

ASSESSING PROGRESS TOWARDS THE 2010 BIODIVERSITY TARGET:

**The 4th National Report to the
Convention on Biological Diversity**

Republic of the Philippines

2009



TABLE OF CONTENTS

List of Tables	3	
List of Figures	3	
List of Boxes	4	
List of Acronyms	5	
Executive Summary	10	
Introduction	12	
Chapter 1	Overview of Status, Trends and Threats	14
	1.1 Forest and Mountain Biodiversity	15
	1.2 Agricultural Biodiversity	28
	1.3 Inland Waters Biodiversity	34
	1.4 Coastal, Marine and Island Biodiversity	45
	1.5 Cross-cutting Issues	56
Chapter 2	Status of National Biodiversity Strategy and Action Plan (NBSAP)	68
Chapter 3	Sectoral and cross-sectoral integration and mainstreaming of biodiversity considerations	77
Chapter 4	Conclusions: Progress towards the 2010 target and implementation of the Strategic Plan	92
References		97
Philippines Facts and Figures		108

LIST OF TABLES

1	List of threatened Philippine fauna and their categories (<i>DAO 2004 -15</i>)
2	Summary of number of threatened Philippine plants per category (<i>DAO 2007 -01</i>)
3	Invasive alien species in the Philippines
4	Jatropha estates
5	Number of forestry programs and forest management holders
6	Approved CADTs/CALTs as of December 2008
7	Number of documented accessions per crop
8	Number of classified water bodies
9	List of conservation and research priority areas for inland waters
10	Priority rivers showing changes in BOD levels 2003-2005
11	Priority river basins in the Philippines
12	Swamps/marshes in the Philippines
13	Trend of hard coral cover, fish abundance and biomass by biogeographic region
14	Quantity and value of fish production, by type of fishing operation 1996 to 2007
15	List of documented IKSPs of tribes
16	National biodiversity strategies and major thrusts
17	Philippine Biodiversity Conservation Priorities (PBCP) strategies and immediate actions
18	Summary of Integrated Protected Areas Fund from 1996 to 2008
19	List of protected areas and income generated as of December 2008
20	Summary of MPAs- 1997, 2000 & 2007

LIST OF FIGURES

1	Map of the Philippines
2	Forest loss in the 20 th century
3	Forest cover in forestlands and A&D land
4	Percentage of Key Biodiversity Areas (KBAs) and Alliance for Zero Extinction (AZE) sites under some form of legal protection from 1996-2006
5	Production of logs, lumber, plywood and veneer 1997-2007
6	Reforestation efforts from 1976-2006
7	Forest fire disturbances, 1996-2006
8	Overlap of KBAs and mining applications
9	Laguna Lake Basin: conditions and trends
10	DO in Laguna de Bay and tributaries
11	BOD in Laguna de Bay and tributaries
12	Lake primary productivity, fish yield, chloride concentration, transparency and lake level, 2004-2006
13	Average DO and BOD levels in Pasig River System 1999-2007
14	Coral reef conditions in the Philippines
15	Fisheries exploitation rate in major fishing areas
16	Trend in mangrove cover from 1918 to 2008
17	Seagrass distribution in the Philippines

- 18 Complete nests and egg production of olive ridley in Bataan and Zambales (Aug. 2004-Feb. 2009)
- 19 Number of complete nests and egg production per year at BIMTS 1994-2007
- 20 HIETA income from ecotours
- 21 Kenhulung Foundation income from handicraft
- 22 PIDWWO net income from 2003-2008
- 23 User fee income in GIMS, 1998-2008
- 24 DENR budget allocation 1987-1999
- 25 On-going FASPs by sector
- 26 LGU budget by sector, by region
- 27 Administrative map showing Manila Bay – Pasig River – Laguna de Bay
- 28 Manila Bay institutional set-up
- 29 Partnerships in Laguna de Bay

LIST OF BOXES

- 1 National Ecotourism Program 2004-2010
- 2 Eastern Mindanao Biodiversity Corridor (EMBC) Conservation Framework
- 3 Save the Northern Sierra Madre

LIST OF ACRONYMS

4NR	Fourth National Report
A&D	Alienable and disposable
A2C2	Albay in Action on Climate Change
ACB	ASEAN Center for Biodiversity
ADB	Asian Development Bank
ADSDPP	Ancestral Domain Sustainable Development and Protection Plan
AGF	Agroforestry
AHTEG	Ad Hoc Technical Experts Group
ARMM	Autonomous Region of Muslim Mindanao
ASEAN	Association of Southeast Asian Nations
AVLDA	Allah Valley Development Alliance
AZE	Alliance for Zero Extinction
BFAR	Bureau of Fisheries and Aquatic Resources
BAR	Bureau of Agricultural Research
BAFPS	Bureau of Agriculture and Fisheries Product Standards
BAI	Bureau of Animal Industry
BATTO	Banaue Tour and Travel Organization
BICMP	Bataan Integrated Coastal Management Program
BIMTS	Baguan Island Marine Turtle Sanctuary
BIMP-EAGA	Brunei-Indonesia-Malaysia-Philippines- East Asia Growth Area
BINU	Biodiversity Indicators for National Use
BOC	Bureau of Customs
BOD	Biological Oxygen Demand
BPI	Bureau of Plant Industry
BSWM	Bureau of Soils and Water Management
BZ	Buffer zone
CADT	Certificate of Ancestral Domain Title
CALABARZON	Cavite, Laguna, Batangas, Rizal and Quezon
CALT	Certificate of Ancestral Land Title
CARP	Comprehensive Agrarian Reform Program
CBD	Convention on Biological Diversity
CBFMA	Community-Based Forest Management Agreement
CBFMP	Community-Based Forest Management Program
CDM	Clean Development Mechanism
CEPF	Critical Ecosystems Partnership Funds
CER	Carbon Emission Reductions
CFP	Community Forestry Program
CHM	Clearing House Mechanism
CIDG	Criminal Investigation and Detection Group
CI	Conservation International
CITES	Convention on International Trade in Endangered Species
CLSUZP	Coastal Land- and Sea-Use Zoning Plan
CLUP	Comprehensive Land Use Plan
CMMO	Coastal and Marine Management Office
CMS	Convention on Migratory Species

CoP	Conference of the Parties
CS	Celebes Sea
CSC	Certificate of Stewardship Contract
DA	Department of Agriculture
DAO	DENR Administrative Order
DENR	Department of Environment and Natural Resources
DepEd-NCR	Department of Education-National Capital Region
DILG	Department of Interior and Local Government
DO	Dissolved Oxygen
DOE	Department of Energy
DOST	Department of Science and Technology
DOT	Department of Tourism
DTI-BDT	Department of Trade and Industry-Bureau of Domestic Trade
EcoGov2	Environmental Governance 2 Project
EBA	Endemic Bird Areas
EMB	Environmental Management Bureau
EO	Executive Order
ESSC	Environmental Science for Social Change
FAO	Food and Agriculture Organization
FARMC	Fisheries and Aquatic Resources Management Council
FLGMA	Forest Land Grazing Management Agreement
FMB	Forest Management Bureau
FPE	Foundation for the Philippine Environment
FPIC	Free and Prior Informed Consent
FRBC	Federation of River Basin Councils
GDP	Gross Domestic Product
GEF-SGP	Global Environment Facility-Small Grants Program
GIAHS	Globally Important Agricultural Heritage Systems
GIMS	Gilutongan Island Marine Sanctuary
GM	Genetically modified
	Grassroots Employment and Entrepreneurship Program for
GREET	Tourism
GSPC	Global Strategy for Plant Conservation
GTI	Global Taxonomic Initiative
HIETA	Hundred Island Ecotour Association
HINP	Hundred Islands National Park
HSP	Herpetological Society of the Philippines
IBAs	Important Bird Areas
IAS	Invasive alien species
ICE CREAM	Integrated Coastal Enhancement: Coastal Research, Evaluation
	and Adaptive Management for Climate Change
ICM	Integrated Coastal Management
ICZM	Integrated Coastal Zone Management
IDP	Integrated Development Plan
IFMA	Integrated Forest Management Agreement
IFMU	Integrated Fisheries Management Unit
IP	Indigenous People

IPRA	Indigenous Peoples Rights Act
IRMBD	Integrated River Basin Management and Development
ISFP	Integrated Social Forestry Program
ITPLA	Industrial Tree Plantation Lease Agreement
IUCN	International Union for the Conservation of Nature and Natural Resources now the World Conservation Union
IWMC	Iloilo Watershed Management Council
KEF	Kalahan Educational Foundation
KANAGMALUHAN	Kapunong sa Nagkahiusang Mananagat ug sa Handumon
KBA's	Key Biodiversity Areas
KPNE	Kalikasan-People's Network for the Environment
LDBE	Laguna de Bay Environment
LGU	Local Government Unit
LLDA	Laguna Lake Development Authority
LLWPDC	Lake Lanao Watershed Protection and Development Council
LULUCF	Land Use, Land Use Change And Forestry
MAWASCO	Maragusan Water System Cooperative
MBEMP	Manila Bay Environmental Management Project
MBEMP-MBIN	Manila Bay Area Information Network
MCDP	Municipal Comprehensive Development Plan
MDG	Millenium Development Goal
MeTCs	Metropolitan Trial Courts
MGB	Mines and Geo-Sciences Bureau
MIAA	Manila International Airport Authority
MOA	Memorandum of Agreement
MPA	Marine Protected Areas
MSU	Mindanao State University
MTCCs	Municipal Trial Courts in Cities
MTPDP	Medium Term Philippine Development Plan
NAECTAF	National Anti-Environment Crime Task Force
NAMRIA	National Mapping and Resource Information Authority
NAP	National Action Plan
NBF	National Biosafety Framework
NBI	National Bureau of Investigation
NBSAP	National Biodiversity Strategy and Action Plan
NCIP	National Commission on Indigenous Peoples
NCRPO	NCR Police Office
NECP	National Ecotourism Certification Program
NEDA	National Economic Development Authority
NEP	National Ecotourism Program
NES	National Ecotourism Strategy
NFRDI	National Fisheries Research and Development Institute
NIPAS	National Integrated Protected Areas System
NPGR	National Plant Genetic Resources Laboratory
NPOA	National Plan of Action
NPS-ENRMP	National Program Support-Environment and Natural Resources Management Project

NPS	North Philippine Sea
NSAP	National Stock Assessment Program
NSCB	National Statistical Coordination Board
NSCS	National Seagrass Conservation Strategy and Action Plan
NSO	National Statistics Office
NZAID	New Zealand Agency for International Development
ODA	Other development assistance
OPMBCS	Operational Plan of the Manila Bay Coastal Strategy
PA	Protected Area
	Protected Area Community-based Resource Management Agreement
PACBRMA	
PAF	Philippine Avicultural Federation
PAMB	Protected Areas Management Board
PAWB	Protected Areas and Wildlife Bureau
PBCP	Philippine Biodiversity Conservation Priorities
PBCPSP	Philippine Biodiversity Conservation Priority Setting Program
PBSP	Philippine Business for Social Progress
PCG	Philippine Coast Guard
PCAMRD	Philippine Council for Aquatic and Marine Research and Development
PCARRD	Philippine Council for Agriculture, Forestry and Natural Resources Research and Development
PCP	Pawikan Conservation Project
PCSDS	Palawan Council on Sustainable Development Staff
PEM	Philippine Environment Monitor
PEMO	Provincial Environment and Management Office
	Partnerships in Environmental Management for the Seas of East Asia
PEMSEA	
PGR	Plant Genetic Resources
PIDWWO	Pamilacan Island Dolphin and Whale Watching Organization
PNSDW	Philippine National Standard for Drinking Water
PO	People's Organization
PPA	Philippine Ports Authority
PPCC	Philippine Plant Conservation Committee
PRSV	Papaya ring spot virus
PSCBD	Philippine Strategy for the Conservation of Biological Diversity
PSY	Philippine Statistical Yearbook
PTFCC	Presidential Task Force on Climate Change
RBCO	River Basin Control Office
RBIIMS	River Basin Integrated Information Management System
RDC	Regional Development Council
RTCs	Regional Trial Courts
RUPES	Rewarding Upland Poor for Environmental Services
SCS	South China Sea
SIFMA	Socialized Industrial Forest Management Agreement
SINP	Samar Island Natural Park
SPS	South Philippine Sea

SP	Sangguniang Panlalawigan
SS	Sulu Sea
TF	Tree Farm
TIHPA	Turtle Islands Heritage Protected Area
TIWS	Turtle Islands Wildlife Sanctuary
TLA	Timber License Agreement
TRNMP	Tubbataha Reef National Marine Park
TVPL	Taal Volcano Protected Landscape
UNDP-GEF	United Nations Development Programme – Global Environment Facility
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
USD	United States Dollar
VS	Visayan Sea
WWF	World Wildlife Fund
ZOMAP	Zoning and Management Plan

Executive Summary

As a member-party to the Convention on Biological Diversity (CBD), the Philippines regularly submits its National Report to the CBD. The National Report summarizes measures that have been undertaken to implement the Convention and its objectives of conserving biological diversity, sustaining the use of its components, and sharing benefits fairly and equitably.

The Fourth National Report focuses on assessing the country's progress towards meeting the 2010 biodiversity target: *“Achieving by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth”*.

Following the format and guidelines provided by the CBD in assessing progress and preparing this Report, the Department of Environment and Natural Resources (DENR) -Protected Areas and Wildlife Bureau (PAWB) convened five (5) consultations/workshops participated by multistakeholder groups representing national and local governments, academic and research institutions, civil society organizations, and the private sector. These consultations/workshops steered discourse and appreciation of the current state of the country's biological diversity, and the existing policy and institutional structures and mechanisms that help ensure that these resources are used, developed, and managed sustainably.

Assessing the country's progress towards meeting the 2010 biodiversity target has been a challenging task in the absence of nationally agreed baselines, targets and indicators. Even more challenging is the fact that the Fourth National Report requires reporting of outcomes and impacts, but most of the data gathered covering the reporting period from mid-2005 to mid-2008, and until early 2009, only report outputs.

Thematic reviews indicate a pattern of continuing degradation of biological diversity with some significant gains in specific areas. Some progress and contributions have been made in protecting components of biological diversity; in promoting sustainable use; in addressing threats, in maintaining goods and services from biodiversity to support human well-being; in protecting traditional knowledge, innovations and practices; in ensuring the fair and equitable sharing of benefits from the use of genetic resources; and, in ensuring provision of adequate resources. These are evident in the increases in the proportion of forest cover, terrestrial protected areas, and mangrove cover to total land area, and in the increases in the size, number and geographic distribution of marine protected areas. These are also manifested in several species and habitat conservation programs, in the development of integrated development and management plans, in improved law enforcement efforts, and in increased production, livelihood opportunities and income derived from the use of biodiversity.

The lessons in the use of the ecosystems approach are best illustrated in a local level rather than a national scale and using appropriate units of management and analysis, in most cases integrated watershed, river basin and coastal management approach. These approaches also incorporate different elements that foster sustainability in programs and projects such as institutions, partnerships and alliances and innovative financing.

At present, many of the biodiversity-related conservation efforts are fragmented and uncoordinated, even within landscapes, seascapes and within and among administrative regions. This makes it doubly difficult to assess overall impact of actions taken. However, across ecosystems, the management approach for environment and natural resources management, including biodiversity conservation, is gradually shifting from sectoral to holistic. Success stories show potentials for upscaling, however, the archipelagic and multi-cultural condition of the country require innovative and flexible ways for replication and diverse management strategies and modes of governance.

Future priorities for action have been identified and categorized into four areas: policy; information, education and communication; capacity building; and, innovative financing. The need to ensure synergy, complementation and harmonization between and among policies, plans and programs in the landscape, seascape and/or political units was emphasized in order to maximize resources and improve governance. So was the need to set national baselines, measurable targets and indicators to assess progress towards meeting, not necessarily the 2010 biodiversity goal, but to guide national and local decision-making and to prepare for the next CBD and MDG Reports.

The need to inform, educate and communicate was also put across. Stakeholders recognized the necessity of a biodiversity information system that will facilitate information sharing and decision making. Formal and non-formal modes of education were also seen as effective tools to increase knowledge and understanding of biodiversity.

Finally, the need to strengthen capacities of local government units was seen as key to protecting biodiversity, promoting sustainable use and ensuring equitable benefits since they are at the forefront of local action. However, there was also recognition that these tasks cannot be borne by a single agency and that the capacities of other key actors such as civil society organizations, the business sector and local communities should also be built to enable strong alliances and partnerships. Innovative financing was also viewed as crucial to sustain efforts on biodiversity conservation.

Introduction

The Philippines is a member-party to the Convention on Biological Diversity (CBD). It signed the Convention on June 12, 1992 during the Earth Summit and ratified the same on October 8, 1993. Member-parties are committed to comply with the provisions of the Convention and implement the same through its domestic laws. Article 26 of the CBD directs all member-parties to report to the Conference of the Parties (CoP) on measures undertaken to implement the Convention and their effectiveness in meeting the objectives of: (a) conserving biological diversity; (b) sustaining the use of its components; and, (c) fair and equitable sharing of the benefits arising out of the utilization of genetic resources. Since our membership to the CBD, we have submitted 3 National Reports that summarize Philippine compliance to its provisions.

This is the fourth country report submitted to the CBD. It focuses on the assessment of the country's progress towards meeting the 2010 biodiversity target: *“Achieving by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth”*. The objectives of the Fourth National Report (4NR) are: (1) to provide an overview of the status, trends, and main threats to biodiversity; (2) to assess the implementation of the National Biodiversity Strategy and Action Plan (NBSAP); (3) to review national progress in meeting the 2010 biodiversity target and the goals and objectives of the Strategic Plan; and, (4) to identify the needs and future priorities for implementation.

The 4NR mainly covers progress made for the period from mid-2005 to mid-2008 and proceeds from accomplishments reported in the Third National Report. Where possible, it is outcome-oriented rather than output-based. It also recognizes the fact that there are programs, projects, and activities that have started before 2005, are continuing even beyond 2008, and that most of the data gathered show outputs rather than outcomes. Following the CBD guidelines, this narrative report is divided into chapters.

Chapter 1 presents an overview and synthesis of the biodiversity status, trends and threats, focusing on seven (7) thematic programs, namely: forest biodiversity, mountain biodiversity, agricultural biodiversity, inland waters biodiversity, marine and coastal biodiversity, and island biodiversity. It is not meant to be an exhaustive assessment, rather it only provides an overview sufficient to guide decision-makers. In this Chapter, forest and mountain biodiversity were treated as one since most of the country's forest areas are in the uplands. Coastal, marine and island biodiversity were also integrated. Chapter 2 discusses the status of the implementation of the NBSAP and its successor plans. Where data are available, it also assesses actions that have been implemented, the obstacles in implementation, and linkages with other articles, provisions, thematic work programs and cross-cutting issues under the CBD. Chapter 3 describes efforts to integrate biodiversity issues into relevant sectoral and cross-sectoral plans, programs and policies, and how these are mainstreamed into relevant sectors. It also describes mechanisms and measures to implement strategies and plans, particularly the use of the ecosystem approach in implementation and mentions synergy in the implementation of related Conventions to which the Philippines is also a member-party. Chapter 4 provides an overall assessment of progress made, the challenges faced and recommendations for future actions that need to be undertaken. In preparing the Report, several processes were undertaken. Secondary data related to national implementation of the CBD were gathered and reviewed. Where necessary, key informant

interviews were conducted to validate and update data, and track other data sources. In assessing progress towards the 2010 biodiversity target, we addressed the basic question: “*Are we making progress?*” In answering this question, we cited case studies and success stories that can be used to assess progress, especially when quantitative assessment of progress made may not be practical due to a general lack of national targets and indicators specifically addressing the Biodiversity 2010 target.

Initial research results were consolidated and presented to various stakeholder groups representing national and local governments, academic and research institutions, civil society organizations, and the private sector. Four multi-stakeholder consultations/workshops were conducted to present initial findings, solicit further inputs and validate information. A Thematic Consultation/Workshop held on 17 November 2008 was attended by specialists and practitioners on various thematic areas. This was followed by regional consultations/workshops in the major island groups of Mindanao, Visayas and Luzon held on 25 and 27 November 2008, and 20 January 2009, respectively. These culminated in a National Consultation/Workshop held on 17 February 2009.

The preparation of the 4NR was facilitated by the Department of Environment and Natural Resources- Protected Areas and Wildlife Bureau (DENR-PAWB) with the assistance of the Ateneo de Manila University-School of Government and other partners, and with funding support from the United Nations Development Programme (UNDP)-Global Environment Facility (GEF) and the ASEAN Centre for Biodiversity (ACB).

Chapter 1.0 Overview of Status, Trends and Threats

The Philippines is located in Southeast Asia, between the Philippine Sea and the South China Sea, east of Vietnam and north of Indonesia and Malaysia (Fig. 1). It is composed of 7,107 islands covering a total area of 300,000 sq km. The main island groups are Luzon, Visayas and, Mindanao with Manila as the capital city.

As of the latest census in August 2007, population reached 88.57 million with an annual growth rate of 2.04%. Over 60% of the population live in coastal areas, with Luzon (the largest island group), accounting for more than half of the entire population. Projected population for 2009 is 92.23 million (NSO, 2007) although there is currently an unofficial population estimate of 96.06 million as of July 2008.

The Philippines has vast natural resources that are a source of food, water, shelter and livelihood for its rapidly growing population. It is one of 18 megabiodiversity countries (containing 2/3 of the earth's biodiversity and about 70-80% of the world's plant and animal species) due to its geographical isolation, diverse habitats and high rates of endemism. The Philippines is 5th in the number of plant species and maintains 5% of the world's flora. Species endemism is very high covering at least 25 genera of plants and 49% of terrestrial wildlife. It also ranks 4th in bird endemism. In terms of fishes, there are about 3,214 (incomplete list) with about 121 endemic and 76 threatened species.



Figure 1. Map of the Philippines

Unfortunately, it is also one of the world's hotspots- with a large number of endangered and threatened species- thus making it one of the top global conservation priority areas.

1.1 Forest and mountain biodiversity

The Ad Hoc Technical Expert Group on Forest Biological Diversity (AHTEG) of the CBD defines forest as a land area of more than 0.5 hectares, with a tree canopy cover of more than 10%, which is not primarily under agricultural or other specific non-forest land use. In the case of young forests or regions where tree growth is climatically suppressed, the trees should be capable of reaching a height of 5 m *in situ*, and of meeting the canopy cover requirement. The CBD treats forests as “a functional ecosystem unit which should be conserved, used sustainably and the benefits derived from it should be shared equitably. In this sense, the CBD’s view of forests is function and ecosystem-oriented”.^{*}

The Philippine government adopts the Food and Agriculture Organization (FAO) definition of forest as “an area of more than 0.5 hectares and tree crown cover (or equivalent stocking level) of more than 10% which includes natural and plantation and production forests”. Based on this definition, the DENR estimates that 7.2 million hectares comprise the forest ecosystem, which is approximately 24 per cent of the total land area.

The forest ecosystem plays a crucial role in soil and water conservation and major ecological services and directly supports approximately 30% percent of the population including some 12 to 15 million indigenous peoples who depend on forests for their survival and whose cultures revolve around their interactions with their natural environment.

The Philippine forests consist of patches of primary (old growth) and secondary growth forests. The largest remaining forest patches in the Philippines are found in northern and southern Luzon (especially the Sierra Madre mountain range), Palawan, Mindanao, and Eastern Visayas. Of the total land area and the remaining forest cover, 12% are dipterocarp/ lowland rainforest and 3.5% mossy/montane/cloud forest. Only 0.4% are coastal and mangrove forest. The pine forests found in Mindoro, Mountain Province and Zambales accounts to 0.77%, and 1.6% sub-marginal forest areas are found in various locations in the country. Catibog-Sinha and Heaney (2006) cited that this estimate is based on 20% cover; but cover per forest type will be lower if estimates were based on 12-13% natural forest cover (Mackinnon, 2002 in Ong et al, 2002), or more if based on 24% forest cover (Philippine Environment Monitor 2004). The disparities in forest cover estimate is largely due to different methodologies and systems employed and on how forest cover is defined.

There are also patches of beach forests, current data for which are still being generated. Ferreras et al (2008) also noted the emergence of a new forest type, the peat swamp forest or peat dome found in Agusan Marsh based on a floristic survey done in Barangay Kaimpugan, San Francisco, Agusan del Sur and in Bunawan, Agusan del Sur. This is a distinct and unique forest type and is considered as among the least botanized of Philippine terrestrial habitat types.

Legal measures are being instituted to protect and conserve the country’s forests, foremost of this is the declaration of protected areas (PAs). As of 2008, there are 234 PAs under the National Integrated Protected Areas System (NIPAS) covering a total area of about 5,234 million hectares

^{*} 6th Conference of Parties to the Convention on Biological Diversity Information Note: Expert Meeting on Harmonization of Forest -related Definitions for Use by Various Stakeholders, Rome, 23 -25 January 2002,

and a buffer zone of 222,634 hectares. Terrestrial PAs occupy a total of 4,092,635.87 hectares and a buffer zone of 202,922.08 hectares while marine PAs cover about 1,141,918.68 hectares and a buffer zone of about 19,712.86 hectares (DENR-PAWB, 2008). Six PAs covering a total area of 121,668 are under the jurisdiction of other government agencies, such as the National Power Corporation, Philippine National Oil Corporation, and the National Irrigation Administration. So far, only 10 have completed the process of establishment by enactment of site-specific law.

The Philippines is also home to a diversity of species that rely wholly or partly on the forest ecosystem for survival. Identifying critical sites for biodiversity conservation remains crucial and urgent as evident in the number of threatened species that the country has.

DENR Administrative Order (DAO) No. 2004-15 establishes the national list of threatened faunal species that includes 34 species of mammals, 80 species of birds, 18 species of reptiles and 14 species of amphibians (Table 1). Among the critically endangered are the Tamaraw (*Bubalus mindorensis*) which is endemic to Mindoro and the Philippine Eagle (*Pithecophaga jefferyi*). This list, however, includes some non-forest dependent species of birds, a marine mammal (*Dugong dugon*) and 4 species of marine turtles.

Table 1. List of threatened Philippine fauna and their categories (DAO 2004 -15)

Faunal Species	Categories				
	Critically Endangered*	Endangered**	Vulnerable	Other Threatened Species	Total
Mammals	7	5	17	5	34
Birds	13	13	54	-	80
Reptiles	4	6	4	4	18
Amphibians	-	4	10	-	14
TOTAL	24	28	85	9	148

*Includes all species listed under Appendix I of the Convention on International Trade on Endangered Species (CITES)

**Includes all species listed under Appendix II of CITES

In 2007, the DENR came out with DAO 2007-01 which established a national list of threatened plants (Table 2). The DAO also prohibited the collection and trade of species in this list unless a permit is granted by the DENR pursuant to the Wildlife Act.

Table 2. Summary of number of threatened Philippine plants per category (DAO 2007 -01)

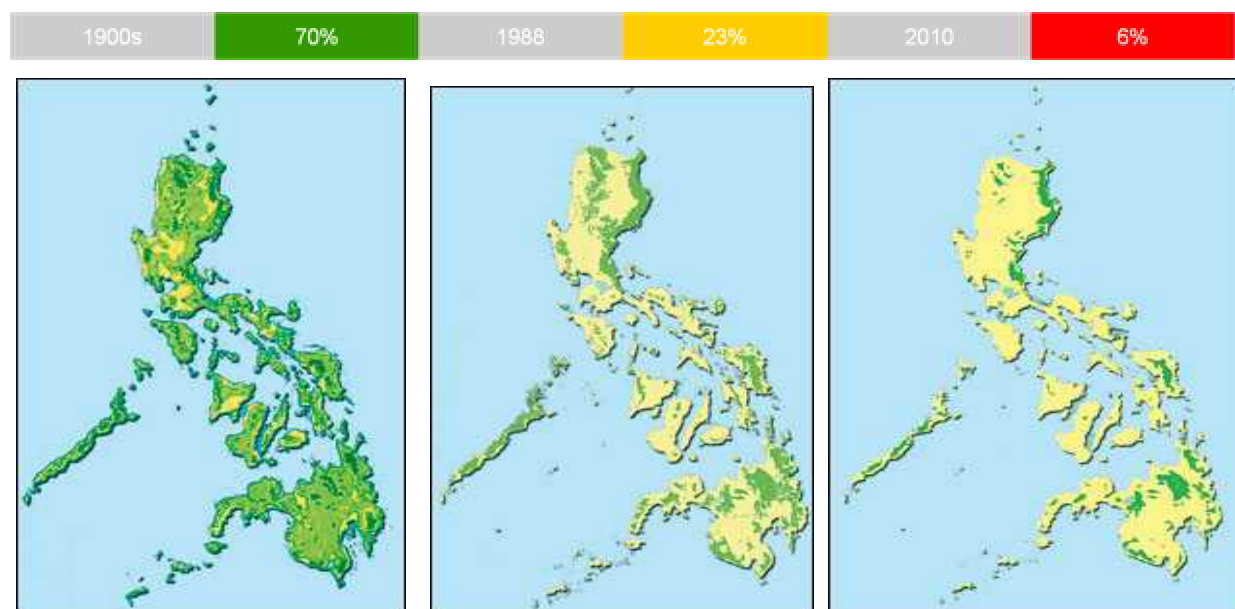
Category	Number of Plant Species
Critically endangered	99
Endangered	187
Vulnerable	176
Other threatened species	64
Other wildlife species	169

Ninety nine (99) species were identified as critically endangered. Most of these belong to Family Dipterocarpaceae, Orchidaceae and Palmae while species. Some critically endangered Dipterocarps are *Hopea acuminata*, *Shorea astylosa* and *Vatica pachyphylla*. Genus *Paphiopedilum* has the most number of critically endangered species in the Orchidaceae Family and Genus *Heterospatha* and *Pinanga* for Palmae. Under the category of endangered, many species belong to Family Orchidaceae, Cyatheaceae, Asclepiadaceae and Melastomataceae.

Trends

It is estimated that from 2000 to 2005, the Philippines lost 2.1% of its forest every year, the second fastest in Southeast Asia (next to Myanmar) and the seventh in the world (Echanove, 2008). The rapid and alarming loss of (natural) forest cover is attributed to pressures from commercial exploitation of forests and population increase, including lifestyle and consumption patterns that put much strain on resources. Citing a study done by the Environmental Science for Social Change (ESSC), Haribon Foundation explains that the further decline of the remaining 18.3% forest cover in 1999 could be arrested with purposive and massive forest regeneration programs that could result to a significant increase to 19% by 2010; otherwise, forest cover could slip to a mere 6% around the same period as shown in Figure 2.

Figure 2. Forest loss in the 20th century.



Source: Key Conservation Sites in the Philippines (Haribon and Birdlife International, 2001), citing ESSC booklet, "Decline of the Philippine Forest"

A joint undertaking of the DENR-Forest Management Bureau (FMB) and the National Mapping and Resource Information Authority (NAMRIA) in 2003 estimated forest cover at 7.168 million hectares or 23.89% of the total land area. This includes 2.47 million hectares of closed forest, 4.28 million hectares of open forest and 297,160 hectares of forest plantation. Of the identified forest covers, 6.432 million hectares (89.73%) are within forest lands while 0.737 million hectares (10.28%) are within alienable and disposable (A&D) lands (Figure 3). The forest

plantations may have significantly contributed to the increase in forest cover, however, they are not seen to provide the appropriate habitat for indigenous species.

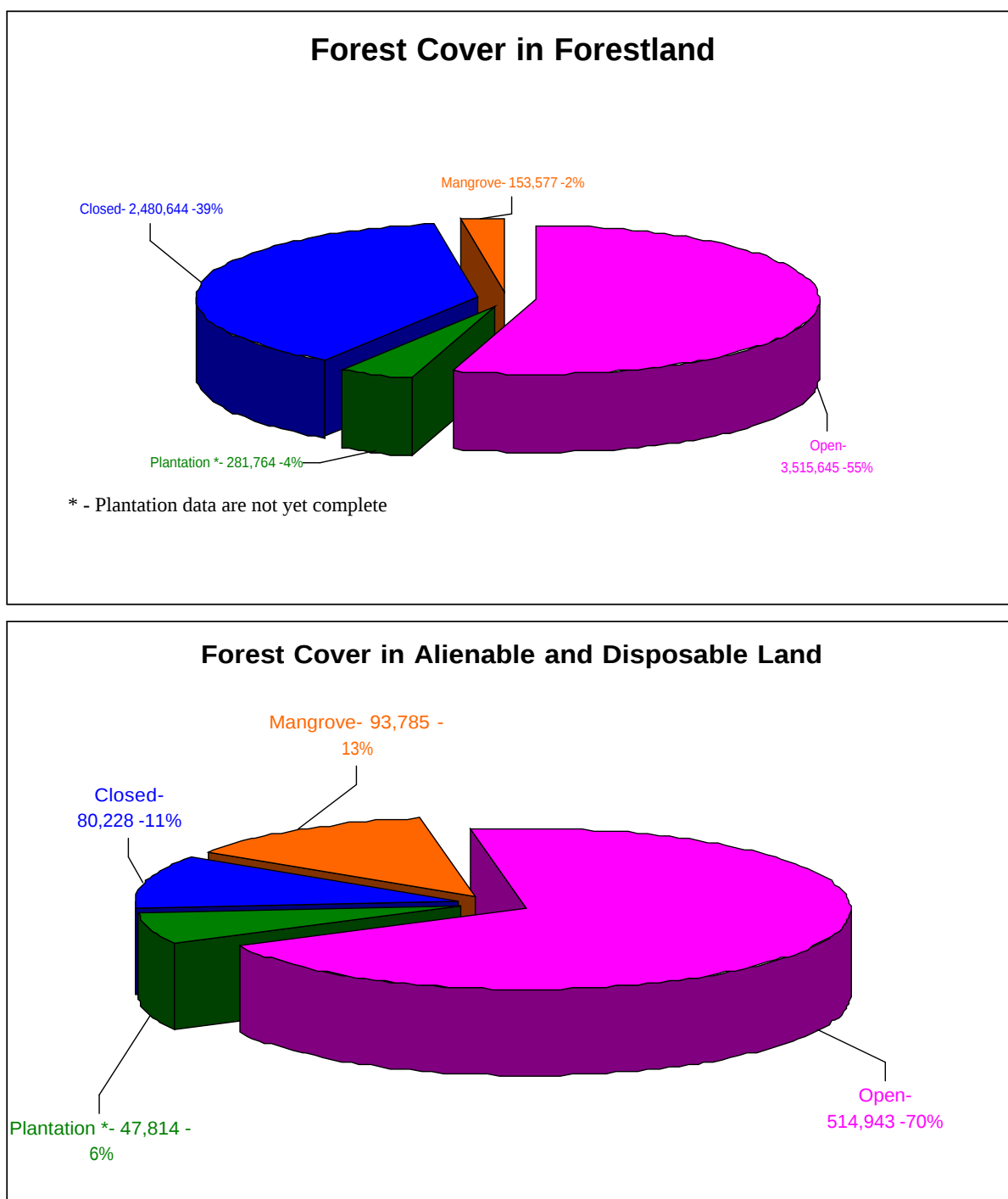


Figure 3. Forest cover in A&D land and forestlands (Philippine Forestry Statistics 2003)

Although the figures on plantation cover are incomplete, the current programs aiming to address livelihood and production needs (e.g., the National Clonal Forestry Program) point to increase in

plantation forests. The United States Agency for International Development (USAID) and EcoGov2 (2008), using land satellite imagery, noted that in Mindanao, there has been a decline in natural forest cover by at least 40,000 hectares per year. An increase in tree plantation cover by an average of 70,000 hectares per year in this area was observed, and could possibly mirror a national trend.

In 2006, the Philippine biodiversity conservation priorities were reinforced with the identification of terrestrial Key Biodiversity Areas (KBAs) using data from Important Bird Areas (IBAs) identified by the Haribon Foundation and Birdlife International, the 2004 International Union for the Conservation of Nature and Natural Resources now the World Conservation Union (IUCN) Red List, as well as point locality data from published literature, experts and scientists, and museum collections. A total of 128 terrestrial KBAs have been identified for 209 globally threatened and 419 endemic species of freshwater fishes, amphibians, reptiles, birds and mammals, and 62 congregatory bird species. An interesting analysis by DENR shows that PAs cover only 51% of the priority sites identified under the Philippine Biodiversity Conservation Priority Setting Program (PBCPSP), 44% of the IBAs, and 35% of terrestrial KBAs. In other words, PAs cover less than half of the priority biodiversity sites identified through scientific studies, and there are many PAs that are not considered strategic for biodiversity conservation. The current implementation thrust of DENR is to reconcile KBAs with the legally-protected sites. Conservation International or CI (undated) has also cited 5 Alliance for Zero Extinction sites from these KBAs which should be considered to be given highest protection priorities (Figure 4). These include Siburan, Mt. Mantalingajan, South and North Gigante Island, Mt. Kambinlio and Mt. Redondo.

