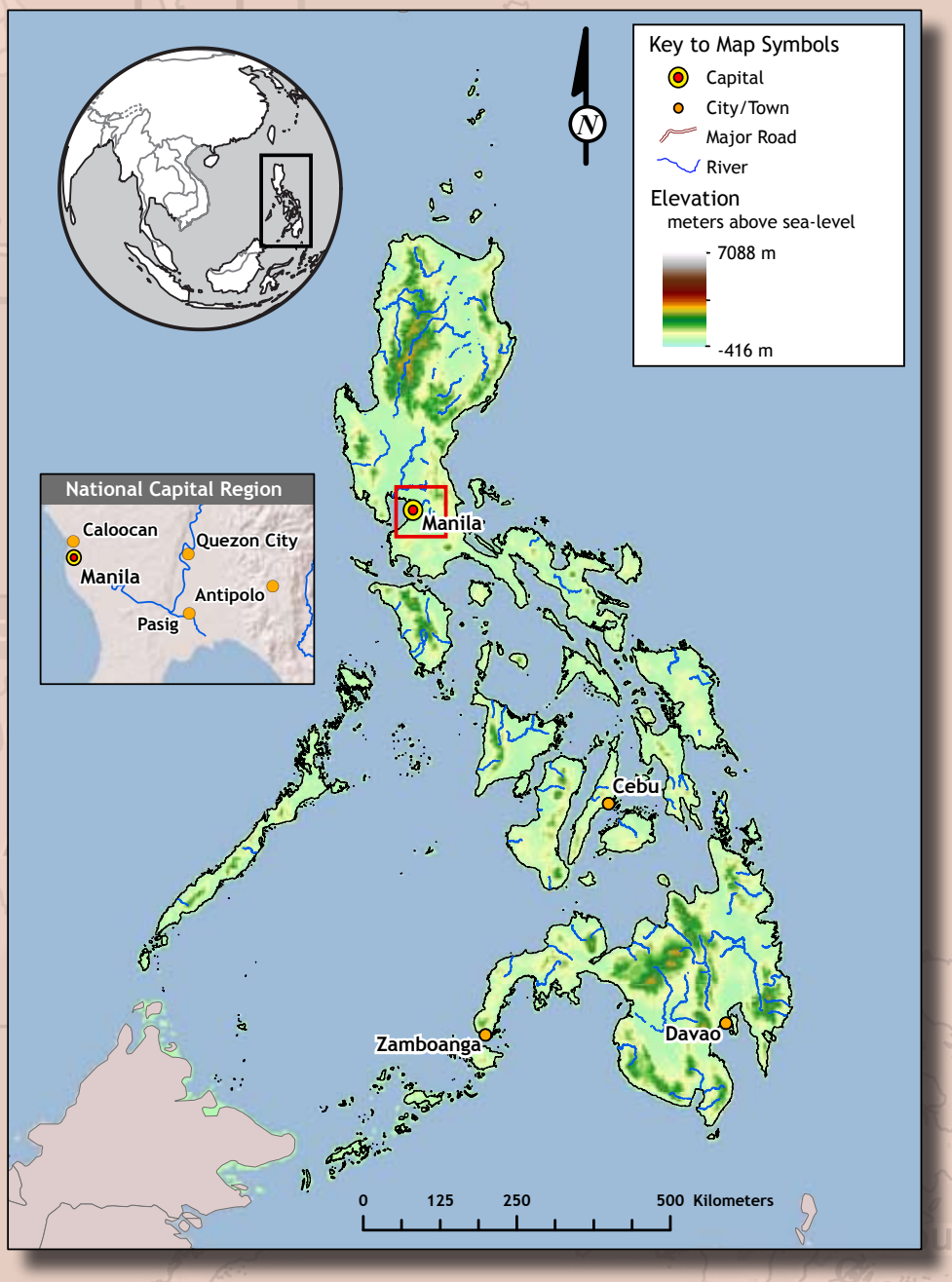


Vulnerability, Risk Reduction, and Adaptation to Climate Change

PHILIPPINES

CLIMATE
DISASTER RISK REDUCTION
ADAPTATION

GFDRR
Global Facility for Disaster Reduction and Recovery

Climate Change Team ENV

COUNTRY OVERVIEW

The Philippines is an archipelago comprised of 7,107 islands (1,000 of which are inhabitable), with a total area of 299,404 sq km.[1] Located between 5° and 20° N of the equator, it has a humid climate and a topography characterized by mountainous terrain bordered by narrow coastal plains. The country's topography is steep, with the highest peaks reaching nearly 3,000 m above sea level, located at a distance of less than 30 km from the sea.[2] The Philippines are also endowed with interior lowland plains, of which the central plain and Cagayan Valley on the island of Luzon, and the Agusan and Cotabato valleys of Mindanao are the most extensive. Considered one of the most biologically rich and diverse countries in the world, the Philippines also has one of the world's longest coastlines, and its marine and coastal resources yield US$ 3.5 billion annually in goods and services.[3] The country's mineral, oil, gas, and geothermal potential are also significant.

The Philippines' main economic sectors are agriculture and industry, with agriculture contributing 14% of GDP and employing over a third of the population.[4] A combination of in-migration and natural population growth has established the Philippines as the fastest urbanizing country in East Asia, with over 65%of its 91 million residents living in urban areas.[5] In 2009, per capita GDP stood at US$ 1,752. The Philippines is also considered to be among the world's most disaster-prone countries. Commonly occurring hazards include floods, droughts, typhoons, landslides and mudslides, earthquakes, and volcanoes. Recent decades have witnessed an increase in damaging extreme events, such as heavy rainfall and tropical cyclone activity, and this trend is likely to continue under a future climate.

PRIORITY ADAPTATION MEASURES

Key Sectors

Agriculture
Coastal Ecosystems
Biodiversity and Forests
Urban areas, Energy, and Infrastructure
Human Health

Sources: ***National Framework Strategy on Climate Change, 2010-2012,*** and the Philippines Initial National Communication on Climate Change, 1999.

