Disaster Risk Reduction in Cambodia

Status Report 2019

adpc Asian Disaster Preparedness Center

UNDRR UN Office for Disaster Risk Reduction

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Status Report

(July 2019)

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About this report

The Disaster Risk Reduction (DRR) report provides a snapshot of the latest DRR progress Cambodia 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 in Cambodia.

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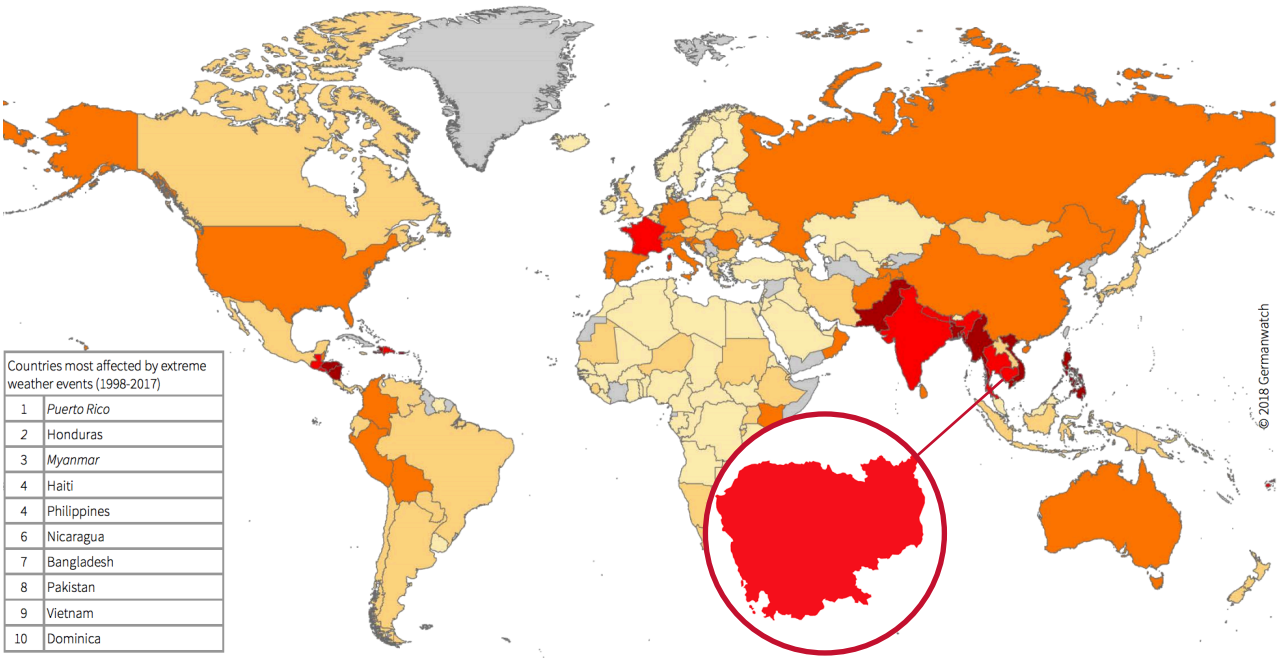
The findings, interpretations, and conclusions expressed in this document do not necessarily reflect the views of UNDRR or of the United Nations Secretariat, partners, and governments, and are based on the inputs received during consultative meetings, individual interviews, and the literature reviews 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 Cambodia: 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 (million)	16.2
Urban Population (million)	3.5 (21.9 %)
Population Density Per Km^2	85
ECONOMIC INDICATORS	
Gross Domestic Product in Current $US	22.16 billion
GDP Per Capita ($US)	1,384.42
GDP Growth (Annual %)	7.7%
HUMAN DEVELOPMENT	
Human Development Index	0.582
HDI Rank	146
Income Level Category	Lower-middle income

(Royal Government of Cambodia, 2014; UNDP , 2019; World Bank, 2019)

Climate Risk Index

Rank 19 / High Risk*

INFORM Risk Index

Rank 54 / 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)

** 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 disaster impact) (INFORM, 2019)

1. Introduction

Cambodia is located between Thailand, Viet Nam and Lao PDR in Southeast Asia. Approximately 46 percent of the 181,035 km^2 of the country's land area is covered with tropical forests, which are a home to 14 genera of endangered animals, 2,300 plant species and contain one of the seven elephant corridors left in the world (CFE-DM, 2017). Mountains, forests, rivers, floodplains and lakes form the foundations to the flourishing ecological systems, including the largest freshwater lake in Southeast Asia, Tonlé Sap, and its floodplains along the Mekong River. The lake's surface area is known to increase by up to 600 percent between dry and monsoon seasons, with water levels fluctuating by 7 to 8 meters (Fujii, et al., 2003). This process creates the country's most agriculturally productive ecosystems, and the floodplains are central to the domestic food supply.

Administratively the country consists of 24 provinces and the municipality of the metropolitan area of Phnom Penh, the capital city, governed by a parliamentary constitutional monarchy. The state's power is being disseminated via the National Assembly, consisting of elected representatives of the citizens.

In terms of economy, Cambodia has developed rapidly, and reached lower-middle income threshold after a rapid market transformation which is currently moving away from reliance on agriculture (OECD, 2017). Hopes are to attain upper middle-income status by 2030 with the support of growing tourism sector, construction, and garment exports, and the average growth rate of 7.7 percent between 1995 and 2018 already places Cambodia among the fastest growing economies in the world (World Bank, 2019).

Hazards in Cambodia include almost every hydrometeorological event from floods, storms and tropical cyclones to droughts (figure 1). Furthermore, fires, epidemics, lightning strikes and landslides (in the northern mountainous regions) contribute to disaster risks as well. Of these, riverine flooding poses the highest risk in terms of Average Annual Loss (AAL[1]) to capital stock in Cambodia, which places the country 3rd highest after Myanmar and Lao PDR in a global comparison (UNISDR, 2015). Additionally, climate change is predicted to have impacts on the flood-pulse powered ecosystems, which are vulnerable to changes in annual weather patterns, such as the increase in, or lack of monsoonal precipitation (CFE-DM, 2017).

Potential impacts of climate change bear grave consequences to the population, livelihoods and food security as well. 90 percent of the population are engaged in agricultural activities, and roughly 80 percent rely on subsistence crops (USAID, 2019). Agricultural activities comprise approximately 27 percent of the GDP, and the fishing industry contributes by 12 percent (USAID, 2019), both of which are major sources of income, and are an integral part of the domestic food security. However, informal economy is still the sector providing employment for nearly 60 percent of Cambodians (USAID, 2019), indicating that many are vulnerable to external shocks which might destabilize livelihoods and incomes of people working outside the social protection system and infrastructure. Yet, the impacts of disasters to these demographics is difficult to measure due to lack of data.

1 "The Average Annual Loss reflects the mean estimated loss distribution expressed in an exceedance probability (EP) curve. EP illustrates the probability that disaster losses will exceed a certain amount within a year, based on a simulation of different scenarios. AAL represents the average losses that fall below this expected exceedance – representing the "normal" average future disaster-related losses.

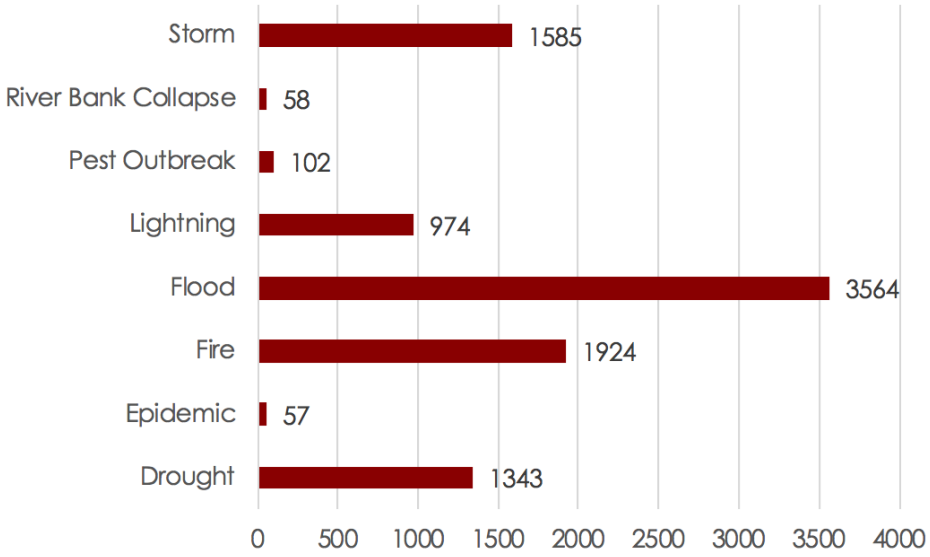


Figure 1. Disaster occurrence between 1993 and 2013 (NCDM, 2013)

1.1 Demographic Characteristics

The current estimated population of Cambodia is 16.2 million, of whom 78.1 percent were projected to be residing in rural regions by 2018 in the National Strategic Development Plan (Royal Government of Cambodia, 2014). The estimates are based on the population census conducted in 2008, but the new general population census taking place later in 2019 should provide a more accurate glance into the demographics. The current estimated proportion of population inhabiting rural areas is estimated at 80.5 percent, and the average population density is only 75 people per km^2 (National Institute of Statistics, Directorate General for Health & ICF International, 2015).