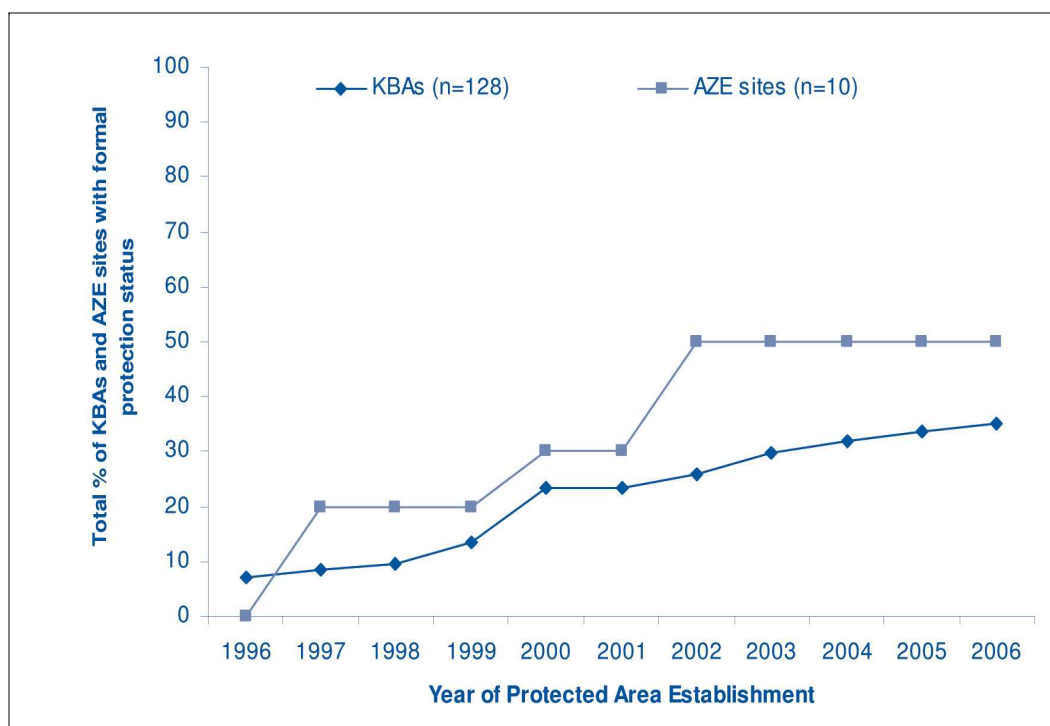


Figure 4. Percentage of Key Biodiversity Areas (KBAs) and Alliance for Zero Extinction (AZE) sites under some form of legal protection, 1996-2006 (CI Brochure on Biodiversity Outcomes Monitoring, undated).

The importance of identifying and establishing KBAs and IBAs is supported by new species discovered in the past 5 years. These new discoveries include the Calayan rail (*Galirallus calayanensis*), Camiguin hanging parrot (*Loriculus camiguinensis*), Philippine forest mouse (*Apomys camiguinensis*) and *Rafflesia mira*.

Threats

Threats to the forest ecosystem can be categorized into: habitat fragmentation, anthropogenic pressures, invasive alien species and other emerging issues, including conflicting roles and mandates. Some of these threats are discussed below.

Forest (habitat) fragmentation

Forest biodiversity decreases due to loss of natural forests. Logging (legal and illegal) is notably the most serious threat to the Philippine forest ecosystem. According to the 2006 Philippine Forestry Statistics, commercial logging operations are covered by 11 Timber License Agreements (TLAs) with a total of 495,000 hectares and an annual allowable cut of 307,558 cu. meters. Since 1987, the government has not issued new TLAs. There is currently a total of 292 Integrated Forest Management Agreement (IFMA)/ Industrial Tree Plantation Lease Agreement (ITPLA)/ Tree Farm Agroforestry Farm Leases covering 883,000 hectares. These agreements and leases contribute to an increase in forest cover without necessarily ensuring increase in forest biodiversity. Logging and other extractive activities especially in areas of high species endemism need to be monitored because the impact of logging is more severe, especially on islands or archipelagic country like the Philippines.

High demands for timber and wood products that exceed the supply pose a serious threat to the forest ecosystems. In 2007, roundwood production totaled to 803,000 cubic meters (Figure 5). One hundred seventy four thousand (174,000) cubic meters of these roundwood and processed wood products were exported. The Philippines is now a major importer of logs, importing processed forest products totaling 359,169 cubic meters in 2007 (Philippine Statistical Yearbook or PSY 2008).

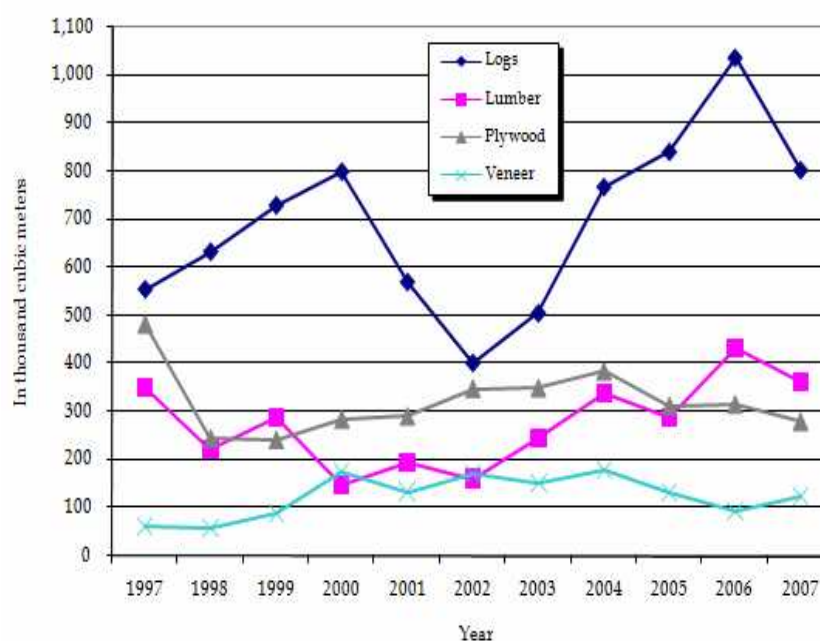


Figure 5. Production of logs, lumber, plywood and veneer 1997 -2007 (PSY 2008)

Kaingin (slash and burn farming) has also resulted in extensive fragmentation of upland forests. Various factors lead to the increasing practice of *kaingin* in the forests/uplands, such as habitation by communities marginalized by development projects, rapid urbanization, displacement due to natural events such as landslides and flooding. Studies also indicate that many tropical forest species (e.g., insect pollinators, tree frogs, and primates) fail to disperse across land clearings and burned forest gaps.

Decline of natural forests occur with simultaneous deforestation and the low uptake on reforestation. Reforestation activities in the country slowed down starting 2004 reported at 18.88%, and further slumped by 56.22% in 2005-2006 (Figure 6). The total land area reforested in 2006 was 7,233 hectares (Philippine Forestry Statistics 2006), mostly of the fast-growing and high-value species.

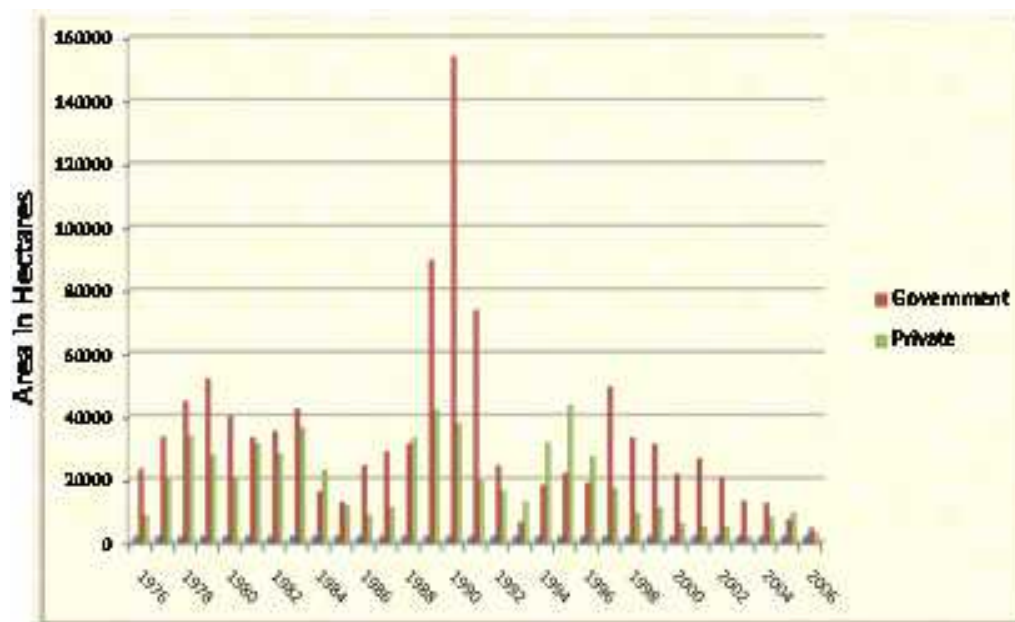


Figure 6. Reforestation efforts from 1976 -2006 (2006 Philippine Forestry Statistics as cited in PSY 2008)

The use of exotic species in the reforestation programs has contributed to habitat fragmentation by acting as barriers between patches of natural forest and has caused some concern because of their invasiveness. Natural forests and the significant habitat for its flora and fauna are also being fragmented by unsustainable cutting and conversion to agriculture by the growing population's need to secure livelihood. Forest fragmentation exposes forest-dependent species to decimating factors, alteration in the distribution pattern of plant and animal populations, pest infestation, and invasion of alien species.

Anthropogenic pressures

As of 2007, the Philippine population has reached 88.5 million (NSO, 2008). If unmanaged, this will pose a threat to our scarce resources. At present, the government is hard-pressed to develop programs and initiatives to meet the demands of its growing population. Some of such programs

have resulted to habitat fragmentation and the increase in built-up areas that may be hostile to most species. Current DENR Secretary Joselito Atienza, however, has asserted in many fora that absence of or poor governance is the problem and not population size.

Development sites and housing projects in urban and semi-urban areas are major barriers to the movement of species between remaining forest patches. Development projects such as roads, power lines, fences and irrigation canals are also physical barriers that obstruct or reduce the ability of some species to move and disperse.

Encroachment of agriculture in the uplands has contributed to the degradation of forests. The need to increase crop and livestock production to address food security and poverty issues of a growing population has paved the way to encroachment in forest lands, and even their conversion for crop cultivation. Fuelwood gathering in forest lands is on the rise, especially with the increasing prices of fossil fuel and liquified petroleum gas which are mostly used in urban areas.

Frequent burning and domestic animal grazing likewise contribute to the disintegration of forests. The factors often associated with forest fires include deliberate burning during land clearing and increased human settlements in close proximity to forests. Moreover, temperature build-up at the forest fringe due to diminishing size of forest has been associated with forest fires. Figure 7 indicates that as of 2006, forest fire disturbances damaged a total of 3,003 hectares. In previous years, more than 60% of these fires occurred in central and northern parts of the country. The frequency and intensity of wildfires have also been linked to global warming and the El Nino phenomenon.

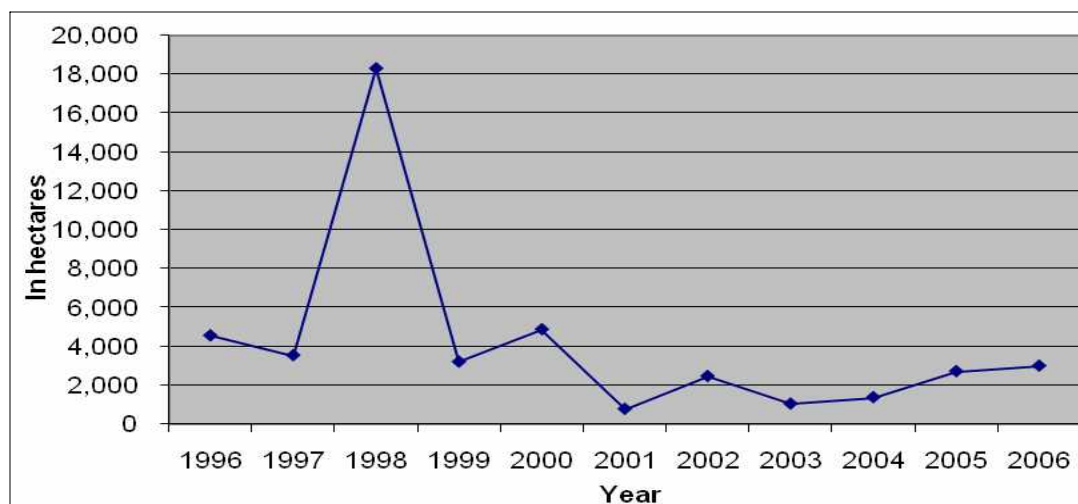


Figure 7. Forest Fire Disturbances 1996 -2006 (PSY 2008)

Pogayed (1991) as cited by Karki (2002) in Project FireFight South East Asia stated that in the Philippines, “wildfire regimes in the Central Cordillera forests have changed. Increasing population pressure and demand for agricultural, grazing and settlement land have brought new fire patterns...which are more detrimental to the forest environment than ever before”.

Pollution has also posed a wide range of direct and indirect effects. For example, plastic and other solid waste problems have intruded into the natural food chain. Persistent organic pollutants or organochlorines in agriculture, termite eradication and weed control degrade the environment and produce toxic by-products that compromise environmental quality and the food chain. Tailings from small scale miners laced with mercury (from processing of gold), pose as direct threats to croplands and water systems, and indirectly threaten forest biodiversity. A project report of the Geological Survey of Denmark and Greenland and the Maximo T. Kalaw Institute for Sustainable Development on two project sites, Camarines Norte and Sibutad, Zamboanga del Norte, confirmed a United Nations Environment Report (UNEP) Report in 2001 that some 140 tons of mercury is released to the environment by small scale miners (Appel et al, 2007).

Introduction of invasive alien species

Introduction of invasive alien species dramatically alters ecosystems in many parts of the world, especially in the forest ecosystems. In a report submitted by Pinol et al (2006) to the Asia-Pacific Invasive Species Network, he enumerated a list of potential invasive alien species (plants, insect pest and other pathogens) in the Philippines (Table 3). These species can eradicate other species, are prone to pests and diseases. Some species may cause stunted growth, and the pathogens can cause shoot swelling or death to other species.

Table 3. *Invasive alien species in the Philippines*

Scientific Name	Common Name
A. Higher plants	
1. <i>Broussonetia papyrifera</i>	Paper mulberry
2. <i>Lantana camara</i>	Coronitas
3. <i>Swietenia macrophylla</i>	Mahogany
4. <i>Leucaena leucocephala</i>	Ipil-ipil
5. <i>Mikania micrantha</i>	Mile-a-minute
6. <i>Acacia mangium</i>	Mangium
7. <i>Acacia a uriculiformis</i>	Auri
8. <i>Chromolaena odorata</i>	Siam weed
9. <i>Coccinia grandis</i>	Ivy gourd
10. <i>Eichornia crassipes</i> *	Water hyacinth
B. Insect Pests	
1. <i>Ozola minor</i>	Measuring worm
2. <i>Heteropsylla cubana</i>	Jumping lice
3. <i>Hypsila robusta</i>	Shoot borer
C. Pathogens	
1. <i>Corticium salmonicolor</i>	Pink disease/ canker
2. <i>Uromycladium tepperianum</i>	Gall rust
3. <i>Phellinus noxius</i>	Root rot

Sources: Asia-Pacific Invasive Species Network; *PAWB

In a recent conference on the impact of invasive alien species on terrestrial ecosystems, a multidisciplinary group of stakeholders recommended strategies and actions to address this threat, among them: 1) research on disturbance ecology (social, environmental and economic); 2) protection of the natural habitat; 3) restoration of disturbed habitats; and, 4) information and education. They further noted that anthropogenically disturbed habitats provide dispersal sites for invasive alien species. Intact forests, however, are less vulnerable to invasion and should therefore be protected.

Other emerging issues

The government's decision to pursue mining as a revenue-generating industry has clashes with biodiversity-related concerns. Go (2008) reported that the DENR- Mines and Geosciences Bureau (MGB) projected an annual investment inflow of USD 1.8 Billion in new investments in 2009. Mining applications are mostly located in forest areas, threatening the integrity of biodiversity in this ecosystem. Twenty-three (23) flagship mining projects are located in biodiversity-rich areas and overlap with KBAs such as in the Sierra Madre, Palawan, Mindoro, and various parts of Mindanao (Figure 8). Companies pursuing mining projects necessarily build communities to support their operations, including roads, houses for the workers, and water dams and channels. Relocating prior occupants of the land further creates pressures on the land, as inevitably, clearing for settlements and agriculture will have to be done.

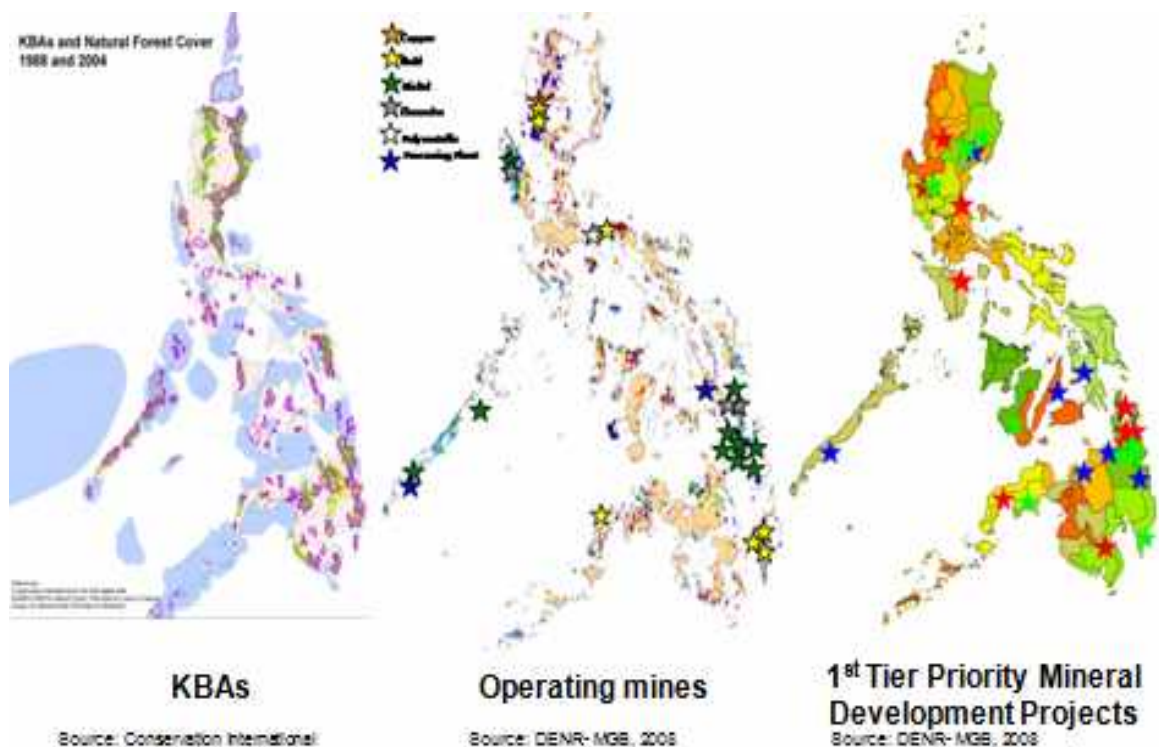


Figure 8. *Overlap of KBAs and mining applications*

Where there are logging and mining activities, there is migration of people pursuing economic and livelihood activities. Hunting, poaching, and flora collection follow human migration into upland areas, aggravating the threat to wildlife. Anticipated post-mining operations (e.g., after 25 years of operations), create pressure as well, in terms of the ability of communities and local governments to both maintain conservation projects initiated by mining companies or repair whatever is left from the extraction. Moreover, areas abandoned by commercial logging and mining concessions attract small scale loggers and miners whose activities are generally more destructive.

Similarly, the government's thrust of searching and developing alternative (to fossil fuel) energy sources, poses as a threat to forest biodiversity by encouraging monoculture tree stands. In the President's Budget Message of 2008, a number of "jatropha estates" have been established covering some 2,600 hectares of land that are 'non-arable' and do not convert croplands (Table 4).

Table 4. *Jatropha estates (Budget Briefer No. 2007 -01)*

Location	Area (hectares)
Tamlang Valley, Negros Oriental	900
Camarines Sur	200
General Santos	300
Fort Magsaysay (Cordero Damaran)	500
Samar	700
Total	2,600

Poor management of the remaining natural forests by tenured stakeholders and the government alike further puts natural forests in peril. Forest plantations have been required to be established under various agreements, including TLAs, IFMAs, and Community-based Forest Management Agreements (CBFMAs). The agreements have important provisions that support sustainable forest management, e.g., requirements for environmental impact study, protection from forest fires and other forms of destruction, prohibition on cutting of trees in areas 50% in slope or within 20 meter on both sides of rivers and public roads. Other requirements are the planting of trees in bare areas and keeping these under permanent cover, protection of unique, rare or endangered trees, palms and wildlife, and a conscious non-introduction of exotic species. Some of the plantations have been unsuccessful- the failures and low survival rates attributed to forest fires, stray animals, and even to climate changes such as drought and rainfall (Country Report presented to the Country Exercise on ASEAN Peer Consultation Framework, July 2008).

Philippine Forestry Statistics 2006 reports that as of 2005, the total area under management by agreement holders, excluding PACBRMA areas, amounted to 7.719 million hectares. Table 5 shows public forest areas managed by different agreement holders from 2001-2005.

Table 5. Number of forestry programs and forest management holders (2006 Philippine Forestry Statistics; PAWB, 2008 PACBRMA Data)

Year	TLA		IFMA/ ITPLA		SIFMA		CBFMA		FLGMA		TF/AGF		PACBRMA	
	No	Area (a)	No.	Area (a)	No.	Area (a)	No.	Area (b)	No.	Area (a)	No.	Area (a)	No.	Area (a)
2001	19	884	186	615	947	28	4,956	5.71	407	119	244	110		
2002	17	741	193	696			4,956	5.71	400	115			14	5802.27
2003	15	616	198	702	1,591	36	5,503	5.97	402	114	251	114	7	1,359.90
2004	14	538	192	710	1,660	43	5,503	5.97	399	112	235	114	27	13,224.03
2005	17	779	178	713	1,837	40	5503	5.97	395	109	222	107	5	1,269.00

(a) Area in thousand hectares

(b) Area in million hectares

(c) Include in all areas covered by people-oriented forestry programs

Communities are involved in the management of forestlands and resources. All the various people-oriented forestry programs such as Certificate of Stewardship Contract (CSC), Integrated Social Forestry Program (ISFP), and Community Forestry Program (CFP) have been consolidated under the Community-based Forest Management Program (CBFMP) for better forest management. The CBFMA allows them to develop and manage as an organized community a maximum of 5,000 hectares of forestland and the resources found there.

Protected Area Community Based Resource Management Agreements (PACBRMA) are entered into by DENR with organized tenured migrant communities or indigenous peoples in protected areas and buffer zones, with a term of twenty-five (25) years and which may be renewed for another 25 years. PACBRMAs intend to provide tenurial security and incentives to develop, utilize, manage, conserve and protect community-based program areas. It can be gleaned from Table 5 that a total of 53 PACBRMAs have been awarded; most of these are in Region 2 (18 PACBRMAs), followed by Region 4A (13 PACBRMAs). From 2006 to 2008, another 5 PACBRMAs were signed. Over the 7 years of implementation, PACBRMAs covered 21,905 hectares.

Portions of the forest lands are covered by ancestral domain claims. As of December 2008, 96 Certificates of Ancestral Domain Titles (CADTs) have been approved compared to a total of 58 from 2002 to 2007, covering about 2.7 million hectares and benefiting about 550, 511 individuals. Also approved were 189 Certificates of Ancestral Land Titles (CALTs) covering an area of 7,442.6407 hectares and benefiting 3,893 individual beneficiaries (Table 6) (NCIP, 2008).

Table 6. Approved CADTs/CALTs as of December 2008 (NCIP, 2008)

Year	No of ADs	Area (Hectares)	No. of Individual Beneficiaries	No. of ALs	Area (Hectares)	No. of Individual Beneficiaries
2002-2004	29	604,143.9513	150,048	48	961.3808	429
2005	9	237,004.4233	36,743	2	2,870.8836	678
2006	18	269,049.4201	50,847	112	1,017.1002	1,681
2007	2	94,425.7497	22,585	13	11.7889	4
2008	38	1,463,489.8320	290,243	14	2,581.4879	1,191
TOTAL	96	2,668,113.3764	550,511	189	7,442.6407	3,893
Total area of approved (CADT and CALT) - 2,675,556.0171 hectares						
Total number of beneficiaries (CADT and CALT) - 554,494						

Beneficiaries of Ancestral Domain Titles and Claims are required to submit their respective Ancestral Domain Sustainable Development and Protection Plans (ADSDPPs) to guide them through the processes of planning, implementation, and monitoring, including, and most especially, utilizing indigenous knowledge systems that promote and respect their biodiversity resources. The principles of ADSDPP encourage the balance of utilization and conservation of biodiversity but it must be harmonized with the Comprehensive Land Use Plan (CLUP) and Zoning Ordinance of the LGU and the PA Management Plan mandated under the NIPAS Act.

A study done by the Cordillera People's Alliance assessing the implementation of the Philippine Government's international commitments on traditional forest-related knowledge (Carino, 2002) point to operational issues between the intent of policies of tenurial instruments such as IFMA, etc. and traditional forest management systems, causing additional pressures on forests. Carino summed up her misgiving about such forest policies as " ... these various forest production sharing agreements are generally directed towards the protection, development and rehabilitation of forestlands to ensure their continuity in productive conditions, (mostly) for profit, rather than recognizing and protecting indigenous knowledge systems" that conserve and promote biodiversity and cultural resources.

Conflicting and overlapping roles and mandates

Conflicting and overlapping roles and mandates of LGUs, DENR, NCIP and the CADT holders and legitimate migrants inside the protected areas and in forests outside protected areas need to be clarified and delineated and agreed upon among the key stakeholders.

NIPAS-designated PAs to a large part overlap with ancestral domain claims of indigenous peoples recognized under the Indigenous People's Rights Act (IPRA, Republic Act No. 8371). The procedure for PA establishment is independent of the process of ancestral domain recognition and titling. While both NIPAS and IPRA have the same overall goal of protecting the natural ecosystem, they have very different approaches in terms of governance structure. Several specific PAs where there are overlapping ancestral domain claims have adopted different approaches to harmonization. Under a Joint Memorandum Circular (2007-01) issued by DENR and NCIP, DENR should closely coordinate with local IPs in the delineation of PA boundaries

that overlap with ancestral domain claims. The circular also facilitates the harmonization of the PA management plan and the ADSDPP. IPs “shall have primary responsibility to maintain, develop protect, and conserve such overlapped areas” with assistance from DENR. IPs may decide to transfer management responsibility to “concerned government agencies” (there is no specific reference to the PAMB), but this is only for a temporary period and the primary management responsibility will eventually revert back to the IP claimants. The joint circular is the latest product of a decade of negotiations between the DENR and NCIP on how to deal with the PA-ancestral domain overlap. Harmonization is going on in several key sites including Mt. Apo Natural Park where almost 80% of the PA is covered by ancestral domain titles already recognized by NCIP. Other areas facing similar concerns are Mt. Kitanglad Range Natural Park and Quirino Protected Landscape. It is too early to tell how the new harmonization arrangement will turn out (La Vina and Kho, 2009).

1.2 Agricultural Biodiversity

As defined by the CBD, agricultural biodiversity (or agrobiodiversity) is a broad term that includes all components of biological diversity of relevance to food and agriculture, and all components of biological diversity that constitute the agricultural ecosystems, also named agro-ecosystems: the variety and variability of animals, plants and micro-organisms at the genetic, species and ecosystem levels which are necessary to sustain key functions of the agro-ecosystem, its structure and processes (CoP decision V/5, Appendix). Agricultural biodiversity is the outcome of the interactions among genetic resources, the environment and the management systems and practices used by farmers. This is the result of both natural selection and human inventive developed over millennia.

The diversity in agricultural ecosystems directly sustains the lives of many Filipinos through continued provision of food, medicine and shelter, and indirectly, by sustaining the sources of their livelihoods. It also provides ecosystem services such as soil and water conservation, maintenance of soil fertility and biota, and pollination, among others. At the genetic level, it can provide plants and animals the ability to adapt to changing environment by increasing their tolerance to frost, high temperature, drought, water-logging, pests, parasites and diseases. For Filipinos to continue reaping these benefits from agriculture, it is imperative that diversity in agricultural ecosystems is conserved.

Status

The Philippines is part of the center of diversity for rice, coconut, mungbean, taro and yam as well as the center of origin and diversity of bananas in Southeast Asia. There is also significant genetic diversity in spices in the country.

Ex situ collections of important germplasm have been assembled and maintained since the early 1900s. Table 7 shows some of the documented accessions per crop. Forty-five (45) government and non-government organizations in the Philippines hold *ex situ* germplasm collections totaling 173,205 accessions (Altoveros and Borromeo, 2007). As of 2004, the Philippine Carabao Center maintains a total of 234 purebred Philippine carabaos (water buffalo) in three field centers DOST

Table 7. Number of documented accessions per crop .

Crop	Number of Documented Accessions
Rice	5,500
Coconut	224
Banana	90
Mango	264
Corn	2,099
Sugarcane	898
Manila Hemp	773

Source: *Altoveros and Borromeo, 2007*

in Catibog-Sinha and Heaney, 2006). However, this is the only deliberate conservation effort undertaken by the government. Whatever genetic conservation and improvement of domesticated animal species happens out of the existing production systems in the country (BAI, 2003).

Trends

There are no actual figures for agrobiodiversity decline or gain in the country due to the absence of national indicators as well as lack of monitoring. Agricultural statistics and monitoring typically focused on crop yields and on the economic productivity of farms rather than biodiversity in the agricultural ecosystem. Altoveros and Borromeo (2007) cited lack of funds as a factor for the absence of systematic assessments of plant genetic erosion in the country. On the other hand, the 2003 Philippine Animal Genetic Resource Report prepared by the BAI states that although surveys on breed characterization has been conducted for most of the livestock and poultry present in the country, these surveys are often limited in scope and irregular in frequency. Also, the data and information derived from past surveys are not utilized to develop an organized database.

Nevertheless, there is a general recognition of the loss of genetic resources important to agriculture in the country as stated in both the plant and animal genetic resources reports prepared for FAO. There are various site-specific researches supporting this fact. For example, a study done by a group of students from the Mindanao State University in General Santos City reveals genetic erosion of rice landraces planted in the municipality of Lake Sebu, South Cotabato. Employing Participatory Rural Appraisal techniques, the researchers were able to determine that there is a high genetic diversity of traditional upland rice cultivars in the area. Of the 136 landraces identified, 22 are no longer cultivated. The loss of traditional landraces in the area was used as an indicator of genetic erosion. Other indicators used were the small farm sizes and their relative isolation (Lasalita-Zapico et al, 2008).

Meanwhile, the country's agriculture ecosystem is in danger as the land area devoted to it has been declining- from 13.12 million hectares in 1988 (DENR, 1990) to 12.39 million hectares in 2007 (PSY 2008). Corollary to this, diversity within the ecosystem may also be compromised.

Threats

Several studies and reports recognize various threats to agricultural biodiversity yet few systematically quantify these threats. Indirect drivers of agrobiodiversity loss are: 1) increase demand for food, land, and other agro-based resources; 2) the pursuit of economic growth through intensive agriculture, export-oriented policies and promotion of potentially environment-damaging extractive industries such as mining; and, 3) lifestyle change of farmers brought about by urbanization. Direct drivers include: 1) habitat destruction via conversion of agricultural land to other uses; 2) the possible negative impacts of biotechnology; 3) natural calamities or extreme

weather events associated with climate change; 4) introduction of invasive alien species, pests and diseases; and, 5) inherent institutional problems of concerned government agencies in conserving agrobiodiversity.

In the Philippines, agriculture is considered to be an important driver for economic growth, poverty alleviation, and food security. In practice, the general approach in pursuit of development is by increasing agricultural productivity through intensive agriculture, monoculture, introduction of high-yield varieties in plants, and genetic upgrading with exotic stocks in animals. At the policy level, certain laws such as Republic Act 7900, also known as the High-Value Crops Development Act, passed in 2002 could negatively impact agrobiodiversity by curtailing the use of traditional food crops in agriculture. This policy may also endanger biodiversity by encouraging the replacement of traditional varieties with those that are more popular for export (Altoveros and Borromeo, 2007). Moreover, policies on farm loans and crop insurance for farmers are restricted to crops of the popular and high-yielding varieties (Altoveros, pers. comm., 2009). As a result of the country's adoption of the 1960s Green Revolution strategy, the total area planted to high yield rice increased from 10% to 60% in just a decade. This also led to increased use of fertilizers, pesticides and water (Pimentel in Catibog-Sinha and Heaney, 2006).

As commercialization of the animal production sector increases, native stocks are continuously upgraded (hybridization with foreign breed) for mass production to meet the food demand of the population. It has been observed that diversity in the country's native chicken and pig species is declining due to hybridization and replacement of traditional stock (BAI, 2003).

The country's policy during the previous decades also has an impact on the current status of farm animal diversity. In the 1960s the government provided generous incentives in the procurement of exotic commercial breeding stocks, particularly for poultry and swine production. Since then, private importers of breeding stocks became the major source of stocks for commercial livestock production. In 1976, the Philippine Government created the Livestock Development Council as part of its declared policy to develop a livestock industry in order to increase the supply of livestock and livestock products to attain self-sufficiency in food commodities of animal origin. While the livestock sector has grown considerably and its contribution to gross domestic product increased, the importation of breeding stocks as well as feedstuffs and other inputs also increased proportionately. Very little effort, if ever, was dedicated to the promotion of the indigenous stock during these times. Even with the growing awareness of the continuing erosion of animal genetic diversity, it was only in the 1980s that the government began to recognize the importance of the maintenance of local animal genetic resources (BAI, 2003).

Similarly, the drive for energy independence has led the government to push for the cultivation of jatropha, cassava, sugarcane, maize, and sorghum for biofuel production thus displacing traditional crop varieties. It is also feared the expansion of biofuel crop production will open up the uplands to monoculture.

Mining is aggressively being pursued in the country to boost the country's economy, reduce foreign debt, and increase employment. With this, the possibility of attracting scrupulous investors that could damage the environment through unsound mining practices is of concern.

Studies done by local non-government organizations and academic researchers indicate instances of soil and water contamination that affected local aquaculture and agricultural activities.

The study by Lasalita-Zapico et al (2008) on genetic erosion of rice landraces in Lake Sebu observed that the change in lifestyle of the *T'boli* tribe (the main farming community in the area) brought about by urbanization affected their decision to plant the traditional varieties of rice. They found out that the *T'bolis* would opt to sell products they bought from the town rather than plant upland rice or other crops in the mountain sides to generate more income. Also, the new generation of *T'bolis* already lost their interest in upland rice farming as education and urbanization had caused them to depart from their culture and traditions.

Altoveros and Borromeo (2007) stated that wild species of rice and abaca are disappearing due to habitat destruction, particularly land conversion. From 1991 to 2001, 600,000 hectares of Philippine agricultural land has been converted to other uses (Bayan Muna in CEC-Philippines, 2005). Many of the conversions are reportedly due to attempts of large landowners to circumvent the implementation of the Comprehensive Agrarian Reform Program (CARP) of the government by converting their land to agri-industrial estates, residential lots, and even mining areas. This type of land conversion negatively impacts on biodiversity as traditional crops are replaced by plantation crops and non-agricultural products.

The Philippines has also adopted biotechnology as a strategy for economic advancement and food security. In fact, the Philippines is one of the world's biotech mega-countries, growing more than 50,000 hectares of biotech crops (James, 2008). As of September 2008, there are 28 genetically modified (GM) crops approved for importation for direct use for food, feed, or processing, 4 of which are also approved for cultivation. The development of delayed ripening, vitamin-enriched, and virus-resistant GM crops are also in the pipeline. There are already ample laws and regulations governing biotechnology in place; nevertheless, there still lies biotechnology's potential to negatively impact on biodiversity in light of poor implementation of the regulations, particularly in terms of monitoring.