- The Philippines has established an autonomous Climate Change Commission affiliated with the Office of the President, which serves as the sole government body for coordinating and evaluating policies and programs related to climate change. In addition to overseeing the development of Local Climate Change Action Plans, the Commission is formulating a National Framework Strategy on Climate Change[6] that seeks to build climate resilience across major sectors. The framework focuses on the following key principles and objectives: Climate resilient and sustainable agriculture, as well as food production and distribution systems;
- Watershed protection and management; Ecosystem rehabilitation and restoration, and integrated ecosystem-based management;
- Resilient infrastructure and adaptive human settlements;
- Climate-responsive health and social protection service delivery; and
- Disaster risk reduction and management.

[1] Adaptation Learning Mechanism (ALM) Country Profile: http://www.adaptationlearning.net/country-profiles/ph
[2] FAO Aquastat Country Profile for Philippines: http://www.fao.org/nr/water/aquastat/countries/philippines/index.stm
[3] Philippines Environment Monitor 2005: Coastal and Marine Resource Management, World Bank.
[4] FAO Profile on the Philippines: http://www.fao.org/countries/55528/en/phl/
[5] World Bank Country Indicators, 2009 estimate: http://data.worldbank.org/country/philippines
[6] Philippines Climate Change Commission website: http://www.climate.gov.ph/index.php/en/

Given the high vulnerability of the Philippines to climatic hazards, the Climate Change Commission and National Disaster Risk Reduction and Management Council are working jointly to prioritize actions for mainstreaming adaptation and disaster risk management, with the aim of improving community resilience to the hazards presented by climate change.[7]

CLIMATE BASELINE AND CLIMATE FUTURE

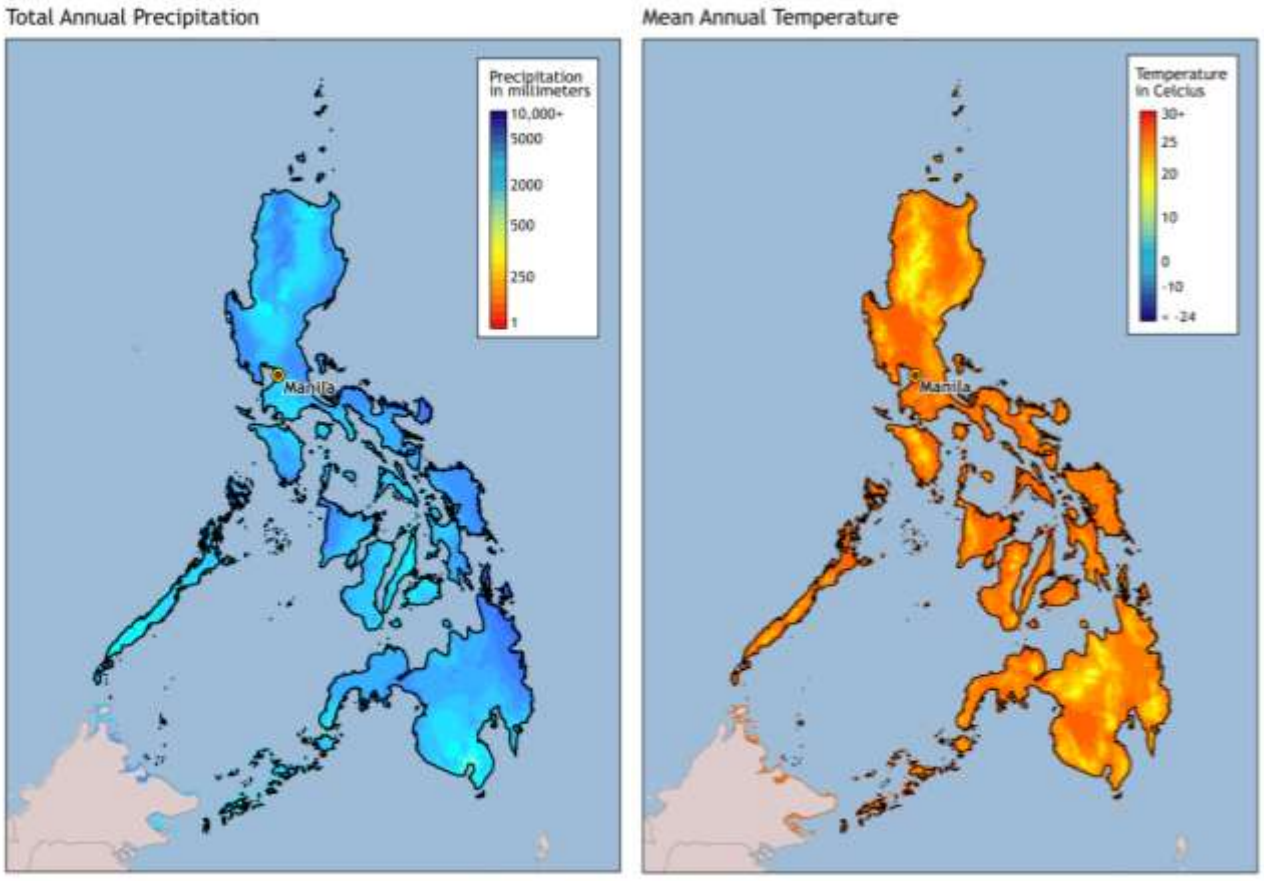


Figure 1: Annual rainfall (left) and temperature (right) for the Philippines[8]

CLIMATE BASELINE

The Philippines has a humid equatorial climate characterized by high temperatures and heavy rainfall. Average annual rainfall is approximately 2,348 mm, but this varies geographically, from 960 mm in southeast Mindanao to

[7] ISDR website: http://www.unisdr.org/news/v.php?id=18145

[8] Worldclim 1960-1990 Averages. Robert J. Hijmans, Susan Cameron, and Juan Parra, at The Museum Of Vertebrate Zoology, University Of California, Berkeley, in Collaboration With Peter Jones And Andrew Jarvis (Ciat), and with Karen Richardson (Rainforest Crc). Www.Worldclim.Org/Current

over 4,050 mm in central Luzon.[9] Temperatures are generally high, particularly in the valleys and plains, averaging 27°C over the year. Humidity levels are high (averaging around 82%due to the warm moist trade winds that flow through the archipelago, as well as sea surface temperatures, a rich and vibrant vegetative cover and abundant rainfall.[10] Rainfall is governed by the southwest monsoons in the summer months, and by the northeast monsoon and tropical cyclones in the winter. Convective rainfall is common due to the country's mountainous terrain, interspersed with narrow coastal plains. The Philippines also experiences strong periodic droughts that are linked to the El Niño Southern Oscillation (ENSO).

