance of DENR field offices and partnership arrangements. The system should capture basic information on forest resources by forest management unit, tenure holder, LGUs, CENRO, PENRO, and region. It should likewise show performance and key results at the tenure holders' level. The development of the data base system will be completed by end of 2016.

As part of the mandate of DENR under the Climate Change Act, DENR through the national technical working group on climate change shall include in the data base, information related to climate change, hazard prone areas, and good practices in climate change adaptation. Following this, documentation of climate change adaptation practices in various parts of the country and elsewhere, will be undertaken to form part of the data base.

- **Sustainable Financing**

A major constraint in implementation of most forestry projects and programs is continuity in financing. Forest protection, rehabilitation and conservation

activities are generally dependent on government allocation and donor funding. It is high time for the forestry sector to innovate and explore other sustainable financing mechanisms. This may include the adoption of payment for ecosystem services (PES), public-private partnership (PPP), access to voluntary carbon markets, and reduced emission due to deforestation and degradation plus (REDD+) financing. DENR can facilitate adoption of these financing mechanisms by developing the necessary policy guidelines/procedures and establishing the appropriate information system as well as the system for monitoring, reporting and verification. For instance, a REDD+-compliant forestry data base from all concerned sectors and agencies will have to be established, updated, and managed to be able to access REDD+ financing. The study and development of guidelines for sustainable financing in forestry, such as the payment for ecosystems services, will be undertaken during the first three years of plan implementation.

- **Results-Based Monitoring and Evaluation**

To promote accountability among tenure holders and field administrators of DENR, results-based monitoring and evaluation system will be put in place. Among others, the system must be linked to desired outputs and results in terms of protection of natural forests, development of forest plantations, and rehabilitation of bare forestlands, biodiversity conservation and sustainable management of watersheds. The baseline information generated in establishing the central data base management system will be used as basis for comparing future results and outputs of forest managers and administrators. Corollary to this, annual monitoring and evaluation of tenure holders' performance by a multi-sectoral provincial, city and municipal forest management TWG will be undertaken to develop transparency and accountability among tenure holders and governance units.

- **Forest Certification**

A forest certification system will be developed and instituted in the forestry sector to promote sustainable management of forest management units and ensure competitiveness of forest based products in the international market. Such a system will be based on a set of criteria and indicators for sustainable forest management (SFM) which the Forest Management Bureau (FMB) with funding support from the International Tropical Timber Organization (ITTO) has developed to measure progress towards SFM. The Philippine government has adopted SFM as the main strategy for plans and programs in the Forestry Sector to secure the long term sustainability of its forest resources.

The development of the Philippine C & I has undergone series of consultations with various sectors namely timber producers, People's Organizations (POs), non-governmental organizations (NGOs), Local Government Units (LGUs), Professional Organizations, the DENR, and other government agencies. However, the adoption and institutionalization of the developed Philippine C & I for SFM would require the development of an appropriate Audit System. The Audit System will lay the standards to measure achievement towards SFM that can be linked to internationally accepted initiatives on Forest/Timber Certification. The Philippines has to develop and adopt an appropriate Audit System to assess the C & I for SFM as basis for certifying sustainably managed forests.

The forest certification component will also be directed towards organizing the National Forest Certification Board which will oversee implementation of the forest certification program in the country. The development of the audit system, the organization of the National Forest Certification Board and the corresponding guidelines including the setting up of the necessary infrastructures will be targeted to be completed by the end of 2018.

- **Forestry Research**

The Ecosystems Research and Development Bureau (ERDB) will continue to provide support in the implementation of the PMPCRFD in terms of scientific information from research findings. Because of the focus on climate change impacts on forest ecosystems and communities, forestry researches will not only focus on production forestry but would now include technologies that will be useful in climate change adaptation in the forestry sector. Among the relevant forestry researches that are urgently needed are indigenous forest species which are resilient to climate change and their silvicultural requirements; the impacts of temperature change and changes in rainfall on different forest species and ecosystems; forest species resistant to fire; and documentation of good adaptation measures and strategies being implemented in various parts of the Philippines and even in other countries which may be adapted locally. Researches on tree improvement and appropriate technologies in the production of planting materials, especially those for commercial forest plantations are likewise very urgent.

Indicative Program Costs

The estimated cost for undertaking the support programs is shown in table 21. The total budgetary requirement is Php 2.68 billion over a 13 year implementation period, with 33.8 % of the total costs (Php 884.0 million) earmarked to support information, education and communication campaign. Additional support to forestry research would require Php 1.1 billion or 41% of the program cost while Php 442 million is needed for regular information gathering and results-based monitoring and evaluation of the forestry master plan implementation. The first year of plan implementation will require Php 226.2

million or 8% of the total budget while the next 6 years from 2017-2022 will need Php 1.23 billion or 46% of the total budget. The last 6 years from 2023-2028 will also require Php 1.23 billion.

Table 21. Indicative program cost: Other Support Programs.

Programs / Activities	Budget (thousand pesos)				%
	2016	2017-2022	2023-2028	Total	
D. Other Support Strategies					
Information, education and communication campaign	68,000	408,000	408,000	884,000	32.92%
Upgrading of central data base system	200	3,000	3,000	6,200	0.23%
Web site upgrading and updating	2,000	3,000	4,800	9,800	0.36%
Upgrading of regional MIS facilities	17,000	25,500	40,800	83,300	3.10%
Information gathering	17,000	102,000	102,000	221,000	8.23%
Results based monitoring and evaluation	17,000	102,000	102,000	221,000	8.23%
Development of forest certification system guidelines & implementation	10,000	60,000	60,000	130,000	4.84%
Additional support to forestry research	85,000	510,000	510,000	1,105,000	41.15%
Support to sustainable financing studies and formulation of guidelines	10,000	15,000	0	25,000	0.93%
Total	226,200	1,228,500	1,230,600	2,685,300	
%	8.42%	45.75%	45.83%	100.00%	

The Master Plan Implementation

5

The Philippine master plan for climate resilient forestry development is a national framework plan for the forestry sector. It provides the direction that the forestry sector will pursue in the next 13 years. Being a national framework plan, all regional plans of the DENR and of the different sectors in forestry should be consistent with the master plan. Thus, regional action plans will be prepared to align the annual forestry plans of the regions with the PMPCRFDD.

Before its implementation, the following institutional actions will be necessary:

- Seek formal approval from the DENR Secretary and the Office of the President through the cabinet to legitimize the Philippine Master Plan for Climate Resilient Forestry Development
- Generate funding support both from internal and external sources to finance implementation of the different programs as provided in the master plan
- As appropriate, coordinate with donor agencies for financial support to specific programs of the PMPCRFDD and
- Conduct orientation/ information campaign about the master plan in all regions to ensure that regional forestry programs are aligned with the master plan programs.

5.1 Implementation Schedule and Targets

The implementation schedule for the priority programs of the Philippine master plan for climate resilient forestry development is presented in table 22. Due to the urgency of responding to climate change impacts, vulnerability assessments, adaptation planning and the preparation of IWRM plans and FLUPs including the necessary capability trainings, will be targeted to be completed

within five years. Re-assessment of vulnerabilities to climate change hazards will be undertaken after four years to identify other areas vulnerable to natural hazards due to intensified climate change. Implementation of adaptation measures and most of the other programs to respond to demands for forest ecosystems goods services will be implemented for the entire plan period.

Table 22. Schedule of Implementation and Targets

Strategic Programs and Activities	Targets and Implementation Period			
	2016	2017-2022	2023-2028	Total
A. Strengthening Resilience of Forest Ecosystems and Communities to Climate Change				
1. Training on vulnerability assessment, adaptation planning, IPM, IWM, FLUP (no. of training)	34	277	0	311
2. Vulnerability assessment (watersheds and PAs)	61	97	40*	158
3. Adaptation planning (watersheds & PAs)	102	138	80 **	240
4. Assessment of other watersheds	0	97	0	97
5. Formulation of integrated watershed management plans	28	103	-	131
6. FLUP formulation (no. of LGUs)	150	712	-	862
7. Protection of existing forests & plantations (ha)	8,132,143	9,500,272	10,720,350	10,720,350
8. Mgmt of protection forest & protected areas				
rehabilitation of degraded areas /ANR dev't (ha)	68,126	102,000	102,000	272,126
ANR areas maintained (ha)	68,126	170,126	102,000	272,126
9. Mangrove rehabilitation & devt.(ha)	31,337	18,000	9,000	58,337
Areas Maintained (ha)	31,337	49,337	36,000	58,337
10. Agroforestry support to CBFM, CADT, PACBRMA				
Rubber-based AF plantation area development (ha)	30,000	30,000		60,000
Plantation maintenance (ha)	30,000	60,000	60,000	60,000
Bamboo-based AF plantation development (ha)	7,782	18,000		
Plantation maintenance (ha)	10,782	25,782	25,782	25,782
Mixed crops AF development	47,000	297,000		344,000
Plantation maintenance (ha)	47,000	344,000	344,000	344,000
11. Support to REDD+ (provinces)	3	10	7	20
B. Responding to Demands for Forest Ecosystems Goods and Services				
1. Forestland boundary & zones demarcation (ha)	0	15,805,325	-	15,805,325
2. Development of seed production areas (sites)	75	75	75	75
3. Commercial forest plantation development for round wood prodn. (ha)				
Plantation establishment (ha)	29,648	598,315	811,335	1,439,298
plantation maintenance (ha)***	401,788	918,505	1,234,298	1,439,298
4. Fuelwood/ bio energy plantation dev't				
Fuelwood plantatios establishment (ha)	12,575	125,683	158,977	297,234

Strategic Programs and Activities	Targets and Implementation Period			
	2016	2017-2022	2023-2028	Total
plantation maintenance (ha)***	87,568	180,286	201839	297,234
5. Management of grazing lands (ha)	88,609	99,203	111,063	111,063
6. Watershed rehabilitation (reforestation)				
Rehabilitation of degraded watersheds (ha)	90,937	102,000	102,000	294,937
Maintenance of refo areas (ha)	90,937	192,937	294,937	294,937
7. Watershed rehabilitation (structural measures and instrumentation (regions supported)	16	16	-	16
8. Organization and capacitation of watershed management bodies (No)	143	240	240	240
9. Support to urban forestry in major cities and urban centers (ha)	867	1,530	1,020	3,417
12. Establishment and operation of mechanized nurseries (regions)	11	11	11	11
C. Promoting Responsive Governance				
1. Inventory of forest occupants	0	1,300		1,300
1. Tenure issuance in open access forestlands (ha)	100,000	1,100,000	1,800,000	3,000,000
2 Enhancement of forest policies (No.of Policy fora)	4	16	12	32
3. Organization and capacitation of multi-sectoral collaborative management bodies (national, regions and province)	17	98	98	98
5. Capability enhancement for DENR/ LGUs (no. of trainings)	34	136	102	272
D. Other Support Strategies				
1. Information, education and communication campaign (regions and central office supported)	17	17	17	17
2. Upgrading of central data base system (central)	1	1	1	3
3. Web site upgrading and updating	1	1	2	4
4. Upgrading of regional MIS facilities (regions)	16	16	16	16
5. Information gathering (regions & central)	17	17	17	17
6. Support to sustainable financing studies and formulation of guidelines (studies)	2	3	-	5
7. Results based monitoring and evaluation (regions)	17	17	17	17
8. Development of forest certification system guidelines & implementation	Guidelines finalized	implement guidelines	implemented guidelines	guidelines implemented
9. Additional support to forestry research (regions and ERDB)	17	17	17	17

* Re-assessment of vulnerability to climate change hazards

** Re-planning of adaptation strategies

*** Includes NGP timber plantations established from 2011 to 2015

5.2 Budgetary Requirements and Financing Program

The total budgetary requirement of the Philippine master plan for climate resilient forestry development is Php 135.16 billion over a period of 13 years. The

bulk of the budget (69%) equivalent to Php 92.8 billion will support programs related to responding to demands for forest ecosystems goods and services. Only 28% of the total cost (Php 38.2 billion) is earmarked to strengthen resilience of ecosystems and communities to climate change while programs on responsive governance and support programs combined consists of 3% of the total budget or Php 4.1 billion.

Among the different program components, forest plantation development for round wood production has the biggest share of the budget at 47%, followed by support to climate smart livelihood/ agroforestry activities of CBFM / CADT beneficiaries (14%), protection of existing forests and rehabilitation of degraded protection forests, combined (12%) and the development of fuelwood plantations (7% of total budget). The rehabilitation of watersheds need about Php 5.7 billion or 4% of the total budget.

Financing of the master plan programs will come from various sources (DENR, LGUs, POs, private investors and donor agencies). National government funding is estimated at 34.5% of the total budget while private sector and donor investments are estimated to be 31% and 24.6%, respectively of the total budget. In most of the program activities where communities and tenure holders have direct economic benefits, private sector investments will be encouraged. This would include forest plantation development, agro forestry development, and management of grazing lands. However, activities related to planning, assessments and capability enhancements will be financed from public funds. This would include vulnerability assessments, adaptation planning, IWM plan formulation, forest land use planning, trainings, and other support and governance related activities. Table 23 presents the total indicative costs needed to implement the priority programs of the Philippine master plan for climate resilient forestry development.

Table 23. Total indicative costs of priority programs under the Philippine Master Plan for Climate Resilient Forestry Development

Programs / Activities	Estimated budgetary requirements				Potential fund sources					% OF TOTAL
	2016	2017-2022	2023-2028	Total	DENR/ Natl	LGUs	POs	Private	Donors	
A. Strengthening Resilience of Forest Ecosystems and Communities to Climate Change	3,862,847	18,448,414	15,909,880	38,221,141	16,785,310	3,053,328	7,824,899	-	10,557,605	28.3%
Watershed Management Planning and Forest Land Use Planning Program	204,800	1,372,900	104,000	1,681,700	1,127,800	456,900	-	-	97,000	1.2%
1 Training on vulnerability assessment, adaptation planning,, IWM, FLUP (no.)	10,200	83,100	-	93,300	93,300	-	-	-	-	0.1%
2. Vulnerability assessment	61,000	237,000	80,000	378,000	208,600	169,400	-	-	-	0.3%
3. Adaptation planning	30,600	89,400	24,000	144,000	72,000	72,000	-	-	-	0.1%
4. Identification/ assessment of other watersheds	-	504,400	-	504,400	504,400	-	-	-	-	0.4%
5. Formulation of integrated watershed management plans	28,000	103,000	-	131,000	34,000	-	-	-	97,000	0.1%
6. FLUP formulation w/ LGUs	75,000	356,000	-	431,000	215,500	215,500	-	-	-	0.3%
Forest Protection and Rehabilitation	3,658,047	17,015,514	15,805,880	36,539,441	15,657,510	2,596,428	7,824,899	-	10,460,605	27.0%
1. Protection of existing forests and Plantations	813,214	5,385,660	6,129,804	12,328,678	4,959,100	1,239,775	-	-	6,129,804	9.1%
2. Rehabilitation of degraded areas in protection forests	613,134	1,785,756	1,530,000	3,928,890	2,398,890	-	-	-	1,530,000	2.9%
3. Mangrove rehabilitation/ plantations development	720,751	683,022	288,000	1,691,773	1,639,270	52,503	-	-	-	1.3%
4. Agroforestry development	1,501,948	9,161,076	7,736,076	18,399,100	6,591,250	1,304,150	7,824,899	-	2,678,801	13.6%

