Disaster Risk Reduction in the Philippines

Status Report 2019

adpc

UNDRR
UN Office for Disaster Risk Reduction

Disaster Risk Reduction in the Philippines

Status Report 2019

Cover photo: Tappasan Phurisamrit/ Shutterstock.com

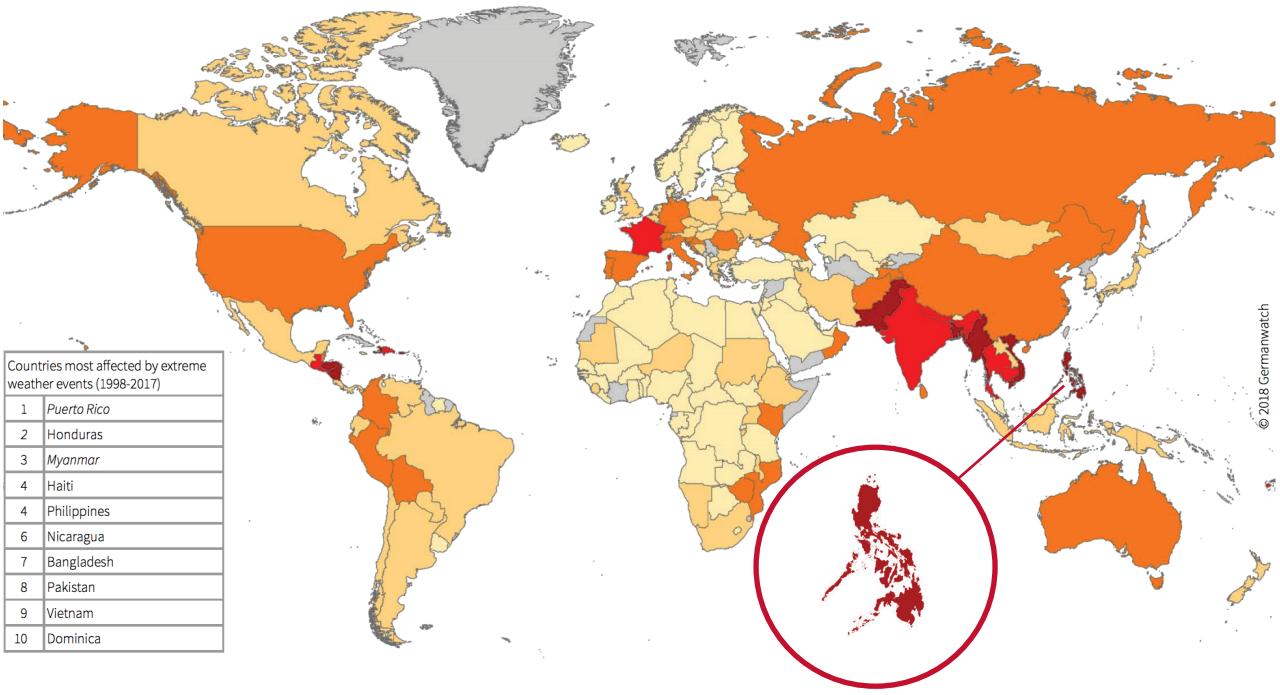
About this report

The Disaster Risk Reduction (DRR) report provides a snapshot of the latest DRR progress the Philippines has achieved under the four priorities of the Sendai Framework. It also highlights some of the key challenges surrounding the issue of creating coherence among the key global frameworks at the country level; and makes recommendations for strengthening the overall Disaster Risk Management (DRM) governance by government institutions and other stakeholders at national, sub-national, and local levels.

The UN Office for Disaster Risk Reduction and the Asian Disaster Preparedness Center acknowledge the governments, international organizations and stakeholder representatives who provided their valuable contribution and feedback to this report. It was made possible by the generous contribution made by the Government of Australia, Department of Foreign Affairs and Trade, as part of the Partnership Framework with the UN Office for Disaster Risk Reduction on 'Supporting Implementation of the Sendai Framework.'

The findings, interpretations, and conclusions expressed in this document do not necessarily reflect the views of UNDRR or of the United Nations Secretariat, partners, and governments, and are based on the inputs received during consultative meetings, individual interviews, and the literature reviews conducted by the research team. While every effort has been made to ensure the accuracy of the information, the document remains open for any corrections in facts, figures and visuals.

UNDRR (2019). Disaster Risk Reduction in the Philippines: Status Report 2019. Bangkok, Thailand, United Nations Office for Disaster Risk Reduction (UNDRR), Regional Office for Asia and the Pacific



(GermanWatch,2019)

POPULATION 2018	
Total Population	104.9 million
Urban Population	53.7 million (51.2%)
Population Density Per Km^2	337
ECONOMIC INDICATORS	
Gross Domestic Product in Current $US	313.6 billion
GDP Per Capita ($US)	2988.95
GDP Growth (Annual %)	6.7
HUMAN DEVELOPMENT	
Human Development Index	0.699
HDI Rank	113
Income Level Category	Lower-Middle income

Climate Risk Index

Rank 176 / Low Risk*

INFORM Risk Index

Rank 75 / Medium Risk**

* Climate Risk Index of 2019 analyses the extent to which countries have been affected by weather-related losses between 1998-2017 (GermanWatch, 2019). However, it should be noted that the CRI may not provide an accurate presentation of the future risk due to the fact that it measures data of past events (which may not always be available depending on the country). Thus, for example in the case of Philippines, low CRI score does not necessarily indicate low climate risk in the future.

** INFORM risk index is a global tool which measures the risk of humanitarian crises and disasters based on 50 indicators assessing hazards, vulnerability and capacity (resources available to mitigate the impact) (INFORM, 2019)

1. Introduction

Philippines is an archipelago state, consisting of some 7,100 islands and islets, and covering a land area of approximately 300,000 km^2. The country comprises three groups or large islands: (1) the Luzon group in the north and west, consisting of Luzon, Mindoro, and Palawan, (2) the Visaya group in the centre, consisting of Bohol, Cebu, Leyte, Masbate, Negros, Panay and Samar, and (3) Mindanao in the South. Manila and nearby Quezon City, the country's most-populous cities, are part of the National Capital Region (NRC or Metro Manila), located on the largest island Luzon (Cullinane, 2019). The islands and groups are divided into four main classes of administrative divisions, which consist of 17 autonomous regions, 81 provinces, 1,489 municipalities, and the smallest political units, 42,044 Barangays as of 2018 (PSA, 2018).The Philippines is governed by a presidential form, in which power is divided among three juridical branches; executive, legislative and judicial, which seek democracy and balance by carrying their equally weighted duties to uphold law, rights and representation of the interests of the people (GoP, 2019).

In terms of disaster risk, Philippines ranked third among all of the countries with the highest risks worldwide according to the World Risk Report 2018, with index value of 25.14% (World Economic Forum, 2018). At least 60% of the country's total land area is exposed to multiple hazards, and 74% of the population is susceptible to their impact (GFDRR, 2017). This is largely due to the location and geographical context as the risk involving coastal hazards such as typhoons, storm surges and rising sea levels is high. Also, as the islands are located within the "Ring of Fire" between the Eurasian and Pacific tectonic plates, earthquakes and volcanoes are posing serious risks to the safety of the populace. Flooding, landslides, droughts and tsunamis further contribute to the exposure to natural hazards (CFE-DM, 2018). Of these, hydro-meteorological events including typhoons and floods, accounted for over 80% of the natural disasters in the country during the last half-century (Jha, 2018).

Given the local ecologies, agriculture, mining, forestry, fishing and services are major sources of people's livelihoods. In 2019, employment rate was reported at 94.8 % (PSA, 2019), and out of the three key sectors of employment (industry, agriculture and services), workers in service providing comprised the largest proportion of the employed population (PSA, 2018) (figure 2).

1.1 Demographic Characteristics

The Philippines population has reached more than 100 million, according to the 2015 Population Census (PSA, 2015). 57% of the population resided in Luzon, 23% in the Visayas, and 20% in Mindanao, and in total, 51.2% of the overall population lived in urban regions (PSA B, 2019). The population density in the urban regions is 60 times higher (20 785 persons/km^2) than the national average of 337 according to the 2015 census (figure 1).

A number of ethnic groups and cultures are found throughout the islands. Indigenous peoples constitute approximately 10–15% of the total population of the Philippines and are present in 65 of the country's 78 provinces (Cariño, 2012). The dominant ethnic groups include the Tagalog (28%), Cebuano (13%), Ilocano (9%), Bisaya (7.6%), Ilonggo

(7.5%), and Bikol (6)% (PSA, 2010), along with numerous other minorities and indigenous peoples who inhabit the islands across the archipelago. The majority of indigenous peoples (61%) are found in Mindanao, 33% are found in Luzon, and 6% in the Visayas (National Commission on Indigenous Peoples, referenced in Cariño, 2012).

