

Disaster Risk Reduction in Republic of Maldives

Status Report 2019



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UNDRR

UN Office for Disaster Risk Reduction

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About this report

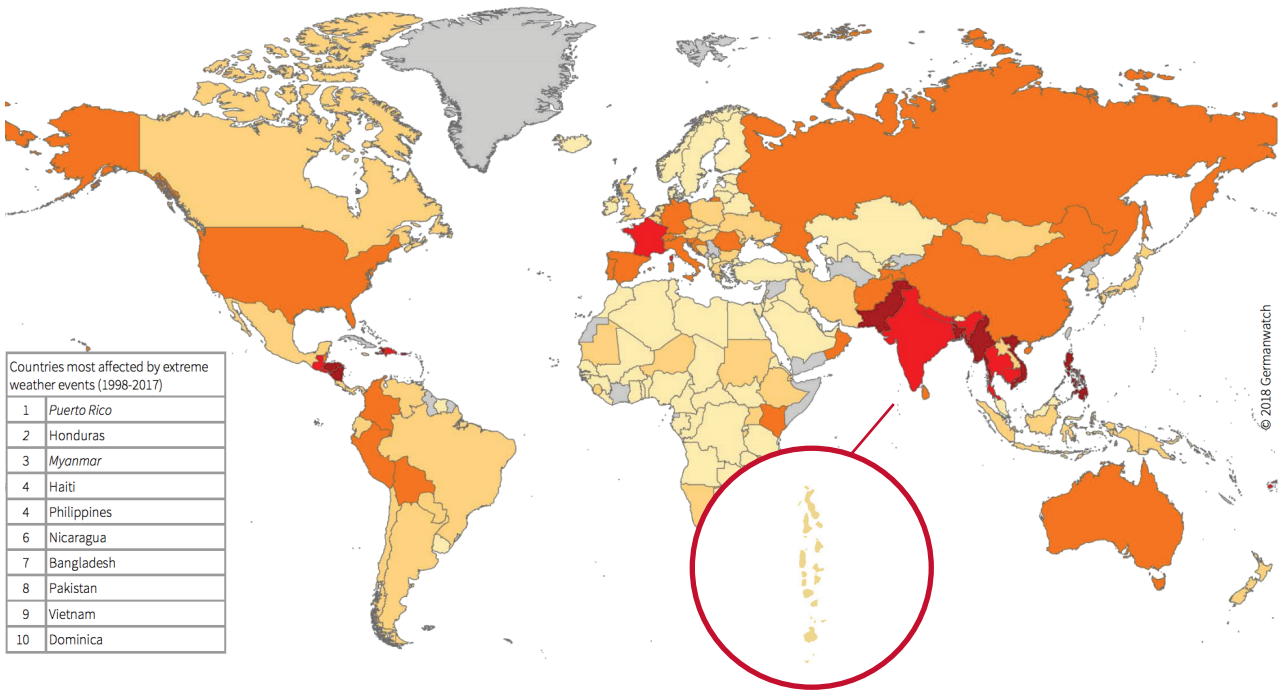
The Disaster Risk Reduction (DRR) report provides a snapshot of the latest DRR progress Maldives has achieved under the four priorities of the Sendai Framework. It also highlights some of the key challenges surrounding the issue of creating coherence among the key global frameworks at the country level; 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.

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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.

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Climate Risk Index: Ranking 1998 - 2017 ■ 1 - 10 ■ 11 - 20 ■ 21 - 50 ■ 51 - 100 ■ >100 ■ No data

(GermanWatch,2019)

POPULATION 2017	
Total Population	436,330
Urban Population	175,892 (40.3%)
Population Density Per Km ²	1102
ECONOMIC INDICATORS	
Gross Domestic Product in Current \$US	4.597 billion
GDP Per Capita (\$US)	10.535
GDP Growth (Annual %)	8.8%
HUMAN DEVELOPMENT	
Human Development Index	0.717
HDI Rank	101
Income Level Category	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 Maldives, low CRI score does not accurately 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

The Republic of Maldives, one of the small island developing states (SIDS) is located in the Indian Ocean, covering a land area of 298 km² in a territory of over 90,000 km². Thus, it is one of the most geographically dispersed nations in the world, consisting of close to 1,200 islands within 26 naturally formed Atoll-systems, which are grouped into 19 administrative atolls. The population is equally scattered across the region, inhabiting 187 islands, while another 128 islands are exclusively occupied by resorts (with 50 more resort islands currently under development). Also, the capital city Male' is among the most densely populated urban areas in the world. As of 2014, 129,381 persons (38% of the total resident population) were living within the two-square kilometers area of the capital (May & Riyaza, 2017).

Maldives has experienced rapid economic development in the recent years, largely as a result of nature-based tourism, and is now classified as a middle-income country (The World Bank, 2017). The country's GDP per capita reached \$10,675 in 2017, compared to \$200 in 1978. GDP continues to grow at the average rate of 7.1% bolstered by construction, tourism, communications, transport, and fisheries (The World Bank, 2017). Tourism as the main economic driver generated the highest share of GDP at 23% (figure 1). Albeit relatively low contribution to GDP, fisheries still remain significant sources of rural livelihoods and play an important role in domestic food and nutrition security, especially in rural areas. Given the fact that 99% of the Maldivian territory is comprised of ocean, fish (especially tuna) is a primary source of protein in local diets.

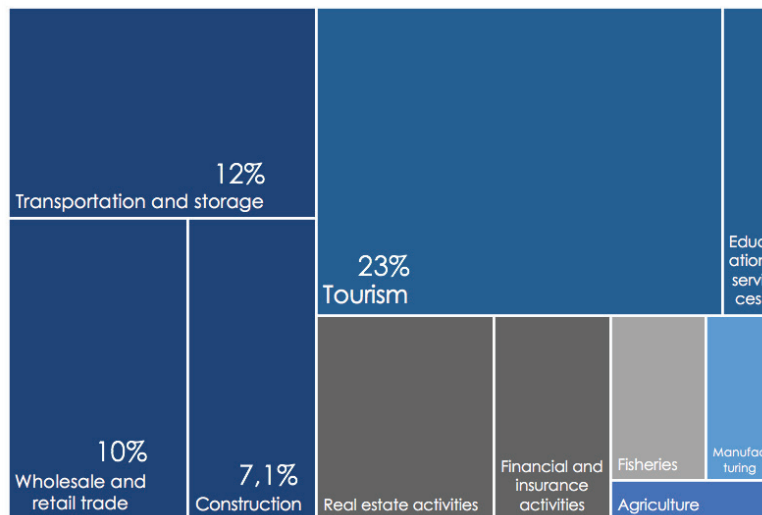


Figure 1. Largest industries contributing to, and their portion of the GDP in % in March 2019. Data sourced from National Bureau of Statistics (2019).

As a low-lying archipelago, with an average elevation of 1.5 meters over the sea-level, the country has also been identified as one of the most vulnerable to threats posed by climate change. Lack of disaster resilience and environmental sustainability is also perceived as threats to development. While the country has rarely experienced major disasters, with the exception of the Indian Ocean Tsunami in 2004, small-scale and recurrent hazards such as increased rainfall, cyclonic winds, storm surges, saltwater

intrusion, and coastal floods have been causing damages and losses in the recent years. Realizing these climate-related challenges, Maldives has proactively taken action to strengthen coping and adaptive capacity and has become active on the international platforms as an advocate of mitigating the impacts of climate change. Maldives has constitutionally recognized protection of the environment as a human right (The World Bank, 2017), and has committed to low-emission development alongside energy security and sustainable development (Ministry of Environment and Energy B, 2015).

1.1 Demographic Characteristics

The total population in the Republic of Maldives at the time of the Census in September 2014 was 402,071 people, with 338,434 Maldivians, majority of them Muslim, and 63,637 (16%) foreigners (National Bureau of Statistics, 2014).

The country has been a development success with robust growth, considerable improvement of infrastructure and connectivity. Health and education indicators demonstrate impressive advances in quality of life and social services, with a literacy rate approaching 100%, and life expectancy of nearly 77 years. Furthermore, Maldives has the lowest infant mortality rate in the South Asia Region (May, 2016). However, such development combined with increasing population estimated to reach nearly 500,000 people by 2050 creates major challenges in terms of environmental sustainability as the islands are already suffering from lack of arable land, overpopulation and environmental degradation (May, 2016).

Furthermore, despite the positive trends in the demographic and health indicators, gender imbalances are a key issue in the country. While the constitution of Maldives and a range of international laws are intended to guarantee gender equality, political participation of women, gender-based violence and legal disadvantages in cases that involve abuse contribute to gender disparities (El-Horr & Pande, 2016). Additionally, while discussing employment, it is worth highlighting that a significant proportion of the country's working populations are foreign immigrants. By 2016, 83,136 immigrant workers were reported to be employed, of which 46.5% were of Bangladeshi origin (Plewa, 2018) (figure 2).

