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# **Climate Change in the Philippines: A Contribution to the Country Environmental Analysis**

Draft for discussion

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## Executive Summary

More than half of the national territory is vulnerable to natural disasters and approximately 85 percent of GDP comes from areas at risk. This paper suggests that future reforms focus on further mainstreaming climate change risk management in national, local and sectoral decision-making processes, focusing on adaptation initiatives, in order to reduce vulnerability to and minimize the adverse impact of climate risk on development efforts.

The Philippines is highly vulnerable to the adverse impacts of climate change, which increase the frequency and intensity of heat-waves, floods, droughts, typhoons; alter agricultural and coastal and marine ecosystem output and productivity; reduce water availability and quality; and increase the incidence of climate-sensitive infectious diseases. The poor are especially at risk from these impacts. Many live in naturally hazard prone areas and are dependant of natural resources for their livelihoods.

The main expected impacts of climate change will come as a result of climate variability— that is changes in precipitation, increase in temperature and sea level rise. In terms of sectoral impacts some of these include changes in agricultural yields for crops such as rice and maize. Changes in land use, as a consequence, of changes in rainfall pattern which will push people to migrate to higher elevations where soil is less fertile causing the rate of conversion of forest to agricultural lands to increase increasing greenhouse emissions. Coastal area resources (such as mangroves) and communities will be affected by sea level rises. Similarly, water resource availability is impacted by dramatic El Niño events, and infectious diseases may appear with more frequency. From the perspective of greenhouse emissions the Philippines is a minor emitter. However, emissions have been on the rise from both energy-use and land-use changes, with the latter as the major GHG contributor.

As early as 1991 the Philippines began to respond to climate change through a series of policy and legal initiatives. Although it does not have any responsibility or commitment to reduce GHG emissions and is relatively a minor emitter, the Philippines, nevertheless, took an active role on the mitigation aspects of climate change especially in the application of the Clean Development Mechanism. In this sense, climate change has been seen as an opportunity for the Philippines' to channel large-scale debit-for-equity programs to reforestation, clean water, irrigation and food production programs.

The government has created the Philippine Council for Sustainable Development (PCSD) in response to its 1992 Earth Summit commitments. The Inter-Agency Committee on Climate Change (IACCC) was established a year earlier in 1991. More recently, the Presidential Task Force on Climate Change Adaptation and Mitigation (PTFCC) and the Advisory Council on Climate Change (ACCC) were also formed after the ratification of the Kyoto Protocol in 2003. Additionally, President Arroyo has made "Green Philippines", which is also a chapter in the Updated 2004-2010 Medium Term Philippine Development Plan, as one of the "8 in 8" priorities. Increasingly the Philippines, both at

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the national and local levels, has begun to pay attention to the adaptation-side of climate change, by promoting climate change risk management initiatives.

Given the above, the report concludes that the Philippines is a relatively minor emitter yet is highly vulnerable to the impacts of climate change especially by natural disasters. While the response to date has mostly focused on mitigation efforts especially in the energy sector, the Philippines should pay greater attention to adaptation.

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## I. The Context

This chapter places the paper in the context of the Country Environmental Analysis (CEA) of the Philippines. It also provides a global context to the concerns with respect to climate change. Chapter II will discuss the impacts of climate change on the Philippines in some detail. Chapter III deals with the Philippines and its development partners' response so far to the challenges posed by probable climate change impacts. Finally, Chapter IV contains some—at this stage preliminary—reflections on the way forward. Further discussions around this paper and the entire CEA will allow us to provide more elaboration.

A CEA is a diagnostic analytical tool that helps to systematically evaluate the environmental priorities of client countries, the environmental implications of key government policies, and countries' capacity to address their environmental priorities. Its aim is to provide the analytical underpinning for sustainable development assistance. It has the potential of bringing together the results of environmental, economic, and sectoral work and facilitates dialogue, both within a country and among development partners.<sup>2</sup>

More specifically, the World Bank, in coordination with the Government of the Philippines (GoP), is undertaking a CEA in order to:

- (i) assess the environmental quality in the Philippines with a focus on how this impacts on human welfare and sustainability;
- (ii) measure and analyze the bio-physical significance and monetary cost of environmental degradation, and derive priority areas of action linked to poverty reduction and growth, to the extent that data allows;
- (iii) review the GoP's and other major stakeholders' response to the environmental challenges identified, including environmental policies, regulations, institutions, public expenditure, public disclosure, CSO involvement, private sector investment, etc; and
- (iv) identify opportunities for cost-effective interventions.

As climate change is likely to play an increasingly important role in the development agenda and activities of countries and the international development community, an evaluation of its trends and impacts and their implications for development management is an integral part of this CEA. The Philippines is a relatively minor contributor of global greenhouse gases. It is, nevertheless, highly vulnerable to the impacts of climate change because of its location, geography, and vulnerability to periodic El Niño and La Niña climatic effects. These extreme and recurring natural events have consequences for a range of sectors including agriculture, infrastructure, fisheries, water resource management, among others.

Against this background, the objective of this paper is to provide a review of climate-related problems, trends and impacts at an early stage, and review the Philippines'

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<sup>2</sup> Source: World Bank Intranet CEA website:<http://go.worldbank.org/T0I0Z0WS80>

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response to climate change so far, in order to integrate climate risk awareness and responsiveness into economic, operational and development planning.<sup>3</sup> The target audience includes stakeholders such as National Government (NG) oversight agencies like the National Economic Planning and Development Authority (NEDA); NG line agencies such as the Department of Environment and Natural Resources (DENR) and its bureaus, the Department of Agriculture (DA), the Department of Energy (DOE), and the Department of Science and Technology (DOST), especially its Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) which monitors, evaluates and projects hydro-meteorological events; Local Government Units (LGUs); as well as development partners among the NGOs, academics, international development community, and the private sector.

## *Climate Change: A Global Perspective*

Climate change can be addressed through two main approaches: mitigation and adaptation. Mitigation seeks to reduce greenhouse gas emissions to influence the rate and magnitude of future climatic changes. The coordination of global mitigation efforts occurs through the following structures and mechanisms:

- United Nations Framework Convention on Climate Change (UNFCCC),
- Clean Development Mechanism (CDM),
- United Nations Conference of the Parties (UN COP), and
- The Subsidiary Body for Scientific and Technological Advice (SBSTA).

Meanwhile, adaptation seeks to adjust human and natural systems to new or changing environment due to climate change. Adaptation initiatives include all measures aimed at reducing the negative impacts resulting from climate change as well as the identification of new opportunities (such as the economic potential of carbon offsets) and benefits associated with new climatic conditions.<sup>4</sup>

Both mitigation and adaptation approaches are necessary and interdependent. Thus, a systematic review of climate change implications at early stages is needed to assist policy-makers develop effective and long-term responses to climate change. Some mitigation initiatives, such as carbon sequestration, produce co-benefits that need to be considered, while coastal areas require more adaptation initiatives.

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC AR4), released in April 2007, notes that “even the most stringent mitigation efforts cannot avoid further impacts of climate change in the next few decades, which makes adaptation essential.” In summary, both approaches are needed to help ensure environmental and economic sustainability as well as poverty reduction.

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<sup>3</sup> Developing a framework that quantifies the impact of climate change is important but is beyond the scope of this paper. ADB is currently carrying out a study entitled: *A Regional Review of the Economics of Climate Change in Southeast Asia*.

<sup>4</sup> Information drawn from *Disaster Risk Management in a Changing Climate*, May 2005, p. 13-14.

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Furthermore, the IPCC AR4 states that the earth's climate system has significantly changed since the pre-industrial era both globally and regionally, with some of these changes being caused by human activities. For instance, the average global surface temperature has increased by about 0.74°C over the 20<sup>th</sup> century - higher than the 0.6°C increase stated in the Third Assessment Report. Thus, snow cover and ice extent have decreased while average sea levels and ocean heat content have both risen. This is supported by NASA findings which show that the five highest global annual average surface temperatures recorded in more than a century occurred only in the last 10 years (in 2005, 1998, 2002, 2003 and 2004, in descending order). Consequently, the average global losses due to extreme weather events (e.g. increased frequency and severity of storms) were estimated at US\$ 40 billion annually in the 1990s, an almost four-fold increase from that of the 1980s (IPCC, 2001). There also seem to be an exponential rise in economic losses due to climate-related disasters (Burton, 1997). These developments were partly traced to atmospheric concentrations of key greenhouse gases (GHG) posting their highest recorded levels in the 1990s mainly due to fossil fuel combustion, agriculture, and land use changes. In the last 200 years, the levels of carbon dioxide, methane and nitrous oxide were reported to have risen by 30 percent, 145 percent and 15 percent, respectively.

The IPCC AR4 also projected the following future climate conditions based on various global development and GHG emissions scenarios:

- **Temperature:** For the next two decades a warming of about 0.2°C per decade is projected for a range of Special Reports on Emission Scenarios (SRES). Even if the concentrations of all GHGs and aerosols had been kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected.
- **Precipitation:** Increases in the amount of precipitation are very likely in high latitudes, while decreases are likely in most subtropical land regions (by as much as about 20 percent in the A1B scenario in 2100), continuing observed patterns in recent trends.
- **Water availability:** By mid-century, annual average river runoff and water availability are projected to increase by 10-40 percent at high latitudes and in some wet tropical areas, and decrease by 10-30 percent over some dry regions at mid-latitudes and in the dry tropics, some of which are presently water stressed areas. In some places and in particular seasons, changes differ from these annual figures.
- **Extreme events:** It is very likely that hot extremes, heat waves, and heavy precipitation events will continue to become more frequent. Based on a range of models, it is likely that future tropical cyclones (typhoons and hurricanes) will become more intense, with larger peak wind speeds and heavier precipitation.
- **Sea level:** Global mean sea level is projected to rise by 0.19-0.59 meters between 1990 and 2100, due primarily to thermal expansion and loss of mass from glaciers and ice caps.

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Increasingly climate change is put on the top of the development agenda. In the context of a CEA it is important to examine, at an early stage, the impact of climate change in the national context.

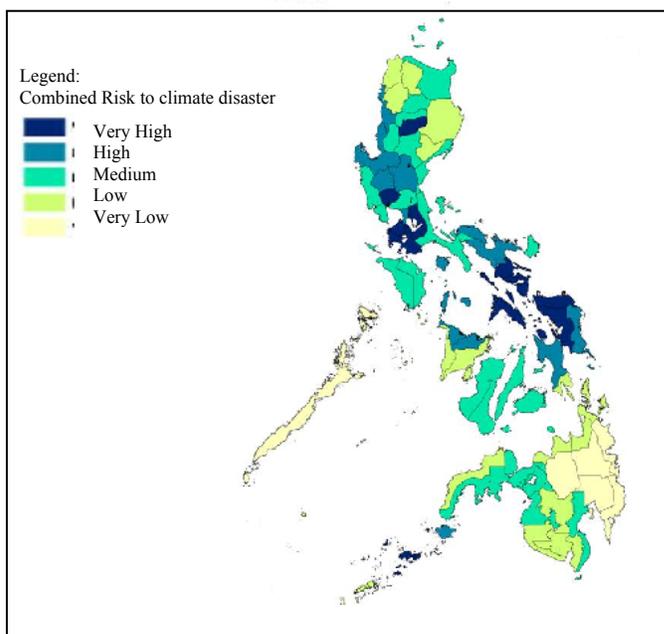
## II. Climate Change Impacts: The Philippine Perspective

### *Vulnerability, Risks and Threats*

The Philippines lies along the western rim of the Pacific Ring of Fire, a belt of active volcanoes and major earthquake faults, and the Pacific typhoon belt. It has a total discontinuous coastline of 32,400 kilometers, the longest in the world and is especially vulnerable to the adverse impacts of climate change. It is one of the world's most natural disaster-prone countries due to a combination of high incidence typhoons, floods, landslides, droughts, volcanoes, earthquakes and the country's considerable vulnerability to these hazards.