Natural calamities and changes in weather events (e.g. excessive rainfall, stronger typhoons) associated with climate change also negatively affects agrobiodiversity in the country. Some areas in the Philippines, specifically northern Luzon and southern Mindanao, are prone to seasonal aridity and are already showing signs of drought. Unfortunately, these lands are also agricultural areas producing corn, rice, and other grains. The country is also prone to typhoons and flooding. Not only do these typhoons damage the crops planted in the fields but have also affected a national gene bank, the National Plant Genetic Resources Laboratory (NPGRL). In September 2006, the storage facility of the NPGRL building in Los Banos, Laguna was damaged due to the flooding brought about by typhoon Xangsane (local name Milenyo). This resulted in the destruction of about 70% of genetic materials in the gene bank (Calleja and Aguilar, 2006).

Additionally, Altoveros and Borromeo (2007) assert that the inadvertent introduction of exotic pests and disease pose as a threat for agrobiodiversity in the country. Examples cited in the report include the loss of local papaya diversity due to the papaya ring spot virus (PRSV); the wipe out of citrus genotypes due to the tristeza virus; the fruit and shoot borer in eggplant; the little leaf and mosaic viruses; the "namamarako" syndrome in local cucurbits like bittergourd, sponge gourd and bottle gourd; and, the threat of erosion of local banana and abaca diversity

from banana bunchy top virus, banana mosaic virus and the sigatoka disease. Recent pests include the coconut leaf beetle (*Brontispa longissima*) and mealy bugs which have caused devastation to crops in certain parts of the country (Altoveros, pers. comm., 2009). The golden apple snail (*Pomacea canaliculata*) infestation of Philippine rice paddies still remains a problem until today. Recent advances in biotechnology, e.g. PRSV-resistant papaya, are addressing some of the problems posed by these pests and diseases.

Systemic and institutional problems also contribute to agrobiodiversity loss. Altoveros and Borromeo (2007) maintained that the delayed recognition and development of *in situ* conservation in the country is one of the root causes of the loss. This is worsened by the fragmented approach to conservation brought about by insufficient funds for the implementation of conservation programs. Moreover, because conservation activities and projects become opportunistic as available funds would allow, little attention is devoted to the complementation of resources for agrobiodiversity conservation.

On the other hand, the BAI report on animal genetics maintains that there is poor appreciation and awareness of the importance of animal genetic resources by both the government and the public. And even if certain institutions are interested, resources and financial support for animal genetic resource conservation and research and development are limited. In most programs, the continuity of financial support is a major problem especially when there is a change in local or national administration.

International Agreements and Local Actions

The Philippines' Department of Agriculture (DA) has promulgated various policies that dovetail with the CBD objectives of conservation, sustainable use, and fair and equitable sharing of the benefits arising out of the use of genetic resources.

In 2005, Executive Order (EO) No. 481 mandating the establishment and implementation of a National Organic Agriculture Program by the National Organic Agriculture Board was issued. This was followed two years after by EO No. 29 or the DA-Sustainable Agriculture Development Program which is implemented in partnership with the Catholic Bishops Conference of the Philippines-National Secretariat for Social Action-Justice and Peace. Moreover, provincial local government units are encouraged to pass local resolutions to further strengthen these national policies. The provinces of Bohol, Negros Oriental and Occidental, and Marinduque are some of the provinces that have resolutions to support organic farming and sustainable agriculture and, in some cases, ban the entry of GM crops into their areas.

The DA, through its different agencies and bureaus, also undertakes several projects and researches aimed at conserving and promoting sustainable use of agrobiodiversity. The Bureau of Plant Industry (BPI) has a project promoting indigenous crops through techno- demo farms, while the Bureau of Agriculture and Fisheries Product Standards (BAFPS), Bureau of Agricultural Research (BAR), and Bureau of Soils and Water Management (BSWM) are also embarking on projects and researches on organic and/or sustainable agriculture. For the country's animal genetic resource, the BAI implements several activities to improve cattle, swine, and small ruminant genetics. It also developed strategies for genetic improvement such as the Unified National Artificial Insemination Program that synchronizes all breeding programs

and activities to carry out genetic improvement in large ruminants through artificial insemination. Researches by BAI include the characterization of different strains of Philippine native goats through electrophoresis and other research and development directed towards the establishment of a policy environment that would promote development of the local carabao industry, among others (BAI, 2003). The DA also collaborates with the DOST-Philippine Council for Agriculture, Forestry, and Natural Resources Research and Development (PCARRD) on many of the aforementioned projects and researches.

As the focal agency for the United Nations Convention to Combat Desertification (UNCCD), BSWM has implemented different projects on soil conservation, crop varietal improvement, and organic agriculture. A relevant project being implemented under the context of UNCCD is the *Agri-Kalikasan*” (Agri-Nature) Program. This program is a science-based back-to-basics sustainable agriculture and rural development program that advocates organic-based farming guided by scientific principles. Also under the UNCCD, the National Action Plan to Combat Desertification, Land Degradation, Drought and Poverty (NAP) was formulated and endorsed by the heads of various national departments to ensure its proper implementation. Furthermore, the NAP was integrated to the Medium Term Public Investment Program for 2004-2010 of the DA and other agencies are now mainstreaming it into their own regular budgets (ACB, 2006).

In 2006, the Philippines ratified the Cartagena Protocol, a supplementary agreement to the CBD that seeks to protect biodiversity from the potential risks posed by genetically modified organisms resulting from modern biotechnology. Implementation of the Protocol entails the cooperation of various stakeholders, including those from government such as the DENR, DA, DOST and the Department of Health (DOH). In the same year, Executive Order No. 514 establishing the National Biosafety Framework (NBF) of the Philippines was issued providing guidelines for its implementation, strengthening the National Biosafety Committee of the Philippines and for other purposes. Along with other regulations, the NBF is expected to support implementation of the Protocol.

Aside from the UNCCD and Cartagena Protocol, the Philippines also ratified the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) in 2006. The objectives of the Treaty are similar to that of the CBD but focuses on plant genetic resources important to food and agriculture. The DA has yet to implement programs to support implementation of the Treaty.

Finally, the Philippines’ own Ifugao Rice Terraces was included as one of the pilot sites in the FAO project on Globally Important Agricultural Heritage Systems (GHIAS). The project aims to establish the basis for global recognition, conservation and sustainable management of such systems and their associated landscapes, biodiversity, knowledge systems and cultures. Aside from heritage conservation, the GIAHS project will also conserve and manage biodiversity in the form of traditional agricultural systems practiced in the site thus complementing the CBD objectives.

To a certain extent, agricultural biodiversity considerations have been included in the country’s socio-economic blueprint, the Medium-Term Philippine Development Plan (MTPDP) 2004-2010. In the agribusiness section, biodiversity is considered to have the potential to provide additional livelihood in the agriculture sector.

1.3 Inland Waters Biodiversity

The CBD defines inland waters as aquatic-influenced environments located within land boundaries. They include lakes, rivers, ponds, streams, groundwater, springs, cave waters, floodplains, as well as bogs, marshes and swamps, which are traditionally grouped as inland wetlands. The CBD has adopted the Ramsar Convention's definition of "wetland " which are "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters."

Inland water biodiversity is defined simply as biodiversity associated with the inland water ecosystem. Water as a physical resource is not biodiversity but the life associated with it is. Water and inland biodiversity issues cannot be separated. Inland water biodiversity is critically important to human well-being. They provide food security and livelihood through fisheries and other resources, and also support many ecosystem services such as climate regulation, flood mitigation, nutrient cycling, groundwater recharge, water purification and waste treatment.

The Bureau of Fisheries and Aquatic Resources or BFAR (1995) defined inland water resources in the country to include swamplands (fresh and brackish), fishponds (fresh and brackish) and other inland resources (lakes, rivers, reservoirs).

The NBSAP listed 78 lakes (DENR, 1977) while the Philippine Biodiversity Conservation Priorities (PBCP) included 211 lakes varying from .01 sq km to 900 sq km, 18 major rivers and 22 marshes, swamps and reservoirs (Ong et al, 2002). There are 10 major lakes that host aquaculture production and many other uses such as for household, recreation, and industry. There are also 421 principal river basins that provide various services for households, transportation, irrigation, and many others. These rivers drain in areas ranging from 41 sq km to 25, 649 sq km, with about 20 of them considered as priority river basins. (DENR-RBCO, 2007). Lakes and rivers occupy 1,830 sq km or 0.61 percent of the total inland water area. The PBCP prioritized 34 inland water bodies for research and conservation.

Inland waters are home to a more than 316 fish species, some of which are endemic and confined to single lakes such as the *Sardinella tawilis* found only in Taal Lake. Fishbase records as of 2008 show that there are about 121 endemic and 76 threatened freshwater species. Other than fish, other species that depend on these habitats are waterbirds, semi-aquatic species like the highly endangered Philippine crocodile (*Crocodylus mindorensis*), plants, and a majority of amphibians.

Unfortunately, inland waters are also the most threatened of all ecosystem types. Globally, the main threats are: physical alteration, habitat degradation, water withdrawal, overexploitation, pollution, and introduction of invasive alien species. In the Philippines, Ong et al, 2002 and the Environmental Management Bureau or EMB (2006) identified pollution from domestic (33%), industrial (27%), agricultural (29%) and non-point sources (11%) as the major reason for biodiversity loss in inland waters. Because of pollution, water quality decreases causing heavy algal blooms and oxygen depletion. Other threats include habitat loss and degradation; (b) resource use and exploitation; (c) climate change; and, (d) alien invasive species. Introduction of invasive alien species has also caused near-extinction of local endemic species. Diversion of

rivers for irrigation and dam construction has also affected movement of migratory fish species, changed the habitat of riverine flora and fauna, and dried rivers. Population pressure remains one of the biggest threats.

For this Report, discussion on status, trends and threats is limited to some inland water bodies where sufficient information is available. As in the other ecosystems, there has been difficulty in determining status, trends and threats at the national level due to lack of data, lack of monitoring systems, and lack of capacity among institutions. This Report also used water quality indicators such as levels of dissolved oxygen (DO) and biological oxygen demand (BOD) primarily because historical data is available. DO is defined as the amount of oxygen available in the water for fish and other aquatic organisms to live. An average DO level of less than 5mg/L may be detrimental to fish and other aquatic communities, so the higher the DO level, the better the water quality, the better for biodiversity. BOD is defined as the amount of oxygen used by microorganisms to decompose organic matter. An average BOD level of not more than 7 mg/L is good for fishery. The lower the BOD level, the better the water quality, the better for biodiversity. The DENR-EMB has classified 525 water bodies in terms of best usage and water quality in about 263 principal rivers, 213 minor rivers, 7 lakes, and 42 coastal and marine waters, representing about 62.5% of the water bodies in the country Table 8 shows the classification and number of water bodies in 2005 and 2006 (EMB, 2006 and 2007).

Table 8. Number of classified water bodies (EMB, 2006 and 2007)

Classification	Number	
	2005	2006
Inland Surface Waters		
Class AA <i>Waters intended for public water supply requiring only approved disinfection to meet to meet the Philippine National Standard for Drinking Water (PNSDW)</i>	5	5
Class A <i>Waters suitable as water supply requiring conventional treatment to meet the PNSDW</i>	203	216
Class B <i>Waters intended for primary contact recreation (e.g. bathing, swimming, skin -diving, etc.)</i>	149	163
Class C <i>Waters intended for fishery, recreation/boating, and supply for manufacturing processes after treatment</i>	231	260
Class D <i>Waters intended for agriculture, irrigation, livestock watering, etc.</i>	23	26
Marine and coastal waters		
Class SA <i>Waters suitable for fishery production, tourism, marine parks, coral reefs parks, and reserves</i>	4	5
Class SB <i>Waters intended recreation such as bathing, swimming, skin -diving, etc., and as spawning areas for Bangus and similar species.</i>	20	43
Class SC <i>Waters intended for recreation/boating, fishery, and as mangrove areas for fish and wildlife sanctuaries</i>	27	32
Class SD <i>Waters used for industrial purposes such as cooling</i>	3	3

Note: There are water bodies with two or more classification

1.3.1 Lakes

There are 10 major lakes in the country, namely: Laguna de Bay, Lake Lanao, Taal Lake, Lake Mainit, Naujan Lake, Lake Buluan, Lake Bato, Lake Pagusi, Lake Labas and Lake Lumao with the first 3 among the largest in the country. The first 5 lakes are also part of the 34 priority inland waters for research and conservation (Table 9) (Ong et al, 2002).

Table 9. List of conservation and research priority areas for inland waters and their provincial coverage (Ong et al, 2002)

1	Abulog River (Apayao and Cagayan)	19	Lake Danao (Leyte)
2	Cagayan River (Cagayan and Isabela)	20	Ilog River (Negros Oriental and Occidental)
3	Abra River (Abra, Mt. Province, Benguet, Ifugao and Ilocos Sur)	21	Twin Lakes (Negros Oriental)
4	Agno/Amburayan River (Mt. Province, La Union, Benguet, Ifugao , Tarlac, Nueva Vizcaya, Pangasinan and Ilocos Sur)	22	Lake Mainit (Agusan del Norte and Surigao del Norte)
5	Candaba Swamp (Pampanga and Bulacan)	23	Lake Duminagat (Misamis Occidental)
6	Umiray River (Aurora, Quezon and Bulacan)	24	Olangui River (Lanao del Norte and Lanao del Sur)
7	Kaliwa-Kanan River (Quezon)	25	Lake Lanao (Lanao del Sur)
8	Laguna de Bay (Laguna, Manila and Rizal)	26	Lake Napalit (Bukidnon)
9	Pasig River (Manila and Rizal)	27	Agusan Marsh (Agusan del Sur)
10	Tadlak Lake (Laguna)	28	Pulangi River (Bukidnon, Maguindanao and North Cotabato)
11	Taal Lake (Batangas)	29	Agusan River (Agusan del Norte and del Sur, Compostela)
12	Pansipit River (Batangas)	30	Ligawasan Marsh (North and South Cotabato, Maguindanao, Sultan Kudarat)
13	7 Lakes of San Pablo City (Laguna)	31	Lake Sebu and Mt. Three Kings (South Cotabato)
14	Lake Nabua (Camarines Sur)	32	Lake Maughan (South Cotabato)
15	Lake Buhi/Lake Manapao/ Lake Katugday (Albay and Camarines Sur)	33	Coron Lakes (Palawan)
16	Lake Naujan (Mindoro Oriental)	34	Lake Manguao (Palawan)
17	Bulusan Lake (Sorsogon)		
18	Jalaud River (Capiz, Antique and Iloilo)		

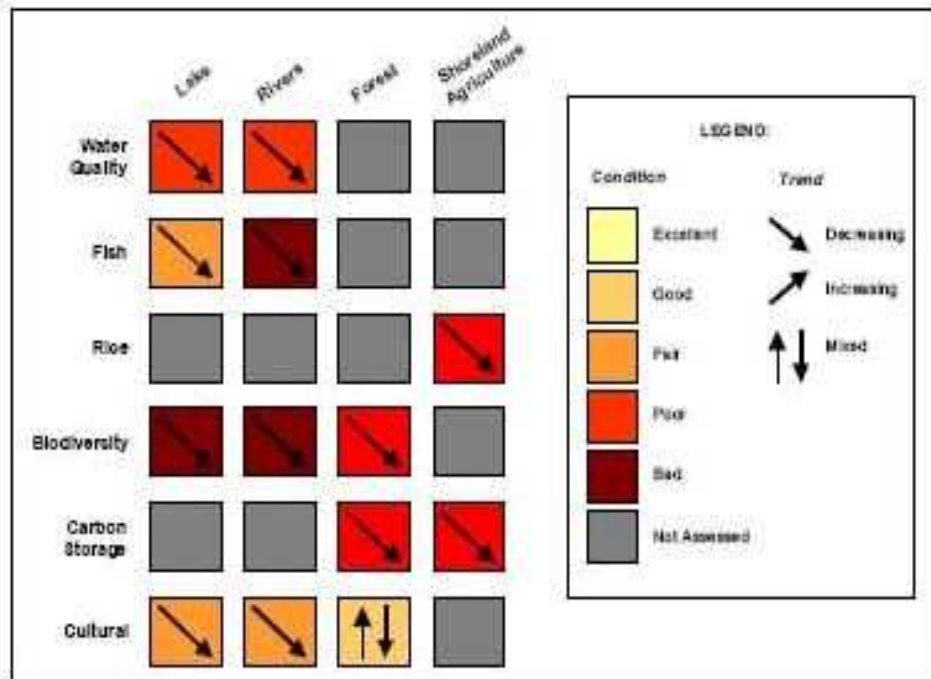
While some conservation efforts have been focused on these priority sites, this Report highlights efforts in 3 lakes, namely: Laguna de Bay, Taal Lake and Lake Lanao primarily because of availability of data and because of lessons that can be learned from their management.

Laguna de Bay

The largest lake is Laguna de Bay with a total area of 3,813.2 sq km. It is also one of Southeast Asia's largest inland water bodies. The Lake is home to 34 species of zooplankton which belong to three major groups: Rotifera (23), Cladocera (7), and Copepoda (4) (EMB, 2006). Thirty-three fish species consisting of 14 indigenous (5 of which are migratory) and 19 exotic or introduced species are found in the Lake. These include high commercial value fish like milkfish, tilapia, carp, catfish, ayungin, biya (LDBE Monitor 2007). Various other species of plants and animals (vascular plants, algae, vertebrate fauna, crustaceans, and mollusks), including 48% of flowering

plants and ferns endemic to the country are found in the lake basin. Findings from the Philippine Millennium Assessment Sub-global Assessment which focused on Laguna de Bay indicated a decreasing trend in water quality, fish, biodiversity and cultural value in the lake and its tributary rivers, a decrease in biodiversity and carbon storage potential in the watershed, and a decrease in rice production and carbon storage in shoreland agriculture (Figure 9).

Figure 9. *Laguna Lake Basin: Conditions and Trends (Lasco and Espaldon, 2005)*



Major threats to the Lake include pollution from wastewater discharges (68.5% domestic, 11.5% agricultural and 19% industrial), sediment contamination, watershed habitat alteration, and urbanization. Introduction of exotic species such as the janitor fish, and destructive harvesting are contributory factors. Fish pens and cages have increased aquaculture production but have also reduced the area for open water fisheries resulting to conflicts with sustenance fishers. The MA Sub-global Assessment Report concluded that: 1) water quality has deteriorated due to pollution from various sources; 2) fish production is declining but still viable through aquaculture technology; fish production in rivers is declining due to pollution; 3) rice production is declining mainly due to land conversion and reduction in rice areas; 4) biodiversity in the forest ecosystem is still good but is also declining due to agricultural encroachment, development projects and timber poaching. (Lasco and Espaldon, 2005).

The Laguna Lake Development Authority (LLDA), which has jurisdiction over the lake, conducts regular monitoring of water quality in the lake and in 15 tributary river stations. Among the indicators used are DO, BOD, nitrate, inorganic phosphate, coliform, chloride, transparency, lake level, and lake primary productivity. From 2001-2005, river tributaries such as Pangil, Bay, Sta. Cruz, and Pagsanjan Rivers passed the Class C DO criterion while Marikina, Mangangate, Tunasan, San Pedro, Cabuyao, San Cristobal, San Juan, Siniloan, and Sapang Baho Rivers failed to meet the criterion (EMB, 2006).

Findings from monitoring data from 2004-2006 for DO indicate that the lake has consistently passed the 5 mg/L Class C criterion, signifying good water quality. Majority of the tributaries however, failed to meet the criteria. Monitoring data for BOD for the same period indicate that the lake has consistently passed the 7 mg/L Class C criterion, signifying good water quality. About 10 tributaries passed the Class C criterion while some were lower than Class D, fit only for irrigation, agriculture, and industrial cooling (Figures 10 and 11). As a whole, majority of the river tributaries failed to meet the water quality standard for DO.

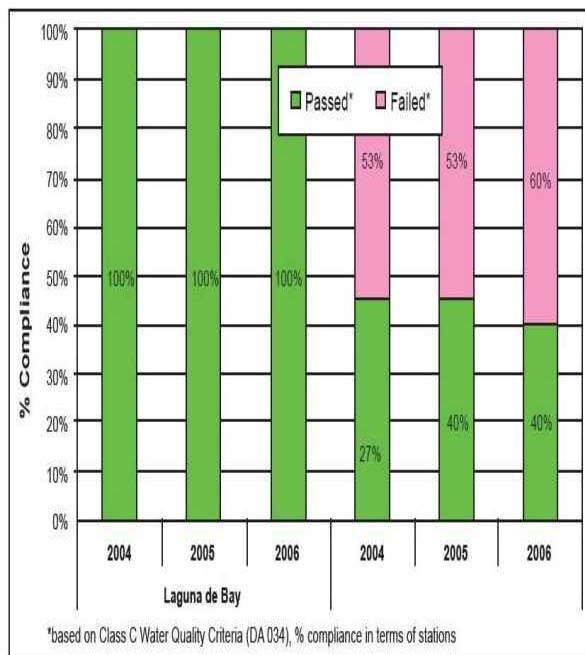


Figure 10. DO in L aguna de Bay and tributaries (LDBE Monitor 2007)

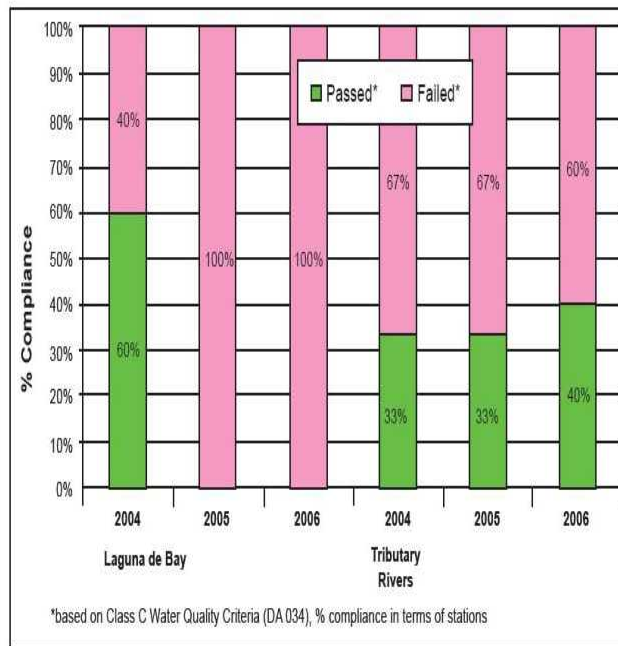


Figure 11. BOD in L aguna de Bay and tributaries (LDBE Monitor 2007).

Findings for the same period also indicate an increased trend in lake water level, a decreased trend in transparency resulting to less algal production, and decreased net primary productivity and fish production (Figure12) (LDBE Monitor 2007).

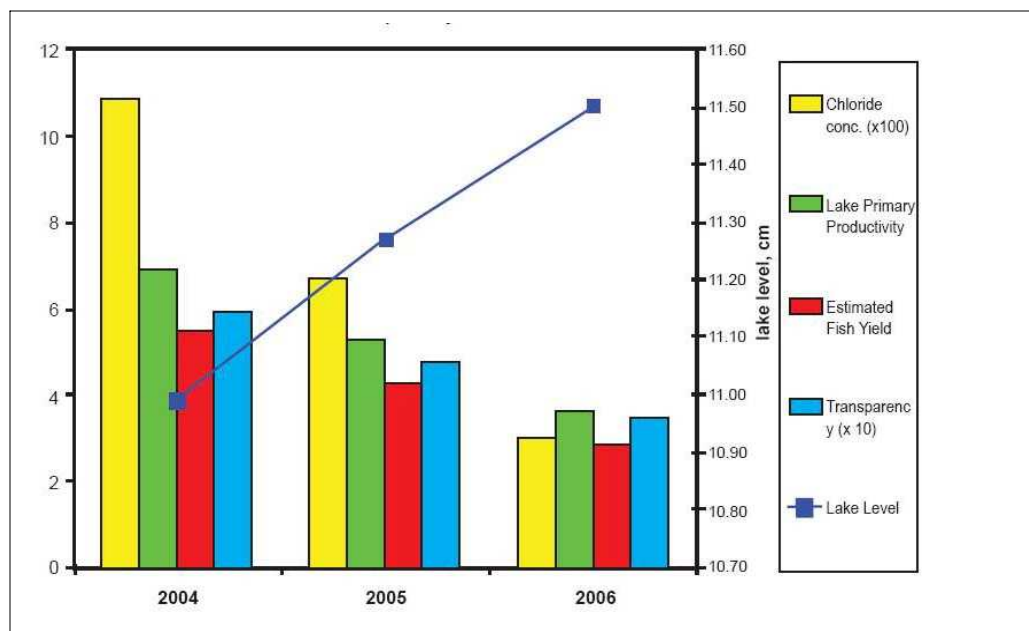


Figure 12. Lake primary productivity, fish yield, chloride concentration, transparency and lake level, 2004 -2006 (LDBE Monitor 2007).

There have been institutional, policy and program responses to the issues and problems on the resource use of the lake such as: formation of multisectoral river rehabilitation councils to address water quality problems, development of a Laguna Lake Master and a Zoning and Management Plan (ZOMAP) designating resource use zones, and inclusion of some areas in the conservation priority areas of the government. However, challenges posed in managing a lake with multiple resources and multiple users cannot be solved by one agency alone. LLDA has built successful partnerships and alliances, described in Chapter 3, to meet these challenges.

Taal Lake

Taal Lake, the third largest lake in the country and the world's smallest active volcano, was declared as Taal Volcano Protected Landscape (TVPL) in 1996 under the NIPAS. It is known for its beauty and tourist attractions and is home to the endemic species *Sardinia tawilis*, the world's only commercial freshwater sardine, and *Hydrophis semperi* locally known as "duhol", one of only three freshwater sea snakes in the world. The lake is also known to have one of the highest diversity of fish species of any lake in the country, with at least 47 species recorded in the early 1930s. Many of these fish species are migratory, moving from coastal areas to the lake through the Pansipit River as larvae then moving back to the sea to spawn. The lake drains into the Pansipit River, the lake's only outflow which then empties into the Balayan Bay (DENR-PAWB, 2005).

Today, the lake is fast deteriorating, fish catch is low and some of the native fishes are gone. The greatest threats to the lake are pollution and unregulated fish cage operations. Fish cages are plentiful with the lake's tilapia farms providing as much as 68% of the annual production in the

Cavite, Laguna, Batangas, Rizal and Quezon (CALABARZON) region and directly employing about 1,500 people. The practice of fish cage operators to overstock and overfeed has threatened the productivity of the lake. Increased chemical loads from feeds have resulted to decreased water quality, fish kills and mud-tasting fish, similarly experienced in Laguna de Bay. Fisheries experts recommended a limit of 6,000 fish cages, however, BFAR's latest count has already reached 9,188 and by other estimates, 11,000 fish cages. These cages occupy only about 2% of the total lake area and are well within the 10% allowable under the Fisheries Code but due to destructive practices, the productivity of the lake has been threatened (Luistro, 2008). The proliferation of fish corrals on the Pansipit River has also prevented the migration of many commercially important fish species. To date, about 1,300 illegal structures have been dismantled and the lake's outlet declogged through the collaborative efforts and resources of the Provincial and Municipal LGUs. There are continuing efforts to sustain clean-up operations and provide livelihood to displaced fishers. The LGUs' active leadership in this task should serve as a model for other LGUs who are similarly faced with this challenge.

A proposed 10-year management plan (2009-2018) for the TVPL is undergoing various consultations with stakeholders. The Management Plan intends to ensure that actions of all stakeholders are consistent with the vision for the basin- "clean water and surroundings, cared for by citizens who are happy and economically secure relying on productive resources and able management of the basin".

Lake Lanao

Lake Lanao in Lanao del Sur is one of 17 ancient lakes in the world and the second largest freshwater lake in the country. It is a reservoir for the Agus hydroelectric power plants which generates 55-65% of Mindanao's power. The lake's only outlet is Agus River which drains into Iligan Bay. Lake Lanao is also a major source of food and livelihood and serves as a transport highway and venue for religious and cultural activities of communities living in the area. Lake Lanao was proclaimed as a watershed reservation in 1992 through Presidential Proclamation 971 to ensure protection of forest cover and water yield for hydropower, irrigation and domestic use. The watershed occupies an area of 153,008 hectares and is home to a rich variety of flora and fauna, including 18 cyprinid species that are endemic to the lake.

As early as the 1980s the scientific community has warned that these endemic cyprinid species may be in danger of extinction due to the long term effects of the hydroelectric plants on lake levels and introduction of invasive alien species. Today, water inflow and outflow have declined, lake water level has decreased, and lakebed exposure has been observed. The accidental introduction of white goby (*Glossogobius g iurus*) in Lake Lanao has also caused the decline of endemic cyprinids (Guerrero, 2002), with only about 5 of 18 species still remaining in the lake

A recent study by the Mindanao State University (MSU) in 2006 discovered massive algal contamination due mainly to soil erosion from indiscriminate logging in the watershed and extensive land use and farming in the surrounding areas (Gallardo, 2006). Other factors that contribute to the deterioration of the lake are the environmental impacts of the dams, hydrological alterations, diminishing waterflow and pollution. If this continues, food security and the livelihood of communities who are dependent on the lake may be seriously affected.

A Lake Lanao Watershed Protection and Development Council (LLWPDC) was created in 1992 responsible for the development of the Lake Lanao Integrated Development Plan (IDP) in 2003. However, the perennial changes in leadership in the Council have made it difficult to implement its mandate. The IDP aimed to manage the Lake Lanao - Agus River Watershed using the landscape approach by harmonizing the various frameworks and activities that have been at work for many years (LLWPDC, 2003). However, current institutional arrangements have not really arrested the degradation of the lake.

Some current initiatives are those provided by the USAID EcoGov2 Project for ridge to reef planning and capacity building of stakeholder groups in the area. The DENR-River Basin Control Office (RBCO) is also supporting the preparation and completion of the Lake Lanao Integrated River Basin Action Plan and the creation of the Agus River Basin Project Management Office. Agroforestry projects, watershed rehabilitation and institutional strengthening are ongoing but harmonization of efforts, sustained management interventions and stakeholder support are keys to saving Lake Lanao.

1.3.2 Rivers and River Basins

Priority Rivers

Under the government's Sagip Ilog Program, 19 priority rivers have been selected for monitoring using DO and BOD levels as indicators (Table 10). These rivers are expected to show improved water quality through a 30 percent increase in DO levels by 2010 using the 2003 levels as baseline.

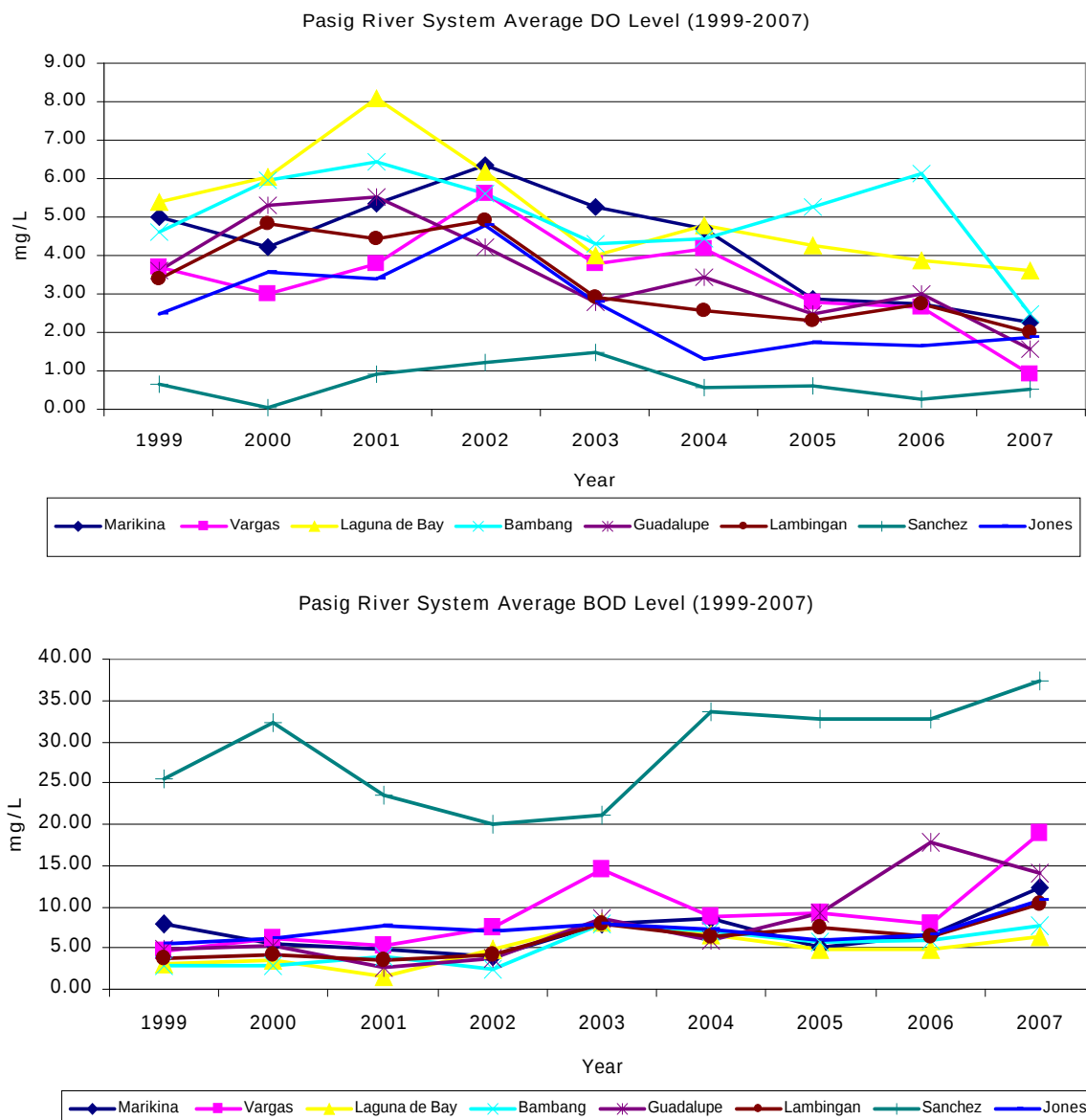
Table 10. *Priority rivers showing changes in BOD levels 2003 -2005 (EMB, 2006)*

Region	Water Body	Annual Average (mg/L)		Change in BOD Level
		2003	2005	
NCR	Marikina River	18.2	12.1	Improved by 33%
	San Juan River	54.8	33.5	Improved by 39%
	Parañaque River	42.0	29.5	Improved by 30%
	Pasig River	10.7	24.2	Increased by 126%
CAR	Balili River	14.8	31.8	Increased by 116%
3	Meycauayan River	38.2	119.8	Increased by 213%
	Marilao River	32.3	41.5	Increased by 28%
	Bocaue River	12.2	6.4	Improved by 48%
4A	Imus River	8.0	9.0	Increased by 13%
	Ylang-ylang River	24.4	8.4	Improved by 66%
4B	Mogpog River	--	--	No data
	Calapan River	4.0	2.9	Improved by 29%
5	Anayan River	8.9	2.3	Improved by 74%
	Malaguit River	5.7	5.8	Increased by 1%
	Panique River	4.4	5.6	Increased by 27%
6	Iloilo River	2.4	4.9	Increased by 103%
7	Luyang River	2.4	2.0	Improved by 15%
	Sapangdaku River	7.6	0.9	Improved by 89%
10	Cagayan de Oro River	1.2	1.3	Increased by 5%

Findings indicate that some have improved but many have not met the criteria. Most of those located in the National Capital Region and Region 3 show poor water quality, with Marilao River in Bulacan showing the worst state. Among those closely monitored by the DENR-EMB for water quality is the Pasig River System for which data on DO and BOD levels are available from 1999-2007. Any improvement in DO and BOD levels can benefit aquatic organisms which in turn benefit other wildlife that are dependent on them.

Figure 13 shows that the Pasig River system has failed to meet the standards set by DENR for water quality. As of 2007, concentration of DO was recorded at a critical level of 5.62 mg/L (standard is $>5\text{mg/L}$), BOD was at 9.55 (standard is at $<7\text{mg/L}$) and coliform at 2,030,000,000 MPN/100ml (standard is at 500). The major threats are pollution from industries, non-point and domestic sources, sedimentation, human settlements, and, population pressure.

Figure 13. Average DO and BOD levels in Pasig River System 1999 -2007 (EMB, 2007).



Priority River Basins

There are 421 principal river basins that provide various services for households, transportation, irrigation, and many others. These rivers drain in areas ranging from 41 sq km to 25, 649 sq km. Twenty river basins, including Amnay-Patrick (466 km²) in Occidental Mindoro and Tigum-Aganan (272 km²) in Iloilo have been prioritized for action due to their huge potential uses, declining carrying capacity and deteriorating life support systems (Table 11).