The health and social indicators have also began improving rapidly. For example, infant mortality has been halved since 2010 to 27 per 1,000 live births in 2014 (Royal Government of Cambodia, 2014). The human development index (HDI) measuring healthy life, access to knowledge and standard of living has reached 0.582 in 2017, which is a 59.9 percent increase since 1990 (UNDP, 2018). On the 2018 Gender Gap Index, Cambodia has the score of 0.683, placing 93rd among the 149 measured countries. The country has illustrated good progress in narrowing gender gaps in economic participation, opportunities and educational attainment for women and girls (World Economic Forum, 2018), and has improved literacy rates across low-income groups.

Cambodia also has excellent future potential; the country is facing a demographic dividend where the age dependency ratio has nearly halved between 1994 and 2014 – over 50 percent of the population were below 25 in 2016 (ILO, 2016). However, to benefit from the dividend to achieve sustained growth, the levels of education should be increased among working demographics, and the economy requires diversification as the sectors of tourism, construction, rice and garment exports are vulnerable to external shocks (ILO, 2016).

1.2 Economic Impact of Disasters

Disasters have been stated to form a threat to the long-term economic development of Cambodia as the growth is narrowly based, with a dependence on garment exports, tourism rice and construction (ILO, 2016).

Due to the fact that approximately 80 percent of Cambodia's territory is covered by the Mekong River and Tonlé Sap basins, annual flooding alone during the wet season is causing estimated losses of US$ 100 to 170 million each year (Royal Government of Cambodia, 2010). Other hydrometeorological hazards are common as well. During the strongest El Niño episode of the past 50 years in 2015/2016, an estimated 2.5 million people were affected by droughts, water shortages, land degradation, livestock loss and reduced agricultural productivity (UNESCAP, 2017). The loss of agricultural products is not only threatening the economic development, but also endangers livelihoods of the rural populations who rely on subsistence agriculture. For example, between 1996 and 2013, floods had damaged 67 percent of all the rice paddy fields in the country, followed by droughts which had caused 31 percent of the total crop losses during the same period (UNDP, 2014), thus jeopardizing the food security and livelihoods of many.

Disasters highlight the present vulnerabilities and provide a glimpse into the future as similar events are likely to grow more severe and frequent. In 2009, the typhoon Ketsana swept through the Philippines, Viet Nam and Lao PDR before impacting Cambodia, where it affected 24 provinces, destroyed the livelihoods of 180,000 people (1.4 percent of the population) and caused 43 casualties (Royal Government of Cambodia, 2010). The total damages were estimated at US$ 132 million, of which 74 million were disaster losses. Transport, housing, education sectors suffered the most severe damages, whereas agriculture suffered the most severe future losses (over US$ 56 million) (Royal Government of Cambodia, 2010). While the impacts on fiscal revenues were considered insignificant, the expenditure on reconstruction needs was expected to have a severe impact on economic growth as it would increase deficits and require additional financing from the government and abroad (Royal Government of Cambodia, 2010). The transport sector has been suggested to be the most vulnerable sector to physical impacts; it was the hardest hit during the worst three disasters in 2009, 2013 and 2014 with a total cost of US$ 454 million (World Bank, 2016).

Alongside disasters (and sometimes in correlation), climate change affects Cambodia's economy. The GDP in 2015 was already 4.6 percent lower than it would have been without climate change affecting the region (figure 2) between 1993 and 2015 (Ministry of Economy and Finance & National Council for Sustainable Development, 2018). Service and agricultural sectors are expected to suffer severe losses due to loss of labor productivity and damage to assets. Rice production could decline by 10 percent for every 1° Celsius temperature rise, and coffee and rubber production might significantly decrease, not to mention the damage to fishing industry, tourism and coastal infrastructure (Ministry of Economy and Finance & National Council for Sustainable Development, 2018). The fishing sector alone contributed up to 10 percent of the country's GDP and employed six million people nationwide in 2013 (National Climate Change Committee, 2013), indicating that that any changes in agricultural productivity and the environment would endanger the economic development and livelihoods of millions. The Tonlé Sap lake is already showing signs of degradation as the fish catchments have been on rapid decline. During the 2016 drought, which was among the worst in recorded

history in Southeast Asia, fish exports dropped by 21 percent, and to this day, the fish stocks have not returned to sustainable levels (Seiff, 2018).

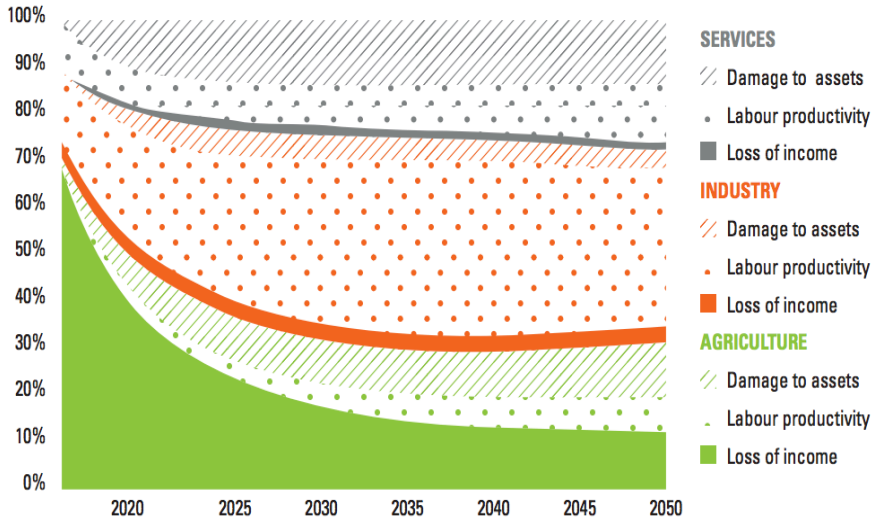


Figure 2. Economic impact of climate change by sector and type of impact (% drop in absolute GDP 2050 (Ministry of Economy and Finance & National Council for Sustainable Development, 2018).

1.3 Social Impact of Disasters

Often the most severe impacts of disasters are borne by those disadvantaged and marginalized (UNESCAP, 2015). Unsafe housing, lack of access to infrastructure, to health, education or sanitation, lack of opportunities or equal standing within a society contribute to increased vulnerability to disasters. In Cambodia, regularly subjected to flooding and droughts, people are increasingly exposed to climatic hazards which pose a dire threat to livelihoods and education, for example. Generally, flooding occurs for more than 3 months per year between July and December, and thus schooling is affected in the beginning of the academic year. Students encounter difficulties to access schooling due to obstructed infrastructure, and the public transportation system is often hindered by these events (ADPC, 2008). Furthermore, dropout rates are significantly higher during the same time period, as poorer families may not be able to afford to send their children to schooling due to cost of travel or increased need for support at home due to loss of livelihoods (ADPC, 2008). This may create persisting cycles of poverty, because lower education rates often correlate with lower income in the future. Agriculture is another sector heavily affected by weather-related hazards, which increases the vulnerability of thousands due to loss of livelihoods. Also, flooding obstructs access to healthcare; between 1996 and 2013, 98 percent of all hazards affecting hospitals were identified as flooding events (UNPD, 2014).

The typhoon Ketsana of 2009 caused US$ 24 million in damages to the education sector, affected 12 percent of the schools in the country and many others had to be closed due to inaccessibility following destroyed infrastructure (Royal Government of Cambodia, 2010). Furthermore, the level of poverty in the hardest hit provinces was above the national average, and the event was expected to increase inequality. Household incomes

were dropped significantly as they were reliant on rice farming, other agriculture, and access to resources such as fish and non-timber forest products. All of these activities suffered as a result of the typhoon (Royal Government of Cambodia, 2010), indicating that extreme weather has a great potential to affect human well-being negatively.

2. Disaster Risk Profile

2.1 Hazards and Climate Change

Cambodia is exposed to nearly all types of hydrometeorological hazards from floods to droughts, heavy storms, typhoons and lightning strikes. Additionally, the Strategic National Action Plan for Disaster Risk Reduction recognizes disease outbreaks (such as cholera, malaria and dengue), climate change impacts, fires and technological hazards as potential triggers of disasters (NCDM & Ministry of Planning, 2009). However, the geographical characteristics of the country contribute to varying exposure; for example, the floodplains along the Mekong are more exposed to river flooding, whereas the mountain ranges (such as the Cardamom) have a higher risk of localized landslides and flash flooding (GFDRR, 2019). Storms and typhoons in Cambodia are often not considered a significant threat as the country is sheltered by mountain ranges which lessen the impacts (NCDM & Ministry of Planning, 2009).