Programs / Activities	Estimated budgetary requirements				Potential fund sources					% OF TOTAL
	2016	2017-2022	2023-2028	Total	DENR/ Natl	LGUs	POs	Private	Donors	
REDD+ Implementation	9,000	60,000	122,000	191,000	69,000	-	-	-	122,000	0.1%
B. Responding to Demands for Forest Ecosystems Goods and Services										68.7%
Forest Plantation Development	4,410,044	40,406,444	48,022,968	92,839,456	26,969,278	801,685	1,597,733	41,946,799	21,523,961	58.7%
Forest Plantation Development	2,466,426	34,211,344	42,602,549	79,280,320	22,586,707	-	1,597,733	36,082,502	19,013,378	58.7%
1. Demarcation of forestland boundaries	-	3,840,694	-	3,840,694	3,840,694	-	-	-	-	2.8%
2. Development and maintenance of seed production areas	75,000	450,000	450,000	975,000	975,000	-	-	-	-	0.7%
3. Establishment of mechanized nurseries (regions)	120,000	-	-	120,000	120,000	-	-	-	-	0.1%
4. Operation and maintenance of mechanized nurseries	55,000	330,000	330,000	715,000	715,000	-	-	-	-	0.5%
5. Commercial forest plantation development for round wood production (ha)*	1,827,972	25,401,063	36,764,876	63,993,912	13,955,705			36,082,502	13,955,705	47.3%
6. Fuelwood/ bio energy plantation dev't (ha)	388,454	4,189,587	5,057,673	9,635,714	2,980,308		1,597,733		5,057,673	7.1%
Watershed Mmanagement and Rehabilitation	1,471,018	3,285,722	2,184,000	6,940,740	3,679,727	750,430	-	-	2,510,583	5.1%
1. Rehabilitation of degraded watersheds (ha)	1,273,118	2,432,622	2,040,000	5,745,740	2,622,727	750,430	-	-	2,372,583	4.3%
2. Watershed rehabilitation (structural measures and instrumentation)	170,000	680,000	-	850,000	850,000	-	-	-	-	0.6%
3. Organization and capacitation of watershed management bodies , (e.g. watershed mgmt. council)	27,900	173,100	144,000	345,000	207,000	-	-	-	138,000	0.3%
Grazing Lands Management (ha)	446,590	2,863,478	3,205,819	6,515,886	651,589	-	-	5,864,298	-	4.8%
Urban forestry support	26,010	45,900	30,600	102,510	51,255	51,255	-	-	-	0.1%
C. Promoting Responsive Governance	52,800	688,300	676,400	1,417,500	733,100	17,000	-	-	667,400	1.0%

Programs / Activities	Estimated budgetary requirements				Potential fund sources					% OF TOTAL
	2016	2017-2022	2023-2028	Total	DENR/ Natl	LGUs	POs	Private	Donors	
1. Inventory of forest occupants	-	130,000	-	130,000	130,000	-	-	-	-	0.1%
2. Issuance of mgmt agreements for open access forestlands	24,300	267,300	437,400	729,000	291,600	-	-	-	437,400	0.5%
3 Forest policy Enhancement & devt ((Policy fora & review)	3,000	12,000	9,000	24,000	24,000	-	-	-	-	0.0%
4. Organization and capacitation of multi-sectoral collaborative management bodies	8,500	211,000	179,000	398,500	219,500	-	-	-	179,000	0.3%
5. Capability enhancement for DENR/ LGUs (no. of trainings)	17,000	68,000	51,000	136,000	68,000	17,000	-	-	51,000	0.1%
D. Other Support Strategies	226,200	1,228,500	1,230,600	2,685,300	2,175,300	-	-	-	510,000	2.0%
Information, education and communication campaign	68,000	408,000	408,000	884,000	884,000					0.7%
Upgrading and maintenance of central data base system	200	3,000	3,000	6,200	6,200					0.0%
Web site upgrading and updating	2,000	3,000	4,800	9,800	9,800					0.0%
Upgrading & maintenance of regional MIS facilities	17,000	25,500	40,800	83,300	83,300					0.1%
Information gathering	17,000	102,000	102,000	221,000	221,000					0.2%
Results based monitoring and evaluation	17,000	102,000	102,000	221,000	221,000					0.2%
De't of forest certification system guidelines & implementation	10,000	60,000	60,000	130,000	130,000					0.1%
Additional support to forestry research	85,000	510,000	510,000	1,105,000	595,000				510,000	0.8%
Sustainable financing studies and formulation of guidelines	10,000	15,000	-	25,000	25,000					0.0%
TOTAL	8,551,891	60,771,659	65,839,847	135,163,397	46,662,988	3,872,013	9,422,632	41,946,799	33,258,966	100.0%
% of total	6.3%	45%	49%		34.5%	2.9%	7.0%	31.0%	24.6%	

5.3 Monitoring and Evaluation

Regular monitoring and evaluation of progress in the implementation of the forestry master plan will be undertaken. Annual assessments of plan implementation will be conducted by the planning office of FMB to determine progress towards achieving the objectives of the master plan including problems and issues encountered in implementation. Aside from the annual assessments, formal review of the master plan implementation will be undertaken every 5 years to determine if adjustments in the plan would be necessary. This formal review will be participated in by DENR field personnel, LGUs and other stakeholders.

The Planning Division of FMB will have to design the M&E system for the PMCRFD. The system to be adopted must be able to assess achievement of master plan objectives and targets. The hierarchy of goals and objectives has been identified in chapter 4 of this plan and specific targets for each program to achieve the objectives have been laid out. It is important to initially identify the indicators for measuring progress towards achievement of the objectives so that it will be clear to the monitoring team what information to gather. The parameters and information to be gathered will also depend on the users of the M&E results.

Once indicators of outputs, effects and impacts of plan implementation have been decided, the frequency of obtaining the necessary data will have to be agreed upon. There are indicators which may not be practical to be measured quarterly or annually since they may not be observable within this period. The means of gathering the needed data will also have to be designed. In some cases, surveys, sampling or other forms of studies may be necessary. For

instance, determining whether the income of upland farmers has increased may need some formal studies.

The actual data gathering will also have to be considered. While in most cases, data gathering may be undertaken internally by DENR personnel, it may be necessary to validate at some point the results of the internal monitoring and evaluation conducted by DENR. In this case, an independent third party evaluation team may be engaged to validate the reported accomplishments and recommend measures to adjust the PMPCRFD if necessary.

Economic Viability of the Philippine Master Plan for Climate Resilient Forestry Development

6

The Strategic programs of the Philippine master plan for climate resilient forestry development along with their key components were evaluated to determine the plan's economic viability, particularly in terms of the following benchmarks:

- Net Present Value (NPV) > 0
- Internal Rate of Return \geq 18% and
- Benefit cost ratio > 1.

The analysis was conducted for the remaining period of master plan implementation which is 13 years. In conducting the assessment, benefits from the following economic program components were assessed:

- Commercial forest plantation establishment
- Fuelwood plantation development
- Agroforestry development (rubber-based and bamboo-based agroforestry) and
- Grazing lands management

The average yield of forest plantations was placed at 100 cubic meters per hectare with a rotation of 10 years. At a conservative farm gate price of Php 1,500/ cu. m, the net benefit of forest plantations is Php 150,000.00 per hectare after 10 years. For fuelwood, the assumed average yield after 3 years is 1,000 cu. meters per hectare, managed through coppice method at three coppicing period. At the average retail price of Php 387.00/ cu. meter and 60% harvesting

and transportation cost, the average benefit from fuelwood plantations is estimated at Php 150,000.00 per hectare every 3 years.

Two models of agroforestry plantations were assessed for the forestry master plan, namely, rubber based agroforestry and bamboo based agroforestry. For rubber, the projected harvest of natural rubber after seven years is 0.40 kgs per tree every 15 days. With 500 trees per hectare and 10 months harvesting period in a year, the yield per hectare per year is about 4,000 kgs. If the tapper's share is 40% of the yield and at an average farm gate price of Php 70.00 per kilo, the farmer's gross income from rubber plantation would amount to Php 168,000.00 per hectare starting in the seventh year. In terms of bamboo production, the documented harvest after five years is 5 poles per clump. With 200 clumps per hectare, the estimated harvest per hectare is 1000 poles. At an average price of Php 50.00/ pole and assuming 25% of the price goes to the harvester, the gross benefit from bamboo plantations would amount to Php 37,500.00 per hectare starting the 5th year and every year thereafter.

The benefit from cattle grazing was computed by assuming a conservative gross weight gain of 0.5 Kg. per cattle per day (posted in pinoyagribusiness.com) with two cattle per hectare at 180 days grass fattening period. Based on the Bureau of Agricultural Statistics report, the farm gate price of live cattle in 2014 was Php90.00 per kg. Thus, the gross benefit from cattle raising is estimated at Php16,200.00 per hectare. Assuming a variable cost of Php 2,500.00/ cattle and a minimum fee of Php 40.00 per hectare for grazing lease, the computed net benefit from cattle raising is about Php 11,160.00 per hectare per fattening period of 180 days.

In addition, benefit from watershed and protected areas rehabilitation including protection of existing forests was estimated by assuming that without adequate protection and rehabilitation of watersheds and forestlands, water supply

/availability would be adversely affected which could lead to a loss of at least 1% in the country's annual palay production of 16.68 million metric tons (Bureau of Agricultural Statistics, 2011). At the current price of Php 19.13/ kg (BAS, 2014), the averted loss in palay production due to improved management of watersheds would amount to Php 3.19 billion per year. However, this benefit would only be realized after the 10th year when the rehabilitation and forest protection efforts would have resulted to significant forest cover on degraded watersheds.

In determining the investment costs of the master plan documented costs during the consultations from actual tree farmers and the NGP costs of ANR, reforestation and mangrove rehabilitation were used. Other assumed costs for training and management planning were based on average costs for these activities by DENR. The total investment cost of the forestry master plan is found in table 23.

Using the benefit and cost estimates as discussed in the foregoing section, the net present value, benefit cost ratio and the internal rate of return were computed. Based on the benchmarks set to determine economic viability, the results are summarized in table 24. Overall, the Philippine master plan for climate resilient forestry development is economically viable by satisfying the hurdle rates of a positive (greater than nil) Net Present Value for Benefits (NPV), at PhP 35.5 billion and at least 18% IRR, which was computed to be 47%. The investments will also result to a benefit cost ratio of 1.73.

Table 24. Economic viability of the Philippine Master Plan for Climate Resilient Forestry Development

Years	Investment Cost	Incremental benefits (Php '000)							
		Commercial forest plantations	Fuelwood plantations	Rubber plantations	Bamboo plantations	Grazing lands mgmt	Averted losses in palay prodn.	Total benefits	Net benefits (Php'000)
1	8,551,891	-	4,280,700	-	-	988,877	-	5,269,577	(3,282,314)
2	9,063,480	-	3,084,900	-	-	1,007,666	-	4,092,566	(4,970,914)
3	9,456,392	-	3,883,350	-	-	1,026,811	-	4,910,161	(4,546,231)
4	9,747,241	-	6,166,950	-	-	1,046,321	-	7,213,271	(2,533,970)
5	10,369,151	-	8,359,549	-	2,918,250	1,066,201	-	12,344,000	1,974,849
6	10,628,766	7,156,650	8,518,381	-	4,043,250	1,086,459	-	20,804,740	10,175,974
7	11,506,630	5,083,050	8,680,230	6,300,000	5,168,250	1,107,101	3,190,884	29,529,515	18,022,886
8	10,153,610	10,984,176	8,845,154	7,350,000	6,293,250	1,128,136	3,190,884	37,791,600	27,637,991
9	10,557,552	11,151,324	9,013,212	8,400,000	7,418,250	1,149,571	3,190,884	40,323,242	29,765,689
10	10,706,978	12,110,054	9,184,463	9,450,000	8,543,250	1,171,413	3,190,884	43,650,064	32,943,086
11	11,201,969	12,715,556	9,358,968	10,500,000	9,668,250	1,193,670	3,190,884	46,627,328	35,425,359
12	11,476,161	13,351,334	9,536,789	11,550,000	9,668,250	1,216,349	3,190,884	48,513,606	37,037,445
13	11,743,578	14,018,901	9,717,988	12,600,000	9,668,250	1,239,460	3,190,884	50,435,482	38,691,904
Total									

[NPV@18%](#) 35,540,500

BCR 1.73

IRR 47%

Carbon Benefits of the Philippine Master Plan for Climate Resilient Forestry Development

Implementation of the Philippine Master Plan for Climate Resilient Forestry Development will contribute towards reducing carbon emissions due to deforestation and forest degradation. It will also contribute to carbon sequestration as new forest/ agroforestry plantations are developed and maintained. In computing the carbon benefits, estimates of carbon stocks and carbon sequestration rates of different vegetative cover based on studies conducted by Lasco and Pulhin (2003), were used (see table 25).

Table 25. . Estimates of carbon stock and sequestration rates (Lasco and Pulhin, 2003)

Forestlands Management	Carbon Content	Carbon stock,(t/ha)	Carbon Sequestration, (t/ha/yr)
Old Growth Forest	50%	212.5	0.9
Mossy	45%	183.8	nd
Pine	49%	90.1	nd
Sub-marginal Forest	Nd	nd	nd
Mangrove	44%	176.8	
Second Growth Forest	45%	207.9	1.1
Brushland	45%	29	4.3
Tree Plantations	varies	59	4.2
Openland/Grassland	43%	12.1	nd
Agroforestry	45%	45.4	5.3
Non-vegetated Land		0	

The net carbon benefits was determine by taking into account the resulting carbon stock from avoided deforestation and the carbon that will be sequestered by the forest area which would have been destroyed without effective protection resulting from the master plan implementation. In addition, the difference in carbon stocks and the net carbon sequestration as result of converting brush lands into plantations under the master plan will add up to the carbon benefit of the forestry master plan.

Avoided deforestation was estimated by computing the deforestation rate between 1980 and 2010 based on actual forest inventory. The 1997 forest cover data from the forestry statistics was not used in this computation since it is based on mere projections in past rates of deforestation when logging by TLAs was still pre-dominant. As such, a lower rate of deforestation was obtained equivalent only to 60,000 hectares per year or 0.9%.

Table 26 summarizes the net carbon benefits as a result of implementing the Philippine Master Plan for Climate Resilient Forestry Development. Implementation of the various forest protection and rehabilitation/ plantation development activities would contribute a net carbon benefit equivalent to 302,278,878 tons of carbon.

Table 26. Estimated Net Carbon Benefit from PMPCRFD Implementation

Components	Net Carbon benefit (tons)
Avoided deforestation	172,125,988
Carbon stock	166,305,007
Carbon sequestration	5,820,981
New Plantations	143,574,732
Carbon stock of new plantations	118,912,487

Components	Net Carbon benefit (tons)
Agroforestry	7,048,425
Mangrove	10,313,982
Rehabilitation of watersheds	52,764,229
Rehabilitation of degraded prot. Forests	48,683,341
Urban forestry	102,510
Carbon sequestration of new plantations	24,662,245
Mangrove	334,696
Agroforestry (AF)	11,650,757
Round wood Tree plantations (TP)	10,167,863
watershed rehab (WR)	1,323,846
Protection forest rehab.(PFR)	1,123,109
Urban forestry(UF)	61,975
Subtotal: carbon benefit	315,700,720
Annual reduction in BL sequestration due to site preparation and maintenance (30%)	13,421,842
Net Carbon Benefit of the PMPCRFD	302,278,878

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Annexes

Annex 1. Summary of Accomplishments, Problems/ Issues, Facilitating Factors and Recommendations in the Implementation of the 2003 Revised Master Plan for Forestry Development

Forestry Master Plan Targets	Findings/ Accomplishments	Problems/Issues/Facilitating Factors	Recommendations
<p>1. All regions starting to implement strategies towards SFM within 1-5 years</p>	<p>All regions (except NCR) are implementing the following SFM strategies:</p> <ul style="list-style-type: none"> • Forestland Boundary delineation • Forest Land Use Planning • Co-Management • CBFM • Convergence initiatives • Tenure Issuance • Establishment of Protected areas • Adoption of the Watershed Ecosystem Management Framework (WEM) 	<p><u>Facilitating factors:</u></p> <ul style="list-style-type: none"> • SFM programs/ strategies are already part of the regular programs of DENR • Donor funding • LGUs are getting interested in co-managing forestlands to prevent destructive calamities (flooding) • There are investors interested to invest in plantation development <p><u>Problems/ issues:</u></p> <ul style="list-style-type: none"> • Difficulty in securing harvesting permits because of required regional clearance under Memo Feb 5, 2013 • How do we strengthen further the implementation of these strategies • How do we sustain financing of these strategies • No clear IRR on co-management • Short time to prepare FLUP • Multi tasking of personnel • Difficulty in renewal of tenure instruments, because 	<ul style="list-style-type: none"> • Provide incentives to plantation developers similar to those provided by the Phil. Coconut Authority (PCA) • Decentralize approval of some permits to CENRO • Expand the coverage of FLUP to cover all LGUs • Explore innovative financing such as carbon trading (ERDB Has spearheaded study on carbon sequestration of 4 forest plantation species) • Expand study to include carbon stock of natural forest • Include C&I to monitor achievement of SFM • Forest certification • PD 705 must be revised and facilitate approval of Sustainable Forest Management Act (SFMA) <p>1. More capacity building on FLUP formulation.</p>

