Disaster Risk Reduction in Pakistan

Status Report 2019

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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 Pakistan 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 Pakistan.

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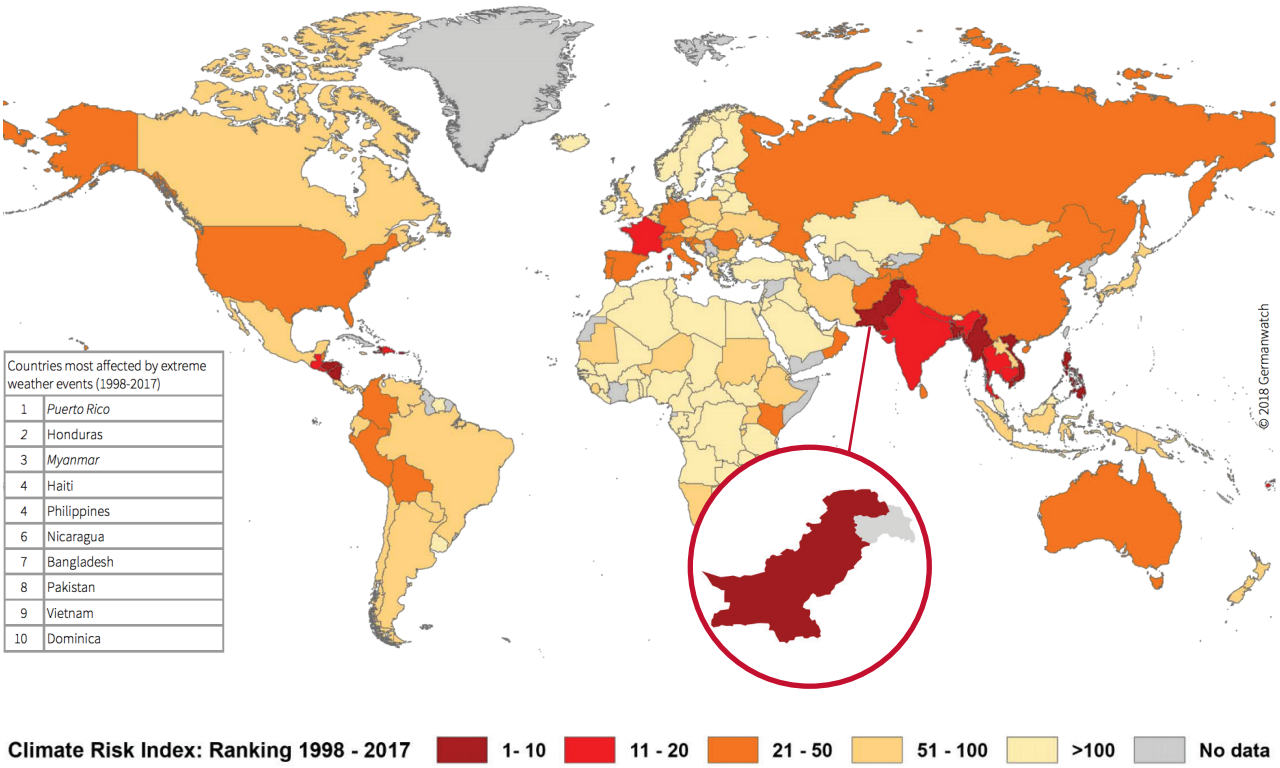
The findings, interpretations, and conclusions expressed in this document do not necessarily reflect the views of UNDRR or of the United Nations Secretariat, partners, and governments, and are based on the inputs received during consultative meetings, individual interviews, and the literature reviews 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 Pakistan: Status Report 2019. Bangkok, Thailand, United Nations Office for Disaster Risk Reduction (UNDRR), Regional Office for Asia and the Pacific



(GermanWatch,2019)

POPULATION 2017	
Total Population	207,774,520
Urban Population	75,584,989 (36.3%)
Population Density Per Km^2	166.3
ECONOMIC INDICATORS	
Gross Domestic Product in Current $US	305 billion
GDP Per Capita ($US)	1547
GDP Growth (Annual %)	5.28%
HUMAN DEVELOPMENT	
Human Development Index	0.562
HDI Rank	150
Income Level Category	Lower-Middle income

Climate Risk Index

Rank 8 / Very High Risk*

INFORM Risk Index

Rank 19 / High 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 the impact) (INFORM, 2019)

1. Introduction

Pakistan is located in South Asia, sharing borders with India, Iran, Afghanistan, and China. The total land area covers 770,875 km^2, which is divided into three major geographicregions: the Balochistan Plateau, Indus River plains, as well as the northern mountain ranges (the Himalayas, Karakorum, and the Hindukush). The climate varies largely depending on the topography, but most of the country is covered by dry deserts – 60 percent of the total land area is classified as arid, receiving less than 200 mm of rainfall annually (ADRC, 2016). Despite the arid to semi-arid conditions, Pakistan encompasses a wide range of ecosystems, which are categorized into 12 vegetative zones from snowfields and cold deserts to swamps and mangrove forests at the Indus River plains (Baig & Al-Subaiee, 2009).

In terms of hazards, Pakistan is among the most disaster-prone countries in South Asia, having suffered an estimated US$ 18 billion in damages and losses during the past decade (World Bank, 2017). For example, tectonic processes at the colliding boundaries of the Indian and the Eurasian tectonic plates, driving the Himalayan orogeny, are causing significant seismic instabilities in the region. Regular flooding also takes place at the Indus river basin where major floods occur during the July-September monsoon season as a result of the seasonal low depressions developing over the Arabian sea or the Bay of Bengal (NDMI, NDMA, UNDP, 2007). Heatwaves in the early summer may also cause flooding at various sites due to many rivers being snow-fed. Other hazards include droughts, landslides, storms and cyclones, glacial lake outburst floods (GLOFs), avalanches and technological accidents (NDMI, NDMA, UNDP, 2007). Pakistan has also been ranked highly in the Climate Vulnerability Index of 2019 - ranking 8th among the 10 most affected countries by extreme weather events between 1997 and 2016 (GermanWatch, 2019).

Despite the recurrent disasters, Pakistan has made significant progress in economic and human development by reducing absolute poverty and increasing shared prosperity over the past two decades. Between 1991 and 2011 the number of people with an income less than US$ 1.25 a day was more than halved (World Bank, 2014), and the country has a future potential for rapid growth similar to that of other South Asian nations.