Table 11. Priority river basins in the Philippines (NWRC, 1996)

River Basin	Region	Drainage Area (sq km)
Cagayan River	Cagayan Valley	25,649
Mindanao River	Southern Mindanao	23,169
Agusan River	Northern Mindanao	10,921
Pampanga River	Central Luzon	9,759
Agno River	Central Luzon	5,952
Abra River	Ilocos	5,125
Pasig-Laguna Lake	Southern Luzon	4,678
Bicol River	Bicol Region	3,771
Abulug River	Cagayan Valley	3,372
Tagum-Libuganon River	Southeastern Mindanao	3,064
Ilog Hillabangan	Western Visayas	1,945
Panay River	Western Visayas	1,843
Tagoloan River	Northern Mindanao	1,704
Agus River	Southern Mindanao	1,645
Davao River	Southeastern Mindanao	1,623
Cagayan River	Northern Mindanao	1,521
Jalaud River	Western Visayas	1,503
Buayan-Malungun River	Southern Mindanao	1,434

These river basins are in varying states of degradation. Direct causes include deforestation and removal of natural vegetation, overexploitation for domestic and commercial uses, inappropriate agricultural and forestry activities, overgrazing, poor water resource management, unregulated land conversion, and pollution. Indirect causes include conflicting institutional mandates and lack of institutional support services, inconsistent policies, statutory and policy framework, and population pressure (DENR-RBCO, 2007).

The Philippine Environment Monitor (2004) and this current review noted the absence of a regular and long-term environmental monitoring programs for major waterways even for such basic indicators as BOD and DO, hence the difficulty in establishing trends and changes. In most areas, rehabilitation efforts have been focused on specific areas or features of the water bodies.

1.3.2 Swamps and Marshes

Major swamps and marshes in the Philippines are listed in Table 12. Some conservation efforts are ongoing in these swamps and marshes, notably in the Ligawasan and Agusan Marsh in Mindanao and the Candaba Swamp in Pampanga.

Ligawasan is the largest marsh with a total area of 220,000 hectares. It is a conglomeration of three marshes: Ligawasan, Libungan and Ebpanan. It spans the provinces of Sultan Kudarat and North Cotabato in Central Mindanao and Maguindanao in the Autonomous Region in Muslim Mindanao (ARMM). It is home to Maguindanaon families whose primary means of livelihood are fishing when water levels are high and agriculture when water levels are low.

Ligawasan Marsh is an important bird area and is rich in biodiversity. About 30,000 hectares of the Marsh is a game refuge and bird sanctuary.

Table 12. *Swamps/Marshes in the Philippines .*

Swamp/Marsh	Location	Area (has)
Candaba Swamp	Bulacan and Pampanga Provinces, Central Luzon	32,000
Lalaguna	Lamon Bay, Quezon Province, Luzon	400
Manlubas Swamp	Camarines Norte, Southern Luzon	unknown
Leyte-Sab-a Basin	Leyte Island, Leyte Province	90,000
Hinunagan Rice Paddies	Southeastern Coast of Leyte, Southern Leyte Province	5,000
Agusan Marsh	Agusan del Sur Province	90,000
Ligawasan Marsh	North and South Cotabato Provinces	220,000
Aju, San Dionisio & Sara Wetlands	Panay Island, Iloilo Province	45,000

The Ligawasan Marsh Development Master Plan (1999-2025) prepared by NEDA-Region XII in 1998 recommended designation of the marsh as a protected area. Past conservation efforts were funded by donor organizations such as the UNDP-GEF Small Grants Program (SGP) and the Foundation for the Philippine Environment (FPE) through its Ligawasan Marsh Integrated Conservation and Resource Management Project. Current efforts include the National Program Support–Environment and Natural Resources Management Project (NPS-ENRMP) for Ligawasan Marsh which intends to enhance ecosystem services for global and local benefits through financing of integrated ecosystems management. While initiatives to conserve the marsh are ongoing, initial research has not generated enough data to determine progress and outcomes of these efforts.

In Agusan, a Master Plan for the Agusan River Basin following an integrated river basin management approach has been developed mapping out development strategies that promote maximum development of resources and reduce poverty. The Master Plan has been completed and presented to the Regional Development Council (RDC) and revisions are ongoing. The Master Plan provides a holistic approach to management, taking into consideration institutional arrangements, resources and people. It includes Agusan Marsh as a management component. Agusan Marsh is a wetland of international importance due to its hydro-ecological significance, biological diversity and uniqueness as a natural wetland. It was declared as the Agusan Marsh Wildlife Sanctuary under the NIPAS system. It occupies 43,954 hectares and straddles five (5) municipalities, namely Bunawan, Rosario, Loreto, San Francisco and La Paz and a small part of the municipality of Vuela, all of Agusan del Sur. The Ramsar-designated area is within the core protected area of the Marsh. Sago forest and peat swamps are also found in the Marsh.

The marsh is also home to a significant population of indigenous peoples who are dependent on the natural resources, cultural and spiritual values of the Marsh. There is a local initiative to register the Marsh as among United Nation’s Educational, Scientific and Cultural Organization’s (UNESCO) World Heritage Sites.

The Marsh provides significant ecological and social benefits globally and locally. However, current challenges to the Marsh are habitat fragmentation and environmental degradation evident in flooding, river bank erosion, unsustainable agricultural practices, resource extraction and over-exploitation, tenure conflicts, land conversion and introduction of invasive alien species. Pollution from mining, agricultural run-off, domestic waste and sediments also pose a challenge. Mercury pollution is also a threat to the marsh where traces of mercury have been recorded in sediments, plants and fish upstream and downstream of the marsh (Roa, 2007). Social concerns such as population pressure, poverty, livelihood and basic health needs also pose additional challenges. The Master Plan intends to address these challenges through management interventions.

The Master Plan, however, is viewed by some as a threat to the integrity of the Agusan Marsh Sanctuary. Included in the Master Plan is the construction of 10 large dams to be completed by 2030 which may have profound impacts on the natural flood regime of the marsh and affect its natural ecological functions. Recommendations for a review of the Master Plan have been put forward.

In Central Luzon, the Candaba Swamp in the Provinces of Bulacan and Pampanga is an important area for agricultural and fisheries production, water for irrigation, and natural flood retention. A privately-owned portion of the swamp has been a declared bird sanctuary and a candidate Ramsar site. Annual waterbird census in Barangay Candating, Arayat from 1990 to 2008 show a considerable number of migratory species in the area. While the number is increasing, some years show fluctuating counts. It may be necessary to standardize the annual census in order to be able to determine trends. Tourism in the area has increased, especially during the migratory season, benefiting the LGUs, the communities, and the migratory birds themselves.

1.4 Coastal, marine and island biodiversity

The CBD refers to coastal and marine environments as those that contain diverse habitats such as mangrove forests, coral reefs, sea grass beds, estuaries in coastal areas, and hydrothermal vents that support marine life such as marine fish and invertebrates. Islands, on the other hand, are defined by the Millennium Ecosystem Assessment as “lands isolated by surrounding water and with a high proportion of coast to hinterland”; however, there is no single accepted definition of islands. Island biodiversity are known to be highly endemic and specialized with new characteristics and unusual adaptations that are shaped by evolutionary processes.

The Philippines is located within the coral triangle, at the center of the highest marine diversity. Its vast, rich and diverse coastal and marine resources are composed of coral reefs, seagrass beds, mangrove and beach forests, fisheries, invertebrates, seaweeds, marine mammals and many others. Species diversity recorded by various authors indicate that there are 468 scleractinian corals, 1,755 reef-associated fishes, 648 species of mollusks, 19 species of seagrass and 820 species of algae (Fishbase 2008, BFAR-NFRDI-PAWB, 2005). Carpenter and Springer (2005) noted that there is a higher concentration of species per unit area in the Philippines than anywhere in Indonesia and Wallacea, that the Philippines is the center of the center of marine

shore fish diversity in the world, and that there should be special focus on marine conservation efforts due to its being an epicenter of biodiversity and evolution.

In 2005, the state of marine and coastal environment was assessed using the following indicators: mangrove cover, percent of coral reefs in excellent condition, seagrass cover, and fisheries production from municipal waters. Findings indicate that mangrove cover is increasing, but coral reef cover, seagrass cover, and fisheries production are decreasing due to continuing pressures on these resources (PEM, 2005).

Threats to the state of this environment can be grouped into five major categories: chemical pollution and eutrophication, fisheries operations, habitat alteration, invasion of alien species, and global climate change. Primary threats are habitat alteration and loss due to destructive resource use, development activities and human population pressure. Specific threats include mining, logging, hazardous and solid waste disposal, pollution, land conversion for industrial, agriculture and urban development (CI, DENR-PAWB and Haribon, 2006), coastal erosion and storm surges associated with climate change.

In 2005, the Biodiversity Indicators for National Use (BINU) for the coastal and marine ecosystem was developed by the DA-BFAR and the DENR-PAWB to respond to the actual needs of planning and decision-making at the national level, particularly in relation to coastal and marine issues. In developing the indicators, the BINU team examined the status, pressures and responses to biodiversity loss using recent scientific researches and monitoring results prepared and reviewed by scientific institutions, experts and data providers. The BINU included similar indicators that were used in the PEM 2004 to assess progress of efforts on biodiversity conservation and sustainable use, and to monitor and report biodiversity status and trends at the national level. These include commercially important fish and invertebrates (pelagic fish, demersal fish, invertebrates), habitats (coral reef, mangrove, seagrass, seaweed), and endangered species (Irrawaddy dolphin, marine turtle, and whale shark).

BFAR-NFRDI-PAWB (2005) reports a declining trend in the state of most coastal and marine ecosystems in the Philippines due to such factors as overfishing, destructive and illegal fishing activities, increase in population and human settlements near coastal areas, infrastructure development and pollution. However, the same report highlights the lack of comprehensive and historical data to better understand the state of this ecosystem.

In assessing progress made between 2005 and 2008, this Report builds on the biodiversity indicators identified in the BINU Report, and in particular coral reef cover, fisheries production, mangrove cover, and other indicators for which historical data are available.

1.4.1 Coral Reefs

Coral reefs in the Philippines cover an estimated area of 27,000 sq km with over 70% in poor or fair quality and quantity of coral cover. Of the remaining cover, only 5% are in excellent condition (Gomez et al 1994). Alino et al (2004) estimates that coral reefs contribute from 8-20% to about 70% for some island reefs to the total fishery production. About 1 million small fishers or about 62% of the population living along coastal areas are directly dependent on reefs for their livelihood (Barut et al 2004).

Our coral reefs are considered to be one of the highly threatened reef areas in the world (Burke et al, 2002). The most serious direct threats are overfishing, destructive fishing practices, and sedimentation. Other threats include coastal development, population pressures, tourism-related activities, pollution, and crown-of-thorns starfish infestations.

Nanola et al (2004) reports that Philippine reefs may be in a steady state of decline (from 5% to 3% to >1%) although better reefs can still be found in Celebes Sea, Southern Philippine Sea, Sulu Sea and the Visayas Biogeographic regions (Figure 14). However, management interventions such as establishment of marine protected areas (MPAs) and law enforcement could contribute to averting the decline in the trend in coral cover, fish abundance and biomass.

A recent report from PhilReefs (2008) using data from biophysical monitoring in 6 biogeographic regions of the Philippines- South China Sea (SCS), North Philippine Sea (NPS), South Philippine Sea (SPS), Visayan Seas (VS), Sulu Sea (SS) and Celebes Sea (CS) - provided reef survey information on the reef conditions in the country and updated the previous status report by Nanola et al in 2004. Coral reef benthos sites, reef fish sites with fish abundance and biomass data from 52 municipalities/ cities and 31 provinces nationwide were used to determine the status of coral reef and associated reef fishes.

These sites were also categorized into MPA

and non- MPA or outside MPAs. Findings indicated that of the 6 biogeographic zones, the SCS had the most number of MPA and non-MPA sites followed by VS, SS, NPS, SPS and CS.

Monitoring data, using hard coral cover, fish abundance and fish biomass as indicators, showed that the country still exhibits an overall declining trend especially in non-MPA sites (Table 13).

In the South China Sea region, average hard coral cover for both MPA and non-MPA sites did not show much change, although there was a higher percentage of coral cover observed in MPA sites. In terms of fish abundance, the Visayan Sea and Sulu Sea regions showed a slightly decreasing trend while the South China Sea region showed an increasing trend. Outside MPAs, there was a general decrease in trend except for Sulu Sea and Celebes Sea regions which remained stable. In terms of fish biomass, the Sulu Sea MPA sites showed a decreasing trend, the Visayan Sea showed an increasing trend, while the South China Sea region remained stable. Many of the non-MPA sites remained stable.

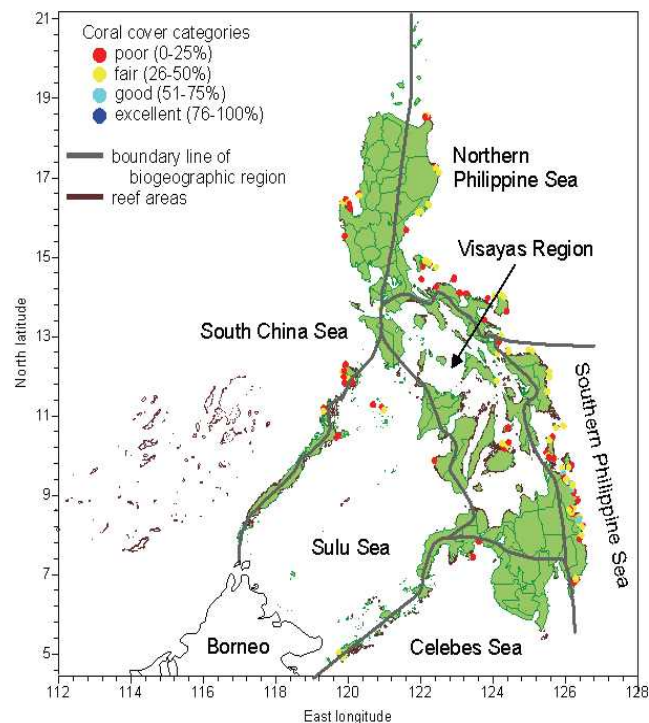


Figure 14. Coral reef conditions in the Philippines (Nanola et al, 2004)

Table 13. Trend of hard coral cover, fish abundance and biomass by biogeographic regions (only those with time series data were included) (Philippines, 2008).

Biogeographic Region	Hard Coral				Fish Abundance				Fish Biomass			
	MPA	%	Non-MPA	%	MPA	%	Non-MPA	%	MPA	%	Non-MPA	%
<i>South China Sea</i>												
Increasing	5	35.7	15	27.8	7	31.8	11	21.6	6	30.0	10	19.2
No net change	6	42.9	23	42.6	8	36.4	11	21.6	13	65.0	36	69.2
Decreasing	3	21.4	16	29.6	7	31.8	29	56.9	1	5.0	6	11.5
TOTAL	14	100.0	54	100.0	22	100.0	51	100.0	20	100.0	52	100.0
<i>North Philippine Sea</i>												
Increasing	2	100.0	7	38.9	0	0.0	7	43.8	0	0.0	0	0.0
No net change	0	0.0	6	33.3	0	0.0	4	25.0	1	100.0	12	100.0
Decreasing	0	0.0	5	27.8	1	100.0	5	31.3	0	0.0	0	0.0
TOTAL	2	100.0	18	100.0	1	100.0	16	100.0	1	100.0	12	100.0
<i>South Philippine Sea</i>												
Increasing	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0
No net change	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0
Decreasing	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0
TOTAL	0	0.0	1	100.0	1	100.0	0	0.0	1	100.0	0	0.0
<i>Visayan Sea</i>												
Increasing	1	12.5	4	12.9	1	20.0	1	20.0	1	50.0	0	0.0
No net change	7	87.5	24	77.4	2	40.0	2	40.0	1	50.0	3	100.0
Decreasing	0	0.0	3	9.7	2	40.0	2	40.0	0	0.0	0	0.0
TOTAL	8	100.0	31	100.0	5	100.0	5	100.0	2	100.0	3	100.0
<i>Sulu Sea</i>												
Increasing	0	0.0	1	11.1	0	0.0	2	16.7	0	0.0	0	0.0
No net change	1	100.0	4	44.4	5	83.3	9	75.0	1	100.0	3	100.0
Decreasing	0	0.0	4	44.4	1	16.7	1	8.3	0	0.0	0	0.0
TOTAL	1	100.0	9	100.0	6	100.0	12	100.0	1	100.0	3	100.0
<i>Celebes Sea</i>												
Increasing	0	0.0	1	100.0	1	100.0	3	75.0	0	0.0	0	0.0
No net change	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	2	100.0
Decreasing	0	0.0	0	0.0	0	0.0	1	25.0	0	0.0	0	0.0
TOTAL	0	0.0	1	100.0	1	100.0	4	100.0	0	0.0	2	100.0
Total Sites	25		95		34		72		23		60	

1.4.2 Fisheries

Fishbase records indicate that the country harbors about 3,212 fish species (list still incomplete), 731 of which are considered commercially important. Annual fish yield is estimated at 5-24 mt per sq km while per capita food consumption of fish and fishery products is estimated at 36 kg per year (BFAR-NFRDI-PAWB, 2005).

As of 2007, the total fish production totaled 4,711.3 mt valued at PhP 180,545.20 million compared to 2004 values of 3,926.10 mt amounting to PhP 138,846.50 million. These are distributed as follows: 1,192.10 mt (PhP 54,737.5 M) from commercial fisheries, 1,304.4 mt (PhP 64,210.4 M) from municipal fisheries, and 2,214.8 mt (PhP61, 597.3 M) from aquaculture (Table 14) (BAS as cited in PSY 2008). As in the past, capture fisheries (commercial and

municipal) continue to be the major contributor to the country's total fish production with the aquaculture sector contributing significantly.

Table 14. Quantity and value of fish production, by type of fishing operation 1996 to 2007
(Quantity in thousand metric tons; value in million peso s) (BAS, PSY 2008) .

Year	Total		Commercial		Municipal		Aquaculture 3/	
	Quantity	Value	Fishing 1/ Quantity	Value	Fishing 2/ Quantity	Value	Quantity	Value
1996	2,796.0	83,275.2	879.1	24,555.3	909.2	25,373.2	1,007.7	33,346.7
1997	2,793.6	80,617.1	884.7	25,935.3	924.5	27,392.9	984.4	27,288.8
1998	2,829.5	85,133.1	940.5	29,737.1	891.1	28,966.5	997.8	26,429.5
1999	2,923.8	92,322.3	948.8	32,242.1	926.3	31,034.1	1,048.7	29,046.1
2000	2,993.3	98,622.1	946.5	33,878.7	945.9	32,595.6	1,100.9	32,147.9
2001	3,166.5	107,193.8	976.5	36,088.7	969.5	34,221.7	1,220.5	36,883.4
2002	3,369.5	113,258.2	1,042.2	39,681.2	988.9	38,158.9	1,338.2	35,418.2
2003	3,619.3	119,866.3	1,109.6	42,002.9	1,055.1	40,664.3	1,454.5	37,199.1
2004	3,926.1	138,846.5	1,128.4	48,349.3	1,080.7	45,674.9	1,717.0	44,822.3
2005	4,161.8	146,392.9	1,134.0	47,272.7	1,132.0	49,950.4	1,895.8	49,169.8
2006	4,408.5	163,374.4	1,080.7	48,555.9	1,235.5	59,146.6	2,092.3	55,671.9
2007	4,711.3	180,545.2	1,192.1	54,737.5	1,304.4	64,210.4	2,214.8	61,597.3

Note: Details do not add up to total due to rounding.

1/ Includes production from commercial fishing vessels.

2/ Includes production from capture activities in various marine and inland (fresh) bodies of water such as lakes, rivers, etc.

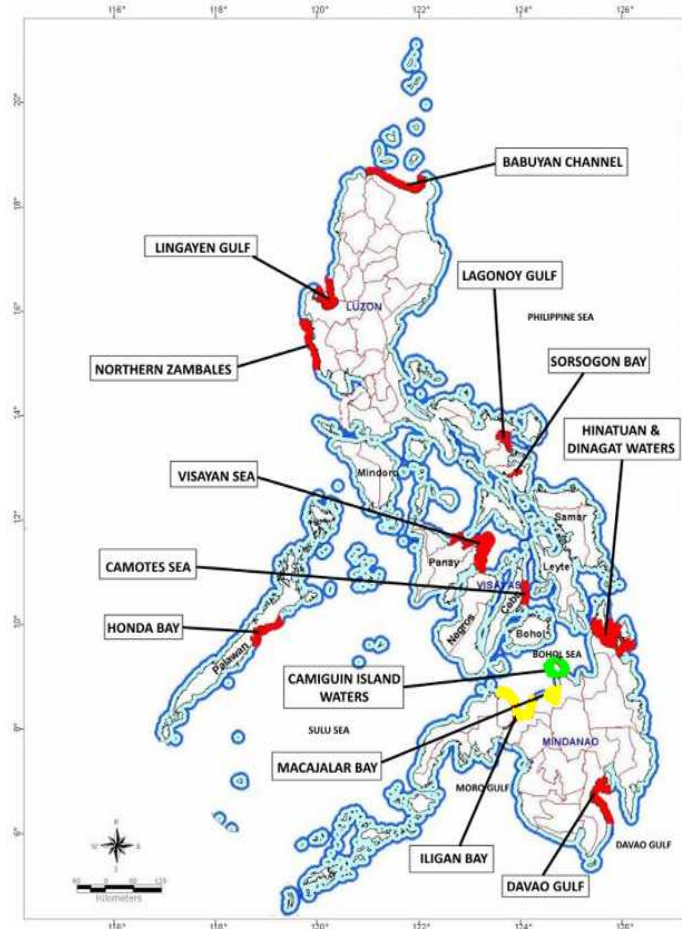
3/ Includes production from aquaculture activities such as brackishwater and freshwater fishponds, freshwater and marine fishpens, freshwater and marine fishcages, culture of oysters, mussels and seaweeds.

Fish and fishery products are mostly landed at the following landing centers: Navotas Fish Port, Zamboanga City, and Quezon for commercial fisheries; Palawan, Zamboanga del Norte, Negros Occidental, Iloilo, and Surigao del Norte for municipal fisheries; and, Tawi-tawi and Sulu; Bulacan, Pampanga, Negros Occidental, Pangasinan, Bataan, and Iloilo for aquaculture.

The National Stock Assessment Program (NSAP) of the BFAR-NFRDI monitors commercial and municipal landings at strategic major and minor ports in 13 fishing grounds nationwide and provides data on the status of fisheries in these major fishing grounds. The NSAP forms part of the Integrated Fisheries Management Unit (IFMU) scheme adopted by BFAR through Fisheries Office Order No. 217, S. of 2008 as a governance approach to fisheries management. The introduction of IFMU's is meant to establish a more comprehensive and integrated approach to sustain coastal fisheries. It addresses the fact that fishery resources are shared resources that go beyond geographical and ecological boundaries, and that collaboration and partnerships across management institutions and stakeholders are necessary to sustain it.

Major threats to fisheries stocks are unabated fishing pressure brought about by the number of fishers and abundance of fishing gear or collectors per unit area, and accelerated development in capture fisheries such as the rapid mechanization of fishing operations and introduction of very

efficient fishing gears. Recent data on the exploitation rates of selected fish species (n = 129 spp.) show high extraction patterns (~ie. fishing mortalities) in the Babuyan Channel, Lingayen Gulf, Northern Zambales, Lagonoy Gulf, Sorsogon Bay, Visayan and Camotes Seas, Honda Bay, Hinatuan and Dinagat Waters and Davao Gulf (Figure 15) (BFAR-NFRDI, 2008).



Exploitation rates (~E values) refers to the ratio of fishing mortality against total mortality (Z) (total mortality being the sum of natural and fishing mortalities), which ideally should be in the range of 0.3-0.5. Natural mortality (M) refers to fish deaths due to natural causes such as death due to old age, diseases, cannibalism, etc. while fishing mortality (F) is attributed to the extraction or fishing activities inflicted on the species.

Figure 15 . Fisheries exploitation rate in major fishing areas.

Legend:
 RED means the E values exceed the recommended maximum
 YELLOW means the E values fall within the "ideal" range of E values
 GREEN means the E values is lower than the E_{0.1} (minimum exploitation rate).

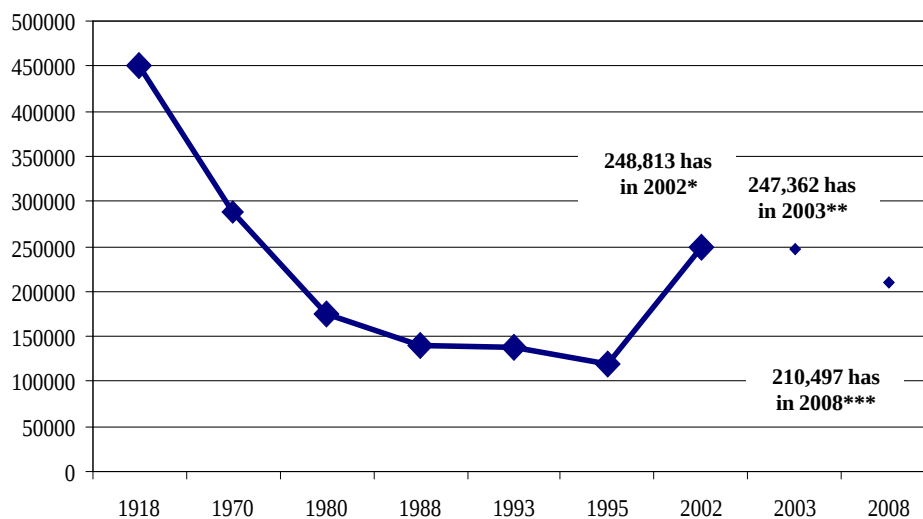
1.4.3 Mangroves

Earlier literatures have reported that mangrove areas are found in Palawan, Aurora, Isabela and Quezon in Luzon, Aklan, Samar provinces in the Visayas, and Zamboanga, Surigao and Sulu provinces in Mindanao, with the largest remaining mangroves areas located in Mindanao (112,745 has), Samar (65,119 has), Palawan (37,432) and Luzon (16,769 has).

There has been significant decline in mangrove forest cover from 450,000 hectares in 1918 to about 120,000 hectares in 1995 and if the post-1980 trend continues, it is expected that there will be less than 100,000 hectares by the year 2030 (PEM 2005 citing Brown and Fischer, 1918; DENR 1988,1998; White and de Leon, 2004). Recent data on extent of mangrove cover gathered from various sources need to be reconciled. Figure 16 shows that the NAMRIA and FMB interpretation of the 2002 satellite images showed a total area of 248,813 hectares, subject to ground validation (PEM 2005). The Forestry Statistics 2007 citing 2003 data reported a total mangrove area of 247,362 hectares. Recent ground validation conducted by the DENR showed a

total of 210,497.62 hectares as of 2008. This validated data includes information from 804 coastal cities/municipalities and 23,492 barangays covering a coastal area of 34,014 sq km.

Figure 16. Trend in mangrove cover from 1918 to 2008.



Note: * Based on NAMRIA and FMB interpretation of 2002 satellite data
 ** Based on Forestry Statistics 2007 citing 2003 data
 *** Based on DENR -CMMO validation of satellite data

Validation is still to be completed in Regions NCR, IV-B, V, VIII, IX, and CARAGA, particularly in isolated areas, and yet to be conducted in the ARMM. Based on this data, the largest mangrove areas are found in Regions IV-B, Region VIII, CARAGA and Region VII. Palawan (52, 693 hectares) in Region IV-B appears to have the largest mangrove area, followed by Northern Samar (9, 961.69) in Region VIII, Surigao del Sur (16,865.14) in Region XIII, and Bohol (14,156.37) in Region VII (DENR-PAWB-CMMO, 2008). Conservation priority areas for mangroves have been identified, namely: Buguey, Cagayan; Divilacan, Isabela; Lingayen Gulf, Pangasinan; Pagbilao Bay, Quezon; Bongsalay; Western Samar; Siargao-Dinagat Islands; Palawan; Sarangani Bay; Puerto Galera Bay; Cablao Bay; Southern Leyte; Panguil Bay; and, Sta. Cruz, Basilan (Ong et al, 2002).

The greatest threat to mangrove forests is conversion to agriculture, aquaculture, saltponds, human settlements and coastal development. Mangrove species are also widely used for fuel, charcoal and manufacture of poles and piles. Despite the ban imposed by the government on mangrove conversion and cutting, mangroves continue to be cleared (BFAR-NFRDI-PAWB, 2005).

There are current efforts to expand the coverage and strengthen protection of mangrove areas in the country. The DENR thrusts in the MTPDP 2004-2010 included protecting and replanting of about 10,500 hectares of mangrove. Mangrove reforestation and afforestation activities are ongoing in several areas such as in Palawan, Sulu and Central Visayas, including Negros, Bohol and Cebu.

In Palawan, the Palawan Council on Sustainable Development Staff (PCSDS) oversees the maintenance of the 20-hectare Isugod Mangrove Reforestation Project fully planted with mangrove propagules under the Development Bank of the Philippines Forest Project. The communities, as direct stakeholders in the area, were also provided with training. In Maruyugon, Puerto Princesa, a community-based Nipa Plantation Project has been launched in coordination with local officials, students and the community (PCSDS, 2007).

1.4.4 Seagrasses

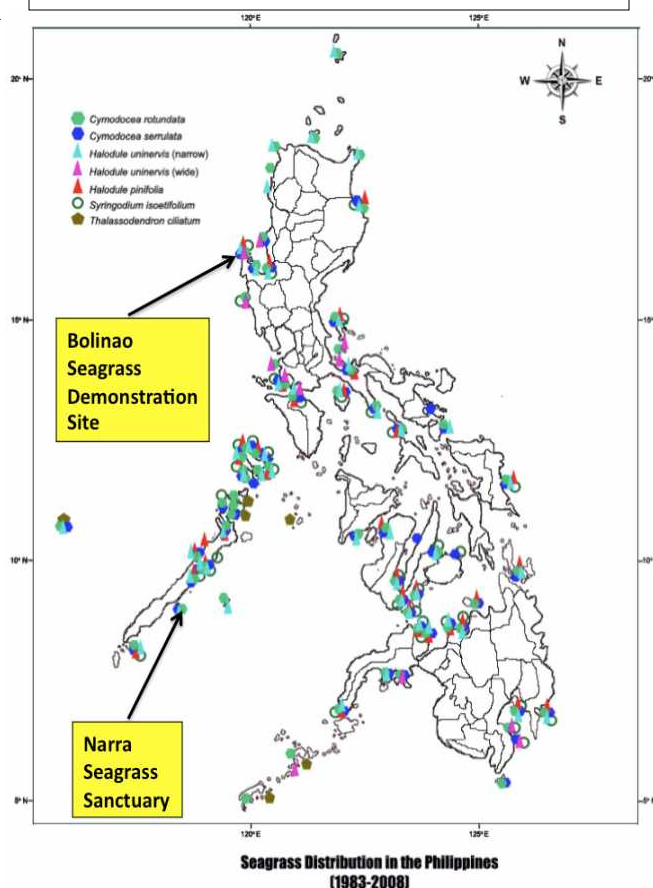
The Philippines has the second highest seagrass diversity in the world, second only to Australia. It contributes about 19 species or about 55% of the number of species in East Asia. Seven (7) species, comprising 40% of the total recorded in the Philippines and in Southeast Asia and 18% of global record, are found in Ulugan Bay in Palawan (Fortes, 2004).

Among the tropical coastal ecosystems, seagrasses are the least studied. The first Philippine-wide surveys indicated that seagrass beds in the Philippines are spread discontinuously over 978 sq km in 96 selected sites. However, this observation is reflective of data resulting from unsystematic studies and incidental collections rather than its true distribution in the country (Fortes 1995 as cited in Fortes, 2004). Of this total, 343 sq km have been estimated using combined satellite images and ground surveys while the rest are based on unvalidated satellite images. Of these sites, Puerto Princes/Honda Bay in Palawan (with 43 sq km of seagrass beds), Bolinao in Pangasinan (25 sq km) and Malampaya Sound in Palawan (21 sq km) top the list. Of the unvalidated sites, Sulu Archipelago (167 sq km), Northern Palawan (89 sq km) and Southwestern Palawan (47 sq km) top the list (Fortes, 2004).

Figure 17 shows recent data on the distribution of seagrasses in the Philippines, now covering about 27,282 sq km (Fortes, 2008).

The decline in coastal water quality, degradation of environment and resources, and human-induced disturbances pose as threats to seagrass communities. In particular, seagrass communities have been destroyed due to siltation or sedimentation, pollution, eutrophication, nutrient loading, dredging, and unsustainable fishing practices. Other site-based threats are oil pollution, tourism development, and boat scour. In the last 50 years, about 30-40% of

Figure 17. Seagrass distribution in the Philippines



seagrass areas in the Philippines have been lost (Fortes, 2008).

A seagrass demonstration site has been established in Bolinao, Pangasinan and a seagrass sanctuary, in Narra, Palawan, to showcase the achievements and lessons learned in the management of these important marine plants. In Bolinao, the main achievements included the development of a management plan that has been adopted by the local government, development of a Bolinao Seagrass Reserve, implementation of a sustained information, education and communication program, capacity building and provision of alternative livelihood programs. Local law enforcement in habitat management using the Bantay Dagat (Sea Watch) has also been instituted (UNEP, 2008). This is also true in Narra Seagrass Sanctuary.

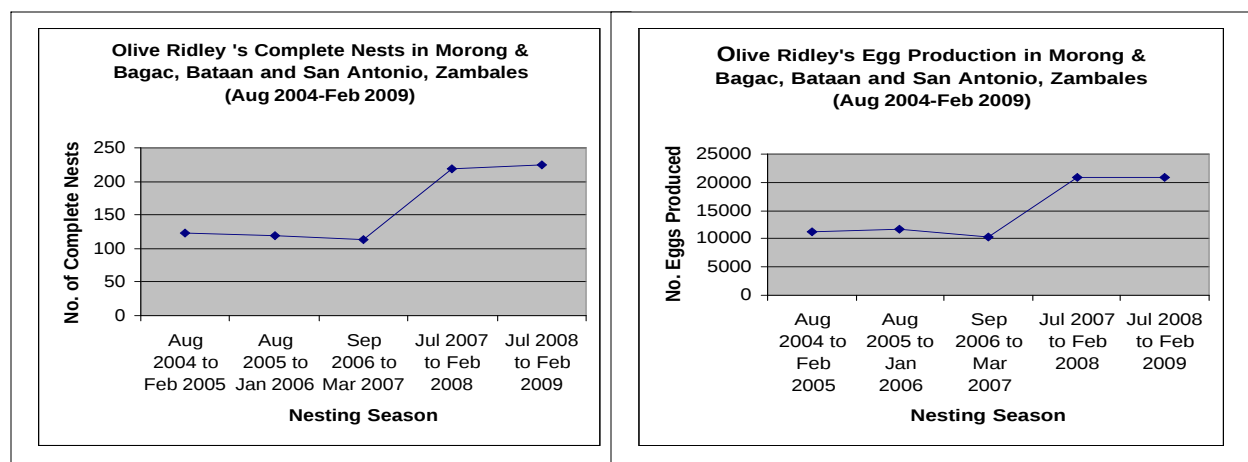
In 2007, the Philippine National Seagrass Committee published the Philippine National Seagrass Conservation Strategy and Action Plan (NSCS). The NSCS is an integrated approach to address seagrass-related issues and concerns developed through a multi-stakeholder participatory process and built on past efforts at developing plans of action. Five major areas for action have been identified, namely: 1) research and monitoring; 2) national policy, legal and institutional arrangements and coordination; c) public awareness, communication and education; 4) capacity building and sustainability; and, 5) resource and habitat management. Some of these identified actions are currently being implemented by partner institutions and agencies.

1.4.5 Marine turtles

Five species of marine turtles are found in the Philippines, namely: green, hawksbill, olive ridley, loggerhead and leatherback. Only green, hawksbill and olive ridley turtles nest in the Philippines and the rest forage in Philippine waters. Green and hawksbill turtles nest throughout the Philippines year round while olive ridley turtles nest mostly in the provinces of Zambales, Bataan and Batangas, particularly from August to September.

Nesting population and egg production are used as indicators to assess the status and population abundance of marine turtles. Data gathered by the PAWB-Pawikan Conservation Project (PCP) in collaboration with DENR Regional Office, LGUs, non-government organizations and resort owners show an increase in the number of Olive Ridley complete nests and eggs produced in Morong and Bagac in Bataan and in San Antonio, Zambales from August 2004 to February 2009 (Figure 18).