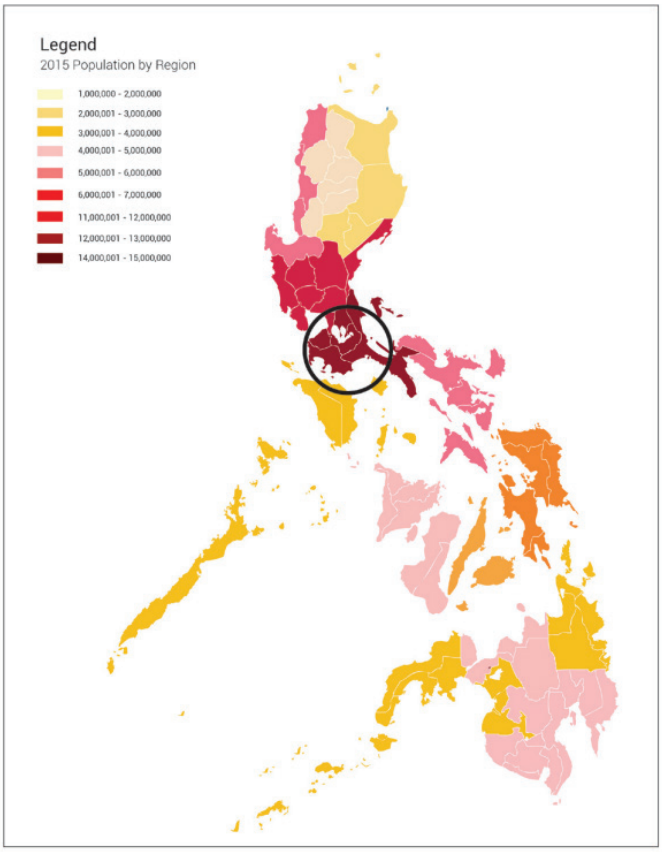


Figure 1. Population density in the Philippines (National Economic and Development Authority, 2017),

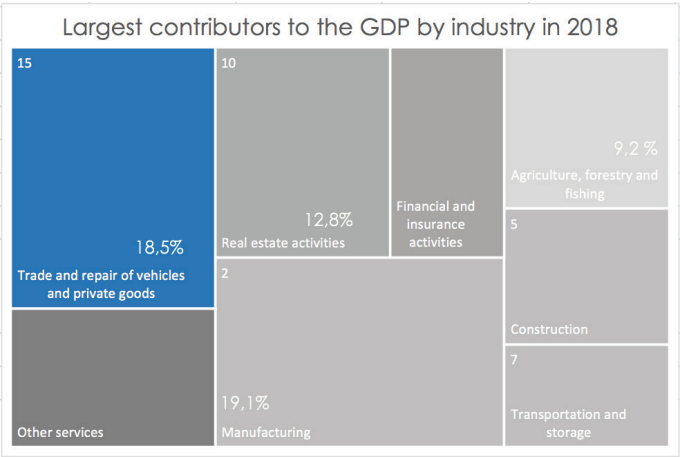


Figure 2. Largest industries contributing to, and their portion of the GDP in % in 2018. Data sourced from Philippines Statistical Authority 2019.

1.2 Economic Impact of Disasters

Since 1990, the Philippines has been affected by 565 disaster events which have caused an estimated $US 23 billion in damages (Jha, 2018). Approximately 85.2% of the sources of the country's production have been reported to be susceptible to disasters, and 50.3% of the total land area is considered to be economically at risk (ADB, 2012). Much of the damage has been resulting from recurrent, massive-scale super typhoons, including Ondoy and Pepeng in 2009, Washi in 2011, Bopha in 2012, Haiyan in 2013, Koppu in 2015, Haima in 2016, and Mangkhut in 2018. Much of the country's exports and trade income have relied on resource-extractive industry (Martinico-Perez, et al., 2018), which further create implications in terms of disaster vulnerability and sustainable economic growth.

Large-scale and recurrent disasters have had long-term implications on the country's economy (figure 3). The estimated multi-hazard annual losses are close to US$ 8 million, which is equivalent to 69% of the country's social expenditure (Alcayna, et al., 2016). One of the most severe disasters to directly hit the Philippines in the recent history is the typhoon Haiyan in 2013. It affected an estimated 16 million people, destroyed more than 1.1 million houses and affected hundreds of thousands of hectares of crops across 41 provinces (FAO, 2018). Overall damage to agricultural sector amounted to $US 1,4 billion, 74% of which was borne by the crops sector (FAO, 2018). The fishing sector carried 20% (approximately 280 million) of the total losses of $US 9.6 billion in the form of destroyed boats and other assets (FAO, 2018). Such impacts had far-reaching economic consequences due to lessened future production, which in turn decreased the annual GDP by 0.9% following the event (Bowen, 2015). However, it has been suggested that the greatest losses are not due to the impact on agriculture; large-scale typhoons have impaired the GDP growth due to disrupted electricity production infrastructure, affecting the output of industry, manufacturing and services in the long term (Ang, 2014).

According to a government official, the typhoon season costs approximately 2% of the country's yearly GDP on average, and another 2% is consumed by the recovery activities – a recurrent disaster trap which hinders overall economic development (Vidal, 2013). Currently, the industrial growth is lacking behind many other countries in the Southeast Asia, despite the great expectations for future – it was predicted that the country would experience growth comparable to the top performing neighbors in the region, including Thailand, Vietnam and Indonesia (Tolo, 2011). While reasons behind the hindered growth have been sourced to collateral damages from the Asian Economic Crisis (Montes, 1998) and significant external debt (Akram, 2015), frequent disasters have been considered as a major obstacle to sustained, long-term economic growth (Benson & Clay, 2004; Alano & Lee, 2016; Alave, 2012; Kim, 2010; Popp, 2006). The "lost growth" between 1970-2010 has been estimated as high as 7.3% of GDP per capita (Alano & Lee, 2016).

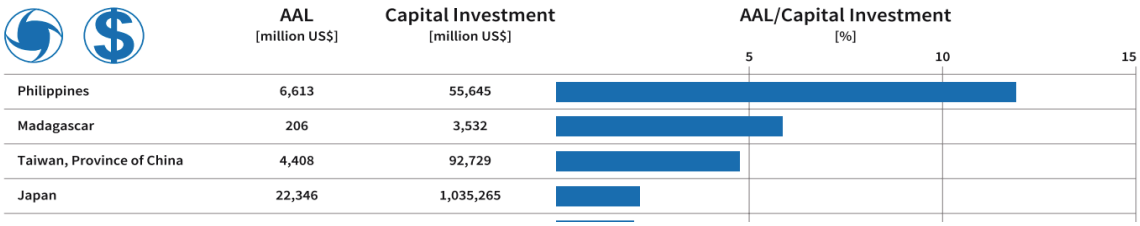


Figure 3. Top countries to have a high Tropical Cyclone AAL in relation to capital investment (excluding Small Island Developing States) (UNISDR, 2015)

1.3 Social Impact

For the majority of the population, rice is the prime source of calories nationally (PSA, 2017). Thus, large-scale disasters affecting production may have a detrimental impact on the food supply on a national scale. The typhoon Haiyan caused an estimated loss of 260,000 tons, leading to severe food shortages across the country; approximately 2,5 million people required food assistance, and roughly a million farmers' livelihoods were compromised as over 67,000 hectares of rice crops were destroyed (Di Nunzio, 2013). Furthermore, it was estimated that the event drove nearly a one million people into poverty (Bowen, 2015). Also, large supply gap of rice has been emerging as a result of crop vulnerabilities, climate change, inefficiencies in production and growing populations, and now the domestic production is not meeting the demand (Exconde, 2018).

The poorest often suffer the most serious consequences of disasters and the losses of livelihoods, as the coping strategies in the Philippines include reducing spending on education, medicine and nutrient-rich food (Anttila-Hughes & Hsiang, 2013). At the household level, poverty is one the most important factor determining vulnerability, which is reflected in the access of basic services and resources, location of housing, yearly earnings and so on (The World Bank, 2005).

When it comes to education, children regularly lose school days and suffer the compounding negative effects on their schooling during disasters; schools are often used as evacuation centers, buildings are damaged, teaching materials are lost or damaged, schedules are disrupted (Save the Children, 2016) and returning to schooling might be impossible for children from low-income backgrounds. This has even longer-term cascading impacts as lack of educational background may foretell increased vulnerability in the future (Hoffman & Muttarak, 2017).

2. Disaster Risk Profile

The geographical location of the Philippines makes the country uniquely exposed to a plethora of hazards, including recurrent typhoons, earthquakes and 53 active volcanoes, eruptions of which are classified as the most deadly and costly globally (Doroteo, 2015). The subduction zone between the two tectonic plates (Eurasian and Pacific) creating the seismic activity in the region are predicted to have the capacity to generate major earthquakes in the near future, and in the vicinity of metropolitan cities (Pailoplee &

Boonchaluay, 2016). Other hazards include floods, landslides, tsunamis and wildfires, all of which are occurring in a frequency which has fundamentally changed the perception of hazards in the country.

2.1 Hazards and Climate Change

Disasters in the past, measured during the period between 1900-2014, illustrate extreme spatial variability. Frequency and the extent of impacts are unevenly distributed across the regions, with majority of the events affecting Central Luzon, Cordillera Administrative Region and the Central Visayas (Doroteo, 2015).