Climate change's impact on the Philippines is most often associated with extreme weather disturbances such as typhoons and floods, which, in turn, affect many other sectors of economic life. With 50.3 percent of its total area and 81.3 percent of the population vulnerable to natural disasters, the Philippines is considered a natural disaster hot-spot. About 85.2 percent of its US\$86 billion annual GDP is endangered as it is located in areas of risk (World Bank 2008). Since 2000, approximately 3 million people have been affected by various disasters annually.

**Figure 1: Combined Risk to Climate Disaster**



Source: Manila Observatory and DENR (<http://www.observatory.ph/vm/findings.html>)

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Figure 1 represents the sum of the normalized and provincialized risks due to climate hazards brought about by typhoon (super typhoons, typhoons, tropical storms and tropical depressions) and drought caused by El Niño, projected rainfall change and projected temperature increase. The top ten provinces affected by such events are: Albay, Pampanga, Ifugao, Sorsogon, Biliran, Rizal, Northern Samar, Cavite, Masbate, and Laguna. In general, Central Luzon and the Bicol regions rank high to very-high on the risk scale.<sup>5</sup>

**Table 1: Ranking of Disaster-related 20th century Philippine Fatalities**

<b>Hazard event</b>	<b>Number Killed</b>	<b>Damage (USD millions)</b>
Typhoon	28812	5653
Earthquake	9572	517
Volcano	6331	228
Flood	2545	431

Source: CRED, 1998

## **Typhoons**

Among the various natural hazards, typhoons are the largest killer in the Philippines. On the average, the Philippines is hit by 20 typhoons annually, of which five are expected to cause major damage in terms of both lives and property. In the 20<sup>th</sup> century, typhoons have killed 28,812 people and caused US\$5,653 million in damages (United Nations 2007). Tropical cyclones may occur any time of the year, but the months from June to December may be considered as the typhoon season, with its peak during the months of July and August. From 1975 to 2002, the annual average number of casualties was 593 dead, and the annual damage to property costing around PhP 4.6 billion, including damage to agriculture of PhP 3.05 billion. Between September 25 and December 1, 2006 the Philippines was hit by four extreme weather disturbances, as seen in Table 2, which caused considerable damage (United Nations 2007).

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<sup>5</sup> This indicates that it is the risk to typhoon scores and risk to projected rainfall change scores that dominate the summation of risks. In the case of risks from El Nino and projected temperature increases, the differences across provinces do not stand out as much as typhoon and projected rainfall change-related risks.

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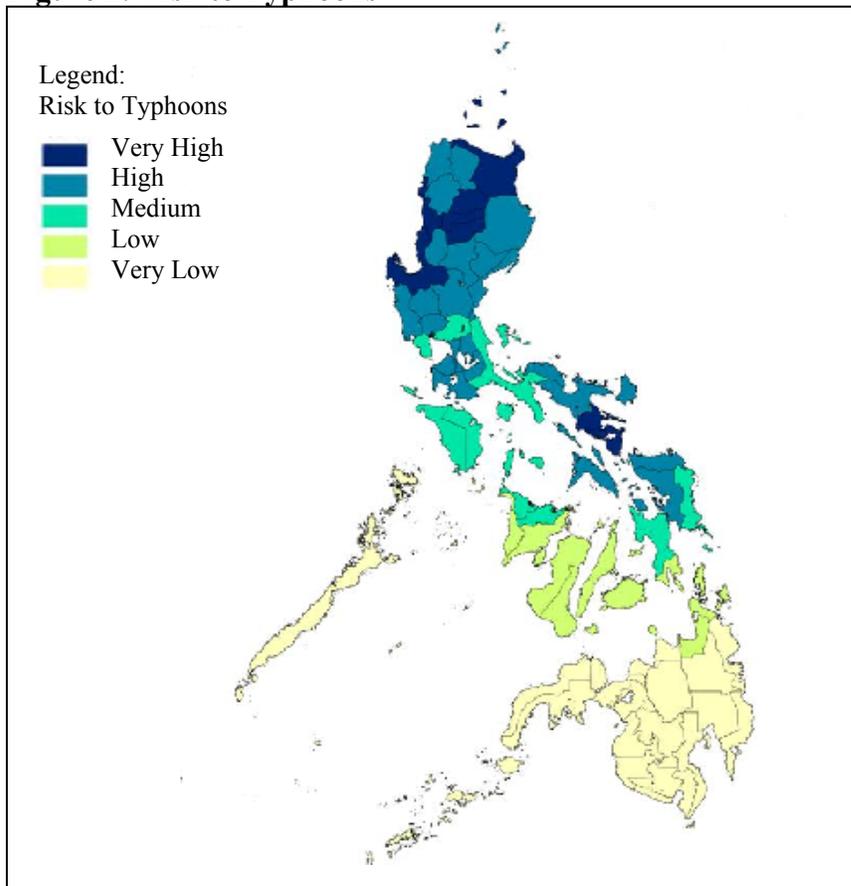
**Table 2: Cumulative damage impact of the most recent typhoons in the Philippines**

Damages	Typhoon Milenyo (Xangsane)	Typhoon Paeng (Cimaron)	Typhoon Reming (Durian)	Typhoon Seniang (Utor)	Total <sup>a</sup>
Casualties					
Dead	188	30	715	9	942
Missing	48	23	764	15	850
Injured	592	65	2,174	7	2,838
Affected Population	4,142,951 persons	364,733 persons	3,160,703 persons	256,817 persons	7.9 million
Displaced Population	244,613 persons	4,251 persons	95,926 persons	94,639 persons	439,429 persons
Totally Damaged Houses	118,081	1,395	181,676	211,032	512,184
Infrastructure	\$53M	\$9M	\$65M	\$40,000	\$127M
Agriculture	\$75M	\$17M	\$27M	\$80,000	\$119M
School Buildings	\$25M	\$5M	\$32M	\$30,000	\$62M

Source: (United Nations 2007)

Northern Luzon, Southeastern Luzon and Eastern Visayas are the areas highly at risk due to the occurrence of tropical depressions, tropical storms, typhoons and super typhoons.

**Figure 2: Risk to Typhoons**



Source: Manila Observatory and DENR (<http://www.observatory.ph/vm/findings.html>)

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## Sea level rise

About 70% of the country's 1,500 municipalities are along the coast, drawing from the abundant resources offered by the coastal zone and near-shore areas. A significant rise in sea level would affect most provinces, including the top economically productive provinces.

A 40-year observation of 5 primary tidal gauge stations in the country (Manila, Cebu, Davao, Legazpi and Jolo) showed an increase in sea level near 15 cm, the lowest expected sea level rise (SLR) set by IPCC at the end of the next century (Table 3). This could be an indication that SLR is now occurring in the Philippines. This is supported by the findings of the two Global Sea Level Observing System (GLOSS) sites in the Philippines (in Manila and Legaspi City). These GLOSS sites observed a small rise in relative sea-level before the 1960s and then a more rapid increase of between 20cm and 40cm up to 1997 (CRU-WWF,1998). The more recent trend may be partly attributed to excessive land reclamation and possible subsidence. Nevertheless, the residual rise in sea-level around the Philippine coast is likely caused by warmer ocean waters and melting glaciers in the world's mountain areas.

**Table 3: Trend in Annual Mean Sea Level (in meters)**

Station	1950 to 1959 Change	1950 to 1969 Change	1970 to 1979 Change	1980 to 1989 Change
Manila	-0.7	+0.083	+0.183	+0.142
Legaspi	+0.044	-0.071	+0.074	+0.165
Davao	-0.099	-0.024	+0.069	+0.165
Cebu	-0.09	-0.085	+0.027	+0.009
Jolo	-0.08	-0.078	-0.020	+0.069

Source: The Philippines' Initial National Communication on Climate Change

## Poverty and Vulnerability

The country's vulnerability to natural hazards is closely linked to poverty and environmental degradation. It is mostly the poor who are in disaster-prone and environmentally fragile areas. At the same time, natural hazards contribute to further degradation and poverty, thus, creating a vicious cycle of poverty, environmental degradation, and vulnerability to natural disasters.

Poverty incidence remains to be high and have even recently worsened in the Philippines (Table 4). About 32.9 percent of the country's population was living below the poverty line in 2006, up from 30 percent in 2003 and nearly equal the poverty incidence in 2000 (30 percent). Thus, the number of poor has increased by over 5.4 million individuals from 2003 to reach 27.6 million in 2006.

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**Table 4: Poverty Incidence in Rural and Urban Areas, 1985-2006 (in percent of population)**

	1985	1988	1991	1994	1997	2000	2003	2006
Philippines	40.9	34.4	34.3	32.1	25.0	27.5	26.0	28.1
Urban	21.7	16.0	20.1	18.6	11.9	13.2	12.1	14.4
Rural	53.1	45.7	48.6	45.4	36.9	41.3	39.5	41.5
Contribution to total poverty								
Urban	20.5	17.7	29.3	28.8	22.6	23.5	22.7	25.2
Rural	79.5	82.3	70.7	71.2	77.4	76.5	77.3	74.8

Source: Balisacan, 2008

Poverty in the country has always been and has increasingly become a rural phenomenon. Rural poverty incidence was estimated to be 41.5 percent in 2006 compared to only 14.4 percent in urban areas. It accounts for about 75 percent of total poverty in the country. Most of the rural poor are dependent on agriculture and natural resources for their livelihood and are, thus, the most vulnerable to climate change. The country's vulnerability to natural hazards is closely linked to poverty and environmental degradation. Risks from global climate change are expected to further exacerbate the country's, especially the poor's, vulnerability to natural hazards.

### ***Contribution to greenhouse gas emissions***

Based on the latest available data, the Philippines' GHG contribution in 2004 (excluding changes in land use) represented 0.27 percent of the world's total (79.1 MtCO<sub>2</sub>), an increase of its 1990 emissions share of 0.18 percent (CAIT 2008). In 2000, the latest year with data on land use change and forestry, emissions were 0.51% of the world total, ranking the Philippines in the 36th place.<sup>6</sup> In 2000, land-use change and forestry was responsible for 55.9 percent of GHG emissions, while the energy sector was responsible for 40.6 percent (with electricity and heat, and transportation the most significant GHG emission contributors) (Table 5).

The Philippines' greenhouse gases (GHG) emissions have been on the rise both from energy use and land-use changes. The sub-sector with the most significant rise in GHG emissions is the transport sector (279 percent), followed by electricity (89 percent), industrial processes (88 percent) and land-use change and forestry (20 percent) (CAIT 2008). In contrast to other countries, GHG emissions in the Philippines need to be curbed from the land-use and forestry angle.