1.1 Demographic Characteristics

The latest population census of Pakistan estimated the population at 207.77 million people in 2017, of which 64 percent are residing in the rural areas, and 7 percent (over 14 million people) in the megacity of Karachi (Pakistan Bureau of Statistics, 2017). 38 percent of the population is under 15 years of age, and only about 4 percent of the population is aged 65 and above (NIPS & ICF, 2019). Due to the large numbers of youth, an estimated 3.1 million people are expected to enter the labor force during the next four decades, indicating that increasing investments in education, health and livelihood opportunities are needed to capture the upcoming demographic dividend (UNFPA , 2017). When this growing youth “bulge” enter the work force with small numbers of dependent populations, the economy could surge rapidly, but only if the aforementioned challenges will be addressed in time.

While the Human Development Index has increased to 0.562 in 2017, Pakistan is still positioned at 150 out of 189 measured countries on the HDI (UNDP, 2018), and the country is performing low on the Global Gender Gap Index (World Economic Forum, 2018). Despite such challenges, the national development is rapid; 95 percent of all households have access to improved drinking water sources, 70 percent have improved sanitation facilities, and 93 percent have electricity (NIPS & ICF, 2019). Social and human health indicators have been on an ascending trend over the past two decades, indicating that rapid future social and economic development is probable if adequate investments are made to increase human capital and to protect development gains from climate and disaster risks.

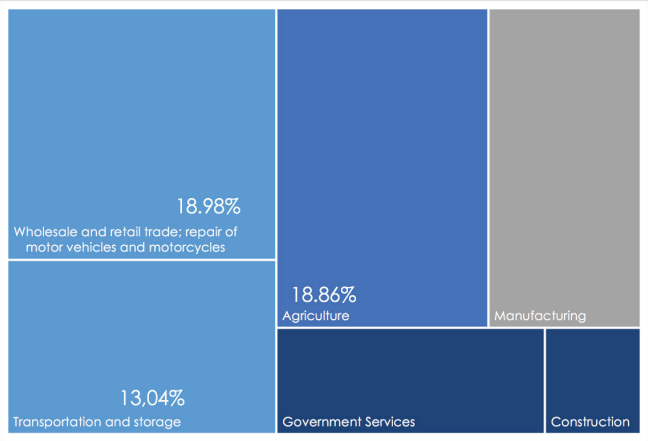


Figure 1. The composition of the GDP of Pakistan and largest contributing fields of industry in 2017 /18 (Pakistan Bureau of Statistics, 2018)

1.2 Economic Impact of Disasters

Several large-scale disasters have affected Pakistan and the development of the country's economy. As a disaster-prone country, with a high exposure to hydro-meteorological, and geophysical hazards with reoccurring and seasonal characteristics, damages caused by earthquakes, flooding, droughts, landslides and storms are not uncommon (ADRC, 2016). Disasters have been found to have a profound impact on economic growth, harming not only human capital but also infrastructure and assets in a manner which has been established to have negative effects on the annual GDP (Shahzad, 2014). In 1998-2001, a severe period of drought reduced the GDP growth by 50 percent (LEAD, 2015). This was followed by the Kashmir earthquake of 2005, the flooding of 2010, earthquake in 2011, and another severe flooding in 2012. On average, these reoccurring disasters have led to 1.16 percent reduction of the national GDP annually, and have forced households to divert resources from productive sectors towards rebuilding and recovery activities (LEAD, 2015).

In the case of the flooding in 2010, unprecedented monsoonal rains induced heavy flooding of the Indus river, which spread through Khyber Pakhtunkhwa, Punjab, Balochistan and Sindh, covering nearly one fifth of the total land area in water (DEC, 2011). As a result, approximately 7 million people were left homeless during the rains which continued for a week with only brief pauses (Gronewold, 2010). Between the year 2006

and 2016, this flooding was the most destructive event to agriculture globally, causing US$ 4.5 billion in overall agricultural damages and losses (FAO, 2018). The overall cost of the flooding in terms of direct damage and indirect losses was estimated to reach US$ 10.1 billion, with minimum additional costs for reconstruction estimated at US$ 6.8 billion in the Preliminary Damage and Needs Assessment (ADB, World Bank & the Government of Pakistan, 2010). According to the Fiscal Disaster Risk Assessment, the economic impact of flooding alone has reached an estimated losses and annual damages of up to US$ 1.8 billion, which is an equivalent of 0.5 percent of the annual GDP (World Bank & GFDRR, 2015), and caused an estimated loss of 3-4 percent to the annual federal budget (GFDRR, 2019).

Also, it should be noted that the impacts of these events often affect low-income households the most. The agriculture sector is one of the most important contributors to the household level economy of Pakistan, because almost 45 percent of the total work force is engaged in agriculture (Usman, 2016). It contributed to nearly 19 percent of the yearly GDP between 2017 and 2018 (figure 1), and has experienced a growth of 3.81 percent as the production of cash crops began ascending (Ministry of Finance, 2018). Rural livelihoods are increasingly exposed to the impacts of adverse impacts of weather, and due to the lack of livelihood options and harsh conditions, many families are becoming more and more vulnerable to hazards and climate change.

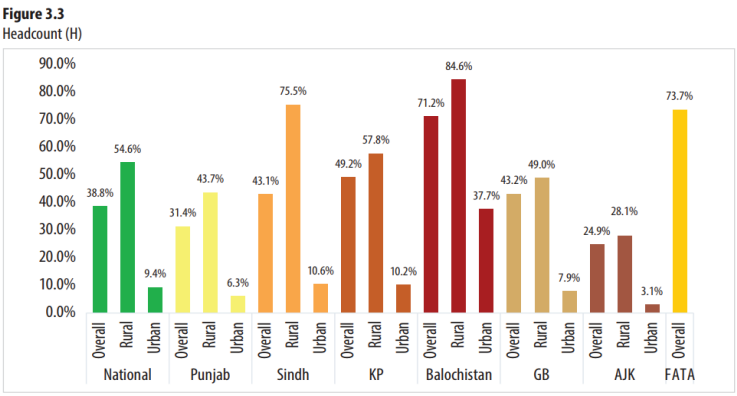


Figure 2. Poverty headcount by district (OPHI, 2017)

1.3 Social Impact of Disasters

Disasters have also had adverse impacts on human life. The flooding of 2010 affected an estimated of 18 million people, caused 1984 casualties, displaced 150,000 families and damaged or destroyed approximately 1.8 million houses across the 78 impacted districts (WHO, 2011). Out of the 9,721 health facilities in the country, 515 were reported damaged or destroyed. However, most severe impacts were caused by the disruption on the delivery of health services as the lack of medical equipment, medication and displaced staff were restricting the effectiveness of relief efforts. Also, displacement persisted several months after the flood depending on the area.