Figure 18. Complete nests and egg production of olive ridley in Bataan and Zambales (August 2004 - February 2009) (PAWB-PCP)

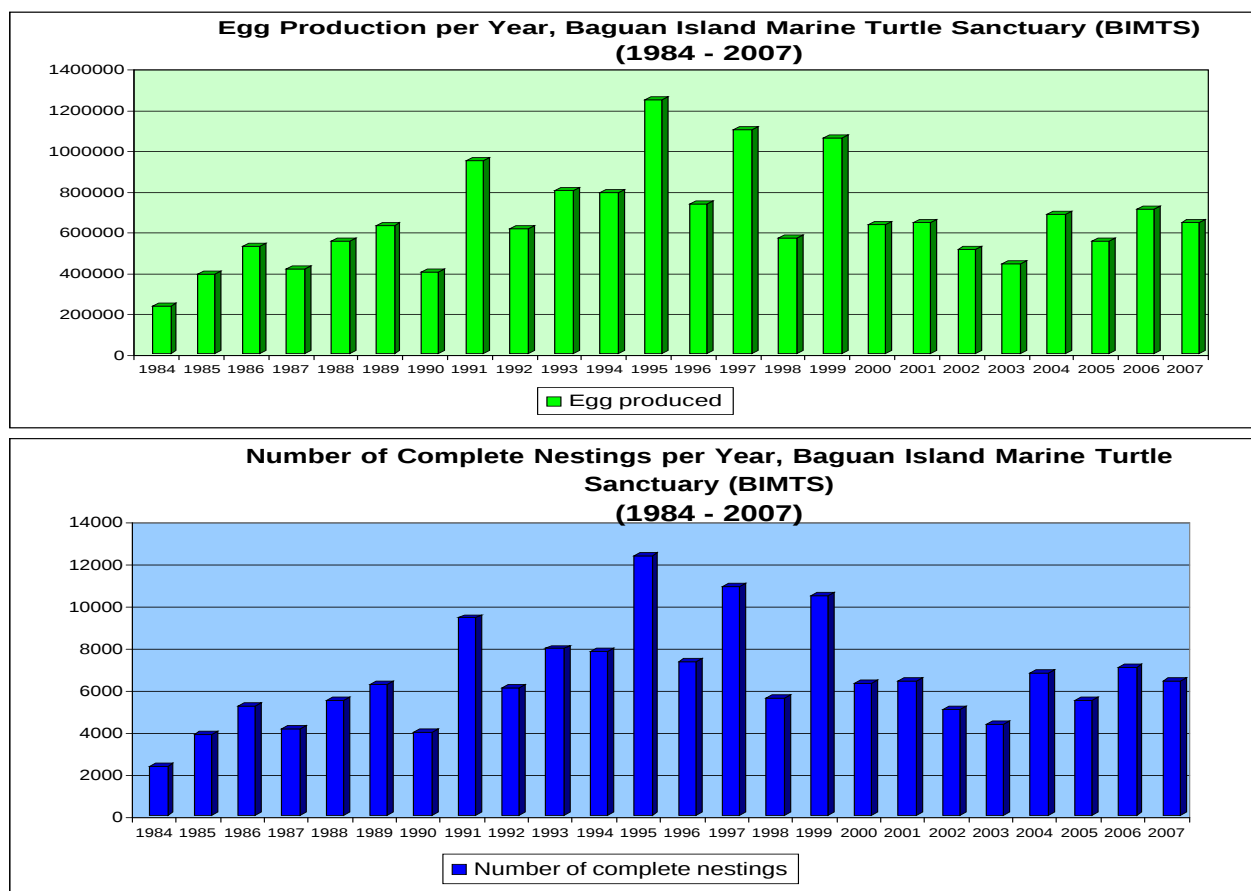


In Region XI, critically endangered hawksbill turtles have been observed to nest in Punta Dumlalag, Matina Aplaya, Davao City and in other areas. A 5-year Memorandum of Agreement (MOA) covering the period from 2004 to 2009 has been forged between and among the DENR, the Mayor of Davao City and Davao Light and Power Company, Inc. for the conservation of marine turtles and dugongs (*Dugong dugon*).

Another well-known marine turtle nesting area is the Philippines Turtle Islands (also known as the Turtle Islands Wildlife Sanctuary or TIWS) and the Sabah Turtle Islands, which together, have been declared as the Turtle Islands Heritage Protected Area (TIHPA). TIHPA is the first transfrontier protected area for marine turtles in world and is composed of six islands administered by the Philippines and three islands administered by Sabah. It is a major nesting area for green sea turtles in Southeast Asia. Hawksbill turtles also nest in the area.

From 1984 to 2007, the DENR-PAWB Pawikan Conservation Project (PCP) recorded egg production and number of complete nestings at the Baguan Island Marine Turtle Sanctuary (BIMTS). Fluctuations in egg production and number of complete nests have been noted due to changes in weather patterns brought about by the El Nino or La Nina phenomenon, and predation by monitor lizards (*Varanus sp.*) (Figure19).

Figure 19. Number of complete nests and egg production per year at BIMTS 1984 -2007 (PAWB-PCP)



Another major threat to marine turtles is large-scale illegal harvest of eggs and collection for ornamental trade. Sixty percent of the turtle eggs produced in TIWS except Baguan Island (which produces more than 50%) are still being collected for trade. Prior to the passage of RA 9147 or the Wildlife Resources Conservation and Protection Act of 2001, collection of turtle eggs in designated islands of the Turtle Islands was regulated through a DENR permit system that allowed collection during the open season from April to December. Only 60% of the eggs were collected, the rest were conserved. After the passage of the Wildlife Act, the collection of sea turtles or any of its derivatives, including eggs, was prohibited. This has resulted to conflicts within and among stakeholders since egg collection is a source of livelihood and accounts for about 35% of the overall income sources in the area (Cola 1999 as cited in BFAR-NFRDI and DENR-PAWB, 2005). A proposal for a phase-out on the collection of turtle eggs and phase-in of alternative livelihood projects in TIWS under a Memorandum of Agreement among stakeholders has been finalized and is pending approval.

Marine turtles are also threatened by coastal development and fisheries practices, including foreign fishers poaching and targeting marine turtles within Philippine waters. Developmental and foraging habitats of marine turtles are being proposed for declaration as Critical Habitats pursuant to Republic Act 9147 or the Wildlife Resources Conservation and Protection Act of 2001. Fishery impact on marine turtles is also a major issue. From a perception survey conducted by the DA-BFAR, gillnet, fish corral and set net are the fishing gears that are most likely to catch marine turtles (DA-BFAR, 2007). Actual reports gathered by the PAWB-PCP throughout the country through its tagging program reveal that fish corral, gillnet and hook and line are the fishing gears that capture most turtles.

The Sulu Sea is a favorite poaching area of foreign fishers targeting marine turtles. In the last decade, over a thousand foreigners (over 600 are Chinese) have been arrested and charged for poaching in the waters of Palawan alone (WWF-Philippines, 2008). Recent reports show a substantial number of green turtles killed by 19 Chinese fishers in TIWS in September 2007 and 101 hawksbill turtles killed by 13 Vietnamese fishers in Linapacan, Palawan in August 2008. This practice has generated national and international attention and has increased vigilance in law enforcement in these areas.

1.4.6 Other indicator species

Other indicator species used by the BINU to assess status of marine and coastal biodiversity include records of whalesharks, humpback whales and Irrawaddy dolphins. There are, however, insufficient data available for assessment.

The whale shark, *Rhincodon typus*, is one of two protected species in the Philippines and is listed as vulnerable in the IUCN Red List Criteria and Appendix II of Convention on International Trade on Endangered Species (CITES). Whale sharks (and manta rays) are also protected by DA-FAO 193, S. 1998 which bans the “taking or catching, selling, purchasing and possession, transporting and exporting of whale sharks and manta rays”. There is no study on population estimates on any species of sharks in the Philippines. Anecdotal claims of population in Donsol, Sorsogon in the 1990s was between 50 to 100 individuals. A decline in sighting rate was documented in Donsol between 1998 and 1999 using tourist-based sighting data (Grover 2000, Alava and Yaptinchay 2000 as cited in BFAR-NFRDI-PAWB, 2005). The World Wildlife Fund

(WWF) -Philippines has initiated participatory research to identify individuals of the whale shark population in Donsol through distinguishing marks, sex, behaviour and photo-documentation. Whale shark aggregation sites have also been identified as priority conservation areas.

At present, the DA-BFAR is finalizing the National Plan of Action (NPOA) for the conservation and management of sharks in the Philippines. The main objective of the NPOA-Shark is to ensure conservation and management of sharks (all chondrichthyan or cartilaginous fishes, comprising the true sharks, winged sharks (skates and rays, also referred to as batoids), and silversharks (or chimaeras), and their long-term sustainable use. The NPOA hopes to provide a national guideline for managers and interested stakeholders on how to incorporate the conservation and management issues concerning sharks and rays into the overall management of fisheries resources (DA-BFAR, 2008).

Humpback whales have been observed off Babuyan Islands located at the northernmost tip of Luzon. Babuyan Islands is a significant marine conservation area, the only known breeding ground for humpback whales that migrate annually to the Philippines to breed. Over 100 individuals have been photo-identified from surveys conducted since 2000 (Acebes, et al. 2007 as cited in CREE website). The area is also being developed as a model ecotourism site for cetacean interaction in partnership with the local governments and other stakeholder groups, and with the assistance of national government agencies and conservation groups such as the World Wildlife Fund-Philippines and the Center for Rural Empowerment and the Environment (CREE). However, conscious efforts are necessary to balance marine resources conservation and ecotourism development, and to build local capacity in order to maximize and sustain the benefits that can be derived from these resources.

Irrawaddy dolphins, *Orcaella brevirostris*, are found in estuaries and semi-enclosed water bodies such as bays and sounds. They are listed in Appendix 1 of the Convention on Migratory Species (CMS) to which the Philippines is a member-party. Range states of this migratory species are encouraged to develop a conservation and management plan for implementation by other range countries. In the Philippines, there is only one known population of less than 100 found in Malampaya Sound. Major threats to this population include accidental killing in fishing gear, habitat degradation, possibly prey depletion from over-fishing and the destruction of fish spawning grounds (Dolar et al. 2002 as cited in BFAR-NFRDI-PAWB, 2005). Several mortalities have been recorded, averaging about 4 a year. Experts propose to minimize fishing gear-dolphin interaction to avoid mortalities.

1.5 Cross-Cutting Issues

Cross-cutting issues as defined by the CBD refer to those issues that are relevant to all thematic programs, directly support work under these programs, or provide bridges and links between programs. These include such issues as tourism, climate change, ecosystem approach, protected areas, invasive alien species, traditional knowledge, innovations and practices, access to genetic resources and benefit sharing, and communication, education and public awareness. Work done on these issues has contributed to facilitating implementation of the CBD and meeting the 2010 biodiversity target.

This section focuses on two cross-cutting issues- tourism and climate change- that have gained significant attention in recent years. Other cross-cutting issues are also discussed below and in other chapters of this Report.

1.5.1 Tourism and Biodiversity

As an archipelagic and a megadiverse country, the Philippines is blessed with natural endowments and cultural resources that provide many benefits to many Filipinos. Tourism is an industry that has benefited a significant number of stakeholders. In particular, ecotourism is being mainstreamed in community-based natural resource management as a means to improve livelihood and manage natural and cultural resources in a sustainable manner. Biodiversity is an important asset to ecotourism.

A National Ecotourism Strategy (NES) and a National Ecotourism Program (NEP) 2004-2008 have been developed with the issuance in 1999 of Executive Order No. 111. The NEP covers major ecotourism components, namely: a) development, management and protection of identified ecotourism sites; b) product enhancement and development; c) environmental education and information campaign; and d) support programs for community stewardship and livelihood development. To complement the NES and the NEP, an action plan for the implementation of the Strategy was also drawn up in the short term (2002-2004), medium term (2002-2007) and the long term (2002-2012).

The NEP was initiated through a joint project of the Department of Tourism (DOT), DENR, and the New Zealand Agency for International Development (NZAID). NZAID has supported ecotourism development through the NEP Phase 1 (2001-2004) in 3 sites: Pamilacan Island, Sapang Bato-Mt. Pinatubo and Banaue Rice Terraces. NEP Phase II (2004-2008) covered 4 sites: Hundred Islands National Park (HINP), Mayon Volcano Natural Park, Rajah Sikatuna Protected Landscape and Lake Sebu Protected Landscape. As of 2008, ecotourism potentials of 24 protected areas have been assessed, 32 ecotourism development/business plans have been prepared in collaboration with LGUs, academe, and other stakeholders (DENR, 2008), and 19 Memorandum of Agreements (MOAs) with LGUs/NGOs/POs have been forged for the development of more ecotourism sites (DENR, 2007).

Models of ecotourism community-based enterprises have been successfully piloted in the HINP in Alaminos City, Pangasinan and in Lake Sebu in South Cotabato. The Hundred Island Ecotour Association (HIETA), a group of out-of-school youth, operates the Kayak Adventure Ecotour in the HINP with the assistance of the DOT, Naturespecs, and the City Government of Alaminos. Since its operation in July 2007 to December 2008, HIETA has generated a total net income of Php 129,800 (Figure 20). Overall, this approach has enabled the HIETA to assist in the conservation efforts in the HINP, in linking this enterprise with other communities, and in stimulating other local livelihood programs.

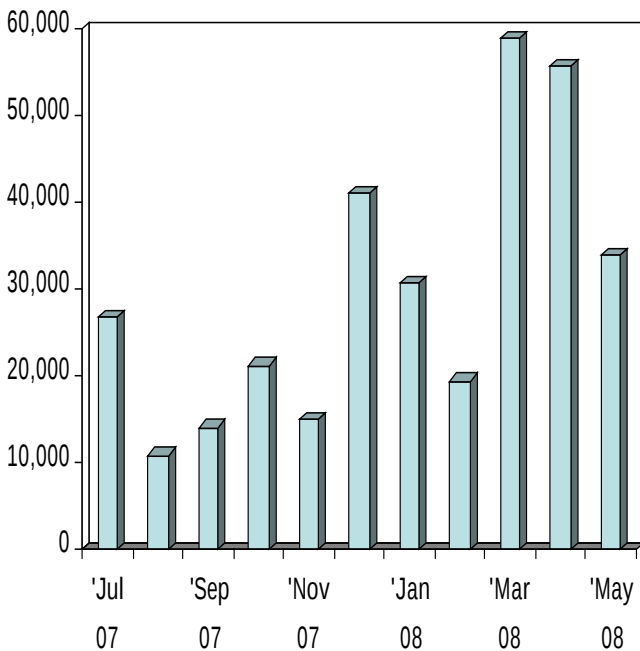


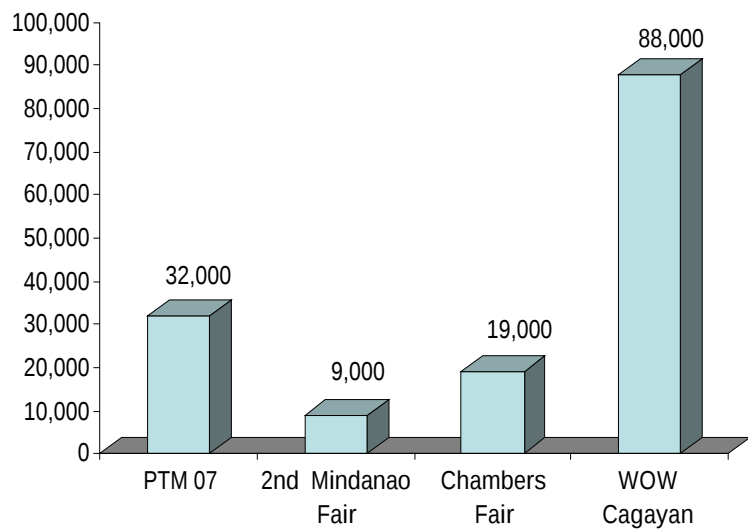
Figure 20 . HIETA Income from EcoTours ,
NEP Annual Report 2007 -2008



Source: NEP Annual Report 2007 -2008

In Lake Sebu, a group of women weavers from 6 different Peoples Organizations (POs) organized as the Kenhulung Federation manages a Handicraft Enterprise with the assistance of NZAID, DOT and the Philippine Business for Social Progress (PBSP). Enhancement trainings on skills, organization and business development, accounting and marketing were provided to the members of the Federation to improve their goods and services.

Source: NEP Annual Report 2007 -2008



The Federation has generated a gross income of from PhP 88,000 to PhP 285,000 from between 2007 to 2008 (Figure 21). The enterprise has expanded to include other indigenous products and a Visitor Management Center to showcase their arts and craft. It has also improved their skills and livelihoods, and strengthened organizational cooperation and teamwork among the different peoples' organizations that are members of the Federation (DENR and DOT, 2008).

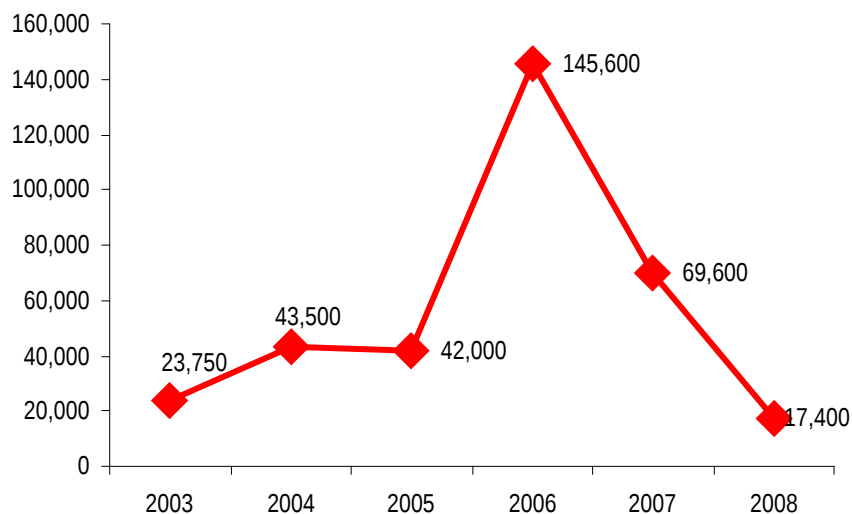
Similar successes have been reported in other parts of the Philippines. In Donsol, Sorsogon, whaleshark or "butanding" spotting, watching and interactions has transformed a sleepy town reliant on fishing and cottage industry alone into a tourism destination where benefits from higher revenues and livelihoods have been realized. In the Visayas Region, the Marine Life Tour of the Pamilacan Island Dolphin and Whale Watching Organization (PIDWWO) in Bohol, and

Figure 21. Income from Handicraft Enterprise ,
NEP Annual Report 2007 -2008.

dolphin watching in Bais City, Negros Oriental have likewise generated livelihoods and raised revenues benefiting local communities. PIDWWO, however, is

currently experiencing a drop in net earnings from PhP 145,600 in 2006 to PhP 17,400 in 2008 due to increasing competition from neighboring communities and absence of leadership (Figure 22) (DENR and DOT, 2008).

Figure 22.
Income from
NEP Annual
2008



PIDWWO Net
2003-2008,
Report 2007-

With the assistance of the DOT-Region VII, the Municipal Government of Baclayon, and NZAID, efforts are ongoing to revitalize the PIDWWO and assist community-based initiatives in Pamilacan. Trainings of new boatmen, crew, spotters and tour guides have been conducted; a local ordinance to regulate tours has been drafted and a management plan and user fee system is being prepared. Ayala Foundation is extending soft loans to fisherfolks to upgrade their fishing and tour boats. The difficulties faced by PIDWWO have made it imperative to view ecotourism

as a comprehensive package that requires not only product and business enterprise development but also organizational development and policy support. Furthermore, a comprehensive regional ecotourism program framework that recognizes shared resources can address issues of competing economic or livelihood opportunities similar to that faced by PIDWWO.

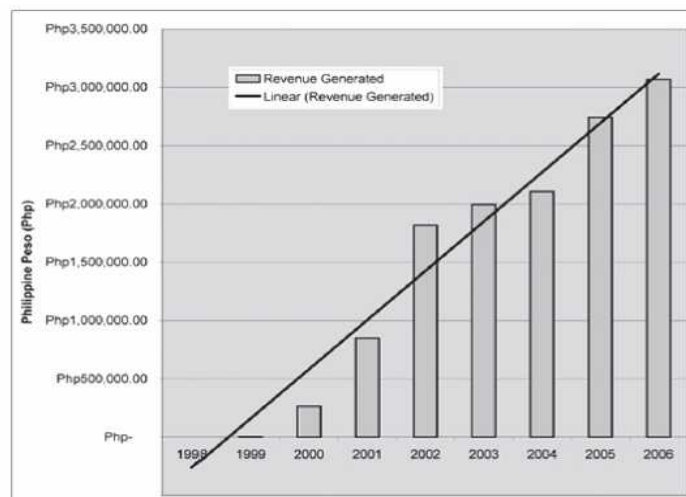


Figure 23. User fees income in GIMS, 1998 -2008
(Eismo -Osorio, 2008)

MPAs that also double as ecotourism sites have likewise generated revenues from user fees. The Gilutongan Island Marine Sanctuary (GIMS) in the Municipality of Cordova in Cebu has generated about PhP 3.0 million in user fee income in 2008 compared to about PhP 550,000 in 2001 (Figure 23). User fees have become a major source of income to sustain activities such as MPA maintenance, water supply and small businesses (Eisma-Osorio, 2008) and this practice is being replicated in other areas in the country.

Box 1. National Ecotourism Program (NEP) 2004 -2008

The NEP 2004-2008 aims to mainstream ecotourism in community-based natural and cultural resources management. Its objectives are:

- 1) To establish ecotourism businesses and visitor services in 4 banner and other candidate sites as a means to improve livelihood strategies for communities living in or adjacent to these:
 - Hundred Islands National Park (Pangasinan)
 - Mayon Volcano Natural Park (Bicol)
 - Rajah Sikatuna Protected Landscape (Bohol)
 - Lake Sebu Protected Landscape (South Cotabato);
- 2) To advocate for and coordinate the implementation of the National Ecotourism Strategy within the DOT and the DENR; and,
- 3) To promote and market ecotourism products at site, regional and national levels.

Beneficiaries of these projects include the sites themselves and surrounding communities. Site level interventions have also benefited indigenous communities such as the Aetas in Sapang Bato where a community visitor center has been expanded to include a souvenir shop; the members of the Banaue Tour and Travel Organization (BATTO) whose tour guiding skills and institutional linkages have been enhanced and strengthened.

At the national level, National Ecotourism Certification Program (NECP) standards, guidelines and primers on ecotourism accreditation, monitoring and evaluation framework, and an ecotourism planning and development module have been developed and used in promoting ecotourism concepts and principles, best practices various clients and users. These products have also been marketed through brochures, audio-visual documentaries, websites, and participation in travel fairs, exhibits, expositions at the local, regional, ASEAN and international levels. In addition, partnerships with government, civil society organizations and the private sector have resulted to showcasing of the NEP and its successes in the “Magandang Pilipinas” Program and participation in the Grassroots Employment and Entrepreneurship Program for Tourism (GREET). Technical assistance in promoting ecotourism awareness and environmental education has also benefited the academe, LGUs, and other government agencies. At the regional level, assistance has been provided in the development of an ecotourism roadmap for the Brunei-Indonesia-Malaysia-Philippines- East Asia Growth Area (BIMP-EAGA).

Based on available data, it appears that the gains from ecotourism have increased with communities and businesses alike benefiting. Government support for nature-based tourism has also increased. The DOT has recently launched Adventure Philippines which features ecotourism tour packages such as whale and dolphin watching, birdwatching, nature trail tour, canopy walk, etc.; land-based adventures like trekking/hiking, cave exploration, etc.; and, water-based adventures like scuba diving, surfing and white water rafting. These eco-adventures are seen to generate income and sustain communities and businesses and at the same time showcase the country's natural resources. The DENR, however, needs to build its capacity because it lacks a solid foundation on ecotourism planning and management and is not grounded on ecotourism as a whole. Capacity building on ecotourism should likewise underscore the potential of the industry to highlight biodiversity conservation and sustainable use.

Another challenge to government is that posed by climate change and its potential impacts on ecotourism and biodiversity. Beaches are the country's main tourist attraction. Climate change could impact on the beach tourism industry through beach erosion, damage from sea surges and storms, increased sea levels, and decreased water supply. Climate change could also impact on biodiversity itself through coral bleaching and changes in migratory patterns, among others (DENR, undated).

1.5.2 Climate Change and Biodiversity

Climate change and biodiversity are interlinked. Climate change is a driver of biodiversity loss but proper management of biodiversity contributes to reduction of climate change impacts. Several direct impacts of climate change have been identified, among them: changes in the timing of biological events, changes in species distribution and behaviour in plants and animals, and increased frequency and intensity of pests and diseases. Potential impacts include increased vulnerability of species to extinction and potential losses of net productivity of ecosystems. Adopting biodiversity-based mitigation and adaptation strategies can reduce the impact of climate change (CBD Manual). Villarin et al (2008) advocate for an integrated mitigation-adaptation framework that will ensure effectiveness of solutions in dealing with climate change.

Alcala (2008) suggests several courses of action, among them: a proactive information, education and communication campaign and change in human behaviour, particularly change in energy consumption patterns. A shift from use of fossil fuels to wind, sun, water and tide can reduce production of carbon dioxide and other greenhouse gases. Biodiversity-related activities, such as reforestation using indigenous species and coral reef protection, can help sequester carbon dioxide already in the atmosphere, prevent flooding and drought, and contribute to the resiliency and ability of ecosystems to provide goods and services.

A review of the country's natural resource policies in response to climate change by Lasco et al (2008) observed that policy makers do not yet see climate change adaptation as a high priority

issue in the context of national development plans. In the same review they noted that policies, programs and actions on natural and agricultural resources management are barely designed to address impacts of climate change and that while focused on a specific sector, may have positive or negative impacts on other sectors. Moreover, current data and information on environmental degradation are yet to be systematically linked or attributed to climate change.

There are many ongoing efforts in the country to address climate change and a number of milestones have been achieved. Among these is the Philippines ratification of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and its Kyoto Protocol in 2003. Institutional mechanisms are also in place with the creation of the Inter-agency Committee on Climate Change in 1991, the Presidential Task Force on Climate Change (PTFCC) in 2007, and the designation of the DENR as the national authority on Clean Development Mechanism (CDM) of the Kyoto Protocol. The PTFCC was reorganized in December 2008 by Executive Order 774 designating President Arroyo as Chair of the Task Force. In January 2008, Senate Bill 1890 or the Philippine Climate Change Act was filed establishing the framework program for climate change, creating the Climate Change Commission, and appropriating funds for implementation. A similar bill has been filed in the Lower House. If enacted, this will facilitate mainstreaming of climate change mitigation and adaptation into policies, programs and activities at the national and local levels.

Under the CDM of the Kyoto Protocol, polluters can compensate for over-pollution by acquiring carbon credits generated by projects that sequester carbon. One carbon credit is equivalent to 1 ton of carbon offset. As of 2007, 35 CDM projects were reviewed and processed, with 8 projects registered with the CDM Executive Board bringing to a total 16 project activities already registered. These projects comprise of renewable energy (wind, geothermal and mini hydropower), methane recovery and electricity generation from hog farms, landfill wastes to power generation, heat recovery from sinter, and water treatment using cogeneration. These 16 registered project activities are expected to generate an estimated of 481,863 Carbon Emission Reductions (CERs)/year (in tons of carbon dioxide equivalent) (DENR-EMB, 2007).

The REDD (Reducing Emissions from Deforestation and Forest Degradation) is another mechanism to address climate change issues. It evolved as a response to a decision of the 13th Conference of Parties to the UNFCCC (CoP13) in Bali in December 2007. Its goal is to assess whether carefully structured payment structures and capacity support can create the incentives to ensure actual, lasting, achievable, reliable and measurable emission reductions while maintaining and improving the other ecosystem services forests provide. Areas of potential support include the following: scoping and alliance building, monitoring and assessment, dialogues, national REDD strategy, support for implementing REDD measures, etc. The Philippines and its ASEAN member-countries, which cover about 16% of the world's total tropical forest, share a common position on REDD, e.g. on policy approaches, positive incentives for REDD, as well as capacity building and methodological issues. Indigenous communities in the Philippines have agreed to actively embark on influencing the REDD scheme, recognizing that the forestry sector (where most IPs live) accounts for 17% of global greenhouse gas emissions, deforestation being the main cause (UN-REDD, 2007).

In Kalahan, Nueva Vizcaya, the leaders of the Ikalahan indigenous peoples which organized the Kalahan Educational Foundation (KEF) in 1973, have documented carbon storage under a forest

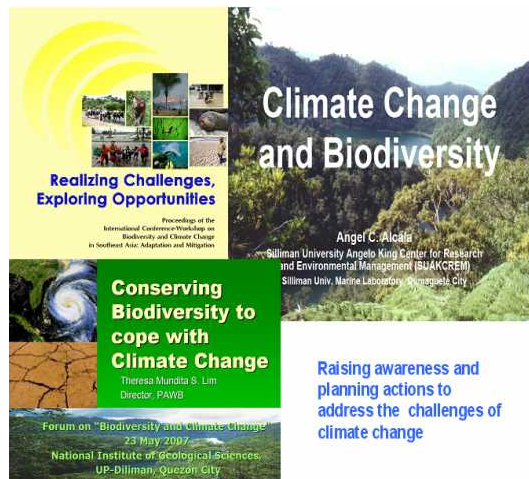
management system started in 1994. A 14-year record of tree growth for 10,000 hectares of production forest is available to justify payments for carbon sequestration. The Rewarding Upland Poor for Environmental Services (RUPES) Program, a program for developing mechanisms for rewarding the upland poor for environmental services they provide, is assisting KEF in estimating the amount of carbon involved and in looking for carbon buyers.

Other ongoing reforestation projects also contribute to the reduction of greenhouse gases in the atmosphere. For example, the advocacy of the Haribon Foundation for rainforestation of 1,000,000 hectares or about 1 billion native trees helps restore original rainforests and contribute to carbon sequestration and climate regulation. DENR's Green Philippines Highways Project launched in August 2006 involves planting more than 500,000 ornamental and forest trees and can help ameliorate microclimate and enhance resilience to climate risks. In July 2007, the "Trees for Life: 20 million Seedlings Project" was launched in coordination with the Green Army Network Foundation. This involves planting and nurturing of 20 million seedlings in protected areas and critical watersheds, mangrove and coastal areas, agroforestry areas, and urban parks, campuses, military camps, and subdivisions with the participation of NGOs, civic groups, national government agencies, indigenous people, students, youth organizations and groups aligned with the Green Army Foundation. The Trees for life is the reforestation component of the Green Philippines Environmental Plan of President Arroyo (DENR, 2007). The LLDA is also implementing a project on community carbon finance with the assistance of the Japan Trust Fund for Climate Change Initiatives. The project aims to reduce carbon emissions and finances small scale environmental projects, like tree farms. Carbon sequestered from these projects can be traded and bought by the World Bank through its Community Development Carbon Fund.

The UNDP-managed joint program on Strengthening the Philippines' Institutional Capacity to Adapt to Climate Change (2008-2010) aims to enhance national and local capacity to develop, manage and administer plans, program and projects addressing climate change risks, and mainstream climate risk reduction into key national and selected local development plans and processes.

Leading the initiatives on climate change mitigation and adaptation at the local government level is the Province of Albay which convened the 1st National Conference on Climate Change Adaptation in Legaspi City in October 2007. The conference was held in collaboration with Albay LGUs, DENR-EMB, the Advisory Council on Climate Change Mitigation, Adaptation and Communication, and the World Agroforestry Centre. As an offshoot of the conference, the Albay Declaration on Climate Change Adaptation was adopted to prioritize climate change adaptation in local and national policies, to advocate for "climate-proofing" development, and to mainstream adaptation through local and regional partnerships. The Albay Declaration was signed by the DA, DENR-EMB, DOST, National Economic Development Authority (NEDA), Department of Energy (DOE), and the Advisory Council on Climate Change Adaptation, and supported by donor institutions such as the World Bank, UNDP, and Asian Development Bank (ADB). It currently serves as a model framework to mainstream climate change concerns into national and local planning, accounting and budgeting systems, and support initiatives by LGUs, civil society and private sector groups.

The Albay in Action on Climate Change (A2C2) of the Province of Albay is a pioneering local initiative on local climate change mitigation and adaptation. One of the component programs of this initiative includes a 90-hectare mangrove plantation project in Manito, Albay and other land use, land use change and forestry (LULUCF) activities. The Sangguniang Panlalawigan (SP) has also passed SP Ordinance 2007-51 mandating the integration of disaster risk reduction and climate change adaptation in the review and update of its CLUP. The Albay initiative is being replicated by other LGUs throughout the country. It is also living proof that while climate change is a global issue, local action contributes to both local and global solution.



Several fora have been conducted to raise awareness on the issue of climate change and biodiversity. While many potential impacts of climate change have been reported, no study has yet been done in the country to actually measure climate change impacts on biodiversity.

Just recently, the DOST- Philippine Council for Aquatic and Marine Research and Development (PCAMRD) funded the Integrated Coastal Enhancement: Coastal Research, Evaluation and Adaptive Management (ICE CREAM) for Climate Change. Under this project, the World Wildlife Fund-Philippines is monitoring climate change impacts on

coral reefs in protected areas such as Apo Reef.

Another recent effort is the Philippine Imperative which is an initiative of Philippine business and industry to respond to global warming. The Philippine Imperative identified crucial areas where private sector support is needed: a) crop insurance for rice farmers who are affected by drought or rain floods; b) advocacy, communications and social mobilization; c) creation of strategies that are responsive to possible massive population migrations, and food and water shortages; and, d) creation of investment incentives for new business opportunities that promote green technologies and cut carbon emissions.

While there are many ongoing initiatives, there is also a general lack of synergy and complementation in terms of building capacities, developing tools and systems, and managing information in national agencies, local authorities and vulnerable communities to respond adequately to climate change issues. Government and other stakeholders need to address this issue in order to avoid overlaps and duplication, and share and/or maximize use of available resources.

1.5.2 Other cross-cutting issues

■ Invasive alien species (IAS)

Invasive alien species are a threat to various ecosystems and directly impacts on biodiversity, biological productivity, habitat structure and fisheries. The threat posed by IAS has been mentioned and discussed in the thematic areas in Chapter 1. Recent developments to address IAS

in the country include the conduct in 2006 of a multi-stakeholder conference/workshop on IAS and their impacts on biodiversity initiated by the DENR-PAWB and WorldFish Center in collaboration with partners from various stakeholder groups. As a result, the Marikina Resolution to develop and strengthen partnerships for the management of IAS was adopted. The same Resolution identified action in 4 major areas, namely: a) research on IAS and government support for such research; b) information and education to build public awareness; 3) networking for information sharing and capacity building; and, 4) a national national policy and management strategy for IAS. The Philippines is drafting the IAS national framework that will give impetus to increased collaborative efforts involving the government, private industry, academe, LGUs, local communities and interested stakeholders.

The issue of IAS in ballast waters of cargo ships is also a growing concern as this has been identified as an important pathway for IAS to invade other habitats. A proposed roadmap and action plan to address ballast water issues, including IAS in ballast waters, has also been recently discussed in a National Consultation Meeting and Seminar on Ratification and Implementation of Ballast Water Management Convention. Among the actions proposed are a status review and a national level risk assessment that will support the development of a national policy, a ballast water management strategy, and a National Action Plan, including possible ratification of the IMO Ballast Water Management Convention.

- *Access to genetic resources and benefit sharing*

In January 2005, a Joint DENR-DA-PCSD-NCIP Administrative Order No. 01 entitled Guidelines for Bioprospecting Activity in the Philippines was approved providing separate regulations for access to biological and genetic resources for purposes of scientific research and commercial research (bioprospecting). To date, reports from DENR-PAWB and DA-BFAR show that no applications and approvals have been processed due largely to the perception that the regulation is restricting research and that the royalty provisions, in particular, provide a disincentive to research. There is an urgent need to review provisions in the regulation in order to address the concerns of both researchers and regulators.

Complementing this regulation is the issuance in 2006 of NCIP Administrative Order No. 01 entitled Free and Prior Informed Consent (FPIC) Guidelines of 2006 which updated the FPIC Guidelines of 2002 and set the FPIC process to be followed depending on the nature and extent of the proposed plan, project, program or activity to be introduced into any ancestral domain area. Any person or entity needs to obtain the FPIC of the community according to customary laws before conducting any activity within the ancestral domain to ensure that these are consistent with traditional practices and to ensure fair and equitable sharing of benefits with the concerned community. As of 2007, NCIP records show that indigenous peoples communities have benefited in terms of royalties, infrastructure, and social programs from 199 projects classified as: mining (70), mini-hydro/ dam (8), forestry (2), small scale sand and gravel (5), biodiversity research (3), and others (31) (NCIP, 2007).