Forestry Master Plan Targets	Findings/ Accomplishments	Problems/Issues/Facilitating Factors	Recommendations
		of required clearance from CADT holders and LGUs (case of BFI, PTFI, SUDECOR, PICOP)	
<p>2. Productive collaboration among DENR, LGUs and other watershed stakeholders in responsible forest management within 5 years</p>	<ul style="list-style-type: none"> • Significant achievements in stakeholders collaboration in all regions as evidence by active participation of LGUs and other watershed stakeholders in forest management through: • Watershed management councils • Multi sectoral forest protection committees (MFPCs) • Protected area management boards (PAMBs) • Co-Management Steering Committees • Multiple Monitoring Team (MMT)\ • Anti – Illegal Logging Task Force • FLUP integrated in CLUP • Barangay Forest Program • LGU involvement in NGP • Management of ecotourism by LGUs • Bottoms Up Budgeting (BUB) • Urban Farming (Quezon City) • Pamana at Masaganang Pamayanan (PAMANA) of DILG 	<p><u>Facilitating Factors</u></p> <ul style="list-style-type: none"> • There are existing mechanisms that promote collaboration: FLUP; Co-management; Anti-illegal logging task force;MFPCs, local govt community manage PA, Indigenous cultural community areas (ICCAs), etc • Awareness on the value of the forests is increasing because of disasters as affected by climate change • Existing policies on DRRM promotes forest conservation aside from existing mechanisms in the DENR <p><u>Some issues/ problems:</u></p> <ul style="list-style-type: none"> • Insufficient funding from stakeholders • Conflicting interests of stakeholders • Overlapping boundaries of tenure holders or LGUs which create conflicts among stakeholders • Weak mechanisms for external linkages with LGUs and other 	<ul style="list-style-type: none"> • More enhanced IEC • Intensify IEC on FLUP, Permit issuance, and other policies (Advocacy) • Replicate good practices in other areas • Complete the cadastral surveys to resolve political boundaries

Forestry Master Plan Targets	Findings/ Accomplishments	Problems/Issues/Facilitating Factors	Recommendations
		stakeholders; <ul style="list-style-type: none"> Unclear responsibility of WMC vis-à-vis PAMB 	
3. 150 watersheds <ul style="list-style-type: none"> Characterized and prioritized in 2 years With integrated management plans prepared in 5 years With management body in place within 5 years 	<ul style="list-style-type: none"> 114 watersheds characterized and prioritized 99 plans prepared Watersheds with organized watershed management councils (WMCs☺) Ligmanan Pulantuna Pola watershed (Reg. 4A) Real – Infanta (Reg. 4B) PAs in Bicol have PAMBs (Reg. 5) 9 proclaimed watersheds in region 6 with active WMC (3 are within PA with PAMB) Carood (R-7) Abatan river Loboc WMCs formed in Reg.8 but some are not very active 2 watersheds in Reg. 9 with active WMCs Regions 10, 11, 13 has 1, 2 and 6 WMC organized respectively 	<u>Facilitating factors</u> <ul style="list-style-type: none"> Donor / funding support Involvement of stakeholders is crucial (Water district in Maasin hired forest guards; EDC, water districts, academe are active in region 8 and providing counter resources Supportive LGUs (e.g. region 7 where PLGU issued EO creating the WMCs) Clear jurisdiction <u>Problems/ issues</u> <ul style="list-style-type: none"> With plans but no budget to implement Some plans still for Secretary’s approval or returned to use new formats Need to link watershed management plan with investment plan User’s fee still being discussed Funding problems for WMC operation 	<ul style="list-style-type: none"> Involve IPs in planning Develop clear policy on water user fees or PES &, benefit sharing; Research on appropriate water rates.- willingness to Pay, etc. Facilitate approval of mgmt plans; DENR to initiate formation of mgmt bodies once the plans are approved; Include in MFO the formation of mgmt bodies Legislate establishment of watersheds and provide funds. Develop mechanisms to generate funds internally for watershed management.

Forestry Master Plan Targets	Findings/ Accomplishments	Problems/Issues/Facilitating Factors	Recommendations
<p>4. Forestlands boundary relocated and demarcated; production forests delineated within 10 years</p>	<ul style="list-style-type: none"> • Forestland delineation almost completed with 75 out of 80 provinces delineated with draft bills but not yet demarcated • Delineation of production and protection forests on going through FLUP 	<p><u>Facilitating factors:</u></p> <ul style="list-style-type: none"> • Donor funding (Loan from world bank) • Delineation was included in regional targets <p><u>Identified problem/ issue</u></p> <ul style="list-style-type: none"> • Requires approval of the draft bills by congress before demarcation can be done & before delineation into production/ protection forestland 	<ul style="list-style-type: none"> • Advocacy for and facilitate congressional approval of the draft bills establishing the forestland boundaries
<p>5. Forestry and related policies harmonized within 5 years</p>	<ul style="list-style-type: none"> • Many policies were issued which harmonized existing forestry related policies, such as: • DENR-NCIP JAO 2008-01- regarding documentation and permitting of indigenous practices and knowledge • DENR-DILG Joint Memorandum Circular (JMC) 2003-01 on Strengthening and Institutionalizing the DENR-DILG-LGU Partnerships on Devolved and other Forest Management Functions, • DA-DAR-DENR JMC 2010-01 Policy and Implementation Framework for the Enhanced Convergence Initiatives among DA, DAR and DENR • DMC 2005-05 Harmonization of definition of terms • Gaps identified: 	<p><u>Facilitating Factor</u></p> <ul style="list-style-type: none"> • The presence of foreign funded projects facilitated the efforts at harmonization (EcoGov for JMC 2003-01 and JICA for JAO 2008-01) <p><u>Problems/ Issues</u></p> <ul style="list-style-type: none"> • Need to harmonize PCSD – DENR issuances (Palawan) • Harmonize local ordinances (LGUs) with. national policies as some Mayors are issuing transport permits (region 6 and 8) • Need to have clear working protocols between NCIP and. DENR to reduce high transaction costs associated with FPIC • need to harmonize implementation of tenure policies within forest lands (e.g. 	<ul style="list-style-type: none"> • More IEC for LGUs, and provide regular updates on current policies. • Facilitate approval of SFMA • Facilitate approval of proposed sustainable forest mgmt agreement (an integrated tenure instrument) • Establish protocols to harmonize working relations among different agencies • Organize multi sectoral bodies which harmonizes IP concerns • Facilitate formulation of ADSDPP harmonized with FLUP & CLUP.

Forestry Master Plan Targets	Findings/ Accomplishments	Problems/Issues/Facilitating Factors	Recommendations
	<ul style="list-style-type: none"> • Guidelines on Co management • Harmonizing governance in PAs, CADTs, Mining, etc . • SFMA has not been passed yet 	tenure overlaps among CBFMA, CADT, PA/ PACBRMA) <ul style="list-style-type: none"> • Weak advocacy for the passage of the SFMA • Need to have a central data base management, internal quality assurance and compliance 	
6. All forestlands under sustainable management by capable managers, all open areas closed within 12 years.	<ul style="list-style-type: none"> • 11 million hectares are under various kinds of tenure instruments and management arrangements, while 4 million hectares are still under open access. 	<u>Problems/ Issues</u> <ul style="list-style-type: none"> • Tenure Issuance/ processing suspended subject to clearance from Secretary except CBFM and additional requirements for Forestland Use Agreement for Tourism (FLAGT) • FLUPs/ CLUP are still on going • Tenure issuance is not part of the KRA of regions; • Centralized issuance of tenure instruments • Overlapping instruments • Most of the open access areas are also covered with CADT applications • Do IPs have the technical and financial capabilities? 	<ul style="list-style-type: none"> • Complete FLUPs of all LGUs • Revoke the memorandum dated April 6, 2010 of then Secretary Reyes which centralized approval of all 25 year contracts and agreements • Establish and improve data base on tenure instruments (map based) • Revisit existing policy on centralized approval of tenure instruments and encourage community managed forestlands • Generate baseline data (esp. on existing forest cover) for all tenure holders as basis for future monitoring • Capability building for IPs

Forestry Master Plan Targets	Findings/ Accomplishments	Problems/Issues/Facilitating Factors	Recommendations
<p>7. Sustainable management of 1.5 million ha of residual forests, self sufficiency in wood in 10 years</p>	<ul style="list-style-type: none"> • Not achieved • Residual forests not yet effectively managed specially the open access areas. • Importation of wood continue 	<p><u>Problems/ Issues</u></p> <ul style="list-style-type: none"> • Inadequate forest guards (due to attrition law) to enforce forest laws (current ratio is 1:5000 ha. Against 1:4000 in previous years ; Forest guards are aging; • Inadequate logistics (budget, equipment, personnel) in forest protection • Because of E.O. 23 private sector has no incentive to protect residual forests. Burden of protection is now with DENR • Highly centralized approval of tenure instruments and harvesting permits • Political intervention 	<ul style="list-style-type: none"> • Emphasize protection of residual forests by responsible tenure holders with incentives and support system • Issue tenure instruments in open access forestlands; • Deputize LGU personnel, POs, and other volunteers as ENR officers. Simplify the process of deputation and renewal; • Update census of forest occupants • Provide other incentives in protection of residual forests for instance NGP funds • More IP involvement in management of residual forests. CADT holders are allowed to harvest and so they have incentive to protect forest resources • Allow intercropping agri crops and fruit trees consistent with lease agreements • Implement C & I • More IEC • Facilitate mechanisms for REDD+

Forestry Master Plan Targets	Findings/ Accomplishments	Problems/Issues/Facilitating Factors	Recommendations
<p>8. Establishment, maintenance and renewal of 460,000 ha of commercial forest plantations within 12 year</p>	<ul style="list-style-type: none"> Only about 147,814 hectares of forest plantations were reportedly developed in TLA, IFMA, SIFMA, CBFMA and TFLA areas from 1993 to 2010. Additional new NGP plantations of 229,168 hectares established from 2011 to 2014. These plantations need to be assessed to determine their potential to supply the wood requirements of the country,. 	<ul style="list-style-type: none"> <u>Facilitating factors:</u> LGUs are initiating measures to encourage development of plantations NGP Funding are available (national government and donor) Funding support from DBP <p><u>Problems and Issues:</u></p> <ul style="list-style-type: none"> Inventory existing plantations; Seedlings not readily available Long gestation period of tree plantations Unclear guidelines in granting permits Climate factors are not favorable for plantation development in some regions High rental fees Limited incentives for private sector Many plantations in timberland are not covered by tenure instruments. Approval of permits is centralized and highly regulated discouraging investments in plantation development. 	<ul style="list-style-type: none"> Explore possibility of government subsidy for plantation development Provide package of incentives; Streamline/ simplify processing of permits; Encourage processing of forest products Liberalize harvesting of planted trees; Review policies on annual rentals. Payment of fees should start when harvesting starts Sustain implementation of DMC 99-26 re self monitoring

Forestry Master Plan Targets	Findings/ Accomplishments	Problems/Issues/Facilitating Factors	Recommendations
<p>9. At least 300,000 hectares of permanent grazing land sustainably managed by 2010</p>	<p>Only about 72,925 hectares are covered by FLGLA mostly in:</p> <ul style="list-style-type: none"> • CAR – 5,622 hectares • Reg. 1 – 1,501 ha • Reg. 2 – 14,418 ha. • Reg. 3 – 8,883 ha. • Region 4-A – 1,035 ha • Reg. 4B – 10,617 ha. • Reg. 5 – 7,515 ha. • Reg. 6 – 203 ha • Reg.10 –8,371 ha. • Reg. 11 – 332 ha • Reg. 12 – 13,308 ha. • ARMM – 1,120 ha <p>No permittees in regions 7,8,9, 13 and NCR</p>	<ul style="list-style-type: none"> • Difficulty in getting permits because of NCIP clearance/ FPIC, LGU clearance and centralized approval • Peace and order problem • Limited areas because of conflicts with CADTs, PAs, NGP • High investment costs • Conflict on pasture use and watershed : accordingly, previous pasture areas were not renewed and squatters came in. • General perception of declining grazing industry 	<ul style="list-style-type: none"> • Delineate permanent areas for grazing and integrate these in FLUP • Lower rental rates • Provide incentives (say free cattle dispersal) • Facilitate approval process for FLGLA • DENR field offices must intensify monitoring of pasture areas and assist in protecting the areas from squatters • Clarify that all forest reservations may be open to development or uses not in consistent with the principal objective of the reservation (sec. 19 PD 1559) provided that commercial grazing is not allowed in critical watersheds • Maximize use of effective grazing areas (EGAS) by encouraging pasture lease holders to introduce forage and do not depend only on native grasses, to increase grazing capacity and support production of more livestock

Forestry Master Plan Targets	Findings/ Accomplishments	Problems/Issues/Facilitating Factors	Recommendations
<p>10. Poverty in the uplands minimized by 50% within 15 year</p>	<ul style="list-style-type: none"> • ERDB study (Jan. 2013) of CBFM-CARP projects in the Philippines indicate 26% increase in average annual income of CBFM-CARP beneficiaries from Php 48,739 in 2007 to Php 61,203 in 2011. However, this average annual income is still below poverty threshold of about Php 84,000 per year per family (2009) 	<ul style="list-style-type: none"> • Lack of baseline data on poverty incidence in the uplands • Target itself is unrealistic • Poverty alleviation is not a DENR mandate and so this target is not appropriate for the sector. But forestry can contribute to minimizing poverty by contributing to increased income. • What constitute the uplands? It is suggested that uplands be limited to timberlands and upland community should include those with farms in the uplands • Availability of DENR and convergence projects in the area contributed to increased income of CBFM beneficiaries 	<ul style="list-style-type: none"> • Generate baseline and indicators of poverty in the uplands(NSO, PA, CBFM, NCIP, FIS) • Lower the target (50% is high) • Improve information generation • Strengthen further the convergence programs • Improve monitoring • More support (infra, marketing, linkages, technical assistance, trainings,) • Promote PES • More livelihood • Promote high value crops in agroforestry • Inventory of plantations in CBFM; Require baseline info for all tenure applicants and members (including NGP) such as what is being done in CBFM CARP

Forestry Master Plan Targets	Findings/ Accomplishments	Problems/Issues/Facilitating Factors	Recommendations
<p>11. Responsible forest based industries within 5 years</p>	<ul style="list-style-type: none"> • Difficult to ascertain because there are no clear indicators to measure 	<ul style="list-style-type: none"> • Decreased revenue in IFMA due to EO 23 which affect forest protection • Declining forest based industries due to limited plantations to supply raw materials; • Centralized approval with so many requirements in the issuance of permits and tenure instruments • Conflicting land use (e.g. plantations situated in protected areas) • Import competition • DENR has monthly/ quarterly monitoring which can facilitate assessment of performance of forest based industries 	<ul style="list-style-type: none"> • Decentralize approval and standardize requirements in permit issuance • Suggested indicator - No violation & Compliance with the provisions of permits/ agreement including sustainable source of raw materials • Identify production forestlands for private investments • Closer and regular monitoring of volume of wood harvested and processed per source through improved tracking system • Liberalize policies in harvesting • Regular monitoring of performance of forest based industries by Professional Foresters • All forest based industries should have registered Forester who will certify to their operations/ reports • Develop linkage between FB industries and CBFMA holders through production sharing arrangements

Forestry Master Plan Targets	Findings/ Accomplishments	Problems/Issues/Facilitating Factors	Recommendations
<p>12. Philippine forest administration fully capable and responsive within 10 years</p>	<ul style="list-style-type: none"> • Hard to ascertain for lack of agreed indicators • The general perception is that DENR is technically capable but there are so many constraints 	<ul style="list-style-type: none"> • Pending implementation of EO 366 (Rationalization of Bureaucracy)—may compromise capacity and quality of technical services delivery • Attrition Law – prohibiting hiring to replace retirements and vacancies • Rationalization plan runs counter to enhancing the capability of PFA • All offices have citizens charter which could facilitate delivery of services to clients 	<ul style="list-style-type: none"> • Orientation of new contractual personnel • Immediate implementation of Rationalization Plan upon approval • Continue the previous program of DENR providing scholarship funds for DENR personnel and encourage LGUs to provide the same • Implement citizen charter; Proposed Indicator: Prompt delivery of services to clients following the citizens charter • More trainings for field personnel • Human resources development program • Continue value orientation • Orient staff on Political communications • Promote more decentralization • • Documentation of good practices and disseminate

Annex 2. Matrix of regional and provincial vulnerability to climate-related hazards and poverty incidence.