Major Climate Processes[11]	Impacts on Climate
Southwest monsoon	*Rainfall (June to August)*
Northeast monsoon	*Rainfall (November to February)*
El Niño	*Associated with droughts*
Low pressure over Pacific or South China Sea	*Tropical cyclones*

Recent Climate Trends

- Mean temperatures across the South Pacific have increased by approximately 1°C since 1970, at an average rate of 0.3°C per decade. Temperatures appear to be increasing more rapidly in the southern reach of the archipelago. In the Philippines specifically, mean annual temperatures increased by 0.14°C between 1971 and 2000..
- Recent evidence suggests a tendency for wetter conditions during the dry season, as the frequency of heavy storms during this period has increased. This dynamic is most notable during La Niña periods. The number of rainy days in the Philippines has increased since the 1990s, as has the inter-annual variability of the onset of rainfall.
- Sea surface temperatures in the Pacific have increased between 0.6°C to 1.0°C since 1910, with the most significant warming occurring after the 1970s.[12]
- The number of category 4 and 5 storms in the Pacific region has more than doubled between 1975-1989 and 1990-2004.
- The number of hot days and hot nights[13] has increased significantly across the Pacific.
- The frequency of cyclones entering the Philippines Area of Responsibility from 1990 to 2003 has increased.[14]

Climate Future

The climate science community sources a suite of models to inform decision makers on future climate. Among the most widely used are GCMs (Global Climate Models), RCMs (Regional Climate Models), downscaling techniques (both empirical and statistical), and several comprehensive reviews are available on the subject. Global Climate

[9] FAO Aquastat Country Profile for Philippines: http://www.fao.org/nr/water/aquastat/countries/philippines/index.stm
[10] The Philippines' Initial National Communication on Climate Change (DENR, 1999).
[11] IPCC 4th Assessment Report, Philippines Initial National Communications (1999), and GFDRR Country Profile
[12] Folland, C.K., J.A. Renwick, M.J. Salinger, N. Jiang, and N.A. Rayner, 2003: Trends and variations in South Pacific Islands and ocean surface temperatures. *Journal of Climate*., 16, 2859-2874 and Folland, C.K., J.A. Renwick, M.J. Salinger, and A.B. Mullan, 2002: Relative influences of the Interdecadal Pacific Oscillation and ENSO on the South Pacific Convergence. Zone. *Geophysical Research Letters*, 29, 21-1-21-4
[13] Hot days and nights are defined as the temperature above which 10% of days or nights are recorded in current climate of that region and season.
[14] IPCC Fourth Assessment Report, WGII (2007).

Models (GCMs) are our primary source of information about future climate. GCMs comprise simplified but systematically rigorous interacting mathematical descriptions of important physical and chemical processes governing climate, including the role of the atmosphere, land, oceans, and biological processes. Unfortunately, as with all small island nations, there are specific challenges when viewing the projected changes for the Philippines. This "island dilemma" is attributable to the fact that single-grid cell values from GCMs are considered by the IPCC (2007) as the least accurate measure of projected changes, and the relative spatial resolution of GCMs renders interpretation of climate change in small island nations difficult. The following insights into a changing climate are thus based on information from this part of the Pacific region as a whole from a suite of GCMs used by the Intergovernmental Panel on Climate Change, as well as downscaled station data available for the Philippines from the Climate Systems Analysis Group at the University of Capetown.[15]

- Average annual and monthly rainfall changes are inconsistent across this region of the Pacific, with models projecting +/-25% changes in rainfall. As yet it is not possible to get a clear picture for precipitation change, due to large model uncertainties.
- While the future patterns of rainfall remain unclear, recent studies project precipitation increases, particularly in the wetter seasons (June to November).Recent evidence and model simulations also point to a more frequent occurrence of El Niño weather patterns, bringing an increase in drought conditions along this region. These more frequent El Niño events are believed to be associated with climate change, though some disagreement exists within the science community on this point.
- More frequent El Niño events could also increase the intensity of tropical cyclones along the Pacific, with important implications for disaster management and response.
- Temperatures in the Pacific are projected to increase between 1.4 and 3.1^{o}C.
- Sea levels are projected to rise by the end of the century (2090-2099) by 0.35 m, although the spatial manifestation of this rise will not be uniform due to circulation changes and ocean density.
- According to the Intergovernmental Panel on Climate Change's 4th Assessment Report, the effects of rising sea level are "likely to be of a magnitude that will disrupt virtually all economic and social sectors in small island nations". In addition to these vulnerabilities, excessive dependence on foreign aid and remoteness make the impact of climate variability and change particularly strong in the Philippines.
- Climate change studies at the sub-national level project the following changes, which should be viewed with caution as they may not reflect projected circulation changes:
    - A 60–100% increase in annual rainfall is projected for the Central Visayas and Southern Tagalog provinces, including Metro Manila.[16]
    - Up to 11% reduction in annual average rainfall is projected for Mindanao by 2050.[17]

CLIMATE CHANGE IMPACTS ON NATURAL HAZARD VULNERABILITY

Located in the western rim of the Pacific and along the circum-Pacific seismic belt, the Philippines is regarded as one of the world's most disaster-prone countries – a function of both the high incidence of natural hazards it