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<sup>6</sup> Within the regions, the Philippines rank behind Thailand, Australia, Myanmar, Malaysia, India and Indonesia (7.05%) with respect to emissions.

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**Table 5: Philippine’s GHG Emissions by Sector, 1990, 2000, 2004**

Sector	1990		2000		2004		Change 1990-2000
	MtCO2	%	MtCO2	%	MtCO2	%	
Energy	36	30.4	68.9	40.6	72.6	91.8	91%
Electricity & Heat	14.2	11.9	26.8	15.8	28.9	36.5	89%
Manufacturing & Construction	8.3	7	9.2	5.4	11.2	14.1	11%
Transportation	6.2	5.2	23.5	13.9	25.4	32.1	279%
Other fuel combustion	7.4	6.2	9.4	5.5	6.8	8.6	27%
Fugitive emissions	0	0	0	0	0.3	0.4	0%
Industrial processes	3.2	2.7	6	3.5	6.5	8.2	88%
Land-Use change & Forestry	79.4	66.9	94.9	55.9	na	na	20%
<b>TOTAL</b>	<b>118.6</b>		<b>169.8</b>		<b>79.1</b>		<b>43%</b>

Source: Citation: Climate Analysis Indicators Tool (CAIT) Version 5.0. (Washington, DC: World Resources Institute, 2008).

As greenhouse gas emission increase worldwide, the Philippines will continue to be affected by climate variability through changes in temperature, precipitation, and sea-level rise. This will affect a number of sectors such as agriculture, forestry, marine and coastal resources, fisheries, water resources and health, which will be discussed in the next section.

### *Probable Climate Change Impacts<sup>7</sup>*

#### **Climate Variability**

##### *Changes in Temperature*

The general circulation models (GCM) used in the Philippines’ Initial National Communication on Climate Change (PINCCC,1999) predict an average increase of 2 to 3°C in annual temperature in the country should a doubling of CO<sub>2</sub> in the atmosphere occur (Table 6; Annex 2). Major impact areas include eastern Mindanao, portions of Samar, Quezon, western Luzon, Metro Manila, and other highly urbanized areas.

However, the Climatic Research Unit of the World Wildlife Fund (CRU-WWF) expects the Philippines to warm more slowly than the global average mainly due to it’s location in a tropical ocean. They believe that its future warming will be uniform throughout the islands and throughout the year. They estimate that it will proceed at a rate of between 0.1°C/decade to 0.3°C/decade.

<sup>7</sup> The probable climate change impacts discussed in this section refer mainly to changes in climate variability---that is through changes in temperature, precipitation and sea level rise---as well as the impact it has on productive sectors.

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**Table 6: Temperature Change and Rainfall Ratio by Water Resource Region Based on the Canadian Climate Center Model (2 x CO<sub>2</sub> Scenario)**

Name of Water Resource Regions	Temperature Change (°C)	Rainfall Ratio
I. Ilocos	<2	1.0-1.5
II. Cagayan Valley	<2	1.0-1.5
III. Central Luzon	2-3	1.0-2.0
IV. Southern Tagalog	2-3	1.6-2.0
V. Bicol	2-3	1.0-1.5
VI. Western Visayas	2-3	1.6-2.0
VII. Central Visayas	2-3	1.6-2.0
VIII. Eastern Visayas	2-3	1.0-2.0
IX. Western Mindanao	2-3	1.0-1.5
X. Northern Mindanao	2-3	<1.0-1.5
XI. Eastern Mindanao	>3	<1.0
XII. Southern Mindanao	2-3	1.0-1.5

Source: The Philippines' Initial National Communication on Climate Change

## ***Changes in Precipitation***

The GCMs mentioned above predict rainfall to increase in many areas of the country under the same CO<sub>2</sub> scenario (see Annex 2). For instance, a 60 to 100 percent increase in annual rainfall is projected in the Central Visayas and Southern Tagalog provinces, including Metro Manila. Meanwhile, an increase of 50 percent or less is predicted in the other areas of Luzon, Samar, and the central and western parts of Mindanao. On the other hand, a decrease in annual rainfall is expected for other sections of the country such as northern and eastern Mindanao and parts of western Luzon.

The CRU-WWF, likewise, predicts average annual precipitation increases in the Philippines by the 2050s with some seasonal differences. The drier seasons of December-February and March-May are expected to become drier still, while the wetter seasons of June-August and September-November will become wetter. The projected rainfall increases ranged from a low of about 5 per cent, which is not much larger than changes in 30-year average rainfall totals that may be caused by natural climate variability, to as high as 20 per cent.

## ***Sea Level Rise***

The PINCCC (1999) pointed out that anthropogenic global warming due to increasing GHG emissions may lead to accelerated sea level rise (ASLR). This will exacerbate the vulnerability of the coastal ecosystems through increased erosion of beaches and cliffs and the direct inundation of low-lying lands; increased risk of flood and storm damage; changes in tides of rivers and bays; and changes in sediment deposition affecting tidal flats and wetlands. Coral reefs and wetlands that are already heavily stressed may not be

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able to keep pace with changes in sea level and mangroves may not survive changes in sediments and salinity. In 1992, using topography as the sole basis for evaluation, the National Mapping and Resource Information Authority (NAMRIA) of the Philippines estimated that a SLR of 100 cm will inundate a total area of 129,114 ha affecting approximately 2 million people.

The CRU-WWF estimated that a 30cm rise in sea-level (which may be reached by 2045) would regularly inundate over 2,000 hectares of the Manila Bay area threatening about 0.5 million people. Meanwhile, a 100cm rise in sea-level (which may be reached by about 2080) would threaten over 5,000 hectares of the Bay affecting over 2.5 million people. These risks would be further enhanced if sea-surges associated with intense storm activity were to increase. The most densely populated areas of Malabon and Navotas in the Bay area would experience more frequent inundation under these circumstances.

## Impact of Climate Change by Sector

Climate change is mostly felt through temperature, precipitation and sea level variations, which, in turn, impacts agriculture through crop yields, irrigation demands; forestry by changes in forest productivity, forest composition; water resources through variability of water supply and quality; coastal areas by erosion of beaches, inundation of coastal areas; species and natural areas through shifts in ecological zones, loss of habitat and species; as well as health impacts through infectious diseases, air quality-respiratory illnesses and water-related mortality. Table 7 summarizes some of the global impacts of climate change by sector.

**Table 7: Summary (global) impacts of climate change, by sector**

<b>Agriculture</b> (Valeroso, 2002a)	<b>Forests and Watersheds</b> (Lasco et al. 2006; Cruz 1997)	<b>Coastal (and Marine) Resources</b> (Perez, 2002a)
<p>Increased temperature</p> <ul style="list-style-type: none"> <li>• Changes in growing seasons</li> <li>• Heat stress in plants and animals</li> <li>• Increased yields (at up to 2oC increase for some crops)</li> <li>• Increased outbreaks/incidences of pests and diseases</li> <li>• Changes in hydrological cycle</li> </ul> <p>Changes in rainfall regimes</p> <ul style="list-style-type: none"> <li>• Changes in crops and crop areas</li> <li>• More severe droughts and/or floods</li> </ul>	<ul style="list-style-type: none"> <li>• Changes in location of areas suitable for the growth of certain species (shift or disappearance of some productive systems)</li> <li>• Changes in production per unit area</li> <li>• Changes in types and incidence of pests and diseases</li> <li>• Altered ecosystem functions (biochemical cycles)</li> <li>• Increased or decreased nutrient retention</li> <li>• Changes in species' reproductive cycles</li> </ul>	<p>Biophysical changes</p> <ul style="list-style-type: none"> <li>• Increased coastal erosion, stresses on coral reefs, and coral bleaching</li> <li>• Inhibition of primary production processes</li> <li>• Prevalence of algal blooms responsible for toxic red tides</li> <li>• Higher storm-surge flooding</li> <li>• Landward intrusion of seawater in estuaries and aquifers</li> <li>• Changes in surface water quality and groundwater characteristics</li> <li>• Changes in the</li> </ul>

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<ul style="list-style-type: none"> <li>• Deterioration of land cover/land resources</li> <li>• Changes in water resources (irrigation)</li> </ul> <p>Changes in frequency/intensity of extreme climate events</p> <ul style="list-style-type: none"> <li>• Increased damage to crops and/or livestock</li> <li>• Decreased productivity</li> <li>• Increased soil erosion</li> </ul>	<ul style="list-style-type: none"> <li>• Changes in the value of a system as a tourist attraction</li> <li>• Increased risks of forest fires, in turn lead to changes in tree and plant species and in forest boundaries (Valeroso, 2002)</li> <li>• Increased runoff, soil erosion and flood occurrences, and decreased productivity of water resources</li> <li>• Changes in local biodiversity (extinction and inhibition of re-immigration from adjacent areas) (The Philippines' Initial National Communication, 1999)</li> </ul>	<p>distribution of pathogenic microorganisms</p> <p>Submergence/inundation of low-lying areas</p> <ul style="list-style-type: none"> <li>• Affect coastal population, settlements, and infrastructure</li> <li>• Increased soil water logging, resulting to poor drainage</li> <li>• Lower plant production and survival</li> <li>• Move freshwater seaward, resulting to low dissolved oxygen availability</li> </ul>
<p><b>Water Resources</b> (Perez 2002b)</p> <ul style="list-style-type: none"> <li>• Change in hydrological (and crop water) regimes</li> <li>• Increased demand for irrigation water</li> <li>• Changes in groundwater quality (saltwater intrusion)</li> <li>• Changes in streamflow and groundwater recharge</li> <li>• Sedimentation of reservoirs</li> </ul>	<p><b>Species and Natural Areas (Biodiversity)</b> (Lim, 2007)</p> <p>Reported impacts</p> <ul style="list-style-type: none"> <li>• Changes in species distribution and in timing of biological events</li> <li>• Changes in morphology, physiology and behavior of many birds, insects and plants</li> <li>• Increased frequency and/or intensity of pest and disease outbreaks</li> <li>• Increased number of plant growing days</li> <li>• Coral bleaching</li> <li>• Changes in marine fish populations</li> <li>• Large fluctuations in the abundance of marine birds and mammals</li> </ul>	<p><b>Human Health</b> (Ebi et al., 2005)</p> <p>Increased incidences of diseases and illnesses</p> <ul style="list-style-type: none"> <li>• Insect- and rodent-borne diseases (dengue, leptospirosis, and malaria)</li> <li>• Water-borne diseases (schistosomiasis, cholera)</li> <li>• Food-borne diseases (diarrheal diseases and typhoid)</li> <li>• Respiratory diseases (asthma, bronchitis, and respiratory allergies and infections)</li> <li>• Heat-related illnesses (sunstroke, sunburn, heat stress or exhaustion, dehydration)</li> </ul>

Source: Taken from (Lasco *et al.* 2007)

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## *Agriculture*

A large part of the adverse impact on economic development and poverty reduction of increasing climate change-related risks were felt through their interrelated effects on agriculture, land/soil quality and forest cover. It should be noted that about 35 percent of the country's 33.7 million employed labor force (January 2008 Labor Force Survey) are dedicated to agricultural, fisheries, and forestry activities and are likely to suffer losses, along with their dependents, on the occurrence of soil degradation, flooding, drought and high temperatures.