Monthly household incomes in some regions dropped by half, and livelihoods or income generation took up to six months to recover in regions that had suffered severe impacts of the flooding (Kirsch, et al., 2012). Also, in the studied households, it was established that households headed by a person without formal education recovered at a slower rate due to a generally lower socio-economic background (Kirsch, et al., 2012), indicating that poor households were among the hardest hit.

By August 2010, almost half a million cases of dysentery and other diseases had been reported as a result of the flooding, and approximately 3.5 million children were estimated to be at risk of contracting diarrhea, cholera, and other water-borne diseases (Looney, 2012). During the months following the flooding, cases of Crimean-Congo hemorrhagic fever, dengue, cholera, malaria, measles, polio and diphtheria started unfolding (Warraich, et al., 2011). Such health impacts and losses of livelihoods following cascading disasters affect households due to the forced need to redirect resources to recovery activities, and also the children of low-income backgrounds are forced to drop out of education to seek employment opportunities to support their families (LEAD, 2015).

2. Disaster Risk Profile

2.1 Hazards and Climate Change

Pakistan is under stress from various hazards, including seismic activity originating in the Himalayan region, along with numerous hydrometeorological hazards such as flooding, cyclones and adverse weather. However, different parts of the country are exposed to varying extent; coastal areas are prone to swell waves and cyclones, the low-lying plains of Indus river are increasingly prone to flooding, and the northern regions are highly vulnerable to landslides, snowstorms, avalanches and earthquakes (Ullah & Takaaki, 2016). These events occur regularly and at all scales, thus increasing vulnerabilities and creating cycles of poverty as they erode the resilience of the most vulnerable inhabiting highly exposed areas.

Most damaging events in the past have been cyclones, droughts, floods, and landslides; 75 percent of all disasters between 1980 and 2013 have been the result of hydrometeorological hazards (GFDRR, 2019; Ullah & Takaaki, 2016). However, seismic events are still a particular concern due to the vicinity of the Himalayan orogenic zone, activity of which has triggered severe large-scale earthquakes. For example, the past earthquake measured 7.2 on the moment magnitude scale resulted in catastrophic losses in Kashmir in 2005. The Kashmir earthquake killed nearly 75 000 people and destroyed 3 million homes partly due to massive-scale landslides (Naranjo, 2008). Furthermore, the tectonic activity of the main plates may trigger the other complex fault zones which have the potential for severe failures. For example, the earthquake of 2008 in Balochistan, where the strike-slip failure of the Chaman fault (driven by the collision of the Indian and Eurasian plates which further interact with the Afghan block) caused a main shock of Mw 6.4 which further cascaded into 1185 total recorded shocks (Yadav, et al., 2012).

Droughts are also frequently occurring events, especially in the Sindh and Balochistan provinces which receive low annual rainfall (Ullah & Takaaki, 2016). They tend to be complex socio-economic phenomena rather than just physical hazards, because in these regions, prevalence of poverty is higher, and overexploitation of groundwater is common due to lack of adaptive capacity. Thus, lack of options for irrigation and the lack suitable land are correlating with drought-related crop losses (Ullah & Takaaki, 2016). Flooding on the other hand, is common along the Indus River basin, which is extending from India through Kashmir and Pakistan towards the Arabian Sea, and covering approximately 25 percent or 977,000 km^2 of the total land area of Pakistan (Shabir, 2013).

Finally, landslides are known to occur frequently, causing significant damage to human activities, housing, roads, water supplies and communication systems. Destroyed infrastructure in the aftermath of the Kashmir earthquake-induced landslides were hindering the distribution of relief and aid, and slope failures are common in areas where soil structure and vegetation have been lost on hillsides due to unmanaged development and deforestation to obtain valuable timber (Tariq & Gomes, 2017).

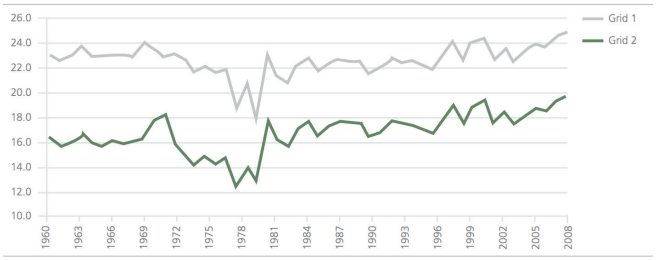


Figure 3. Annual change in temperature in Islamabad (UN-Habitat, 2014)

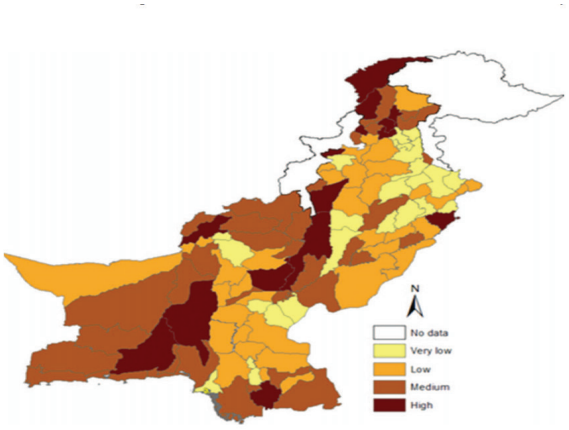


Figure 7. Total vulnerability assessment for Pakistan by district. Available in colour online.

Figure 4. Vulnerability assessment of Pakistan by district (Rafiq & Blaschke, 2012).

Many of the impacts of these hazards are magnified by climate change; a general warming trend has been identified in Pakistan, and the future projected trend has been estimated to be higher than the global average (ADB, 2017) (figure 3). For example, Karakoram Glaciers have indicated declining stability, and the risk of GLOFs is increasing as a result of melting. 80 percent of the Hassanabad village has been found to be highly exposed to large-scale flooding in the near future, and the low-lying areas of Hunza River are susceptible to catastrophic damage as they are in the vicinity of the Shishper glacier which has shown highly anomalous behavior due to melting between 2018-2019 (Shah, et al., 2019).