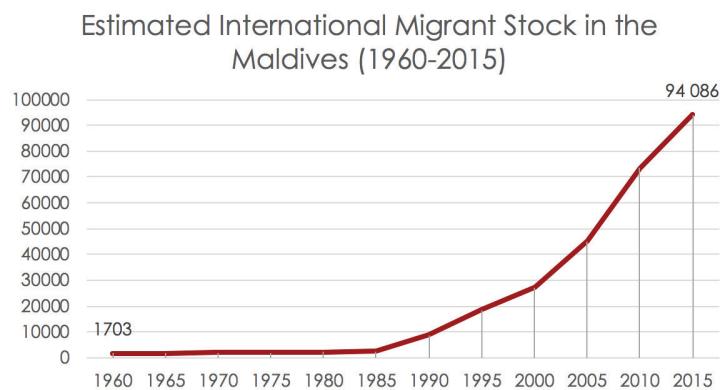


Figure 2. Estimated International Migrant Stock (1960-2015) (The World Bank, 2015).

1.2 Economic Impact of Disasters

Along with the catastrophic tsunami of 2004, Maldives has experienced local, recurrent hazards in the past years. However, precise data on damages and losses are not available, making it difficult to estimate the extent of the factual economic impacts.

Still, the country was among the worst affected (in macroeconomic terms) by the 2004 Indian Ocean tsunami, despite the fact that the capital Male was spared from the effects. While the death toll was less than 100 people, over 1,300 people suffered injuries, and nearly a third of the population were affected. Of the inhabited islands, 53 suffered severe damages and 10% of the islands were completely destroyed. Impacts cost nearly 62% of the country's gross domestic product; approximately US\$ 470 million was lost in damages (ADB, 2015). However, the largest losses came in the form of a series of economic shocks which resulted from the loss of tourism and fishing equipment, both of which are the cornerstones of the economy (Republic of the Maldives, 2005). Because the domestic banking sector is highly exposed to the tourism-related income, it is highly vulnerable to external shocks as well (Rashfa, 2015). Indeed, 19 of the 87 operating resorts at the time of the 2004 tsunami were closed, and because of the "One Island-One Resort" concept of development, all resort islands are self-sufficient – meaning that they will be completely isolated if their own power supplies, sewage systems, water supplies and support facilities are destroyed (Carlsen & Hughes, 2008). Most resorts remained fully operational but sustained considerable losses due to shortfalls of revenue following mounting cancellations, bookings and sales.

At the community levels, significant portion of the income and livelihoods of people depends on home-based production, either agricultural production, fishing activities or small cottage industries and businesses. Thus, when homes and localities were destroyed, livelihoods tied to them were lost as well. A total of over 5,700 houses needed to be built or rehabilitated (Ministry of Planning and National Development, 2005). Many islanders were also experiencing issues in repaying their loans taken from the National Bank or the Atoll Development Committee, which was expected to have a long term impact on the economy as the people had neither assets to mortgage, or lost any form of collateral as a surety against loans they now could not repay (World Food Programme, 2005).

Finally, there is another conundrum particular to SIDS; the vulnerability of freshwater resources to saltwater intrusion and droughts across the atolls is high. Thus, each year, government has to assign significant amounts of resources for water distribution to guarantee water availability, especially during disasters. The process becomes more expensive and challenging during times of uncertainty. For example, during the dry seasons of 2009 and 2010, supplying of desalinated water to over 90 islands came with the expense of around Rf10 million (or US\$ 640,000), and it was expected to rise with fuel prices as the distance between islands requires a long travel (Lubna, 2012).

1.3 Social Impact of Disasters

The 2004 tsunami had devastating impacts to the people. This was especially true in the case of the poorest of demographics, who are often out of the reach of public safety nets, were not receiving remittances, or had no steady income (Republic of the Maldives, 2005). Fishers lost their boats and equipment, farmers lost their tools, seeds and fertilizers, and the water became too salinized to be used for irrigation, indicating that most vulnerable to the tsunami were the ones dependent on artisan professions, fishing and agriculture with high reliance on environment as their primary income (World Food Programme, 2005). They are also among the poorest demographics in the country (figure 3), and are mainly inhabiting the remote atolls, where 12.8% of the population is considered poor (figure 4). The mean monthly consumption in Male' is almost twice as high than it is in the remote regions of the country (National Bureau of Statistics, 2016).

The tsunami also destroyed schools and clinics on some 50 islands. According to the National Disaster Management Centre, quoted in Asian Development Bank's report, 64 schools, 30 health centers, and 60 island administrative facilities needed to be reconstructed or rehabilitated (ADB, 2005). This had long-term impacts especially in the harder to reach regions, because aid and support were not distributed evenly among the communities. This was due to the fact that some of the remote islands are not easily reachable from Male'.

Lack of suitable land for resettlement also created issues as the tsunami created a group of internally displaced people (IDPs) (Brusset, et al., 2009). Long-term relocations of people to other communities caused internal stresses on both sides (Republic of the Maldives, 2005), contributing to the social and communal tensions as people did not necessarily wish to relocate.

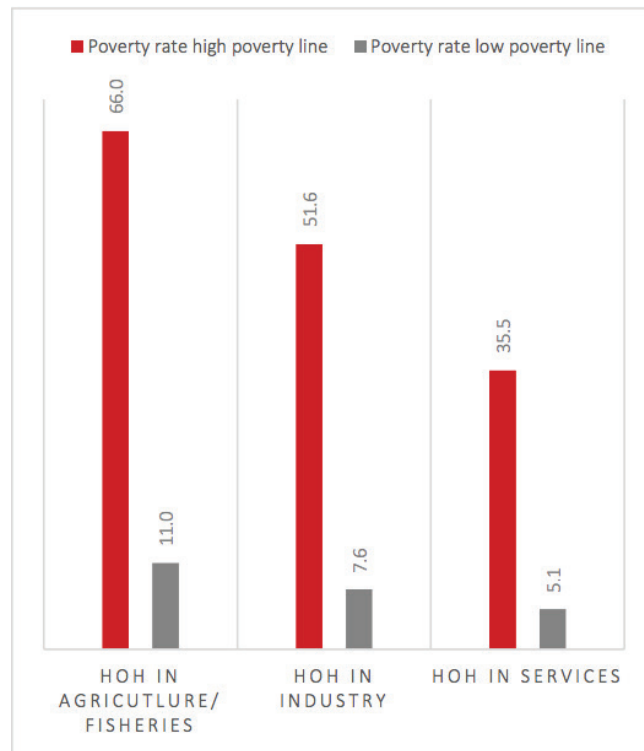


Figure 3. Poverty rates by broad sector of employment of Head of Household (National Bureau of Statistics, 2016)

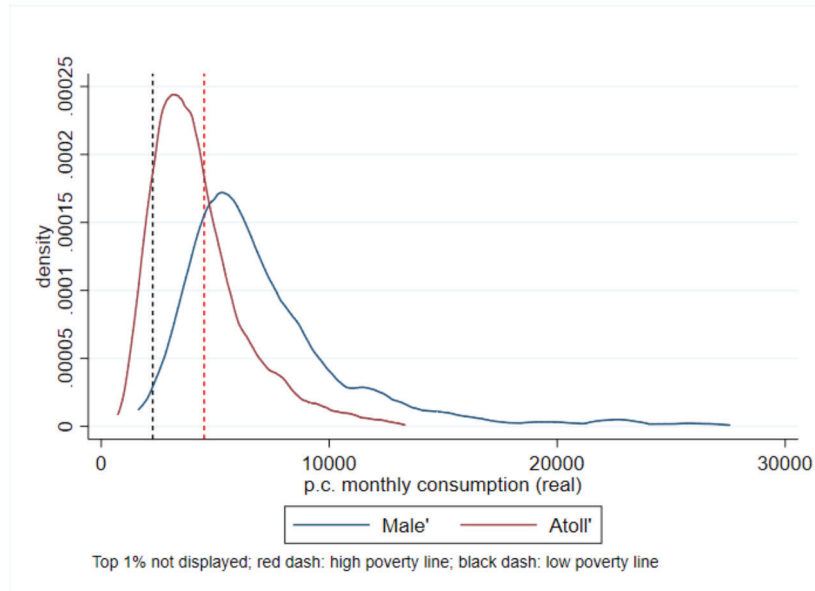


Figure 4. Distribution of total p.c. monthly expenditures in Male and the Atolls in 2016 (National Bureau of Statistics, 2016)

2. Disaster Risk Profile

2.1 Hazards and Climate Change

The island chain of Maldives is regularly exposed to meteorological hazards such as droughts, storms, monsoonal heavy rains, cyclones, storm swells and coastal erosion. In fact, most of the disaster events originate from meteorological and hydrological events, which accounted for 45% of deaths and 79% of economic losses between 1988-2007 (The Republic of Maldives, 2010). The most common hazard is flooding. Wave run-ups at the coast have been found to be the main culprit, as they are often prolonged during swell wave conditions (Wadney, et al., 2017). Other reasons include astronomical tides, high winds and the gradually rising sea levels. Human-induced hazards include oil-spills, fires and aviation accidents (UNDP, 2006). Also, in rare cases, tsunamis are a threat especially to the eastern shores of the islands (figure 5) due to the recurrent seismic activity at the Sumatran Subduction zones in the east, where 90% of all tsunamis affecting Maldives between 1816-2006 have originated from (UNDP, 2006).