For instance, the 1982-83 and 1997-98 El ENSO (El Niño-Southern Oscillation) events, which induced prolonged wet and dry seasons, caused a large drop in agricultural production and contributed to the sharpest falls in GDP in the past decades. The 1997-1998 El Niño resulted in a 6.6 percent GDP contraction in agricultural production and the decline in construction and construction-related manufacturing by 9.5% (Republic of the Philippines 1999). The estimated damage due to 1990-2003 ENSO-related drought was estimated to be more than US\$ 370 million (Lasco et al. 2008).

*Palay* (unhusked rice) and corn, the two cereals widely grown in the Philippines, account for about half of total crop area. Another 25 percent of the production area is taken up by coconuts, a major export earner. Climatic conditions are a major determinant of crop production patterns. For example, coconut trees need a constant supply of water and do not do well in areas with a prolonged dry season. Decrease in production and gross value added for rice, maize, sugarcane and coconut in the Philippines coincides with El Niño years, while increases coincide with La Niña years (Valeroso 2002 in Lasco et al 2007). The 1997-1998 El Niño, led to a combined loss of 1.8 million tons (valued at US\$248,000) in rice and maize production (PCARRD, 2001 in Lasco et al 2007; table 8).

**Table 8: Philippines- annual rice production and losses arising as a consequence of natural disasters, 1991-2000**

Year	Total <i>Palay</i> production*	Typhoons and floods		Drought		Total losses	
		Loss in production*	Loss % of production	Loss in production*	Loss % of production	Loss in production*	Loss % of production
1991	9,673	152	1.6	16	0.2	168	1.7
1992	9,129	11	0.1	79	0.9	90	1
1993	9,434	246	2.6	-	0	246	2.6
1994	10,538	112	1.1	48	0.5	160	1.5
1995	10,541	328	3.1	45	0.4	373	3.5
1996	11,284	73	0.6	1	0	74	0.7
1997	11,269	75	0.7	15	0.1	90	0.8
1998	8,555	1,048	12.3	462	5.4	1,511	17.7
1999	11,787	321	2.7	1	0	322	2.7
2000	12,389	390	3.1	-	0	390	3.1
<b>Total</b>	<b>104,599</b>	<b>2,757</b>	<b>2.6</b>	<b>667</b>	<b>1.5</b>	<b>3,424</b>	<b>3.3</b>

Source: World Bank 2005 \*000s tons

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Typhoons, floods and drought caused 82.4 percent of total rice losses between 1970 and 1990 (Lasco *et al.* 2007). Rice yield losses of 65 percent, 81 percent and 52 percent (in 1973, 1983 and 1990, respectively) have been linked with wet season cropping due to El Niño. Drought in the latter part of 1989 and first half of 1990 reduced agricultural production, damaging some PhP 365 million worth of crops and causing an estimated opportunity loss of PhP1.2bn in *palay* production and P 808 million in corn production (NEDA undated in World Bank 2004).<sup>8</sup> The impact from tropical storms can be so severe for the agricultural sector that in 2006 storm Milenyo caused damages of PhP 3.9 million (Lasco *et al.* 2007).

Simulations for the major rice growing regions of Asia have shown that for every 1°C rise in temperature rice yields decrease by 7 percent. In the Philippines, simulation models have shown that rice yields can vary from 6.6 percent increase to 14 percent decline for every 1°C rise in temperature (Lasco *et al.* 2006).

## ***Forestry and land use***

Changes in precipitation may also cause a re-composition and re-distribution of forest types. The PINCCC (1999) predicted that a decrease in soil moisture in drier areas may accelerate forest loss while increase in precipitation could increase run-off resulting in soil erosion and flooding. For example, dry forests could be eliminated with a 25 percent increase in precipitation, while rain forest types could significantly increase (Lasco *et al.* 2007). This may also affect the livelihood of those communities dependent on forests, causing migration of populations.

Meanwhile, land use can both mitigate as well as abet climate change; the former by atmospheric carbon sequestration through photosynthetic activity, the latter by contributing to climate change through CO<sub>2</sub> emissions. Changes in land use is the result of expansion of agriculture, changes in watering system, deforestation and reforestation, urbanization processes, and infrastructure development. (Lasco *et al.* 2006). It was only in the late 1990s that climate change was linked with land degradation following the ratification of the UNFCCC.

In the Philippines, twenty percent of CO<sub>2</sub> emissions in 2004 were the result of land use, with the rate of deforestation of about 2.2 percent per year between 1990 and 2005. This figure is considerable by way of international comparison (World Bank 2007). About 45 percent of the arable land in the Philippines is moderately to severely eroded. Until the early 1980s land management interventions were limited to reducing illegal logging. In the decade of the 1980s efforts to address land degradation expanded but without significant impact on agricultural productivity as more people were pushed to farm in uplands causing more environmental damage. Changes in rainfall pattern also pushed people to migrate to higher elevations where soil is relatively fertile causing the rate of conversion of forest to agricultural lands to increase This in turn has increased GHG

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<sup>8</sup> Philippine NEDA. No date. Economic Impact of Disasters. Manila: National Economic Development Authority.

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emissions. A rehabilitation activity of degraded land, therefore, offers great potential for carbon sequestration which provides many opportunities for co-benefits and financial sources for adaptation.

## *Coastal Areas, Marine Resources, and Fisheries*

More than 60 percent of the coastal population's livelihood depends on marine resources. The coastal and marine environments in the Philippines contain an abundance of biodiversity in coral reefs, mangrove forests and sea grasses. But these assets are under strong pressure due to unsustainable fishing practices, estimated to exceed natural reproduction by about 30-50 percent resulting in declining catches per unit of effort. Coastal fishing accounts for 40 to 60 percent of the total fish catch, represents about 4 percent of GNP and employs over one million Filipinos. The economic loss of over-fishing has been estimated at about \$125 million per annum, while losses due to red tides were about \$30 million per year in the 1990s (World Bank 2005).

Mangroves and coral reefs are the most valuable coastal asset. While coral reefs have been estimated to contribute about \$1.4 billion per year to the economy accounting for about 10 to 15 percent of total annual fish yield, only some 5 percent of them are now in excellent condition. Mangrove forests help stabilize sediments which threaten marine life. While mangroves are able to cope with sea level rise of up to 12 cm over the next 100 years, mangroves populations are steadily decreasing in quantity and quality due to over-cutting, land clearing and habitat conversion (Perez undated).

Capili, et al (2005) pointed out that, in the recent years, reefs in poor condition increased to 40% in the last 20 years due partly to ocean warming. Coral bleaching and fish kills were observed in Silaqui Island and Bolinao while the coastal areas in the Visayas were affected by bleaching. A significant decrease (up to 46%) in live coral cover was observed after the 1997-98 bleaching event in the country. It was noted that the highly bleached areas in the country coincided with areas of poverty and dense populations. Shelter and security are also issues of concern especially in areas affected by sea-level rise. In cases where construction of man-made barriers will not suffice, relocation of inhabitants will be the most likely option. Coastal erosion has been observed along the 60 km long coast of southern La Union, Philippines.

## *Water Resources*

Variation in stream flow and groundwater surcharge affect water quality and availability (ADB 2008). An investigation on the effect of climate, topography and tidal variations in the quality of fresh water supply reported that the increased height of the tide contributed to increased specific electrical conductivity (SEC) which is an indicator of salinity. Groundwater with SEC values > 1,000 uS/cm contain chloride concentrations > 250 mg/l, making the water unfit for drinking (Ong, 2000 as cited in Perez, 2002).

Meanwhile, El Niño events in the Philippines have significantly reduced water inflows into major watersheds, reservoirs and other impoundments, thus, causing considerable

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strain on water resources. As a result, water for households and irrigated agriculture have been severely curtailed, especially in Metro Manila. During severe El Niño-driven droughts, water for agriculture has been sacrificed in favor of domestic and industrial water supply seriously impairing agricultural land productivity during the period (Moya and Malayang, 2004).

Using general circulation model (GCM) results, Jose and Cruz (1999) found that changes in rainfall and temperature will be critical to future inflow in two major reservoirs, Angat and Lake Lanao<sup>9</sup>; with rainfall variability having a greater impact than temperature variability. In both locations, runoff is likely to decrease in the future and be insufficient to meet future water demands. Other factors deemed as contributing to the impacts of climate change on water resources include degradation of water areas, unchecked extraction of groundwater, pollution due to industrialization, saltwater intrusion and sedimentation of reservoirs. Saltwater intrusion has been reported to be evident in nearly 28 percent of coastal municipalities in Luzon, 20 percent in the Visayas, and almost 29 percent in Mindanao (Rellin et al., 1999 as cited in Perez, 2002).

Similarly in the 97,318 ha Pantabangan-Carranglan watershed that services a total area of about 103,000 ha across 24 municipalities in Nueva Ecija, Bulacan and Pampanga provinces, 1980-2000 data show that observed streamflow closely follows the pattern of monthly rainfall averages for both the wet and dry seasons. ENSO events also appear to affect the pattern of streamflow, as the significant rise and drop of the hydrograph coincided with the strong ENSO events of 1982-83 and 1997-98. The changes in climate (rainfall and temperature) could translate to about 17 percent increase in wet season streamflow and a decrease of around 35 percent in dry season streamflow of PCW (Lasco et al 2006).

## ***Health impacts***

According to the IPCC Fourth Assessment Report climate change may impact health in the following manner:

- Increase under nutrition and consequent child growth and development.
- Increase injuries, illness and deaths due to heatwaves, floods, droughts, storms and fires
- Increase number of cases of diarrheal diseases
- Increase cardio-respiratory diseases where ozone exposure concentrations increase
- Increase number of people at risk of dengue, malaria, etc (Ebi 2008).

The First National Communication Report 2000 correlated the incidence of different diseases in five provinces and a city in the Philippines with various indicators of climate change. Diseases such as nutritional deficiencies, malignant neoplasms (cancer) and mumps had more than 50 percent correlation with climate change factors. Those between

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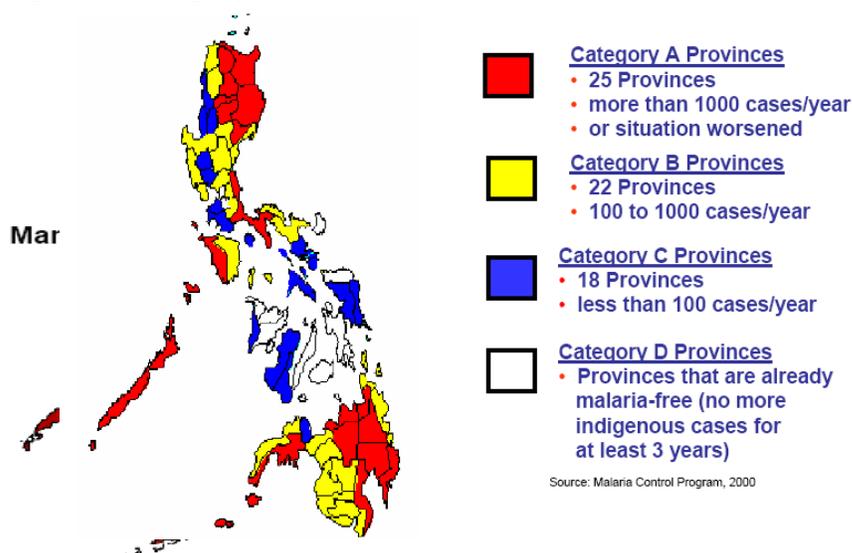
<sup>9</sup> The Angat multipurpose reservoir is the main municipal water source for Metro Manila, and also supplies irrigation water, serves as flood control for areas downstream, and contributes to power generation in Luzon. Lake Lanao meanwhile is the second largest lake in the Philippines, with a volume of about 21,500 million cm, and is the main source of hydroelectric power in Mindanao.

