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Natural Disasters in the Middle East and North Africa:

A Regional Overview

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THE WORLD BANK

January 2014

Urban, Social Development, and
Disaster Risk Management Unit
Sustainable Development Department
Middle East and North Africa

Natural Disasters in the Middle East and North Africa: A Regional Overview

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FOREWORD

Managing disasters is one of the most complex development issues. Floods, earthquakes, droughts, and other hazards are critical challenges hindering growth and stability in World Bank member countries. Over the past 30 years, disasters have affected more than 40 million people in the Middle East and North Africa (MNA) Region and have cost their economies about US$20 billion. During the last 5 years alone, more than 120 disasters have caused an average of US$1 billion per year in damages and losses. In the MNA Region, the synergy of natural disasters, rapid urbanization, water scarcity, and climate change has emerged as a serious challenge for policy and planning.

This report, prepared in close partnership with the United Nations Development Programme (UNDP) and the United Nations Office for Disaster Risk Reduction (UNISDR), focuses on these challenges, presenting a synthesis of the status of disaster risk in the MNA Region, including gaps and areas for remedial or enhanced actions. It highlights the progress already made and opportunities to learn from best practices, and provides critical feedback to governments and partners on efforts and processes required to make the region disaster resilient. Lastly, this report proposes a strategic framework to help MNA countries shift from disaster response to proactive risk management.

This report is the culmination of several years of interaction and partnership building facilitated by the World Bank and the Global Facility for Disaster Reduction and Recovery (GFDRR) that included working with governments, regional organizations, and nongovernmental organizations to make disaster risk management a core component of development programs.

Inger Andersen
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The report benefitted from a regional consultation workshop that was held on November 17–18, 2013, in Jeddah, Saudi Arabia, under the leadership of the Presidency of Meteorology and Environment (PME). Almost 50 representatives of 14 countries from the Middle East and North Africa (MNA) region attended the workshop, aiming to update the draft report, share regional and international disaster risk management (DRM) practices, and coordinate closely to tackle disaster risk in the region. Special acknowledgment is extended to the United Nations Development Programme (UNDP) and the United Nations Office for Disaster Risk Reduction (UNISDR) for their partnership and contributions throughout the production of the report.

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Finally and most importantly, the team gratefully acknowledges the financial support of the Global Facility for Disaster Reduction and Recovery (GFDRR), under the leadership of its Manager, Francis Ghesquiere, without which this report would not have been possible.

ABBREVIATIONS

AASTMT	Arab Academy for Science, Technology and Maritime Transport
ARADO	Arab Organization for Administrative Development
ASEAN	Association of South East Asian Nations
CAMRE	Council of Arab Ministers Responsible for the Environment
CARAD	Natural Disaster Risk Assessment and Monitory System
CAS	Country Assistance Strategy
CAT DDO	Catastrophe deferred drawdown option
CCA	Climate change adaptation
CERD	Djibouti Center for Research Studies
CPS	Country Partnership Strategy
CRED	Centre for Research on the Epidemiology of Disasters
CRW	Crisis Response Window (World Bank)
DDO	Deferred drawdown option
DLNA	Damage, loss, and needs assessment
DRFI	Disaster risk financing and insurance
DRM	Disaster risk management
DRR	Disaster risk reduction
EMDAT	OFDA/CRED International Disaster Database
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GCC	Gulf Cooperation Council
GDP	Gross domestic product
GFDRR	Global Facility for Disaster Reduction and Recovery
GIZ	German Agency for International Cooperation
HFA	Hyogo Framework for Action
IPCC	Intergovernmental Panel on Climate Change
IRM	Integrated risk management
ISDRRM	Islamic Strategy for Disaster Risk Reduction Management
ISESCO	Islamic Educational, Scientific and Cultural Organization
KACST	King's Abdulaziz City for Science and Technology
LAS	League of Arab States
MNA	Middle East and North Africa
MoU	Memorandum of understanding
NDMA	National Disaster Management Act (Pakistan)
NDRMF	National Disaster Risk Management Framework (Pakistan)
OFDA	Office of U.S. Foreign Disaster Assistance (USAID)
OIC	Organization of Islamic Cooperation
PDNA	Post-Disaster Needs Assessment
PME	Presidency of Meteorology and Environment (Saudi Arabia)
PPCR	Pilot Program for Climate Resilience
PRSP	Poverty Reduction Strategy Paper
RCDRR	Regional Center for Disaster Risk Reduction
SDC	Swiss Agency for Development and Cooperation
SECO	Swiss State Secretariat for Economic Affairs
SEGRC	Executive Secretariat for Risk and Disaster Management (Djibouti)
SESRIC	Statistical, Economic and Social Research and Training Center for Islamic Countries
SPCR	Strategic Program for Climate Resilience
TFESSD	Trust Fund for Environmentally and Socially Sustainable Development (World Bank)
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Development Programme
UNISDR	United Nations Office for Disaster Risk Reduction
USAID	United States Agency for International Development
USGS	United States Geological Survey
WRI	World Resource Institute