On average, about 20 tropical cyclones enter the Philippines waters each year, with approximately eight or nine making landfall (ESCAP/WMO, 2009; Bankoff, 2003). They are also the largest contributors to disaster damage. Of all the disasters, cyclones and the accompanying landslides, storm surges and floods have caused the largest losses of life and property (Huigen & Jens, 2006; Bankoff, 2003), mostly because majority of the population is living within 60km from the coast. However, 80% of all the damages and deaths caused by typhoons between 1970-2014 have been caused by 6 super-scale events, Haiyan included (Espada, 2018). Based on vulnerability studies, the most vulnerable regions to tropical cyclones in the country are the National Capital Region (NCR), Southern Tagalog, Cagayan Valley, Central Luzon, the Cordillera Administrative Region, and Bicol Province (Cruz, et al., 2017). Visayas and Mindanao are likewise becoming more at risk due to an increasing number of tropical cyclones entering the southern part of the country.

Furthermore, the varying geomorphology affects the distribution of hazards. For example, the Baguio district is most landslide prone region due to highest recorded rainfalls resulting from the interaction of the monsoon season, cyclones, and the orographic lifting of air by the Cordillera mountains (Nolasco-Javier, et al., 2015). Severe, reoccurring flooding on the other hand is common in the lowland areas (Bankoff, 2003). Earthquakes also tend to have their unique characteristics depending on the local context. Seismic activity produces severe secondary impacts in areas with cohesionless soil conditions. Liquefaction is a significant concern in central Luzon, especially in the provinces of Pangasinan and Tarlac (Bankoff, 2003). Extremely destructive earthquakes and associated tsunamis have been known to occur during the known history and are a likely threat in the future.

In terms of climate, the Philippines is among the top countries at risk of adverse impacts of climate change due to sensitive ecological systems (including reefs and marine fauna), large numbers of coastal populations and exposure to frequent weather extremes which are likely to grow in intensity. Climate change effects are considered to be a key factor contributing to the occurrence of stronger typhoons, sea-level rise, and elevated storm surges in coastal regions. Intensified storm surges are predicted to affect more than 40% of the coastal population living in informal settlementsm and they are likely to face the first impacts of increased storm surges and flooding (CFE-DM, 2018).

Studies indicate that temperature and precipitation have increased steadily during the past six decades, and temperature extremes are becoming more frequent (Cinco, et al., 2014). Data also illustrates temporal and spatial variability of rainfall which has unique regional characteristics of increased precipitation in western and central regions.

However, the country has undergone an overall climatological drying trend outside of the monsoon (Villafuerte, et al., 2014). These changes are reflected in rice production losses, as the crops are most sensitive to temperature changes, and in some extent, to typhoons and excessive flooding. Production variability in the past has largely correlated with soil moisture changes (Stuecker, et al., 2018), indicating that future droughts may pose the highest risk to crop yields and thus to national food security. Conversely, increased monsoonal precipitation will likely increase the risk of flash flooding and landslides.

2.2 Exposure

Nearly half of the population is residing in urban centers, 25% of which in the capital alone. Massive urban sprawl has expanded the metropolis of Manila into the Greater Manila Area, now covering parts of the neighboring provinces as well. This expanded metropolitan area has a population of about 25 million, (The Centre of Expertise on Asia, 2016).

Informal settlement and unplanned city expansion are prevalent issues, resulting in urban congestion as well as compounding physical, social and environmental vulnerabilities to hazards in the National Capital Region (NCR). Rapid urbanization, conversion of agricultural lands to residential areas and concreting open spaces have resulted in the loss of topsoil and destruction of the natural ecosystems, which drastically reduce the ground's capacity to absorb water (OCD-NDRRMC, 2015). This will further exacerbate the impacts of heavy rainfall and flooding.

An estimated one third of the inhabitants of Metro Manila reside in informal settlements, where inadequate housing and lack of infrastructure are often highlighted as the most prevalent issues (Morin, et al., 2016). Demographic growth and urbanization have also affected the provision of services, resulting in inadequate solid waste management among other issues. The urban poor are also often highly vulnerable to natural hazards, partly due to rapid urban growth and lack of tenure which have forced many to inhabit hazard-prone areas such as flood plains, riverbanks, the coasts and on steep slopes (Swiss NGO DRR Platform, 2014).

Coastal areas are also increasingly exposed and vulnerable to the impacts of climate and sea-level rise, impacts of which are only exacerbated by the environmental degradation (pollution, habitat destruction, and erosion) prevalent in resource-rich coastal communities (Sales Jr., 2009). Thus, disaster and climate resilient urban development is crucial to safeguard people and sustainable development, especially in major cities like Metro Manila, which contributes to about 35 % of the Philippine economy (The World Bank, 2017).

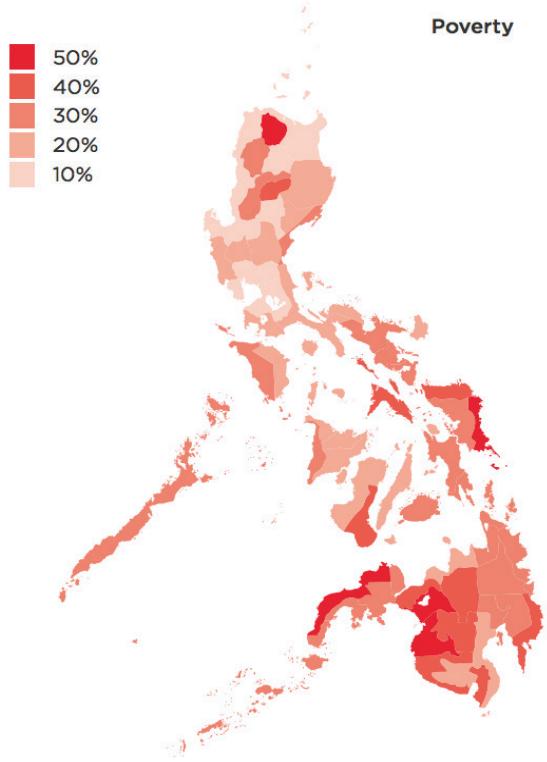


Figure 4. Distribution of poverty in the Philippines by province (GSMA Intelligence, 2014)

2.3 Social Vulnerability

Poverty in the Philippines is characterized by distinct spatial and individual disparities; poorest provinces are located in the southern regions of the country (figure 4) and the poor households are also very heterogenous in nature. The poor, depending on their background, location and gender, are affected by various observable economic and natural shocks such as fuel prices, varying rainfall, or natural hazards, and for many, education is determining factor of future income and economic status (Mina & Imai, 2016). This is an important consideration given the evidence indicating that even small-scale recurrent disasters, such as periodical flooding, can have negative impacts on education, especially for students from low-income backgrounds (Cadag, et al., 2017; Save the Children, 2016). This observation indicates that a cycle has been forming between disasters, hindered education, subsequent increased likelihood for poverty and thus, increased vulnerability.

The impacts of climate change and environmental degradation do not impact the populations equally. Among various socioeconomic groups in coastal communities, especially small-scale enterprising poor such as fishers and shellfish gatherers, have been found to be most vulnerable to coastal flooding, coastal erosion and saltwater intrusion (Sales Jr., 2009). This is due to increasing coastal hazards, lack of household resources, environmentally dependent sources of livelihoods and exposure to frequent hazards, among other factors. Small-scale farmers are the other most vulnerable group; household levels often carry the brunt of disaster impacts, suffering from food insecurity

and other ripple effects due to lack of diverse coping strategies (Danilo & Roehlano, 2012; Anttila-Hughes & Hsiang, 2013).

Some vulnerabilities have strong gendered characteristics, as men's and women's vulnerability to disasters is influenced by cultural norms and perceptions influencing gendered behavior. For example, evidence from Central Philippines suggests that cultural norms and perceptions of modesty significantly lower the swimming capabilities of women and girls, which also has transgenerational effect (Hunter, et al., 2016).

2.4 Physical Vulnerability

The paradigm shift emphasizing economic development through effective utilization of resources has jeopardized the physical and natural reserves in certain regions. Strategic resources from upland, lowland, and coastal areas have experienced negative impacts as a result of industrial development, such as mining. Threats to natural protective shields, including mangroves, watersheds, forest covers, and topsoil (OCD-NDRRMC, 2015), cause profound impacts on people's lives, livelihoods, food security, health and well-being.

Due to growing informal urban settlements, proliferation of substandard materials and poor construction is still observed in many areas. It increases the vulnerability to earthquakes and flooding, as well as increases the probability of WASH related diseases to occur due to lack of infrastructure, poor drainage systems and lack of sanitation (Morin, et al., 2016). Many low-lying coastal communities are habitually exposed to flooding, and numerous housing units are often built with wood on pile foundations, covered by sheet metal and plastic, all of which are inadequate to withstand typhoon (or earthquake) impacts (Morin, et al., 2016).

The mangrove ecosystems, one of the best buffers against typhoons, coastal flooding and storm surges, have been severely deteriorated (Ida Gabrielsson, 2018). The Philippines has lost hundreds of thousands of hectares of mangroves in the last century, as a result of rampant conversion of natural space to the use of agriculture, fish ponds, aquaculture. Also, the forests have been degrading due to extensive use of mangrove for timber and and fuel, and due to the expansion of coastal settlements. Large scale mining development has been found to be another source of environmental degradation, and they may potentially enhance the processes resulting to the loss of rural livelihoods (Holden, 2015).