Region/ Province	Vulnerability						Poverty Index (2012) (Poverty Incidence among families (%))
	Temp. Increase	Typhoons	Earthquake	Tsunamis	Water stress	Combined Climate Risks	
NCR	Medium	High	Medium	High	High	High	3.8
1 st District							3.8
2 nd District							3.1
3 rd District							4.9
4 th District							3.8
Region 1 (Ilocos)							16.7
Ilocos Norte	Very low	High	Low	Low	Mild	Low	11.0
Ilocos Sur	Very low	Very high	Medium	Medium	Mild	High	17.1
La Union	Low	Very high	High	High	Mild	High	19.8
Pangasinan	Low	Very high	High	High	High	High	17.0
Region 2 (Cagayan Valley)							19.8
Batanes	Very low	Very high	Low	Low	No water stress	Medium	21.4
Cagayan	Very low	Very high	Low	Low	No water stress	Medium	17.7
Isabela	Very low	High	Low	Low	No water stress	Low	21.7
Nueva Vizcaya	Low	High	High	No risk	No water stress	Medium	17.0
Quirino	Very low	High	Medium	No risk	No water stress	Low	21.7
CAR							22.6
Abra	Very low	High	Low	No risk	Mild	Low	34.4
Apayao	Very low	High	Low	No risk	No water stress	Low	59.8
Benguet	Low	High	High	No risk	No water stress	Medium	4.3
Ifugao	Low	Very high	High	No risk	No water stress	Very High	47.5

Region/ Province	Vulnerability						Poverty Index (2012) (Poverty Incidence among families (%))
	Temp. Increase	Typhoons	Earthquake	Tsunamis	Water stress	Combined Climate Risks	
Kalinga	Very low	Very high	Low	No risk	No water stress	Medium	29.4
Mt. Province	Very low	Very high	Medium	No risk	No water stress	Medium	34.8
Region 3 (Central Luzon)							12.2
Aurora	Low	High	Medium	Low	High	Medium	30.7
Bataan	Low	Medium	Medium	Medium	High	Medium	7.3
Bulacan	Medium	Medium	Medium	Medium	High	Medium	6.7
Nueva Ecija	Medium	High	Medium	No risk	High	High	23.0
Pampanga	Medium	High	High	No risk	High	Very High	6.4
Tarlac	Medium	High	High	High	High	High	14.0
Zambales	Low	High	High	High	High	Medium	18.0
Region 4-A							11.2
Batangas	Medium	High	Medium	High	High	Very High	19.4
Cavite	Medium	High	Medium	High	High	Very High	4.1
Laguna	Medium	High	Low	Medium	High	Very High	6.3
Quezon	Low	Medium	Low	Medium	High	Medium	22.6
Rizal	Medium	High	Medium	No risk	High	Very High	7.6
Region 4-B							28.4
Marinduque	Medium	Medium	Low	Low	High	High	29.4
Occidental Mindoro	Medium	Medium	Medium	Medium	High	Medium	38.0
Oriental Mindoro	Medium	Medium	Low	Medium	High	Medium	26.2
Palawan	Medium	Very low	Low	Low	High	Very Low	25.2
Romblon	Low	Medium	Low	Medium	High	High	29.8
Region 5							34.1

Region/ Province	Vulnerability						Poverty Index (2012) (Poverty Incidence among families (%))
	Temp. Increase	Typhoons	Earthquake	Tsunamis	Water stress	Combined Climate Risks	
Albay	Low	Very high	Low	High	High	Very High	36.1
Camarines Norte	Low	High	Low	Medium	High	High	24.7
Camarines Sur	Low	High	Low	Medium	High	High	33.5
Catanduanes	Low	High	Medium	Low	High	Medium	27.1
Masbate	Medium	High	Low	High	High	Very High	44.2
Sorsogon	Medium	Very high	Medium	Low	High	Very High	32.1
Region 6							24.7
Aklan	Medium	Medium	Medium	Low	No water stress	High	21.0
Antique	Low	Low	Low	Medium	No water stress	Low	32.1
Capiz	Medium	Medium	low	Low	No water stress	High	25.4
Guimaras	Medium	Low	Low	Medium	No water stress	Low	26.2
Iloilo	Medium	Low	Low	Medium	No water stress	Low	21.9
Negros Occidental	High	Low	Low	Low	No water stress	Medium	26.2
Region 7							28.8
Bohol	High	Low	Medium	Medium	High	Medium	32.5
Cebu	High	Low	Low	High	High	Medium	22.4
Negros Oriental	High	Low	Low	High	High	Medium	45.3
Siquijor	High	Low	Low	Low	High	Medium	24.6
Region 8							37.2
Biliran	Medium	High	Low	No risk	No water stress	Very High	20.7
Eastern Samar	Medium	Medium	Medium	Low	No water stress	High	59.4
Leyte	Medium	Medium	Low	Medium	No water stress	High	31.9
Northern Samar	Medium	High	Medium	Medium	No water stress	Very High	43.7
Southern Leyte	Medium	Low	Medium	Low	No water stress	Low	36.4
Western Samar	Medium	High	Medium	Low	No water stress	Very High	36.0

Region/ Province	Vulnerability						Poverty Index (2012) (Poverty Incidence among families (%))
	Temp. Increase	Typhoons	Earthquake	Tsunamis	Water stress	Combined Climate Risks	
Region 9							36.9
Zamboanga del Norte	High	Very low	Low	Low	No water stress	Low	50.3
Zamboanga del Sur	Very high	Very low	Medium	Low	No water stress	Medium	30.1
Zamboanga Sibugay	Very high	Very low	Medium	Low	No water stress	Medium	36.8
Isabela City	Very high	Very low	Low	Low	No water stress	Medium	19.4
Region 10							35.6
Bukidnon	High	Very low	Low	Low	No water stress	Very Low	43.3
Camiguin	High	Very low	Medium	Low	No water stress	Medium	34.9
Lanao del Norte	Very high	Very low	Medium	Medium	No water stress	Low	42.5
Misamis Occidental	Very high	Very low	Medium	Low	No water stress	Medium	36.6
Misamis Oriental	Very high	Very low	Low	Medium	No water stress	Low	25.0
Region 11							28.6
Davao del Norte	High	Very low	Medium	Low	No water stress	Very Low	30.9
Davao del Sur	Very high	Very low	Medium	Low	No water stress	Medium	22.3
Davao Oriental	High	Very low	High	Low	No water stress	Very Low	48.0
Compostela Valley	High	Very low	Medium	Low	No water stress	Very Low	36.3
Region 12							37.5
North Cotabato	High	Very low	Low	No risk	No water stress	Low	43.9
Saranggani	Very high	Very low	High	High	No water stress	Low	46.5
South Cotabato	High	Very low	Medium	Low	No water stress	Low	28.0

Region/ Province	Vulnerability						Poverty Index (2012) (Poverty Incidence among families (%))
	Temp. Increase	Typhoons	Earthquake	Tsunamis	Water stress	Combined Climate Risks	
Sultan Kudarat	High	Very low	Medium	Low	No water stress	Low	41.6
Cotabato City	Very high	Very low	High	Low	No water stress	Medium	41.5
Caraga							34.1
Agusan del Norte	High	Low	Medium	Low	No water stress	Low	32.0
Agusan del Sur	High	Very low	High	No risk	No water stress	Very Low	38.6
Surigao del Norte	Low	Low	High	Medium	No water stress	Low	34.6
Surigao del Sur	Low	Very low	High	Medium	No water stress	Very Low	31.8
ARMM							46.9
Basilan	Very high	Very low	Low	Medium	No water stress	High	32.5
Lanao del Sur	Very high	Very low	Medium	Low	No water stress	Medium	68.9
Maguindanao	Very high	Very low	High	Medium	No water stress	Medium	57.8
Sulu	Very high	Very low	Low	Medium	No water stress	Very High	30.3
Tawi-tawi	Low	Very low	Low	No risk	No water stress	Low	20.8

1. <http://vm.observatory.ph>
2. NSCB website: <http://www.nscb.gov.ph>

Annex 3. Ancestral Domain Areas in the Philippines in Hectares (Botengan and Quicho 2013)

REGION	CADT		CADT Area		CADT IP Population		ADSDPP		ADSDPP Area		AD IP Population		ADSDPP With CADT	
	No	%	Ha	%	No	%	No	%	Ha	%	No	%	No	%
CAR	20	12.7	340,999.8	7.9	266,610	29.0	28	32.2	546,678.5	28.4	299,785	45.8	17	33.3
I	6	3.8	37,365.1	0.9	27,075	10.5	4	4.6	35902.5	1.9	9,551	1.5	3	5.9
II	11	7.0	970,969.6	22.6	53,238	5.8	10	11.5	277985.8	14.4	44,851	6.9	3	5.9
III	12	7.6	133,559.5	3.1	19,594	2.1	10	11.5	60517.5	3.1	19,408	3.0	5	9.8
IV-A	21	13.3	865,159.7	20.1	69,938	7.6	2	2.3	6145.9	0.3	3,013	0.5	2	3.9
IV-B	8	5.1	41,787.5	1.0	21,811	2.4	3	3.4	19208.0	1.0	12,122	1.9	2	3.9
V	5	3.2	20,399.3	0.5	7,625	0.8	2	2.3	10407.9	0.5	5,230	0.8	2	3.9
VI	11	7.0	142,853.2	3.3	41,760	4.5	4	4.6	115497.4	6.0	57,705	8.8	1	2.0
VII	16	10.1	242,986.2	5.6	57,315	6.2	7	8.0	149954.2	7.8	35,631	5.4	5	9.8
VIII	14	8.9	634,363.2	14.7	131,516	14.3	9	10.3	476599.5	24.8	123,535	18.9	5	9.8
IX	14	8.9	377,584.7	8.8	148,826	16.2	2	2.3	49387.1	2.6	20,529	3.1	2	3.9
X	20	12.7	496,437.1	11.5	73,187	8.0	6	6.9	176936.7	9.2	23,211	3.5	4	7.8
XI	158	100.0	4,304,464.9	100.0	918,495	100.0	87	100.0	1,925,221.0	100.0	654,571	100.0	51	100.0

Annex 4. 18 Major River Basins in the Philippines

Name of River Basin	Area (Ha.)	Coverage (REGION)	Province	Municipality
Cagayan RB	2,776,200	CAR, 2 and 3	Apayao, Kalinga, Ifugao, Benguet, Abra, Quirino, Nueva Vizcaya, Isabela, Cagayan, Nueva Ecija, Aurora, Mountain Province, Ifugao, Benguet, Nueva Vizcaya	River Basin Region 2 Cagayan Aparri Baggao Gattaran Peñablanca Piat Tuao Tuguegarao City Isabela Quezon San Mariano N. Vizcaya Bayombong Solano Quirino Maddela Nagtipunan Aurora Dilasag Ifugao Lagawe Mt. Province Bontoc Paracelis Sadanga Kalinga Lubuagan Tabuk
Mindanao RB	2,150,200	10, 12 and ARMM	Maguindanao , Lanao del Sur , Bukidnon , South Cotabato , Cotabato City , Sultan Kudarat	Bukidnon, Kibawe, Malaybalay City, Maramag, Talakag, Valencia City, South Cotabato, Banga, Sultan Kudarat, Tacurong City, Maguindanao, Talayan
Agusan RB	1,193,700	11 and 13	Misamis Oriental, Bukidnon, Compostela Valley, Davao Oriental, Davao (Davao del Norte), Surigao del Sur, Agusan del Sur, Agusan del Norte	Davao Oriental Boston Cateel Agusan del Sur La Paz Prosperidad Talacogon veruela Agusan del Norte Buenavista

Name of River Basin	Area (Ha.)	Coverage (REGION)	Province	Municipality
Pampanga RB	1,043,400	3, 1 and 2	Aurora, Bataan, Bulacan, City of Valenzuela, Kalookan City, Nueva Ecija, Nueva Vizcaya, Pampanga, Pangasinan, Quezon City, Rizal	Aurora Maria Aurora San Luis Pampanga Angeles City Guagua Bulacan Angat Malolos City San Miguel Nueva Ecija Cabanatuan City Gabaldon Gen. Tinio Palayan City Pantabangan San Jose City Tarlac Tarlac City Olongapo City
Agno RB	622,000	CAR, 1, 2 and 3	Benguet, Tarlac, Pangasinan, Ifugao, Pampanga, Nueva Vizcaya, Mountain Province, Nueva Ecija, Zambales	Pangasinan Binalonan Bugalion Lingayen N. Vizcaya Kayapa Tarlac Camiling Gerona Benguet Baguio City Kabayan
Abra RB	512,500	CAR and 1	Apayao, Kalinga, Benguet, Abra, Ilocos Sur, Ilocos Norte, Mountain Province	Ilocos Sur Cervantes Vigan City Mankayan Abra Bangued Licuan Manabo Sallapanan Tineg

Name of River Basin	Area (Ha.)	Coverage (REGION)	Province	Municipality
Pasig-Marikina-Laguna RB	410,900	NCR and 4a	Batangas, Bulacan, Cavite, Las Piñas City, Makati City, Malabon City, Mandaluyong City, Marikina City, Muntinlupa City, Parañaque City, Pasig City, Valenzuela City, Kalookan City, Laguna, Navotas, NCR – Manila, First District, Pasay City, Pateros, Quezon City, Rizal, San Juan, Taguig	Laguna Calamba City Paete San Pablo City Batangas Lipa City Rizal Baras Quezon Lucban Manila Muntinlupa City Quezon City
Bicol RB	317,389	5	Quezon, Camarines Sur, Camarines Norte, Albay	Albay Ligao Polangui Camarines Sur Iriga City Libmanan Naga City Sipocot
Abulug RB	337,200	CAR and 2	Apayao, Cagayan	Kabugao Pudtol Flora Luna Calanasan Coner Abulog Sanchez-Mira Pamplona
Tagum Libuganon RB	306,400	11	Bukidnon, Compostela Valley, Davao del Sur, Davao (Davao del Norte), Agusan del Sur	Compostela Valley Laak Mawab Monkayo Montevista Nabunturan Davao del Norte Asuncion Braulio E. Dujali carmen Kapalong New Correla Sto. Tomas

Name of River Basin	Area (Ha.)	Coverage (REGION)	Province	Municipality
				Tagum City Talaingod
Ilog-Hilabangan RB	194,500	6 and 7	Negros Occidental, Negros Oriental	Negros Oriental Bayawan City
Panay RB	184,300	6	Iloilo, Capiz, Aklan	Iloilo Lemery Capiz Dao Dumalag Ivisan Panitan
Taguoloan RB	170,400	10	Misamis Oriental, Bukidnon	Bukidnon Malaybalay City Sumilao
Agus RB	191,785	12 and ARMM	Lanao del Sur, Bukidnon, Marawi City, Lanao del Norte	Lanao del Norte Balo-i Iligan City Linamon Matungao Pantao-Ragat Pantar Lanao del Sur Bacolod-Grande Balindong Bayang Binidayan Buadiposo-Buntong Bubong Butig Ganassi Kapai Lumba Bayabao

Name of River Basin	Area (Ha.)	Coverage (REGION)	Province	Municipality
Agus RB	191,785	12 and ARMM	Lanao del Sur, Bukidnon, Marawi City, Lanao del Norte	Lumbatan Lumbayanague Madalum Madamba Maguig Marantao Marawi City Masiu Mulondo Poona-Bayabao pualas Saguiran Sultan Dumalondong Tamparan Taraka Tugaya
Davao RB	162,300	10 and 11	Bukidnon, Davao del sur, Davao (Davao del Norte),Cotabato (North Cotabato), Bukidnon	Davao City Talaingod San Fernando Quezon
Cagayan De Oro RB	152,100	10 and 12	Misamis Oriental, Bukidnon, Lanao del Norte	Bukidnon Talakag Misamis Oriental Cagayan De Oro City
Jalaur RB	150,300	6	Iloilo, Capiz, Antique	Iloilo Passi City
Buayan-Malungun RB	143,400	11 and 12	Sarangani, South Cotabato, Davao del Sur	Davao del Sur Malalag Malita Sta. Maria Sarangani Alabel Malungon Gen. Santos City Tampakan Tupi
GRAND TOTAL	11,018,974			