Cambodia has two seasons – a dry season from November to April, followed by the monsoonal rains lasting for six months, (NCDM, 2014), which bring 80 percent of the annual rainfall. However, there is a dry spell occurring during the monsoon, lasting generally from two to three weeks between July and August, during which droughts may occur depending on the region (NCDM, 2014). In 2015, Cambodia experienced its worst drought in 50 years; 2.5 million people were severely affected across 25 provinces (UNDP, 2019). Droughts have a severe impact on the rural populations who rely on subsistence agriculture, and lack of rainfall correlates with decreased production because artificial irrigation is not yet feasible to practice in large scale (Open Development, 2016)[2].

As a predominantly low-lying country with large flood plains, flooding is common across the country (figure 3). While the flooding does have beneficial impact on agriculture-based livelihoods as they increase soil moisture and fertility, there are occasions when they have caused loss of lives, homes and livelihoods in already fragile communities. Mekong flooding and flash flooding are the most common hydrometeorological hazards, and major events occur approximately every five years (NCDM & Ministry of Planning, 2009).

It should be noted that rice production is a significant contributor to the national economy and important provider of livelihoods, but it is also susceptible to heavy losses due to aforementioned hazards. In 2004, severe drought lead to an 82 percent loss of harvest, and in 2009, the government had to spend US$ 12 million to cover the costs (Chhinh, 2015). The 2016 drought caused massive depletion of fish stocks and livestock (Crothers, 2016). Water scarcity threatened national food security and livelihoods, and 260,000 affected families were estimated to be in need of water deliveries (Caritas, 2016). Such events suggest that climate change may have severe consequences to the agricultural production.

2 Open development Cambodia (ODC) is an "open data" website, first of its kind in Southeast Asia

Climate change is indeed threatening the development of Cambodia, and contributes to increasing hazards, despite the government's efforts to mainstream environmental protection and climate adaptation. The future projections indicate an increase in annual rainfall, but also a decrease in precipitation in the northeast of the country. The coastline is expected to suffer from inundation during the next 90 years as a result of sea level rise (Ministry of Environment, 2016). Low-lying farming lands would not only be exposed to increased flooding, but also to saline intrusion, and 10 percent decline in rice yields is estimated for every 1° increase in temperature, indicating that climate change is a serious threat to food security and safety (National Climate Change Committee, 2013).

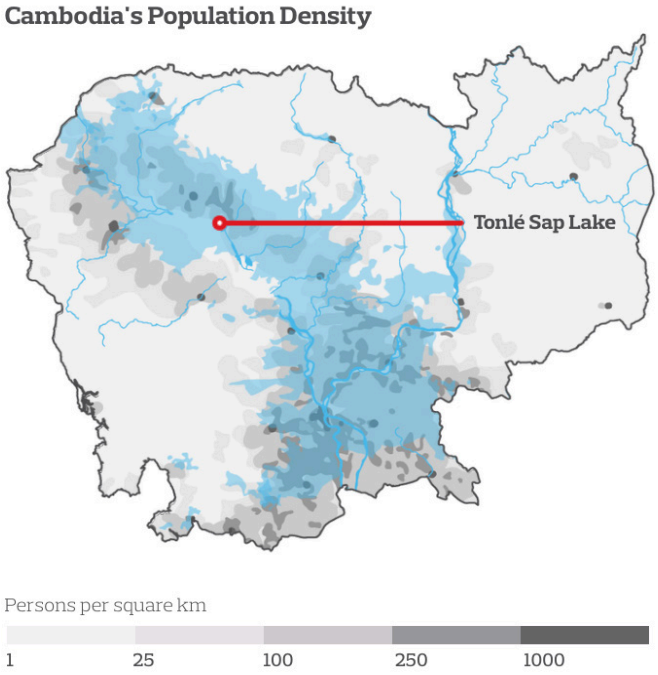


Figure 3. Cambodia's population density and the exposure to flooding (Aon, 2016)

2.2 Exposure

Cambodia is among the most exposed countries to disasters worldwide, ranking 15th in the global comparison which measures the average occurrences of disasters per million people and per 1,000 km^2 land area (UNESCAP, 2015). Malnutrition, agricultural dependence and high number of settlements in flood plains all contribute to the increased vulnerability to weather events and disasters (Davies, et al., 2015). For example in 2018, thousands of people in northern parts of the country were exposed to massive flooding following the breach of the Xepian-Xe Nam Noy dam in Lao PDR in the wake of heavy storms. The flood waters crossed the Cambodian border via the Sekong river, and caused rise of water levels of up to 11.5 meters, which displaced more than 6,000 people across the river basin (Ellis-Petersen, 2018). Flooding may also cause exposure to diseases in the aftermath of disasters.

Unplanned urbanization is also contributing to increased exposure. Approximately 250,000 informal settlers reside in Phnom Penh, a city with an estimated population of 1.6 million people (Flower, et al., 2017). Increase in exposure to hazards is often associated with lack of infrastructure; informal settlements occupy low-lying areas and riverbanks susceptible to flooding, drainage is inadequate, eviction is always a possibility due to lack of legal ownership, and the poor-quality dwellings are not resilient enough to withstand heavy weather (Flower, et al., 2017). An estimated 10 million people are in need of decent housing across the country, and approximately 2 million houses require critical improvements to meet the minimum quality standards (Habitat for Humanity, 2018). Furthermore, an additional 1.1 million houses are required by 2030 to accommodate the growing population in the urban regions (Habitat for Humanity, 2018). Finally, the Cambodian people are largely dependent on the fish in the Tonlé Sap Lake, where billions of fish from more than a 100 species thrive and flock to during the monsoon season when the flood waters are high. More than 1.2 million people live in the vicinity of the lake, and the consumption of fish nationally is up to three times over the global average (Seiff, 2018) However, the lake ecosystem is highly susceptible to the impacts of climate change.

2.3 Socio-economic Vulnerability

The National Strategy for Disaster Risk Reduction recognizes underlying vulnerabilities as sources of disasters; high prevalence of poverty, remoteness of communities, dependence on agriculture and fisheries as well as exposure to the weather-related events all contribute to increased vulnerability in Cambodia (NCDM & Ministry of Planning, 2009).

Despite the proportion of people living in absolute poverty has drastically reduced, large numbers of people are economically vulnerable as they remain close to the poverty line (Open Development, 2015). In 2014, 52 percent of the people did not have access to improved sanitation, and malnutrition is prevalent – even when the public health care infrastructure has improved, issues related to poverty persist especially in the rural regions (WHO, 2016), where 90 percent of the poor in the country reside (ADB, 2014). This unequal distribution of services and wealth applies to education as well. Rural and disadvantaged schools tend to have worse facilities, fewer and less experienced teachers, students from these areas are four times less likely to achieve baseline level of proficiency in mathematics, and the difference between urban and rural schools amounts to a more than a year spent in schooling (MoEYS, 2018). Rural regions are also often worst affected by hazards, which then creates an impasse for rural demographics; low education may correlate with lesser opportunities for employment, which often leads into further reliance on subsistence agriculture, which in turn is susceptible to heavy damages following to adverse weather. Thus, cycles of poverty are being born.

However, it should be noted that poverty cannot be used as a blanket term. For example, disability of an individual in Cambodia has been determined to aggravate poverty by 12 to 15 percent (Kang, et al., 2017). Gender is also likely to affect poverty levels; households headed by women are more likely to be vulnerable to poverty, and women have limited economic opportunities and access to resources due social hierarchies (ADB, 2014). Also, households or individuals with only singe livelihood source, such as fishing, tend to be most vulnerable to changes in ecological systems as they have the least capacity to adapt to accommodate losses (Teh, et al., 2019). When the

livelihoods of drought or flood impacted families burdened by debt are lost, households are often forced to engage in illegal or dangerous work. Brick production is among the industries where children and people from low-income backgrounds often resort to for employment, but the conditions are often dangerous, lowly paid and poorly regulated (Summers & Cristofoletti, 2018). These demographics are more exposed and vulnerable to disasters due to lack of livelihood options, debt burdens, lack of access to education and services, and often due to ill health following dangerous professions.

Finally, there is also an increasing interest in understanding the connection between weather events and migration in Cambodia, and a growing number of studies are exploring the mobility patterns in flood-prone areas. Agricultural adaptation strategies would often require resources, indicating that the rural poor are often resorting to sale of assets and loans which increases indebtedness and landlessness during times of crises (IOM, 2016). This in turn drives migration as an adaptation mechanism, which may lead to domestic and international migration to areas which are able to provide employment. Most of the opportunities for alternative livelihoods are found in the vicinity of growing urban regions, and the migrants are often forced to inhabit the unregulated, informal settlements in the peripheries of cities as the living costs tend to be too high in the cities themselves. Thus, more and more people are increasingly exposed to hydrometeorological and epidemics in the urban slums.