2.5 Future of Disaster Risk

The projected impacts of climate change to agricultural production are dire. It is estimated that the number of people at risk of hunger will increase by 17% by 2050, per capita GDP will experience yearly losses of 10%, and that the overall yearly cost to the country's economy could reach over US$ 3.5 billion (Rosegrant, et al., 2015). Also, as the climate varies, risk of rice production losses is likely to contribute to increased hunger, and regionally changing precipitation will likely increase the risk of seasonal flooding and landslides across the country. According to the Global Assessment Report on Disaster Risk Reduction 2015, the Philippines is among the countries with largest proportion of their capital investment at risk (UNISDR, 2015). Already, multi-hazard annual losses represent nearly 69% of the social expenditure (UNISDR, 2015) – projections of which are worse. The Philippines is also among the countries with highest numbers

of population exposed to volcanic eruptions, which occur frequently along the Ring of Fire (Brown, 2015). Future economic and social development may be compromised due to recurrent medium and large-scale hazards (UNISDR, 2015).

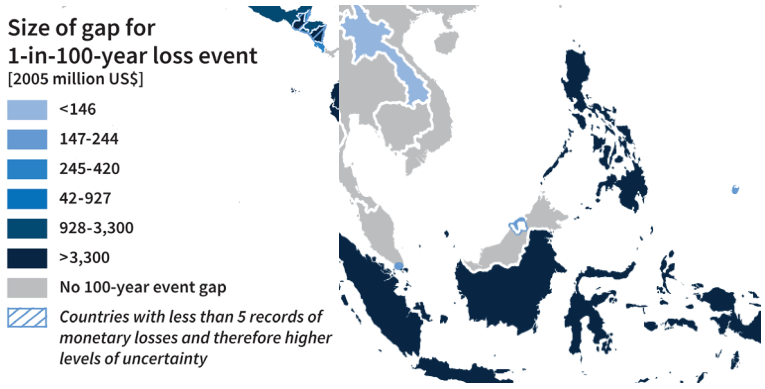


Figure 5. Countries facing a financing gap for a 1-in-100-year loss event (UNISDR, 2015).

3. Disaster Risk Reduction and Climate Action Interventions

Disaster risk reduction and climate action have been embraced as compulsory functions of all levels of governance required to sustain productivity, and to shelter development gains in the Philippines. DRR and institutionalization of disaster risk management have become permanent elements of the official governance, in recognition of the fact that disasters and climate change are increasingly threatening the national security. The following chapters shed light on the process and key interventions on disaster risk reduction (DRR) and climate change adaptation (CCA), in consideration of the global policy frameworks: Sendai Framework for Disaster Risk Reduction (SFDRR), Sustainable Development Goals (SDGs) and the Paris Climate agreement.

3.1 Sendai Framework for Disaster Risk Reduction

Priority 1. Understanding Disaster Risk. Philippines has made significant progress in collecting comprehensive and updated risk information using different technological tools including GIS, Light Detection and Ranging (LiDAR), Interferometric Synthetic Aperture Radar (IfSAR), computer simulations, and fault mapping. Country's assessments of hydro-meteorological, geological, and seismic hazards as well as community vulnerabilities, especially in the urban context, cover the parameters of hazards, exposure and vulnerability contributing to risks. However, enhanced cross-agency collaboration will be required to optimize the use of existing databases, managed by different government offices to generate finer scale of risk information.

At national level, technical agencies with direct and relevant mandates for conducting risk assessments are the Philippines Institute of Volcanology and Seismology (PHIVOLCS), the Philippines Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), NAMRIA, and Mines and Geoscience Bureau (MGB), and UP Resilience Institute. The agencies have technical expertise that complements one another when conducting multi-hazard risk assessments. Conducting risk assessments for volcanic eruptions, earthquakes, and tsunamis are the main technical services of PHIVOLCS. It is also in-charge of earthquake impact assessments, as well as severe wind and flood impacts from the Barangay to provincial level. This service, in turn, requires inputs from PAGASA, responsible for data collection, modeling and tracking of typhoons, and other hydro-meteorological hazards, alongside climate projections.

Landslide mapping falls under the technical expertise of the MGB, with products including urban exposure maps, population exposure maps, and road network exposure maps for the local government units. The assessment relies on base maps, developed by NAMRIA, which provides key services and products, including resource assessment and mapping, delineation of maritime boundaries, and risk mapping at the sub-national levels.

Priority 2. Strengthening Disaster Risk Governance to Manage Disaster Risk. Since 1970s, Philippines has updated legal foundations for disaster risk reduction and management, emphasizing response-centric interventions, along with disaster prevention preparedness, and mitigation activities. This has been complemented by local risk governance legislation since 2003 to enable the use of local calamity funds for disaster preparedness and mitigation. However, these were considered insufficient to support change at the local level (GoP, 2009). This acknowledgement led to the enactment of the Philippine Disaster Risk Reduction and Management Act of 2010 (or Republic Act 10121), as the country's foremost legal instrument and guiding policy framework driving DRRM momentum across various governance levels.

In terms of institutional arrangements, National Disaster Risk Reduction and Management Council (NDRRMC) serves as the highest decision-making body, comprising members from different departments, government agencies, LGUs, Civil Society Organizations and private sector. The architecture of DRM consists of multi-tiered bodies down to the Barangay (community) level, comprising Disaster Risk Reduction and Management Office (DRRMO) in every province, city and municipality, and a Barangay Disaster Risk Reduction and Management Committee (BDRRMC), which are responsible for operations requiring vertical coordination, as mandated by the DRRM Act.

In the attempt to strengthen risk governance at the local level, the Guidelines for the Establishment of Local Disaster Risk Reduction and Management Offices (LDRRMOs) or Barangay DRRM Committees (BDRRMCS) in Local Government Units (LGUs) have been issued in 2014 through a Joint Memorandum Circular between the NDRRMC, Department of the Interior and Local Government (DILG), Department of Budget and Management, and Civil Service Commission (JMC No. 2014-1). The government is also contributing significantly to capacitating local government units (LGUs) by developing a checklist of actions to be taken and supplies to be procured together with providing communications and contingency templates for disaster preparedness (Alcayna, et al., 2016). Community involvement in local DRRM (at the Barangay level) taking place through CBOs and private sector operators who are key stakeholders of the DILG in joint trainings and projects under the auspices of the Local Government Academy (LGA).

The DRRM Act 2010 and the Climate Change Act of 2009 have explicitly indicated environmental protection provisions, the monitoring of which is mandated to NDRRMC and Department of Interior and Local Government (DILG), Department of Environmental and Natural Resources (DENR) and the offices under it. Programs to translate policies into actions have been formulated and implemented, including sector-specific programs on coastal resource management, forest development, protection and rehabilitation, the Ridge to Reef Framework of Development and localized policies, such as the Agno River Basin Inter-Regional Watershed Management Program in Ilocos (OCD-NDRRMC, 2015).

IMPLEMENTATION	LEGISLATION/POLICY	SCOPE	PURPOSE
NATIONAL DISASTER COORDINATING COUNCIL	The Presidential Decree No. 1566 (1978)	National, provincial and municipalities	Emphasizes disaster prevention, preparedness, mitigation and community preparedness against natural and man-made hazards.
GOVERNMENT OF THE PHILIPPINES	Local Government Code of 1991	Local governments in provinces, municipalities and the Barangays	Aimed to achieve decentralization by increased stakeholder participation through for civil societies and allocated national powers and responsibilities to LGUs.
BUREAU OF FIRE PROTECTION	Revised Fire Code of the Philippines (2008)	National	Assigns authority to BFP to issue rules and regulations relating to fire management, to oversee national fire safety across sectors.
THE CLIMATE CHANGE COMMISSION	Climate Change Act of 2009, RA No. 9729 (2009)	National, provincial, and municipalities	Monitors and evaluates all national programs and action plans to guarantee mainstreaming of climate risk considerations across sectors, operated under the autonomous CCC.
GOVERNMENT OF THE PHILIPPINES	Philippine Disaster Risk Reduction and Management Act of 2010 (2010)	National, provincial and municipalities	Extending Decree 1566, focusing on pro-active disaster and climate risk reduction and management via participation of all levels and sectors. A whole of society approach, which includes considerations to gender and indigenous people.
PHIVOLCS & PAGASA	Calamity Hazard Mitigation Program Act (2010)	Sectoral	Requires the PHIVOLCS and PAGASA to establish natural calamities' hazard mitigation programs for all coastal areas, to perform hazard monitoring, assessment and early warnings

IMPLEMENTATION	LEGISLATION/POLICY	SCOPE	PURPOSE
GOVERNMENT OF THE PHILIPPINES	Disaster Risk Reduction Management Plan (NDRRMP) 2011-2028	National, districts and municipalities	Aims to guarantee sustainable, climate adaptive and disaster resilient development across sectors by fulfilling the mandates set in Decree 1566 and the Disaster Act of 2010
DEPARTMENT OF DISASTER RESILIENCE	Department of Disaster Resilience Act (2018)	National	Mandates the creation of Department of Disaster Resilience, advised by the National Disaster Resilience Council, to mainstream disaster and climate risk reduction across sectors and stakeholders, to focus on local resilience and on proactive recovery, rehabilitation and "building back better"

Table 1. Disaster legislation and policies of the Philippines

Priority 3. Investing in Disaster Risk Reduction for Resilience. Since 2008, National Economic and Development Authority (NEDA) has been developing and updating DRR mainstreaming framework for addressing disaster risk issues. The local DRRM Plans (LDRRMPs) are developed by the Local Disaster Risk Reduction and Management Office (LDRRMOs) at the provincial, city and municipal levels and the Barangay Development Councils, to guide DRRM activities and investment. Significant efforts have been made to enhance risk-informed spatial planning, with the OCD tasked to evaluate and ensure that disaster risk reduction measures are incorporated into the Comprehensive Development Plan (CDP) and the Comprehensive Land Use Plan (CLUP).