Climate change is also identified as one of potential drivers of domestic migration in Pakistan. In a low-middle-income country, with income and wealth disparities apparent especially in the rural regions (where poorest demographics are reliant on agriculture), eroding livelihoods and dwindling food security following adverse impacts of weather could significantly contribute to internal migration in the future as people are forced to look alternative livelihood options (SDPI, 2016). Many are already leaving their jobs and hometowns due to losing income and homes as a result of water shortages and disasters (Malik, et al., 2018), and the issue is likely to become worse in the future. Heatwaves have also been projected to increase. By 2030, annual heat accumulation could increase up to 32 percent in Punjab and Sindh (Nasim, et al., 2018). Climate change has been found to have adverse impacts on majority of the major food crops, and the growing population has been suspected to face the problem of reduced food security in the future (Ali, et al., 2017). 90 percent of the agricultural output comes from irrigated land, and 50 to 80 percent of water running through the irrigation network is sourced directly from the glaciers and snow melt in the Hindukush mountain ranges (USAID, 2013). Thus, any change in the glacier mass could significantly decrease the availability of water and affect the energy production as 33 percent of the energy supply is hydropower driven (USAID, 2013).

2.2 Exposure

Millions of people in Pakistan are exposed to the environment by living in the vicinity of flood plains, the ocean or in the northern regions prone to landslides and seismic activity. However, a common denominator is shared by most of the population; one of the crucial resources in Pakistan is water. Increasing temperature and lessened rainfall as a result of climate change and changing rainfall patterns may increase the incidence of droughts, and Pakistan has been categorized among the most water-stressed countries; between 1947 and 2013, per capita water availability has decreased nearly six-fold (Abid, et al., 2016). In rural regions, where farming is a lifeline of many, climate change and decreasing water resources are a significant threat.

In terms of tectonic hazards, due to the complex web of active fault lines, earthquakes are common and have a potential to cause massive-scale destruction mainly in the northern mountainous regions. The remoteness also poses difficulties during the phases of response; the Kashmir earthquake in 2005 buried entire towns by landslides, disrupted infrastructure and communication networks and severely hampered the provision of aid (Naranjo, 2008). Another 7.5 magnitude earthquake took place in 2015, again affecting the Kashmir region.

Also, flash flooding is causing significant damage to lives and livelihoods. Such events are common especially in the mountain ranges due to steep topography and unpredictable climate which increases the soil instability (Shabir, 2013). Forest degradation has been suggested to be a contributor to the increased flood damages along the Indus river basin, especially in regions where illegal felling and clearing of riverine forests for farm land and settlements have reduced the natural buffer zones to prevent inundation (White, 2011). Forest cover decline and environmental degradation have been found to be prevalent in most of the regions (Baig & Al-Subaiee, 2009).

2.3 Socio-economic Vulnerability

Nearly 80 percent of the poor populations reside in rural regions and are heavily dependent on agriculture and the availability of water for irrigation (Abid, et al., 2016). Thus, rural farmers are disproportionately vulnerable to variations in the regional weather patterns because they often do not have access to improved seeds or advanced technologies which could lessen climatic risks (Abid, et al., 2016), and because they may adopt negative coping mechanisms such as planting weather resilient cotton which is more resilient to weather but requires increased irrigation – which in turn contributes to lessened availability of water (Mustafa, et al., 2018). Thus, due to lack of other options, climate change has forced households to adopt methods which increase vulnerability to droughts as a trade-off for environmental resilience. In the coastal communities, where low-income households are engaged with fishing or agriculture, families tend to be disproportionally affected by climate change, especially if they lack basic infrastructure, income diversification opportunities, and access to education (Salik, et al., 2015)

The influence of feudal families adds to the difficulties farmers are facing in times of adversity. An estimated 2 percent of Pakistani households control more than 45 percent of the total land area – meaning that these powerful households hold the control over water subsidies and agriculture (Looney, 2012). In the aftermath of the 2010 flooding, landless farmers and peasants struggled to recover their livelihoods, lacked access to shelter, were forced into debt cycles and were largely at the mercy of the good will of private money lenders and feudal families – a situation which pushed low-income demographics further into poverty (Looney, 2012).

Also, the poorest and landless tend to inhabit low-lying regions and on the peripheries of villages, rendering them increasingly exposed to flooding impacts (Ullah & Takaaki, 2016). Highly vulnerable regions have been considered to have lowest income and education levels, with limited access to clean water and infrastructure (Rafiq & Blaschke, 2012). The issues of low quality housing for the poor are partly structural and have roots in the structure of the economy; 68 percent of the population (lowest income) have 1 percent of the available housing units within their buying reach (Siddiqui, 2014), indicating that the poorest are forced out of safer areas.

2.4 Physical Vulnerability

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It has also been established that in regions where poverty is high, increase in physical vulnerability follows (figure 4). The landless and the poor tend to construct low-cost houses with easily available materials, and such buildings are susceptible to damages of disasters due to lack of engineering (Ullah & Takaaki, 2016). According to a risk assessment conducted by Rafiq & Blaschke, well developed areas and major hubs of economic activities have a very low risk ranking, whereas low-income districts with high numbers of vulnerable populations in the south-west (including Gawadar, Turbat, Khuzdar, Awaran and Bolan) and some areas in the north have a very high risk of flooding, earthquakes, droughts or cyclones (Rafiq & Blaschke, 2012).

Rapid unplanned urbanization is yet another contributing factor to increasing disaster risks in Pakistan. Karachi is growing at an annual rate of 5 percent, and vulnerabilities to disasters are increasing; inadequate housing being developed on marginal land is more prone to flood and earthquake damages (Ali, et al., 2015) and environmental degradation often follows such unmanaged urban growth. Urban expansion in Lahore Metropolitan region has been found to be affecting the ground water quality due to industrial pollution and municipal waste (Batool, et al., 2019), and environmental degradation not only contributes to risks, but also has the potential to impact economic development negatively due to lessened availability of local resources for domestic production (Azam & Khan, 2016). The agricultural sector is already facing challenges of erosion, salinity and waterlogging, and these processes are most likely to contribute in increased food insecurity due to unmanaged land-use following population growth, and due to impacts of climate change (Qasim, et al., 2016).