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30 to 50 percent correlation include tuberculosis, meningococemia, tetanus, chicken pox, influenza, bronchitis, pneumonia, whooping cough, hepatitis, diarrhea, dengue, cholera and viral encephalitis. Most of these diseases are droplet spread and are water- or food-borne. Diarrhea and malaria are the two main diseases affected by climate change in the region (Ebi 2008). The estimated mortality attributable to climate change in 2000 for the Western Pacific (which includes the Philippines) was of 2160 deaths per million population (Ebi 2008).

In terms of malaria while it has been controlled and eliminated in 10 provinces it is still endemic in 64 provinces. Malaria morbidity rate has been declining from 147 in 1992 to 60 cases in 1997 to 48 cases per 100,000 population in 2002.<sup>10</sup> Data from the Department of Health showed how malaria cases (more than 1,500 recorded cases) and other diseases increased in 1998, a year when temperature rose as a consequence of El Niño (Global Health Monitoring 2008).

**Figure 3: Geographical Distribution of Malaria, 1991-2001**



Source: <http://www.isap.org/2005/ICC-ISAP-symposium/slides/Bustos/BUSTOS-Manilla-Malaria-05-06-05.pdf>

<sup>10</sup> <http://www.un.org.ph/index-global-commitment.html>

### **III. The Philippine Response So Far in Addressing Climate Change**

#### ***Policy and Legal Initiatives<sup>11</sup>***

The first significant recognition by the state to sustainable development was set out in the 1987 Constitution by stating that “the policy of the State to protect and advance the right of the Filipino people to a balanced and healthful ecology in accord with the rhythm and harmony of nature”.

In 1991, the Philippines began to address the issue of climate change in its thrust to achieve sustainable development with the formulation of the Philippine Strategy for Sustainable Development (PSSD). Immediately, thereafter, the country officially adopted the Agenda 21 by formulating the Philippine Agenda 21. This document serves as the overarching framework to lay down the national agenda for sustainable development for the 21st century geared towards having a “harmonious integration of a sound and viable economy, responsible governance, social cohesion and harmony and ecological integrity to ensure that development is a life-enhancing process. The ultimate aim of development is human development now and through future generations” (Asuncion D. Merilo 2008).

In 1991 it also created the Inter-Agency Committee on Climate Change (IACCC). While a majority of the members of the IACCC are government agencies, it has the membership of a civil society umbrella group, the Philippine Network on Climate Change (PNCC). This group is internationally recognized by its work not only on climate change but also other relevant environmental issues.

Its’ commitment to address global environmental issues was further manifested by its support to the UNFCCC and by being a signatory to at least ten more international conventions.<sup>12</sup> The Philippine was one of the first countries to set up a national committee to discuss and develop positions on climate change prior to the establishment of the Intergovernmental Negotiating Committee, which then negotiated the UNFCCC (Asuncion D. Merilo 2008). The UNFCCC ratified on April 15, 1998, committed the country to the provisions set for a Non-Annex 1 Party, to curb GHG emissions, even when, the Philippines, does not have any responsibility or commitment to reduce or limit its anthropogenic emissions of greenhouse gases (Asuncion D. Merilo 2001). The DENR is the technical focal point recognized by the UNFCCC and international community while the Department of Foreign Affairs (DFA) serves as the political focal point.

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<sup>11</sup> This section has benefited from Ms. Asuncion D. Merilo’s reaction delivered at the CEA Consultative Workshop.

<sup>12</sup> Convention on Biological Diversity, Convention on Wetlands, Convention on Migratory Species, Convention on International Trade in Endangered Species of Wild Fauna and Flora, Convention to Combat Desertification, Montreal Protocol on Substances that Deplete the Ozone Layer, Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Basel Convention on the Transboundary Movements of Hazardous Wastes and their Disposal, Cartagena Protocol on Biosafety, Convention on the Law of the Sea

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One of the commitments of the Parties to the UNFCCC is to incorporate climate change consideration, when feasible, in relevant social, economic and environmental policies and actions. The following laws explicitly address climate change:

- **Agriculture and Fisheries Modernization Act (1997)** establishes that the Department of Agriculture together with other appropriate agencies, should take into account climate change, weather disturbances and annual productivity cycles in order to forecast and formulate appropriate agricultural and fisheries programs.
- **Philippine Clear Air Act (1999)** provides that the DENR together with concerned agencies and LGUs prepare and implement national plans that are in accordance with UNFCCC and other international agreements, conventions and protocols on reducing greenhouse emissions. In addition it establishes that meteorological factors affecting ozone depletion and GHGs should be monitored and standards set (Asuncion D. Merilo 2008).

In 1990 and 1994, the Philippines conducted a national greenhouse gas emissions inventory. This process led to the First National Communication on Climate Change in May 2000 funded by GEF. This initial communication highlighted the 1994 GHG emission inventory and reports the country's efforts on mitigation and adaptation, vulnerability assessment and information, training and awareness.

After signing the Kyoto Protocol on August 2, 1994, which was later ratified on November 20, 2003, the Philippines set out to participate in the Clean Development Mechanism (CDM) of the Kyoto Protocol.

More recently, the Presidential Task Force on Climate Change was created to promote national projects, programs and actions on climate change. Several senate bills have also been introduced that aim to provide with adaptation and mitigation proposals, including the creation of the Global Warming Commission.

## **National Development Plans**

The Medium Term Philippine Development Plan (MTPDP) for 2004-2010, the primary document that guides national development programs, climate change is mentioned in connection with the potential of participating in the CDM and emerging carbon market (National Economic and Development Authority 2004). In terms of adaptation to climate change, it is usually referred to in the document within the context of Disaster Risk Reduction (DRR) (Lasco *et al.* 2007) which has also been incorporated as one of the priority concerns in the Government's 10-Point Action Plan for Effective Governance (United Nations 2007). Similarly, in at least four chapters, the government addresses the needs of victims of disasters.

The recent MTPDP, 2004-2010 mid-term updating exercise shows additional progress in the mainstreaming of climate change in decision-making. The latest draft shows more mention of climate change in the updated document. Climate change was mentioned in

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the Green Philippines chapter but also in the same manner as stated above. However, climate change was, for the first time, mentioned in the Agribusiness chapter; firstly, in the context of S&T-based innovations in the sector, especially for mitigation, and, secondly, in the call for the adoption of climate change adaptation models/technologies for agriculture.

In the energy sector, the major programs center on energy efficiency as well as promotion and use of new and renewable energy (NRE) sources. Under the Philippine Energy Plan (PEP) – 2004 to 2013, the NRE sources are envisioned to contribute significantly to the country's electricity requirements. The primary energy supply from NRE by 2013 is projected to increase to 53 percent of the total supply (400.91 MMBFOE ) from 51 percent of total supply (273.98 MMBFOE) in 2004. Furthermore, the Biofuels Act (2007), which was designed to pursue energy sufficiency and security, in a way helps reduce the emission of greenhouse gases,.

Meanwhile, in the Philippines' Midterm Progress Report on the Millennium Development Goals, it is suggested that climate change creates an opportunity for the Philippines' to channel large-scale debt-for-equity programs to reforestation, clean water, irrigation and food production programs. In other words, climate change is seen to have a devastating impact on the attainment of the MDGs mostly through a series of natural disasters, and, therefore, the report highlights the importance of climate change adaptation and long-term disaster risk management (NEDA 2007).

### **Local Government Units**

Some Local Government Units (LGUs), especially those in the disaster-prone areas, have also been active in the promotion of climate change risk management. For instance, a multi-stakeholder National Conference on Climate Change Adaptation was convened by the Provincial Government of Albay in partnership with the Department of Environment and Natural Resources and the World Agroforestry Centre. It was held in Legazpi City on October 22-24, 2007 to discuss the potential impacts of climate change to the Philippines, explore concrete adaptation options to current climate risks and future climate change, and to discuss the policy implications of climate change to local government units. The major output of this conference was the crafting of the Albay Declaration on Climate Change (Annex 1) which was subsequently submitted to President Arroyo. The Province of Albay, through Governor Salceda (former Congressman and Presidential Economic Adviser) is actively pursuing follow-through activities within the framework of the declaration, which includes working on a plan of action to prioritize climate change adaptation in the national agenda; promote 'climate-proofing' development through multi-sectoral participation in the development national strategic framework on climate change adaptation, among others (see Annex 1 for more details).

### ***Organizational Responses and Mechanisms***

The government has adopted the Philippine Agenda 21 and the Millennium Development Goal for environmental sustainability; has created the Philippine Council for Sustainable Development (PCSD), the Inter-Agency Committee on Climate Change (IACCC), the Presidential Task Force on Climate Change Adaptation and Mitigation (PTFCC), the Advisory Council on Climate Change (ACCC), and the President has made a Green Philippines as one of the “8 in 8” priorities.

### **Oversight and Coordination**

In May 1991, by virtue of Presidential Administrative Order No.220, the **Inter-Agency Committee on Climate Change (IACCC)** was created. The main tasks of this committee was to coordinate various climate change related activities, propose climate change policies and prepare the Philippine positions to the UN Framework Convention on Climate Change (UNFCCC) in Rio de Janeiro, which, in 1992, the Philippines signed.

The Earth Summit in 1992 recommended the active participation of citizens along with governments in implementation of the Rio Summit agreements. The **Philippine Council for Sustainable Development (PCSD)** was created on September 1, 1992, as a multi-stakeholder participatory body, through Executive Order No. 15 in order to chart environment and sustainable development (SD) initiatives in the country. The PCSD is headed by the Director-General of the National Economic and Development Authority (NEDA) as Chairperson, and the Secretary of the Department of Environment and Natural Resources (DENR) as Vice-Chairperson. The membership of the Council is composed of various departments of the government and groups/organization from the civil society. One of its main functions is to establish guidelines and mechanisms to operationalize the sustainable development principles embodied in the Rio Declaration and incorporate them in the preparation of the Medium-Term Philippine Development Plan at both the national and local levels.

In 2007, Administrative Order 171 was issued to create a **Presidential Task Force on Climate Change (PTFCC)**, integrated by seven governmental agencies.<sup>13</sup> Its mandate is to address and mitigate the impact of climate change in the Philippines, paying special attention to adaptation, mitigation and technological solutions. In particular, the task force focuses on improving compliance to air emission standards and acts to combat deforestation and environmental degradation. The functions of the PTFCC include:

- Conduct rapid assessments on the impact of climate change, particularly on vulnerable sectors such as: water resources, agriculture, coastal areas, terrestrial and marine ecosystems;
- Ensure compliance to air emission standards and combat deforestation and environmental degradation;
- Undertake and initiate strategic approaches and measures to prevent or reduce GHG emissions;

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<sup>13</sup> It is currently in the process of incorporating 2 new agencies.