[15] World Bank Climate Change Knowledge Portal: http://sdwebx.worldbank.org/climateportal/
16 The Philippines' Initial National Communications on Climate Change (DENR, 1999). Projection is for a doubled CO2 scenario.
17 National Framework Strategy on Climate Change 2010-2012, Government of the Philippines: http://www.neda.gov.ph/references/Guidelines/DRR/nfscc_sgd.pdf

experiences and its high vulnerability, linked to poverty and environmental degradation.[18] At least 60%of the country's total land area and 74%of the population are exposed to multiple hazards, including typhoons, floods, landslides, droughts, volcanoes, earthquakes and tsunamis.[19] The areas with highest vulnerability are the National Capital Region of Manila, Southern Tagalog, Cagayan Valley, Central Luzon, the Cordillera Administrative Region, and Bicol Province.[20] In densely populated areas, such as greater Manila, disasters pose a serious threat to both people and economic assets. The major climate-related natural hazards impacting the Philippines are cyclones, sea level rise and storm surge, floods, and droughts. Their impacts and frequency of occurrence across the country are discussed in detail below.

AT A GLANCE

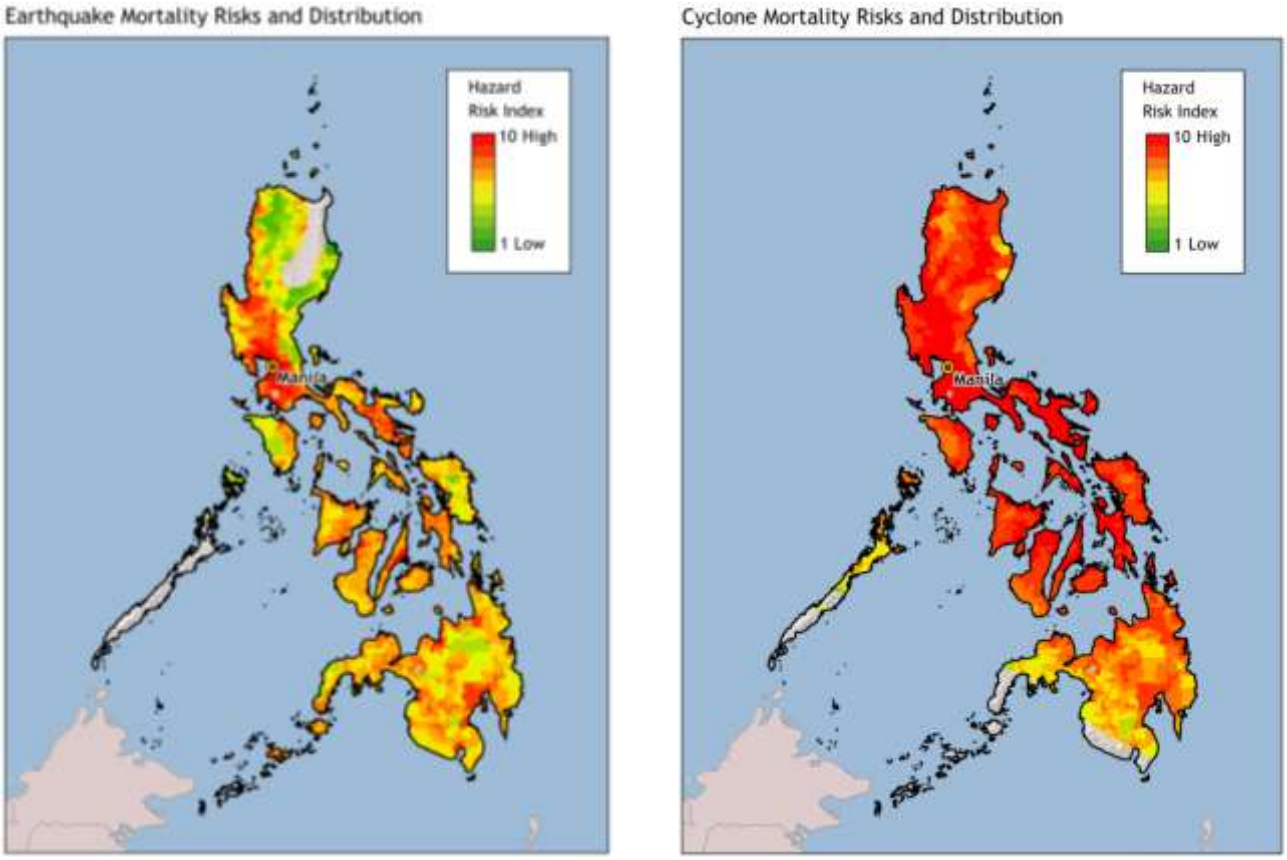


Figure 2: Exposure to climate-related hazards across Philippines[21]

- ***Tropical cyclones*** – Typhoons season in the Philippines occurs between June and December. Over 20 typhoons affect the country annually, with 8 or 9 making landfall.[22] These come from the southeast, are generally the strongest, and affect Samar, Leyte, eastern Quezon province, and the Batan islands, with the

[18] Philippines Climate Change Adaptation Agenda: Coordination and implementation of climate risk management (with a special focus on agriculture and natural resources). Report prepared by Van Aalst, M. (2006) for the World Bank.
[19] GFDRR Country Profile for the Philippines.
[20] Climate Change Vulnerability Mapping for Southeast Asia. IDRC, SIDA & CIDA (2009).
[21] Columbia University Center for Hazards and Risk Research (Chrr) and Columbia University, Center for International Earth Science Information Network (Ciesin).
[22] IPCC 4th Assessment Report, Working Group II, 2007.