2.5 Future of Disaster Risks in Pakistan

Future prospects for disasters are dire. Hydro-meteorological hazards are likely to increase in severity and frequency; water is becoming increasingly scarce and growing populations in large cities require increasing amounts of resources and services in a country which is losing significant amounts of its annual GDP and federal funding to disasters. The Climate Risk Index places Pakistan as 8th out of the 10 worst affected countries by climate change globally. For example, in the case of farmer households, Ahmad, et. al. (2015) estimated that 69-89 percent of families would be made vulnerable to climate change by mid-century. Lessened availability of water will be a key challenge; as a highly water-stressed country, the projected frequency and severity of droughts could be detrimental to livelihoods of thousands. Most of the hydrometeorological hazards (including GLOFs) are likely to increase in frequency and severity, and climate change may also threaten the coastal communities. 10 percent of the population and 40 percent of all industry reside at or in the vicinity of the coast of the Arabian Sea, on an area which is becoming increasingly vulnerable to storm swells, cyclones and rising sea-levels (Rabbani, et al., 2014). Even a slight sea level rise threatens storm barriers and salt water intrusion could affect fresh water resources along the coastal belt – not to mention the Indus Delta plains, 7 500 km^2 of which could become submerged in a severe climate scenario (Rabbani, et al., 2014). Increase in flooding and storm intensity also increases coastal erosion, and with the declining natural buffer zones (such as the mangrove forests) exposure to hydro-meteorological hazards is rapidly increasing.

3. Disaster Risk Reduction and Climate Action Interventions

While the Indian Ocean Tsunami 2004 is thought to have promoted DRM advancement in affected countries such as Sri Lanka, Maldives and Thailand, the Kashmir Earthquake in October, 2005, created a sense of urgency for establishing a proactive and comprehensive DRR system in Pakistan. The major flood event in 2010 has expedited further actions to drive DRR momentum into full implementation. The following chapters capture highlights of the legacy of past attempts and current status in DRR, as well as looks into the implementation challenges and priorities for the future.

3.1 Sendai Framework for Disaster Risk Reduction

Priority 1. Understanding Disaster Risk. The National Hazard and Risk Assessment, conducted in 2011, is the nation-wide mechanism serving as a key baseline document for risk sensitive development planning at the national, provincial and local levels (ADB, 2015). However, more work is needed to develop a thorough understanding of hazard and disaster risks in Pakistan. Also, lack of essential risk information, such as baseline data and risk profiles for different geographic areas, is considered as a missing link required for risk-informed holistic DRM policy development (World Bank, 2013).

Multi-hazard vulnerability and risk assessment (MHVRA) is one of main focus areas indicated in the Implementation Roadmap 2016-2030 of Pakistan's National Disaster Management Plan. While a nation-wide scale MHVRA is still to be developed, detailed and location specific assessments have been carried out, providing comprehensive risk information for Provincial Disaster Management Authorities (PDMAs) and concerned agencies in DRM and development planning. Recently conducted MHVRA includes Multi Hazards & Risk Assessment Studies of five districts in Punjab (Multan, Jhang, Bahawalpur, R.Y.Khan & Khanewal) covering complete spectrum of hazards and vulnerabilities, while another similar assessment has been piloted to cover Sindh Province on a micro-level scale with focus on five selected districts (Thatta, Badin, Tando Mohammad Khan, Tando Allah Yar and Mir Pur Khas) (ADRC&NDMA, 2017).

To support risk-informed decision-making for sectoral development, sector specific risk assessments have been conducted in the past. Some include considerations for multi-dimensional vulnerabilities by adopting Multi-dimensional Poverty Index (MPI) as a proxy for vulnerability to food security. Some other examples include the Sindh Drought Needs Assessment in August 2016 to understand drought risk and its impacts on livelihoods, food security, nutrition, health, water, and sanitation sector, and the Child-Centered Risk Assessment (2017) in three focused District of Balochistan (Quetta, Jaffarabad and Naseerabad), by UNICEF.

At the local level, risk assessment exercises have been carried out in small cities and districts as pilot versions, and for other purposes such as for zoning reconstruction areas to enable the estimation of seismic risks and related phenomena commissioned by the Aga Khan Development Network (AKDN) for 2005 Earthquake reconstruction program (Zimmerman & Issa, 2009).

While recognizing the need to consolidate risk assessments, National Working Group (NWG) has been established by the National Disaster Management Authority (NDMA) to provide strategic guidance and coordinate all activities related to vulnerability and risk assessments for guaranteeing uniformity of data, information and the utilization of standard methodologies (NDMA, 2015). For enhancing uniformity in risk assessment methodologies, guidelines for conducting MHVRA have been launched by NDMA (NDMA, 2016). Pakistan Shared Platform for Disaster Resilience Information is under development, led by NDMA with support of World Bank, to serve as a one-stop online hub of risk information.

Priority 2. Strengthening Disaster Risk Governance to Manage Disaster Risk. Pakistan has developed a robust institutional structure for DRM. After the 2005 Kashmir earthquake, Earthquake Reconstruction and Rehabilitation Authority (ERRA) was established as a central coordinating body to assume the responsibility over earthquake recovery and post-earthquake development work inclusive of disaster risk reduction considerations. To strengthen DRM system, the National Disaster Management (NDM) Act 2010 was enacted to set up institutional arrangements of DRM in Pakistan with decentralized responsibility under the three-tier governance level: federal, provincial and district level, with authorized DRM bodies: the National Disaster Management Authority (NDMA), Provincial Disaster Management Authorities (PDMAs) and District Disaster Management Authorities (DDMAs).

Pakistan's DRM policy and plans have evolved over the years with the National Disaster Risk Management Framework (NDRMF) 2007-2012 outlining a comprehensive DRR agenda and a successive plan (National Disaster Management Plan (NDMP) 2012-2022), as a mechanism to manage the complete spectrum of disasters by developing disaster risk reduction policies, strategies, measures and actions in partnership with all stakeholders, having highlighted priority actions and costs for the ten-year period. The NDMP comprises the Master Plan, Human Resource Development Plan on Disaster Management, Multi-Hazard Early Warning System Plan and Instructors' Guidelines on Community Based Disaster Risk Management, which is a tested model for CBDRM for possible replication (NDMA, 2012). Hazard specific preparedness plan, contingency plans, and standard operating procedures are all in place to be used as a reference for all concerned agencies.