Effects of climate change enhance many of these hazards, potentially increasing the impacts of storms, droughts and regional flooding. It also threatens the integrity of the country due to the low elevation; Maldives is among the few countries which are facing the near complete or complete submersion of all national territory in the future due to sea-level rise (Nachmany, et al., 2015). It has been estimated that as the sea levels rise, the tide-induced flooding will also increase in intensity as well (Brown, et al., 2017). Of all the possible climate induced risks, sea-level rise has been stated as the most threatening to coastal ecological systems as it threatens housing foundations, coastal vegetation and infrastructure, not to mention the damage to reefs (Naylor, 2015). Sea level rise also affects the water lenses and the freshwater availability for agriculture, humans and inland vegetation. Furthermore, livelihoods depending on the availability of fish are increasingly threatened by the increasing acidity and the warming of the oceans (The Government of Maldives, 2010).

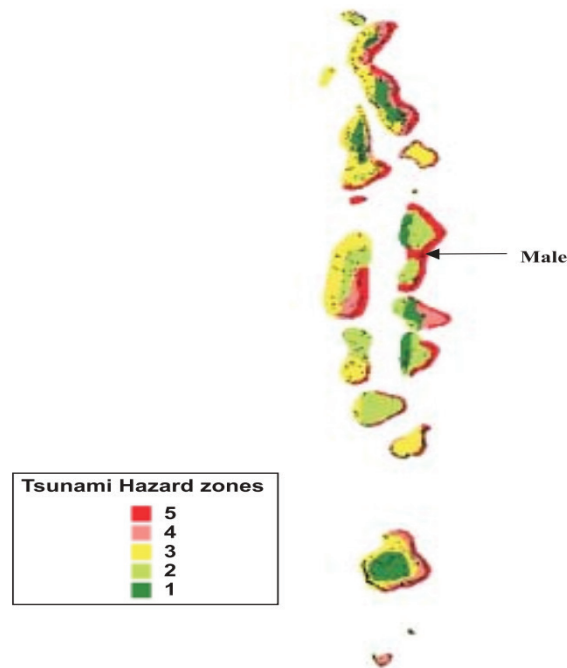


Figure 5. Tsunami risk zones in the Maldives (UNDP, 2006)

2.2 Exposure

Over 90% of the islands have been reported to flood annually, 97% are reporting shoreline erosion, and 64% of the islands experiencing erosion reported the issue as severe (Nachmany, et al., 2015). Nearly 50% of all housing structures are also within 100 meters from the coastline, only few of which are capable of withstanding tidal floods, let alone tsunamis (Nachmany, et al., 2015). Populations are increasingly exposed to climatic extremes as a result of climate change as inhabiting small coral islands leaves no other option.

Low-lying coral islands and the scattered populations inhabiting them are increasingly more exposed to weather and climate change, depending on the region. This is due to the hazards having a high spatial variability; cyclones usually affect the northern regions due to their proximity to the cyclone belt, which also produces the highest risk of storm surges nationally (UNDP, 2007). Risk of heavy rain and rain-induced flooding is comparatively low in the north, but the north is also very vulnerable to drought due to the regional climatic characteristics and topography (UNDP, 2007). Conversely, the opposite is true in the south, which is very vulnerable to flooding and rain, but not so to droughts.

Apart from the local populations, tourists themselves are also equally exposed to sudden-impact events in remote resort islands which depend on their own infrastructure. Tourists may also lack knowledge of local hazards, perceive risks differently, and may be unable to communicate in local languages, all of which heighten the importance of considering tourists as a variable in the local disaster management planning (Nguyen, et al., 2016).

Environmental degradation is another significant issue which increases the communities' exposure; for example, the population growth has resulted in the expansion of land

surface across Male's lagoon and reef flats with the cost of extensive coral mining resulting in degradation of natural defenses (Naylor, 2015), thus increasing the risks of coastal flooding. Paradoxically, despite being the major source of the country's income, poor construction and management of tourist resorts contributes to the destruction of the environment due to lack of sewage control, boat cleanings, and increased nutrient deposits which encourage algae growth near resort sites (Cowburn, et al., 2018). Only 0.5% of the atoll areas are legally protected, which directly endangers the long-term prospects of tourism and fisheries which require sustainable management of the marine environments (Stevens & Froman, 2019).

Also, the increase in tourism is contributing to the accumulation of waste in the country. 1.2 million visitors who stayed at the atolls in 2015 generated an estimated 33,600 tons of solid waste, on top of the average of 120 tons of municipal solid waste produced in Male in any given day (Kapmeier & Gonçalves, 2018). Waste management facilities are often lacking capacity, thus much of the solid waste is shipped into the artificial Thilafushi industrial island to be manually processed. However, the island does not have mechanisms to prevent spillages or blowing waste into the sea (Peterson, 2015). Furthermore, most islands without waste processing facilities have accumulated a waste pile of their own, and small communities habitually dump their waste in unofficial locations (Peterson, 2015), which indicates that especially the ground water resources are threatened by pollution.

Finally, dengue fever is a prevalent problem across the country, with average of over 1,500 cases reported each year (Bangert, et al., 2018). Main breeding sites (mostly on inhabited islands) are located at unmanaged waste sites and in the presence of unprotected water storage containers, highlighting the need for adequate wastewater management (Bangert, et al., 2018).

2.3 Socio-economic Vulnerability

It should be noted here that one of the largest contributors to vulnerability is distance of some of the communities from resources and delivery of goods or aid, which becomes a significant issue during emergencies. Such is the case of the Laamu atoll for example, where studied groups living in the core islands were less likely to experience food and water shortages (McNamara, et al., 2018). The opposite was true in the harder to reach islands, where the lack of service delivery due to small local population size also creates lower levels of socioeconomic wellbeing (McNamara, et al., 2018). More than half of the population is spread over 188 islands, and some of the development of health and educational facilities in distant atolls are behind the standards of the capital (Plewa, 2018).

While this peripherality could have been addressed within the context of exposure, it is important to notice that geography affects the mobility of people, along with gender, health and age, which are all elements of vulnerability (McNamara & Clissold, 2019). Of these, gender has a major role in creating societal vulnerabilities because both major employment sectors, tourism and fishing, are dominated by men, and women do not have ownership over vessels (Lama, 2018). Thus, women's mobility is restricted, they are often bound by duties related to household maintenance, and are employed in low-paid fields which are deemed "unworthy" for men (Lama, 2018), which contributes to women's increased vulnerability as they lack access to resources, movement between islands and are more likely to end up in poverty. However, grouping of "women" into one

homogenous group is inadequate; intersecting categories of vulnerability exist which are influenced by factors such as poverty, marital status and geographical location (McNamara & Clissold, 2019). Thus, addressing vulnerability requires identifying these multiple, sometimes overlapping dimensions.

Surprisingly, the youth are also disproportionately vulnerable groups in the Maldives. With the growing of population in youth and working age, and given the constraints of living on an atoll, young people experience the outside world through the internet, social media and the increasing numbers of tourists and foreigners. A desire for freedom and for higher social status clash with cultural norms and perceptions, leaving young people disappointed and disengaged (World Bank, 2014). Other social problems in the capital include drug-related ills. Incidents such as gang violence pose major challenges in the country (Maldivian Red Crescent, 2018), and the lack of mentoring or mental health facilities contribute to the growing problem related to exposure to drugs, criminal activities and disengagement (McNamara & Clissold, 2019).

In terms of poverty reduction, it has been stated that reduction activities in the Maldives have not reached their full potential when contrasted to the GDP incline, and the high-end tourism industry is not creating enough opportunities for local low-skilled labor (The World Bank, 2015). This means that due to lack of opportunities, many are relying on fishing activities across the atolls, and do not consider migration as an option due to it being financially and socially costly (Plewa, 2018).

Immigrants willing to accept lower wages and poor work conditions are also reducing opportunities available for the local low-skill populations. There were approximately 35,000 undocumented low-skilled migrants working in Maldives in 2015, a group of which is also very vulnerable to exploitation (Plewa, 2018). A study conducted among Bangladeshi workers living in Maldives also revealed that many of them lack knowledge about health and safety issues, and their sometimes illegal status may contribute to poor quality of life due to lack of access to societal services (Shamsi & Al-Din, 2016).

2.4 Physical Vulnerability

Male' has experienced rapid urbanization, increase in rural to urban transformation, and the numbers of domestic migrants towards urban centers are increasing as well. In 2014, the population of Male' Atoll, North Ari Atoll and South Ari Atoll were experiencing a significant influx of domestic migrants. This is due to the proximity of tourist resorts, which are located in the area, thus also attracting settlements of workers (National Bureau of Statistics, 2014). These urbanization processes have been found to contribute to pollution which threatens the environment, including groundwater resources and marine ecosystems, and may expose people to hazardous materials (ADB, 2018).

Beach erosion is a serious problem, with 97% of inhabited islands reporting erosion. Furthermore, uncontrolled disposal of solid waste, including medical waste, is a threat to coastal and marine ecosystems. Human settlements development, transportation and energy projects are undertaken without adequate environmental management and there are no set environmental standards for these sectors (Mangroves for the Future, 2017).