island of Luzon at a significantly higher risk than the southern areas.[23] Typhoons cause significant damage through heavy rainfall, flooding, and high winds; the 2009 typhoons Ondoy and Pepeng alone inflicted damages and losses on the order of US$ 4 billion, or almost 3% of the gross national product.[24] Tropical Storm Ketsana, which struck the Philippines in late 2009, displaced 736,000 people and damaged 36,728 hectares of rice fields in central Luzon (as well as other high-value commercial crops) through heavy rains and flooding, leading to a major spike in food prices.[25] Rising sea surface temperatures, coupled with increased intensity storms, pose a significant risk to the country under a changing climate.[26]

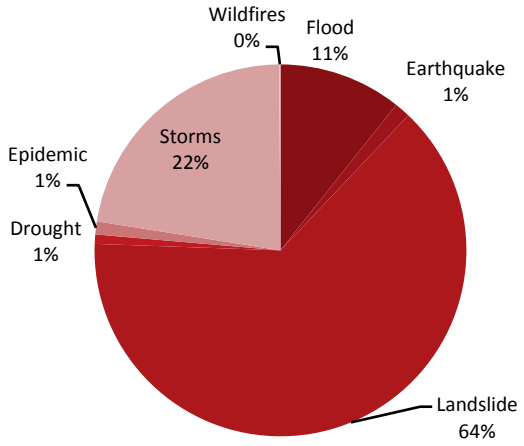


Figure 3: Average Impacts of major natural hazards in the Philippines

Source: "EM-DAT: The OFDA/ CRED International Disaster Database, Université Catholique de Louvain, Brussels, Bel." Data version: v11.08

- ***Sea level rise and storm surge*** – Global estimates of sea level rise range from 28 to43 cm above base level by 2100, depending on the temperature scenario.[27] The Philippines is particularly vulnerable to sea level rise and storm surge because about 60% of its municipalities and 10 of its largest cities are located along the coast (where roughly 60% of the population resides).[28] Rapid urbanization is likely to increase this figure over the coming decades. Four Philippine cities (based on percent of area exposed) rank among the top 10 East Asian cities likely to be affected by sea level rise and storm surges, with some studies projecting that storm surge zones may increase by over 25% relative to present levels.[29]

- ***Floods, landslides, and mudslides*** – Flooding often results from heavy or prolonged rainfall associated with typhoons and tropical depressions. Prolonged heavy rainfall can destabilize soils along mountain-slopes, resulting in landslides and mudslides that cause severe damage to nearby villages. The impact of the massive 2006 landslide in Leyte[30] was exacerbated by extensive logging along mountan slopes. Projected increases in extreme rainfall events could compound the risk of mudslides and landslides in the future.

- ***Droughts*** – Major droughts are associated with El Niño years. Droughts in 1997-1998 caused widespread crop failures, water shortages, and forest fires in various parts of the Philippines[31], and also dried out 20% of the country's fishponds. This led to a 6.6% drop in agricultural production and a 9.5% drop in construction and construction-related manufacturing.[32] During El Niño events, low annual rainfall over basins and decreases in the annual water inflows of major reservoirs place significant pressure on the

[23] Natural Disaster Risk Management in the Philippines: Enhancing Poverty Alleviation through Disaster Reduction. World Bank and National Disaster Coordinating Council, Philippines. Report based on 2003 research mission.
[24] Climate Analysis and Modeling for Philippine Risk Assessment. Tadross, M. (2008). Report prepared for World Bank.
[25] World Disasters Report 2010: Focus on Urban Risk, IFRC.
[26] Climate-resilient Cities: A Primer on reducing Vulnerability to Disasters, World Bank (2009).
[27] Ibid note 21.
[28] Philippines Environment Monitor 2003: Water Quality, World Bank.
[29] Sea Level Rise and Storm Surges: A Comparative Analysis of Impacts in Developing Countries. World Bank Policy Research Working Paper, 2009.
[30] UNICEF News Brief: http://www.unicef.org/philippines/news/060202.html
[31] Ibid note 21.
[32] UN Habitat Cities and Climate Change Initiative, Climate Change Assessment for Sorsogon, Philippines: A Summary.

country's water-resources[33], affecting domestic water supply, irrigation, and hydropower generation. Environmental impacts include soil degradation, changes in water quality due to salt-water intrusion, and a high risk of forest fires.

Implications for Disaster Risk Management (DRM)

- The future of typhoons is still a subject of much debate in this are of the Pacific, but some studies suggest that these are likely to intensify with rising sea surface temperatures, which would imply higher windspeeds and/or more intense rainfall, and greater consequent damage.
- Heavy rainfall associated with typhoons and other weather systems may increase in both intensity and frequency under a changing climate. This could exacerbate flooding in existing flood-prone areas and increase landslide and mudslide risk, as well as introduce flood risk to new areas.
- In the Philippines, strong droughts are associated with El Niño. Climate change projections suggest that an intensification of ENSO may occur, which has profound implications for agricultural production and thus food security and pricing. The country is already witnessing longer drought episodes, with attendant crop damage and often sharp declines in GDP.

Sectoral Climate Risk Reduction Recommendations

Agriculture

More than a third of the Philippines' population depends on agriculture, fishing, and forestry for a living, and the sector contributes 14% to national GDP.[34] Rice, grown under both irrigated and rain-fed regimes, is the single most important agricultural crop, contributing an average of 21.9% to agricultural gross value added in 2003-2005 and serving as the basic food staple for over 80% of the population. Irrigated rice production has increased significantly in the past 35 years, rising from 46% of total area harvested in 1970 to 69% of the area harvested in 2005[35]. This increase in rice yields has been the result of the introduction of new and improved varieties, use of fertilizers, and improved farm management practices. Although the Philippines has been a net importer of food and feed grains since the 1980s, the government's rice program is moving the country toward self-sufficiency.[36] However, recent evidence suggest that even with these significant increases in yield, meeting self-sufficiency could be challenged by a rapidly growing population. Maize production has also increased in recent years, by 15% in 2006 alone.