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- Conduct nationwide massive and comprehensive public information and awareness campaigns;
- Design concrete risk reduction and mitigation measures and adaptation responses, especially on short-term vulnerabilities on sectors and areas where climate change will have the greatest impact;
- Collaborate with international partners to stabilize GHG emissions and
- Integrate and mainstream climate risk management into development policies, plans and programs of the government.

The Secretary of the Department of Energy (DOE) serves as the Chair while the Secretary of the DENR serves as the Vice Chair of the PTFCC. The IACCC is the technical arm of the PTFCC. The PTFCC prepared the first draft of the Philippine Climate Change Strategic Framework and Action Plan in October 2007 which provides the strategic directions it will take to address climate change-related development issues (Box 1). This strategic framework and action plan is currently being updated which would include an inventory of existing National Government climate change activities, the identification of cross support and synergy opportunities among these activities as well as the identification of gaps.

## **Box 1: Strategic Directions of the Presidential Task Force on Climate Change (as of October 2007)**

In the next few years, the Task Force will lead the national effort to reduce GHG emissions through bold and aggressive mitigation measures. The DOE, in collaboration with the members of the Climate Change Task Force, will take decisive action to achieve a climate-friendly energy supply mix, while meeting the energy demand reduction targets for 2012.

At the same time, the Task Force will design adaptation responses to address vulnerabilities of sectors and areas where climate change will have the greatest impact. Focus will be on disaster-prone settlements, high-risk population centers, and food production areas.

The magnitude of the climate change challenge demands mitigation and adaptation measures that can strain the financial resources of developing countries. The Philippines would need to harness financial resources to address the causes and effects of climate change. Recognizing the massive infrastructure and technical requirements to pursue its mitigation and adaptation goals, the Task Force is committed to search for financing mechanisms in support of local and sectoral initiatives.

Toward this end, the task force will tap official development assistance (ODA) funds and technical assistance, explore market-based incentives (eg, tradable emission permits), develop targeted subsidies, introduce innovative lending schemes and other means of financing in order to meet the commitments of various sectors involved in climate change mitigation and adaptation.

In support of mitigation strategies, climate-friendly technologies have to be shared with local communities and sectors to establish low-carbon infrastructure for transportation, energy, agriculture, industry, and settlements. On the adaptation side, agricultural technologies along the lines of developing drought-resistant crops, for instance, would have to be introduced. The Task Force will lead in forging bilateral agreements, regional cooperation, and multilateral action to facilitate transfer of technology.

Social mobilization is a key strategy in mustering a cohesive national response to the challenge of

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climate change. The enabling interventions on the financial and technology fronts would enhance the capacity of the Task Force to rally stakeholders from diverse sectors around its core advocacy.

A far-reaching social mobilization effort across sectors and communities would yield manifold benefits:

- a. It would enable effective governance of the Philippine climate change response by setting in place the right policy environment and a system for tracking the progress of multi-agency efforts to plug vulnerabilities.
- b. It would pave the way for action and cooperation among diverse stakeholders, ensuring a unified and coherent national response.
- c. It would strengthen the advocacy for lifestyle changes among ordinary citizens, which can help in reducing carbon emissions.
- d. On another level, the concerted action of Philippine stakeholders would serve to highlight the urgent need for industrialized states to fulfill their mitigation commitments so as to avert severe devastation and dislocation in vulnerable countries.

Source: PTFCC Secretariat

**An Advisory Council on Climate Change Mitigation, Adaptation and Communication (IACC)** to the PTFCC is composed of leading CC experts in the country. As previously discussed, the IACC is the technical arm of the PTFCCC, established to coordinate the government and non-government sectors and formulate positions to the Climate Change Convention negotiations (Tarradell 2004).

In term of access to information, **Klima Climate Change Center**<sup>14</sup>, serves as the national body to disseminate information on climate change, raise awareness, conduct relevant research, and support national capacity building.

On land degradation, several institutional efforts have been made to address adaptation to climate change. For example several policy legislations have been adopted which include: the Agriculture and Fisheries Modernization Act (AFMA), Presidential Proclamation 1071 on the adoption of balanced fertilization strategy, and Executive Order 481 on the promotion and development of Organic Agriculture in the Philippines (see Annex 4).

The Bureau of Soils and Water Management (BSWM) is responsible for matters relative to the utilization and management of soils and water as vital agriculture. This includes addressing the issue of prolonged droughts and extensive rainfall, seeking to minimize their effect on standing crops.

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<sup>14</sup> Established in 1999 under the Climate Studies Division of the Manila Observatory at the Ateneo de Manila University as a joint venture of the Inter-Agency Committee on Climate Change (IACCC), the Department of Environment and Natural Resources (DENR) and the Department of Energy (DOE) under the Philippine Climate Change Mitigation Program with funding assistance from the United States Agency for International Development (USAID).

# (NOT FOR ATTRIBUTION; FOR DISCUSSION PURPOSES ONLY)

## ***Disaster Management***

Disaster management is organized around the principles set out in the Presidential Decree PD1566, promulgated on 11 June 1978. PD1566 established the National Disaster Coordinating Council (NDCC) as the highest policy-making body on matters pertaining to disasters, advising the President. It stipulates:

- State policy on self-reliance among local officials and their constituents in responding to emergencies and disasters
- Each political and administrative subdivision to utilize all available resources in the area before requesting assistance from neighboring or higher authority
- Primary responsibility rests on government agencies in the affected areas in coordination with the people themselves
- Government departments, bureaus and agencies should have documented plans
- Planning and operation shall be done at the barangay level in an inter-agency, multi-sectoral basis to optimize resource utilization
- Responsibility for leadership rests on the Provincial Governor, City/Municipal Mayor and Barangay Chairman
- When an emergency covering several towns or cities occurs the Provincial Governor assumes operational control
- Periodic exercises to be conducted at all levels, principally in barangays.

National Disaster Coordinating Council (NDCC) coordinates the actions of the respective member agencies are responsible for carrying out respective tasks and responsibilities, which include preparedness, mitigation, response and rehabilitation. It does not have a working budget but rather operated through NDCC does not have a regular budget; but operates through member-agencies and their local networks, namely the regional and local disaster coordinating councils (DCCs). Members of the NDCC and their respective responsibilities are as follows:

**Table 9: Agencies and their responsibilities with natural disaster management**

<b>Agency</b>	<b>Responsibility</b>
Secretary of National Defense-Chairman	<ul style="list-style-type: none"><li>▪ Convenes NDCC as necessary and calls on other government agencies and private sector when need arises</li></ul>
Secretary of Public Works & Highway	<ul style="list-style-type: none"><li>▪ Restores destroyed public structures, such as flood control, waterworks, roads, bridges and other vertical/horizontal facilities;</li><li>▪ Provides equipment for rescue, relief and recovery</li></ul>
Secretary of Transportation & Communications	<ul style="list-style-type: none"><li>▪ Restores destroyed communication and transportation facilities such as railroads and vertical structures;</li><li>▪ Organizes national transport services</li></ul>
Secretary of Science & Technology--Philippine Atmospheric, Geophysical and Astronomical Services PAGASA	<ul style="list-style-type: none"><li>▪ Continuing watch on environmental conditions to prepare daily weather forecasts, typhoon watches and flood outlooks.</li></ul>

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Philippine Institute of Volcanology & Seismology PHIVOLCS	<ul style="list-style-type: none"> <li>▪ Issues advisories on earthquakes, volcanic activity and tsunamis;</li> <li>▪ Identifies appropriate evacuation sites and organizes disaster control groups and reaction teams</li> </ul>
Philippine Nuclear Research Institute	<ul style="list-style-type: none"> <li>▪ Issues advisories on radioactive fallout, contamination and radiation incidents; organizes disaster control groups and reaction teams;</li> </ul>
Secretary of Social Welfare & Development	<ul style="list-style-type: none"> <li>▪ Extends relief assistance and social services to victims and provides rehabilitation</li> </ul>
Secretary of Agriculture	<ul style="list-style-type: none"> <li>▪ Undertakes surveys in disaster-prone areas and actual disaster areas to determine extent of damage of agricultural crops, livestock and fisheries;</li> <li>▪ Technical assistance to disaster victims</li> </ul>
Secretary of Education, Culture & Sports	<ul style="list-style-type: none"> <li>▪ Provides assistance in public education and campaigns regarding disaster preparedness, prevention and mitigation through integration of relevant subjects in school curriculum;</li> <li>▪ Makes school buildings available as evacuation centers;</li> <li>▪ Trains education staff in disaster preparedness</li> </ul>
Secretary of Finance	<ul style="list-style-type: none"> <li>▪ Issues rules and regulations regarding funding by local governments of DCC requirements;</li> <li>▪ With DBM issues rules and regulations on preparation of local government budget and utilization of the 2% reserve for disaster operations</li> </ul>
Secretary of Interior & Local Government	<ul style="list-style-type: none"> <li>▪ Oversees organization of local DCCs, the establishment of Disaster Operations Centers (DOCs) of all local governments, and the training of DCC members in coordination with OCD, DSWD and other relevant agencies</li> </ul>
Secretary of Trade & Industry	<ul style="list-style-type: none"> <li>▪ Maintains normal level of commodity prices during emergencies and organizes disaster control groups and reaction teams in large commercial and recreational premises</li> </ul>
Secretary of Health	<ul style="list-style-type: none"> <li>▪ Provides health services during emergencies and organizes reaction teams;</li> <li>▪ Issues public health warning notices</li> </ul>
Secretary of Environment & Natural Resources	<ul style="list-style-type: none"> <li>▪ Responsible for reforestation and control of areas prone to flood, landslide, mudflow and ground subsidence;</li> <li>▪ Provides technical assistance on environmental pollution</li> </ul>
Secretary of Tourism	<ul style="list-style-type: none"> <li>▪ Organizes and trains disaster control groups and reaction teams in hotels, pension houses, restaurants and other tourist-oriented facilities</li> </ul>
Secretary of Budget & Management	<ul style="list-style-type: none"> <li>▪ releases funds required by departments for disaster operations</li> </ul>
Secretary of Philippine Information Agency	<ul style="list-style-type: none"> <li>▪ provides public information service through dissemination of mitigation and preparedness measures</li> </ul>
Secretary-General, Philippine Red Cross	<ul style="list-style-type: none"> <li>▪ Conducts disaster leadership training courses, assists in DCC training at all levels;</li> <li>▪ Helps in provision of emergency relief</li> </ul>
National Housing Authority	<ul style="list-style-type: none"> <li>▪ Assessment of housing requirements of displaced persons;</li> <li>▪ Provision of temporary housing and rebuilding of destroyed areas</li> </ul>

# (NOT FOR ATTRIBUTION; FOR DISCUSSION PURPOSES ONLY)

Chief of Staff, Armed Forces of the Philippines	<ul style="list-style-type: none"><li>▪ Responsible for provision of security in disaster area and assistance in reconstruction;</li><li>▪ Provides transportation for relief supplies and personnel</li></ul>
Director-General, National Economic Development Authority	<ul style="list-style-type: none"><li>▪ Responsible for determination and analysis of effects of disasters on socio-economic programs, and the development of damage assessment schemes</li></ul>
Administrator, Office of Civil Defense <ul style="list-style-type: none"><li>▪ The OCD serves as the operating arm of NDCC.</li></ul>	<ul style="list-style-type: none"><li>▪ Acts as NDCC Executive Officer</li><li>▪ Coordinates activities and functions to implement policies and programs, and advises Chairman on disaster management matters</li></ul>
Secretary of Labor & Employment	<ul style="list-style-type: none"><li>▪ Organizes and trains Disaster Control Groups in factories and industrial complexes; provides emergency employment opportunities to disaster victims and implements industrial civil defense programs and measures</li></ul>

Source: World Bank 2004

## ***The Clean Development Mechanism (CDM)***

One area which the Philippines have made substantial institutional progress has been on the mitigation side of climate change through the CDM that aims at reducing greenhouse gas emissions. The basic principle of the CDM is for (a) developed countries to invest in low-cost abatement opportunities in developing countries and receive credit for the resulting emissions reductions, and therefore lowers the cost of compliance with the Kyoto Protocol for developed countries; (b) developing countries benefit from increased investment inflows, particularly to advance sustainable development goals (Institute for Global Environmental Strategies (IGES) 2005).