Isolated islands are also more vulnerable to damage to critical infrastructure. For example, a water generator unit broke down in 2014 as a result of fire, cutting off drinking water to over 150 000 people in Male' (GSMA, 2015). While the government acted quickly, the water stocks depleted rapidly, and State of Emergency was declared.

2.5 Future of Disaster Risk in the Maldives

The availability of fresh water will likely form a significant issue in the future, as the groundwater resources become compromised by droughts and rising sea level. It also creates a complication in terms of sustainability; the on-going desalination of freshwater by facilities across the atolls is in a direct conflict with the government's aim to reduce carbon emissions by 2020 as they require such high amounts of energy (Shakeela & Becken, 2015). Paradoxically, another significant hindrance to sustainable development is the development of resorts of which the country is also dependent on, as they consume one third of the country's energy production with their large-scale refrigeration and air-conditioning units (Nachmany, et al., 2015).

Perceptions on climate change are another issue for the government to tackle. It has been established that the perception of risk is not following a traditional pattern where "non-elites" would lack understanding and interest in responding to environmental threats – rather, they focus on the short-term future and everyday mitigation efforts without considering the urgency of the cause (Arnall & Kothari, 2015). Thus, the issue lies in the lack of dialogue between elites and non-elites, when policymakers do not necessarily recognize these perspectives and small-scale mitigation methods of local communities, and when global research perspective is applied to local context precariously (Arnall & Kothari, 2015).

Waste management is another serious issue to be rapidly solved in the future, as the local capacity is quickly exceeded across atolls and accumulation of unprocessed waste may pose a threat not only to human health but also to the tourism industry (Kapmeier & Gonçalves, 2018). Finally, the lack of sustainable development approaches in tourism sector and at urban areas are contributing to the climate risks, and currently, there are no policies or regulations which would address impacts of tourism which may elevate said risks (Shakeela, et al., 2015). While the economic growth remains largely tied to the growth of the tourism sector, identifying sustainable building practices and their impact to the environment to further the understanding of increased climate and disaster risks are elemental to safeguarding the country's future.

3. Disaster Risk Reduction and Climate Action Interventions

The country is facing the threat of total inundation, severe environmental degradation, and a plethora of climate change risks along with natural hazards. To illustrate the government's will and commitment to protect the population and the country from future disasters, the following chapters shed light on the country's process in DRR and CCA, under the global policy frameworks: Sendai Framework for Disaster Risk Reduction, Sustainable Development Goals, and the Paris Climate agreement.

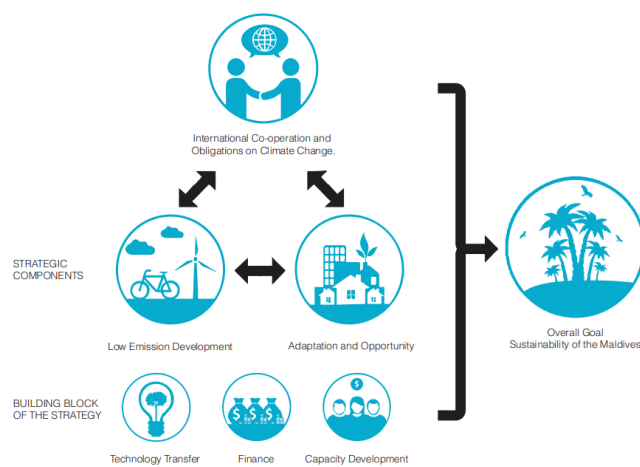


Figure 6. Strategic policy framework envisaged under the MCCPF (Ministry of Environment and Energy A, 2015) .

Priority 1. Understanding Disaster Risk Since the preparation of National Adaptation Programme of Action (NAPA) in 2006, existing climate data and hazard information for the Maldives was analyzed to produce the first Climate Risk Profile (2006). Other sources of information the risk assessments have utilized during the NAPA formulation are vulnerability assessments, which have been conducted in the country since 1987 (Ministry of Environment, Energy and Water, 2006). In terms of understanding the correlation between island development and vulnerability of the environment, environmental impact assessments (EIA) have been established as well. However, EIAs for building resorts are largely inadequate: they have no official guidelines or a basic standard; they are not published for the public or local communities; sustainability is not a requirement; and post-construction monitoring is not conducted (Zubair, et al., 2011; Cowburn, et al., 2018). Yet, there is a strong on-going incentive, mostly driven by private sector, to support and nurture sustainable development because reefs and the ecological systems are drivers of tourism (Cowburn, et al., 2018).

Despite the progress made in reducing disaster risk through understanding the present hazards and past events, disaster data management is still lacking. Few steps have been taken to solve the issue, such as the adoption of the National Post-Disaster Assessment Framework in 2015, which enabled the National Disaster Management

Centre's staff to collect, verify and record data in post-emergency phases, which enhances the understanding of disaster impacts in the country (UNICEF, 2015). DesInventar methodology is currently utilized as the main data management tool. However, no single institution is in charge of managing the data, it is not publicly available, it is not disaggregated adequately to identify vulnerabilities, and the agricultural losses are not collected either, among other issues (Government of the Maldives, 2015). Most of the current issues in disaster data management are related to the lack of technical capacity and human resources (Government of the Maldives, 2015), and coordinating data collection in a highly geographically fractured country is a persevering challenge (ADPC, 2018).

Priority 2. Strengthening Disaster Risk Governance to Manage Disaster Risk. The Disaster Management Act (2015) stipulates responsibility of the State to protect its people, their health and well-being, their property, urban areas and the environment from natural and man-made hazards. The Act articulated holistic approach for DRM which covers mitigation, disaster preparedness, strengthened national emergency response, as well as ensuring coordination in accordance with established national standards.

National Disaster Management Authority (NDMA) was established as promulgated by the Disaster Management Act (28/2015) on 30th of December 2018, and it assumes most of the preceding NDMC's operational functions such as drafting regulations, setting up local committees and aligning DRM plans at every level. NDMA is intended to carry out comprehensive DRM interventions to address vulnerability issues as an integral part of risk management (NDMC, 2019). NDMA, guided by the National Community-based Disaster Risk Reduction Framework (CBDRRF), is also mandated to uphold the legal and administrative system required for DRR activities by centralizing coordination between government ministries, private sector, NGOs, and citizens.

The work of NDMA is supported by numerous frameworks, policies and plans, most important of which is the CBDRRF (2014), due to the fact that some of the communities and distant atolls are completely self-reliant. The aim of the framework is to incorporate CBDRR into local development, DRR and climate planning by participatory risk assessments, understanding of localities and by capacity building where required, and seeks to institutionalize bottom-up approaches to meet the needs of the most vulnerable (Koshi & Magu, 2015). Another significant plan is the currently utilized Strategic National Action Plan (2010-2020) (SNAP), which outlines impacts of climate change (including considerations for lessened food and water availability) and identifies areas to further adaptation activities. Its major objectives are to create enabling environments, empower communities, increase the access to technology and knowledge, and implement risk-sensitive development processes (The Government of Maldives, 2010).

However, as the SNAP is nearing its end, the new National Disaster Management Plan (NDMP) is currently in draft process with the support of UNESCAP. It covers early warning systems, institutional arrangements for DRR, capacity development plan and risk sensitive budgeting, and it is aligned with Sendai priorities and the Sustainable Development Goals to further address challenges such as ad-hoc coordination of DRR and CCA activities, lack of financial resources and institutional capacity. Several other documents and processes are in development or have already been institutionalized, including the Relief Guideline, Framework for managing internally displaced persons (IDPs) and the National Emergency Operations Plan (NEOP) (NDMC, 2019). As of now, SFDRR implementation framework is being developed (ADPC, 2018), and a division for

SDG implementation has been established under the Ministry of Environment and Energy (MEE). National Ministerial Coordination Committee chaired by MEE is the final authority making related policy decisions.

At the local level, each atoll is administered by an Atoll Chief, appointed by the President. The Ministry of Atoll Administration and its Northern and Southern Regional Offices, Atolls Offices and Island Offices are collectively responsible for Atolls Administration. At the Island level, the Island Chief is the head of island administration, who is appointed by the Ministry of Atolls Administration. Supported by the Decentralization Act of 2019 and the CBDRRF of 2014, the chiefs at the sub-national levels conduct their own disaster management plans, establish DM committees, and are responsible of the local disaster funds. Furthermore, they carry out community awareness raising on risk reduction with the support of central government, the national policies and frameworks for enhancing community resilience.