Land degradation, partly due to the increased use of chemical inputs, has led farmers to move into increasingly marginal environments, rendering production more vulnerable to shocks in the future. In 2009, food price inflation was found to be partly linked to failed harvests, suggesting that small shocks to the supply chain and production can cause dramatic price increase.[37] Agriculture is highly vulnerable to climatic shocks such as heavy rainfall (and flooding) and drought. Adverse changes in drought conditions with an intensified El Niño, would have severe consequences on this sector.

[33] *ENSO Impacts in the Philippines*. http://iri.columbia.edu/climate/ENSO/societal/example/Jose.html
[34] FAO Profile on the Philippines: http://www.fao.org/countries/55528/en/phl/
[35] Ibid note 28.
[36] FAO Aquastat Country Profile for Philippines: http://www.fao.org/nr/water/aquastat/countries/philippines/index.stm
[37] Climate Analysis and Modeling for Philippine Risk Assessment. Tadross, M. (2008). Report prepared for World Bank.

Adaptation options in the agricultural sector should include:[38]

- Improved management of soil and water resources to mitigate drought conditions and ensure water availability;
- Flood and drought monitoring systems to respond appropriately to hazard events;
- Soil conservation measures (such as composting and terracing);
- Establishment of windbreaks (strips of trees, shrubs, and vines to reduce wind-related evaporation and damage associated with heavy rains);
- Engineering solutions (such as pipe irrigation, which controls evaporation, percolation, and seepage);
- Introduction of improved seeding techniques; small reservoirs; and improved outdoor grain storage facilities;
- Improved livestock production;
- Mapping of vulnerable agricultural areas; and
- Research on indigenous resilient crop species.

COASTAL ECOSYSTEMS[39]

Measuring 36,289 km, the Philippines' coastline is among the longest in the world. It is also densely populated—25 of the country's major cities are along the coastline and each kilometer of coastline hosts 2,467 inhabitants. The country's coastal resources are varied and diverse, comprised of sandy beaches, rocky headlands, sand dunes, coral reefs, mangroves, sea-grass beds, wetlands, estuaries, and lagoons. Generating a wide variety of goods and services, the annual economic benefits from the country's coastal ecosystems are estimated at US$ 3.5 billion. The present condition of coastal ecosystems is of concern, however–only 4-5% of its coral reefs remain in pristine condition, while 70% of the mangroves have been converted to other uses or logged, seagrass beds are facing increased degradation, and beaches are under pressure from uncontrolled development and population growth.

Climate change has tremendous potential to exacerbate existing vulnerabilities in the coastal areas. Coral reefs are highly sensitive to temperature increases; during 1998, one of the warmest years on record for the Philippines, 15 to 20% of the country's living corals died. Modest increases in sea level are likely to have large impact on coastal ecosystems and populations, and possible changes in coastal storm frequency and strength may result in high storm surges, mudslides, and increased erosion. Successful adaptation hinges on meeting the needs of the various stakeholders that depend on this sector, so that ecosystems improve while boosting local livelihoods and contributing to the national economy. This will require a suite of institutional measures, some of which are listed below:

- Implementing an integrated coastal resources management framework at the local level in several areas, including improved stakeholder participation, equitable sharing of economic benefits, as well as supporting legal and policy frameworks, and monitoring and information systems.
- Improved observation and research on coastal environmental change (and on the potential impacts of climate change on coastal areas) is also urgently needed in order to devise adaptation solutions.

[38] Productive Sector Risk Assessment for Hydro-Meteorological Hazards in the Philippines, Benson, C. (2007). Report for World Bank.
[39] Philippines Environment Monitor 2005: Coastal and Marine Resource Management. World Bank.

Biodiversity and Forests[40]

The Philippines is one of the world's most environmentally rich and diverse countries, with 65% of its species not found elsewhere. A combination of factors such as indiscriminate logging, unsound policy and lack of protection, land conversion, and pest and fire outbreaks, however, have made the country a critical hotspot, with over 800 of its plant and animal species threatened with extinction. Increasing pressure from urbanization and population growth have been large drivers of reduction in forest cover. Climate change could pose an additional stress on ecosystems and the species they host and could result in a crossing of climatic thresholds that some species cannot keep up with. The Philippines is addressing these concerns by implementing an integrated ecosystems-based management approach that focuses on improved monitoring by establishing baselines, standards, and indicators; improved coordination among various stakeholder agencies; and improved governance and participatory institutional arrangements that should boost conservation.

Urban Areas and Infrastructure

The Philippines has one of the highest rates of urban growth in the world, with the peri-urban areas of Metro Manila (such as Dasmarinas, Cavite and Santa Rosa, Laguna) having recently seen growth rates on the order of 10%.[41] Over 60% of the country's population resides in urban areas, and urban-based services and growth are major drivers of economic growth in the country. Approximately 84% of national GDP is accounted for by industry and services, based out of urban and peri-urban areas.[42]

Infrastructure, environmental quality, and delivery of basic services are major issues of concern for the country's urban areas.[43] Air pollution is a serious problem in the Manila region, and transportation and communications systems are often inadequate. Attempts to privatize urban infrastructure development (e.g., water supply systems, airport facilities) have been unsuccessful, and poorly functioning land markets tend to drive up housing prices and thwart urban accessibility.

Infrastructure is highly vulnerable to heavy rainfall and strong winds, which can result in structural fatigue and materials failure.[44] In 2009, tropical storm Ketsana destroyed US$ 33 million of roads and bridges, with Metro Manila being among the worst hit areas. Climate change impacts are expected to bring added pressure for the urban environment with respect to sustainable land use, infrastructure, access to potable water and health services, and waste management, among others.[45] For most urban centers that are located along the coast – 25 of the country's cities[46] – the impacts of sea level rise are compounded by ground subsidence due to over-extraction of ground-water for domestic and industrial use.