Also, Institutional capacity strengthening has taken place by National Institute of Disaster Management (NIDM) acting as a technical and training institute of NDMA, with funding support from international donors. Major programs include capacity building of disaster management bodies at the federal, provincial and district levels.

At the federal level, the National Disaster Management Commission (NDMC), headed by the Prime Minister, is the main policy making body, with NDMA performing the functions of its secretariat with the overall responsibility in coordinating DRM implementation. This structure is replicated at provincial level with Provincial Disaster Management Commissions (PDMCs) as decision-making bodies headed by the respective Chief Minister of the Province, with Provincial/Regional Disaster Management Authorities as secretariat and operational arms. At district level, District Disaster Management Authorities (DDMAs) have been established to be responsible for the whole spectrum of DRM in their jurisdiction (NDMA, 2015)

However, overlapping functions of DRM agencies and operators remain a challenge from national to sub-national level, resulting in lack of clarity over the chain of command. While the policy framework and institutional mandates strive towards holistic DRM, government interventions are still responsive rather than preparedness and risk reduction focused.

IMPLEMENTATION	LEGISLATION/POLICY	SCOPE	PURPOSE
GOVERNMENT OF PAKISTAN	The Calamities Act (1958)	National	To guide the state's action during emergencies with a focus on response and relief
EARTHQUAKE RECONSTRUCTION AND REHABILITATION AUTHORITY (ERRA)	ERRA Act 2011 (enforced as an ex-post facto law from July 1st, 2007)	National	To rehabilitate the affected regions and to establish an institutional framework for undertaking reconstruction and development work after the 2005 earthquake.
NATIONAL DISASTER MANAGEMENT AUTHORITY	National Disaster Management Act (2010)	National, Provincial, Districts	To lay down a comprehensive framework for DRM, covering all phases of the disaster management cycle (replacing the DM ordinance of 2009)
NATIONAL DISASTER MANAGEMENT AUTHORITY	National Disaster Risk Management Framework (2007-2012)	National, Provincial, Districts	Intended to identify guiding principles and priorities for disaster risk reduction
NATIONAL DISASTER MANAGEMENT COMMISSION	National Disaster Management Plan (2012-2022)	National, Provincial, Districts	To guide and mainstream institutional and technical DRM priorities, in recognition of the needs of pre-disaster phases.
NATIONAL DISASTER MANAGEMENT AUTHORITY	National Disaster Risk Reduction Policy (2013)	National, Provincial, Districts	To outline priorities and directions for risk reduction from a proactive perspective, with a special emphasis on prevention, mitigation and preparedness
NATIONAL DISASTER MANAGEMENT AUTHORITY	National Disaster Management Plan Implementation Road Map (2016-2030)	National, Provincial, Districts	Sets up priority activities for the period of 2016-2030, with a focus on multi-hazard risk assessments, capacity building, community resilience and raising awareness.
NATIONAL DISASTER MANAGEMENT AUTHORITY	The national Disaster Response Plan (2019)	National, Provincial, Districts	Outlines the framework for disaster response based on identified roles and responsibilities of various stakeholders

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

Priority 3. Investing in Disaster Risk Reduction for Resilience. To improve risk financing capacity and establish secured funding to actualize planned DRR interventions, the National Disaster Management Act of 2010 sets up a National Disaster Management Fund managed by the federal government, while separate disaster management funds are to be established by each of the provincial governments and district administration. At sub-national level, PDMAs and DDMAs have varying financial capacity and have faced budget constraints for DRM activities. Due to the fact that the country has suffered recurrent flooding and other large-scale events which have caused accumulating financial impacts, international agencies have played a crucial role in strengthening financial resource for DRM including a US$ 200 million loan approved by the ADB in 2016 to support the establishment of a National Disaster Risk Management Fund, and support by the World Bank on the establishment of disaster risk financing strategies and DRM funds at the provincial level (ADB, 2019).

Addressing socio-economic vulnerabilities would entail reducing economic disparities, in which social safety nets play a crucial role to cushion acute disaster and financial shocks, and, for a broader purpose, to ensure minimum income support for the poor. Pakistan has initiated social safety net schemes for labor force and non-labor forces including Workers Welfare Fund, the Employees Old-Age Benefits Institution, the Zakat Fund, the Pakistan Bait-ul-Mal, and the Benazir Income Support Programme (BISP). Established in 2008, BISP helps reduce social and economic vulnerabilities by covering more than 7.7 million households (ADB, 2019). The National Socio-Economic Registry (NSER), established under BISP, hosts a database of more than 27 million households (approx. 167 million people), which is utilized by the federal and provincial social sector programs to improve targeted pro-poor performance. (World Bank, 2015).

Risk-sensitive DRR investment has also become compulsory in development planning. It has been made mandatory for government agencies to complete disaster risk screening using DRR checklist as part of official procedures by the Planning Commission (ADPC, 2018), hence ensuring the mainstreaming of DRR into public sector development projects before their approval by the highest planning forum for implementation (NDMA, 2015). Mainstreaming DRR into provincial planning and development departments has started in some provinces including Punjab, Balochistan and Khyber Pakhtunkhwa (NDMA, 2015).

In terms of sectoral DRR mainstreaming, agriculture is one of the highly vulnerable sectors given that the economy and livelihoods are largely dependent on agriculture. Key impediments, including high costs of adaptation measures in semi-arid rural areas and the farmers' lack of knowledge about hazards, have to be overcome (Qaisrani, et al., 2018). Investment in irrigation development schemes has been conducted, with Flood Control Commission (FFC) and provincial irrigation departments as key executing parties, to expand irrigated areas for local farming and increase capacity for flood protection. However, besides the structural interventions, more investments in experimenting cost-effective and locally-viable adaptation options, financing necessary provisions to enable local adaptation, and increased capacity building on adaptation for farmers should be prioritized to enhance the resilience of the agricultural sector.