In the Mid-Term Philippines Development Plan (2004-2010), the mitigation aspect of climate change is closely associated with the potential of participating in the clean development mechanism (CDM) and emerging carbon market.

“The Department of Environment and Natural Resources (DENR) was designated as the national authority for the Clean Development Mechanism (CDM), by virtue of Executive Order (EO) 320 dated June 25, 2004, with the DOE taking the lead role in evaluating energy-related projects prior to their endorsement to/registration with the United Nations Framework Convention on Climate Change–CDM Executive Board.... while some industrialized countries like Germany have initiated the establishment of carbon funds which will be used to purchase carbon emission certificates (CER) to comply with their pledged reduction levels in GHG emission under the Kyoto Protocol. It will be advantageous to the country to actively participate in the emerging carbon market as a seller of CERs since it will boost the development of indigenous resources in line with the energy independence agenda” (National Economic and Development Authority 2004).

In accordance to the Executive Order No. 320 dated 25 June 2004, the Designated National Authority (DNA) for CDM is the DENR, which evaluates, in accordance with the Philippines’ national approval criteria, whether a project activity contributes to the

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country's sustainable development and whether the Philippine-based project participants have the legal capacity to participate in the proposed project.

The DENR Administrative Order No. 2005-17 prescribes the national approval criteria for CDM, where participants must be in a legal capacity to participate and where CDM projects must contribute to the Philippines' sustainable development (Table 11):

**Table 10: Contribution of CDM projects to the Philippines' sustainable development**

Economic Dimension	Provide variety economic opportunities
	Provide proper safety nets and compensatory measures for affected stakeholders
	Promote the cleaner, more efficient, energy saving, technically sounded and environmental-friendly technology in the sector (e.g. renewable energy, waste management, reforestation, etc.)
	Provide new financial resources
Environmental Dimension	Comply with the environmental policies and standards set by the Philippines
	Improve the quality of the environment, e.g. air, water, soil, etc.
	Promote sustainable use of natural resources
Social Dimension	Build up the capacities of local stakeholders through education and training
	Provide local resources and services to vulnerable groups
	Encourage local participation in the CDM project activity

Project level indicators shall be proposed by the project participants to be used in identifying the sustainable development impacts of a project activity. The overall sustainable development impact of a proposed project activity must be positive.

There are now fourteen projects registered with the CDM Executive Board as of 10 September 2007 which are expected to prevent emission of 359,718 tons of CO<sub>2</sub> equivalent per year (See Annex 3). At the Bali Conference, DENR Secretary Atienza stated that the Philippines "are in the top ten countries that have the most number of clean development mechanism (CDM) projects for greenhouse gas emissions".

## ***Partnerships with International Organizations***

Various programs and projects have also been undertaken in cooperation with concerned international development agencies (See Annex Tables 4 and 5). Most of these initiatives are grant-funded assistance focused mainly on capacity building. These include the Asia Least Cost Greenhouse Gas Abatement Project (ALGAS), which identified mitigation options; the formulation of the National Action Plan on Climate Change, which designed mitigation measures which are "no regrets" in character; and the "Enabling Activity on

## (NOT FOR ATTRIBUTION; FOR DISCUSSION PURPOSES ONLY)

Climate Change” which intends to build the capacity of various government institutions to prepare its initial national communication to the UNFCCC.

Most donor-funded projects have been on climate change mitigation, largely in the energy sector. Nevertheless, these also include environment programs with climate change mitigation components either through community-based forest management (CBFM) or air pollution abatement programs (eg, ADB’s Metro-Manila Air Quality Program).

It is only recently that climate change adaptation interventions have been initiated. The focus of these interventions is the agriculture sector. These includes the Provention Consortium grant-funded “Agriculture Climate Risk Assessment Project” which focuses on crop modeling, insurance, and agricultural assets. In addition, a \$ 5million GEF-funded “Philippine Climate Change Adaptation Project Phase 1” will soon be implemented. It seeks to develop and demonstrate the systematic diagnosis of climate-related problems and the design of cost-effective adaptation measures, while integrating climate risk awareness and responsiveness into economic and operational planning, particularly in agriculture and natural resources management. The DENR is leading a team of concerned national government agencies (eg, DA, PAGASA, NAMRIA) in both adaptation projects. The Coral Triangle Initiative, which is a new multilateral partnership to help safeguard the marine and coastal resources of the Eastern Pacific that has also been launched.

At the local government unit (LGU) level, the UN/ISDR together with CITYNET and the World Bank’s East Asia Sustainable Development Department, in partnership with the Global Facility for Disaster Reduction and Recovery (GFDRR), held a regional workshop for city planners in 12 and 13 May 2008 in the city of Makati to initiate a dialogue on strategies to mitigate and adapt to potential impacts of climate change and associated natural disasters at the local level. The workshop looked into existing policy and operational work addressing the potential impact of climate change-related events on cities, including outlining the main actors, institutions (including national and city governments), existing partnerships and networks, and their implementation capacity. More particularly, it pilot- tested the World Bank-developed “Practitioner’s Handbook for Reducing Vulnerability to Climate Change Impacts and Related Natural Disasters in East Asia” among the participating city planners. The handbook contained good practices as well as prescribed steps to be taken at the city level to reduce the risk of disasters and impacts of climate change based on various typologies and hazard projections. This handbook will be further refined based on the participants’ feedback before it is rolled out for use.

## **IV. Climate Change Risk Management in the Philippines: The Way Forward**

### ***At the national level***

There is a need to further mainstream climate change risk management in national decision-making processes.

Although climate change has been mentioned more frequently in the Updated 2004-2010 MTPDP, it continues to be narrowly directed since it is mentioned in only two chapters : 3 times in the Green Philippines Chapter and twice in the Agribusiness Chapter. To the extent that the MTPDP determines public resource allocation, then climate change risk management is not expected to be a high priority government expenditure.

Similarly, in terms of national laws, Lasco *et al* (2007) found that few laws address mitigation of climate change, such as the Clean Air Act, and/or prescribe adaptation strategies to potential impacts of climate change (see Annex 6). In addition, a Land Use Act has yet to be passed making the protection of land resources more difficult.

Lasco *et al* (2007) interviewed 83 policy makers and scientists and found that there appears to be consensus that there is scope for climate change mitigation and adaptation policies to be better integrated or mainstreamed into national development programs. About 95 percent of respondents thought that mainstreaming climate change in Philippine policies is important and nearly 59 percent concurred that climate change has not been mainstreamed in the country. The most common reasons for this was lack of understanding, appreciation for the issue of climate change, lack of political will, and also lack of funding or financial support. Climate change is still seen as peripheral when compared to poverty alleviation and economic growth (Lasco *et al*. 2007). There is a great opportunity to improve the linkage between climate variability and development.

### **Formulate a More Strategic Climate Change Framework and Action Plan**

An entry point is the updating of the current Philippine Climate Change Strategic Framework and Action Plan. If done properly, it can help mainstream climate change in the MTPDP and other sectoral strategies, plans and programs. It can also effectively input into the Department of Budget and Management's (DBM) annual Paper on Budget Strategy (PBS) which rationalizes the configuration of the following year's National Government budget. It could also enrich the Philippine Agenda 21, which is an instrument of government, civil society and business in monitoring the country's compliance to its Agenda 21 commitments, through the integration of climate change issues into its thematic concerns.

## (NOT FOR ATTRIBUTION; FOR DISCUSSION PURPOSES ONLY)

However, based on the available documents<sup>15</sup>, further elaboration and refinements appear to be needed in the current Philippine Climate Change Strategic Framework and Action Plan given the very general statements provided here. It should give clearer directions and priorities based on solid technical analyses for this to effectively find its way into the mainstream decision making processes and documents of the national government.

For instance, the framework merely states that climate change adaptation and mitigation measures will both be undertaken in an integrated and balanced manner for synergy and greater impact. However, it does not elaborate on how such a “balanced” approach between climate change adaptation and mitigation would look like and how this will be achieved. Off hand, it puts mitigation and adaptation on equal footing even though climate change adaptation would be the more strategic and cost-effective approach for a country such as the Philippines whose share of GHG emissions is relatively minor.

For mitigation, the framework states that GHG emissions will be reduced mainly through an energy-friendly energy supply mix which targets energy reduction goals by 2012. Even though land use is the major source of GHG emissions in the country, it is not mentioned as a priority area of intervention.

Meanwhile, for adaptation, the document points to the most vulnerable sectors and areas, such as disaster-prone settlements, high-risk population centers and food production areas as the major focus. In terms of sector, only agriculture is explicitly mentioned as the focus of government intervention in adaptation.

Identified in the framework is a broad and generic menu of supporting and facilitating strategies for climate change risk management. These involve resource mobilization, technology development and utilization, as well as social mobilization. Resource mobilization will cover tapping ODA funds and technical assistance, the exploration of market-based incentives (e.g., tradable emission permits), the development of targeted subsidies, the introduction of innovative lending schemes and other means of financing. Bilateral, regional and multilateral agreements will be pursued to facilitate the transfer of climate-friendly technologies. This will involve low-carbon infrastructure for transportation, energy, agriculture, industry, and settlements which will be disseminated to local communities and the appropriate sectors. On the adaptation side, agricultural technologies along the lines of developing drought-resistant crops, for instance, will be introduced. Meanwhile, social mobilization will entail rallying the stakeholders from various sectors around the government’s core advocacies.

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<sup>15</sup> Only the abridged version of the current Philippine Climate Change Strategic Framework and Action Plan can be obtained from the PTFCC. Their action plan is still undergoing the process of stakeholder consultation.