At the global level, an international regime on access to genetic resources and benefit sharing is currently being discussed. In line with this, the Philippines has started an initiative that looks into

policy coherence between and among biodiversity, indigenous peoples' rights and intellectual property rights issues.

▪ *Traditional Knowledge, Innovations and Practices*

From 2005 to 2008, NCIP has documented the indigenous knowledge systems and practices (IKSP) of 16 tribes nationwide (Table 15). The documentation aims to better understand the norms of conduct, customs and traditions, belief systems and institutions of indigenous people. This information can help facilitate preparation of management plans and support policy formulation and legislation.

Other organizations have also contributed to documenting IKSPs. For example, various projects have been undertaken by organizations such as the Environmental Legal Assistance Center and the WorldFish Center that involved documenting specific aspects of the Calamian Tagbanwa tribe of Coron Island.

Table 15 . List of documented IKSPs of tribes (NCIP, 2008)

Year	Region	Location	Tribe
2005	CAR	Ifugao Province	Tuwali Communities of Banaue, Hingyon, Kiangnan, Lagawe
		Tinglayan, Kalinga	Kalinga
	Region VI	Libacao, Aklan	Bukidnon of Alfonso XII, Rosal Oyang & Dalagsaan
	Region X	Real, Bukidnon	Bukidnon of Bae Inatlawan, Adelina Tarino, Sitio Inhandig, Dalwangan
2006	CAR	Happy Hallow, Baguio City	Ibaloi and Kankanaey
	Region I	Banayoyo, Ilocos Sur	Bago
	Region IV	Iraan, Aborlan, Palawan	Tagbanua
	Region V	Iriga City, Camarines Sur	Kabihug
	Region XII	Lake Sebu, South Cotabato	T'boli
	Region XIII	Gigaquit, Surigao del Norte	Mamanwa
2007	Region II	Sta. Margarita, Baggao, Cagayan	Ibanag
		Kayapa, Proper West, Kayapa, Nueva Vizcaya	Kalanguya
	Region III	Abucay, Bataan	Aeta
	Region IX	Limpapa, Zamboanga City	Subanon
	Region XI	Sibulan, Davao del Sur	Bagobo
2008	Region II	Dupax Norte, Nueva Vizcaya	Bugkalot

▪ *Global Strategy for Plant Conservation and Global Taxonomic Initiative*

The Global Strategy for Plant Conservation (GSPC) was adopted in 2002 by Decision VI/9 with the long-term objective of halting the current and continuing loss of plant diversity. Related to

this, the CoP created the Global Taxonomic Initiative (GTI) to address the lack of taxonomic information and expertise and improve decision-making in plant conservation.

In the Third National Report, the Philippines reported that GSPC and GTI-related concerns are largely being addressed by the Philippine Plant Conservation Committee (PPCC) created under DENR Special Order No. 2003-32 and the GTI National Focal Points on forest trees, insects and plants. To date, a Philippine Plant Conservation Strategy and Action Plan has been prepared and as an offshoot, a National List of Threatened Philippine Plants or plant species that need priority attention for protection and conservation has been issued under DENR Administrative Order No. 2007-01. The list also includes species or subspecies which are protected under the international convention/agreements such as the CITES to which the Philippines is a signatory. The present list is an output of several assessments and meetings of the PPCC from 2004-2008 whose mandate includes assessing the conservation status of all known plant species at national level.

A similar national list of economically important plant species (those that have actual or potential value in trade or commercial use), including schedule, volume of allowable harvest, regional geographical distribution and areas of collection, is currently being drafted.

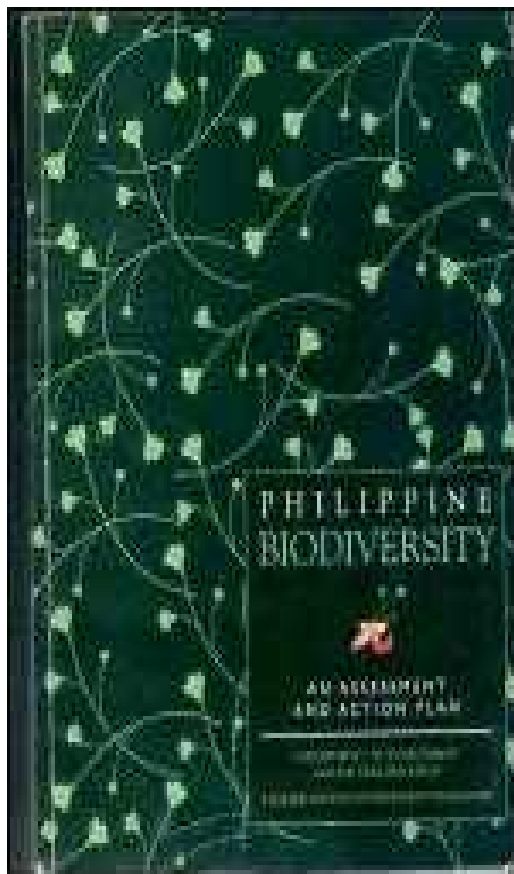
Chapter 2.0 Status of the National Biodiversity Strategy and Action Plan (NBSAP)

Article 6 of the Convention states that Parties are to develop national strategies, plans or programs for the conservation and sustainable use of biological diversity or adapt existing strategies, plans or program that indicate measures to implement the Convention, including integrating them into relevant sectoral or cross-sectoral plans, programs and policies.

In compliance to and consistent with this provision, the Philippines started formulating its biodiversity strategy and action plan in 1994 with the formulation of the Philippine Strategy for the Conservation of Biological Diversity (PSCBD). In 1995, the Philippines undertook an assessment of the country's biodiversity through the UNEP-assisted Philippine Biodiversity Country Study. As a result, the National Biodiversity Strategy and Action Plan (NBSAP) was developed and published in 1997.

The NBSAP identified 6 strategies and 17 major thrusts anchored on the framework of resources, humans, the interaction between the two, and the need to balance utilization and conservation (Table 16). Then President Fidel Ramos directed the integration of these strategies into the sectoral plans and programs of various government agencies.

From its publication and implementation in 1997, significant progress has been made to meet the goals of the strategies through several programs/plans/activities that were implemented. However, the lack of targets and indicators, including lack of monitoring has made it difficult to quantitatively assess progress in implementation.



A review of the NBSAP identified constraints and limitations in implementation, among them: (1) lack of a clear cut mechanism that defines tasks, sources of funds, institutional arrangements, indicators for monitoring, and monitoring schemes; (2) inadequate capacity to implement biodiversity conservation initiatives (i.e., funding, overlapping jurisdictions, conflicting policies, lack of implementation support from other sectors); (3) lack of database development and information sharing; and, (4) lack of specific geographical priorities (PAWB, undated).

Table 16. National biodiversity strategies and major thrusts (NBSAP 1997)

Strategies		Major thrusts
1	Expanding and improving knowledge on the characteristics, uses, and values of biological diversity	▪ Augmenting knowledge of species and ecosystem diversity ▪ Estimating current uses and values of biological diversity ▪ Underscoring the need to hedge for the future.
2	Enhancing and integrating existing and planned biodiversity conservation efforts with emphasis on in-situ activities	▪ Evaluating on-going and identifying in-situ and ex-situ biodiversity conservation and management approaches ▪ Consolidating research and development programs for ex-situ and in-situ conservation of biodiversity ▪ Institutionalizing a nationwide network of conservation centers
3	Formulating an integrated policy and legislative framework for the conservation, sustainable use and equitable sharing of the benefits of biological diversity	▪ Aligning policies governing the utilization of biological diversity by pursuing a systematic policy evaluation ▪ Devising policies that promote proper, sustainable and equitable utilization of biological diversity
4	Strengthening capacities for integrating and institutionalizing biodiversity conservation and management	▪ Integrating the planning, implementation, evaluation and monitoring of biodiversity conservation and management in government and non-governmental sectors ▪ Strengthening human resource capability in biodiversity conservation and management
5	Mobilizing an integrated information, education and communication (IEC) system for biodiversity conservation	▪ Increasing access to updated biodiversity information and database systems ▪ Institutionalizing community-based biodiversity conservation education and research ▪ Harnessing traditional and alternative media to increase public awareness and support for biodiversity conservation ▪ Encouraging and sustaining advocacy for biodiversity conservation
6	Advocating stronger international cooperation on biodiversity conservation and management	▪ Operationalizing specific country commitments made under the CBD and other similar agreements, ▪ Creating institutions to oversee the international coordinated implementation of the CBD, and ▪ Strengthening linkages of local non-government organizations with international counterparts for biodiversity conservation

New information, approaches and analyses from several conservation initiatives saw the need to revisit the NBSAP. Five years later in 2002, the NBSAP was subjected to extensive review by multi-stakeholder groups including natural and social scientists from government, research and academic institutions, civil society organizations, donor communities and the private sector. This resulted to a broad-based consensus on 206 conservation priority areas and species conservation priorities collectively known as the Philippine Biodiversity Conservation Priorities (PBCP). The PBCP is considered as the second iteration of the NBSAP. Six major strategies were identified and immediate actions recommended, with the NBSAP providing as a firm foundation from which priorities were based (Table 17). The PBCP was also meant to further refine related strategies identified in the NBSAP.

Table 17. *Philippine Biodiversity Conservation Priorities (PBCP) strategies and immediate actions (PBCP, 2002).*

Strategies		Immediate Actions
1	Harmonize research with conservation needs	▪ Create a multi-sectoral, multi-institutional mechanism called “Network for Nature” (N4N) which will proactively disseminate, monitor and coordinate the implementation of the PBCP ▪ Implement a “road show” that promotes the PBCP and helps ensure that these results are included in the decision-making process of critical stakeholders ▪ Adopt the PBCP as a framework for the DENR’s conservation program ▪ Issue an Executive Order instructing government agencies to incorporate the PBCP into work plans and projects that are being planned in or near identified priority areas ▪ Adopt the PBCP as a conservation agenda and basis for securing donor commitments and investments ▪ Integrate PBCP into the Comprehensive Land Use Plans (CLUPs) and Development Plans (CDPs) of LGUs ▪ Promote the PBCP to the legislative and judicial branches of government ▪ Adopt the PBCP as a basis for conservation work of NGOs ▪ Use the PBCP results as teaching and extension materials and in developing conservation-based research by the academic and scientific community ▪ Adopt the PBCP as guide to the private sector on corporate social responsibility ▪ Use the PPCP as springboard to develop a national and international constituency for biodiversity conservation
2	Enhancing and strengthen the protected areas system	
3	Institutionalize innovative but appropriate biodiversity conservation approaches: the biodiversity corridors	
4	Institutionalize monitoring and evaluation systems of projects and of biodiversity	
5	Develop a national constituency for biodiversity conservation in the Philippines	
6	Advocate stronger international cooperation on biodiversity conservation and management	

Like the NBSAP of 1997, the PBCP identified broad strategies to serve as a framework for the country’s biodiversity programs, plans and activities, without identifying time-bound objectives, specific targets and indicators. A cursory examination of the strategies and recommended immediate actions shows that except for some tasks that require national government intervention such as the formal adoption of the PBCP through executive issuance, majority of these strategies and immediate actions have been implemented in varying degrees. However, the lack of a concrete monitoring and evaluation system as well as targets and indicators has made difficult quantitative assessment of progress in implementation, except in areas where data are available.

In both initiatives, agricultural biodiversity failed to figure as prominently as forest, inland waters and marine and coastal biodiversity. This may be due to the approach used in the formulation of the strategies and actions. For instance, in the 2002 priority-setting program, there was no working group devoted specifically to agricultural biodiversity. The lack of knowledge, understanding, and appreciation may have also contributed to the exclusion of this thematic area.

In 2006, the PBCP was reinforced with the identification of KBAs (sites or network of sites that are critical to the conservation of globally important biodiversity). All 128 sites are terrestrial KBAs. The marine KBAs are currently being discussed. Again, areas important for agricultural biodiversity were not addressed.

There are many ongoing conservation programs in KBAs that are within and outside protected areas and these contribute significantly to arresting biodiversity loss. However, the lack of monitoring mechanisms is a constraint in determining the outcomes of the activities, some of which have been mentioned in other chapters of this Report.

Some obstacles to implementation

As early as 1999, lessons and experiences from implementing the NBSAPs which were shared by countries in Southeast Asia, including the Philippines, showed the need to address the following areas; a) funding; b) integration with economics; c) consultative processes; d) priority setting; e) implementation mechanisms and structure; f) communication, information sharing and management; and, g) monitoring and assessment (IUCN, 1999). Most of these issues have been adequately addressed but some remain relevant to the Philippines until today - information sharing and management, monitoring and assessment, and funding. These are briefly discussed below.

Information sharing and management

There is no doubt that there is an immense wealth of information on biodiversity and biodiversity conservation efforts in the Philippines. However, the lack of a systematic reporting system and a database that can help manage information needed for decision making are severely lacking. From the preparation of the First, Second, Third and Fourth National Reports, the challenge has always been gathering updated information from data holders and this is made even more challenging given the archipelagic nature of the country.

Information on the various areas of biodiversity is lodged in several institutions and individuals, and accessing them can be a tedious and frustrating exercise. Several attempts have been made to facilitate delivery of reliable and updated data and enable the exchange of information among key stakeholders. A Biodiversity Information Sharing Network composed of about 20 institutions working on or involved in biodiversity-related issues was convened in 2002 to facilitate information exchange and provide data to the Philippines Clearing House Mechanism (CHM), a web-based information exchange mechanism. The CHM was created under Article 18, Section 3 of the Convention and sought to promote and facilitate scientific and technical cooperation between and among information systems and activities that are relevant to the Convention. The Network was short-lived but there current efforts to revive it and to explore ways on how to operationalize and sustain it so that delivery of and access to information via the Philippines CHM can be facilitated.

Other biodiversity information systems may also have to be integrated to or complement each other in order to enrich information needed for decision-making. For example, PhilBatis is a new project which will create a freshwater biodeiversity information system for the Philippines, funded by PCAMRD. The ASEAN Center for Biodiversity (ACB) and the WorldFish Center

have also proposed to have ACB as a Regional OBIS (Ocean Biogeographic Information System) node that will enable occurrence data sharing within the region.

Monitoring and evaluation mechanism

As previously mentioned, the continued lack of an effective and sustained monitoring and evaluation mechanism has made it difficult to assess outcomes and impacts of biodiversity conservation efforts in the country. It has also resulted to a lack of harmonization and convergence of policies, programs, projects and activities. In fact, quite a number of institutions have several or similar ongoing initiatives in the same geographic area, landscape or seascape, and in many instances these are not harmonized such that it is not possible to measure the overall impact of these initiatives. The need to establish a framework and guidelines for biodiversity monitoring and assessment cannot be over emphasized. It is equally important to clearly identify the structure and institutions that will take on the monitoring role and to define ways to sustain it.

Several biodiversity monitoring tools have been developed but sustaining the effort remains a challenge, especially after donor exit. In 1999, the Biodiversity Monitoring System (BMS) was introduced as a tool to collect data on priority species and resource use and to guide decision-making by the Protected Areas Management Board (PAMB). This was institutionalized through policy. For a time, the monitoring efforts yielded promising results and resulted to management interventions. In some protected areas, the BMS was sustained through local efforts but in general, monitoring ceased due to lack of funds. The same can be said of the Criteria and Indicators for Sustainable Forest Management which faced a similar fate after donor exit, coupled with the difficulty in implementation because it required multi-disciplinary teams. The BINU for Coastal and Marine Ecosystems remains to be implemented by other stakeholders although BFAR is slowly piloting it within its bureaucracy. Conservation International's framework for monitoring biodiversity conservation outcomes also showed promise but failed to fully take off due to lack of funds.

Coherence and convergence initiatives have also been introduced. Recently, a policy coherence initiative on biodiversity, genetic resources, traditional knowledge and folklore was raised as part of a discussion on access and benefit sharing. In the coastal and marine arena, a harmonization and convergence forum participated in by key players from government and other stakeholder groups have led to the development of a partnership framework.

There have been many attempts at monitoring and harmonization and it is imperative for key actors to put their acts together and maximize the limited human and financial resources that are available.

Financing the implementation of the NBSAP and the Convention

The NBSAP and its successor plan, the PBCP, are jointly or severally implemented by various stakeholders at the level of the national government through its several national agencies, the local government units, research and academic institutions, civil society organizations, and private sector groups. It is difficult to provide an overall estimate of financial resources poured into the implementation of these strategies and action plans. However, some estimates can be provided on particular programs, projects and activities, where data are available.

As early as 1999, the issue of funding NBSAPs has been identified as a major concern. Countries in the Southeast Asia region faced the reality that government funding for biodiversity conservation was diminishing and that innovative financing was necessary to push the conservation agenda. The private sector was seen to play a key role both in funding and as an actor in NBSAP planning and implementation. There was also recognition that biodiversity conservation may not always means more funds but behavioral change or reorientation of existing programs.

Implementing the provisions of the Convention has always remained a major challenge, especially in terms of financial resources. For example, public expenditure for the environment and natural resources (ENR) sector is low. Analysis done by the USAID-EcoGov2 Project noted the government's lack of priority for ENR programs, with a very limited budget appropriated for the DENR. In 2007 and 2008, the DENR budget was PhP 7.5 Billion (.67% of national budget) and PhP 8.3 Billion (.68% of national budget), respectively, with about 80% allocated for personnel costs and capital outlay, leaving only a small portion for programs. For 2009, DENR proposed a budget of PhP 12.4 Billion, 40.71% higher than the 2008 budget (Figure 24). The 2009 budget represents roughly 1% of the proposed total national budget of PhP 1.415 Trillion. Despite the seeming increase, public expenditure still remains low considering the expanding mandate brought about by the enactment of recent laws and executive issuances.

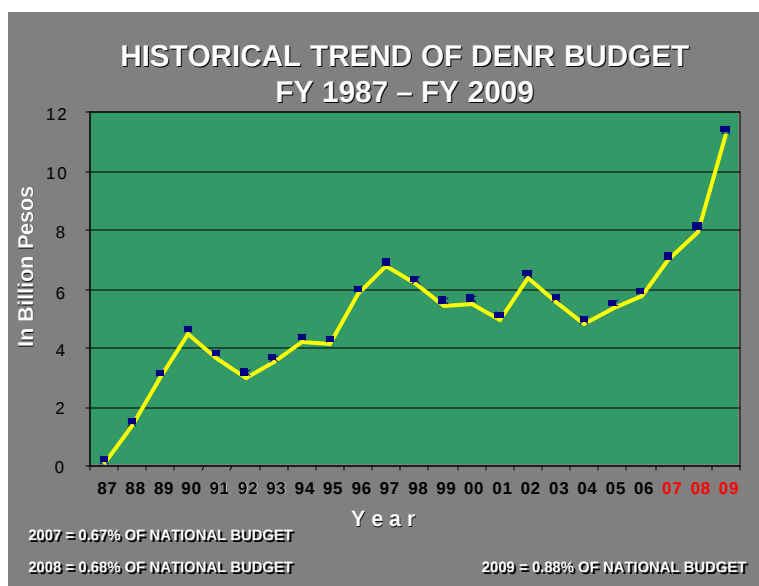
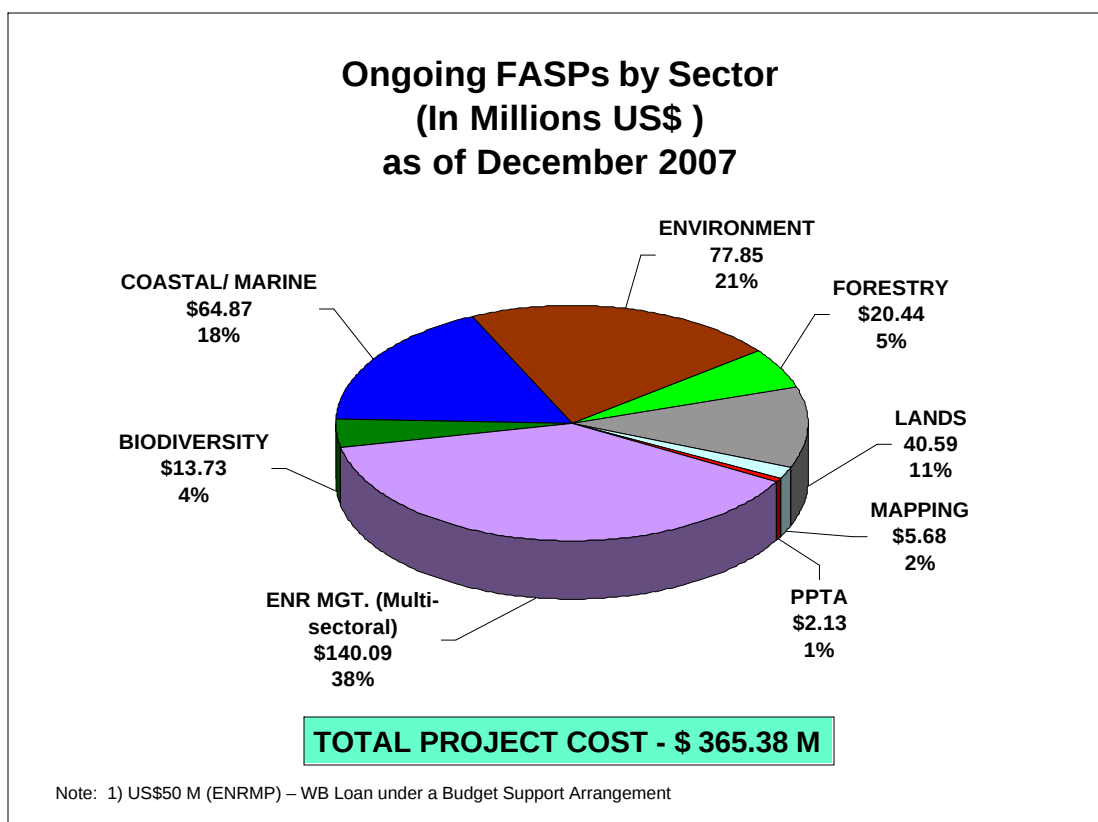


Figure 24. DENR Budget Allocation 1987 -1999 (DENR)

Other development assistance (ODA) in the form of loans, grants and technical assistance has helped DENR pursue its programs and projects, especially those that require capital investments. In 2007, sectoral distribution of the ODA was as follows: multi-sectoral or integrated ENR projects (US\$140 million or 38%); environment (US\$77.85 million or 21.3%); coastal and marine (US\$64.87 million or 17.7%); lands (US\$40.59 million or 11.1%); forestry (US\$ 20.44 million or 5.6%) and biodiversity/protected areas (US\$13.73 million or almost 4%) for two (2) projects (Figure 25).

Figure 2 5. On-going FASPs by Sector (DENR FAPs Annual Report CY 2007)



The level of ODA has been fluctuating from 2001-2007 reaching its lowest in 2004. DENR (2007) attributes this to several factors: a) the prevailing country assistance strategy and priorities of donors and financing institutions; b) the budget available to absorb new projects, and, c) the lengthy project preparation and approval process. In 2007, 33 development and technical assistance projects with an estimated total cost of USD365 million or roughly PhP18 billion was approved, representing an increase of 55% over the 2006 level of USD235 million. Loan projects account for 15% of annual increments in the DENR budget.

The main contributors for loans are World Bank (48.9%), Asian Development Bank or ADB (36.7%) and Japan Bank for International Cooperation or JBIC (15.3%). For grants, the largest contributors are the Global Environment Facility (GEF) administered by the UNDP, World Bank, and ADB (28%) and the Multilateral Fund of the Montreal Protocol, administered by the World Bank (21%). Other donors include the Australian Agency for International Development or AusAid (13%), United States Agency for International Development or USAID (13 %), Japan International Cooperation Agency or JICA (9%), German Technical Cooperation or GTZ (8%), the Netherlands Government (3%) and New Zealand Agency for International Development or NZAID (2%) (DENR, 2007).

USAID and EcoGov2 (2008) noted a decline in external funding for biodiversity conservation and forest rehabilitation and that there have been no big projects over the last 5 years except for the EU fund for Mt. Malindang Protected Area in Misamis Occidental, and the USAID- EcoGov

Project, Fisheries for Improved Sustainable Harvest (FISH), and Philippine Tropical Forest Conservation Foundation (PTFCF).

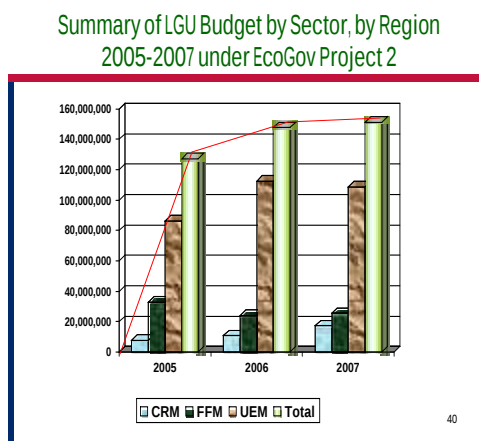


Figure 26. LGU Budget by Sector, by Region (USAID-EcoGov2)

LGUs have likewise poured their own resources into biodiversity conservation. The USAID-EcoGov2 Project reports an increasing number of LGUs allocating support for protected area management from their own Internal Revenue Allotment (IRA). Figure 26 shows a summary of some LGU budgets for coastal, forest and urban management from 2005 to 2007. LGUs have also shown capacity to support local activities such as MPAs and MPA networking and provide support to holders of CADTs and community-based forest management, especially those related to water, livelihood, and agroforestry systems. In 2007, part of the 20% of the LGU IRA of PhP 133 Billion has been allocated for environment and natural resources management.

In addition to the government's general annual appropriations and ODA, another source of fund for biodiversity-related concerns is the Integrated Protected Areas Fund (IPAF) created under the NIPAS Act. As of May 2008, the IPAF has generated about PhP 139.45 Million in revenues to sustain operations of protected areas (Table 18). Seventy-five percent of IPAF funds are used by protected areas that generate the fund while 25% goes to the central fund to finance other protected areas that do not generate income to support their activities.

Table 18. Summary of Integrated Protected Areas Fund from 1996 to 2008 (PAWB, 2008)

	PA Sub-Fund (75%)	PA Central Fund (25%)	Total (100%)
Deposited	104,434,302.34	34,870,167.80	139,453,127.22
Disbursed	98,694,178.48	595,350.00	99,289,528.48
Balance	7,136,760.93	34,274,817.80	41,411,578.74

Based on IPAF records managed by PAWB, 15 protected areas have generated an income of more than a million pesos as of December 2008 (Table 19). The Ninoy Aquino Park and Wildlife Center, Apo Island Protected Landscape and Seascape and Hinulugang Taktak top the list. The rest of the PAs generated less than a million pesos.

Table 19. List of protected areas and income generated as of December 2008 (PAWB, 2008)

Rank	Protected Area	Income Generated (PhP)
1	Ninoy Aquino Park and Wildlife Center	66,588,063.35
2	Apo Island Protected Landscape and Seascape	21,693,274.43
3	Hinulugang Taktak National Park	11,153,969.00
4	Apo Reef Marine Reserve	4,585,440.00
5	Manleluag Hot Spring National Park	3,964,077.67
6	Biak-Na-Bato National Park	3,707,805.00
7	Mt. Pulag National Park	3,223,389.84
8	Roosevelt National Park	2,110,793.43
9	St. Paul Subterranean River National Park	2,085,503.17
10	Mt Kitanglad Range Natural Park	1,740,131.50
11	Northern Sierra Madre Natural Park	1,563,219.50
12	Batanes Protected Landscape and Seascape	1,404,296.60
13	El Nido-Taytay Managed Resource Area	1,371,078.95
14	Bangan Hill NP	1,253,500.00
15	Bataan National Park	1,235,932.01

In summary, there is general lack of funds to support biodiversity conservation. However, various modes of environmental user fees are being explored to ensure sustainability.

Chapter 3.0 Sectoral and cross-sectoral integration and mainstreaming of biodiversity considerations

Since the formulation and implementation of the NBSAP in 1997, the PBCP in 2002 and the KBAs in 2006, a number of other frameworks, master and sector plans, policies, programs/projects/activities have been developed in support of biodiversity conservation and sustainable use. Executive directives have been issued to integrate the NBSAP and similar plans into the sectoral plans and programs of various government agencies and other stakeholder groups. In 1995, Presidential Memorandum Order No. 289 was issued directing the integration of the NBSAP. In 2006, Executive Order No. 578 was issued establishing the national policy on biodiversity and directing all concerned government agencies and offices and LGUs to integrate and mainstream the protection, conservation and sustainable use of biological diversity into their policies, rules and regulations, programs, projects and development planning process.

The previous Chapters already made mention of biodiversity-related initiatives by key stakeholders. This Chapter focuses on efforts at integrating biodiversity considerations into sectoral and cross-sectoral concerns, evident in the use of the ecosystems approach and in the partnerships and alliances forged between and among national government, civil society organizations, private sector and communities.

3.1 Ecosystems approach to environment and natural resources management

Under the framework of the CBD, the ecosystems approach is a strategy that integrates management of land, water and living resources in order to promote conservation, sustainable use and equitable sharing of benefits. Central to this approach are humans and their cultural diversity as integral components of the ecosystem.

Watersheds, river basins and coastal areas play important roles in the environment and in society. These ecosystems support a variety of vital social, economic and ecological functions. The forest ecosystem provides ecological services that benefit agriculture, industries, water and power needs. A watershed with adequate forest cover provides water that supports lowland agriculture, prevents soil erosion and siltation of coasts and water bodies, and sustains the supply of surface and groundwater for domestic use. Production forest areas for tree plantations and agroforestry activities also provide sources of jobs and revenues.

Inland, coastal and marine ecosystems likewise serve as a source of livelihood: fisheries, recreation and tourism, and many others. Yet, their productivity and capacity to support life systems are continuously being threatened by land- and water-based activities which cause soil erosion, siltation, and pollution. With a steadily growing population 88.5 million Filipinos (PSY 2008), the pressure on these resources will continue. There is a need to adopt an integrated and holistic approach to water, land and related resources in order to meet the social and economic demands of the population, and the sustainability of ecosystems.

Traditionally, sectoral approaches have been used to manage environment and natural resources. This has resulted to separate governance mechanisms for different resource uses, and conflicts in management. In the 1990s, the terms watershed approach, watershed and ecosystems approach,

bay region planning, and integrated coastal zone management (ICZM) approach to development and management emerged defining planning units and addressing issues that cut across ecosystems. Recent terminologies and catchy phrases have also been introduced such as “ridge to reef” or “peak to coast”. These approaches share similar principles and features and when examined closely, refer to the same concept of ecosystems management which today is the dominant approach to environment and natural resources management.

3.1.1 Integrated watershed management

Several initiatives are ongoing in different parts of the country. Carood Watershed, admittedly the most barren of the watersheds in Bohol, employed this approach to reforest a bigger part of Carood. Carood Watershed spans portions of six municipalities in the eastern part of Bohol. Two main tributaries drain the watershed - Napo River in Alicia and Gabayan River in Candijay - which then discharge surface runoff through Carood/Matul-id River emptying into Cogtong Bay. Being the fifth largest watershed in Bohol, Carood provides water for several thousand households in the six municipalities for household needs, farms and livestock. Efforts of the provincial government of Carood earned this LGU- driven initiative the recognition as the 67th site of the International Model Forest Network (IMFN). The IMFN is a voluntary association of global partners working on sustainable landscapes and natural resources and awards model sites based on innovative approaches that combine the socio-cultural, economic and environmental needs of local communities.

As early as 1998, as part of the initial implementation of the CBFM program, the DENR established the Ubay-Mabini- Alicia (UMA) Watershed Sub-Project. The DENR contracted the Ubay Federated Tree Planters Association, Inc., Alicia Federated Tree Planters Association, Inc. and the Mabini Reforestation Association to undertake a comprehensive site development. Funded by a loan from the Overseas Economic Cooperation and later by the Japan Bank for International Cooperation, Carood's development plan includes reforestation, agro-forestry and bamboo plantation. Government leaders of the Carood towns and partner NGOs have also pooled their resources for the project. LGUs put in funding for the establishment of municipal nurseries to add to the seedling production of the provincial nurseries. As well, businesses threw in financial support for reforestation projects that are well-received by communities, for generating local employment.

In Samar Island, the Samar Island Biodiversity Project (SIBP) has managed to facilitate a participatory development of a 10-year general management plan cum manual for the Samar Island National Park (SINP), the largest protected area in the Visayas based on the principle of integrated watershed management. In preparing the management plan, Samar Island was divided into 8 major watersheds, with 8 individual watershed management plans developed and Watershed Management Councils created, including that of Olot Watershed, a model forest network site. The individual plans were consolidated into a general management plan approved by the 301-member SINP PAMB and endorsed to the DENR Secretary for approval. The SINP management plan will be presented to the Regional Development Council and further integrated into the various local planning processes of the province, city/municipality.

In a related development, the SIBP is also piloting biodiversity modules in the school curricula of selected elementary and high schools in Samar Province in collaboration with the Department

of Education through a MOA signed in 2005. Several workshops and writeshops have been conducted to complete the modules for elementary and high school. Trainings for about 18 elementary and 25 high schools teachers in model schools (1 each for elementary and high school) per province have been conducted. This initiative has the potential to be upscaled and replicated in other schools and LGUs throughout the country.

3.1.2 Integrated coastal management (ICM)

Executive Order No. 533 issued in 2006 mandated the adoption of ICM and related approaches, such as CRM or CZM, as the national strategy for the sustainable development of the country's coastal and marine environment and resources. The goal is to achieve food security, sustainable livelihood, poverty alleviation, vulnerability reduction and ecological integrity. In implementing EO 533, interrelationships between governance and sustainable development aspects, and the participation of stakeholders in achieving the goal cannot be overemphasized. ICM is being implemented in many coastal and marine areas, addressing the interlinkages among associated watersheds, estuaries and wetlands, and coastal seas, by all relevant national and local agencies, civil society, and the private sectors.

In a recent review by DENR of programs and projects that respond to the governance and sustainable development components of EO 533, it appears that a significant number and amount of resources have been poured into ICM. There are, however, major challenges to its implementation, among them: (a) disparity in the capacity among government agencies and coastal municipalities; (b) lack of national training program in support of local coastal governance; and, (c) lack of sustainability after donor exit. Moreover, there are a number of models and approaches in use for coastal management, and there is no standard by which to measure ICM coverage (Ross, 2008).

Manila de Bay

A major accomplishment for the Manila Bay Environmental Management Project (MBEMP) is the adoption of the Operational Plan of the Manila Bay Coastal Strategy (OPMBCS) in 2006. The Plan covers the entire Manila Bay Region, consisting of the National Capital Region (NCR), four (4) coastal provinces (Bataan, Bulacan, Cavite and Pampanga) and four (4) non-coastal provinces in the watershed areas (Laguna, Nueva Ecija, Rizal and Tarlac). Using the ecosystems approach to management, the challenges of water pollution, overexploitation of resources and degradation of habitats and historical, cultural, religious, archeological and unique sites are being addressed. Partnerships and governance issues are recognized in light of multiple-use conflicts and environmental interactions within the Bay, its associated watersheds and resources.



In support of the OPMBCS and EO 533, the Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) has provided assistance in capacity building through various training and special skills programs, including on integrated information management, coastal use zoning, environmental risk assessment, resource valuation, and integrated environmental monitoring. It also supported the State of Coasts reporting system for ICM sites and the actual implementation of the Manila Bay Coastal Strategy, particularly in strengthening institutional arrangements, ICM replication, and implementing other key objectives and actions programs in the OPMBCS such as pollution reduction and waste management; habitat restoration, resource conservation and protected area management; food security and livelihood management; and in integrating river basin and coastal area management. A recent victory for Manila Bay is the unanimous decision of the Supreme Court in January 2009 which directed the DENR to fully implement the OPMBCS for the rehabilitation, restoration and conservation of Manila Bay at the earliest possible time. It also directed other agencies of government to implement their mandates as regards the clean-up of Manila Bay.

Bataan ICM

The Province of Bataan is in the forefront of ICM implementation in the Philippines and its ICM is a model of best practice that combines fish sanctuaries, marine reserves, mangrove nurseries, law enforcement, and coastal use zoning. The Bataan ICM has been established and institutionalized in 2005 through the creation of a Project Management Office within its Provincial Planning and Development Office. It is operationalized and financed through a co-sharing scheme between and among the LGUs and their partners from the civil society, private sector and local stakeholders. The Bataan Coastal Strategy formulated in 2002 has been updated and adopted in 2006 as the Bataan Sustainable Development Strategy. Bataan is also a pilot site for the coastal use zoning scheme for Manila Bay. Its Coastal Land- and Sea-use Zoning Plan (CLSUZP) was approved by the Provincial Board in 2006 and has since become a model for other LGUs.