Priority 4. Enhancing disaster preparedness for effective response to "Build Back Better" in recovery, rehabilitation and reconstruction. Attempts to strengthen emergency response and coordinating mechanism for crisis management include the National Disaster Response Plan (NDRP-2019), an updated version of NDRP-2010, the Host Nation Support Guidelines for Foreign Assistance to Pakistan During Disasters (2018) and National Monsoon Contingency Response Directive. Updated and issued annually before monsoon period, the National Monsoon Contingency Response Directive presents the outlook of the monsoon situation for the upcoming year, visualizes monsoon contingencies, and provides response guidelines for three tiers of response level: Local Emergency Response by DDMAs, Provincial level and National level led by the NDMA. The directive guides phased actions and assign tasks for concerned agencies for hydro-met hazards including cyclone, flashfloods, GLOFs, landslides and avalanches (NDMA, 2018).

Recognizing specific needs and vulnerability of women and children, the Gender and Child Cell (GCC) was established in 2010 under NDMA. Responsible for integrating the understanding of the needs of women, children and other vulnerable segments of population during humanitarian response, emergency management and DRR, the Gender and Child Cell reflects the country's attempt to fulfil its legal obligations in protecting fundamental rights as articulated in the Constitution, aligned with international conventions and treaties on the rights of children, women and marginalized populations. Policy guidelines, standards and tools have been developed to be adopted in emergency response including National Policy Guidelines on Vulnerable Groups in Disasters (2014), Minimum Standards for Protective Spaces for Children (2013), and Guidelines for Minimum Standards of Relief in Camp (2017).

With prior experience in post-disaster recovery, Pakistan has introduced ad hoc recovery management bodies with plans devised for early recovery and recovery interventions. Special agencies established for, and guiding recovery framework include the Earthquake Reconstruction & Rehabilitation Authority (ERRA) for post-Earthquake 2005 recovery, a Strategic Early Recovery Action Plan (SERAP) and Flood Relief and Early Recovery Response Plan (PFRERRP) for 2010 Floods (UNDP, 2012).

Post-disaster needs assessments (PDNAs) consider damages by sector and cross-cutting themes have been conducted with support from GFDRR and different technical agencies following the 2010 and 2011 flooding to assist the government in determining socioeconomic impacts and formulating recovery strategies for sustainable reconstruction. Recovery needs assessment (R&A) was conducted for 2014 Floods by NDMA, jointly with UNDP and other partners to inform estimated cost for recovery and reconstruction. Enhancing build-back-better started in 2010 with the Guidelines for Mainstreaming Disaster Risk Reduction in Early Recovery of Floods, developed to guide disaster risk-sensitive recovery across 8 clusters: community physical infrastructure, governance, water and sanitation, education, health, housing, agriculture and food security, and nonfarm livelihoods.

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

Building synergies between climate change, disaster risk reduction and sustainable development are well articulated in different policy and planning frameworks, and they are reflected in the institutional arrangement. The Parliamentary SDGs Secretariat is formed based at the National Assembly to steer the SDGs localization and mainstreaming process and a dedicated SDGs Section is housed under the federal Ministry of Planning, Development & Reform (MoPDR) for SDGs monitoring and national coordination.

Federal budget for country SDGs implementation has also been put in place. MoPDR with support from UNDP Pakistan has started National Initiative for Sustainable Development Goals to institutionalize 2030 Agenda that will look at a broad spectrum of interventions to fully operationalize SDGs encompassing financial resources, mainstreaming SDGs into plans, policies and resource allocation, establishing a robust SDGs monitoring system, and innovative approach for accelerating the implementation (Federal SDGs Support Unit, 2018).

Pakistan 2025: One Nation – One Vision, fully aligned with the SDGs (Ministry of Planning Development and Reform, 2018) is a blueprint for future-oriented and growth-centric development for Pakistan, taking into account climate change challenges as a priority for government action. The Vision 2025 states that the key interests include inclusive growth, security of energy, water and food, regional connectivity, and private-sector and entrepreneurship-led growth. Aspects with DRR-linkages are well noted as part of water security including water resource management and water related disaster resilience. From the climate change domain, the National Climate Change Policy (NCCP) 2012 provides an overarching framework for addressing threats of change climate and recognizes the importance of sectoral-wise adaptation and mitigation measures. NCCP is not taken as a standalone policy but is motivated by its contribution to achieve c ountry's economic growth (ADB, 2017).

Similarly, the framework for implementation of the National Climate Change Policy for the period 2014-2030 provides strategic guide to integrate adaptation actions and mitigation measures across development sectors, hence promoting climate-friendly national and economic planning (Government of Pakistan, 2017). With the enactment of the Climate Change Act 2017, Pakistan Climate Change Council was established as an apex policy formulation and decision-making agency on climate change, chaired by the Prime Minister.

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	National Disaster Management Plan Implementation Road Map (2016-2030)	The Framework for Economic Growth (2011) Vision 2025 (2014) Adoption of the Sustainable Development Goals as the National Development Goals	Climate Change Act 2017 Implementation Framework for the National Climate Change Policy (2014-2030)
Environmental Protection	National Environmental Policy (2005)	National Environmental Policy (2005) National Forest Policy (2015)	National Forest Policy 2015 National Climate Change Policy (2012)
Disaster and Climate Risk Reduction	National Disaster Management Plan (2012-2022) National Disaster Risk Reduction Policy (2013) National Flood Protection Plan (2015-2025)	Climate Change Act 2017	Nationally Determined Contribution for the Paris Agreement (2016)
Vulnerability Reduction	The National Action Plan for the Implementation of the Bangkok Principles on Health Aspects of the SFDRR (2017)	Benazir Income Support Program (BISP)	National Climate Change Policy (2016)
		National Action Plan on Responsible Consumption and Production (2017)	National Adaptation Plan and the sub-national integrated development plans of action (LAPAs)
Urban Development	National Disaster Risk Reduction Policy (mentions the need for improved, risk-informed land-use planning (2013)	11th Five-year Plan	11th Five-year Plan

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

5. Issues in Implementation of the DRR and Climate Policy

With increased frequency and intensity of disaster events, emergency response capacity and more amplified preparedness interventions have to be strengthened, especially for floods as recurrent hazards. Moreover, for disaster risk reduction, actions should be emphasized by establishing coherent plans, with the division of functions and roles between multi-tiered DRM structures and concerned agencies at different levels (Fayaz & Bussell, 2017). Revisiting DRM institutional arrangements and mandates at all levels should be prioritized to clarify the division of tasks and chain of incident command.