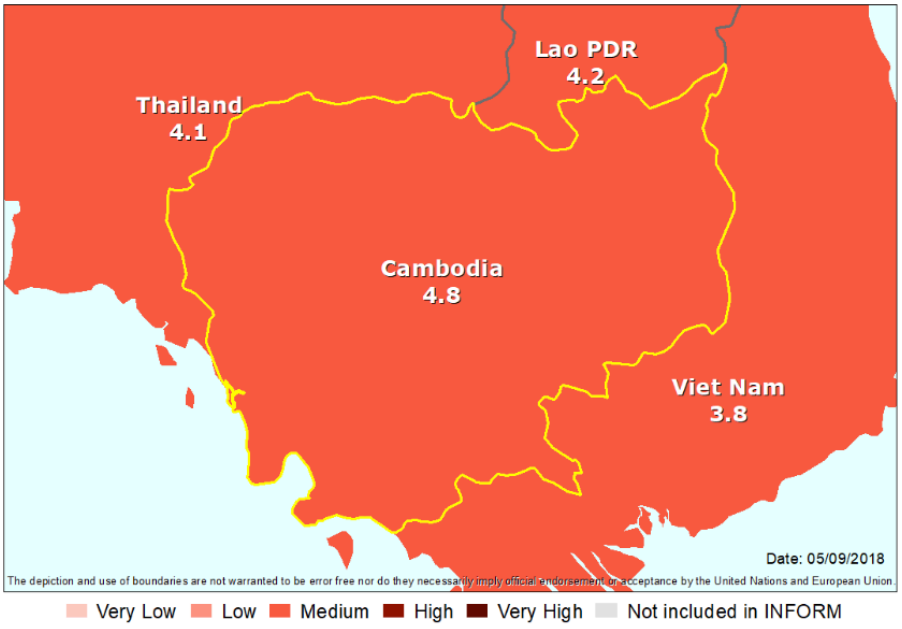


Figure 4. Cambodia risk profile (INFORM, 2019).

2.4 Physical Vulnerability

Cambodia has a medium risk ranking on the INFORM 2019 index (figure 4), but the country still scores high on some indicators, including vulnerability and lack of coping capacity. It has a score of 7.2 out of 10 for vulnerability due to deprivation and lack of development, and 5.7 on hazards and exposure (INFORM, 2019). The risk indicators measuring lack of coping capacity are high as well (7 out of 10), and they measure the resilience of infrastructure, access to healthcare and risk governance among other factors.

However, some issues are not reflected in INFORM measurements. For example, the government has recognized land degradation as one of the most severe issues contributing to increased vulnerability of rural communities and agriculture (IOM, 2016). Alongside losing their livelihoods to disasters or weather, the poor rural households are also forced to seek alternative options due to resource depletion and land degradation. Degradation further contributes to increased uncertainty of maintaining livelihoods of many, as their opportunities for employment are often limited due to lack of education and access to credit.

Degradation is prevalent in the urban regions as well, which contributes to increased vulnerability to extreme events. Several major problems are prevalent in the urban centers, including congestion, urban flooding, increased numbers of urban poor and the associated growing slums in the peripheries of cities (UNFPA, 2014). A plethora of laws and regulations exist to control this development, but the laissez-faire implementation and monitoring of existing regulatory framework has resulted in an unplanned growth of informal settlements, which exposes large numbers of households living in poverty to flooding or diseases associated with lack of infrastructure (UNFPA, 2014). Furthermore, the wastewater accumulation in the cities is not well managed due to lack of urban drainage facilities, and the overflows of septic tanks are often directly running into watersheds in the Phnom Penh Metropolitan Area (JICA, 2016).

It is also an acknowledged fact that the fresh water resources along the coasts of South East Asian countries are at risk of salinization due to storm surges, frequency and intensity of which are exacerbated by climate change (Hoque, et al., 2016). Droughts and adverse weather already threaten the availability of fresh water and irrigation infrastructure in Cambodia, and the effects of future climate change to water resources cannot be overlooked.

2.5 Future of Disaster and Climate Risks

Cambodia is very vulnerable to climate change, because the rising temperatures, change in sea level and varying hydrological cycles are expected to reduce the productivity of agriculture, fisheries, and labor. Tourism and forestry are also expected to suffer greatly. By 2030, Cambodia's GDP could be reduced by 2.5 percent, and by 2050 the loss could reach nearly 10 percent following the impacts of climate change (National Council for Sustainable Development, 2018). Most severe impacts would be borne by the agricultural and garments sectors, which contribute highly to the GDP and are major providers of employment in the country but are also among the most vulnerable. This trend has severe consequences not only to the future economic growth, but also to livelihoods of people who rely on agricultural production and natural resources as their only sources of livelihoods. Increasing flooding, intensity of storms and inundation in the coastal regions are also threatening the lives, wellbeing and safety of people.

The temperature is estimated to increase by 0.013° to 0.036° degrees annually, meaning that during the next century the increase could cross 0.7° degrees (Ministry of Environment, 2016). Furthermore, the sea levels could rise by 56 centimeters by 2090 under the worst-case GHG emission scenario, indicating a severe impact on the economic, social and natural systems, and with the potential to derail sustainable development efforts as well. Already achieved development gains are also in danger, which suggests that increased investments are required to address the challenges posed by the climate (Ministry of Environment, 2016).

Damage to infrastructure is also projected to be significant; for example, the investment needs for resilient transport infrastructure accounts for over 20 percent of the total climate change-related expenditure as proposed in the government's estimates (Ministry of Economy and Finance & National Council for Sustainable Development, 2018).

3. Disaster Risk Reduction and Climate Action Interventions

Priority 1. Understanding Disaster Risk. The Royal Government of Cambodia has invested in disaster information management systems, and is continuously seeking to improve the understanding of impacts of disasters and climate to increase the capacity to address the increasing risks. A good example of such efforts is the recently published "Addressing Climate Change Impacts on Economic Growth in Cambodia" report, which looks into the sectoral effects of climate change to support risk and knowledge-informed development planning (Ministry of Economy and Finance & National Council for Sustainable Development, 2018).

For managing comprehensive disaster information, the NCDM maintains the CamDI database for storing damage and loss information. They also conduct risk assessments at the provincial levels to support the utilization of the disaster information. However, technical challenges are limiting the usage, as there is no guideline for data collection. Sex and age disaggregated data (SADD) is inconsistent or unavailable, and no national policies set standards for the disaster information systems (NDMC, 2016). While information for hazard mapping exists, the maps are not coherent or standardized and are often conducted on an ad-hoc basis due to the limitations of available data (PIN, 2013)[3]. Further efforts and investments should be directed for creating a coherent, standardized mechanism for data collection and analysis with a special focus on social vulnerabilities as opposed to measuring impacts or the technical aspects of exposure and disasters.

Despite the challenges, important advances are currently being made in terms of managing the climate risks in the Mekong river basin under the SERVIR- Mekong project. It is a joint initiative of USAID, NASA, ADPC and other regional organizations targeted for five countries in the Lower Mekong Region to advance better understanding and management of climate risks through utilization of geospatial data provided by observing satellites (ADPC, 2019). The region covers Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam, and the objectives at the country level include improving the sharing of data,

3 People In Need

new user-tailored tools, data and models as well as institutionalizing technical capacity improvements to improve decision-making, planning and communication in managing risks in the lower Mekong-basin (ADPC, 2019).

Private sector has also contributed to the disaster information management in Cambodia. ThinkWhere has implemented web-based mapping technology for visualizing disaster data, and assisted in improving the management and sharing of weather and response data in partnership with WFP and People in Need (thinkWhere, 2018)[4].

Priority 2. Strengthening Disaster Risk Governance to Manage Disaster Risk. The Royal Government of Cambodia considers disaster management as a key component of development planning due to the prevalence of a plethora of hazards. The legal framework for DRM began when the National Committee for Disaster Management (NDMC) was established in 1995 under the sub-decree No.54 ANKR-BK, which was followed and supported by the sub-decree No. 30 ANKR.BK for establishing sub-national level disaster management committees (ADRC, 2014). Various other decrees followed to support the localization of DRM initiatives. However, a comprehensive Law on Disaster Management, which formalized the role of NDMC as the lead administrator and coordinator of disaster activities, was passed in 2015. In this law, the roles and responsibilities of institutions, as well as expenditure mechanism for DRM, were solidified to guarantee adequate implementation of disaster prevention, adaptation, mitigation, response and recovery measures (CFE-DM, 2017).

The foundations of DRM planning are strong due to the national commitment. In 2008, the strategic National Action Plan for Disaster Risk Reduction for 2008-2013 (SNAP) was established to focus on vulnerability reduction (especially of the poor) and to serve as a road map for comprehensive DRR in Cambodia (NCDM & Ministry of Planning, 2008). This was replaced by the National Action Plan for Disaster Risk Reduction (NAP-DRR) for 2014-2018, which again highlighted poverty reduction as the primary development priority and expanded the scope by utilizing learnings from the previous SNAP. NAP-DRR focused on capacity building, mainstreaming DRR, creating synergies between DRR and CCA, increased the pace of institutional reforms and highlighted the role of research and academic institutions in national disaster management (NCDM, 2013).