3.1.3 Marine Protected Areas

MPAs in the Philippines serve as an important strategy for ICM and have been used extensively in addressing habitat degradation and decline in fish stocks. They are legally established through Republic Act 7586 or the NIPAS Act or through Republic Act 8550 (Fisheries Code) via local ordinance.

Arceo et al (2008) reports that there is an estimated 1,169 existing and 164 proposed MPAs as of 2007 compared to 439 existing and 139 proposed a decade ago. This translates to more than 100% of 1997 estimates (Table 20). Majority of these MPAs are under the category of reserves, sanctuaries or parks (RSP). There is also a significant increase in size with about 48% within the range of 11 to 100 hectares.

Table 20. Summary of the MPAs - 1997, 2000 & 2007 (Reefs through Time 2008).

Political Regions	Indicative No. of Existing MPAs (Cheung 1995)	Indicative No. of MPAs (1997)*		Indicative No. of MPAs (2000)**		Indicative No. of MPAs (this review)	
		Existing	Proposed	Existing	Proposed	Existing	Proposed
I	3	6	4	7	0	20	0
II	4	4	0	8	0	11	4
III	2	6	9	10	1	22	3
IV	60	77	10	59	12	205	12
V	36	41	13	98	9	90	9
VI	3	18	11	28	12	48	10
VII	68	106	27	127	26	417	30
VIII	14	77	21	98	17	120	22
IX	7	23	15	40	14	56	19
X	4	16	6	20	5	46	10
XI	7	14	12	21	13	35	20
XII	1	3	5	7	8	15	14
CARAGA	38	44	3	36	3	66	3
NCR	0	2	0	2	0	2	0
ARMM	0	2	3	4	3	16	8
TOTAL	348	439	139	565	123	1169	164

In terms of biogeographic regions, the Visayas Sea region has the highest number. Central Visayas (composed of the Provinces of Cebu, Bohol, Oriental Negros and Siquijor) has the highest number, comprising about 24% of 439 MPAs recorded. Bohol has 180 MPAs, Cebu has 115, Oriental Negros has 40 and Siquijor has 11 (Keller et al, 2008). This is followed by the North Philippine Sea and the South China Sea regions. In general, there is an increase in the number of MPAs in all the biogeographic regions. Despite the number of MPAs, however, Alino et al (2000) noted that only about 10-15% are effectively managed. Recent reviews, however, indicate that management effectiveness has increased to around 20-30% based on the level of enforcement in these areas.

Despite the increasing number of MPAs, experts suggest that the more important point to consider is how much of the critical habitats of municipal waters is being conserved or managed by the LGUs. Most of the affected communities prefer to locate their MPAs in 2nd or 3rd best sites. Most locally managed MPAs reportedly have little or no value in terms of biodiversity and efforts should be strengthened to establish MPAs in areas of high biodiversity such as in biodiversity corridors. At present, networking of MPAs is being employed to hasten MPA protection and management, and to facilitate inter-LGU collaboration, alliances and partnerships. This approach is seen to provide ecological and social benefits, and leverage financing for management.

Examples of MPA Best Practices

In 2007, 3 MPAs received recognition for most outstanding good practice based on management effectiveness, bio-physical and ecological impacts and socio-economic benefits (PAMS, 2008). These include the following:

- Handumon/Libaong Marine Sanctuary, Jandayan Island, Jetafe, Bohol- This MPA was established in 1998 by Municipal Ordinance No. 4, managed by a PO called Kapunong sa Nagkahiusang Mananagatug Lumulupyo sa Handumon (KANAGMALUHAN). It was recognized for achieving sustainability (CCEF Rating Level 4) manifested through increased fish abundance and catch, increased tourism attraction from improved seahorse population, and improved livelihoods;
- Sagay Marine Reserve, Sagay City, Negros Occidental- This MPA was established as a fish sanctuary in 1983 by Municipal Ordinance No. 2, as a marine reserve in 1995 by Presidential Proclamation 592, and finally by Republic Act No. 9106 in 2002. It is a NIPAS site managed by a PAMB. It was recognized for achieving sustainability (CCEF Rating Level 4) manifested through ecological and economic benefits such as increased fish yields, return of investments, improved law enforcement, and improved livelihoods;
- Twin Rocks Marine Sanctuary, Brgy. San Teodoro, Mabini, Batangas- This MPA was established in 1991 by Municipal Ordinance No. 11, managed by the Municipal Government of Mabini. It was recognized for achieving sustainability (CCEF Rating Level 4) manifested through increased fish abundance and diversity, annual average collection of Php100,000 for dive fees from 2003-2007, and active participation of stakeholders.

These examples of best practices should serve as models for other LGUs and communities to emulate.

3.1.4 Integrated river basin and coastal area management

EO 510 issued in 2006 mandated the creation of the River Basin Control Office (RBCO) and the preparation of an Integrated River Basin Management and Development (IRMBD) Master Plan, the national blueprint for sustainable and ecosystems management and development of river basins. Under the IRBMD Master Plan, four principal frameworks and development strategies are used: integrated water resources management, integrated water management, wetland management, and flood mitigation. It is expected that with the creation of the RBCO and the adoption of the Master Plan, the river basin programs will be more integrated and well-coordinated, financing resources are maximized, and desired changes in the operational, institutional, social, economic, and environmental aspects of river basin development and management are achieved.

There are many ongoing efforts implementing the mandates under EO 510 but most of these efforts are fairly recent such that it is not possible to report outcomes as of this reporting period. Recent initiatives by the RBCO have led to the formulation of an integrated river basin action plan for Manila Bay-Pasig River- Laguna de Bay (see Figure 27, administrative map)

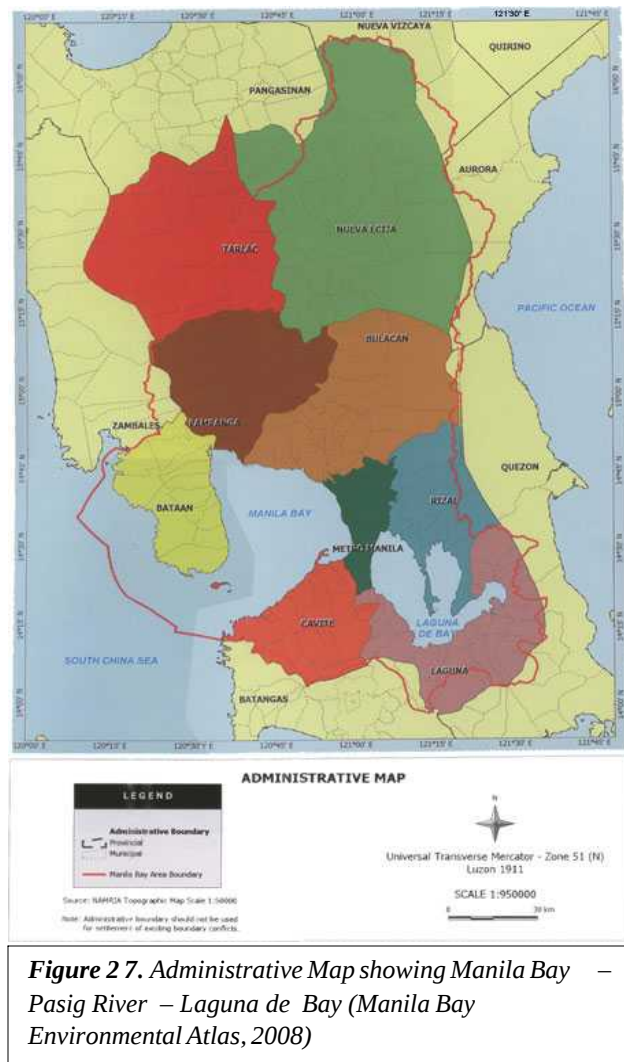
PEMSEA and MBEMP-Manila Bay Area Information Network (MBIN) (2007) has recognized the significance of the Manila Bay-Pasig River- Laguna de Bay watershed and its interconnectedness- politically, economically, ecologically and socially. These systems share the same challenges posed by population pressure, economic demands, industrialization and use of resources. Unfortunately, these systems also have separate administrative mechanisms, responsibilities and priorities and it will be quite a challenge to operationalize its integrated plan. At present, the Project Management Office of the MBEMP has been institutionalized as the Manila Bay Coordinating Office under the RBCO. The management of Manila Bay as a priority area for integrated river basin and coastal area management continues to be a challenge. The recent Supreme Court decision, however, has provided the impetus to meet this challenge.

There are currently other ongoing efforts principally focused on the preparation of master plans, action plans, and creation and administration of river basin management and coordinating offices. As of August 2008, the River Basin Master Plans of the Cagayan River and Cebu River are under preparation; the Integrated River Basin Action Plans of

Meycauayan-Obando-Marilao, Lake Lanao, Pasig-Laguna Lake-Manila Bay have been completed while that of Cagayan de Oro is under preparation. The creation of the River Basin Project Management Office of Agus, Agusan and Pampanga River Basins are ongoing while that of Manila Bay has been completed. The River Basin Integrated Information Management System (RBIIMS) has been developed and is currently being operationalized (DENR-RBCO, 2008).

The Pampanga River Basin Development Action Plan (2008-2010 and 2008-2014) has been completed and current focus is on the rehabilitation of the Meycauayan-Obando-Marilao river system and the Pampanga River Basin. Based on EMB monitoring data, the BOD level of the Meycauayan River has increased by 213% in 2005 compared to its level in 2003. There is currently no available data to indicate whether current efforts have contributed to any improvement in water quality.

In the Cagayan River Basin, the largest river basin in the country covering the provinces of Isabela, Cagayan, Nueva Vizcaya, Quirino and Mt. Province, EO 747 issued in 2008 has paved the way for the development of the Cagayan River Basin and Watershed Strategies Framework and creation of the Cagayan River Basin Project Management Office. The Cagayan River Master



Plan to guide rehabilitation and development in the North Luzon Growth Quadrangle super region is currently under preparation.

In Iloilo Province, watershed management has shifted from forest to river basin perspective. Like Samar Province, Iloilo Province was delineated into 20 medium-sized ridge-to-reef watersheds, with small watersheds clustered for ease of management. In particular, efforts have been made from the early 1990s up to the present to rehabilitate the Maasin Reserved Forest, a critical watershed that is the source of domestic water supply for Iloilo City and neighbouring towns. In the year 2000, a multi-sector group called Iloilo Watershed Management Council (IWMC) was created under Ordinance 2000-41 and tasked to be responsible for the Province's watershed including conservation, development, utilization, protection and socio-economic issues around the watershed. In 2007, with reports of increased water demand, decreased water supply, and other challenges in the watershed such as poor biodiversity, mono-cropping in large areas (bamboo, mahogany, gmelina), accelerated spread of invasive species, and drying of river beds in summer and drought seasons, the protection of the watershed took a wider perspective (Salas, 2008). Maasin watershed is the headwater of two major rivers - the Tigum and Aganan (one of 20 priority river basins)- passing Iloilo City to Guimaras Strait and Visayas Sea. Upon delineation, the Tigum-Aganan River Basin covered 8 municipalities and 1 city. Institutional arrangements between and among the IWMC, the Tigum-Aganan Watershed Management Board, the DENR, the PAMB and other stakeholders are being threshed out.

3.1.5 Biodiversity conservation corridors

In 2004, CI, DENR-PAWB and Haribon initiated a process of identifying conservation targets in the Philippines. At the site level, 128 KBAs were identified while at the landscape level, 19 terrestrial and 9 marine biodiversity conservation corridors were identified. The corridor approach focuses on linking major sites across wide geographic areas in order to sustain large-scale biological processes and ensure the maintenance of a high level of biodiversity in areas of intact forest habitats and marine transition zones.

CI and the Critical Ecosystem Partnership Fund (CEPF) are working in 3 terrestrial biodiversity corridors, namely: Sierra Madre, Palawan and Eastern Mindanao (see Box 2 for initiatives on the Eastern Mindanao Corridor). The aim of these corridors is to maximize biological survival by contributing efforts to an integrated landscape-scale program of conservation where transboundary or regional cooperation will be more effective than a local approach.

Both CI and CEPF have also embarked on a project to monitor biodiversity conservation outcomes in these corridors using as indicators such as change in fragmentation and change in habitat extent within KBAs. By analyzing fine-resolution, low-cost satellite data to track changes over time in habitat cover, changes in natural forest cover for the period 1990 to 2000 were mapped. Findings indicated that while the proportion of habitat cover within KBAs in Eastern Mindanao was lowest, the rate of decline was similar in all corridors. The rate of deforestation for AZE sites (sites where species are in imminent danger of disappearing) in Palawan and Sierra Madre corridors were higher. In terms of change in fragmentation, findings indicated that edge fragmentation increased in Eastern Mindanao and Sierra Madre and decreased in Palawan despite a slight decline in habitat cover. The changes in fragmentation in these corridors are

considered small since the natural habitats are in one large patch (CI and CEPF Brochure, undated).

Box 2. Eastern Mindanao Biodiversity Corridor (EMBC) Conservation Framework (*PEFI, CEPF, CI and DENR, 2008*).

The EMBC is composed of 9 core KBAs and the mosaic of landscapes amid them called “biodiversity corridors” which provide habitat and dispersal routes for wildlife, maintain ecological processes, and provide sources of livelihood to local residents. These KBAs cover about 909,191 hectares of wildlife habitats for 69 globally endangered species and provide ecological services to 4 cities, 88 municipalities and 8 provinces.

From 2002 to 2007, multi-stakeholder participatory workshops were convened to develop the EMBC Conservation Framework, a 10-year blueprint for biodiversity conservation and sustainable development within Eastern Mindanao. These stakeholders included representatives from government agencies, LGUs, academic institutions, and NGOs and led by a Strategic Planning and Policy Team (SPPT) chaired by the Regional DENR XI and CARAGA Offices.

The goal of the EMBC conservation framework is to minimize and mitigate impacts of human development to biodiversity. Nine major threats were identified, namely: 1) population growth; 2) poverty; 3) non-compliance by logging companies; 4) illegal logging and the lack of monitoring and law enforcement; 5) open pit and strip mining; 6) forest conversion; 7) land-use conversion and crop shifting; 8) wildlife hunting and collection for food and trade; and, 9) invasive species. The EMBC conservation framework also identified 8 major strategies and corresponding action plans for each of the 9 KBAs. The strategies are to: 1) create and expand the network of protected areas, 2) mainstream and institutionalize biodiversity conservation in local development plans and policies, 3) build stakeholder capacity for sustainable resource management, 4) establish corridor research database for planning, policy and decision-making, 5) address population, health, education, poverty and other people issues linked to biodiversity, 6) establish better information education and communication (IEC) system, 7) promote and develop sustainable livelihood, and 8) install adequate fund mechanisms to meet conservation goals. Institutional arrangements that include a Corridor Council, 2 KBA Councils (one each for Region XI and CARAGA) and a KBA Cluster that takes the lead in implementing KBA-specific conservation goals have been recommended.

The EMBC Conservation Framework is a first step towards a corridor-wide conservation and management of biodiversity within this corridor. Implementing the strategies and actions and sustaining them remains a current and future challenge.

The preparation of the EMBC Conservation Framework was generously supported by the Philippine Egale Foundation, Critical Ecosystems Partnership Fund (CEPF), Conservation International and DENR.

In Southern Cebu, the corridor approach is important in patching forest fragments to protect and sustain the Cebu black shama “siloy” whose habitats and populations are being jointly protected by concerned LGUs with the participation of other stakeholders. The protection of the “siloy” habitat translates to protection of other species. Parallel efforts like the annual “siloy” festivals are also held to instill pride, spread awareness and conservation ethic to others.

Under the Sulu-Sulawesi Conservation Project, conservation efforts are also ongoing in the marine biodiversity corridors of Cagayan Ridge, Balabac Strait, the Tri-National Sea Turtle, and the Verde Passage. The Verde Passage, situated between Batangas and the two Mindoro Provinces, is known as the center of the centers for marine shorefish diversity in the world, one of the country’s richest fishing grounds, and a top tourist destination. Executive Order 578 passed in 2006 mandated the creation of a multi-agency task force on Verde Island Passage and the formulation of an integrated management plan for the area. Efforts are ongoing to refine and implement a Verde Island Passage Framework Plan in collaboration with 21 municipalities, 3 provinces and other stakeholders. Other priority activities in this and other corridors are focused on establishing and managing a network of MPAs, strengthening law enforcement, information and awareness campaign, and building partnerships and alliances. Implementing a seascape strategy in these corridors can serve as a model for marine conservation in other areas (CI, undated).

The adoption of the corridor approach stimulates new levels of civil society participation to support government and corporate responses to conservation. The biodiversity corridor approach relies on strategic partnerships with key stakeholders to build a support framework and to coordinate activities in the field. The active involvement of local stakeholders and the development of their planning and implementation skills are essential to the sustainability of these corridors.

3.2 Building alliances and partnerships

Alliances and partnerships play a key role in meeting current and future environmental challenges. Many of these challenges cannot be addressed by a single agency and require the concerted efforts of multistakeholders from government, academic and research institutions, private sector and civil society organizations. This approach encourages trans-disciplinary collaboration, sharing of resources, skills and expertise, and learning exchanges. Fr. Peter Walpole, Executive Director of the Environmental Science for Social Change affirmed the upside of alliances and partnerships in dealing with environmental issues and concerns, especially as natural landscapes may straddle more than one local administrative unit. “Alliances strengthen the resource access rights and tenure.” Moreover, engaging communities would bridge the gap of commitment and concern when there are changes in (elected) leadership.

Several models of alliances and partnerships have been successful in meeting these challenges. Some partnerships have been formalized through Executive Orders (as in the case of the Bicol River Basin and the Watershed Management Councils in Lake Lanao and Bukidnon Watershed) or through a Memorandum of Agreement or Understanding (such as the case of the Kabunanan Watershed Multi-Sectoral Council). Under said Councils, multi-sectoral and multi-disciplinary task forces, committees, and technical working groups have been organized to address specific

policy decisions or implementation problems or issues, either at the local, provincial level or regional level, depending on the extent of coverage of the river basin and watershed.

In Manila Bay, the Manila Bay River Basin Coordinating Committee (Figure 28), reorganized in 2007, has aptly addressed the institutional linkages that need to be established for the Bay and its watersheds by including local governments in influence or upstream areas in the Committee. Innovative partnerships with other concerned stakeholders have been developed to address the complexity of issues affecting the Bay. Technical Working Groups, composed of representatives from concerned national government agencies, local government units, academic and scientific institutions, and civil society, and Site Coordinating Committees have also been created to coordinate and collaborate on specific issues. The Manila Bay institutional set-up can serve as a model structure for other river basins and associated coastal areas.

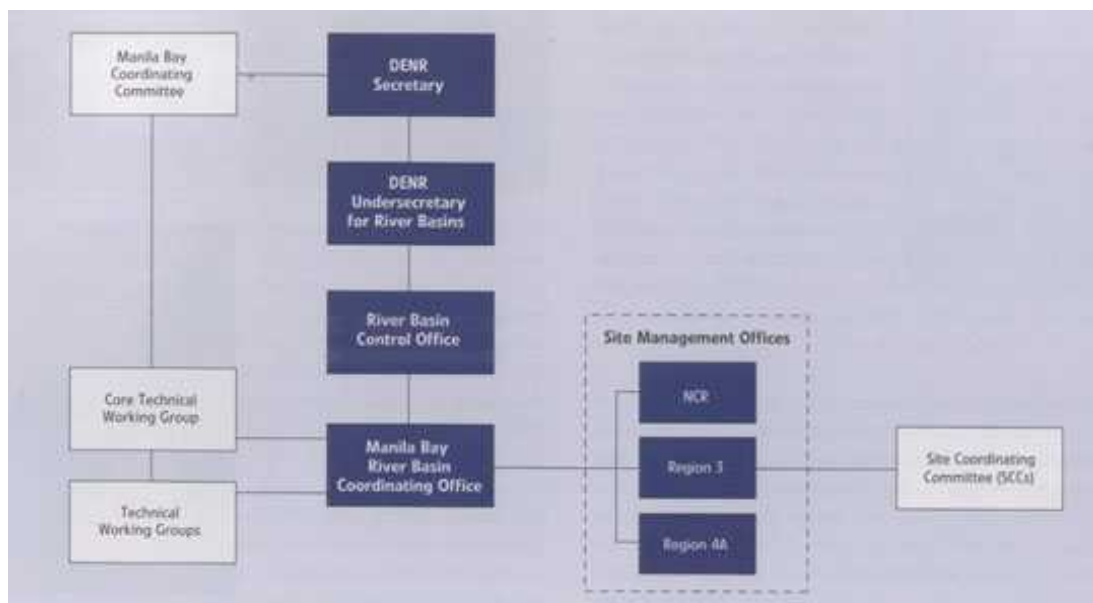
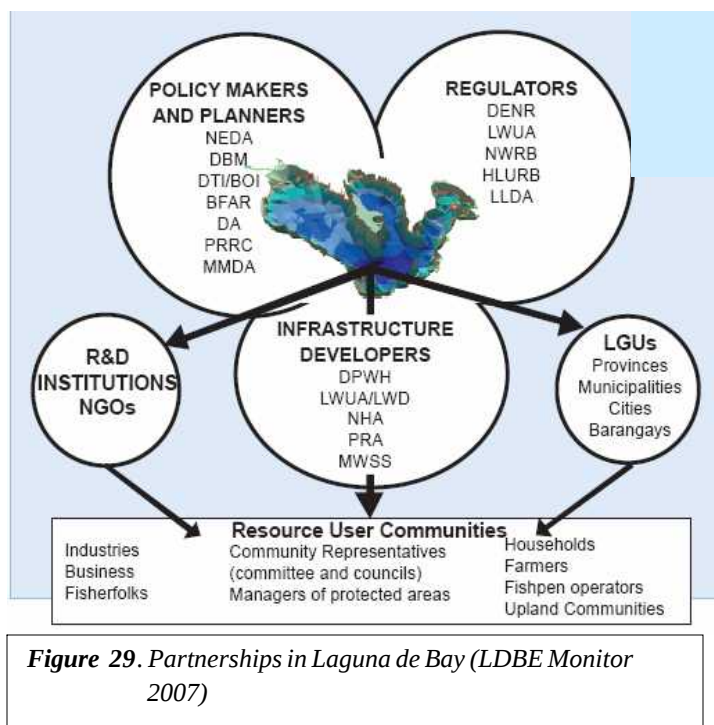


Figure 28. Manila Bay Institutional Set -up (Manila Bay Environmental Atlas, 2007)

In Laguna de Bay, integrated lake management is a shared responsibility that calls for committed and sustained partnerships with various stakeholder groups now called “partners”. The LLDA has engaged in partnerships for co-managing and co-facilitating the lake’s resources and development process. In particular, partnerships have been forged with fisherfolk organizations through the Fisheries and Aquatic Resources Management Councils (FARMCs) for the appropriate use of marine and coastal resources; with LGUs for the co-management of environmental projects; with youth organizations such as the Young Environmental Stewards for environmental advocacy; with industries and other business organizations for self-monitoring, compliance and voluntary self-regulation; with NGOs for communication and education. LLDA has also forged strategic international partnerships for knowledge exchange, capacity building, dialogue, strategic action, promotion of economic growth and collaboration in sustainable management and development (Figure 29) (LDBE Monitor 2007).



A strong ally in the governance of Laguna de Bay are 28 independent River Councils organized as early as 1997 in the 24 micro-watersheds of the Laguna de Bay region that have federated themselves into the Federation of River Basin Councils (FRBC). The FRBCs are representatives of civil society organizations and serve as coordination points between and among LLDA and its stakeholders. They are in charge of raising awareness, monitoring water quality, supporting restoration efforts within their communities, and are stewards of their rivers. Efforts are

currently ongoing to make them self-sustaining.

The outcome of these partnerships can be gauged from the improvement in water quality of the lake using indicators such as DO and BOD reported in Chapter 1 and the quality of life of the communities that rely on the lake's resources. LLDA recognizes that this may fall short of the ideal state but progress has been made in maintaining the water quality to Class C, good for fishery and industrial water supply (LDBE Monitor 2007).

In Bataan, there also exists a unique partnership between the local governments (Provincial and Municipal) - and the Bataan Coastal Care Foundation Inc. (a consortium of 19 major industries in Bataan) who serve as the private sector partner of the provincial government in implementing and co-financing the Bataan Integrated Coastal Management Program (BICMP). This partnership has catalyzed the development of the Bataan CLSUZP, an integral component of the BICMP which was approved in December 2006 by the Bataan Provincial Board through Sanggunian Panlalawigan 155 (Provincial Order 155). It has also enabled the BICMP to be a catalyst in rehabilitating Manila Bay, to increase awareness among stakeholders on the value and importance of coastal and marine resources and their roles in sustainable development, and in resolving multiple use conflicts within the coastal and marine areas in Bataan.

In Bohol Province, the Bohol Marine Triangle, including the islands of Pamilacan and Balicasag, is managed by the Panglao, Daus and Baclayon Management Council or PADAYON. This multistakeholder initiative began with the support of NGOs and local communities in the first 2 years and has grown henceforth with the support of the LGUs, using the "bibinka" approach-support from below and above. Support is also provided by research and academic institutions. PADAYON is co-chaired by municipal mayors who provide annual budget allocation. This initiative has also turned whale shark hunters into tourist guides in the whale and dolphin watching tourism industry.

In Mindanao, environmental alliances have also been strengthened. In Lake Lanao River Basin, a 40-hectare agroforestry project has been developed, 45 hectares of watershed rehabilitated, and protection of the lake is being strengthened through the involvement of 5 Multi-sectoral Forest Protection Committees at the barangay level.

The Allah Valley Landscape Development Alliance (AVLDA) has strengthened its linkages with other environmental alliances in Mindanao (e.g. Agusan Marsh Development Alliance, Agusan del Sur Provincial Technical Working Group, Bukidnon Watershed Protection and Development Council, Lanuza Bay Development Alliance in Surigao del Sur, and the Lake Mainit Development Alliance) and in Visayas (e.g. Matarinao Bay Management Council in Eastern Samar, the Carood Watershed Management Council in Bohol) to deal with various natural resources management concerns and the development of sustainable community livelihood ventures.

In Maragusan, Compostela Valley Province in Mindanao, a partnership between the LGU and the water utility cooperative Maragusan Water System Cooperative (MAWASCO) has been forged to meet the Millenium Development Goal (MDG) target on water supply, sanitation and watershed protection. The Municipality of Maragusan occupies a total land area of 54,745 hectares, 77% of which is forestland. The quality of forest contributes to sustaining water bodies in the Municipality. The LGU-MAWASCO partnership follows the co-planner, co-implementer, and co-monitor strategy. As co-planner, they are members of the Municipal Development Council – the highest planning body of the municipality. They are also involved in the formulation of the Forest Land Use Plan and revision of the Municipal Comprehensive Development Plan (MCDP). Other functions include participation in problem solving and conceptualization of various development programs and projects most particularly in the field of water supply, sanitation and watershed protection. As co-implementer, the Water Cooperative identifies, develops and implements programs and projects anchored on the priorities identified in the MCDP following a counterpart scheme. Some of the projects implemented are water system expansion to barangays, watershed protection and management, water for the poor program, and water for the school program. The LGU provides technical assistance such as surveys, map preparation, documentation and forest protection. As co-monitor, both partners assist in monitoring and assessing activities (Sumampong, 2008).

The Philippines has a known vibrant community of non-state actors referred to as civil society organizations (CSOs), which includes POs. These non-state actors have been instrumental in bringing about changes in policies and practice for conservation of the country's natural resources, even as they increasingly partner and collaborate with government (where traditionally they had been adversaries). In the area of biodiversity conservation, CSOs have led the work in several key areas: a) reforming policies; b) resource mobilization for conserving KBAs; c) species-focused conservation work; among others.

Recently, Haribon Foundation launched a movement called “Road to 2020” to restore 1 million hectares of rainforests using native tree species, which, in the long run, envisages to recover and conserve biodiversity, optimize supply of forest benefits and ecosystems services, reduce risk of natural hazards, and enhance community options for livelihood. The Cebu Biodiversity Conservation Foundation drew in community activities to conserve Cebu's last few hectares of forests, mindful that Cebu had been wanting for sources of potable water in the past few decades

Species-focused conservation initiatives have also been undertaken by CSOs. The Philippine Eagle Foundation Inc. has made significant strides in conserving the Philippine eagle. The Philippine Cockatoo Conservation Program on Palawan also reduced theft of cockatoo eggs. Community organizing programs of NGOs and POs have so far resulted in remarkable behavioral changes among members of community members who once engaged in destructive activities, e.g., hunters had turned to be ecotourism guides in some areas in Bohol.

3.3 Environmental law enforcement and green courts

There are quite a number of environmental cases pending in Philippine courts. Based on records from the Office of the Court Administrator, 2,353 are still pending as of December 2006. By October 2007, the Haribon Foundation reports that this has increased to 3,102 cases, 109 of which have been filed more than a decade ago (Nepomuceno, 2008). Illegal collection and trade in Philippine wildlife species continues. Revenue from illegal wildlife trade is estimated at PhP4 million to PhP 6 million per year (Catibog-Sinha and Heaney, 2006). PAWB records on confiscation of illegally traded wildlife species regulated under the CITES show an increase in confiscations from about 513 heads in 2005 to about 2,691 heads in 2007. However, the low number of cases being filed in courts for these violations and the slow resolution of these cases suggests that law enforcement and prosecution need to be strengthened.

Environmental law enforcement was given particular emphasis by the Philippine Government in 2006, manifested through Executive Order 515 issued on 15 March 2006. This EO created the National Anti-Environment Crime Task Force (NAECTAF) under the Presidential Anti-Organized Crime Commission, Office of the President. The NAECTAF was tasked to investigate and prosecute violations against environmental laws. The NAECTAF however was short-lived as it was deactivated on 22 August 2007 by virtue of E.O. No. 655.

Committed to strictly enforce environmental laws and pursue cases against violators, the DENR subsequently created the Task Force Kalikasan (TFK) on 06 February 2008 through Administrative Order No. 2008-01. Barely a year, the TFK was rendered inoperative. It was replaced by the “Environmental Law Enforcement Task Force” (ELETf) created by virtue of DENR Administrative Order No. 2009-02 on 06 January 2009. Among the functions of the ELETf are to investigate and arrest violators of environmental and natural resources laws, rules and regulations; and, assist in the prosecution of environmental violators until their final conviction.

Multi-agency Memoranda of Agreement (MOAs) have also been forged aimed at abating illegal wildlife trade. About 17 government agencies and offices in Metro Manila (DENR- NCR), PAWB, National Bureau of Investigation (NBI), Bureau of Customs (BOC), NCR Police Office (NCRPO), Criminal Investigation and Detection Group (CIDG), Philippine Ports Authority (PPA), Philippine Coast Guard (PCG), Manila International Airport Authority (MIAA), Department Of Agriculture - Bureau of Animal Industry (DA-BAI), Department Of Trade And Industry-Bureau of Domestic Trade (DTI-BDT), Department Of Education-National Capital Region (DepEd-NCR), My Zoo Volunteer Group Foundation (MYZOO), Herpetological Society of The Philippines (HSP), Philippine Avicultural Federation (PAF), Haribon Foundation for the Conservation of Natural Resources (Haribon), and the Conservation International

Foundation through its branch office Conservational International-Philippines (CI-Philippines) have signed the MOA. This approach has been replicated in most DENR Regional Offices.

In January 2008, the Supreme Court designated 84 branches of first-level courts and 31 branches of second-level courts (or a total of 115 courts) as special Environmental Courts or “green benches” or “green courts” to handle cases involving violations of environmental laws. The include Regional Trial Courts (RTCs) from the National Capital Judicial Region and 12 other Judicial Regions, Metropolitan Trial Courts (MeTCs), and Municipal Trial Courts in Cities (MTCCs). This development is expected to facilitate the resolution and adjudication of environment-related cases and strengthen efforts of LGUs to enforce their environmental ordinances.

The creation of green courts is a positive development in the evolving role of the judiciary in environmental protection. However, this is only an initial step as there are still a number of measures needed, such as enhanced training programs and amendments of procedural and evidentiary rules, to make these courts fully functional and more effective (La Vina, 2008). This development can be used as a baseline in the countdown towards 2010, and whether these courts will prove themselves effective in resolving environmental cases.

Box 3. *Save the Northern Sierra Madre*

The Northern Sierra Madre Natural Park was declared as a protected area by Republic Act 9125 in 2001. The 359,486-hectare park located in the province of Isabela is being threatened by illegal logging. Rivers along the park fringes are used to float illegally cut logs. Despite efforts by forest rangers and volunteer environment groups to stop timber poaching, there are not enough human and financial resources to guard the park. Only 22 forest rangers are deployed in the Park responsible for at least 16,000 hectares each. Volunteers from Bantay Kalikasan, mostly Agtas and town residents, have been augmenting the forest rangers.

Following reports of massive illegal logging in the area, Isabela Governor Grace Padaca reactivated the Anti-Illegal Logging Provincial Task Force and renamed it as the Provincial Task Force on Forest Protection. Governor Padaca was deputized by DENR Secretary Atienza as special environment and natural resources officer (SENRO). The Task Force is headed by the Isabela provincial government, the DENR, military, police and civil society organizations such as Tanggol Kalikasan, an environmental rights NGO. Support has also been provided by church-based groups, former atcheros (chainsaw operators) and bugaderos (log transporters), and the Philippine Tropical Conservation Foundation Inc

Operations of the Task Force from July to December 2008 led to the confiscation of about 513,759 board feet (out of an estimated 1 million board feet of cut logs) with an estimated value of Php 7.9 Million. The seized forest products are being auctioned to support continuing illegal logging operations, provide livelihood assistance program for affected communities, and establish a "mega-nursery" for the reforestation of the denuded portion of the Northern Sierra Madre.

Tanggol Kalikasan Executive Director Asis Perez has described the efforts of the Task Force as a "milestone in environmental law enforcement ... this level of enforcement has never been done in this area, or maybe in the entire Philippines for the last 25 years". Governor Padaca has also recognized the importance and effectiveness of the multisectoral approach in addressing illegal logging. Beyond the mutisectoral approach, however, the political will and leadership is also a key factor in this campaign. What remains a bigger challenge is addressing the root problems of this practice and sustaining the gains from this operation.

Chapter 4.0 Conclusions: Progress towards the 2010 target and implementation of the Strategic Plan

The Philippines has made significant strides and gains in biodiversity-related policies, programs, projects and activities in the years 2005 to 2008. However, assessing the country's progress towards meeting the 2010 biodiversity target of achieving reduction in biodiversity loss has been a challenging task in the absence of nationally agreed baselines, targets and indicators. Even more challenging is the fact that the Fourth National Report requires reporting of outcomes and impacts but most of the data gathered only reports outputs.

Based on available data, the Philippines responses and gaps to meeting the 2010 biodiversity target can be summarized as follows:

Protecting components of biological diversity

- 1) The proportion of forest cover to land area has increased from 23.9% in 2003 to 52.6% in 2006 (DENR-FMB as cited in 2007 Mid-term Progress Report on the MDG). This figure includes plantation forests that are monocrops and do not necessarily provide the cover needed for biological diversity. This increase is subject of much debate primarily because there is disagreement on the definition of forest. There is an urgent need for a common understanding and harmonization of forest cover and other related definitions.
- 2) The proportion of terrestrial protected areas to total land area has increased from 8.5% in 1992 to 13.8% in 2008 (DENR-PAWB as cited in 2007 Mid-term Progress Report on the MDG; PAWB, 2008). This translates to increased protection of biological diversity. However, much of the debate in this issue centers on the management effectiveness of these protected areas.
- 3) Mangrove cover has increased from 120,000 hectares in 1995 to 210,497 hectares in 2008 (based on 2002 satellite data validated by ground surveys). Ground validation is yet to be completed in several areas. This translates to improvement of habitats for species that are mangrove-dependent and consequently contribute to increase in fisheries stock and livelihoods.
- 4) The number of marine protected areas (MPAs), majority of which are under the category of reserves, sanctuaries or parks, increased from 439 (existing) and 139 (proposed) in 1997 to an estimated 1,169 (existing) and 164 (proposed) MPAs as of 2007. There is also a significant increase in size with about 48% within the range of 11 to 100 hectares. This suggests understanding by decision makers and communities of the ecological importance and benefits derived from MPAs. MPAs have been established in 415 coastal municipalities in 62 provinces in 2008 compared to 276 municipalities in 62 provinces in 2000. Management effectiveness of these sites also increased from 10-15% in 2000 to about 20-30% in 2007 based on enforcement level in these areas. While numbers have increased, questions have been raised about the quality of locally managed MPAs since some are located in sites that have little or no value in terms of biodiversity. Efforts should be strengthened to establish MPAs in areas of high biodiversity such as in marine biodiversity corridors.