IMPLEMENTATION	LEGISLATION/POLICY	SCOPE	PURPOSE
GOVERNMENT OF MALDIVES	Disaster Management Act (2015)	National, Atolls, Islands,	To protect people from natural and man-made hazards, to incorporate DRR into all levels of planning, to create awareness about disaster and climate risk, and to state the roles of operators at all levels.
NDMC, ISLAND & ATOLL COUNCILS	Community Based Disaster Risk Management Framework (2014)	Atolls, Islands, Communities	To guarantee the institutionalization of community-based DRR approaches, and to enhance local capacities at the islands through participation.
NATIONAL DISASTER MANAGEMENT CENTER	National Framework for Managing Internally Displaced Persons in the Maldives (2013)	National, Atolls	The framework for managing IDPs is to ensure that individuals receive support which is on par with the international principles and SPHERE standards on displacement nationwide.
NATIONAL DISASTER MANAGEMENT CENTER	Health Emergency Operations Plan (2018)	National, Atolls, Islands	An action plan to provide a multi-hazard strategic plan for health emergencies, assigning roles and responsibilities to relevant agencies and operators for a better response.
THE GOVERNMENT OF MALDIVES	Strategic National Action Plan for Disaster Risk Reduction and Climate Change Adaptation SNAP (2010-2020)	National, Atolls, Islands	To guarantee an integrated approach to DRR and CR where systematic efforts to manage disasters and climate risk have been synergized through streamlining DRR and CR into all development.

IMPLEMENTATION	LEGISLATION/POLICY	SCOPE	PURPOSE
THE GOVERNMENT OF MALDIVES	Maldives Decentralization Act (2010)	Atolls, Islands	Granted more powers and responsibilities to local governments to better carry out their local plans and take after their constituencies.
GOVERNMENT OF MALDIVES	Maldives Climate Change Policy Framework (MCCPF) (2014-2024)	National, Atolls, Islands	Guided by a set of principles, the MCCPF aims to guide activities by taking into account existing laws, development plans, strategies, policies and relevant documents in efforts to incorporate climate planning at all levels.

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

Priority 3. Investing in Disaster Risk Reduction for Resilience. When it comes to investing in disaster risk reduction, considerations for budgeting and thoughtful allocations of resources have taken place in the past. For example, the SNAP of 2010-2020 not only manifests political commitment to optimize DRR and CCA countermeasures, but also seeks to mainstream these into the planning and budgeting process. Now, as the country's DRM is gearing towards proactive risk reduction approach, specific focus is given to mainstreaming community-based DRR into development planning by incorporating disaster mitigation within the sustainable development projects, communities, international institutions, and disaster management policies.

In this context, it is also necessary to note the significant investments made in the national development. The government has invested in an artificial island near Male, named Hulhumalé – the Maldives' biggest and most ambitious urban development project to date. Led by the Housing Development Corporation (HDC), the project is expected to finish in 2023 and will be able to accommodate about 130,000 people. Eight similar islands have already been built to safeguard people and communities from the future effects of climate change and to eliminate the possibility of forced dislocation by fortifying existing environment with geoen지니어ing (Dauenhauer, 2017).

The government has also heavily invested in capacity building, disaster education, and regional assessments. For example, National Bureau of Statistics received capacity strengthening to better analyze and manage social-sector data to support evidence-based policy making (UNICEF, 2015). In 2017, the agency received support to conduct Multidimensional Poverty Analysis which lead to the formation of the Multidimensional Poverty Index for children (UNICEF, 2017). Also, Situation Analysis for Children and Women was conducted in 2015 to support the formulation of the new Country Programme Document for 2016-2020, National Nutrition Conference was conducted to form a sectoral plan to address nutrition issues in children under five, and a Child Abuse Prevention Campaign has been rolled out nationwide (UNICEF, 2015). WASH, protection of children from violence, increased support for education, and child nutrition have received extensive support and funds from the UNICEF and the government of Maldives in their efforts to reduce vulnerabilities nationally (UNICEF, 2017).

Non-governmental organizations such as UNICEF and Maldivian Red Crescent have a major role in supporting the national DRR funding because there is no state budget for preparedness, awareness and vulnerability reduction activities. However, even the partnerships do not often allow investments in infrastructure and equipment – they require a separate fund allocated by the Ministry of Finance and Treasury (ADRC, 2015).

In 2016, the priority areas for investing included the education sector, sustainable water security and management, and risk transfers in the form of insuring all fishing vessels (ADPC, 2016). Furthermore, the private sector had given considerations for DRR fund allocations, and the largest insurance company of the country had begun working with National Disaster Management Center to establish disaster sensitive insurance schemes for households across the country (ADPC, 2016). This Disaster Relief Loan Scheme was established to relieve financial constraints in relief operations and is intended for the reconstruction of disaster affected homes. The scheme ensures the lowest interest rate for a housing loan with a repayment period of 15 years (ADPC, 2016). Flood response mechanism has also been implemented at the island-level and flood response equipment and training have been provided to 31 islands. However, prioritizing budgeting for mitigation is complicated. The island population sizes vary between 5000 to less than 500 – yet, the costs of structural mitigation at each island remain more or less the same, (Shadiya, 2018). Maldives has also implemented a universal healthcare scheme Aasandha, and the overall spending to social welfare accounted for more than a quarter of the governments' total expenditure in 2014 (Nizar & Rasheed, 2015). Aasandha has been a working system, as it was identified in 2013 that the poorest demographics were the most frequent users of the service (Nagpal & Redaelli, 2013). Furthermore, pension spending accounted for 8% of total government's expenditure, and 22% was allocated for food subsidies in 2014 (Nizar & Rasheed, 2015).

Priority 4. Enhancing disaster preparedness for effective response to “Build Back Better” in recovery, rehabilitation and reconstruction. Maldives has taken steps to establish comprehensive, multi-hazard warning systems. For example, the seismological and meteorological early warning system has been operated by the Maldives Meteorological Service (MMS) since 2010, and today, there are 5 offices monitoring meteorological events throughout the country (Shadiya, 2018). Furthermore, 20 automated stations and 3 tide gauges are providing real time data to operators at the national level. Coded message priorities are established for tsunamis, earthquakes, and wind (predicting wave swells and tidal waves). The Maldives Meteorological Service also runs their own NWP (Numerical Weather Prediction) model to generate short range forecast (GFCS, 2016).

However, lack of human capacity in the field of meteorology, lack of mechanism for public dissemination of information and inadequate hardware remain as significant challenges which need to be addressed to enhance the systems' effectiveness (Shadiya, 2018). In 2014, the CAP on a Map Project was initiated to further enhance the institutional responsiveness to emergencies and early warning through Multi-agency Situational Awareness, which involves deploying the Common Alerting Protocol (CAP) content standard and associated alerting/warning procedures in support of establishing a Multi-Agency Situational Awareness (MASA) platform supported by Sahana Alerting and Messaging Broker or SAMBRO (Waidyanatha, 2015). SAMBRO has been established to narrow the distances between atolls to optimize emergency response; it allows the consolidation and exchange of emergency information through SMS based system shared by all Maldivian entities from private sector to the government (Waidyanatha, 2016).

For disaster response, work is underway to establish a modern and well-equipped Emergency Operations Center. NDMA is currently working to establish the capacity and needed resources in each island community in Maldives for efficient and effective response in emergencies. The CERTs are also equipped with necessary knowledge and skills to take preparedness action and mitigation to reduce any further loss or damage, carry out initial field assessment to assess the situation, and coordinate further relief efforts (NDMC, 2018). Response activities are supported by policies such as the multi-hazard health emergencies plan of 2018 and the Guide for School Emergency Operations (2009) which assign roles and responsibilities to relevant partners and agencies to guarantee a better response. However, effective emergency response is restricted given the country's limited man power, geographical isolation, and limited availability of water.

FUNCTIONS	AT NATIONAL LEVEL	AT ATOLLS/CITIES	ISLAND/LOCAL LEVEL
DECISION MAKING/ STRATEGIC	Disaster Management Council Disaster Management Steering Committee	Atoll/City Disaster Management Committee	Island Disaster Management Committee
EMERGENCY MANAGEMENT/ TACTICAL	National Emergency Operators Centre	Atoll/City Disaster Management Unit	Island Disaster Management Unit
FIELD LEVEL FIRST RESPONDERS/ FIELD OPERATORS	National Emergency Response Force		Local Emergency Response Force. Community Emergency Response Team

Table 2. Emergency response operators

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

Coherence between DRR and CCA have been well addressed since the formulation of the Strategic National Action Plan (SNAP) on Disaster Risk Reduction and Climate Change Adaptation, initiated with the UNDRR's assistance. It is considered the world's first climate and disaster action plan that integrates DRR and CCA (ReliefWeb, 2011). The SNAP articulates coherent efforts on DRR interventions to deal with the full range of natural and human-induced hazards, as well as Climate Change Adaptation to address longer term impacts, including changes in ecosystem services and spread of climate-sensitive diseases such as dengue, which are peripheral domain for DRR interventions. It reiterates on creating mutual benefits that offset both climate and disaster-related risks to approach development in a more holistic manner (The Government of Maldives, 2010).

Such synergies are found in other planning documents. Even before the Tsunami 2004, the Ministry of Planning and National Development had developed a plan to construct so-called safe islands in each of the 20 atolls under the “Safe Islands Program” or the “Focus Island Program”. The program identifies larger islands with adequate natural protection and enhanced coastal defences and develops infrastructure for resettlement of communities living on smaller, less inhabited and vulnerable islands (UNISDR, 2013).