The Cambodia Climate Change Strategic Plan for 2014 – 2023 was developed as the first comprehensive policy document to respond to climate change issues to advance the development towards low carbon, resilient, equitable and sustainable society (National Climate Change Committee, 2013). It was intended to fill in policy gaps among national development, poverty reduction and environmental sustainability by introducing linkages for supporting a harmonized approach (National Climate Change Committee, 2013). The framework was included to engage the public, civil societies, private sector and other development stakeholders.

The Climate Change Action Plan for 2016-2018 has been created to respond to the challenges imposed by climate change, which supports the implementation of the Cambodia Climate Change Strategic Plan (CCCSP) for 2014-2023. It identifies the scope of strategic action regarding environmental protection, conservation, sustainable use of natural resources, green growth and good governance to achieve effectiveness in implementing interventions (Ministry of Environment, 2016). As a result of the

4 Scotland-based GIS company

implementation, it is expected that the public awareness of climate change will increase, the national capacity will be improved, community resilience is enhanced and significant reduction in the national GHG emissions will be seen following the efforts (Ministry of Environment, 2016).

The government is also striving to respond to climate change by policy development. For example, the Climate Change Strategic Plan, which defines 64 strategies, complemented by sectoral Climate Change Action Plans (defining 115 different plans at the sub-national level), aims towards better adaptation, preparedness and mitigation of climate change impacts (National Council for Sustainable Development, 2018).

Priority 3. Investing in Disaster Risk Reduction for Resilience. The DM budget is supported by the DM Law of 2015 which guarantees budget for the NCDM and national or sub-national authorities to ensure the materialization of disaster management in Cambodia (Royal Government of Cambodia, 2015). Furthermore, it also includes a guideline for reserving assets to be used by public and private sectors, armed forces, civil societies and other relevant institutions in disaster relief and emergency response.

However, it is not clear how much of the government's budget has been set aside for disaster management activities, especially for disaster response and long-term recovery (World Bank & GFDRR, 2017). Furthermore, Cambodia does not have a strategy or policies to manage financial impacts of disasters; the country relies largely on the overall contingency budget to provide financing in the event of disasters, which is not exclusively reserved for such usage (World Bank & GFDRR, 2017). In the past, the process of covering disaster costs has been supported by donor assistance, but the affected populations have still absorbed the costs which has resulted into increased debts and poverty (World Bank & GFDRR, 2017).

To illustrate the importance of the international community to the national disaster risk reduction financing, it is useful to look into the support in the past. Between 1991 and 2010, the per capita disaster risk reduction finance from donors was indeed significantly higher than in many other low-income countries. Per capita DRR funding during the measured time period was US$ 6.69, a figure which is nearly two times higher than in Viet Nam, over 31 times higher than in Myanmar, and Cambodia was among the only three countries which have received more than US$ 50 million for DRR during the measured two decades (GFDRR, 2013).

However the government has prioritized some elements of disaster financing internally as well, for example by establishing and maintaining the Cambodia Food Reserve Systems (CFRS) since 2012. They have the strategic objective to provide food to populations affected, to provide seeds to farmers affected and to operate in the immediate disaster response. CFRS have been utilized in the past for example during the floods of 2013, and during the floods and droughts in 2014 where approximately 720 tons of rice was distributed to people across 11 provinces to mitigate the impacts (Ministry of Economy and Finance, 2015). Despite the efforts, the lack of resources, lack of capacity to conduct risk assessments and inadequate mainstreaming of DRR and climate action into planning and financing still hinder the efforts to manage disaster finances efficiently (Ministry of Economy and Finance, 2015).

IMPLEMENTATION	POLICY/PLAN	SCOPE	PURPOSE
ROYAL GOVERNMENT OF CAMBODIA	Sub-decree No.54 ANKR-BK	National	Mandates the establishment of the National Committee for Disaster Management
NATIONAL COMMITTEE FOR DISASTER MANAGEMENT	Sub-decree No. 30 ANKR-BK	National, Provincial	Supports the decree No. 54 by requiring disaster management committees to be established below the national level
NATIONAL COMMITTEE FOR DISASTER MANAGEMENT, OTHER RELEVANT PARTIES	National Action Plan for Disaster Risk Reduction (2008-2013)	National, Provincial, Districts	Provides focus on vulnerability and poverty reduction, a road map for comprehensive DRR
NATIONAL COMMITTEE FOR DISASTER MANAGEMENT, OTHER RELEVANT PARTIES	National Action Plan for Disaster Risk Reduction (NAP-DRR) (2014-2018)	National, Provincial, Districts	Articulates country's DRR strategic focuses and desired outcomes towards resilience building
NATIONAL COMMITTEE FOR DISASTER MANAGEMENT	Law on Disaster Management (2015)	National	Formalizes the role of the NDMC as the lead administrative organ of disaster management activities. Identifies roles and responsibilities of other institutions as well.
ALL RELEVANT STAKEHOLDERS FROM THE GOVERNMENT TO PRIVATE SECTOR	Climate Change Action Plan (2016-2018)	National, Provincial	Identifies the scope and needs to sustainable growth and utilization of natural resources.
ALL RELEVANT STAKEHOLDERS FROM THE GOVERNMENT TO PRIVATE SECTOR	Cambodia Climate Change Strategic Plan (2014-2023)	National, Provincial, Sectoral, Districts	First comprehensive policy document to address climate change to guarantee low-carbon, resilient and equitable development of sectors and society.

Table 1. National disaster and climate risk reduction policies, plans and legislation in the Cambodia

Priority 4. Enhancing disaster preparedness for effective response to "Build Back Better" in recovery, rehabilitation and reconstruction. The main organization responsible for disaster response in Cambodia is the NCDM, with the support of other relevant organizations and members of the committee, including the Royal Cambodian Armed Forces and the Civil Aviation Authority. During a disaster, the NCDM assembles at the national Emergency Coordination Centre to coordinate the activities. Different ministries share responsibilities based on their expertise, for example the Ministry of Health deploys Rapid Response Teams, and heads the Emergency Operation Center, while the Ministry of Water Resources and Meteorology provides early warnings for hydrometeorological hazards. Additionally, the Ministry of Education, Youth and Sports is integrating DRR into school curriculum to increase awareness of disaster risks (CFE-DM, 2017).

NGOs such as the Cambodian Red Cross (CRC), are also members of the NCDM, and provide support in response activities across the provinces in the country, and the CRC acts as the main relief and response mechanism with direct support from the central government (CFE-DM, 2017). To improve the existing infrastructure, several other UN Agencies and NGOs, including World Food Program and Action Aid, partake in the Humanitarian Response Forum (elaborated in chapter 6) which has been established to improve the coordination and communication in response, recovery and emergency preparedness. Furthermore, continuous efforts to improve response capacity are taking place. In 2018, the Preparedness Partnership of Cambodia organized a capacity building course on disaster management to bridge institutional gaps and to address the growing needs for human resources in the local humanitarian agencies (ADPC, 2018).

In terms of early warning, climate information and EWS in Cambodia have been improved through a series of initiatives under a 4-year project (2015-2019) led by the Ministry of Water Resources and UNDP. The initiatives aim to enhance the institutional capacity for weather monitoring, to increase the availability of weather information and to strengthen the capacity to operate early warning systems based on the information provided by stations monitoring hydrological and weather data (UNDP, 2015). Drought Monitoring InfoHub is among these initiatives, bringing together Ministry of Water Resources and Meteorology, Ministry of Agriculture, Forestry and Fisheries and the NCDM to identify vulnerabilities and to improve coherent monitoring to prepare communities to droughts (UNDP, 2019). Weather monitoring is crucial given the fact that more than three quarters of the population rely on subsistence agriculture, which is vulnerable to extreme weather. Thus, the project is currently being scaled up to cover more provinces and to increase the capacity of provincial officials (UNDP, 2019).

However, lack of cross-country early warning systems remains as an issue, because sometimes flooding can originate outside of Cambodia. During the collapse of the Xepian-Xe Nam Noy dam in Lao PDR, lack of cross-country EWS contributed to the widespread damages because Cambodia did not receive any indication of the impending disaster after the dam had breached on the other side of the border (Sassoon, 2018).

"Building back better" in the aftermath of disasters has been identified as one of the utmost priorities to help end poverty, to reduce future well-being losses, and to increase inclusivity so that no one is left behind in the phases of reconstruction (World Bank, 2018). Cambodia has strived towards reconstruction which is built on the learnings of the past by habitually conducting post disaster needs assessments, and by prioritizing build back better already since the Ketsana Typhoon in 2009 (Royal Government of Cambodia, 2010). The intention was to incorporate the BBB principles and DRM activities into all recovery

and reconstruction, but especially in the housing sector by reviewing housing standards and construction needs in the medium and long-term future. The progress has further been supported by the European Union, World Bank and the UNDP through the Strengthening Capacities for Post-Disaster Needs Assessment and Recovery Preparedness project, which focused on capacity building to improve the country's readiness to response and recover (UNDP, 2018).

UNDP and People in Need have also partnered with the government and provincial committees for disaster management to implement a SMS-based early warning system which provides information to communities about storms, floods, fires or disease outbreaks (UNDP, 2018). The Ministry of Water Resources will be generating and disseminating the warning messages which focus on communities most exposed to hazards and which are engaged in agriculture.