EXECUTIVE SUMMARY

Disasters are increasing worldwide, with more devastating effects than ever before. The year 2011 saw the highest economic losses yet due to natural disasters, estimated at US$370 billion worldwide. This is an increase from 2010, which saw US$226 billion in economic losses, already 3 times the total of 2009. Disasters in 2010 also claimed significantly more lives, with nearly 304,000 killed—the highest number since 1976.[1] A cumulative 3.3 million people have died around the world from the impacts of disasters in only 40 years (1970–2010).

While the absolute number of disasters around the world has almost doubled since the 1980s, the average number of natural disasters in MNA has almost tripled over the same period.[2] In the Middle East and North Africa (MNA),[3] the synergy of natural disasters, rapid urbanization, water scarcity, and climate change has emerged as a serious challenge for policy and planning. This synergy has reconfigured risk landscapes by making the region's natural resource base fragile and extremely susceptible to a variety of internal and external factors. The 2011 *Global Assessment Report on Disaster Risk Reduction*[4] finds that, although global flood mortality risk has been on the decrease since 2000, in MNA and some other regions, it is still increasing. The percentage of gross domestic product (GDP) exposed to floods, the most recurrent hazard in the region, has tripled from 1970–79 to 2000–2009.[5] The 2008 floods in the governorates of Hadramout and Al-Mahara alone cost US$1.6 billion, the equivalent of 6 percent of the Republic of Yemen's GDP.[6] Earthquakes are the second most prevalent disaster in the region, with serious impacts on lives and livelihoods. Droughts recurrently hit the region, bringing significant water shortages, economic losses, and adverse social consequences. Between 2008 and 2011, drought in Djibouti caused a yearly economic contraction of approximately 3.9 percent of GDP.[7] Among a series of floods that occurred in Jeddah during 2009–11, the 2009 floods had catastrophic consequences with losses that amounted to about US$1.36 billion.[8] Despite the different levels of development, between 1980–2010, 81 percent of disaster events in MNA were concentrated in just 6 countries: Algeria, Djibouti, the Arab Republic of Egypt, the Islamic Republic of Iran, Morocco, and the Republic of Yemen.

MNA's rapid urbanization is increasing the exposure of people and economic assets to disaster events. The urban population already accounts for 62 percent of total population and is expected to double in the next 3 decades.[9] Additionally, 3 percent

1 Swiss Re, "Natural Catastrophes and Man-Made Disasters in 2010."

2 EM-DAT, OFDA/CRED International Disaster Database, Université Catholique de Louvain, Brussels, www.emdat.net.

3 The Middle East and North Africa (MNA) Region, as defined by the World Bank Group, includes Algeria, Bahrain, Djibouti, the Arab Republic of Egypt, the Islamic Republic of Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, the Syrian Arab Republic, Tunisia, the United Arab Emirates, West Bank and Gaza, and the Republic of Yemen.