Maldives has also been at the very frontier with their efforts to combat climate change; they submitted their new Intended Nationally Determined Contribution to the UN Framework Convention on Climate Change (UNFCCC) months before the climate conference in December 2015 (United Nations, 2015). Small island states, being the first victims of climate change, have been stated to be the driving force for change in international climate change conferences; Kiribati, Vanuatu and Marshall Islands among others launched a campaign to push other nations to expand their commitments by 2020 to unify the global agreements to reduce emissions (Worland & Poland, 2018). Maldives has expressed their refusal to become the first victims of climate crisis and are prepared to do whatever they can to ensure the country’s future (Chestney, 2018).

Their interest in streamlining harmonized climate and disaster risks into national policies are driven by the efforts to survive – a strong incentive for taking tangible action with the support from Maldives UNDP. Additionally, the SDG coordination unit (established in 2016), will be taking on the task to guide the development path towards achieving these global visions locally. Many of the SDG s are directly aligned with the best interest of Maldives, which is a country where all energy needs are met with imported fossil fuels (Ministry of Environment and Energy, 2017). Mounting waste is a continuous threat, where health services are inadequately distributed and over 80% of goods have to be imported (Meesters, 2018).

Another example of building coherence is the Climate Change Policy Framework of 2015, which strives to integrate climate considerations into all sectors and development by building on existing legislation, plans and policies. It is guided by core principles such as climate leadership, equitability, mainstreaming climate change, international commitments, partnerships, climate resilience and transfers of technology (Abdulla, et al., 2015).

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 and Climate Change Adaptation (SNAP) 2010-2020 The Climate Change Policy Framework (MCCPF) (2015)	Local Government Authority Development Plan (2017-2021) Strategic Action Plan (2013-2018)	Strategic National Action Plan for Disaster Risk Reduction and Climate Change Adaptation (SNAP) 2010-2020 The Climate Change Policy Framework (MCCPF) (2015)
Environmental Protection	Environmental Impact Assessment Regulation (2012)	Plan to introduce a framework for reducing plastic Pollution National Biodiversity Strategy and Action Plan (2016-2025) National Waste Management Policy 2015	Environmental Protection and Preservation Act 1993/2014
Disaster and Climate Risk Reduction	Disaster Management Act (2015) National Programme of Community Participatory Disaster Risk Reduction (2017)	The Climate Change Policy Framework (MCCPF) (2015) Tourism Adaptation Project (TAP) Maldives National Strategy for Sustainable Development	Environmental Protection and Preservation Act 1993/2014
Vulnerability Reduction	National Framework for Managing Internally Displaced Persons in the Maldives (2013) Community-based Disaster Risk Management Framework (2014)	National Food Safety Policy (2017-2026) "No Child Left Behind" education policy, with guaranteed 14 years of free education for every child. Health Master Plan (2016-2025) Gender Equality Act	National Adaptation Plan of Action (NAPA) 2006 Strategic National Action Plan for Disaster Risk Reduction and Climate Change Adaptation (SNAP) 2010-2020
Urban Development	Regulation on the Protection and Conservation of Environment in the Tourism Industry (2006) The Climate Change Policy Framework (MCCPF) (2015)	On-going initiative to improve water supply and sewerage on remote islands by Ministry of Environment and Energy (to which 48% of the population had access to as of 2016). Integrated Water Resource Management Approach to guarantee provision of safe drinking water	Maldives Energy Policy and Strategy 2016 Environmental Protection and Preservation Act 1993/2014

Table 3. Synergies between the national policies, plans and frameworks by sector

5. Issues in Implementation of the DRR and Climate Policy

Few of the mentioned issues of implementing DRR and climate policies include high turnover of staff, limited local capacity to conduct risk assessments and to collect data, limited administrative budget at sub-national levels and the distance of some remote atolls from central government operations (Koshi & Magu, 2015). Furthermore, despite the fact that the National Action Plan for Disaster Risk Reduction and Climate Change Adaptation of 2010-2020 included detailed descriptions of intended targets and objectives, the necessary details for financing said initiatives was not considered (Nachmany, et al., 2015). National budget has already been stretched to limits. There are also some obstacles to achieving the SDGs by 2030. For example, most of the staple goods and food items are imported, and thus the country is vulnerable to external economic shocks (Republic of Maldives, 2017). The most common locally sourced protein is tuna, which in turn is threatened by environmental degradation. Such conundrums need rapid solving to safeguard the population from impacts of climate change and disasters. Similar paradoxes are formed by the reliance on tourism, which mainly runs on imported fossil fuels due to lack of space for sustainable energy production. Also, peripherality of the remote islands is hindering equal distribution of the government's services due the high cost of sustaining infrastructure for smaller localities.

6. Stakeholder Analysis

Stakeholders provide critical support to the DRR and CCA activities in Maldives, especially in the remote atolls which are receiving less support from the local government due to lack of capacity, funds and easy access. For example, The private sector had an instrumental role in supporting emergency response during the 2014 water crisis in which private operators provided support to the Maldives National Defense Force (MNDF) to distribute water supplies by mobilizing necessary human resources (GSMA, 2015).

Private sector has a crucial role to play on DRR and fight against climate impacts. Given that tourism is the main business sector driven by private investment, the private sector has identified the importance of investing in DRR in collaboration with the NDMC to formulate business continuity plans and disaster management plans for tourist establishments and resorts (ADPC, 2016). The Disaster Relief Loan Scheme is another illustration of the private sector's importance in enhancing resilience.

In terms of civil society engagement in DRR, the country has very few local NGOs. However, there is a wide range of community-based associations. At the island level, different sections of the communities are mobilized to form Community Based Organizations (CBOs), including Island Women's Committee, Island Development Committee, Island Youth Movement and the Fishermen Association, among others. About 1,200 CBOs registered in the country have focused on areas from social and economic development to income generation, education, empowerment of vulnerable populations, environmental protection, as well as disaster and emergency response (UNDP, 2011).

Working with local authorities, the CBOs are instrumental in providing community services and in carrying out voluntary development work on remote islands. However, it is necessary to build awareness among the groups about island-specific issues with greater considerations to DRR (UNISDR, 2013) and climate adaptation. Including the CBOs in local decision making could also be beneficial in the less developed atolls, which are already struggling with lack of resources and human capacity.

International NGOs such as the Red Crescent Society have been in an elemental role with their support to the government as well. Recently, vulnerability capacity assessment practitioners were trained to better facilitate the development of DRR plans in the context of their islands – two pilot atolls have already completed risk profiling, hazard mapping, and developed their own disaster and climate resilience plans (UNICEF, 2015). Also, UNESCO, Ministry of Education (MoE) and National Institute of Education (NIE) trained teachers in Addu and Fuah Mulaku Islands to enhance the promotion of disasters, environmental conservation and resilience to students (UNICEF, 2015). These approaches have been planned to be mainstreamed across the nation. Additionally, the first ever tsunami evacuation drills and tsunami education took place relatively recently in the Gaafu Alif Atoll, where 550 children were trained in emergency evacuation plans and warning signs (UNDP, 2017). Despite being localized and small-scale initiatives, these actions indicate increased efforts and political commitment to enhance climate resilience and disaster risk reduction work with the support of international operators.

7. Future Challenges and Priority Issues

7.1 Challenges

Maldives has progressed rapidly in terms of DRR and CCA, and has strived to advance the efforts by establishing a robust disaster risk management system across different administrative levels. However, as the country strives to increase economic competitiveness, and seeks to create employment opportunities for the growing working population, risk related to disasters, climate change and environmental stress may be multiplied, with existing risk being transferred from outer islands to the Greater Male' area. Close monitoring of the impacts of construction to the environment is considered crucial. Expansion of infrastructure and increased density of built environment could result in increased vulnerability to floods as well, while waste and its disposal is likely to exacerbate water pollution and health problems during flood affected period due to the lack of effective waste management. Reducing the trade-off between human-induced development and disaster risk is among the key issues to be addressed.

Another issue relates to the reliance on imported fossil fuels in the electricity sector, and the growing needs of the resorts and increasing populations. While the islands lack space of sustainable energy production, action is rapidly needed to guarantee the graduation from 2030 SDG goals and to achieve carbon neutrality. Furthermore, sustainability of marine ecosystems and the water resources has to be assured as well, possibly by increasing the size of the protected areas. However, commercial fishers and families depending on local fishing have been suspected to suffer extensively from the extension of protected areas (Rasheed, et al., 2016), which creates a challenge for the government.

Lack of financial and human resources in the remote atolls is yet another issue. While the government has tried to consolidate the populations to urban centers to avoid disseminating budget allocations across close to 200 islands, some of the islanders oppose forced relocations and choose to remain at their home atolls. The issues of stretched finance are worsened in the aftermath of disasters, as the economy is reliant on fishing and tourism which are affected by large-scale events.

7.2 Priority Issues

With limited man power for emergency response, inner-atoll and inner-island emergency response capacity building should be one of key priorities for disaster preparedness in Maldives to reduce total dependence of the Atolls and Islands upon the central government. Community Emergency Response Team (CERT) should be an essential part of the country emergency response system, with ability to mobilize trained CBOs and volunteers for response operations, as well as early warnings that supports islands/atoll and city authorities. Multi-level coordination mechanism is yet to be established, in consideration of the various scales of disasters and operational challenges at different levels. Such initiatives should be a part of a wider localization of DRR and CCA, which is required in a setting characterized by remoteness and isolated communities. Empowering local leaders and communities to take action not only in the phases of response, but also in disaster and climate risk reduction, adaptation and preparedness is important to safeguarding the population (and especially the most marginalized) from the impacts of adverse events.