Also, overcoming budget constraints for resilience building is critical, and they are being addressed substantially. The Republic Act 10121 provides that the Local Disaster Risk Reduction and Management Fund (LDRRMF); amounting to no less than 5% of income from regular sources which is to be set-aside for disaster risk reduction and management, with a ratio of 70% for prevention, mitigation and preparedness, and 30% is dedicated to Quick Response Fund (QRF), (OCD-NDRRMC, 2015). This is helping to ensure budget allocation for disaster risk interventions at local levels. The 70% allocation will finance implementation of structural and non-structural activities, including risk-mitigation infrastructure, purchase of equipment, stockpiling of basic emergency relief supplies, training, planning, capacity including, development of Information, Education and Communication (IEC), and risk transfer mechanisms among others (OCD-NDRRMC, 2015).

While there are budgeting mechanisms in place for cities to allocate financing for disaster risk management through the Local Disaster Risk Reduction and Management Funds, cities often face significant challenges in securing adequate resources for post-disaster operations, including rapid access to funding to support early recovery efforts such as

the restoration of critical infrastructure, delivery of services, and support for livelihoods. Effective and inclusive risk transfer options have been explored, given the need to reduce financial constraints and fiscal risk of the government, including the use of market-based catastrophe risk insurance - the Philippine City Disaster Insurance Pool (PCDIP), to directly support contingency financing that provide liquidity immediate after disaster. This involves stakeholders from finance and insurance domains, including Department of Finance (DoF), Insurance Commission, Government Service Insurance System (GSIS), and Philippines Insurance and Reinsurance Association (PIRA).

Incentives for DRR investment at local level are being explored, in the form of concessional loans for investing in disaster risk reduction activities (ADB, 2016). However, more is to be done to create attractiveness and an enabling environment to put this into operationalization. To address fiscal challenges, after the Typhoon Haiyan in 2013, the Department of Finance of the Philippines has elaborated a national Financial Protection Strategy to enhance the resilience to disaster and climate risks with priority actions identified at the national, local and individual level (ADB, 2018). This builds on a country-specific catastrophe risk model carried out by the Department of Finance with support of the World Bank and the Global Facility for Disaster Reduction and Recovery.

Priority 4. Enhancing disaster preparedness for effective response to "Build Back Better" in recovery, rehabilitation and reconstruction. A national disaster response plan was formulated and adopted for different hazards and disaster scenarios with the participation of stakeholders, including civil societies and the private sector. The NDRRMC Operation Center has been established for monitoring, evaluation, and coordination of disaster response operations. The OCD conducts Pre-Disaster Risk Assessment – Actions Programs and Protocols (PDRA-APP), and capacity building for emergency preparedness, Incident Command System (ICS), Search and Rescue and PDNA. OCD, in partnership with other government counterparts, including DILG, and the Philippine Public Safety College (PPSC) have continued support to LGUs on DRM. LGUs and the members of the Regional Disaster Risk Reduction and Management Council (RDRRMC) have already set their "Oplan Paghahanda" to properly respond to any disaster scenario, but they would need to continuously enhance their response capabilities (Baccay, 2018). Some LGUs have also already established their own local operations center.

Hazard forecasting and monitoring equipment are regularly updated. As of 2015, the country has 74 seismic stations for earthquake monitoring, 36 tsunami detection stations, 6 volcano observatories and 10 tsunami early warning systems. There are also 19 NAMRIA sea level monitoring stations. PAGASA has over 1000 automated weather stations and water level sensors, with information provided for public access on their respective websites (OCD-NDRRMC, 2015). There is also the Nationwide Operational Assessment of Hazards (NOAH Program) under the Department of Science and Technology (DOST), to provide early warning with a six-hour lead time to vulnerable communities against impending floods.

The NOAH Program has reported significant achievements, including the production of useful, sophisticated hazard maps and accomplishing wide Light Detection and Ranging (LIDAR) survey coverage. (OCD-NDRRMC, 2015) While a certain technical capacity has been developed for forecasting and hazard anticipation, these have yet to be fully expanded to the end-users. Advisories from PAGASA-DOST and PHIVOLCS-DOST are shared through the agencies' official internet websites and at the same time through

SMS to the Office of Civil Defense, Local Chief Executives of LGUs, RDRRMC/PDRRMC member agencies and local media. LGUs are then expected to inform their barangay officials via SMS and/or handheld radios. Hazard maps are also available both in hard copies and electronic copies downloadable from the websites (OCD-NDRRMC, 2015). Early warning systems are further enhanced by the Free Mobile Disaster Alert Act of 2014, which mandates telecommunication operators to issue free public warnings via mobile phones, as required by the state, PHIVOLC or PAGASA (GoP, 2014).

Post-Disaster Needs Assessment (PDNA) undertaken after major disasters with widespread impacts (such as the Ondoy and Pepeng typhoons 2009, and Yolanda Typhoon 2013) provides a comprehensive and thorough assessment of the damage, losses, and impacts in 13 key sectors of the economy. Previous assessment covered the damage to public assets and flows, while the more recent ones are more comprehensive, covering an estimate of the damage and losses suffered by the private sector. An assessment is also presented of the broader economic and social impacts of the disasters. The PDNA also provides a basis for determining the country's needs for post-disaster recovery and reconstruction (GoP, 2009). Now, 'building back better' in recovery and reconstruction has evolved towards a more long-term approach. The post Yolanda 2013 recovery efforts have geared towards inclusive, risk-sensitive and locally viable options, governed by the Comprehensive Rehabilitation and Recovery Plan (2014), devised by NEDA to set short, medium and long term recovery framework and investment for reconstruction of infrastructure including education, health, housing and recovery of social services, livelihoods, employment and resettlement. A number of good practices reflecting participatory approaches are also being adopted in efforts to further support the affected, facilitated by LGUs, non-government agencies, and CBOs.

Special needs and intersectional vulnerabilities are ensured to be addressed during the recovery phase; National agencies such as the Government Insurance Service Systems (GSIS), the Home Development Mutual Fund (HDMF), and the Social Security System (SSS) provide calamity loans to disaster affected persons. The Development Bank of the Philippines (DBP), Land Bank of the Philippines (LBP), local cooperatives and microfinance institutions provide assistance to farmers and other individuals. The Department of Labor and Employment (DOLE) implements integrated livelihood and emergency employment programs under the "Tulong Pangkabuhayan" (livelihood assistance) for Displaced/ Disadvantaged workers. (OCD-NDRRMC, 2015)

4. Coherence with the Sustainable Development Goals & the Paris Climate Agreement

Development strategies and planning instruments of the Philippines have geared towards resilient development with integrated disaster risk considerations as exhibited in the Philippine long-term vision 2040 (integrates the global agendas: SDGs, SFDRR, and Climate Change Agreement). To support the efforts, the current Philippines Development Plan (PDP) 2017-2022, the first socioeconomic blueprint of the Philippines, sets the focus on inclusive growth, and a globally-competitive economy. Development,

DRR and climate resilience have been articulated in the plans to improve adaptive capacities to minimize disruption in services by hazards with the lead of government agencies, including LGUs. A human approach to development and governance is adopted by the government, which is providing a solid strategic framework for equity and inclusive growth aligned with the SDGs. Legal provision has been established for securing, protecting and promoting human rights of women and children, persons with disabilities, and indigenous peoples, guaranteeing the access to education, health, public services and social services. (GoP, 2017). Given the potential for large/scale disasters to occur, the Philippine Government prioritizes the provision of social protection and the reduction of poverty and inequality. DRR has been guided by the overarching sustainable development agenda, and is aligned with climate change efforts.

Climate change has been identified as a cross-cutting development agenda in the governance system, with solid legislative framework and policy instruments, with the Philippines ratifying the UNFCCC treaty in 1994, and later on the Kyoto Protocol in 2003, followed by the ratification of the Paris Climate Change Agreement in 2015. Enactment of laws and regulations pertaining to climate change over the years have led to the implementation of the Solid Waste Management Act (2000), the National Environmental Awareness and Education Act (2008), and the Renewable Energy Act (2008).

The Climate Change Act 2009 promulgates implementation structures with Climate Change Commission (CCC), as the principal climate policymaking body of the government. The NFSCC sets up strategic framework to address climate vulnerabilities, promote adaptation capacities and formulate climate-sensitive interventions in key sectors including agriculture and fisheries, health, coastal system, water resources and ecosystem management.

The need for local governments to adopt evidence-based resilience plans, programs and practices is made even more urgent given the combined impacts of climate change, rapid urbanization and environmental degradation. Currently, the DILG-LGA is exploring how the climate and disaster risk assessment (CDRA) relates to the core functions of local governments particularly in the rationalized and simplified planning of their development plans such as comprehensive land use plan (CLUP) and comprehensive development plan (CDP), considering the hazards, exposures and vulnerabilities of the LGU (LGA, 2018).