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

Continued attempts have been made to enhance synergies between DRR and Climate Resilience, and to incorporate disaster and climate concerns into socio-economic development agendas. The Rectangular Strategy for Growth, Employment, Equity and Efficiency: Building the Foundation Toward Realizing the Cambodia Vision 2050 Phase IV (2018), and the preceding national development strategies have recognized climate change and disaster risk as development challenges and incorporated adaptation and vulnerability reduction into overarching strategies, (Royal Government of Cambodia , 2018). Considered as a cross-cutting theme in water resource management, agriculture and rural development (Royal Government of Cambodia, 2012), DRR and CR have been mainstreamed into development planning at sub-national levels as well (Ministry of Planning, 2016).

Upon the endorsement of SDGs, consultative process was undertaken to identify country needs and priorities aligned to SDGs as described in the Voluntary National Review (VNR) report 2019. It highlighted efforts to adapt and deliver the Cambodian SDGs (CSDGs) and their integration within the National Strategic Development Plan (NSDP) 2019-2023, focusing on six prioritized goals: Education, Decent Work and Growth, Reduced Inequalities, Climate Action, Peace and Institutions, and SDG Partnerships, which are also set out in the Rectangular Strategy IV (UN, 2019). In the domain of DRR, the Strategic National Action Plan for Disaster Risk Reduction 2019 – 2023 is under the formulation process, facilitated by UNDP, UNDRR and NCDM, in consideration of the SDGs and SFDRR. It is also aligned to the overarching development agendas and geared towards forging coherence among global and country development frameworks.

In fact, identifying development pathways towards sustainability has been in focus since 2012 following the National Report for Rio+20, or the Cambodian Government's Achievements and Future Directions in Sustainable Development, which has elaborated policy, planning and institutional framework for Sustainable Development; and thematic sectors for recommended actions, including strengthening resilience and incorporating disaster risk reduction and climate change adaptation mechanisms (Royal Government of Cambodia, 2012). This has evolved into the National Strategic Plan on Green Growth 2013-2030, focusing on promoting economic development based on green growth principles and environmental sustainability.

Very recently, Cambodia hosted a workshop to improve resilience and to reduce disaster risks by the development of a Strategic National Action Plan for Disaster Risk Reduction (NAP-DRR) 2019-2023. In the workshop, the new NAP-DRR approach was streamlined with the SDGs, Sendai Framework and the Paris Agreement into coherent efforts to guide future development and protect development gains (Mead, 2019). Reflecting on the success and challenges from the implementation of the previous NAP-DRR for 2014-2018, the goal was to bridge together the interlinkages between SDGs and DRR for effective action. The new Strategic National Action Plan for Disaster Risk Reduction (2019-2023) takes the coherence planning a step further. To protect the already achieved development gains and economic growth, the new strategy is intended to be aligned with the Sendai Framework for Disaster Risk Reduction, the Paris Agreement and the Sustainable Development Goals (Amach, 2019). The opportunity is there to mainstream the post-2015 development agenda comprehensively across sectors to guarantee whole-of-government response for disaster risk reduction and climate change adaptation.

Sectoral Aim	Policies with Linkages to Sendai Framework for Disaster Risk Reduction	Policies with Linkages to Sustainable Development Goals	Policies with Linkages to the Paris Climate Agreement or Environment
National Development	Strategic National Action Plan for Disaster Risk Reduction (NAP-DRR) 2019-2023	Cambodia Climate Change Strategic Plan 2014-2023 National Strategic Development Plan (2019-2023)	National Strategic Plan on Green Growth 2013-2030 Cambodia Climate Change Strategic Plan 2014-2023
Environmental Protection	Cambodia Climate Change Strategic Plan 2014-2023	Industrial Development Policy (2015-2025)	Law on Environmental Protection (1996) National REDD+ Roadmap
Disaster and Climate Risk Reduction	Strategic National Action Plan for Disaster Risk Reduction (NAP-DRR) 2019-2023	National Action Program for Land Degradation (2010-2020) National Forest Programs (2010-2029)	Climate Change Action Plan (2016-2018) Climate Change Strategic Plan (2014-2023)
Vulnerability Reduction	National Action Plan for Disaster Risk Reduction (2008-2013) Strategic National Action Plan for Disaster Risk Reduction (NAP-DRR) 2019-2023	National Strategy for Rural Water Supply, Sanitation and Hygiene (2011-2025) Plan for Action for Disaster Risk Reduction in Agriculture (2014-2018)	National Adaptation Programme of Action (NAPA), 2006 Climate Change Strategic Plan (2014-2023)
Urban Development	City Development Strategy (2005-2015) Sub-Decree on Urbanization of Capital, Municipal and Urban Areas (2014)	Sub-Decree No. 27 on Water Pollution Control (1999) National Housing Policy (2014)	Sub-Decree No.42 on Air Pollution and Noise Disturbance Control (2000)

Table 2. Synergies between the national policies, plans and frameworks by sector

5. Issues in Implementation of the DRR and Climate Policy

In terms of implementing climate change policy, there is still a lack of mainstreaming climate change into sub-national development plans, partly due to limited human and financial resources at the local levels. Also, disaster risk management policies and priorities have been overlapping with climate policies, and the capacity for response could also be improved (National Climate Change Committee, 2013). Despite the fact that priorities are now shifting towards coherent and sustainable implementation of harmonized disaster and climate risk reduction policies, lack capacity, insufficient analytics and heavy focus on response obstruct systemized approach for disaster management (World Bank & GFDRR, 2017).

Report by the World Bank also identified gaps in disaster risk financing and insurance in emergency response, indicating that short-term emergency response costs of flooding exceed the available resources, and the gaps are more severe for extreme events (World Bank & GFDRR, 2017). In terms of estimating the future impacts and fiscal resource needs for reconstruction, more information is required about the exposure of public assets in Cambodia. However, it is certain that the future needs for climate adaptation and policy implementation are increasing exponentially. While the GDP is projected to suffer annual losses, the level of public investment needs is assumed to rise to 34 percent of the GDP under a high emission scenario (Ministry of Economy and Finance & National Council for Sustainable Development, 2018).

6. Stakeholder Analysis

An important supporter of the disaster management system in Cambodia is the ASEAN Agreement on Disaster Management and Emergency Response (AADMER) pact between the countries in the region. AADMER provides support to disaster management in the ASEAN region, provides oversight on implementation of programs, and sets regional targets and guidelines for disaster preparedness, response and assistance in the member countries to enhance the harmonization of regional initiatives. Through the AADMER, the ASEAN countries are aiming to become mutually supportive, increasingly cooperative and coherent in their efforts in DRR and CCA throughout the region (AADMER, 2016). The work is conducted in recognition of the immense challenges the countries are facing, and the intention is to increase mutual understanding of disasters and climate, to increase the regional capacity and disaster finance through collaboration.

DRM stakeholders outside the government are instrumental in emergency management, humanitarian assistance and advancing DRR interventions across development sectors. With close working relationship established at the ground level, INGOs supporting local NGO networks, as well as CSOs are pivotal in supporting communities during disasters, strengthening local DRM capacity and in enhancing local DRR practices that link rural poverty reduction, natural resource management, local infrastructure development, and livelihood opportunities with mitigation, preparedness and adaptation.

To ease the process for providing humanitarian assistance, Provincial-Municipal Committee for Disaster Management (PCDM) can pledge for assistance request of non-state actors through their provincial and field offices. Also, to complement the government systems, situation monitoring, emergency response services and early recovery in Cambodia is conducted by the Humanitarian Response Forum (HRF), a network of United Nations (UN), non-government organizations (NGOs), and international organizations (IOs). During the Flood of 2018 affecting six provinces along the Mekong River, rapid initial needs assessment and the delivery of need-based basic services, especially WASH kits, temporary tents, food items and flood relief packages were taken care by HRF members including Plan International, UNICEF, Save the Children, Cambodia Red Cross and WFP as key agencies working in close collaboration with NCDM (Humanitarian Response Forum, 2018).

Localization of emergency response and preparedness has driven country intervention to strengthen local NGOs. Local NGOs recognize the critical need for synchronized capacity building, enhanced local coordination mechanism and synergized actions between local INGO and NGO networks to ensure self-sustaining capacity to conduct disaster risk reduction activities (ADPC, 2016). Cambodian Humanitarian Forum was set up in 2012 comprising more than 120 NGOs to strengthen the leadership capacity of NGOs (CHF Cambodia, 2019).

The role of media in the DRM domain is increasingly important given that news report and media coverage are the key medium for disaster risk knowledge sharing, awareness raising, and for disseminating early warnings. ABC International Development, a private media company, has supported improving disaster risk communication and emergency broadcasting by working with four provincial stations in Battambang, Kampong Cham, Kampot and Siem Reap by building the capacity of media practitioners on quality radio production and improving institutional preparedness through emergency broadcasting plans (ABCID, 2014). To strengthen the role of the private sector, the Federation of Associations for SMEs of Cambodia (FASMEC) was identified as suitable partner of the Preparedness Partnership of Cambodia (PPC), formed since 2018 to enhance coherent action on humanitarian assistances in Cambodia. The FASMEC started working towards integrating disaster resilience in its activities, for resilient business development of micro, small and medium Enterprises (ADPC, 2018).