This process of strengthening the local level resilience with Community-Based Disaster Risk Management (CBDRM) programs is on-going (ADPC, 2019). However, the CBDRM process need to be optimized beyond response to elicit interlinkages between DRR, CCA and development from the communities' perspectives, which will be essential to inform development priorities with integrated DRR and CCA. This is highly important to move away from the perspectives of experts and authorities towards addressing contextualized problems and needs at local levels. The Climate Change Policy Framework of 2015 included participatory approaches by involving community members and the most vulnerable sectors and groups in the process of risk assessments, decision making and implementation – however, its effectiveness is yet to be measured.

Regular drills and simulation exercises would also be beneficial to test functions of all concerned actors. Also, the Early Warning SMS system of the MET requires updating. Currently, the messaging system has the capacity to cater to only to approximately 100 focal persons, and similar parallel systems (such as the SMS alert to tourist resorts by Ministry of Tourism) may cause misunderstandings between operators (Waidyanatha, 2016). To support the progress of enhancing EWS, data collection and analysis covering hydrometeorological hazards should be reinforced and encouraged in the future. However, lack of human capacity, lack of mechanisms for public dissemination of information and inadequate hardware remain as significant challenges which need to be addressed to enhance the systems' effectiveness (Shadiya, 2018).

With regards to risk reduction, priority areas include establishing inter-agency and cross-sectoral coordination, particularly for data sharing and collection. However, this is difficult especially at the lower levels of government and in the localities due to lack of technical capacity, budget and other resources. Comprehensive disaster information management

systems covering even the frequent, small-scale disasters is yet to be established, and the limited availability of data, including sectoral impacts and SADD, is constricting thorough vulnerability and risk assessments. Building capacities and technical requirements to support data collection, monitoring and analysis (as mandated by the SFDRR) should be among the highest priorities of the government to further understand and identify future priority needs for DRR and CCA.

Specific understanding of disasters and climate change with regard to vulnerable sectors should also be focused on during this progress. As the country's economy is predominantly dependent upon tourism and fisheries, vulnerability reduction in these two sectors must be the focus of any efforts aimed at sustainable economic and social development, guided by comprehensive understanding of disaster and climate risks. Similarly, as the urban regions are steadily growing and while the government is focusing on consolidating the population to few major islands, emphasizing urban resilient infrastructure development and management in Greater Male' region must be another focused area of DRR and CCA. In this context, investing in waste management should also be among the list of priorities to reduce exposure of humans, groundwater and the environment to pollutants.

Also, given the high prevalence of environmental degradation, pollution and other risks associated with urban growth and expanding industry, sustainable and resilient approach (especially in the sector of tourism and urban development) must be enforced through environmental impact assessments and other considerations to the negative impacts which may destabilize the fragile systems prone to suffer from anthropogenic stressors. Supporting the EIAs jointly with the private sector must be enforced and encouraged further in the future, followed by basic standards and guidelines which must be established in consideration of the SDGs and other international commitments.

Finally, poverty reduction should be the epicenter of vulnerability reduction activities in the Maldives. While risk transfers such as insurances and subsidies have been established, they should be reinforced and thoroughly studied to identify gaps and needs in the social protection schemes. Given that the future needs for risk financing are increasing (also in terms of investments to resilient development), considerations should be directed towards understanding how climate change and disasters will affect livelihoods of those dependent on the environment. This should be done in recognition of the fact that increasing amount of resources is required to mitigate the impacts from loss of livelihoods, and to guarantee that provision of safe water, for example, will not be impaired by budget deficits. Given that 80% of the country's goods have to be imported, managing the availability of food, water and services even in the most remote islands must be carefully managed to safeguard the population from disaster and climate change impacts.

8. References

1. Abdulla, A. et al., 2015. Maldives Climate Change Policy Framework. Maldives: The Republic of Maldives.
2. ADB, 2005. Tsunami Impact Summary: Maldives, Manila: Asian Development Bank.
3. ADB, 2015. An Enduring Partnership The Maldives and the Asian Development Bank, Manila: Asian Development Bank .
4. ADB, 2018. Proposed Grant and Technical Assistance Grant and Administration of Grant Republic of Maldives: Greater Malé Environmental Improvement and Waste Management Project, Manila: Asian Development Bank.
5. ADPC, 2016. 13th Regional Consultative Committee (RCC) on Disaster Management Meeting Report: Operationalizing Global Frameworks for Risk-Resilient Development in Asia, Islamabad: ADPC.
6. ADPC, 2018. Policies and Practices for Coherence between Global Frameworks: 14th Regional Consultative Committee on Disaster Management Meeting Report, Kathmandu: Asian Disaster Preparedness Center.
7. ADPC, 2019. Meeting Report: 14th RCC Policies and Practices for Coherence between Global Frameworks. s.l., s.n.
8. ADRC, 2015. Country Report: Republic of Maldives, s.l.: s.n.
9. Arnall, A. & Kothari, U., 2015. Challenging climate change and migration discourse: Different understandings of timescale and temporality in the Maldives. *Global Environmental Change*, Volume 31, pp. 199-206.
10. Bangert, M. et al., 2018. Economic analysis of dengue prevention and case management in the Maldives. *PLoS Neglected Tropical Diseases*, 19(9).
11. Brown, S., Nicholls, R. J. & Haigh, I., 2017. Coastal flooding in the Maldives: an assessment of historic events and their implications. *Natural Hazards*, 89(1), pp. 131-159.
12. Brusset, E. et al., 2009. A ripple in development? Long term perspectives on the response to the Indian Ocean tsunami 2004, Stockholm: Sida.
13. Carlsen, J. & Hughes, M., 2008. Tourism Market Recovery in the Maldives After the 2004 Indian Ocean Tsunami. *Journal of Travel & Tourism Marketing*, 23(2), pp. 139-149.
14. Chestney, N., 2018. Maldives tells U.N. climate talks: 'We are not prepared to die'. Reuters, 13 December.
15. Cowburn, B., Moritz, C., Birrell, C. & Grimsditch, G. A. A., 2018. Can luxury and environmental sustainability co-exist? Assessing the environmental impact of resort tourism on coral reefs in the Maldives. *Ocean and Coastal Management*, Volume 158, pp. 120-127.
16. Dauenhauer, N. J., 2017. On front line of climate change as Maldives fights rising seas. *New Scientist*, 2020 March.
17. El-Horr, J. & Pande, R. P., 2016. Understanding Gender in Maldives, Washington DC: The World Bank .
18. FAO, 2012. Food and Agriculture Organization: Maldives Country Programming Framework 2013-2017, s.l.: Food and Agriculture Organization .
19. GFCS, 2016. 9th South Asian Seasonal Climate Outlook Forum (SASCOF 9) & 2nd Climate Services Users Forum for Agriculture (CSUF Ag2). Nay Pyi Taw, WMO.
20. Government of the Maldives, 2015. Maldives Sendai Framework Data Readiness Review - Report, Male: The Republic of the Maldives.
21. GSMA, 2015. Disaster Response: Preparing for the Unexpeted: Ooredoo Responds to the Water Crisis in Maldives, Male: GSMA.
22. INFORM, 2019. INFORM country Risk Profiles Maldives. [Online] Available at: <http://www.inform-index.org/Countries/Country-profiles/iso3/MDV> [Accessed 15 April 2019].
23. Kapmeier, F. & Gonçalves, P., 2018. Wasted paradise? Policies for Small Island States to manage tourism driven growth while controlling waste generation: the case of the Maldives. *System Dynamics Review*, 34(1-).
24. Koshi, R. H. & Magu, A., 2015. National Community Based Disaster Risk Reduction Framework