Sectoral Aim	Policies with ties to Sendai Framework for Disaster Risk Reduction	Development targets by 2022 (Explicit SDG targets not available)	Policies with ties to the Paris Climate Agreement or Environment
National Development	Philippine Disaster Risk Reduction and Management Act (2010) Philippine Development Plan (2017-2022)	Access to health services improved nationally	Philippine Disaster Risk Reduction and Management Act (2010) Climate Change Act (2009)

Sectoral Aim	Policies with ties to Sendai Framework for Disaster Risk Reduction	Development targets by 2022 (Explicit SDG targets not available)	Policies with ties to the Paris Climate Agreement or Environment
Agriculture & Mining	Mineral Resources Development Presidential Decree No. 463 (1974) Comprehensive Agrarian Reform Program Extension with Reforms (CARPER) (2009)	Ratio of irrigated area and area required for agricultural development increased to 65,07% Growth of GVA in agriculture, forestry and fisheries increased by 2,5-3,5%	Philippine Mining Act of 1995, RA No. 7942 The Agriculture and Fisheries Modernization Act of 1997, RA No. 8435 (1997)
Disaster and Climate Risk Reduction	Philippine Disaster Risk Reduction and Management Act (2010) Free Mobile Disaster Alert Act (2014) Calamity Hazard Mitigation Program Act (2010)	Number of CC/DRRM-enhanced plans increased within all LGUs Quality of coastal and marine habitats improved substantially Area of land degradation hotspots decreased by 300 000 hectares	Decree No. 1467 for the "Philippine Crop Insurance Corporation (1978, revised in 1995) Philippine Disaster Risk Reduction and Management Act (2010) Climate Change Act (2009)
Vulnerability Reduction	Department of Disaster Resilience Act (2018) Adopting a National Building Code in 1997	Proportion of families affected by natural and man-made calamities provided with relief assistance 100% Proportion of urban population living in slums/ informal settlements/ inadequate housing decreased to 0 Percentage of population covered by health insurance 100%	Climate Change Act (2009) The Agriculture and Fisheries Modernization Act of 1997, RA No. 8435 (1997) Penalizing Squatting and Other Similar Acts Presidential Decree No. 772 (1975)
Urban Development	Philippine Development Plan (2017-2022) National Land Use Act (2017) Urban Development and Housing Act (1992)	Percentage of households with access to safe water supply increased to 95,16% HHs with access to basic sanitation increased to 97,46% Solid waste diversion rate increased to 80% Percentage of barangays with access to sanitary landfills increased to 29,26%	Philippine Development Plan (2017-2022) HHs with access to basic sanitation increased to 97,46% Philippine Development Plan (2017-2022)

Table 2. Some of the synergies between international agreements and different policies and commitments of the Philippines in various sectors.

5. Issues in Implementation of the DRR and Climate Policy

Typhoon Yolanda in 2013 was the most significant test of governance structure and related strategies. It revealed drawbacks of the current council-led governing structure to advancing resilience. Salient topics include how to respond better to disaster realities, how to efficiently coordinate among relevant agencies, and how to be more inclusive of relevant actors.

Together with other issues, a thorough examination of RA 10121 by the national government and advocates for DRRM is underway. The most important discourse to date focuses on ways to institute a powerful governing body that enables more efficient DRRM with administrative and financial powers. The hope is that by instituting a governing system that can thoroughly lead all phases of preparedness, mitigation, response, and recovery, the country can better withstand future—and likely more frequent—mega-disasters (KanakoIuchi, 2019).

The recovery framework also needs a thorough revisiting. The RA 10121 provides that the responsibility for post-disaster recovery and rehabilitation falls under NEDA, but the practice after Yolanda – specifically the creation of a new office called the OPARR – shows that the mechanisms, systems, and structures on recovery have yet to be clarified and institutionalized. This is an imperative in order to ensure that the country can quickly "build back better" after every disaster (OCD-NDRRMC, 2015).

6. Stakeholder Analysis

The Philippines civil society organizations are widely seen as some of the most vibrant and advanced in the world, with total estimated number in the range of 249,000–497,000. However, 40% of these organizations were non-registered in 2013 (ADB, 2013). The CBOs have long been an essential part of political activism, an enabling factor for good governance, and one of key agents to enhance people-centered development and peoples empowerment. The NDRRMC serves as a national multi-stakeholder body for coordination, collaboration, and creating synergy of actions among DRRM players from the government, private sectors and CBOs. As articulated in the DRRM Act of 2010, CSOs, private sector and volunteers will be engaged further in DRR programs to improve the delivery of services.

CSOs and NGOs have a pivotal role in emergency response and CBDRM activities including the church, faith-based NGOs, and grassroots women's organizations. Media partners are also involved in DRR activities through their commitment in the early warning system and emergency broadcast system of various regions as well as nationwide (OCD-NDRRMC, 2015).

Some key NGOs network active in DRR are the Disaster Risk Reduction Network Philippines (DRRNetPhils), composed of over fifty organizations, whose expertise is focused on different pillars of disaster risk reduction; the Mindanao Coalition of Development NGO Networks (MINCODE), one of the largest NGO coalitions in the

Philippines composed of 11 CSO networks with some 700 organizations; and the Philippines Partnership for the Development of Human Resources in Rural Areas (PhilDHRRA) - a network of 52 NGOs focusing on resilient agriculture for rural areas.

The private sector has a unique role to play in the Philippines as private investment drives infrastructure, public utilities and industrial development in the country, which could significantly reconfigure disaster risk. Risk-informed investment under the Private Sector Alliance for Disaster Resilient Societies (ARISE), launched in 2015 and led by the United Nations Office for Disaster Risk Reduction (UNISDR), has urged more members of the private sector to collaborate with local government units to raise awareness and deliver impacts on DRR management and resilience.

7. Future Challenges and Priority Issues

7.1 Challenges

The main challenge for the Philippines lies in identifying methods for keeping up with the increasing frequency and severity of disasters exacerbated by climate change, and the hazards which are constantly testing the limits of the country's institutions and preparedness mechanisms that have been put in place. The problems in fully localizing the DRRM framework sometimes creates confusion in the phases of disaster response, including the accessing of earmarked funds, as well as while striving to conduct recovery (OCD-NDRRMC, 2015).

Furthermore, rapid progress in the level of regional development contradicts certain land use policies and has focused primarily on socio-economic sectors, at times failing to recognize DRR concerns. The policy of 'no build zone' in high risk areas is yet to be fully applied, with strong enforcement of land administrations and sustainable options for incorporating social, economic and cultural considerations of the affected communities. Poverty and lack of access to resources contributes to this situation. A better management of disaster finance is one of country's priorities for safeguarding economic growth to attain middle income status (GFDRR, 2017).

7.2 Priority Issues

Strengthening local institutional capacity for DRR is among the highest priorities. Technical support from national agencies, academia and DRR professionals to LGUs are the most critical factors to aid in the tangible implementation of DRR actions at local level. Understanding different capacities and constraints of local governments are critical. Having no sufficient capability to conduct multi-sectoral risk assessments, limited funding, and low commitment are among common challenges. Innovative working modality should be explored and established to ensure all LGUs, especially those in high risk zones, are equipped with what is needed for their readiness. Furthermore, involving local communities and leaders in the official DRR and CR infrastructure is critical to maintain the mainstreaming of contextualized knowledge, and to avoid top-down approaches when reducing risks. Local governments and authorities are often knowledgeable about the local needs and gaps, and their support in the operations, especially in the remote regions, is important to guarantee the actualization of intended aspirations for future resilience and sustainability not only in recovery, but also in preparedness and mitigation.

Similarly, there is a need to develop a harmonized and comprehensive planning process with clear understanding of the linkages between DRR, CR and sustainable development at the local level. More often than not, mainstreaming the policies, frameworks and plans with those of the local governments is difficult due to lack of sub-national level capacity and resources. Furthermore, the scope of different planning tools designed at the national level (including comprehensive land use plans (CLUPs), local DRRM Plan, etc.) are overwhelming for the LGUs, and do not always rather ease local planning processes. It is critical to be realistic on DRR mandates and obligations imposed on the LGUs.

One of the key gaps are the limited amount of attention and resources devoted to DRR research. As a result of this, many CLUPs and community development plans (CDPs) are also not updated and not tuned into DRR/CR concerns. Understanding of disaster and climate change impacts to different sectors and the populace is paramount to further safeguard the society from future impacts of adverse events by increasing the availability of knowledge through data and its analysis. Collection, analysis and management of disaster and climate related data (especially SADD and sectoral impacts) are crucial for the formation of risk and vulnerability assessments, and they must be available in updated, public disaster information management systems. However, localization of data collection (as envisaged under the SFDRR) is admittedly challenging given the constraints of resources and capacities at the sub-national level. Further improving data management systems should be among the government's highest priorities.

There are also very few learning institutions devoted to DRR and CR, and the research outputs of these institutions are not sufficiently used by the concerned agencies and the public in general (OCD-NDRRMC, 2015). This was apparent in the country's recent disasters, most notably during Yolanda, when the local government and communities were overwhelmed not only by the calamity itself but also by the initially disorganized humanitarian responders. Inter-LGU collaboration/cooperation in planning remains as a challenge to be addressed (OCD-NDRRMC, 2015).