Annex 5. List of Watershed Forest Reserve (Proclaimed Watershed)

Region	NAME OF WATERSHED FOREST RESERVE	MUNICIPALITY	PROVINCE	No.	AREA (HA.)	PROCLAMATION NO.	DATE
CAR	SUB-TOTAL	-	-	8	119,114.94		
CAR	Ambuklao-Binga Watershed Forest Reserve	Atok, Bokod	Benguet	1	63,650.00	548	4-19-69
CAR	Ambuklao Watershed Forest Reserve (Pilot)	Atok, Bokod	Benguet	1	9,700.00	120	11-25-66
CAR	Lower Agno Watershed Forest Reserve	Tuba, Itogon Baguio City	Benguet	1	39,304.00	2320	11-22-83
CAR	Busol Watershed Forest Reserve	Baguio City, La Trinidad	Benguet	1	329.00	15 Amended by 202	4-14-22 (12-24-87)
CAR	Buyog Watershed Forest Reserve	Baguio City	Benguet	1	20.00	93	11-05-92
CAR	Lucnab Watershed Forest Reserve	Lucnab	Baguio City	1	5.98	178	5-12-93
CAR	Marcos highway WFR	Tuba, Benguet	LaUnion to ' Baguio City	1	6,105.00	1754	6-28-78
CAR	Pucsusan Watershed Reservation		Baguio City	1	0.96	2035	4-6-2010
Region 1	SUB-TOTAL	-	-	10	6,167.00		
Region 1	Ilocos Norte Metropolitan Watershed Forest Reserve	Pasuquin	Ilocos Norte	1	2,815.00	731 Amended by 218	9-7-34 6-23-67
Region 1	Magnuang Watershed Forest Reserve	Batac	Ilocos Norte	1	152.00	220	7-02-67

Region 1	Libunao Spring Watershed Forest Reserve	Sinait	Ilocos Sur	1	47.00	410	10-02-31
Region 1	Bigbiga Spring Watershed Forest Reserve	Narvacan	Ilocos Sur	1	135.00	431	8-16-39
Region 1	Santa Watershed forest Reserve	Santa	Ilocos Sur	1	25.00	844	9-26-35
Region 1	Lidlidda Watershed Forest Reserve	Lidlidda	Ilocos Sur	1	1,228.00	79	9-17-36
Region 1	Sta. Lucia Watershed Forest Reserve	Sta. Lucia	Ilocos Sur	1	174.00	333	10-18-38
Region 1	Naguilian Watershed Reservation	Naguilian	La Union	1	90.00	52	4-11-36
Region 1	Tanap Watershed Forest Reserve	Burgos	Ilocos Norte	1	41.00	803	2-01-71
Region 1	Lon-oy Watershed Forest Reserve	San Gabriel, Santol	La Union	1	1,460.00	378	5-11-94
Region 2	<u>SUB-TOTAL</u>	-	-	<u>5</u>	<u>119,261.00</u>		
Region 2	Casecnan River Watershed Reservation		N. Vizcaya, Quirino, Aurora		85,219.00	136	8-11-87
Region 2	Dupax Watershed Reservation	Dupax	N. Vizcaya		425.00	720	8-08-34
Region 2	Bawa Watershed Forest Reserve	Gonzaga & Lal-lo	Cagayan		8,955.00	108	5-13-87
Region 2	Wangag Watershed Forest Reserve	Gonzaga & Lal-lo	Cagayan		6,992.00	107	5-13-87
Region 2	Tumauini Watershed Forest Reserve	Cabagan, San Pablo, Maconacon and Divilacan	Isabela		17,670.00	355	4-14-94
Region 3	<u>SUB-TOTAL</u>	-	-	<u>24</u>	<u>281,190.60</u>		
Region 3	Watershed Purposes of Mariveles (Palanas)	Mariveles	Bataan	1	325.00	E.O. 20	2-25-19

Region 3	Olongapo Watershed Forest Reserve	Olongapo	Zambales	1	6,335.00	Amended by 66	3-20-87
Region 3	Subic Watershed Forest Reserve		Bataan	1	10,000.00	926	6-25-92
Region 3	Angat Watershed Forest Reserve	Montalban, San Jose, Norzagaray, Angat, San Rafael	Rizal, Bulacan, Nueva Ecija	1	55,709.10	71 Amended by 391	3-10-27 (4-30-68)
Region 3	Pantabangan-Carranglan Watershed Reserve	Pantabangan, Carranglan	Nueva Ecija	1	84,500.00	561	5-21-69
Region 3	Angat Watershed & Forest Range (Pilot)	Norzagaray, San Jose, Montalban	Bulacan Rizal	1	6,600.00	391	4-30-68
Region 3	Talavera Watershed Reservation	Sta. Fe, Carranglan, Lupao, San Jose, Pantabangan	N. Vizcaya, Nueva Ecija	1	37,156.00	350 Amended by 244	12-12-38 (11-17-56)
Region 3	Dona Remedios Trinidad-General Tinio Watershed Forest Reserve	Dona Remedios Trinidad, Gen. tinio	Bulacan, Nueva Ecija	1	20,760.00	230	3-23-88
Region 3	Calabgan Watershed Forest Reserve	Casiguran	Aurora	1	4,803.00	915	6-01-92
Region 3	Dipaculao Watershed Forest Reserve	Dipaculao	Aurora	1	1,786.00	116	6-10-87
Region 3	Dinadiawan River Watershed Forest Reserve	Dipaculao	Aurora	1	3,387.00	918	6-09-92
Region 3	Aurora Watershed Forest Reserve	Baler	Aurora	1	430.00	34	2-04-36
Region 3	Amro River Watershed Forest Reserve	Casiguran & Dilasag	Aurora	1	6,470.00	633	8-28-90
Region 3	Talaytay River Watershed Forest Reserve	Dinalungan	Aurora	1	3,527.87	670	12-3-90
Region 3	Simbahan-Talagas River Watershed Forest Reserve	Dinalungan	Aurora	1	2,266.49	905	5-22-92

Region 3	Dibalo-Pingit-Zabali-Malayot Watershed Forest Reserve	Baler & San Luis	Aurora		4,528.00	908	5-25-92
Region 3	Diteki River Watershed Forest Reserve	Maria Aurora San Luis	Aurora	1	12,970.00	20	8-24-92
Region 3	Dingalan River Watershed Forest Reserve Reserve	Dingalan	Aurora	1	1,788.00	23	8-24-92
Region 3	Pacugao River Watershed Forest Reserve	Maria Aurora Dupax del Norte	Aurora, N. Vizcaya	1	3,247.00	110	11-23-92
Region 3	San Luis Watershed Forest Reserve	San Luis	Aurora	1	2,789.00	109	11-23-92
Region 3	Pinamacan River Watershed Forest Reserve	Dilasag	Aurora	1	2,905.00	236	8-23-93
Region 3	Bulawan Falls Watershed Forest Reserve	Dinalungan	Aurora	1	986.00	395	5-30-94
Region 3	Diaat River Watershed Forest Reserve	Maria Aurora ,Dupax	Aurora, N. Vizcaya	1	3,219.14	399	5-24-94
Region 3	Bazal River Watershed Forest Reserve	Maria Aurora	Aurora	1	4,403.00	402	6-2-94
Region 3	Mangan Vaca Watershed Forest Reserve	Subic	Zambales	1	300.00	1607	8/29/2008
NCR	<u>SUB-TOTAL</u>			1	2,659.00		
NCR	La Mesa Watershed Forest Reserve	Quezon City, Caloocan City		1	2,659.00	1336	6/25/2007
REGION 4-A	<u>SUB-TOTAL</u>	-	-	13	48,160.63		
REGION 4-A	Marikina Watershed Reservation	Antipolo, Montalban	Rizal	1	27,980.20	E.O. 33	7-26-1904
REGION 4-A	Mulanay Watershed Forest Reserve	Mulanay	Quezon	1	26.00	296	7-21-38

REGION 4-A	Infanta Watershed Forest Reserve	Infanta	Quezon	1	384.00	158	2-13-67
REGION 4-A	Polilio Watershed Forest Reserve	Polilio	Quezon	1	130.00	72	8-09-66
REGION 4-A	Maulawin Spring Watershed Forest Reserve	Guinayangan	Quezon	1	204.00	365	1-02-39
REGION 4-A	Buenavista Watershed Forest Reserve	Mulanay	Quezon	1	356.00	166	6-27-37
REGION 4-A	Lopez Watershed Forest Reserve	Lopez	Quezon	1	418.00	566	6-22-40
REGION 4-A	Calauag Watershed Forest Reserve	Calauag	Quezon	1	328.00	367	1-02-39
REGION 4-A	Alabat Watershed Forest Reserve	Alabat	Quezon	1	688.00	156	9-18-87
REGION 4-A	Tibiang-Damagandong Watershed Forest Reserve	Quezon	Quezon	1	280.00	295	7-21-38
REGION 4-A	Binahaan River Watershed Forest Reserve	Pagbilao & Mauban	Quezon	1	465.00	735	5-29-91
REGION 4-A	Umiray River Watershed Reservation	Gen. Nakar, Norzagaray and Montalban	Quezon, Bulacan, Rizal	1	16,722.75	264	9-28-93
REGION 4-A	Panukulan Watershed Forest Reserve	Panukulan	Quezon	1	178.68	290	11-6-93
REGION 4-B	<u>SUB-TOTAL</u>			6	8,747.75		
REGION 4-B	Torrijos Watershed Forest Reserve	Torrijos	Marinduque	1	105.00	463	4-06-32
REGION 4-B	Palawan Flora, Fauna & Watershed Reserve	Puerto Princesa	Palawan	1	4,776.00	2221	7-14-82
REGION 4-B	Calatrava-San Andres-San Agustin Watershed Forest	Calatrava, San Andres, San Agustin	Romblon	1	2,670.00	2186	4-29-82

	<u>Reserve</u>						
REGION 4-B	Bacuit Watershed Forest Reserve	Bacuit	Palawan	1	94.00	785	3-28-35
REGION 4-B	Naampias River Watershed Forest Reserve	Torrijos	Marinduque	1	417.00	357	4-20-94
REGION 4-B	Ipil River Watershed Forest Reserve	San Fernando	Romblon	1	685.75	394	5-30-94
REGION 5	<u>SUB-TOTAL</u>	-	-	<u>11</u>	<u>37,724.95</u>		
REGION 5	Catanduanes Watershed Forest Reserve	Virac, Bato, San Miguel, Pandan, Calolbon, Baras	Catanduanes	1	26,010.00	123	6-23-87
REGION 5	Lagonoy Watershed Forest Reserve	Lagonoy	Camarines Sur	1	470.00	500	9-26-32
REGION 5	Dahican Watershed Forest Reserve	Mambulao	Camarines Norte	1	44.00	592	6-23-33
REGION 5	Capalonga Watershed Forest Reserve	Capalonga	Camarines Norte	1	752.00	128	11-25-66
REGION 5	Abasig-Matogdon-Mananap Watershed Forest Reserve	Labo, San Lorenzo Ruiz & San Vicente	Camarines Norte	1	5,545.00	836	11-18-91
REGION 5	Mt. Masaraga Watershed Forest Reserve	Polangui, Oas, Ligao, Tabaco	Albay	1	810.00	84	10-27-92
REGION 5	Magallanes and Juban Watershed Forest Reserve	Magallanes, Juban	Sorsogon	1	1,032.00	108	11-23-92
REGION 5	Diwata Watershed Forest Reserve	San Fernando	Masbate	1	350.00	370	5-02-94
REGION 5	Tugbo Watershed Forest Reserve	Mobo, Masbate	Masbate	1	246.95	369	5-02-94
REGION 5	Matang-Tubig Watershed Forest	Monreal	Masbate	1	1,305.00	368	5-02-94

REGION 5	Jose Panganiban Watershed Forest Reserve	Jose Panganiban	Camarines Norte	1	1,160.00	1151	1-09-98
REGION 6	<u>SUB-TOTAL</u>	-	-	<u>9</u>	<u>131,777.00</u>		
REGION 6	Pan-ay River Watershed Forest Reserve	Tapaz	Capiz	1	4,350.00	599	6-28-90
REGION 6	Aklan River Watershed Forest Reserve	Madalag & Libucao	Aklan	1	23,185.00	600	6-28-90
REGION 6	Jalaur River Watershed Forest Reserve	Calinog	Iloilo	1	9,228.00	601	6-28-90
REGION 6	Ilog-Hilabangan Watershed Forest Reserve	Himamaylan & Kabankalan	Negro Occ.	1	10,211.00	602	6-28-90
REGION 6	Dalanas River Watershed Forest Reserve	Barbaza	Antique	1	8,558.00	603	6-28-90
REGION 6	Bago River Watershed Forest Reserve	Talisay, Murcia, Don Salvador, Benedicto, Calatrava	Negro Occ.	1	61,926.00	604	6-28-90
REGION 6	Tipulu-an Mau-it River Watershed Forest Reserve	Sibalom	Antique	1	7,737.00	605	6-28-90
REGION 6	Kabankalan Watershed Forest Reserve	Kabankalan	Negros Occ.	1	432.00	820	10-25-91
REGION 6	Maasin Watershed Forest Reserve	Maasin	Iloilo	1	6,150.00	16	2-12-23
REGION 7	<u>SUB-TOTAL</u>	-	-	<u>7</u>	<u>104,380.89</u>		
REGION 7	Loboc Watershed Forest Reserve	Balilihan, Bilar, Batuan, Carmen, Garcia Hernandez	Bohol	1	19,410.00	450	12-23-53
REGION 7	Mananga River Watershed Forest Reserve	Talisay, Minglanilla, Cebu City	Cebu	1	6,823.00	581	5-29-90

REGION 7	Kotkot and Lusaran River Watershed Forest Reserve	Cebu City, Danao City Balamban, Compostela Consolacion	Cebu	1	14,121.00	932 amended by 1074	6-29-92 ('9-2-97)
REGION 7	Alijawan-Cansujay-Anibongan River Watershed Forest Reserve	Duero, Jagna	Bohol	1	3,630.00	881	3-20-92
REGION 7	Wahig-Inabanga River Watershed Forest Reserve	Pilar, Candijay, Alicia, Duero, Sierra, Bullones, Carmen, Dago-hoy, Danao, Inabanga, Buenavista, Jetafe	Bohol	1	52,516.00	468	9-26-94
REGION 7	Buhisan Watershed Forest Reserve	Buhisan	Cebu	1	630.89	E.O. No. 36	7-13-11
REGION 7	Argao River Watershed Forest Reserve	Argao & Dalaguete	Cebu	1	7,250.00	414	6-29-94
REGION 8	<u>SUB-TOTAL</u>	-	-	<u>9</u>	<u>30,599.24</u>		
REGION 8	Pan-as Falls Hayban Watershed Forest Reserve	Catarman & Calbayog City	Samar	1	7,832.00	318	12-15-67
REGION 8	Palompon Watershed Forest Reserve	Palompon, Villaba	Leyte	1	2,392.00	212	1-29-88
REGION 8	Jicontol Watershed Forest Reserve	Dolores & Can-avid	Eastern Samar	1	7,390.00	882	3-26-92
REGION 8	Hinabian-Lawigan Watershed Reservation	Libagon, Hinunangan, St. Bernard & Silago	Southern Leyte	1	4,536.00	107	11-23-92
REGION 8	Bulosao Watershed Forest Reserve	Lawa-an, Marabut	Eastern Samar, Western Samar	1	4,055.00	106	12-10-92