4 United Nations, *2011 Global Assessment Report on Disaster Risk Reduction*, 28.

5 Ibid, 32.

6 GFDRR, "Yemen Floods Post Disaster Needs Assessment."

7 GFDRR, "Djibouti Post-Disaster Needs Assessment (PDNA)."

8 Nail M. Momani and Ayman S. Fadil, "Changing Public Policy Due to Saudi City of Jeddah Flood Disaster," 424–28.

9 UN-HABITAT, *The State of Arab Cities 2012: Challenges of Urban Transition,* 2012, www.unhabitat.org.

of the region's surface area is home to 92 percent of the total population.[10] Citizens in urban areas must deal with floods on a regular basis, with limited structural protection, inadequate citywide drainage systems, and weak nonstructural flood mitigation measures.

The impact of urbanization is especially important in the region's coastal areas, where the largest cities and economies are located. Today, approximately 60 million people (about 17 percent of MNA's total population) live in the region's coastal areas. Rapid growth of informal settlements is resulting in greater exposure to floods. If urban development continues unregulated, this will lead to the creation of new disaster risk.

The future of the roughly 100 million poor people who are the least resilient to disasters is most concerning.[11] According to the Inter-Governmental Panel on Climate Change (IPCC),[12] sea-level rise would cause millions to be displaced in the region. In Egypt alone, a 1-meter rise in sea level is estimated to put 12 percent of the country's agricultural land at risk. The same event would directly affect 3.2 percent of the population in the region, compared to a global figure of 1.3 percent.[13]

Projections by climatologists and United Nations specialists suggest that MNA economies and livelihoods will be the second most affected by climate change.[14] In 2050, the region will likely face a 50 percent renewable water supply gap. Thus, water will need to be imported or desalinated, costing the driest MNA economies at least a 1 percent reduction in GDP.[15]

Governments across the region are increasingly seeking comprehensive disaster risk management (DRM) services. Increasing awareness of DRM issues has brought about progressive policy shifts, as seen in the creation of a number of DRM-specific institutions and investments in programs around the region. These programs, include early warning systems and national and city-level risk assessments. In 2010, for instance, the Islamic Conference of Environment Ministers adopted the Islamic Strategy for Disaster Risk Reduction and Management, which aims to establish comprehensive DRM structures and policies across Islamic countries.

Thanks to the Global Facility for Disaster Reduction and Recovery (GFDRR), since 2007, a range of country-level programs has been launched in Djibouti, Morocco, and the Republic of Yemen to increase their disaster resilience. These programs include activities aimed at improving information availability on disaster risks, developing the policy environment for risk reduction, building capacities in DRM through training at the national and local levels, and creating state-led, post-disaster recovery and reconstruction programs. In Algeria, Djibouti, Jordan, Lebanon, Morocco, Saudi Arabia, and the Republic of Yemen, donor-funded hazard risk assessments have been completed or are ongoing; flood-recovery projects have been launched in Djibouti and the Republic of Yemen; and inter-ministerial steering committees on DRM have been established under

10 World Bank, *Poor Places, Thriving People*.

11 World Bank, *Adaptation to a Changing Climate in the Arab Countries: A Case for Adaptation Governance and Leadership in Building Climate Resilience*.

12 Ibid.

13 Mostafa K. Tolba and Najib W. Saab, *2009 Report of the Arab Forum for Environment and Development*, VIII.

14 World Bank, *Adaptation to a Changing Climate in the Arab Countries.*

15 Ibid.

the prime ministers' offices in Djibouti, Lebanon, Morocco, and the Republic of Yemen, and under the Ministry of Interior in Algeria.

While a certain level of momentum has been building on DRM in MNA, it has not yet been matched with the integrated approaches required to manage disaster risks effectively. In 2012, the region launched a 10-year Arab Strategy for Disaster Risk Reduction, including the reduction of climate change impacts and disaster losses through the identification of strategic priorities; the enhancement of coordination mechanisms; and monitoring at the national, regional, and local levels. Nevertheless, given the region's growing exposure to natural hazards, risk reduction challenges continue to grow. However, systematically building awareness, institutional capacity at the national, regional and local levels, and a solid resource base can help minimize risks. Building these capacities entails taking immediate steps, and taking them collaboratively. Good development planning, informed by risk analysis, will contribute significantly to the path of development while simultaneously enhancing people's lives and their livelihoods.