- Maldives. Male: The Republic of Maldives.
25. Kulkarni, R., 2018. Innovative finance for the Maldives' sustainable development. UNDP Content, 27 September.
 26. Lama, P. D., 2018. Gendered consequences of mobility for adaptation in small island developing states: case studies from Maafushi and Kudafari in the Maldives. *Island Studies Journal*, 13(2), pp. 111-128.
 27. Lubna, H., 2012. Nearly 60 islands hit with water crisis. *Maldives Independent*, 12 April.
 28. Maldivian Red Crescent, 2018. Country Profile: Republic of Maldives. [Online] Available at: <https://redcrescent.org.mv/maldivian-red-crescent-2/country-profile-republic-of-maldives/> [Accessed 5 April 2019].
 29. Mangroves for the Future, 2017. Maldives. [Online] Available at: <https://www.mangrovesforthefuture.org/countries/members/maldives/> [Accessed 11 April 2019].
 30. May, J. F., 2016. *Maldives' Population Dynamics: Policy Prospects for Human Growth and Opportunity*, Washington DC: UNFPA.
 31. May, J. F. & Riyaza, F., 2017. *Maldives' Population Dynamics*. PRB, 13 July.
 32. McNamara, K. E. & Clissold, R., 2019. Vulnerable groups and preliminary insights into intersecting categories of identity in Laamu Atoll, Maldives. *Singapore Journal of Tropical Geography*, 0(0).
 33. McNamara, K. E. et al., 2018. What is shaping vulnerability to climate change? The case of Laamu Atoll, Maldives. *Island Studies Journal*, Issue Ahead of Print.
 34. Meesters, H., 2018. Plastic in Paradise: why the SDGs matter in the Maldives now more than ever. *Medium*, 20 September.
 35. Ministry of Environment and Energy, 2015. *Maldives Climate Change Policy Framework*, Male: The Republic of Maldives.
 36. Ministry of Environment and Energy, 2015. *Maldives Intended Nationally Determined Contribution (INDC)*, Male: Government of Maldives.
 37. Ministry of Environment and Energy, 2017. *Island Electricity Data Book 2017*, Male: The Republic of Maldives.
 38. Ministry of Environment, Energy and Water, 2006. *National Adaptation Programme of Action (NAPA)*: Republic of Maldives, Male: The Republic of Maldives.
 39. Ministry of Planning and National Development, 2005. *National Recovery and Reconstruction Plan Programmes and Projects*: Republic of Maldives, Male: Republic of Maldives.
 40. Nachmany, M. et al., 2015. *CLIMATE CHANGE LEGISLATION IN MALDIVES AN EXCERPT FROM The 2015 Global Climate Legislation Study A Review of Climate Change Legislation in 99 Countries*, London: Grantham Research Institute on Climate Change and the Environment.
 41. Nagpal, S. & Redaelli, S., 2013. *Maldives Health Policy Note -2*, Male: The World Bank.
 42. National Bureau of Statistics, 2018. *Statistical Pocketbook of Maldives 2018*, Male: Republic of Maldives.
 43. National Bureau of Statistics, 2014. *Maldives Population and Housing Census*, Male: Government of Maldives.
 44. National Bureau of Statistics, 2016. *Statistical Release IV: Poverty and Inequality*, Male: The Republic of Maldives.
 45. National Bureau of Statistics, 2019. *Publications*. [Online] Available at: <http://statisticsmaldives.gov.mv/> [Accessed 14 April 2019].
 46. Naylor, A. K., 2015. Island morphology, reef resources, and development paths in the Maldives. *Progress in Physical Geography: Earth and Environment*, 39(6), pp. 728-749.
 47. NDMA, 2016. *Disaster Management Act*. Male: The Republic of Maldives.
 48. NDMC, 2018. *Case Study: the Community Based Disaster Risk Management Programme in Maldives*. Male: NDMC.
 49. NDMC, 2019. *National Disaster Management Agency (NDMA): About*. [Online] Available at: <http://ndmc.gov.mv/about/> [Accessed 13 April 2019].
 50. Nguyen, D., Imamura, F. & Iuchi, K., 2016. *Disaster Management in Coastal Tourism*

- Destinations: The Case for Transactive Planning and Social Learning. *International Review for Spatial Planning and Sustainable Development*, 4(2), pp. 3-17.
51. Nizar, A. Z. & Rasheed, S., 2015. 3. History and Structure of the Main Social Protection Programs and Subsidies in the Maldives. *MMA Research Papers*, 2(1), pp. 18-57.
52. Peterson, C., 2015. ASSESSMENT OF SOLID WASTE MANAGEMENT PRACTICES AND ITS VULNERABILITY TO CLIMATE RISKS IN MALDIVES TOURISM SECTOR, Male: Ministry of Tourism.
53. Plewa, P., 2018. Migration in Maldives: A Country Profile 2018, Male: International Organisation for Migration.
54. Rasheed, R. A., Abdulla, A. & Zakariyya, N., 2016. Vulnerability of different types of fishers to potential implementation of a management plan in a Marine Protected Area (MPA) in the Maldives. *Marine Policy*, Volume 74, pp. 195-204.
55. Rashfa, M., 2015. The Sluggish Growth in Bank Credit to the Private Sector. *MMA Research Papers* 2016, April, 2(1), pp. 70-86.
- ReliefWeb, 2011. Maldives Government Endorses World's First Strategic National Action Plan Integrating Disaster Risk Reduction, Climate Change Adaptation. [Online] Available at: <https://reliefweb.int/report/maldives/maldives-government-endorses-world%E2%80%99s-first-strategic-national-action-plan> [Accessed 14 April 2019].
56. Republic of Maldives, 2017. Voluntary National Review for the High Level Political Forum on Sustainable Development 2017, Male: Republic of Maldives.
57. Republic of the Maldives, 2005. Tsunami: Impact and Recovery: JOINT NEEDS ASSESSMENT WORLD BANK-ASIAN DEVELOPMENT BANK-UN SYSTEM, Male: World Bank.
58. Shadiya, F., 2018. The Current Context of Multi-hazard Early Warning Systems (MHEWS) for Coastal Resilience at the National Level in Maldives, Male: Cabaret.
58. Shakeela, A. & Becken, S., 2015. Understanding tourism leaders' perceptions of risks from climate change: an assessment of policy-making processes in the Maldives using the social amplification of risk framework (SARF). *Journal of Sustainable Tourism*, 23(1), pp. 65-84.
59. Shakeela, A., Becken, S. & Johnston, N., 2015. Gaps and Disincentives that Exist in the Policies, Laws and Regulations which Act as Barriers to Investing in Climate-Change Adaptation in the Tourism Sector of The Maldives, Male: Ministry of Tourism.
60. Shamsi, T. & Al-Din, Z. H. M., 2016. Lifestyle of Bangladeshi Workers in Maldives. *World Journal of Social Sciences*, 6(2), pp. 144-154.
61. Stevens, G. M. W. & Froman, N., 2019. Chapter 10 - The Maldives Archipelago. In: C. Sheppard, ed. *World Seas: an Environmental Evaluation*. London: Elsevier, pp. 211-236.
62. The Republic of Maldives, 2010. Strategic National Action Plan for Disaster Risk Reduction and Climate Change Adaptation 2010- 2020. Male: The Republic of Maldives.
63. The Republic of Maldives, 2010. Strategic National Action Plan for Disaster Risk Reduction and Climate Change Adaptation 2010-2020. Male: The Republic of Maldives.
64. The World Bank, 2015. Identifying Opportunities and Constraints to Ending Poverty and Promoting Shared Prosperity: A Systematic Country Diagnostic Maldives, Male: The World Bank Group.
65. The World Bank, 2015. The World Bank Data: Maldives. [Online] Available at: <https://data.worldbank.org/indicator/SM.POP.TOTL?locations=MV> [Accessed 14 April 2019].
66. The World Bank, 2017. The World Bank In Maldives. [Online] Available at: <https://www.worldbank.org/en/country/maldives/overview> [Accessed 5 April 2019].
67. UNDP, 2006. Developing a Disaster Risk Profile for Maldives, Male: UNDP.
68. UNDP, 2006. Developing a Disaster Risk Profile for Maldives, Male: United Nations Development Programme.
69. UNDP, 2007. Detailed Island Risk Assessment in Maldives (Final report), Male: UNDP Maldives.
70. UNDP, 2011. Comprehensive Study of the Maldivian Civil Society, Male: The United Nations Development Programme in the Maldives and the Government of Maldives.
71. UNDP, 2017. Around 550 Maldivian School Children Take Part in a Week-Long Tsunami

- Education Programme and Drill, Male: UNDP.
72. UNDP Maldives, n.d.. Maldives Localizing SDGs for a Dispersed Population. s.l.:s.n.
73. UNICEF, 2015. Annual Report Maldives 2015, Male: UNICEF.
74. UNICEF, 2017. UNICEF Annual Report Maldives 2017, Male: UNICEF.
75. UNISDR, 2013. Building Resilience to Tsunamis in the Indian Ocean: Baseline Study Report, Shaviyani Atoll, Maldives, Male: UNISDR.
76. United Nations, 2015. C News. [Online]
Available at: <https://unfccc.int/news/maldives-submit-their-climate-action-plan-ahead-of-2015-paris-agreement>
[Accessed 14 April 2019].
77. Wadney, M., Brown, S., Nicholls, R. J. & Haigh, I., 2017. Coastal flooding in the Maldives: an assessment of historic events and their implications. *Natural Hazards*, 89(1), pp. 131-159.
78. Waidyanatha, N., 2015. Workshop Report: Maldives Kickoff Workshop and Meetings: 'CAP on a Map' for improving Institutional Responsiveness, Male: Sahana Foundation.
79. Waidyanatha, N., 2016. SAMBRO Narrowing the Response Distance in the Maldives, Male: Sahana Foundation.
80. Worland, J. & Poland, K., 2018. These Tiny Island Nations Are Leading the Fight Against Climate Change. *Time Magazine*, 18 December.
81. World Food Programme, 2005. Rapid Assessment Report of the Impact of the Tsunami in the Maldives, Rome: World Food Programme.
82. Zubair, S., Bowen, D. & Elwin, J., 2011. Not quite paradise: Inadequacies of environmental impact assessment in the Maldives. *Tourism Management*, Volume 32, pp. 225-234.