Well-planned investments in infrastructure are required to cope with the projected impacts of climate change. Options that are currently under consideration include:

- The Marikina Dam, embankments along the Pasig and Marikina Rivers;
- Storm surge barriers, in some low-lying areas such as west of Mangahan;

[40] National Framework Strategy on Climate Change 2010-2012, Government of the Philippines.
[41] Urban Development and the Philippines. World Bank website: http://go.worldbank.org/7BRH2R0P80
[42] Ibid.
[43] *Issues and Dynamics: Urban Systems in Developing East Asia – Philippines*, World Bank: http://siteresources.worldbank.org/INTEAPREGTOPURBDEV/Resources/Philippines-Urbanisation.pdf
[44] National Framework Strategy on Climate Change 2010-2012, Government of the Philippines.
[45] UN Habitat Cities and Climate Change Initiative, Climate Change Assessment for Sorsogon, Philippines: A Summary.
[46] Philippines Environment Monitor 2005: Coastal and Marine Resource Management. World Bank.

- Improved pumping capacity to reduce flood depth and duration[47];
- Improved land use planning, zoning, and enforcement;
- Upgrading informal settlements to reduce the vulnerability of the urban poor; and
- Improved coordination among local government and national flood management agencies.

ADAPTATION

A number of climate change projects, analyses and programs are underway in the Philippines. These aim to improve understanding of the potential impacts of climate change in key sectors, reduce vulnerability to current climate variability and future climate change, and also seek to gain insights and experience on a range of potential adaptation strategies. Some exemplary efforts in this regard are listed below.

Ongoing Efforts- At a Glance

Adaptation

- Climate Change in Coastal Areas (World Bank)
- Philippines: Climate Change Adaptation Program (World Bank)
- Climate Forecast Applications (CFA) for Disaster Mitigation in Indonesia and the Philippines (ADPC, IRI)
- Cities and Climate Change Initiative (UN-Habitat)
- Coral Triangle and Climate Change: Ecosystems, People, and Societies at Risk (WWF)
- Strengthening Capacities for Climate Risk Management and Disaster Preparedness in Selected Provinces of the Philippines (FAO)
- Adaptation to Climate Change and Conservation of Biodiversity in the Philippines Project (GTZ)

Vulnerability Reduction

- Bridging the Gap between Seasonal Climate Forecasts and Decision-makers in Agriculture (PAGASA, ACIAR[48], PIDS[49], LSU[50])
- Project to improve rice and corn productivity and raise standards of living through a community-based climate information (KOICA)
- Coastal and Marine Resources Management in the Coral Triangle (ADB-GEF)
- - Study on the provision of integrated climate, market and financial risk information (ADPC, FAO, PAGASA)

GFDRR Interventions

- Disaster Risk Reduction City-to-City Sharing Initiative
- Supporting Local Government Capacity to Manage Natural Disaster Risks in the Philippines
- Reducing Vulnerability to Flooding in Metro Manila

[47] Climate Risks and Adaptation in Asian Coastal Megacities: A Synthesis Report. ADB, World Bank, JICA (2010)
[48] Australian Center for International Agriculture Research
[49] Philippines Institute for Development Studies
[50] Leyte State University

EXISTING ADAPTATION FRAMEWORK/STRATEGY/POLICY AND INSTITUTIONAL SET-UP

The Philippines established a Climate Change Commission to facilitate coordination across relevant agencies and institutions. The Commission has identified as a priority the need to make key sectors climate-resilient, and to work with local governance to address adaptation and disaster risk reduction needs. Several project- or program-based climate change adaptation initiatives are underway. The need for local governance and adaptation has been a major focus of much of the work. Additional strategic actions include:

- A Presidential Task Force on Climate Change (PTFCC) was created in 2007 to coordinate and oversee climate change policy. Supporting agencies include the Inter-Agency Committee on Climate Change (IACCC) and the Klima Climate Change Center (KCCC). The IACCC was created in 1991 to coordinate various climate change–related activities, propose climate change policies, and prepare the Philippines positions on UNFCCC negotiations. The KCCC disseminates information on climate change, raises awareness, conducts relevant research, and supports national capacity building.
- Ongoing programs for DRM include hazard mapping, establishing early warning systems, exploring risk sharing mechanisms such as crop insurance, community-based DRM, and capacity building. These are currently the purview of several government agencies, such as NEDA, NDCC, and DILG.
- Internationally-funded adaptation efforts have partnered with local institutions to promote integrated coastal resource management principles, biodiversity conservation, and sustainable agricultural practices. In order to support the country's goal of adaptation and disaster risk mainstreaming, such programs should ensure that the capacity of local institutions is a strong element.
- IRRI, the International Rice Research Institute, is conducting research to help Filipino farmers boost rice yields. Three new rice varieties were introduced in the Philippines in 2009 — one flood-tolerant, one drought-tolerant, and one salt-tolerant. IRRI is also actively engaging local research and extension partners to develop and facilitate appropriate rice technology to farmers.

INSTITUTIONAL AND POLICY GAPS

In order to adapt to climate risks, the disaster management sector of the Philippines will need to adopt both a coordinated national planning structure and local and community-level response measures. Several initiatives are already underway to address these issues, but additional efforts are required at the institutional level, as outlined in two priority pathways: capacity and coordination. These are discussed below.

- *Issues related to capacity*
  - Improved capacity for agricultural and coastal zone impact modeling is needed.
  - Enforcement of current legislation is required in order to mitigate the potential negative effects of climate change on already vulnerable areas.
  - Support to cooperatives is required in order to guarantee farmers access to inputs and credit.
  - Improved extension services are desperately needed, particularly in the vulnerable agricultural regions.
- *Issues related to coordination*
  - Donor, agency, and institutional coordination is crucial to ensure synergistic action, particularly with regards to addressing climate change risks in disaster risk management. Of particular note is the requirement for significant collaboration between extension works and hydrometeorological research institutions, making climate data and information accessible to farmers.

RESEARCH, DATA, AND INFORMATION GAPS

The Government of the Philippines has made significant progress in recent years; however, several areas remain where capacity needs to be strengthened in order to adequately address current and projected changes in climate, especially given the potential wide range of cross-cutting sectoral impacts. Some of the measured required are listed below.