Also, given the on-going environmental degradation and loss of natural buffer zones (such as the mangrove forests), environmental impact assessments and protection measures should be rapidly enforced and maintained, especially for the private sector. Maintaining the equilibrium between growth and sustainability is difficult to manage even at the global scale, but it's increasingly important in a naturally fragile settings which suffer from anthropological factors. To mitigate the future impacts of climate change and various hazards, eco-system based services and protection of natural spaces should be focused on alongside mitigating the negative side-effects of economic development.

Furthermore, addressing the problems arising from unplanned urban expansion requires attention. Informal urban settlements, substandard materials used, and poor construction practices are still observed in many areas, resulting in increased pollution and exposure of the peoples inhabiting slums. Poverty reduction (alongside with significant infrastructural investments) are an important element of improving the living conditions of many, and should be consistently highlighted even in the sub-national development planning. Guaranteeing the continuity of social protection and welfare services for the most marginalized, even in the aftermath of disasters, is crucial to protect the most vulnerable from the negative impacts. Additionally, exploring alternative livelihood options, subsidies and risk-transfers which would be available for all could be beneficial given the fact that climate change is most likely to severely hinder agricultural output, and endanger the livelihoods of subsistence farmers or other low-income households dependent on the environment.

8. References

1. Swiss NGO DRR Platform, 2014. Disaster Risk Reduction and Management in the Philippines: A desk study conducted by the Swiss NGO DRR Platform following Typhoon Haiyan, Luzerne, July 2014, s.l.: Swiss NGO DRR Platform.
2. ADB, 2012. Special Evaluation Study: ADB's Response to Natural Disasters and Disaster Risks, Manila: Asian Development Bank .
3. ADB, 2013. Civil Society Briefs: Philippines, Manila: Asian Development Bank.
4. ADB, 2016. Incentives for reducing disaster risk in urban areas: experiences from Da Nang (Viet Nam), Kathmandu Valley (Nepal), and Naga City (Philippines), Mandaluyong City: Asian Development Bank.
5. ADB, 2018. Philippine City Disaster Insurance Pool Rationale and Design, Manila: Asian Development Bank.
6. Akram, N., 2015. Is Public Debt Hindering Economic Growth of the Philippines. International Journal of Social Eonomics, 42(3), pp. 202-221.
7. Alano, E. & Lee, M., 2016. Natural Disaster Shocks and Macroeconomic Growth in Asia: Evidence for Typhoons and Droughts, Manila: Asian Development Bank
8. Alave, K. L., 2012. Calamities Slowed Philippine Economy - Official. Inquirer, 31 January.
9. Alcayna, T., Bollettino, V., Dy, P. & Vinck, P., 2016. Resilience and Disaster Trends in the Philippines: Opportunities for National and Local Capacity Building. PloS Currents, 14(8).
10. Ang, A., 2014. Typhoons and Economic Growth. Ateneo De Manila University , 25 July.
11. Anttila-Hughes, J. K. & Hsiang, S. M., 2013. Destruction, Disinvestment, and Death: Economic and Human Losses Following Environmental Disaster, s.l.: SSRN.
12. Asian Develoment Bank, 2018. ADB Revises 2018 Philippine Growth Outlook to 6.4%, Expects Pick Up in 2019. News from country offices, 26 September.
13. Baccay, O. T., 2018. DILG urges LGUs to strengthen disaster preparedness. [Online] Available at: https://reliefweb.int/report/philippines/dilg-urges-lgus-strengthen-disaster-preparedness
14. Balisacan, A. M., 2015. The Growth-Poverty Nexus: Multidimensional Poverty in the Philippines. In: A. Balisacan, U. Chakravorty & M. Ravago, eds. Sustainable Economic Development. London: Elsevier, pp. 445-467.
15. Bankoff, G., 2003. Cultures of Disaster: Society and Natural Hazard in the Philippines. 1st ed. London : Routledge .
16. Batalla, E. V. C., 2016. Divided Politics and Economic Growth in the Philippines. Journal of Current Southeast Asian Affairs, 35(3), pp. 161-186.
17. Benson, C. & Clay, E. J., 2004. Understanding the Economic and Financial Impacts of Natural Disasters, Washington DC: The World Bank.
18. Bermudez, R., Temprosa, F. T. & Benson, O. G., 2018. Twenty Years of the Guiding Principles on Internal Displacement, Oxford: University of Oxford.
19. Bohra-Mishra, P., Oppenheimer, M., Cai, R. & Feng, S., 2017. Climate Variability and Migration in the Philippines. Population and Environment, 38(3), pp. 286-308.
20. Bowen, T., 2015. Social Protection and Disaster Risk Management in the Philippines: The Case of Typhoon Yolanda (Haiyan), s.l.: The World Bank.
21. Cadag, J. R. D. et al., 2017. Hidden disasters: Recurrentflooding impacts on educational continuity inthe Philippines. International Journal of Disaster RIsk Reduction , Volume 25, pp. 72-81.

22. Cariño, J. K., 2012. Country Technical Note on Indigenous Peoples' Issues: Republic of the Philippines, Manila: IFAD.
23. CFE-DM, 2018. Philippines: Disaster Management Reference Handbook, Pearl Harbor, Ford Island: Center for Excellence in DIsaster Management and Humanitarian Assistance.
24. Chandra, A., McNamara, K. E., Dargusch, P. & Caspe, A. M. D. D., 2017. Gendered vulnerabilities of smallholder farmers to climate change inconflict-prone areas: A case study from Mindanao, Philippines. Journal of Rural Studies, Volume 50, pp. 45-59.
25. Cinco, T. A., Guzman, R. G., Hilario, F. D. & Wilson, D. M., 2014. Long-term trends and extremes in observed daily precipitation and near surface air temperature in the Philippines for the period 1951–2010. Atmospheric Research , Volume 145-146, pp. 12-26.
26. Crost, B., Duquennois, C., Felter, J. H. & Rees, D. I., 2018. Climate change, agricultural production and civil conflict: Evidence from the Philippines Author links open overlay panel. Journal of Environmental Economics and Management, Volume 88, pp. 379-395.
27. Cruz, R. V. O. et al., 2017. 2017 Philippine Climate Change Assessment: Impacts, Vulnerabilities and Adaptation, Manila: The Oscar M. Lopez Center for Climate Change Adaptation and Disaster Risk Management Foundation, Inc..
28. Cullinane, C. G. H. G. C. B. M., 2019. Philippines, s.l.: s.n.
29. Danilo, I. & Roehlano, B., 2012. Impacts of Natural Disasters on Agriculture, Food Security, and Natural Resources and Environment in the Philippines. PIDS Discussion Paper Series, Volume 36, pp. 1-41.
30. Di Nunzio, J., 2013. Long-Term Food Security Risk in Philippines after Typhoon Haiyan. Future Directions International, 27 November.
31. Doroteo, H. J. E., 2015. Disaster Risk Profile and Disaster Risk Management Framework of the Philippines: Natural Disasters. s.l., University of Oviedo.
32. ESCAP/WMO, 2009. ESCAP/WMO Typhoon Committee. Chiang Mai, ESCAP/WMO .
33. Espada, R., 2018. Return period and Pareto analyses of 45 years of tropical cyclone data (1970–2014) in the Philippines. Applied Geography, Volume 97, pp. 228-247.
34. Exconde, B., 2018. On Rice Production and Consumption Patterns in the Philippines. The Lobbyist, 16 February.
35. FAO, 2018. The Impact of Disasters and Crises on Agriculture and Food Security, Rome: Food and Agriculture Organization of the United Nations.
36. Gao, W., Angerer, J. P., Fernandez-Gimenez, M. E. & Reid, R. S., 2015. Is Overgrazing A Pervasive Problem Across Mongolia? An Examination of Livestock Forage Demand and Forage Availability from 2000 to 2014. Ulaanbaatar, Nutag Action and Research Institute.
37. Gera, W., 2015. The Politics of Ethnic Representation in Bureacracy. Ethnic and Racial Studies, 39(5), pp. 858-877.
38. GFDRR, 2009. Post-Disaster Needs Assessment 2009, Manila: Government of the Republic of the Philippines.
39. GFDRR, 2017. GFDRR: Philippines. [Online] Available at: https://www.gfdrr.org/en/philippines [Accessed 25 March 2019].
40. GoP, 2014. Republic Act No. 10639. Manila: Government of Philippines.
41. GoP, 2017. The Philippines: A Human Approach to Development and Governance, Manila: Government of Philippines.
42. GoP, 2019. GOV.PH. [Online] Available at: https://www.gov.ph/web/guest/about-the-government [Accessed 2015 March 2019].
43. GoP, G. W. B. A., 2009. Typhoons Ondoy and Pepeng: Post-Disaster Needs