7. Future Priorities

7.1 Challenges

Due to the frequent occurrence of droughts and large-scale flooding (which are expected to grow more severe in the future), Cambodia is facing immense challenges to protect already achieved development gains, infrastructure and the people from the impacts of disasters. The efforts to end poverty and to increase people's resilience against disasters are hindered by hazards and climate change which often reduce agricultural production, loss of which pushes people further into poverty. Food security is also threatened not only by production loss, but also due to water scarcity which is projected to have grave impacts on rice production. Salinization of groundwater resources following the rise of sea-levels is also likely to contribute to water scarcity in the coastal regions, and it endangers coastal communities. Also, the trade-off between growth and sustainable development must be managed well, because the economic development is driving land degradation and rapid unplanned urbanization in cities where people (especially those who have lost their livelihoods) gather to seek employment opportunities. Many live near the poverty lines, and are vulnerable to poverty following external shocks, which drive migration and urbanization processes.

Yet, managing environmental degradation in the rural regions is not always simple due to the fact that many rely on natural resources such as timber or fish in the Tonlé Sap lake. When the lake was heavily affected by 2016 droughts, and when the fish stocks plummeted, fish consumption needs still remained high due to it being a major source of protein nationwide. This poses another challenge on managing large-scale events which have negative effects on the environment and availability of food. For example, posing limitations on fishing would have only increased food insecurity following the drought unless actions were taken to otherwise mitigate the impacts, and restricting farming in the rural regions can mean loss of livelihoods for many if alternative employment options are not immediately available.

High spatial variability of poverty between rural and urban regions also has implications on successful disaster and climate risk management. Equal attention should be provided for managing the land use both in cities and in the rural regions, with an enhanced focus to hotspots of vulnerability. Yet, due to lack of resources, capacity and prevalence of frequently reoccurring hazards damaging infrastructure, achieving equity in development must be prioritized to guarantee the graduation from the SDGs by 2030. In terms of institutional challenges, the lack of capacity for disaster data management and the limited financial resources for DRM activities are obstructing the effective harmonization of disaster and climate risk reduction activities and hinder the process of implementing and monitoring the Sendai Framework and the Paris Climate Agreement mandates.

7.2 Priority Issues

While the government is striving to mainstream DRR and CCA into national development plans as part of its efforts to streamline approaches, the same process is yet to take place at the sub-national level. As the country's policy and strategic directions lay solid framework for coherence, efforts to operationalize these plans for tangible outcomes at the local government levels remains to be achieved.

Lack of capacity must be addressed before these intentions could materialize. Financing needs also require immediate attention because, as established earlier, the costs of climate change and associated hazards are estimated to grow at an exponential rate which places a massive burden on the society and people. Resilient agriculture, sustainable resource management and land-use planning should be among the first financing priorities due to the high dependence on these sectors.

Poverty reduction is also among the immediate priority needs. Large portions of the population still remain vulnerable to poverty and rely on undiversified livelihoods, often on fish stocks and rice production, both of which are vulnerable to external shocks. The future economic development may provide alleviation to the unequal distribution of poverty, but only if the growth is managed to guarantee equity and to minimize the trade-offs between environmental impacts and development.

To alleviate institutional challenges, disaster financing should be strengthened and institutionalized across sectors to guarantee budget for preparedness and risk mitigation activities as well as for contingency finance. Currently, disaster finance draws from the general contingency budget, which may be stretched thin as the funding needs grow greater due to climate change. Improving functions of the whole DRM architecture (comprising NCDM, provincial, district and commune committees and Village Disaster Management Groups), focusing on capacity building, developing DRM professionals, and setting up mechanisms for vertical coordination among respective DRM committees would be critical. Technical skills to maintain and monitor disaster-related and SADD disaggregated data is needed to complement to existing disaster databases.

Finally, the focus should be directed towards a more participatory, proactive approach to manage disasters and climate risk, especially at the sub-national and grassroots levels, which are not only the first responders in disasters, but also best equipped to address disasters and climate risk reduction needs in a manner that does not compromise local livelihoods. Untapped potential of self-help groups, livelihoods groups and local environmental protection groups in DRR and CCA has to be realized, with support from the plethora of local NGOs and their networks to enhance people empowerment, poverty reduction, livelihood diversification and local resilience building catering to locally-driven needs and context.

8. References

1. AADMER, 2016. *AADMER Work Programme 2016-2020.* Semarang: AADMER.
2. ABCID, 2014. *Disaster information providers in Cambodia,* s.l.: International Development Unit of the Australian Broadcasting Corporation.
3. ADB, 2014. *CAMBODIA COUNTRY POVERTY ANALYSIS 2014,* Manila: Asian Development Bank.
4. ADPC, 2008. *Impact of Disasters on the Education Sector in Cambodia,* Bangkok: Asian Disaster Preparedness Center.
5. ADPC, 2016. *Uniting local NGOs against disasters in Cambodia,* s.l.: s.n.
6. ADPC, 2018. *ADPC News ambodia implements Disaster Management course to prepare for floods.* [Online]
   Available at: https://app.adpc.net/news/cambodia-implements-disaster-management-course-prepare-floods
   [Accessed 1 June 2019].
7. ADPC, 2018. *Engaging the private sector in preparedness for response Experiences from the Asian Preparedness Partnership,* Bangkok: Asian Disaster Preparedness Center.
8. ADPC, 2019. *About SERVIR-Mekong.* [Online]
   Available at: https://servir.adpc.net/about/about-servir-mekong
   [Accessed 30 May 2019].
9. ADRC, 2014. *Country Report of Cambodia Disaster Management,* Kobe: Asian Disaster Reduction Centre.
10. Amach, O. H., 2019. Cambodia Steps Up Fight Against Climate Change. *UNDRR News Archive*, 8 April.
11. Caritas, 2016. *Drought Emergency Appeal.* Phnom Penh: Caritas Cambodia.
12. CFE-DM, 2017. *Cambodia: Disaster Management Reference Handbook,* Ford Island : Center for Excellence in Disaster Management and Humanitarian Assistance.
13. CHF Cambodia, 2019. *Cambodian Humanitarian Forum (CHF).* [Online]
   Available at: http://chfcambodia.net/what-we-do/
   [Accessed 30 May 2019].
14. Chhinh, N., 2015. *DROUGHT, DROUGHT VULNERABILITY AND ADAPTATION POLICY IN CAMBODIA WITH REFERENCE TO THE FARMING SECTOR.* Adelaide: Flinders University of South Australia.
15. Crothers, L., 2016. Animals die as Cambodia is gripped by worst drought in decades. *The Guardian*, 5 May.
16. Davies, G. L. et al., 2015. Water-Borne Diseases and Extreme Weather Events in Cambodia: Review of Impacts and Implications of Climate Change. *International Journal of Environmental Research and Public Health,* Volume 12, pp. 191-213.
17. Ellis-Petersen, H., 2018. Laos dam collapse sends floods into Cambodia, forcing thousands to flee. *The Guardian*, 26 July.
18. Flower, B. et al., 2017. Using participatory methods to uncover interacting urban risks: a case study of three informal settlements in Phnom Penh, Cambodia. *Environment and Urbanization,* 30(1), pp. 301-316.
19. Fujii, H. et al., 2003. Hydrological roles of the Cambodian floodplain of the Mekong River. *International Journal of River Basin Management,* 1(3), pp. 253-266.
20. GFDRR, 2013. *Financing Disaster Risk Reduction: A 20-year Story of International Aid* , s.l.: GFDRR.
21. GFDRR, 2019. *ThinkHazard Cambodia.* [Online]
   Available at: http://thinkhazard.org/en/report/44-cambodia/LS
   [Accessed 22 May 2019].
22. Habitat for Humanity, 2011. *Disaster Relief in Cambodia The 2011 Floods.* [Online]
   Available at: https://www.habitatforhumanity.org.uk/what-we-do/disaster-response/disaster-relief-in-cambodia/?gclid=EAIaIQobChMIocLCloOs4gIVrZPtCh3sZwDXEAAYASAAEgI30