REGION 8	Catbalogan Watershed Forest Reserve	Catbalogan, Jiabong	Western Samar	1	804.00	413	6-29-94
REGION 8	Loog Watershed Forest Reserve	Basey	Western Samar	1	1,865.99	703	11-28-95
REGION 8	Anas Watershed Forest Reserve	Naval, Almeria, Culaba	Biliran	1	1,142.25	763	3-19-96
REGION 8	Patag-Gabas Watershed Forest Reserve	Baybay	Leyte	1	582.00	1202	4-20-98
REGION 9	<u>SUB-TOTAL</u>			<u>4</u>	<u>11,456.00</u>		
REGION 9	Pasonanca Watershed Forest Reserve	Zamboanga City	Zamboanga del Sur	1	10,560.00	199	12-17-87
REGION 9	Buug Watershed Forest Reserve	Buug	Zamboanga del Sur	1	108.00	81	8-09-66
REGION 9	Siocon Watershed Forest Reserve	Siocon	Zamboanga	1	612.00	155	9-18-87
REGION 9	Ambogoc Watershed Forest Reserve	Dapitan City	Zamboanga del Norte	1	176.00	611	6-23-95
REGION 10	<u>SUB-TOTAL</u>			<u>4</u>	<u>114,970.00</u>		
REGION 10	Muleta-Manupali Watershed Forest Reserve	Lantapan & Pangantukan	Bukidnon	1	61,500.00	127	6-29-87
REGION 10	Mt. Malindang National Park & Watershed Reservation	Oroquieta, Ozamis City, Calamba, Bonifacio, Jimenez	Mis. Occ.	1	53,262.00	R. A. 6266	6-19-71
REGION 10	Malisbilisan Falls Watershed Forest Reserve	Talisayan	Misamis Or.	1	72.00	51	4-11-36
REGION 10	Mahoganao Watershed Forest Reserve	Cagayan	Misamis Or.	1	136.00	470	4-29-32
REGION 11	<u>SUB-TOTAL</u>			<u>4</u>	<u>7,964.00</u>		

REGION 11	Malagos Watershed Reservation	Guianga	Davao City	1	235.00	612	8-31-33
REGION 11	Mati Watershed Forest Reserve	Mati	Davao Oriental	1	890.00	222	7-02-67
REGION 11	Andap Watershed Forest Reserve	New Bataan	Davao del	1	6,725.00	329	2-14-94
REGION 11	Baganga Watershed Forest Reserve	Baganga	Davao Oriental	1	114.00	195	12-8-87
REGION 12	<u>SUB-TOTAL</u>			<u>5</u>	<u>272,759.12</u>		
REGION 12	Libungan Watershed Forest Reserve	Libungan, Alamada	North Cotabato	1	52,820.00	563	5-03-90
REGION 12	Kabulnan River Watershed Forest Reserve	Esperanza, Isulan, Bagumbayan, Ninoy Aquino, Kalamansig, Palembang, (SK), Ampatuan, (Mag.), Lake Sebu (S Cot)	Sultan Kudarat, Maguindanao, and South Cotabato	1	116,451.83	241	2-8-2000
REGION 12	Allah Watershed Forest Reserve	Isulan, Banga, Surallah, Kiamba	South Cotabato	1	92,450.00	2455	9-24-85
REGION 12	Sebu Watershed Forest Reserve	Banga & Kiamba	South Cotabato	1	9,900.00	65	8-04-66
REGION 12	Koronadal Watershed Forest Reserve	Marbel	South Cotabato	1	1,137.29	607	6-23-95
REGION 13	<u>SUB-TOTAL</u>			<u>12</u>	<u>81,842.44</u>		
REGION 13	Surigao Watershed Forest Reserve	Sison, Malinao San Francisco	Surigao del Norte	1	967.00	635	8-29-90
REGION 13	Andanan River Watershed Forest Reserve	Sibagat & Bayugan	Agusan del Sur	1	15,097.00	734	5-29-91
REGION 13	Cabadbaran Watershed Forest	Cabadbaran	Agusan del Norte	1	16,025.00	834	11/13/1991

	Reserve						
REGION 13	Mt. Magdiwata Watershed Forest Reserve	San Francisco	Agusan del Sur	1	1,658.00	282	10-25-93
REGION 13	Adlay Watershed Forest Reserve	Carrascal	Surigao del	1	27.00	291	11-8-93
REGION 13	Taguibo River Watershed Forest Reserve	Butuan City, RTR & Cabadbaran	Agusan del Norte	1	4,367.44	1076	9-4-97
REGION 13	Alfred Spring Watershed Forest Reserve	Bunawan	Agusan del Sur	1	100.00	1236	05-29-98
REGION 13	Buyaan River Watershed	Madrid,	Surigao del	1	6,683.00	1747	3-23-2009
REGION 13	Carac-an River Watershed	Madrid,	Sur	1	23,570.00	1747	3-23-2009
REGION 13	Sipangpang Falls Watershed	Cantilan		1	1,218.00	1747	3-23-2009
REGION 13	Alamio River Watershed	Cantilan		1	5,085.00	1747	3-23-2009
REGION 13	Panikian River Watershed	Carrascal		1	7,045.00	1747	3-23-2009
ARMM	<u>SUB-TOTAL</u>			<u>2</u>	<u>182,354.00</u>		
ARMM	Lake Lanao Watershed Reservation		Lanao del Sur	1	180,460.00	871	2-26-92
ARMM	South Upi Watershed Forest Reserve	South Upi	Maguindanao	1	1,894.00	65	2-20-87
	GRAND TOTAL			135	1,561,128.56		

Annex 6. List of Priority Watersheds With Characterization Reports and Management Plan as of 2013

No . of Water shed	Region (Watershed)	River Basin	Name of Watershed	National Irrigation System (NIS) Supported	Region	Province	Municipality	Watershed Area NIA (ha)	NIS Service Area (In Ha)
4	CAR								
1	CAR	Cagayan RB	Chico River Watershed	Lower Chico RIS, Upper Chico RIS	CAR	Mt. Province, Ifugao, Kalinga, Apayao	Bauko, Sabangan, Bontoc, Sagada, Sandangan & Barlig, Tictic & Hugdungan, Tanudan, Lubuagan, Tinglayan, Pinukpuk, Tabuk, Balbalan & Pasil, Coner	330,000	19,407
1	CAR	Cagayan RB	Mallig River Watershed	Mallig RIS	CAR	Kalinga, Mt. Province	Tanudan, Tabuk, Paracelis	45,580	
1	CAR	Abulog RB	Abulog River Watershed	Abulog-Apayao RIS	CAR, Region 2,	Apayao, Cagayan, (Basin Wide)	Calanasan, Kabugao, Pudtol, Flora & Coner, Abulog	205,000	
1	CAR	Pamplona RB	Manucotae River Watershed	Pamplona RIS	Region 1, CAR	Cagayan, Apayao	Pamplona, Luna	1,920	746
17	REGION 1								
1	REG 1	Bulu RB	Bulu River Watershed	Bulu RIS	Region 1	Ilocos Norte	Bangui	17,200	425
1	REG 1	Laoag RB	Laoag Watershed	Bonga Pump . 1, Bonga Pump . 2, Bonga Pump . 3	Region 1	Ilocos Norte	Sarrat, San Nicolas, Laoag City	55,700	1,154
1	REG 1		Magalis-Papa River Watershed	Dingras RIS	Region 1	Ilocos Norte	Espiritu, Nueva Era, & Pinili	14,000	1,016
1	REG 1		Cura River Watershed	Cura RIS	Region 1	Ilocos Norte			
1	REG 1	Vintar RB	Vintar River Watershed	Laoag-Vintar RIS, NMC Pasuquin RIS	Region 1	Ilocos Norte	Vintar,, Burgos, & Bangui	29,000	2,377
1	REG 1	Sta Maria RB	Sta. Maria River Watershed	Sta. Maria-Burgos RIS	Region 1	Ilocos Sur	Burgos, Santiago, Banyuyom, Lidlidia & San Emilio	16,400	919

1	REG 1	Buaya RB	Buaya River Watershed	Sta. Lucia-Candon RIS	Region 1	Ilocos Sur	Candon, Sta. Lucia, Gregorio del Pilar, Sta. Lucia Salcedo, Sta. Cruz, Suyo, & Sigay	16,800	1,592
1	REG 1	Amburayan RB	Amburayan River Watershed	Amburayan RIS	Region 1, CAR	Ilocos Sur, La Union, Benguet	Tagudin & Sugpon, SudipenAtok, Kibungan, Bakun, Tublay Kapangan & Bugias	99,300	3,420
1	REG 1		Chico-Paduaquit River Watershed	Tagudin RIS	Region 1, CAR	Ilocos Sur, Benguet	Suyo, Alilem, Sigay & Cervantes, Bakun		
1	REG 1	Aringay RB	Aringay River Watershed	Masalip RIS	Region 1, CAR	La Union, Benguet	Aringay, Tubao & Pugo, Sablan, Tuba & Baguio City	27,300	1,453
1	REG 1	Bued RB	Bued River Watershed	San Fabian RIS	Region 1, CAR	Pangasinan, La Union, Benguet	San Fabian, San Jacinto, Pozorrubio & Sison, Pugo & Rosario, Tuba & Itogon	29,700	2,288
1	REG 1	Agno RB	Dumuloc River Watershed	Dumuloc RIS	Region 1, Region 3	Pangasinan, Zambales	Bugallon, Sta. Cruz	8,200	1,360
1	REG 1	Agno RB	Agno River Watershed	Ag RIS	CAR, Region1	Benguet, Pangasinan	Buguias, Kabayan, Bokod, La Trinidad & Itogon, Baguio City, Sta. Maria, San Nicolas, Sto. Tomas, Asingan, Tayug & San Manuel	228,400	7,500
1	REG 1	Agno RB	Ambayoan River Watershed	Ambayoan RIS, ADRIS Extension	Region 1, Region 2, CAR	Pangasinan, Nueva Vizcaya, Benguet	San Nicolas, Sta. Fe & Kayapa, Itogon	5,900	289
1	REG 1	Agno RB	Dipalo River Watershed	Dipalo RIS	Region 1, Region 2	Pangasinan, Nueva Ecija	Umingan, Lupao	4,200	2,252
1	REG 1	Agno RB	Agno - Banawan River Watershed	Lower Ag - Toton	Region 1	Pangasinan			
1	REG 1	Sinucalan RB	Agno - Sinucalan-Tuboy Watershed	Ag - Sinucalan RIS	Region 1, CAR	Pangasinan, Benguet	San Manuel, Itogon	152350	12663
8	REGION 2								

1	REG. 2	Cagayan RB	Magat River Watershed	Magat River Integrated Irrigation System (MARIIS II)	Region 1, Region 2, CAR	Nueva Vizcaya, Isabela, Ifugao	Sta Fe, Kayapa, Bambang, Dupax del Sur, Aritao, Bayombong, Sola, Bagabag & Diadi, Ramon, Naguilian, Ilagan & Gamu, Lagawe & Mayayao	412,300	88,370
1	REG. 2	Baua RB	Baua River Watershed	Baua RIS	Region 2	Cagayan	Gonzaga	5,000	2,419
1	REG. 2	Cagayan RB	Dummun River Watershed	Dummun RIS	Region 2	Cagayan	Capissayan	20,600	1,802
1	REG. 2	Cagayan RB	Pared River Watershed	Baggao RIS	Region 2	Cagayan	Baggao, Penablanca	20,950	2,067
1	REG. 2	Cagayan RB	Zinundangan River Watershed	Zinundangan RIS	Region 2, CAR	Cagayan, Apayao	Sto. Ni, Kabugao	21,500	2,045
1	REG. 2	Cagayan RB	Pinacanauan de Tuguegarao River Watershed	Pinacanuan RIS	Region 2	Cagayan	Penablanca, Maconacon	12,920	880
1	REG. 2	Cagayan RB	Pinacanauan de San Pablo Watershed	SanPablo-Cabagan RIS	Region 2	Isabela	San Pablo, Maconancon	13,450	1,273
1	REG. 2	Cagayan RB	Pinacanauan de Tumauni River Watershed	Tumauni RIS	Region 2	Isabela	Tumauni, Cabagan, Divilacan, Maconancon	17,630	3,615
14	REGION 3								
1	REG. 3	Pampanga RB	Tarlac River Watershed	Tarlac RIS, Odonell RIS, San Miguel RIS	Region 3	Tarlac, Zambales	Capas, Bamban, Tarlac City, Botolan	54,850	13,976
1	REG. 3	Agno RB	Camiling River Watershed	Camiling RIS	Region 3	Tarlac	Mayantoc, Candelaria, Masinloc	8,580	7,694
1	REG. 3	Pampanga RB	Upper Pampanga River Watershed	UPRIS - II	Region 3	Nueva Ecija	Pantabangan, Caranglan		
1	REG. 3		Pampanga-Coronnal River Watershed	UPRIS - III	Region 3	Nueva Ecija	Palayan City, Bongabon		
1	REG. 3	Caulaman RB	Caulaman River Watershed	Caulaman RIS	Region 3	Zambales, Pampanga	San Marceli, Castillejos, & Subic, Floridablanca	1,800	553

1	REG. 3		Dingalan Watershed		Region 3	Aurora	Dingalan		
1	REG. 3	Nayom RB	Nayom River Watershed	Nayom RIS	Region 3	Zambales, Pangasinan	Sta. Cruz, Infanta & Bugallon	14,450	1,148
1	REG. 3	Cabaluan RB	Cabaluan River Watershed	Bayto RIS	Region 3	Zambales	Sta. Cruz & Candelaria	11,260	
1	REG. 3	Sto. Tomas RB	Sto. Tomas River Watershed	Sto. Tomas RIS	Region 3	Zambales	San Narciso	18,100	3,924
1	REG. 3	Bucao RB	Bucao River Watershed	Bucao RIS	Region 3	Zambales	Botolan, Cabangan, San Felipe, Iba & San Marcelli	55,320	1,231
1	REG. 3	Pampanga RB	Porac-Gumain River Watershed	Porac-Gumain RIS (2 Intake)	Region 3	Pampanga	Porac & Floridablanca	22,500	
1	REG. 3	Pampanga RB	Angat-Maasim River Watershed	Angat-Maasim RIS	Region 3	Bulacan, Pampanga	Angat, rzagaray, San Ildefonso & San Rafael, San Luis	61,300	31,485
1	REG. 3	Pampanga RB	Angat-Ipo River Watershed	Ipo Dam (MWSS)	Region 3, Region 4A	Bulacan, Rizal	rzagaray, San Jose del Monte, Rodriguez (Montalban)	6,600	(MWWS) domestic Metro Manila
1	REG. 3	Pinulot RB	Pinulot River Watershed	Colo RIS	Region 3	Bataan, Zambales	Dinalupihan, Hermosa & Morong, Ologapo City & Subic	8,850	483
24	REGION 4A								
1	REG. 4A	Pasig-Laguna de Bay RB	Balanac River Watershed	Balanac RIS	Region 4A	Laguna, Quezon	Magdalena, Majayjay & Lusiana, Lucban	6,660	1,056
1	REG. 4A	Pasig-Laguna de Bay RB	Mabacan River Watershed	Mabacan RIS	Region 4A	Laguna	Calauan	4,900	492
1	REG. 4A	Pasig-Laguna de Bay RB	Llano River Watershed	Mayor RIS	Region 4A	Laguna, Quezon	Sta. Maria, Siniloan, Real	3,300	372
1	REG. 4A	Pasig-Laguna de Bay RB	Sta. Cruz River Watershed	Sta. Cruz RIS	Region 4A	Laguna	Sta. Cruz, Magdalena, & Nagcarlan	8,000	3,100
1	REG. 4A	Pasig-Laguna de Bay RB	San Antonio River Watershed	Sta. Maria RIS	Region 4A	Laguna, Rizal, Quezon	Sta. Maria, Tanay, Real	1,150	801

1	REG. 4A	Pasig-Laguna de Bay RB	NPC Tailrace & Lewin Creek	Lumban RIS	Region 4A	Laguna	Lumban	1,350	102
1	REG. 4A	Pasig-Laguna de Bay RB	Macabling River Watershed	Macabling RIS	Region 4A	Laguna		30,630	752
1	REG. 4A	Pasig-Laguna de Bay RB	San Cristobal River Watershed	- Cabuyao East PIS, - San Cristobal RIS, - Diezmo RIS	Region 4A	Laguna, Cavite	Cabuyao, Canlubang and Calamba, Silang & Tagaytay City		575
1	REG. 4A	Pasig-Laguna de Bay RB	San Juan River Watershed	- San Juan RIS	Region 4A	Laguna, Batangas	Calamba, Sto. Tomas, Tanauan and Malvar		509
1	REG. 4A	Maragondon RB	Maragondon River Watershed	- Balayugan A Dam, - Balayugan B Dam		Cavite	Naic	52,900	
1	REG. 4A	Labac RB	Caisobo River Watershed	- Culong-Culong Dam		Cavite	Indang		1,701
1	REG. 4A	Labac RB	Labac-Alemang River Watershed	- Sahing Dam, - Bancud Dam		Cavite	Naic, Indang		611
1	REG. 4A	Timalan RB	Timalan River Watershed	- Tres Cruses Dam		Cavite	Tanza		467
1	REG. 4A	Canas RB	Canas River Watershed	- Bayan Dam, - Plucena Dam, - Matanda A Dam, - Matanda B Dam		Cavite	Gen. Trias, Tanza		872
1	REG. 4A	San Juan RB	Ylang-ylang River Watershed	- Pasong Kastila Dam, Butas Marcelo Dam, - San Agustin Dam, - Butas Navarro Dam		Cavite	Imus, Gen. Trias, Dasmarinas		2,760
1	REG. 4A	San Juan RB	Lasong Camachile River Watershed	- Butas Lawang Bato Dam		Cavite	Gen. Trias		2,853
1	REG. 4A	Imus RB	Imus River Watershed	- Julian Dam, - Makuling, - Lukshuhin, -		Cavite	Imus, Dasmarinas		632