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## **Develop Decision-Making Tools on Climate Change**

It has been pointed out that there is also almost an exclusive emphasis on the adaptation to risks associated with current climate variability and extremes (e.g., tropical cyclones) rather than on climate change per se. These can be partly traced to the insufficient capacity among the concerned NG agencies for climate change monitoring, modeling and evaluation. Thus, empirical evidence of policy impacts vis-à-vis sectoral baseline status are currently unavailable. In addition, available and accessible data and information relating to environment and environment degradation are yet to be systematically linked to the trends of climate change in the Philippines.

Another mainstreaming instrument that can be considered is the development of a supplementary development planning, programming, budgeting, monitoring and evaluation manual or primer on climate change that will provide the framework, the steps and indicators in its integration in NG decision-making processes. This can be used in the regular planning, programming and M&E activities of both oversight and line agencies. Similar instruments have already been developed in the areas of mainstreaming Gender and Development (GAD) as well as Agenda 21 in development planning and budgeting. The latter, along with the Practitioner's Handbook for Reducing Vulnerability to Climate Change Impacts and Related Natural Disasters in East Asia for Cities/LGUs, can be used to develop such a manual/primer for the NG. It should also be reiterated that the development of a credible climate change impact monitoring system will significantly facilitate climate change mainstreaming in NG decision-making processes.

## ***At the local level***

There is a need to further mainstream climate change risk management in local decision-making processes.

## **Disseminate and build on local and international good practices**

It is noteworthy that the province of Albay, through its current governor (a former Presidential Adviser on Economic Affairs and Congressman) is taking a strong initiative to promote climate risk management, especially adaptation, not only within the province but nationwide as well. This drive is imbedded in the fact that it was among the hardest hit in the 2006 typhoons, with deadly mudslides that descended the slopes of Mt Mayon volcano, and which killed more than 100 people and displacing 10,000. According to the National Disaster Coordinating Council, 1,158 people lost their lives, 3,235 were injured, 891 missing and 300,000 displaced. It is the first local government to work on disaster-proof and climate-proof adaptation. The plan includes strengthening and improving evacuation sites, introducing climate change into school curricula and training of 720 local officials in climate change adaptation and disaster preparedness, which includes food-for-work scheme to clear out debris and blockages from the seven major rivers in the province that flow from the volcano to forestall flooding. With more than 50.3

# (NOT FOR ATTRIBUTION; FOR DISCUSSION PURPOSES ONLY)

percent of total area of the Philippines at risk of a natural disaster, and 81.3 percent of the population in areas at risk, more local governments are likely to draw lessons from the Albay initiative.

## **Raise awareness as well as build constituencies and capacities among all local stakeholders**

The mainstreaming of climate change risk management in the decision-making processes of LGUs may, however, still take some doing due to the lack of information as well as the short planning horizon of local government executives (LGEs). The former challenge can be handled through a more intensive and extensive IEC campaign. This can be institutionalized and regularized through the development of orientation/training materials for use by the Local Government Academy (LGA) of the Department of the Interior and Local Government (DILG) in the mandatory orientation program for new LGU officials as well as in the regular skills upgrade and training of LGU staff.

Getting LGU executives to deliberately and systematically consider climate change risk management in their decisions is, however, more of a challenge. These executives are in office for nine years at the most and, thus, usually focus more on short-gestating development programs and concerns. Thus, the strategic focus of the advocacy and capacity building efforts of the NG and its development partners should perhaps be in stabilizing the local bureaucracy and in constituency-building within this bureaucracy and within local communities. The PTFCC has spoken of initiatives in this area. These would foster a strong demand that local executives have to respond to as well as a local bureaucracy geared for long-term planning and development.

## **Develop decision making aids and tools in order to mainstream climate change into the LGUs' 5-year development and investment plans**

The World Bank-developed "Practitioner's Handbook for Reducing Vulnerability to Climate Change Impacts and Related Natural Disasters in East Asia" is a good start but must be further developed into a planning, budgeting and M&E manual for LGUs in order to be more operationally useful.

## ***Other cross-cutting initiatives***

### **Further expand climate change adaptation initiatives in the country**

When climate change risk management is directly acknowledged in development strategy documents, like the 2004-2010 MTPDP, it is usually with regards to mitigation. Thus, it is not surprising that most climate change risk management initiatives in the Philippines is on mitigation. Climate change adaptation activities in the country are only just now beginning, especially at the local level where the impact of climate change is felt. It should be noted, however, that regardless of the country's mitigation efforts, its impact at

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the global level is expected to be minor given the Philippines' small GHG contribution. The country accounted for less than 0.3 percent of global GHG emissions.

Without slackening domestic mitigation efforts, it is, nevertheless, more strategic for the country to focus even more internal efforts and resources on adaptation initiatives given its low impact on global climate change mitigation ("small country" scenario with global climate change considered as mainly exogenous). This has been recognized by the organizers and framers of the 2007 Albay Declaration. Concomitantly, the Philippines can also consider increasing its diplomatic initiatives and influence as a more cost-effective strategy in further promoting (global) climate change mitigation

### ***Mainstream climate change risk management in other sectors besides agriculture and energy***

As previously mentioned, most climate change mitigation activities in the country is in the energy sector along with reforestation in the natural resources sector. Meanwhile, the first phase of the NG's climate change adaptation project will focus on the agriculture sector, with the other sectors to follow in the subsequent phase/s of the proposed GEF-funded, DENR-executed project. Given that this is a 5-year project, following this game plan will entail perhaps an inordinately long time for other sectors to initiate adaptation measures. Although the GEF project is DENR-executed, the main implementers are the DA and the DOST-PAGASA. Thus, it should not tax the DENR's coordinating and oversight abilities for other sectors<sup>16</sup> to contemporaneously start climate change adaptation activities.

One sector where climate change risk management could be better mainstreamed is in coastal management. At the national level, Capili, et al (2005) pointed out that only a few NG climate change initiatives concentrate on the impacts of climate change in the coastal system. These include the Integrated Coastal Zone Management (ICZM) program that is being implemented in Lingayen Gulf, Davao Gulf, Cebu and Batangas Bay. It seeks to change the resource use patterns from single to multiple uses and will be achieved through governance and community participation. This program was, however, deemed lacking in its response to climate change impacts on coastal resources. Other initiatives such as Coastal and Fisheries resources management, Environmental impact assessment (EIA) system, Disaster management system, Fisheries sector and Coastal Environment programs are also being implemented. It is, however, noted that these initiatives were not primarily planned to address the impacts of climate change in coastal communities. Thus, it was recommended that an integrated assessment for all coastal initiatives with detailed implementing measures on climate change impacts, identification of priority areas, and problems encountered, should be developed.

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<sup>16</sup> It should be noted that the World Bank office in Manila has recently submitted a proposal entitled "PHILIPPINES: Strengthening and Operationalizing the Government's Framework and Strategy on Climate Change Mitigation and Adaptation" to the EAP Scale-Up Funds facility. It will focus on the non-agriculture sector such as urban transport, energy, water supply/water resource management, among others.

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The province of Palawan undertook some action planning and initiatives to address climate change concerns (Perez undated). They provided some recommendations for NG action which include i) the creation, enhancement or strict implementation of coastal laws (Fisheries Code of 1998, mining laws, etc), regulations (on land use, zoning, etc) or programs (Disaster Management Program, Coastal Environment Program, Coastal Zone Management); and ii) the formulation of guidelines and legislation for the implementation of an integrated coastal zone management for all coastal zones in the Philippines. .

## **Improve the affordability of mitigation and adaptation technologies.**

The relative affordability of greenhouse gases mitigation technologies (e.g. utilization of renewables in power production interventions) is often cited as a critical factor that determines the pace of climate change management promotion in decision-making processes. The need to overcome market barriers for the widespread use of renewables is, therefore, paramount.

Thus, the World Bank Group, in consultation with the regional development banks and interested countries, is seeking to establish a Clean Technology Trust Fund (CTTF) as one of a portfolio of strategic Climate Investment Trust Funds (CIF) and programs. The objective of the CTTF would be to provide scaled-up financing to assist developing countries in transitioning to low carbon economies through cost effective transformative investments resulting in mitigation of greenhouse gas emissions.

The affordability of technologies is also true in climate change adaptation. A joint ICRAF-UPLB multi-country study on the Assessment of Impacts and Adaptation to Climate Change observed that cost is the major limiting factor of adaptation strategies (Lasco, et al, 2006). Moreover, technologies for systematic observation and monitoring are also needed.

## **Expand financing options and opportunities**

There is a need to further mobilize greater and more diverse sustainable sources of financing that are nationally appropriate for climate change risk management, especially in the private sector.

Given the increasing risks especially from hydro meteorological hazards, a wider array of climate/ natural hazard risk financing instruments are now being offered. However, these are, for the moment, mostly offered to and by governments. For instance, the World Bank has recently developed and are offering client countries several new catastrophe risk financing instruments based on the probability and severity of their occurrence. These include the i) Development Policy Loan Deferred Drawdown Option (DPL DDO), ii) the

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Catastrophe Deferred Drawdown Option (Cat DD), and iii) the multi-country catastrophe bonds (Cat Bonds). The first two are fast-disbursing lines of credit that provides immediate liquidity to National Governments upon the occurrence of a natural disaster while other sources of funds are being mobilized. They are bridge financing facilities for high probability but low intensity types of catastrophes. The DPL DDO is, however, more multi-purpose as it can be multi-sector or sector-specific with macroeconomic policy framework and program implementation adherence as eligibility criteria. On the other hand, the Cat DDO is specific to a disaster risk management program. Meanwhile, the Cat Bond is an index or parametric based multi-country calamity insurance system for low probability but high intensity types of catastrophes where payments are based on pre-agreed calamity parameters (eg, typhoon or earthquake intensity whose center is at within a certain distance from the country) as well as a declaration of a state of calamity by the head of state. The multi-country nature of this facility, along with the World Bank's backing, are intended to improve the access and affordability of this instrument especially for developing countries.

For private sector/household calamity risk financing, a similar weather index or parametric agricultural insurance facility is now also available for farmers. This is intended to improve the coverage and affordability of risk financing instruments by addressing the perennial free-rider and adverse selection problems of the regular damage-based agriculture insurance system. The World Bank has successfully piloted this innovative facility in several countries (eg, livestock in Mongolia, crops in India). It is also supporting the establishment of a Global Index Reinsurance Facility (GRIF), which is a multi-donor trust fund linked with a specialized index-based reinsurance company, which will promote index-based insurance in developing markets.

For the moment, weather risk insurance in the country is limited to the provision of crop damage insurance by the Philippine Crop Insurance Corporation (PCIC), a government corporation. A Provention Consortium-funded World Bank project on Agriculture Climate Risk Assessment is currently exploring the possibility of pilot-testing a weather index-based agricultural insurance system in the country. Its upscaling and replication will, however, be based on the government's willingness to set a conducive environment for such a system, such as by investing in the expansion of weather monitoring systems. Nevertheless, there appears to be great potential for private sector participation in such a natural hazard risk financing system based on feedback received by the Provention/WB project from local and international non-life insurers. For the other sectors, the Turkish Catastrophe Insurance Pool (TCIP) for homesteads/properties can also be studied for possible adoption/adaptation in the Philippines.

### **Raise awareness**

Finally, there is also a national need for climate change issues, problems and solutions to be translated into local context and with a language that people can understand.

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