fD_BwE
[Accessed 21 May 2019].
23. Habitat for Humanity, 2018. *Cambodia Country Profile,* Phnom Penh: Habitat for Humanity.
24. Hoque, M. A. et al., 2016. Drinking water vulnerability to climate change and alternatives for adaptation in coastal South and South East Asia. *Climatic Change,* Volume 136-247, pp. 247-263.
25. Humanitarian Response Forum, 2018. *Cambodia Disaster 2018 Humanitarian Response Forum (HRF) Report - No. 7,* s.l.: Humanitarian Response Forum.
26. ILO, 2016. *Kingdom of Cambodia Decent Work Country Programme (DWCP) 2016–2018,* Phnom Penh: International Labour Organization .
27. INFORM, 2019. *INFORM Risk Country Profile: Cambodia.* [Online]
Available at: http://www.inform-index.org/Countries/Country-profiles/iso3/KHM
[Accessed 31 May 2019].
28. IOM, 2016. *Assessing Vulnerabilities and Responses to Environmental Changes in Cambodia,* Phnom Penh: International Organization for Migration.
29. JICA, 2016. *The Study on Drainage and Sewerage Improvement Project in Phnom Penh Metropolitan Area: Final Report Volume II,* Phnom Penh: Japan International Cooperation Agency.
30. Kang, S. J., Sawada, Yasuyki & Chung, Y. W., 2017. Long-term consequences of armed conflicts on poverty: the case of Cambodia. *Asia-Pacific Journal of Regional Science,* 1(2), pp. 519-535.
31. Mead, L., 2019. Cambodia Seeks to Align National Disaster Strategy with SDGs, Sendai Framework, Paris Agreement. *IISD SDG Knowledge Hub*, 16 April.
32. Ministry of Economy and Finance & National Council for Sustainable Development, 2018. *Addressing Climate Change Impacts on Economic Growth in Cambodia,* Phnom Penh: Ministry of Economy and Finance.
33. Ministry of Economy and Finance, 2015. *Cambodian Experience: Gaps and Needs in DIsaster Risk Reduction Planning and Financing for Regional Conference on Strategies and Tools for Integrating DIsaster Risk Reduction into Development Planning and Financing.* Bangkok: Ministry of Economy and Finance.
34. Ministry of Environment, 2009. *Cambodia Environment Outlook,* Phnom Penh: Ministry of Environment.
35. Ministry of Environment, 2016. *Climate Change Action Plan 2016 – 2018.* Phnom Penh: Royal Government of Cambodia.
36. Ministry of Health & WHO, 2015. *Success Factors for Women's and Children's Health,* Geneva: World Health Organization.
37. Ministry of Planning, 2016. *Country Report of Cambodia Disaster Risk Reduction.* Phnom Penh: Royal Government of Cambodia.
38. MoEYS, 2018. *Education in Cambodia: Findings from Cambodia's experience in PISA for Development,* Phnom Penh: OECD.
39. National Climate Change Committee, 2013. *Cambodia Climate Change Strategic Plan 2014 – 2023.* Phnom Penh: Royal Government of Cambodia.
40. National Council for Sustainable Development, 2018. *Addressing Climate Change Impacts on Economic Growth in Cambodia.* Phnom Penh: Royal Government of Cambodia.
41. National Institute of Statistics, Directorate General for Health & ICF International, 2015. *Cambodia Demographic and Health Survey,* Phnom Penh: National Institute of Statistics, Directorate General for Health & ICF International.
42. NCDM & Ministry of Planning, 2008. *STRATEGIC NATIONAL ACTION PLAN FOR DISASTER RISK REDUCTION 2008 ~ 2013.* Phnom Penh: Royal Government of Cambodia.
43. NCDM & Ministry of Planning, 2009. *Strategic National Action Plan for Disaster Risk Reduction 2008 ~ 2013.* Phnom Penh: National Committee for Disaster Management (NCDM).
44. NCDM, 2013. *National Action Plan for Disaster Risk Reduction (NAP-DRR) 2014-2018.* Phnom Penh: The Royal Government of Cambodia.
45. NCDM, 2014. *Climate Change Action Plan for Disaster Management.* Phnom Penh: National Committee for Disaster Management.

46. NCDM, 2013. *CAMBODIA DISASTER MANAGEMENT INFORMATION AND DATABASE SYSTEM.* Phnom Penh: NDMC.
47. OECD, 2017. *Social Protection System Review of Cambodia,* London: Organisation for Economic Co-operation and Development.
48. Open Development, 2015. *Open Development Cambodia: Social Development.* [Online] Available at: https://opendevelopmentcambodia.net/topics/social-development/ [Accessed 21 May 2019].
49. Open Development, 2016. *Open Development Cambodia.* [Online] Available at: https://opendevelopmentcambodia.net/topics/drought/ [Accessed 22 May 2019].
50. PIN, 2013. *An Overview of Hazard Mapping in Cambodia,* Phnom Penh: People in Need.
51. Royal Government of Cambodia , 2018. *The Rectangular Strategy for Growth, Employment, Equity and Efficiency: Building the Foundation Toward Realizing the Cambodia Vision 2050 Phase IV,* Phnom Penh: Royal Government of Cambodia .
52. Royal Government of Cambodia, 2010. *Cambodia Post-Ketsana Disaster Needs Assessment,* Phnom Penh: Government of Cambodia.
53. Royal Government of Cambodia, 2012. *The Cambodian Government's Achievements and Future Direction in Sustainable Development: National Report for Rio+20,* Phnom Penh: Royal Government of Cambodia.
54. Royal Government of Cambodia, 2014. *National Strategic Development Plan.* Phnom Penh: Royal Government of Cambodia.
55. Royal Government of Cambodia, 2015. *Law on Disaster Management.* Phnom Penh: Royal Government of Cambodia.
56. Sassoon, A. M., 2018. Thousands of Cambodians evacuated as floods hi. *Al-Jazeera*, 26 July.
57. Seiff, A., 2018. *When There Are No More Fish Climate Change, Drought, and Development Have Devastated Cambodia's Tonlé Sap Lake, Which Feeds Millions Across Southeast Asi,* Muscatine: The Stanley Foundation.
58. Summers, H. & Cristofoletti, T., 2018. How climate change forces farmers into slavery in Cambodia's brick kilns – in pictures. *The Guardian*, 18 October.
59. Teh, L. S. L. et al., 2019. The economic impact of global change on fishing and non-fishing households in the Tonle Sap ecosystem, Pursat, Cambodia Author links open overlay panel. *Fisheries Research,* Volume 210, pp. 71-80.
60. thinkWhere, 2018. *thinkWhere Mapping Innovation Helps Manage Disasters in Cambodia.* [Online] Available at: https://thinkwhere.com/thinkwhere-mapping-innovation-helps-manage-disasters-in-cambodia/ [Accessed 30 May 2019].
61. UN, 2019. *Cambodia Voluntary National Review (VNR) Key Messages.* [Online] Available at: https://sustainabledevelopment.un.org/memberstates/cambodia
62. UNDP , 2019. *Cambodia, looking to the horizon, prepares for drought.* Phnom Penh: UNDP.
63. UNDP, 2015. *Strengthening climate information and early warning systems in Cambodia Project summary.* Phnom Penh: UNDP.
64. UNDP, 2018. *Cambodia stepping up preparedness for recovery.* [Online] Available at: http://www.kh.undp.org/content/cambodia/en/home/presscenter/pressreleases/2018/cambodia-stepping-up-preparedness-for-recovery.html [Accessed 29 May 2019].
65. UNDP, 2018. *Human Development Indices and Indicators: 2018 Statistical Update Briefing note for countries on the 2018 Statistical Update Cambodia,* s.l.: UNDP.
66. UNDP, 2018. *Linking technology and community early warning: UNDP and People in Need to extend disaster early warning for Koh Kong and Sihanoukville communities.* Phnom Penh: UNDP.
67. UNDP, 2019. Cambodia, looking to the horizon, prepares for drought. *UNPD: Climate Change Adaptation*, 30 January.
68. UNESCAP, 2015. *Overview of Natural Disasters and their Impacts in Asia and the Pacific,* s.l.: UNESCAP.

69. UNESCAP, 2017. *Disaster Resilience for Sustainable Development: Asia-Pacific Disaster Report 2017,* Bangkok: United Nations Economic and Social Commission for Asia and the Pacific.
70. UNFPA, 2014. *Urbanizateion and its Linkage to Socio-Economic and Environmental Issues,* Phnom Penh: UNFPA.
71. UNISDR, 2015. *Global Assessment Report on Disaster Risk Reduction,* Geneva: UNISDR.
72. UNDP, 2014. *CamDi: Cambodia Disaster Loss and Damage Information System,* Phnom Penh: UNDP.
73. USAID, 2019. *Climate Risk Profile: Cambodia,* Phnom Penh: USAID.
74. WHO, 2016. *CAMBODIA–WHO Country Cooperation Strategy 2016–2020.* Phnom Penh: World Health Organisation.
75. World Bank & GFDRR, 2017. *Disaster Risk Finance Country Diagnostic Note: Cambodia,* s.l.: World Bank.
76. World Bank, 2016. *Project Information Document/ Integrated Safeguards Data Sheet (PID/ ISDS).* [Online]
Available at: http://documents.worldbank.org/curated/en/919801481702569084/pdf/ITM00184-P160929-12-14-2016-1481702565622.pdf
[Accessed 16 May 2019].
77. World Bank, 2018. Building Back Better: How to Cut Natural Disaster Losses by a Third. *Presss Release*, 18 June.
78. World Bank, 2019. *Cambodia Overview.* [Online]
Available at: https://www.worldbank.org/en/country/cambodia/overview
[Accessed 15 May 2019].
79. World Economic Forum, 2018. *The Global Gender Gap Report 2018,* Geneva: World Economic Forum.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