				Embarcadero Dam					
1	REG. 4A	Zapote RB	Zapote River watershed	- Molino		Cavite	Bacoor		2,238
1	REG. 4A	Lian RB	Palico River Watershed	Palico RIS	Region 4A	Batangas	Tuy & Nasugbu		443
1	REG. 4A	Lagnas RB	Lagnas River Watershed	Lagnas RIS	Region 4A	Quezon	Candelaria	11,800	386
1	REG. 4A	Janagdong RB	Janagdong River Watershed	Hanagdong RIS	Region 4A	Quezon	Candelaria & Sariaya	1,860	753
1	REG. 4A	Dumacao RB	Dumacao River Watershed	Dumacao RIS	Region 4A	Quezon	Tayabas	1,360	329
1	REG. 4A	Agos RB	Agos River Watershed	Agos RIS	Region 4A	Quezon, Rizal	Gen. Nakar, Infanta, Real, Tanay, Teresa	8,500	2,227
1	REG. 4A	Pasig-Laguna de Bay RB	Marikina River Watershed	Wawa Dam	Region 4A	Rizal	Tanay, Montalban, Antipolo,	91,260	1,119
10	REGION 4B								
1	REG. 4B	Bansud RB	Bansud River Watershed	Bansud RIS	Region 4B	Mindoro Oriental	Bongabong & Pinamalayan	7,000	1,062
1	REG. 4B	Catuiran RB	Catuiran - Bucayao River Watershed	Baco RIS	Region 4B	Mindoro Oriental, Mindoro Occidental	Baco, Naujan, & SanTeodoro, Sablayan & Sta. Cruz	26,000	
1	REG. 4B	Pula RB	Pula River Watershed	Pula RIS	Region 4B	Mindoro Oriental	Pinamalayan	12,970	2,768
1	REG. 4B	Magasawang Tubig RB	Magasawang Tubig-Mapalo River Watershed	Magasawang Tubig RIS	Region 4B	Mindoro Oriental, Mindoro Occidental	Naujan, Sablayan	19,565	1,700
1	REG. 4B	Pagbahaan RB	Pagbahan River Watershed	Pagbahan RIS	Region 4B	Mindoro Oriental, Mindoro Occidental	San Teodoro & Puerto Galera Mamburao & Sta Cruz	23,380	1,005
1	REG. 4B	Amnay RB	Amnay-Patrick River	Amnay-Patrick RIS	Region 4B	Mindoro Occidental, Mindoro Oriental	Sta. Cruz & Sablayan, Baco & San Teodoro	20,750	1,331
1	REG. 4B	Mongpong RB	Mongpong River Watershed	Mongpong RIS	Region 4B	Mindoro Occidental	Sablayan	22,300	882
1	REG. 4B	Cagara y RB	Cagaray River Watershed	Cagaray RIS	Region 4B	Mindoro Oriental, Mindoro	Mansalay & Bulalacao, San Jose	12,900	3,308

						Occidental			
1	REG. 4B	Lumintao	Lumintao River Watershed	Lumintao RIS	Region 4B	Mindoro Occidental	Sablayan	38,600	1,504
1	REG. 4B	Malasgao RB	Malasgao River Watershed	Malasgao RIS	Region 4B	Palawan	Quezon & Aborlan	6,360	2,607
15	REGION 5								
1	REG. 5	Bicol RB	Ponso Watershed	Hibiga RIS	Region 5	Albay	Pulnagui & Oas	10,090	420
1	REG. 5	Bicol RB	Basay River Watershed	Mahaba RIS	Region 5	Albay	Liago & Oas		566
1	REG. 5	Bicol RB	Nasisi River Watershed	Nasisi RIS	Region 5	Albay	Ligao & Gui batan		780
1	REG. 5	Bicol RB	Bublusan Watershed	Ogsong RIS	Region 5	Albay	Gui batan & Camalig		180
1	REG. 5	Bicol RB	Buhi-Iriga River Watershed	Buhi-Lalo RIS, Lake Buhi RIS (Buhi-Lalo)	Region 5	Camarines Sur, Albay	Buhi, Nabua & Iriga City Tiwi	41,350	4,984
1	REG. 5	Bicol RB	Nabua River Watershed	Barit (Rida) RIS	Region 5	Camarines Sur	Baao, Buhi & Iriga City	19,500	2,224
1	REG. 5	Basud RB	Daet River Watershed	Daet RIS	Region 5	Camarines Norte	Daet, San Vicente, &	6,320	-
1	REG. 5	Talisay RB	Talisay River Watershed	Talisay RIS	Region 5	Camarines Norte	Daet & San Vicente	2,820	2,603
1	REG. 5	Bicol RB	Sipocot-Pulantuna Watershed	Libmanan-Cabusao RIS	Region 5	Camarines Sur	Libmanan, Sipocot, Lupi,	54,200	2,195
1	REG. 5	Bicol RB	Pili River Watershed	Pili RIS	Region 5	Camarines Sur	Pili	2,680	250
1	REG. 5	Bicol RB	Tigman River Watershed	THIRIS Tigman Dam	Region 5	Camarines Sur	Calabanga & Tinambac	8,990	3,542
1	REG. 5	Bicol RB	Hinagyana River Watershed	THIRIS Hinagyana Dam					
1	REG. 5	Bicol RB	Inainigan/Inarihan	THIRIS Inarihan Dam					
1	REG. 5	Sabang RB	Sabang River Watershed	San Francisco RIS	Region 5	Sorsogon			
1	REG. 5	Tubugan RB	Tubugan River Watershed	San Ramon RIS	Region 5	Sorsogon	Bulan, Irosin & Matig	1,590	590
11	REGION 6								
1	REG. 6	Sibalom RB	Tipuluan River Watershed	Sibalom-San Jose RIS	Region 6	Antique	Sibalom & San Jose	61,600	5,065

1	REG. 6	Panay RB	Mambusao River Watershed	Mambusao RIS	Region 6	Capiz, Aklan	Sapian, Jamindan & Mambusao, Altavas	31,630	1,423
1	REG. 6	Jaro RB	Aganan River Watershed	Aganan RIS	Region 6	Iloilo	Alimodian & Maasin	11,300	4,863
1	REG. 6	Barotac Viejo RB	Barotac Viejo River Watershed	Barotac-Viejo RIS	Region 6	Iloilo	Barotac Viejo, Lemery &	9,150	1,774
1	REG. 6	Jalaur RB	Jalaur River Watershed	Jalaur RIS	Region 6	Iloilo	Dingle, Pototan, Janiuay, Passi, Dueñas, Calig, Lambunao, Anilao, Banate, & Barotac Viejo	107,700	11,560
1	REG. 6	Jalaur RB	Jalaur-Suage River Watershed	Suage RIS	Region 6	Iloilo	Janiuay, Maasin, Cabatuan, & Lucena	17,480	2,916
1	REG. 6	Sibaloman-Tigbauan RB	Sibalom River Watershed	Sibalom-Tigbauan RIS	Region 6	Iloilo	Leon, Alimodian & Tigbauan	11,400	2,020
1	REG. 6	Jaro RB	Tigum River Watershed	Sta. Barbara RIS	Region 6	Iloilo, Antique,	Cabatuan, Maasin & Janiway, Valderama & San Remigio	19,200	3,399
1	REG. 6	Bago RB	Bago River Watershed	Bago RIS	Region 6	Negros Occidental	Bago, Murcia, Talisay, San Carlos and Calatrava	62,500	12,700
1	REG. 6	Binalbagan RB	Pagiplan River Watershed	Pagiplan RIS	Region 6	Negros Occidental	Binalbagan	1,756	8,030
1	REG. 6	Ibajay RB	Ibajay River Watershed	Panukayan RIS	Region 6	Aklan	Ibajay	23,400	900
2	REGION 7								
1	REG. 7		Caruod Watershed			Bohol	Ubay, Mabini, Aklan	21,497	
1	REG. 7		Matutinao Watershed			Cebu	Badiana, Alegria, Malabuyoc, Ahoy, Dalaguete	5,735.67	
11	REGION 8								
1	REG 8	Mayo RB	Magon-Bucan River Watershed	Balire rth RIS	Region 8	Leyte	La Paz, Macarthur & Inayupan	4,500	300
1	REG 8	Bao RB	Bao River Watershed	Bao RIS	Region 8	Leyte	Ormoc City, Kananga, Capoocan & Cariagara	5,800	1,917
1	REG 8	Quilot RB	Binahaan River Watershed	Binahaan South RIS, Binahaan rth RIS, Lower Binahaan	Region 8	Leyte	Ormoc City, Jaro, Pastrana & Dagami	21,910	4,402

				RIS					
1	REG 8	Biot RB	Bito River Watershed	Bito RIS	Regio 8	Leyte	Inayopan, Abuyog, & Baybay	11,380	1,411
1	REG 8	Daguitan RB	Daguitan River Watershed	Daguitan RIS	Region 8	Leyte	Burauen, Albuera, & Dagami	4,300	850
1	REG 8	Gibuga RB	Gibuga River Watershed	Gibuga RIS	Region 8	Leyte	Burauen, Julita, Dulag, La Paz & Sta. Cruz	5,400	738
1	REG 8	Guinarona RB	Guinarona River Watershed	Guinarona RIS	Region 8	Leyte	Dagami & Burauen	1,450	646
1	REG 8	Sapaniton RB	Mainit River Watershed	Mainit RIS	Region 8	Leyte	Carigara, Jaro, & Alangalang	3,150	2,186
1	REG 8	Himonglos RB	Pongso River Watershed	Pongso RIS	Region 8	Leyte	Cariagara, Barugo & Tunga, Ormoc City	4,020	800
1	REG 8	Palo RB	Palo River Watershed	Suong-Tibak RIS	Region 8	Leyte	Palo, Jaro, Sta Fe, & Alangalang, Tacloban City	2,350	1,630
1	REG 8	Salug RB	Salug River Watershed	Hindang-Hilogos RIS	Region 8	Leyte	Hindang, Hilongos & I pacan	7,200	720
3	REGION 9								
1	REG. 9	Dipolo RB	Dipolo River Watershed	Dipolo Dam (RIS), Salug RIS	Region 9	Zamboanga del Sur	Molave	67,200	8,824
1	REG. 9	Labangan RB	Labangan-Puluan-Lantian-Tiwagan Rivers	Labangan RIS	Region 9	Zamboanga del Sur		43,360	3,195
1	REG. 9	Sibuguey RB	Sibuguey-Dipili Rivers	Sibuguey Valley RIS	Region 9	Zamboanga del Sur		21,800	3,143
4	REGION 10								
1	REG. 10	Mindanao RB	Manupali River	Manupali RIS	Region 10	Bukidnon		13,850	4,395
1	REG. 10	Mindanao RB	Muleta-Kulaman River Watershed	Muleta RIS	Region 10	Bukidnon	Pangantukan & Maramag	21,450	4,063
1	REG. 10	Mindanao RB	Roxas Kuya River Watershed	Roxas Kuya RIS	Region 10	Bukidnon	Maramag	9,300	823
1	REG. 10	Maranding	Dipolo-Maranding River Watershed	Maranding RIS	Region 12	Lanao del Norte	Nunuñgan & Kapatagan	39,350	4,927

8 REGION 11									
1	REG. 11	Agusan RB	Batutu Watershed	Batutu RIS	Region 11	Compostela Valley	Compostela	10,500	3,269
1	REG. 11	Tagum - Libugan RB	Libugan River Watershed	Libugan RIS	Region 11	Davao del Norte, Compostela Valley	Kapalong, Sto. Tomas, Asuncion, San Vicente, New Correla Tagum City, Nabunturan Moncayo	74,730	9,000
1	REG. 11	Saug RB	Saug River Watershed	Saug RIS	Region 11	Davao del Norte, Compostela Valley	Kapalong, Asuncion, Nabunturan	41,100	3,900
1	REG. 11	Lasang RB	Lasang River Watershed	Lasang RIS	Region 11	Davao del Norte	Kapalong & Panbo, Davao City	39,450	4,450
1	REG. 11	Matanao RB	Matanao River Watershed	Mal RIS	Region 11	Davao del Sur	Digos	35,400	2,613
1	REG. 11	Padada RB	Padada River Watershed	Padada RIS	Region 11	Davao del Sur, NoNorth Cotabato	Digos, Makilala	81,850	3,512
1	REG. 11	Sumlog RB	Sumlog River Watershed	Lupon RIS	Region 11	Davao Oriental, Davao del Norte	Lupon, Banaybanay & Mati, Panutukan	25,540	2,450
1	REG. 11	Buayan RB	Buayan-Tinagacan Rivers	Buayan RIS	Region 11	Davao del Sur, Sarangani, South Cotabato	Malalag, Sta. Maria & Malita, Malungon, Alabel, Polomolok, Gen Santos City	7,580	710
9 REGION 12									
1	REG. 12	Mindanao RB Liguasan Marsh	Kabacan River Watershed	Kabacan-Pagalungan RIS	Region 12	North Cotabato	Kabacan & Kidapawan	74,000	4,428
1	REG. 12	Mindanao RB	Libungan River Watershed	Libungan RIS	Region 12	North Cotabato	Libungan	51,700	4,496
1	REG. 12	Mindanao RB Liguasan Marsh	M'lang River Watershed	M'lang RIS	Region 12	North Cotabato	M'lang & Makilala	20,100	2,981
1	REG. 12	Mindanao RB Liguasan Marsh	Malasila River Watershed	Malasila RIS	Region 12	North Cotabato	Tuluran & Makilala	31,200	4,006
1	REG. 12	Mindanao RB	Allah River Watershed	Allah I RIS, Allah II Lambayong RIS	Region 12	South Cotabato	T'Boli, rala, Surallah	158,290	23,355

1	REG. 12	Mindanao RB	Banga River Watershed	Banga RIS	Region 12	South Cotabato	Banga	28,800	2,682
1	REG. 12	Silway-Klinan RB	Silway River Watershed	Silway RIS	Region 12	South Cotabato	Dadiangas, Polomolok &	53,300	1,406
1	REG. 12	Mindanao RB	Palian River Watershed	Marbel RIS 1 & 2	Region 12	South Cotabato	Marbel & Tupi	20,675	3,557
1	REG. 12	Minadanao RB	Alip River Watershed	Alip RIS	ARMM	Sultan Kudarat	Columbio, Lutayan	37,950	1,500
6	REGION 13								
1	REG. 13	Cabadbaran RB	Cabadbaran River Watershed	Cabadbaran RIS	Region 13	Agusan del Norte	Cabadbaran	7,350	3,213
1	REG. 13	Agusan RB	Taguibo River	Taguibo RIS	Region 13	Agusan del Norte	Butuan City & Cabadbaran	8,430	2,158
1	REG. 13	Agusan RB	Andanan River Watershed	Andanan RIS	Region 13	Agusan del Sur	Bayugan	19,200	5,000
1	REG. 13	Agusan RB	Simulao River Watershed	Simulao RIS	Region 13	Agusan del Sur, Surigao del Sur	Bunawan & Trento, Bislig & Lingig	42,900	2,540
1	REG. 13	Caracan RB	Caracan River Watershed	Cantilan RIS	Region 13	Surigao del Sur, Agusan del Norte	Madrid, Jagupit	12,180	1,785
1	REG. 13	Tago RB	Tago River Watershed	Tago RIS	Region 13	Surigao del Sur, Agusan del Sur	Tago, Cagwit, Bayugan	118,000	3,716
1	ARMM								
1	ARMM	Gata RB Lake Lanao	Gata River Watershed	Rugnan RIS	ARMM	Lanao del Sur	Maguing & Lumba-Bayabao	18,150	2,500
143	Grand Total								
								-	481,602

Annex 7 . List of Protected Areas of the Philippines

(http://readtiger.com/wkp/en/List_of_protected_areas_of_the_Philippines)

Classification

Protected areas in the Philippines are managed according to the classifications described in Section 4 of the National Integrated Protected Areas System Act of 1992 (NIPAS Act).