Decentralization of the DRM agenda has moved slowly, although some countries are making a progressive shift. Most DRM activities continue to be conducted at the national level. However, in Algeria, Egypt, Morocco, and the Republic of Yemen, a slow but progressive shift toward decentralization has begun. In Morocco, community-level DRM activities are being developed, including community maps, training on construction standards, and community early warning systems. The early warning systems are particularly important to empower communities to manage their own risks. The 2012 *Sendai Report*[16] shows that an effective DRM strategy requires a decentralized approach and an appropriate division of resources (human and financial) in all tiers of government. At the local level, city managers are not only the ones with key roles to play. Civil society organizations can also contribute significantly to building local resilience. MNA countries are still among the most centralized in the world, with some of the lowest total local government expenditures (ranging from 3 percent in Jordan to 18 percent in Egypt, compared to the world average of about 22 percent). However, several countries in the region, including Morocco, Tunisia, and the Republic of Yemen, are gradually moving toward greater devolution of powers to lower tiers of government.[17] This shift represents an opportunity to strengthen cities, making them more resilient and increasing their capacity to manage development, and thus support the DRM agenda.

This *Regional DRM Overview* is directed at all DRM stakeholders, but particularly at the MNA Regions' governments, institutions, and partners. This report aims to broaden the dialogue for a more proactive and collaborative management of risks through taking stock of progress in DRM in MNA and identifying gaps for future interventions.

This report builds on the strategic vision, principles, and goals of the MNA Region countries; the Islamic Strategy for Disaster Risk Reduction and Management (ISDRRM); the MNA Strategic Framework for Climate Action; and the World Bank's Strategy Update for MNA. Ongoing and proposed activities aim to scale up existing good practices and continue building DRM capacities in MNA's disaster-prone countries; and increase their medium-term predictability of programming for DRM, while strengthening the delivery of and accountability for results.

16 World Bank and GFDRR, *Sendai Report*.

17 UN-HABITAT, *The State of Arab Cities*.

Furthermore, this report aims to establish a more strategic and collaborative framework between the World Bank and its international partners, particularly the United Nations Office for Disaster Risk Reduction (UNISDR) and the United Nations Development Programme (UNDP), to assist MNA countries' efforts to shift from disaster response to proactive risk management. Approaches used to develop the framework may include implementation of probabilistic modeling; risk assessment (using completed studies in Djibouti, Morocco, Lebanon, and the Republic of Yemen) to sensitize authorities and guide vulnerability reduction strategies; financial disaster risk transfer instruments; and leveraging best practices from around the world and within the region (some of these are presented in this report).

A regional consultation workshop on the draft version of this report, *Natural Disasters in the Middle East and North Africa: A Regional Overview*, was held on November 17–18, 2013, in Jeddah, Saudi Arabia, under the leadership of the Presidency of Meteorology and Environment (PME).[18] The representatives of 14 countries from the MNA Region attended the workshop, aiming to update this report, share regional and international DRM practices, and coordinate closely to tackle disaster risk in the region. The workshop was organized by the World Bank and was attended by 50 participants, including international and regional partners such as the Organization of Islamic Cooperation (OIC) and the Islamic Development Bank (IDB).

18 For more information on the Jeddah workshop, see annex 2.

I. Overview: Natural Disasters in the Middle East and North Africa Region

Regional Profile

Managing disaster risks is one of the most complex development challenges in MNA. Floods, earthquakes, and droughts represent serious challenges to growth and stability in the region. While around the world, the number of disasters has almost doubled since the 1980s, in MNA, the average number of natural disasters has almost tripled over the same period.[19] Approximately 40 million people have been affected by over 350 natural disasters between 1981 and 2010, according to EM-DAT.[20]

The most frequent disasters in the region are floods, earthquakes, storms, and droughts. Over the last 30 years (1981–2011), floods have been the most recurrent disasters recorded in EM-DAT, with at least 300 events (53 percent of the total number of disasters), indicating a strong need for early warning systems. Earthquakes account for 24 percent of the total,[21] and storms and droughts both account for approximately 10 percent. The low percentage for drought, however, is due to limited data availability.