While each district has formulated a District Disaster Risk Mitigation (DRM) Plan, putting the plan into action has been hampered in part by lack of resources (NDMA, 2015). Thus, addressing financial challenges is another critical area. Direct allocation from federal level for provincial and district DRR activities is not in tune with the current budget system, and PDMAs and DDMAs themselves have faced serious impediment in mobilizing locally-generated funds for DRR, amidst various competing demands. Alignment of donor priorities with national strategies and more effective resource allocation from donor-funded schemes should be explored (ADPC, 2018) to channel financial resource, and thus realizing planning into materialized actions. Disaster risk finance strategy is compulsory for Pakistan to address the significant financial and fiscal costs arising from disasters and climate change.

6. Stakeholder Analysis

Pakistan has hands-on extensive experience in multi-stakeholder collaboration on the reconstruction work after the 2005 earthquake. The Earthquake Reconstruction and Rehabilitation Authority (ERRA) partnered with local NGOs possessing prior experience in reconstruction and through the partnership, social mobilization and community capacity building on seismic-resistance reconstruction through cascading training was made possible (World Bank, 2013). Community led bodies, e.g. Village Reconstruction Committees were formed for implementation of people-centered housing reconstruction with training provided to local masons, artisans and craftsmen on earthquake-resistant housing.

Various local, national and international NGOs have been instrumental in providing aid and humanitarian services. Pakistan Humanitarian Forum (PHF), representing 63 international aid organizations, has been active since 2003 to address humanitarian and development needs for vulnerable populations in Pakistan. In remote areas, local NGOs have supported monitoring the progress of shelter reconstruction by different partners, feeding back to shelter cluster and provincial authorities, for coherent recovery effort. NGOs have a pivotal role in providing a wide range of health and education and other services to millions of people in poverty in remote parts of the country (Mohmand, 2019).

However, roles of NGOs, CBOs and people-organized groups are still peripheral in DRM domain and limited mostly to relief distribution. While platforms are established for coordination and joint initiatives such as through Disaster Risk Reduction Forum, a network of INGOs and NGOs, their engagement in mitigation and preparedness is not strong enough to advocate for policy change nor trigger responsive acts from the government (Fayaz, 2017). Potential of these actors have to be optimized through various coordinating platforms and mechanisms that enhance synergies and complementary of state and non-state actors.

7. Future Challenges and Priority Issues

7.1 Challenges

Challenges related to water security have reached their critical threshold. Various factors are acknowledged to be contributing to the situation; poor water data and information for water resource monitoring and management, weak processes for water resources planning and allocation, absence of environmentally sustainable water utilization, widespread pollution, and low water productivity in agriculture (World Bank, 2019). Coupled with increasing flood and drought risks, sustainable water management by adopting multi-disciplinary solutions, with basin-scale multi-stakeholder water planning, will be crucial.

Risk-sensitive spatial planning is still hindered by the lack of technical capacity, comprehensive disaster and climate risk information, and due to complex governance and urban development systems. However the plethora of government agencies involved in DRM and DRR at federal, provincial and district level as well as non-state actors provided both, opportunities as well as challenges. From DRR perspective, there is a lack of long-term planning for flood risk reduction and activities remain extremely centralized (Imran, et al., 2016).

7.2 Priority Issues

Increasing the understanding of disaster and climate impacts in Pakistan is among the highest priorities due to lack of availabile baseline data, SADD and contextualized information stored in comprehensive and updated disaster information management systems. Furthermore, information should be made easily available to all sub-national level development planners and the private sector to mainstream the implementation of DRR and CR in all sectoral development. However, lack of technical capacity and resources are limiting the collection, analysis and management of disaster information at the lower levels of government.

Characterized by climatic and topographic diversity, all provinces and regions in Pakistan are facing a range of disaster and climate change threats. This reaffirms the hypothesis that on-going efforts to decentralize DRR is necessary. However, addressing the non-availability of local expertise and professionals in DRR is compulsory for the country to fully roll out the National Disaster Management Plan (NDMP) 2012-2022 into actions that address specific problems and needs of each locality. Also, building technical competency

in conducting risk assessments, and capacity building on DRR, must be extended down to sectoral planners, local planning authorities, town planners, and data and statistics management agencies especially at provincial and district level.

DRM architecture in Pakistan has improved in terms of scale and quality. However, participatory approaches and work modality with non-state actors must be further enhanced. Continued awareness-raising and promotion of people-centric DRR should be mainstreamed in all DRR and climate interventions. More up-scaled actions are required to empower people in inclusive disaster preparedness and mitigation, enhance coping capacity and livelihood diversifications, and to promote the application of climate change adaptation among vulnerable populations. In this regard, concerned government agencies will be a key driver of the process by providing necessary provision and imparting technical know-how to the communities, alongside building ownership and trust among diverse population groups, based on mutual DRR benefits.

With an increased investment in irrigation systems and flood mitigation structures, one of the priorities is to look at connectivity of developed irrigation structures of different scales, efficacy of the system as a whole, and improved soft-interventions, essentially on water situation analysis and management, that requires interdisciplinary knowledge and skills. Degradation of Indus River Basin, (said to be a result of poorly managed irrigation system), and other river basins suffering deterioration require long term strategies and solutions that explore options for managing water-resources and ecosystems in a holistic manner.

Establishment of national disaster management fund has filled financial resource gaps and promoted resilient investments into all development projects related to DRR (ADPC, 2018). Investment in DRR is envisaged to achieve greater scale of operation in the years to come. Systematic mechanism is essential at this point for Pakistan to track benefit and overall impacts of spent funds for medium and long term DRR policies and investment. A robust monitoring system for progress tracking feeding into SFDRR monitoring is also an important instrument to build a strong case of comparative benefits of DRR investments for sustainable growth, aligned with the SDGs.

Finally, given the fast expansion of urban areas and growing cities, Pakistan requires rapid risk reduction initiatives conducted in the urban context. Enforcing existing building codes and improving the drainage capacity are among key aspects to mitigate the flood and seismic risks. Furthermore, social safety net schemes and funds, including the Zakat fund, could be further utilized to supplement financial assistance to low-income households and those vulnerable to poverty. In this context, measures focused on poverty reduction are increasingly important given the fact that livelihoods dependent on the environment are increasingly threatened by hazards associated with climate change, including flooding and droughts which may severely endanger crop output, and thus wellbeing of people.

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