National Parks

National parks refer to forest reservations essentially of natural wilderness character which have been withdrawn from settlement, occupancy or any form of exploitation except in conformity with approved management plan and set aside as such exclusively to conserve the area or preserve the scenery, the natural and historic objects, wild animals and plants therein and to provide enjoyment of these features in such areas.

Name	Location	Area	Established
Apo Reef	Mindoro Occidental	15,792 ha 39,023 acres	1996
Balinsasayao Twin Lakes	Negros Oriental	8,016.05 ha 19,808 acres	2000
Bicol	Camarines Norte-Camarines Sur	5,201 ha 12,850 acres	2000
Bongsalay	Masbate	244.72 ha 605 acres	2000
Bulusan Volcano	Sorsogon	3,672 ha 9,074 acres	2000
Kalbario-Patapat	Ilocos Norte	3,800 ha 9,390 acres	2007
Lake Danao	Leyte	2,193 ha 5,419 acres	1998
Mahagnao Volcano	Leyte	635 ha 1,569 acres	1998
Mayon Volcano	Albay	5,775.70 ha 14,272 acres	2000
Mount Apo	Davao del Sur-Cotabato	3,632.74 ha 8,977 acres	2007
Mount Balatukan Range	Misamis Oriental	8,423 ha 20,814 acres	2007
Mount Guiting-Guiting	Romblon	15,265.48 ha 37,722 acres	1996

Mount Inayawan Range	Lanao del Norte	3,632.74 ha 8,977 acres	2007
Mount Isarog	Camarines Sur	10,112.35 ha 24,988 acres	2002
Mount Kalatungan Range	Bukidnon	21,247.73 ha 52,504 acres	2000
Mount Kanlaon	Negros Occidental-Negros Oriental	24,388 ha 60,264 acres	1997
Mount Kitanglad Range	Bukidnon	31,235.19 ha 77,184 acres	1996
Mount Malindang	Misamis Occidental	34,694 ha 85,731 acres	2002
Northern Negros	Negros Occidental	80,454.50 ha 198,807 acres	2002
Northern Sierra Madre	Isabela	359,486 ha 888,309 acres	1997
Northwest Panay Peninsula	Aklan-Antique	12,009.29 ha 29,676 acres	2002
Pasonanca Natural Park^[7]	Zamboanga del Sur	12,107 ha 29,917 acres	1999
Samar Island	Eastern Visayas	333,300 ha 823,602 acres	2003
Sibalom	Antique	5,511.47 ha 13,619 acres	2000
Tubbataha Reef	Palawan	97,030 ha 239,766 acres	2010

25 – Total

Natural Monuments

A natural monument is a relatively small area focused on protection of small features to protect or preserve nationally significant natural features on account of their special interest or unique characteristics

Name	Location	Area	Established
Bessang Pass	Ilocos Sur	693.32 ha 1,713 acres	2000
Chocolate Hills	Bohol	14,145 ha 34,953 acres	1997
Salinas	Nueva Vizcaya	6,675.56 ha 16,496 acres	2000
Timpoong and Hibok-Hibok	Camiguin	2,227.62 ha 5,505 acres	2004

4 Total

Protected Landscape

Protected landscapes/seascapes are areas of national significance which are characterized by the harmonious interaction of man and land while providing opportunities for public enjoyment through recreation and tourism within the normal lifestyle and economic activity of these areas.

Name	Location	Area	Established
Aliwagwag	Davao Oriental-Compostela Valley	10,491.33 ha 25,925 acres	2011
Amro River	Aurora	6,471.08 ha 15,990 acres	2000
Baganga	Davao Oriental	114.88 ha 284 acres	2000
Bigbiga	Ilocos Sur	135.71 ha 335 acres	2000
Buenavista	Quezon	284.27 ha 702 acres	2000
Calbayog-Pan-as-Hayiban	Samar	7,832 ha 19,353 acres	1998
Casecnan	Cagayan Valley-Aurora	88,846.80 ha 219,545 acres	2000
Central Cebu	Cebu	29,062 ha 71,814 acres	2003
Dinadiawan River	Aurora	3,371.33 ha 8,331 acres	2000
Hinulugang Taktak	Rizal	3.20 ha 8 acres	2000
Jose Rizal Memorial	Zamboanga del Norte	439 ha 1,085 acres	2000
Libunao	Ilocos Sur	46.70 ha 115 acres	2000
Lidlidda	Ilocos Sur	1,157.44 ha 2,860 acres	2000
Magapit	Cagayan	3,403.62 ha 8,411 acres	2000
Mainit Hot Spring	Compostela Valley	1,374 ha 3,395 acres	2000
Manleluag Spring	Pangasinan	1,935.17 ha 4,782 acres	2004
Mati	Davao Oriental	914.26 ha 2,259 acres	2005

Maulawin Spring	Quezon	149.01 ha 368 acres	2000
Mimbilisan	Misamis Oriental	66 ha 163 acres	1999
Mounts Banahaw -San Cristobal	Quezon-Laguna	10,900.59 ha 26,936 acres	2009
Mount Mantalingajan	Palawan	120,457 ha 297,656 acres	2009
Mount Matutum	South Cotabato	15,600 ha 38,548 acres	1995
Mounts Palay-Palay - Mataas-na-Gulod	Cavite-Batangas	3,973.13 ha 9,818 acres	2007
Mount Timolan	Zamboanga del Sur	1,994.80 ha 4,929 acres	2000
Pamitinan	Rizal	600 ha 1,483 acres	1996
Quezon	Quezon	938 ha 2,318 acres	2003
Quirino	Quirino	164,364.46 ha 406,153 acres	2005
Rajah Sikatuna	Bohol	10,452.60 ha 25,829 acres	2000
Roosevelt	Bataan	786.04 ha 1,942 acres	2000
Santa Lucia	Ilocos Sur	174.16 ha 430 acres	2000
Simbahan-Talagas	Aurora	2,266.49 ha 5,601 acres	2000
Taal Volcano	Batangas	62,292.14 ha 153,927 acres	1996
Talaytay	Aurora	3,526.29 ha 8,714 acres	2000
Upper Marikina River Basin	Rizal	26,125.64 ha 64,558 acres	2011
34 total			

Protected Landscape and Seascape

Name	Location	Area	Established
Agoo-Damortis	La Union	10,513.30 ha 25,979 acres	2000
Albuquerque-Loay-Loboc	Bohol	1,164.16 ha 2,877 acres	1999

Aliguay Island	Zamboanga del Norte	1,191.89 ha 2,945 acres	1999
Apo Island	Negros Oriental	691.45 ha 1,709 acres	1994
Baliangao	Misamis Occidental	295 ha 729 acres	2000
Batanes	Batanes	213,578 ha 527,763 acres	1994
Biri Larosa	Northern Samar	33,492 ha 82,761 acres	2000
Cuatro Islas	Leyte	12,500 ha 30,888 acres	2000
Dumanquilas	Zamboanga del Sur	25,948 ha 64,119 acres	1999
Great and Little Santa Cruz Islands	Zamboanga del Sur	1,877 ha 4,638 acres	2000
Guiuan	Eastern Samar	60,448 ha 149,370 acres	1994
Initao-Libertad	Misamis Oriental	800.45 ha 1,978 acres	2002
Mabini	Compostela Valley	6,106 ha 15,088 acres	2000
Malabungot	Camarines Sur	120.62 ha 298 acres	2000
Malampaya	Palawan	200,115 ha 494,495 acres	2000
Murcielagos Island	Zamboanga del Norte	151 ha 373 acres	2000
Peñablanca	Cagayan	118,781.58 ha 293,516 acres	2003
Pujada Bay	Davao Oriental	21,200 ha 52,386 acres	1994
Selinog Island	Zamboanga del Norte	1,294.35 ha 3,198 acres	2000
Siargao Island	Surigao del Norte	278,914.13 ha 689,212 acres	1996
Talibon Islands	Bohol	6,456.87 ha 15,955 acres	1999
21 total			

Protected Seascape

Name	Location	Area	Established
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Panglao Island Bohol	385.67 ha 953 acres	2003
Sarangani Bay Sarangani	215,950 ha 533,624 acres	1996
Tañon Strait Cebu-Negros Oriental	450 ha 1,112 acres	1998

3 total

Game Refuge and Bird Sanctuaries

Strict nature reserve is an area possessing some outstanding ecosystem, features and/or species of flora and fauna of national scientific importance maintained to protect nature and maintain processes in an undisturbed state in order to have ecologically representative examples of the natural environment available for scientific study, environmental monitoring, education, and for the maintenance of genetic resources in a dynamic and evolutionary state.

Name	Location	Area	Established
Calauit Safari Park	Palawan	3,400 ha 8,402 acres	1976
Calavite and FB Harrison	Mindoro Occidental	121,983.81 ha 301,429 acres	1920
Lake Buluan	Cotabato	6,300 ha 15,568 acres	2006
Lake Malimanga	Zambales	12.35 ha 31 acres	1980
Olango Island	Cebu	920 ha 2,273 acres	1992
Palawan	Palawan	761,416 ha 1,881,500 acres	1967

6 total

Resource Reserves

Resource reserve is an extensive and relatively isolated and uninhabited area normally with difficult access designated as such to protect natural resources of the area for future use and prevent or contain development activities that could affect the resource pending the establishment of objectives which are based upon appropriate knowledge and planning.

Name	Location	Area	Established
Siocon	Zamboanga del Norte	793.74 ha 1,961 acres	1999
Upper Agno River Basin	Cordillera-Nueva Vizcaya	77,561 ha 191,657 acres	2000

2 total

Managed Resource Protected Areas

Name	Location	Area	Established
El Nido Managed Resource Protected Area	Palawan	89,134.76 ha 220,257 acres	1998
1 total			

Marine Reserves

Name	Location	Area	Established
Masinloc and Oyon Bay	Zambales	7,568 ha 18,701 acres	1993
Palau Island	Cagayan	7,415.48 ha 18,324 acres	1994
Sagay	Negros Occidental	32,000 ha 79,074 acres	2001
Taklong Island	Guimaras	1,143.45 ha 2,826 acres	1990
4 Total			

Watershed Forest Reserves

Name	Location	Area	Established
Aklan River	Aklan	23,185 ha 57,291 acres	1990
Alabat	Quezon	688 ha 1,700 acres	1987
Alijawan-Cansuhay-Anibongan River	Bohol	3,630 ha 8,970 acres	1992
Allah	South Cotabato	92,450 ha 228,449 acres	1985
Angat River	Bulacan	6,600 ha 16,309 acres	1968
Aurora	Aurora	430 ha 1,063 acres	1936
Bawa	Cagayan	8,955 ha 22,128 acres	1987
Binahaan River	Quezon	465 ha 1,149 acres	1991
Calabgan	Aurora	4,803 ha	1992

		11,868 acres	
Calatrava-San Andres-San Agustin	Romblon	2,670 ha 6,598 acres	1982
Calauag	Quezon	328 ha 811 acres	1939
Capalonga	Camarines Norte	752 ha 1,858 acres	1966
Catanduanes	Catanduanes	26,010 ha 64,272 acres	1987
Dahican	Camarines Norte	44 ha 109 acres	1933
Dalanas River	Antique	8,558 ha 21,147 acres	1990
Dibalo-Pingit-Zabali-Malayay	Aurora	4,528 ha 11,189 acres	1992
Dipaculao	Aurora	1,786 ha 4,413 acres	1987
Doña Remedios-General Tinio	Bulacan-Nueva Ecija	20,760 ha 51,299 acres	1988
Dupax	Nueva Vizcaya	424.80 ha 1,050 acres	1934
Ilocos Norte Metro	Ilocos Norte	2,815 ha 6,956 acres	1934
Ilog-Hilabangan	Negros Occidental	10,211 ha 25,232 acres	1990
Infanta	Quezon	384 ha 949 acres	1967
Jalaur River	Iloilo	9,228 ha 22,803 acres	1990
Kabankalan	Negros Occidental	432 ha 1,067 acres	1991
Lake Lanao	Lanao del Sur	180,460 ha 445,926 acres	1992
Libungan	Cotabato	52,820 ha 130,521 acres	1990
Loboc River	Bohol	19,410 ha 47,963 acres	1953
Lopez	Quezon	418 ha 1,033 acres	1940
Lower Agno	Benguet	39,304 ha 97,122 acres	1983
Maasin	Iloilo	6,150 ha 15,197 acres	1923

Mahugunao	Misamis Oriental	136 ha 336 acres	1932
Malagos	Davao del Sur	235 ha 581 acres	1933
Marcos Highway	Benguet	6,105 ha 15,086 acres	1978
Mariveles (Palanas)	Bataan	325 ha 803 acres	1919
Mulanay	Quezon	26 ha 64 acres	1938
Naguilian	La Union	90 ha 222 acres	1936
Olongapo (Palanas)	Zambales	6,335 ha 15,654 acres	1987
Palawan	Palawan	4,776 ha 11,802 acres	1982
Palompon	Leyte	2,392 ha 5,911 acres	1988
Panay River	Capiz	4,350 ha 10,749 acres	1990
Pantabangan-Carranglan	Nueva Ecija	84,500 ha 208,804 acres	1969
Polillo	Quezon	130 ha 321 acres	1966
Santa	Ilocos Sur	25 ha 62 acres	1935
South Upi	Maguindanao	1,894.20 ha 4,681 acres	1987
Talavera	Nueva Ecija-Nueva Vizcaya	37,156 ha 91,814 acres	1938
Tanap	Ilocos Norte	41 ha 101 acres	1971
Tibiang-Damagandong	Quezon	280 ha 692 acres	1938
Torrijos	Marinduque	105 ha 259 acres	1932
Tumauini	Isabela	17,670 ha 43,664 acres	1994
Wangag	Cagayan	6,992 ha 17,278 acres	1987
50 total			

Natural Biotic Areas

Natural biotic area is an area set aside to allow the way of life of societies living in harmony with the environment to adapt to modern technology at their pace.

Name	Location	Area	Established
Abasig-Matogdon-Mananap	Camarines Norte	5,420.12 ha 13,393 acres	2000
Basilan	Basilan	4,497 ha 11,112 acres	2000
Buug	Zamboanga del Sur	1,095 ha 2,706 acres	1998
Lagonoy	Camarines Sur	444.60 ha 1,099 acres	2000

4 total

Wildlife Sanctuaries

Wildlife sanctuary comprises an area which assures the natural conditions necessary to protect nationally significant species, groups of species, biotic communities or physical features of the environment where these may require specific human manipulation for the perpetuation.

Name	Location	Area	Established
Agusan Marsh	Agusan del Sur	14,835.99 ha 36,661 acres	1996
Chico Island	Masbate	7.77 ha 19 acres	2000
Marinduque	Marinduque	8,827.96 ha 21,814 acres	2004
Mount Calavite	Mindoro Occidental	18,016.19 ha 44,519 acres	2000
Mount Hamiguitan Range	Davao Oriental	6,834 ha 16,887 acres	2004
Naro Island	Masbate	109.98 ha 272 acres	2000
Rasa Island	Palawan	1,983 ha 4,900 acres	2006
Turtle Islands	Tawi-Tawi	242,967 ha 600,385 acres	1999

8 total

Wilderness Areas

Name	Location	Area	Established
Alibijaban Island	Quezon	430 ha 1,063 acres	1981
Awasan Bay Islands	Surigao del Norte		1981
Bantayan Island	Cebu		1981
Basot-Quinalang-Malabugot Islands	Camarines Sur	185.38 ha 458 acres	1981
Caniago Strait Islands	Bohol	210 ha 519 acres	1981
Cebu Strait Islands	Bohol	34 ha 84 acres	1981
Dampalit Island	Masbate		1981
Guinauyan-Naro-Chico-Pobre Islands	Masbate	23.25 ha 57 acres	1981
Isabela Monte Alto Timber Resource Corp.	Isabela	1,985 ha 4,905 acres	1987
Majaba-Napayuan Islands	Masbate	18 ha 44 acres	1981
Panag Bay Islands	Surigao del Norte		1981
Rasa Island	Surigao del Norte		1981

12 total

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