This increase in disasters is mainly due to an increase in exposure and vulnerability across the region. The 2011 *Global Assessment Report on Disaster Risk Reduction* finds that, although global flood mortality risk has been on the decrease since 2000, in MNA, it is still increasing (figure 1). The percentage of GDP exposed to floods has tripled in the region from 1970–79 to 2000–2009.[22] In the Republic of Yemen, cumulative loss in real income over the 5-year period following the 2008 floods in Hadramout was estimated at 180 percent of preflood regional agricultural value added.[23] This large increase can be attributed to a growing concentration of assets at risk, particularly in urban areas, and insufficient structural and nonstructural mitigation measures.

Flash flooding is also increasing in cities across the region. The number of flash floods and people affected or killed has doubled during the last 10 years. These increases are largely due to the construction of new concrete surfaces that cannot absorb water, inadequate city drainage systems, and increased settlement in low-lying areas.[24] Recent

19 www.emdat.be/database. In EM-DAT, events missing data are indicated with zeros for both number affected and number killed. Dates can also be a source of ambiguity (such as inaccuracies in the case of slow onset disasters such as droughts).

20 www.cred.be. While Center for Research on the Epidemiology of Disasters (CRED) statistics are some of the most widely cited in disaster-related research, there are a number of known limitations. The quality of the disaster data is largely dependent on reporting systems, the existence of generally accepted standards, collection methodologies, and definitions. The criteria used by CRED to classify an event as a disaster includes: (i) more than 10 people killed; (ii) 100 or more people affected, injured, or made homeless; (iii) significant damage incurred; and (iv) declaration of a state of emergency and/or an appeal for international assistance. Due to very limited data availability, this report uses EM-DAT as the main database.

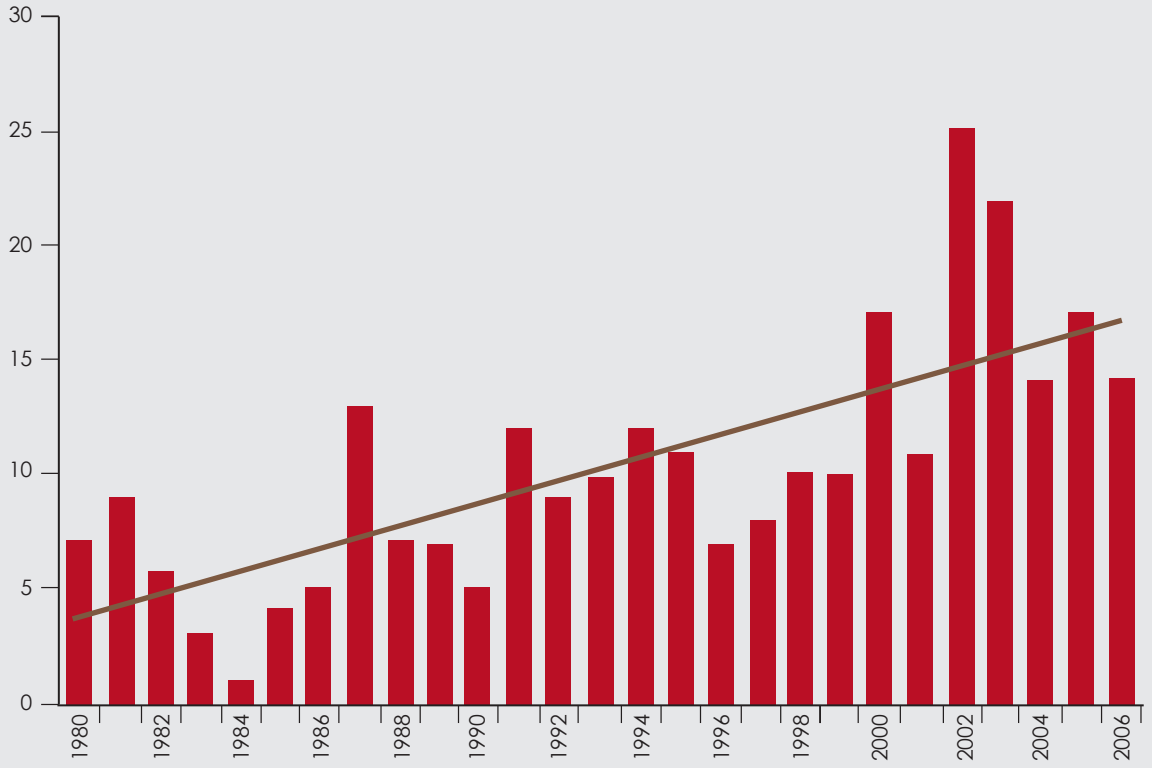
21 Given the 30-year period (1981–2011) taken into account for this report, the data do not include other previous significant hazards, such as the Agadir (Morocco) earthquake that killed 12,000 people in 1960, or the West Bank earthquake in 1927, with an estimated 300 victims.