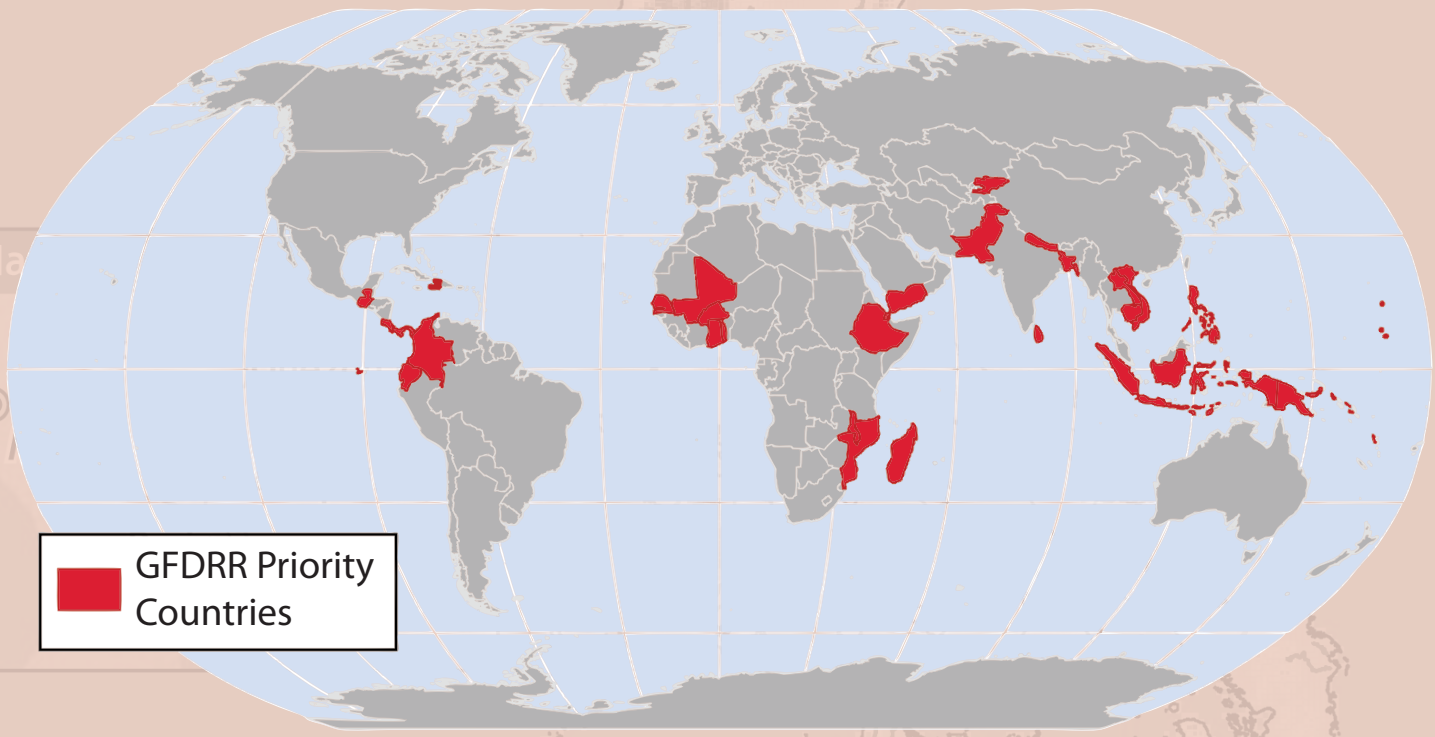
DATA AND INFORMATION GAPS

- Improving the country's meteorological services, including restoring and upgrading the basic infrastructure and operations, and putting in place an appropriate local capacity building program to improve scientific/technical staff resource levels and to upgrade skills. Building climate change Issues into National Development Plans Adequate and reliable data are needed to develop an accurate understanding of both current and future hydro-meteorological variability. Data management systems are required and need to be developed to facilitate data sharing and access to decision-relevant information.
- The results of technical studies conducted on climate change impacts should be disseminated to all relevant local partners, in order to both apprise relevant partners of emerging information and avoid potential duplication of work.
- Map hazards and vulnerabilities - Highlighting the location of specific hotspots in the country where climate-related hazards are experienced or likely to be felt is a key step in identifying intervention areas. Mapping exercises should document the current hazards, use socio economic information to characterize the vulnerability of the areas exposed to these hazards, and identify the projected changing dynamics of these hazards in light of climate changes. Subsequent training in integrated vulnerability assessment is necessary to appropriately formulate adaptation options at different scales.
- Almost no work has been done to downscale climate models to individual islands. Realistically, it may not be possible to derive more accurate climate change information due to the small size of these islands; however, more work needs to be done to address the "island dilemma". New information should be made available in an accessible format and should be credible and useful to decision making at the island scale.

RESEARCH GAPS

- Comprehensive vulnerability maps identifying the locations of high vulnerability could support disaster planners in preparing communities for worse-case impacts as well as help local communities take an active role in identifying appropriate response mechanisms.
- Improved sub-national information is needed on the impacts of climate change on agricultural production, particularly rice production, the staple food for most of the Philippines' population.
- Detailed assessments of climate change impacts and risks across a variety of sectors are required in order to develop sound response strategies, in particular focusing on food security, water resources, and coastal resources.

This Country Profile *(**http://countryadaptationprofiles.gfdrr.org**) is part of a series of 31 priority country briefs developed by the Global Facility for Disaster Reduction and Recovery (GFDRR) as part of its Disaster Risk Management Plans. The profile synthesizes most relevant data and information for Disaster Risk Reduction and Adaptation to Climate Change and is designed as a quick reference source for development practitioners to better integrate climate resilience in development planning and operations. Sources on climate and climate-related information are linked through the country profile's online dashboard, which is periodically updated to reflect the most recent publicly available climate analysis.*



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