Assessment MAIN REPORT, s.l.: s.n.
44. GSMA Intelligence, 2014. Country overview: Philippines Growth through innovation, s.l.: GSMA Intelligence.
45. Hoffman, R. & Muttarak, R., 2017. Learn from the Past, Prepare for the Future: Impacts of Education and Experience on Disaster Preparedness in the Philippines and Thailand. World Development, Volume 96, pp. 32-51.
46. Holden, W. N., 2015. Mining amid typhoons: Large-scale mining and typhoon vulnerabilityin the Philippines. The Extractive Industries and Society, Volume 2, pp. 445-461.
47. Huigen, M. G. A. & Jens, I. C., 2006. Socio-Economic Impact of Super Typhoon Harurot in San Mariano, Isabela, the Philippines. World Development, 34(12), pp. 2116-2136.
48. Human Rights Watch, 2017. Philippines; Events of 2017. [Online] Available at: https://www.hrw.org/world-report/2018/country-chapters/philippines [Accessed 26 March 2019].
49. Hunter, L. M., Castro, J., Kleiber, D. & Hutchens, K., 2016. Swimming and Gendered Vulnerabilities: Evidence from the Northern and Central Philippines. Society and Natural Resources, 29(3), pp. 380-385.
50. Ida Gabrielsson, S. V. &. N. M., 2018. How restoring mangroves has helped empower women in Sri Lanka, Vietnam and the Philippines. [Online] Available at: https://scroll.in/article/892270/how-restoring-mangroves-has-helped-empower-women-in-sri-lanka-vietnam-and-the-philippines
51. ILO, 2015. Social Protection and Climate Change, s.l.: s.n.
52. IMDC, 2017. International Displacement Monitoring Centre: Philippines. [Online] Available at: http://www.internal-displacement.org/countries/philippines [Accessed 28 March 2019].
53. INFORM, 2019. INFORM Country Profile: Mongolia. [Online] Available at: http://www.inform-index.org/Countries/Country-profiles/iso3/MNG [Accessed 13 March 2019].
54. International Alert Philippines, 2017. Conflict Alert. [Online] Available at: http://conflictalert.info/data-visualization/# [Accessed 26 March 2019].
55. Jha, S. A. M. P. Q. Z. A. a. L. W., 2018. Natural Disasters, Public Spending, and Creative Destruction: A Case Study of the Philippines, Tokyo: ADBI Working Paper: 817.
56. KanakoIuchi, Y. e. o., 2019. Natural Hazards Governance in the Philippines.
57. Kim, C. K., 2010. The Effects of Natural Disasters on Long-Run Economic Growth. The Michigan Journal of Business, Volume 41, pp. 15-49.
58. Lewis, J., 2017. Social Impacts of Corruption upon Community Resilience and Poverty. Jamba; Journal if Disaster Risk Studies, 9(1).
LGA, 2018. Expanding Partnerships through the NRC for Local Disaster Resilience. [Online] Available at: https://lga.gov.ph/article/expanding-partnerships-through-the-nrc-for-local-disaster-resilience
59. Macusi, E. D. et al., 2014. The Potential Impacts of Climate Change on Freshwater Fish, Fish Culture and Fishing Communities. Journal of Nature Studies, 14(2), pp. 14-31.
60. Martinico-Perez, M. F. G., Schandl, H., Fishman, T. & Tanikawa, H., 2018. The Socio-Economic Metabolism of an Emerging Economy: MonitoringProgress of Decoupling of Economic Growth and Environmental Pressures inthe Philippines. Ecological Economics, Volume 147, pp. 155-166.
61. Mina, C. D. & Imai, K., 2016. Estimation of Vulnerability to Poverty Using a Multilevel Longitudinal Model: Evidence from the Philippines. The Journal of Development Studies, 53(12), pp. 2118-2144.

62. Montes, M. F., 1998. The Philippines as an Unwitting Participant in the Asian Economic Crisis. In: K. D. Jackson, ed. Asian Contagion: The Causes and Consequences of a Financial Crisis. New York: Routledge, pp. 241-268.
63. Morin, V. M., Ahmad, M. M. & Warnitchai, P., 2016. Vulnerability to typhoon hazards in the coastal informal settlements of Metro Manila, the Philippines. Disasters, 40(4), pp. 693-719.
64. National Economic and Development Authority, 2017. Philippine Development Plan 2017-2022. Manila: National Economic and Development Authority.
65. National Statistics Office of Mongolia, 2019. Population. [Online]
Available at: http://www.en.nso.mn/
[Accessed 27 February 2019].
66. NEDA, 2018. Preliminary tool for measuring socio-economic resilience to natural disasters in the Philippines. [Online]
Available at: http://www.phresilience.com/description/
67. Nguyen, H. T., 2018. Gendered Vulnerabilities in Times of Natural Disasters: Male-to-Female Violence in the Philippines in the Aftermath of Super Typhoon Haiyan. Violence Against Women, 25(4), pp. 421-440.
68. Nolasco-Javier, D., Kumar, L. & Tengonciang, A. M. P., 2015. Rapid appraisal of rainfall threshold and selected landslides in Baguio, Philippines. Natural Hazards, 78(3), pp. 1587-1607.
69. OCD-NDRRMC, 2015. National progress report on the implementation of the Hyogo Framework for Action (2013-2015), s.l.: s.n.
Pailoplee, S. & Boonchaluay, N., 2016. Earthquake Activities in the Philippines Islands and the Adjacent Areas. Geosciences Journal, 20(6), pp. 877-889.
70. Popp, A., 2006. The Effects of Natural Disasters on Long Run Growth. Major Themes in Economics, 8(7), pp. 61-82.
71. PSA B, 2019. Urban Population in the Philippines, Manila: Philippine Government.
72. PSA, 2010. 2010 Census of Population and Housing, Manila: Philippine Government.
73. PSA, 2015. Philippines Census of Population and Housing , Manila: Philippine Government.
74. PSA, 2017. Food Consumption and Nutrition Report , Manila: Philippine Government.
75. 75.PSA, 2018. 12 Barangays Established in the First Quarter of 2018, Manila: Philippine Statistics Authority .
76. PSA, 2018. Employment Situation in July 2018, Manila: The Philippine Government.
77. PSA, 2019. PSA: Labor and Employment. [Online]
Available at: http://www.psa.gov.ph/statistics/survey/labor-force
[Accessed 25 March 2019].
78. Reyes, C. M., Mina, C. D. & Asis, R. D., 2017. Inequality of Opportunities Among Ethnic Groups in the Philippines, Helsinki: United Nations University World Institute for Development Economics Research.
79. Salazar, M. A., Pesigan, A., Law, R. & Winkler, V., 2016. Post-Disaster Health Impact of Natural Hazards in the Philippines in 2013. Global Health Action, 9(1), pp. 1-7.
80. Sales Jr., R. F. M., 2009. Vulnerability and adaptation of coastal communities to climate variability and sea-level rise: Their implications for integrated coastal management in Cavite City, Philippines. Ocean and Coastal Management, Volume 52, pp. 395-404.
81. Save the Children, 2016. Education Disrupted: Disaster Impacts on Education in the Asia Pacific Region in 2015 , Sydney: Save the Children.
82. Stavenhagen, R., 2005. Report of the Special Rapporteur on the Situation of Human Rights and Fundamental Freedoms of Indigenous People. Australian Indigenous Law Reporter, 9(1), pp. 102-113.

83. Stuecker, M. F., Tigchelaar, M. & Kantar, M. B., 2018. Climate Variability Impacts on Rice Production in the Philippines. PLos One, 13(8), pp. 1-17.
84. Swiss NGO DRR Platform, 2014. Disaster Risk Reduction and Management in the Philippines: A desk study conducted by the Swiss NGO DRR Platform following Typhoon Haiyan, Luzerne, July 2014, s.l.: s.n.
85. The Centre of Expertise on Asia, 2016. Challenges and opportunities for urban development in the Philippines. [Online]
Available at: https://asiahouse.org/challenges-opportunities-urban-development-philippines/
[Accessed 28 March 2019].
86. The World Bank, 2005. NATURAL DISASTER RISK MANAGEMENT IN THE PHILIPPINES: ENHANCING POVERTY ALLEVIATION THROUGH DISASTER REDUCTION , Manila: The World Bank.
87. The World Bank, 2017. Metro Manila Flood Management. [Online]
Available at: https://www.worldbank.org/en/country/philippines/brief/project-highlights-metro-manila-flood-management
[Accessed 28 March 2019].
88. Tolo, W. B. J., 2011. The Determinants of Economic Growth in the Philippines, Manila: International Monetary Fund.
89. UN, 2018. Children and Armed Conflict. [Online]
Available at: https://childrenandarmedconflict.un.org/where-we-work/other-countries/philippines/
90. Walch, C., 2018. Typhoon Haiyan: pushing the limits of resilience? The effect of land inequality on resilience and disaster risk reduction policies in the Philippines. Critical Asian Studies, 50(1), pp. 122-135.
91. Valerio, K. A., 2014. Storm of Violence, Surge of Struggle: Women in the Aftermath of Typhoon Haiyan (Yolanda). Asian Journal of Women's Studies, 20(1), p. 2014.
92. WAVES, 2017. Waves Policy Brief Philippines 2017, Manila: Waves.
93. Vidal, J., 2013. Typhoon Haiyan: what really alarms Filipinos is the rich world ignoring climate change. The Guardian, 8 November.
94. Villafuerte, M. Q. et al., 2014. Long-term trends and variability of rainfall extremes in the Philippines. Atmospheric Research, Volume 137, pp. 1-13.
95. World Economic Forum, 2018. The Glolabl Risks Report 2018: 3th Edition , Geneva: World Economic Forum.


UNDRR
UN Office for Disaster Risk Reduction


adpc