22 UNISDR, *Global Assessment Report on Disaster Risk Reduction*, 31.

23 Government statistics.

24 World Bank, *Adaptation to a Changing Climate in Arab Countries*.

FIGURE 1. **DISASTER TREND IN MNA REGION**



Source: WRI.

striking examples are the flash floods of Bab-El-Oued in the Algerian capital, which left more than 900 casualties in 2001; or the flash floods that hit Jeddah, Saudi Arabia, in 2009, 2010, and 2011, which were registered as the worst floods in 30 years.[25] Flash floods often follow extensive droughts, such as the devastating Djibouti floods in 2004 after a multiyear water stress. This pattern further demonstrates the need for comprehensive approaches to urban development and water resource management.

Droughts also have considerable long-term impacts in the MNA Region. The number of people affected by drought in MNA from 1970–2009 totals approximately 38 million.[26] In Djibouti, the 2008–11 drought, with its fourth consecutive year of rainfall deficit, affected at least 120,000 people[27]—50 percent of the rural population. From 2008 to 2011, drought caused economic losses equivalent to 3.9 percent of Djibouti's GDP per annum. In Syria, in 2010, following a third consecutive year of drought, 1.3 million people were affected, and 800,000 people lost almost all sources of livelihood and are now facing extreme hardship.

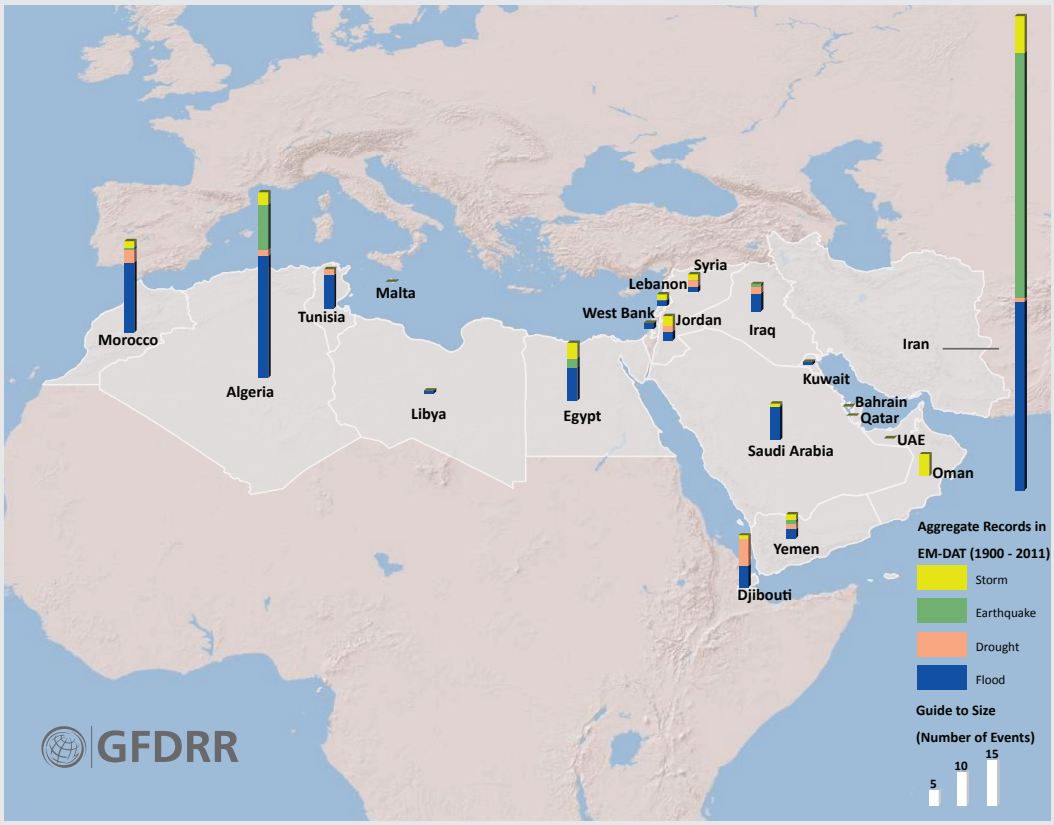
25 EM-DAT.