- 5) Monitoring data using hard coral cover, fish abundance and biomass from selected MPA and non-MPA sites in 52 municipalities/cities in 31 provinces indicated that there is an overall declining trend especially in non-MPA sites.
- 6) Two hundred six (206) conservation priority areas and species conservation priorities were identified. Of these, 128 terrestrial KBAs have been identified and 66 marine KBAs are being proposed as priority areas that need research and management interventions. These include inland water bodies.
- 7) Threatened flora and fauna were accorded further protection through the various species conservation programs and executive and administrative issuances that disallow collection and trade without a permit. For marine turtles, the number of complete nests in Bataan and Zambales showed increasing numbers of complete nests. Egg production and number of complete nests in the Baguan Island Marine Turtle Sanctuary fluctuated due to changes in weather patterns and predation. The number of threatened species indicates that biodiversity as a source of food, shelter, medicine, and livelihood may be degraded.
- 8) The number of confiscations of illegally traded wildlife species regulated under CITES increased from 513 heads in 2005 to about 2,691 heads in 2007. In 2008, 513,759 board feet of illegally cut logs valued at PhP 7.9 million were confiscated in the Northern Sierra Madre Natural Park. The increasing number of confiscations suggests unsustainable harvest of species on which many rely on for sustenance and livelihood, and at the same time suggests improved law enforcement. However, the low number of cases being filed in courts and the slow resolution of cases suggests that law enforcement and prosecution need to be further strengthened.
- 9) There is a general recognition of the loss of genetic resources important to agriculture in both the plant and animal genetic resources. However, there are no actual figures for agricultural biodiversity decline or gain. Agricultural statistics and monitoring typically focus on crop yields and on the economic productivity of farms rather than biodiversity in the agricultural ecosystem. There is no systematic assessment of plant genetic erosion in the country.

Promoting sustainable use

- 10) The total quantity and value of fish production from commercial, municipal and aquaculture operations increased from 2.796 million metric tons valued at 83. 275 million pesos in 1996 to 4,711 million metric tons valued at 180.545 million pesos in 2007. Capture fisheries (commercial and municipal) continue to be a major contributor to fish production with the aquaculture sector contributing significantly.
- 11) Ecotourism in protected areas provided increased livelihood opportunities and income for local communities and local government units. Environmental user fees derived from resource use and other recreational activities from MPAs generated more income that accrued to their management and the communities that manage them.

Addressing threats to biodiversity

- 12) Integrated development and management plans were prepared for various priority inland water bodies, coastal and marine areas, watershed and river basins to address the problem of multiple users, multiple resource uses, and degraded ecosystems. However, problems of implementation have repeatedly surfaced due to conflicting mandates, overlapping jurisdictions and lack of funds.
- 13) There are no known management plans in place for major alien species that threaten ecosystems but there is renewed interest in addressing the impacts of invasive alien species on biodiversity. A national framework for IAS is being drafted to give impetus to collaborative efforts among stakeholders.
- 14) Despite reports of impacts, there are no studies in the Philippines that actually measure the impacts of climate change on biodiversity. Milestones have been achieved through membership to the UNFCCC and the Kyoto Protocol, establishing institutional mechanisms, adopting biodiversity-based mitigation and adaptation measures, and filing a Philippine Climate Change Bill.

Maintaining goods and services from biodiversity to support human well -being

- 15) Based on data from Pasig River and Laguna de Bay and using DO and BOD levels as indicators, water quality improved in 9 out of 19 priority rivers. However, the Pasig River system failed to meet the standards set for water quality. Laguna de Bay indicated a decreasing trend in water quality in previous years but monitoring data from 2004 to 2006 for DO indicated that the Lake passed the Class C criterion while majority of the tributaries failed to meet standards.
- 16) In major lakes, the same problem of pollution from point and non-point sources, illegal fish pens and fish cages, overstocking and overfeeding has resulted to eutrophication and decreased productivity. There are increasing efforts by the local governments and communities to enforce regulations that will help improve the quality of the lake.

Protecting traditional knowledge, innovations and practices

- 17) Indigenous knowledge systems and practices of 16 indigenous tribes have been documented by the NCIP from 2005 to 2008 to enable better understanding of the norms of conduct, customs and traditions, belief systems and institutions of indigenous people, and in support of policy formulation and legislation.

Ensuring the fair and equitable sharing of benefits arising out of the use of genetic resource s

- 18) Access and benefit sharing has been institutionalized through the process of free and prior informed consent secured from indigenous and local communities. However, the process is also seen as a constraint to research and potential commercialization of genetic resources. The regulation on bioprospecting, for example, has discouraged potential research collaborations and partnerships.

Ensuring provision of adequate resources

- 19) Financial resources from government and donor communities are decreasing. However, revenues from environmental user fees and from protected areas and wildlife resources are increasing. Local government allocations for biodiversity-related activities are also increasing. Innovative financing mechanisms can help augment the resources needed for biodiversity conservation and management.

At present, there are many players from various stakeholder groups with different projects that have their own life of project targets. These are often fragmented and uncoordinated even within landscapes, seascapes and within and among political units. This makes it doubly difficult to assess overall impact of actions taken. However, across ecosystems, the management approach for natural resources management, including biodiversity conservation, is gradually shifting from sectoral to holistic. The successes of the ecosystems approach are best illustrated in a local level rather than a national scale and using appropriate units of management and analysis, in most cases integrated coastal management, watershed and river basin approach. The approaches also incorporate the different elements that foster sustainability in programs and projects such as institutions, partnerships and alliances and innovative financing.

Tenurial instruments, partnerships and alliances among stakeholders groups are increasing. The scattered success stories of biodiversity conservation efforts show potentials for upscaling. However, the archipelagic and multi-cultural condition of the country requires that there should be innovative and flexible means for replication and diverse modes of governance, strong organizational development, management approaches and strategies by stakeholders.

Recommendations for Action

Future priorities for action have been identified based on data gathered and the results of the regional workshops/consultations. These are categorized as follows:

- 1) Policy
 - Set national baselines, measurable targets and indicators to assess progress towards meeting the 2010 (or 2015) biodiversity goal, to guide decision-making, and in anticipation of the next CBD and MDG Reports
 - Establish a coordinated and sustained monitoring and evaluation system as a top priority
 - Adopt a mainstreaming framework to assess extent of mainstreaming of biodiversity considerations in plans and programs of government, research and academic institutions, civil society organizations, business sector and other stakeholders
 - Agree on a definition of forest cover to avoid conflicts in interpretation, improve the quality and usefulness of information, allow comparability and guide decision makers
 - Harmonize NIPAS, IPRA, Fisheries Code and the Local Government Code
 - Ensure synergy, complementation and harmonization between and among plans and programs in the landscape, seascape and/or political units to maximize resources and improve governance

2) Information, Education and Communication

- Generate data, update information and create a biodiversity information system that will guide and facilitate decision-making, including on agricultural biodiversity and indigenous knowledge systems and practices for which data is limited
- Encourage the use of the Clearing House Mechanism of the CBD for biodiversity information sharing
- Integrate biodiversity conservation and sustainable use in the school curriculum (at all levels), and develop specialized biodiversity-related courses for practitioners and policy makers

3) Capacity Building

- Build taxonomic capacity, including parataxonomy
- Strengthen capacity of LGUs on biodiversity-related concerns and in mainstreaming into LGU plans and programs
- Strengthen the participation of those in the agricultural sector and related fields in discussions on biodiversity;

4) Financing biodiversity

- Explore options for innovative financing, including the potential of biodiversity-related projects for inclusion in the proposed debt conversion for MDG programs and projects.
- Study the various modes of environmental user fees as a means to sustain efforts on biodiversity conservation.

REFERENCES

- Abuyuan, L. 2008. Allocative efficiencies in the environment and natural resources sector: An initial assessment. Department of Budget and Management.
- Adraneda, K. 2008. Rich biodiversity of Davao Gulf threatened – EcoGov. Retrieved October 6, 2008 from <http://www.philstar.com/archives>.
- Alcala, Angel C. Undated. Climate change and biodiversity. Powerpoint Presentation
- Altoveros, Nestor and Teresita H. Borromeo. 2007. The state of the plant genetic resources for food and agriculture of the Philippines (1997-2006): A country report. Department of Agriculture (DA) - Bureau of Plant Industry (BPI).
- Appel, P., E. Perez and R.Rasmussen. 2007. Training of Small Scale Miners and Their Families in Safe Handling of Mercury During Extraction of Gold in the Philippines: Improving Access to Social Services for Small Scale Miners and Their Families. Geological Survey of Denmark and Greenland, Denmark.
- Arceo, H., P.M. Alino and R.O. Gonzales. 2008. Where are we now with marine protected areas? In Coral Reef Information Network of the Philippines (Philreefs). 2008. Reefs through time 2008: Initiating the state of the coasts reports. Philreefs, MPA Support Network (MSN), Marine Environment and Resources Foundation, Inc. (MERF, Inc.), and the Marine Science Institute, University of the Philippines (MSI-UP), Diliman, Quezon City. 152pp.
- ASEAN Center for Biodiversity. 2006. Mainstreaming agriculture and rural development programs: UNCCD country reports-Philippines. ASEAN Biodiversity Newsmagazine, Volume 1, Number 1.
- ASEAN Center for Biodiversity. 2008. Analysis of the NBSAPs. ASEAN Biodiversity Newsmagazine, Volume 7, Number 1.
- Asian Development Bank. 2004. Technical assistance to the Republic of the Philippines for a master plan for the Agusan River Basin. TAR: PHI 36540.
- Asian Waterbird Census: 20 year review for the Philippines. Retrieved 10 November 2008 from <http://www.wetlands.org/Whatwedo/Wetlandbiodiversity/MonitoringWaterbirds/AsianWaterbirdCensus/tabid/928/Default.aspx>.
- Barut N.C., M.D. Santos and L.R. Garces. 2004. Overview of Philippine marine fisheries. In: DA- Bureau of Fisheries and Aquatic Resources (BFAR). In turbulent seas: The status of Philippine marine fisheries. Coastal Resource Management Project of the Department of Environment and Natural Resources (DENR), Cebu City, Philippines, pp 22-31.
- Bureau of Agricultural Statistics (BAS). 2007. Facts and figures on the Philippine agricultural economy. Retrieved October 10, 2008 from <http://countrystat.bas.gov.ph>.

- Bureau of Animal Industry (BAI). 2003. Status of the Philippines' animal genetic resources: A country report. DA-BAI.
- BAS and Food and Agriculture Organization (FAO). Philippine country statistics database. Retrieved October 30, 2008 from <http://countrystat.bas.gov.ph/index.asp>.
- Bureau of Fisheries and Aquatic Resources (BFAR). 1995. Philippine fisheries profile 1994.
- BFAR-National Fisheries Research and Development Institute (NFRDI) - Protected Areas and Wildlife Bureau (PAWB). 2005. Biodiversity indicators for national use (BINU): Philippine report on coastal and marine ecosystems. BINU Project supported by UNEP (United Nations Environmental Programme) – Global Environment Facility (GEF). BFAR, NFRDI, DA and DENR- PAWB, Philippines. 68p.
- BFAR-NFRDI Information Sheet on the National Stock Assessment Program
- Burke L, E. Selig and M. Spalding. 2002. Reefs at risk in Southeast Asia. World Resource Institute, Washington DC, USA. 72 p
- Cabreza, V. 2007. Atienza: Global warming not population's fault. Retrieved March 26, 2009 from: <http://sustainablepopulation.blogspot.com/2007/11/dont-blame-culprit.html>
- Calleja, N.C. and E. Aguilar. 2006, October 9. Priceless plant research materials destroyed by 'Milenyo'. Inquirer.net. Retrieved October 10, 2008 from <http://www.inquirer.net/specialfeatures/milenyo/view.php?db=1&article=20061009-25599>.
- Carino, J. 2002. An assessment of the implementation of the Philippine government's international commitments on traditional forest-related knowledge from the perspective of indigenous peoples.
- Carpenter, K.E. and V.G. Springer. 2005. The center of the center of marine shore fish biodiversity: The Philippine islands. *Environmental Biology of Fishes* 72: 467–480.
- Catibog-Sinha C.S. and L.R. Heaney. 2006. Philippine biodiversity: Principles and practice. Haribon Foundation for the Conservation of Natural Resources, Inc. Quezon City, Philippines.
- Center for Environmental Concerns-Philippines. 2005. Saving our future: A situationer on Philippine environment and struggles. Center for Environmental Concerns-Philippines.
- Center for Rural Empowerment and the Environment (CREE). Babuyan Islands Humpback Whales Project. Retrieved 31 March 2009 from <http://www.conservationforpeople.org/projects.cfm?projectID=3>
- Concepcion, R.N. 2000. Summary of national country report on the UNCCD implementation (Philippines). Retrieved October 10, 2008 from <http://www.unccd.int>

Congressional Planning and Budget Department Budget Briefer No. 2007-01

Conservation International (CI) - Philippines. Undated. Brochure on monitoring biodiversity conservation outcomes in the Philippines.

CI- Philippines, DENR-PAWB and Haribon Foundation. 2006. Priority sites for conservation in the Philippines: Key biodiversity areas. Quezon City, Philippines. 24pp.

CI- Philippines, Haribon Foundation, DENR-PAWB and the Critical Ecosystem Partnership Fund (CEPF). 2006. Philippines outcomes database.

Coral Reef Information Network of the Philippines (PhilReefs). 2008. Reefs through Time 2008: Initiating the state of the coasts reports. Coral Reef Information Network of the Philippines (PhilReefs), MSN, MERF, Inc. and MSI-UP, Diliman, Quezon City, 152 pp.

Country Report presented to the Country Exercise on ASEAN Peer Consultation Framework, July 2008.

Department of Agriculture - BFAR. 2008. National plan of action for the conservation and management of sharks in the Philippines (Draft copy).

DA-BFAR. Philippine report on the Workshop on assessing the relative importance of sea turtle mortality due to fisheries in Southeast Asia. 19-23 March 2007. Bangkok, Thailand. SEAFDEC and FAO.

Department of Environment and Natural Resources (DENR) Accomplishment Report 2007.

DENR Administrative Order No.2004-15 “Establishing the list of terrestrial threatened species and their categories, and the list of other wildlife species pursuant to Republic Act 9147, otherwise known as the Wildlife Resources Conservation and Protection Act of 2001” (Approved May 22, 2004).

DENR Administrative Order No.2007-01 “Establishing the national list of threatened Philippine plants and their categories, and the list of other wildlife species” (Approved January 22, 2007).

DENR Consultative Workshop for the implementation of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA)/E.O. 533. Fernando Hall, Fersal Place Hotel, December 2, 2008.

DENR Foreign-Assisted Projects Annual Report for CY 2007.

DENR FY 2009 Budget Presentation House of Representatives, 12 September 2008.

DENR Powerpoint presentation on Effects of Climate Change on Tourism's Major Asset: the Environment (Biodiversity). Undated

DENR. 1997. Philippine biodiversity: An assessment and plan of action. Makati City: Bookmark. 298 pp.

DENR. 2004. The current policy system governing Philippine mangroves. UNEP-GEF South China Sea (SCS) Project, DENR, Visayas Avenue, Diliman, Quezon City, Philippines. 41 pp.

DENR. 2004. The Philippines country report. UNEP-GEF South China Sea Project, Department of Environment and Natural Resources, Visayas Avenue, Diliman, Quezon City, Philippines. 35pp.

DENR. 2004. The Philippine mangrove action plan. UNEP-GEF South China Sea Project, Department of Environment and Natural Resources, Visayas Avenue, Diliman, Quezon City, Philippines. 45 pp.

DENR-PAWB-Coastal and Marine Management Office (CMMO) Summary of regional and Provincial table on validated mangroves as of 2008.

DENR and Department of Tourism (DOT). 2008. National ecotourism program annual report- July 2007 to June 2008.

DENR- Environmental Management Bureau (EMB) Annual Accomplishment Report CY 2007

DENR- EMB. 1990. The Philippine environment in the eighties. DENR-EMB, Quezon City.

DENR- EMB. 2006. National water quality status report 2001-2005.

DENR -Forest Management Bureau (FMB) Forestry Statistics 2006.

DENR-FMB Forestry Statistics 2007.

DENR-FMB Forestry Statistics 2008.

DENR- Protected Areas and Wildlife Bureau (PAWB). List of all protected areas in the Philippines as of 2008.

DENR- PAWB. 2008. National report on the implementation of the Ramsar Convention on Wetlands. National report submitted to the 10th Meeting of the Contracting Parties, Republic of Korea, October 28-November 4, 2008.

DENR- PAWB. 2005. UNEP/GEF Project: Reversing environmental degradation trends in the South China Sea and Gulf of Thailand- Philippines national report on wetlands. Quezon City, Philippines, 104.pp.

- DENR-PAWB. 1992. National wetland action plan for the Republic of the Philippines.
- DENR- River Basin Control Office (RBCO) Annual Accomplishment Report CY 2007
- DENR-RBCO. 2007. Integrated river basin development and management master plan.
- East Asian Seas Congress. 2006. Proceedings on the workshop on ecosystems-based management of interrelated river basins, estuaries and coastal seas. December 12-13, 2006, Haikou City, Hainan Province, PR China.
- Echanove, J. 2008. Forests in Asia: Trends and challenges. Haring Ibon Issue No. 35. Reprinted from EU News, Vol. 6, Issue 2, June 2008
- Eisma-Osorio, R. 2008. Sustainable financing mechanisms to support ICZM strategies. Proceedings of the Coastal Zone Philippines 2 Congress: Sustainable financing and marine protected areas.
- Estrella, M. 2008. Albay in action on climate change (A2C2): Pioneers local action on climate change adaptation. Retrieved 26 January 2008 from http://maidon.pcarrd.dost.gov.ph/regional_consortia/bcarrd/albay-in-action-on-climate-change-a2c2-pioneers-local-action-on-climate-change-adaptation.htm
- Estrella, M. 2008. Albay leads national conference on climate change adaptation. Retrieved 26 January 2008 from http://maidon.pcarrd.dost.gov.ph/regional_consortia/bcarrd/albay-leads-national-conference-on-climate-change-adaptation.htm
- Fernando, E. S., L.L. Co et al. 2008. Threatened plants of the Philippines: A preliminary assessment. Asia Life Sciences, The Asian International Journal of Life Sciences Supplement 3, April 2008.
- Ferreras, U.F., L.L. Co et al. 2008. Floristic assessment of Agusan Marsh. Unpublished report.
- Fortes, M. 2004. National report on seagrass in the South China Sea-Philippines. Reversing environmental degradation trends in the South China Sea and Gulf of Thailand. UNEP/GEF South China Sea Project.
- Fortes, M. 2008. Seagrass map of the Philippines. Powerpoint Slide.
- Fortes, M. 2008. Coral Triangle Initiative- Seagrass. Powerpoint Slide.
- Froese, R. and D. Pauly (Eds.). 2009. FishBase. World Wide Web electronic publication. www.fishbase.org, version (02/2009).
- Galang, Renee. 2004. A critical review of wildlife conservation in the Philippines. Philippine Spotted Deer Conservation Project. Retrieved January 26, 2008 from http://www.rafflesialobata.org/files/critical_review.pdf.

- Galicia, A.M. Jr. and F.O. Eleserio. Undated. Current information on inland capture fisheries in the Philippines. BFAR-DA. Retrieved October 15, 2008 from <http://www.bfar.da.gov.ph/aquaculture/information/%20info.htm>
- Gallardo, F. 2006. Contaminated Lake Lanao in danger. Mindanews, 14 October 2006.
- Go, M.V. 2008. DENR to revise mineral investment targets. Retrieved March 26, 2009 from <http://www.philstar.com/Article.aspx?articleid=427644>
- Greenpeace Southeast Asia. 2007. The state of water resources in the Philippines.
- Guerrero, R.D. 2002. Invasive aquatic animals in the Philippines: their impacts and management. ASEAN Biodiversity October-December 2002.
- Institute for Global Environmental Strategies (Ed.). 2006. CDM country guide for the Philippines, 2nd Edition. Institute for Global Environmental Strategies, Ministry of Environment-Japan, Preferred Energy, Inc. and DENR.
- International Union for the Conservation of Nature and Natural Resources (IUCN) - The World Conservation Union. 1999. Developing and implementing national biodiversity strategies and action plans (NBSAPs): Lessons from Southeast. Global Biodiversity Forum, 24 - 26 October 1999, Colombo, Sri Lanka.
- James, C. 2008. Global status of commercialized biotech/GM crops: 2008. ISAAA Brief No. 39. ISAAA: Ithaca, New York.
- Jara, R. Undated. SDS-SEA implementation in Philippines: Review of existing programs and projects. Presented during the Convergence Workshop for the Implementation of a National ICM Program, May 29-30, Manila, Philippines.
- Karki, S. 2002. Community involvement in and management of forest fires in South East Asia. Project FireFlight South East Asia.
- Keller, M., R. Amolo, REMOTE. 2008. Marine protected areas in Central Visayas. In Coral Reef Information Network of the Philippines (Philreefs). 2008. Reefs through time 2008: Initiating the state of the coasts reports. Philreefs, MSN, MERF. Inc., and the MSI-UP, Diliman, Quezon City. 152pp.
- Kenya Wildlife Service. Undated. BINU project: Kenya- biodiversity indicators for national use.
- La Vina, A.G. and J. Kho. 2009. Protected areas legislation guidelines project: Philippines case study (Draft report).
- La Vina, A.G. 2008. The future of environmental law and governance. 5th Metrobank Foundation Professorial Chair Lecture delivered on October 3, 2008, Malcolm Theatre, U.P. College of Law.

- Laguna Lake Development Authority (LLDA) and Federation of River Basin Councils (FRBCs) in the Laguna de Bay Region. 2005. Laguna de Bay Environment Monitor 2004.
- LLDA and FBRCs in the Laguna de Bay Region. 2006. Laguna de Bay Environment Monitor 2007.
- Lake Lanao Watershed Protection and Development Council. 2003. Integrated development plan.
- Lasco, R.D., R.J. Delfino and P.A. Sanchez and. 2007. Local government initiatives to climate change adaptation: A case study of Albay Province, Philippines.
- Lasco, R.D., R. Gerpacio, P.A. Sanchez and R.J. Delfino. 2008. Philippine policies in response to a changing climate: a review of natural resource policies.
- Lasalita-Zapico, F., T.T. Martin, R.J. Pena, and J. Gonzales. 2008. Farming and seed conservation practices of rice farmers in the marginal uplands of Lake Sebu, South Cotabato, Philippines. Retrieved December 30, 2008 from <http://www.usm.edu.ph/rdpo/download/zapico.pdf>.
- Lasco, R.D., R. Gerpacio, P.A. Sanchez and R.J. Delfino. 2008. Philippine policies in response to climate change: a review of natural resource policies.
- Lasco, R.D and M.V. Espaldon (Eds.). 2005. Ecosystems and people: The Philippine millennium ecosystem assessment (MA) sub-global assessment. Environmental Forestry Programme, University of the Philippines Los Baños (UPLB) -College of Forestry and Natural Resources (CFNR), DENR and LLDA. Retrieved 10 November 2008 from <http://www.millenniumassessment.org/en/SGA.Philippines.aspx> Philippines
- Lim, T.M.S. 2007. Conserving biodiversity to cope with climate change. Powerpoint Presentation in the Forum on Biodiversity and Climate Change, 27 May 2007, National Institute of Geological Science, UP Diliman, Quezon City.
- Luistro, M.A.S. 2008. Despite protected area status illegal fish cage operations poison Taal Lake. Philippine Center for Investigative Journalism, 5 June 2008. Retrieved 10 January 2009 from <http://www.pcij.org/stories/2008/taal-lake4.html>.
- Mallari, N.A., B.R. Tabaranza, Jr., and M.J.Crosby. 2001. Key conservation sites in the Philippines. Haribon Foundation and Birdlife International.
- Melana, D.M. E.E. Melana and A.M. Mapalo. 2000. Mangrove management and development in the Philippines. Paper presented during the meeting on Mangrove and Aquaculture Development held at Kasetsart University Campus, Bangkok, Thailand, February 14-16, 2000.

- Miclat, R.I., R.O.M. Gonzales and P.M. Alino. 2008. Proceedings of the coastal zone Philippines 2: Sustainable financing and marine protected areas (MPA) congress. MSN, MERF Inc., MSI-UP, Diliman, Quezon City, Philippines. 100 pp.
- Nañola, C.L. Jr., P.M. Aliño, H.O. Arceo, W.Y. Licuanan, A.J. Uychiaco, M.C.C. Quibilan, W. Campos, A.C. Alcala, A.T. White and E.D. Gomez. 2006. Status report of coral reefs of the Philippines- 2004. Proceedings of the 10th International Coral Reef Symposium, 1955-1061.
- National Commission on Indigenous Peoples (NCIP) Annual Report CY 2007.
- NCIP List of Approved CADTs/CALTs as of December 2008.
- NCIP List of Documented Indigenous Knowledge Systems and Practices (IKSPs) as of 2008.
- National Economic and Development Authority (NEDA). 2004. Medium-term Philippine development plan 2004 to 2010. Retrieved November 3, 2008 from <http://www.gov.ph/documents/MTPDP%202004-2010%20NEDA%20v11-12.pdf>
- NEDA. 2007. Socio-economic report 2006.
- National Statistical Coordination Board Philippine Statistical Yearbook 2008.
- National Statistics Office. 2008. Official population count reveals. Number: 2008 – 30. Date Released: April 16, 2008. Retrieved on 12 January 2009 from <http://www.census.gov.ph/data/pressrelease/2008/pr0830tx.html>
- National Stock Assessment Program (NSAP) Planning Workshop, Great Eastern Hotel, October 2008.
- Nepomuceno, P. 2008. SC names ‘green courts’. PNA News Service, 03 February 2008. Retrieved 10 January 2009 from <http://saverapurapu.blogspot.com/2008/02/sc-names-green-courts.html>
- Newton, A.C. and V. Kapos. Undated. biodiversity indicators in national forest inventories. UNEP World Conservation Monitoring Center, Cambridge, United Kingdom.
- Ong, P.S., L.E. Afuang, and R.G. Rosell-Ambal (eds.) 2002. Philippine biodiversity conservation priorities: A second iteration of the national biodiversity strategy and action plan. DENR-PAWB, CI-Philippines, Biodiversity Conservation Program (BCP) – University of the Philippines Center for Integrative and Development Studies (UPCIDS) and Foundation for the Philippine Environment (FPE), Quezon City, Philippines.
- Palawan Council on Sustainable Development Staff (PCSDS) Annual Report 2007
- Partnerships in Environmental Management of the Seas of East Asia (PEMSEA) and Manila Bay Environmental Management Program (MBEMP)-Manila Bay Information Network

- (MBIN). 2007. Manila Bay Area Environmental Atlas. PEMSEA Technical Report 20, 182 p. Global Environment Facility/United Nations Environment Programme/International Maritime Organization Regional Programme on Building Partnerships in Environmental Management of the Seas of East Asia (PEMSEA) and the MBEMP-MBIN, Quezon City, Philippines.
- Philippine Association of Marine Science (PAMS). 2008. 2007 Outstanding MPA awards and recognition: Promoting MPA best practices. MSN, MERF Inc., MSI-UP, Diliman, Quezon City, Philippines. 40 pp
- Philippine Eagle Foundation Inc. (PEFI), Critical Ecosystems Partnership Fund (CEPF), Conservation International (CI) and DENR. 2008. Eastern Mindanao Biodiversity Corridor (EMBC) Conservation Framework.
- Philippines: National Biodiversity Strategy and Action Plan (NBSAP). Powerpoint presentation in the Regional and Sub-Regional Capacity-Building Workshops on Implementing NBSAPs and Mainstreaming Biodiversity - SOUTH, SOUTHEAST and EAST ASIA, 14-18 January 2008, Singapore.
- Philippine National Seagrass Committee (PNSC). 2007. National Seagrass Conservation Strategy of the Philippines.
- PNSC. 2004. Seagrasses of the Philippines: Country report. UNEP/GEF SCS Project: Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand. PNSC Publication. Philippines, 130pp.
- Philippine Sustainable Development Network. Undated. Faunal diversity in Philippine forests. Retrieved August 2008 from <http://www.psdn.org.ph/nbsap/page3.html>.
- Philippine Watershed Management Coalition (PWMC). 2008. Busol Forest Reservation (Baguio and La Trinidad, Benguet). Poster presentation at the 8th General Assembly of the PWMC, November 27-28, 2008, Linmarr Apartelle and Suites Davao City.
- PWMC. 2008. Evolving from the forest to river basin perspective. Poster presentation at the 8th General Assembly of the PWMC, November 27-28, 2008, Linmarr Apartelle and Suites Davao City. Poster.
- PWMC. 2008. Northern Negros Natural Park. Poster presentation at the 8th General Assembly of the PWMC, November 27-28, 2008, Linmarr Apartelle and Suites Davao City. Poster.
- PWMC. 2008. Know your ecological address. Poster presentation at the 8th General Assembly of the PWMC, November 27-28, 2008, Linmarr Apartelle and Suites Davao City. Poster.
- Pinol, Agustin, E.A. Perino, M.T. Pollisco, H.O. San Valentin and M.V. Pacho. 2006. Asia-Pacific Forest Invasive Species Network (APFISN): A report on the stocktaking of national forest invasive species (FIS) activities in the Philippines. Retrieved 12 January 2009 from http://apfisn.net/country_report/Philippines.pdf.

- Roa, E.C. 2007. Mercury pollution: A threat to Agusan Marsh. In First Agusan Marsh Scientific Conference. May 21-25, 2007, Balanghail Hotel, Butuan City, Philippines.
- Ross, A. 2008. SDS-SEA work program. Powerpoint presentation in the Convergent Workshop for the Implementation of a National ICM Program, May 29-30, 2008, Manila, Philippines.
- RUPES Kalahan. Undated. Retrieved 27 January 2009 from http://www.worldagroforestry.org/sea/Networks/RUPES/download/SiteProfiles/RUPES-Kalahan_FINAL.pdf
- Salas, J.C. 2008. Rainwater harvesting in IWRM for climate change adaptation: A project of UNEP Program Iloilo Watershed Management Council (IWMC) Tigum-Aganan Watershed Management Board (TAWMB). Report to the 8th General Assembly of the Philippine Watershed Management Coalition, November 27-28, 2008, Linmarr Apartelle and Suites, Davao City.
- Sumampong, M.G. 2008. Institutionalizing cooperative water utility – LGU and community partnership as an initiative to meet the Millennium Development Goals target on water supply, sanitation and water protection: The Maragusan experience. Report to the 8th General Assembly of the PWMCM, November 27-28, 2008, Linmarr Apartelle and Suites. Davao City.
- United Nations Development Programme (UNDP)-Global Environment Facility (GEF). 2008. Towards 2010: a guide to carrying out national assessments of progress towards the 2010 biodiversity target-setting targets and preparing the Fourth National Report to the CBD.
- UNDP. 2008. Reversing environmental degradation trends in the South China Sea and Gulf of Thailand. Report of the 9th Meeting of the Regional Working Group on Seagrass. UNEP/GEF/SCS/RWG-SG.9/3.
- United Nations University-Institute of Advanced Studies, Tebtebba, Convention on the Biodiversity, UN-REDD Programme. 2008. Summary report on global consultation on reducing emissions from deforestation and forest degradation, November 12-14, 2008, Baguio City, Philippines. Retrieved on March 26, 2009 from http://www.tebtebba.org/index.php?option=com_docman&task=doc_download&gid=289&Itemid=27%20-
- United Nations- Reduced Emissions from Deforestation and Degradation (REDD) Programme Fund UN Collaborative Programme on REDD in Developing Countries. Retrieved on 27 March 2009 from www.undp.org/mdtf/UN-REDD/overview.shtml
- United States Agency for International Development (USAID) and Environmental Governance 2 Project (EcoGov2). 2008. Conservation of biological diversity and tropical forests in the Philippines. FAA 118-119 Analysis 2008 Update.
- Villarin, J.R., M.A. Loyzaga and A.G.M. La Vina. 2008. In the eye of the perfect storm: what the Philippines should do about climate change.

World Bank. 2004. Philippines Environment Monitor 2004: Assessing progress.

World Bank. 2007. Philippines Environment Monitor 2007: Environmental health.

World Basin Management Initiative. Philippines: Establishment of country-wide lake network.
Retrieved 10 November 2008 from <http://www.worldlakes.org/activities.asp?activityid=17>

World Wildlife Fund-Philippines. Humpback Whale Research & Conservation Project in the Babuyan Islands. Retrieved 31 March 2009 from
<http://www.wwf.org.ph/about.php?pg=wwd&sub1=00003>

World Wildlife Fund-Philippines. 2008. Pulling the plug on poaching: WWF ensures that Vietnamese intruders get their due. Biota Filipina July-September 2008.

PHILIPPINES
FACTS and FIGURES

Area :		<i>Total</i> 300,000 km ²	Protected Areas (PA and Buffer	5.23 M has (PA);
		<i>Land</i> 298,170 km ²	Zone (BZ) (2008)	0.22 M has (BZ)
		<i>Water</i> 1,830, km ²	<i>Terrestrial ecosystem</i>	4.09 M has (PA);
Boundaries:				0.20 M has (BZ)
<i>North:</i>		Balintang Channel	<i>Marine Ecosystem</i>	1.14 M has (PA);
<i>South:</i>		Sulu and Celebes Sea		0.19 M has (BZ)
<i>East:</i>		Philippine Sea/ Pacific Ocean		
<i>West:</i>		South China sea		
Coastline :		17,460 km	Environment – International Agreements:	
Maritime Claims:			<i>Party to :</i> Climate Change-Kyoto Protocol, Endangered Species,	
<i>Total Territorial water area incl.</i>			Hazardous Wastes, Marine Dumping, Nuclear Test Ban, Ozone	
<i>Exclusive Economic Zone</i>		2,200,000 km ²	Layer Protection, Biodiversity-Cartagena Protocol, Wetlands,	
<i>Coastal</i>		266,000 km ²	Migratory Species, World Heritage Whaling, POPs	
<i>Oceanic</i>		1,934,000 km ²		
<i>Continental shelf area</i>		184,600 km ²		
Climate: Tropical; northeast monsoon (Nov. to April);				
southwest monsoon (May to October)				
Terrain: Mostly mountains, with narrow to extensive				
coastal lowlands				
Elevation extremes:				
<i>Lowest point</i>		Philippine Sea 0 m		
<i>Highest point</i>		Mt. Apo 2,954 m		
Land Use:				
<i>Arable land</i>		19%		
<i>Permanent pastures</i>		4%		
<i>Permanent crops</i>		12%		
<i>Forest & wetlands</i>		46%		
<i>Others</i>		19%		
<i>Forestland</i>		15.792 M has		
<i>Alienable and Disposable Lands</i>		14.207 M has		
GDP (2008)		1,432 B	Urban population (% of total)	62.6
GDP Growth Rate (2008)		4.6%	Access to safe water	
GDP – composition by sector:			(% of population 2007)	73.7%
<i>Agriculture (2007)</i>		18.4%	Access to sanitation	
<i>Industry (2007)</i>		32.5%	(% of population 2007)	67.6%
<i>Services (2007)</i>		49.1%	Life expectancy at birth (Male)	67.8 years
Unemployment Rate		6.8%	(Female)	72.5 years
Industrial production growth rate		5%	Literacy (total population 20 03)	93.4%
Agriculture production growth rate		3.2%	Elementary participation rate	83.22%
Agriculture – products: rice, corn, coconut, sugarcane,			Visitor Arrivals (2008 October)	3,091,993
banana, pineapple, mango, cassava, and			National Capital	Manila
carabao, cattle, hogs, goats, chickens, ducks			Geo-Political Subdivisions	
livestock and poultry products			<i>Regions</i>	17
Exports		USD3.494 B	<i>Provinces</i>	81
Imports		USD3.482 B	<i>Cities</i>	136
Exchange Rate		PhP47.20	<i>Municipalities</i>	1,495
Population (2007)		88.57 million	<i>Barangays</i>	41,995
Population growth rate		2.04%	Independence:	June 12, 1898

Sources : Ada pted from PEM 2006, NSO 2008, Fishbase 2008, DAO 2004 -15, DAO 2007 -01, NAMRIA, PAWB, DA -BFAR, NSCB