26 L. Abu Swaireh, "Disaster Risk Reduction Global and Regional Context."

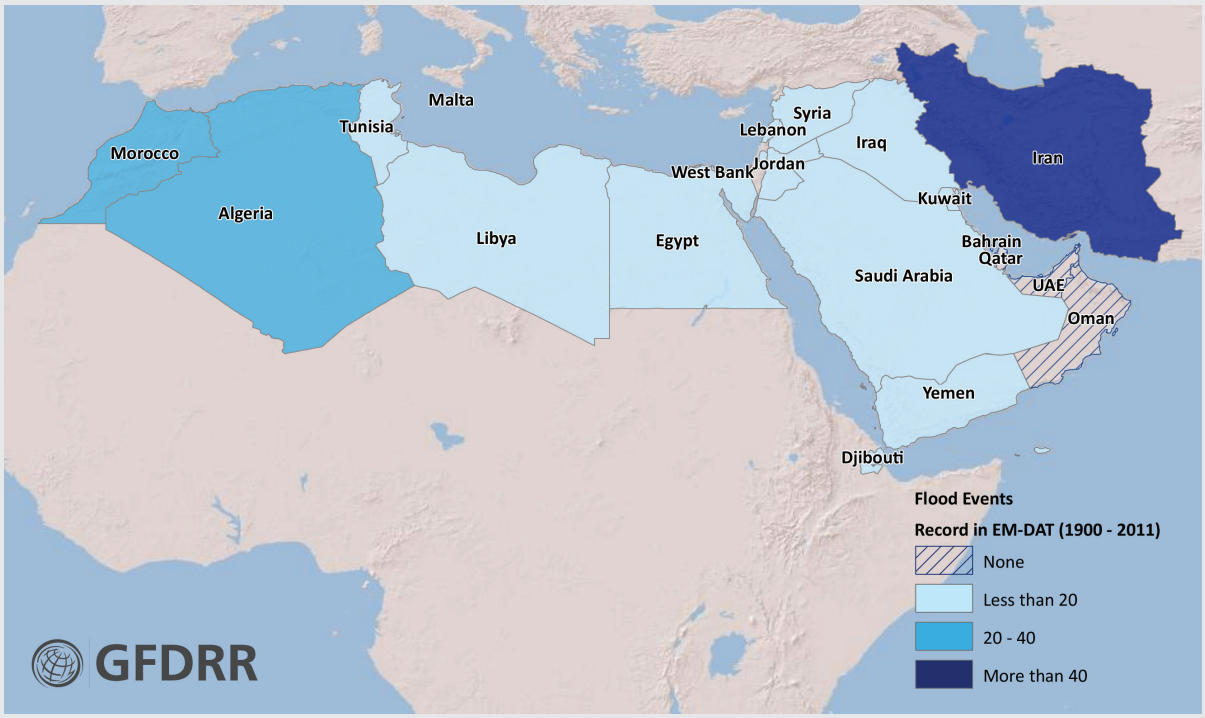
27 This is the official figure of the affected people, even though the government believes that as many as 245,000 could have been affected nationally. There is no hard evidence to back up this figure.

FIGURE 2. **MNA REGION: NUMBER OF DISASTERS, BY DISASTER TYPE, 1980–2006**

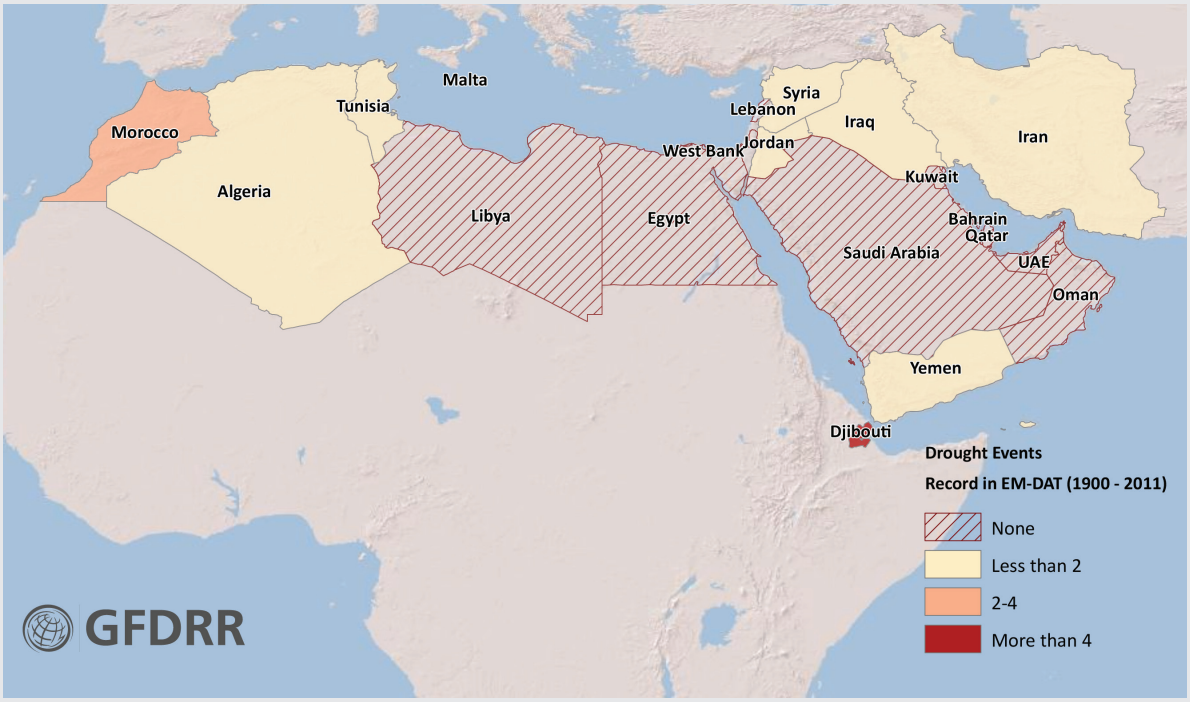
a. Stacked disasters: See figures 2b,c,d, and e for more details on specific natural hazards' frequency and number of affected people.



b. Flood hotspots: Floods are the most frequent disaster occurring in MNA countries. From 1900 to 2011, 213 floods have hit 15 MNA countries, killing almost 19,000 people while affecting 8.6 million others.



c. Drought hotspots: From 1900 to 2011, 28 drought events have been recorded across nine MNA countries, affecting 44 million people. Drought hazard data are limited given the slow onset nature, lack of a solid definition, and insufficient systems in place for measurement.



d. Storm hotspots: Between 1900–2011, more than 20 severe storms have affected the MNA region. The countries most affected have been Iran, Oman, Egypt, and Algeria. According to EM-DAT, more than six storms affected Iran and Oman, and three to six affected Algeria and Egypt.

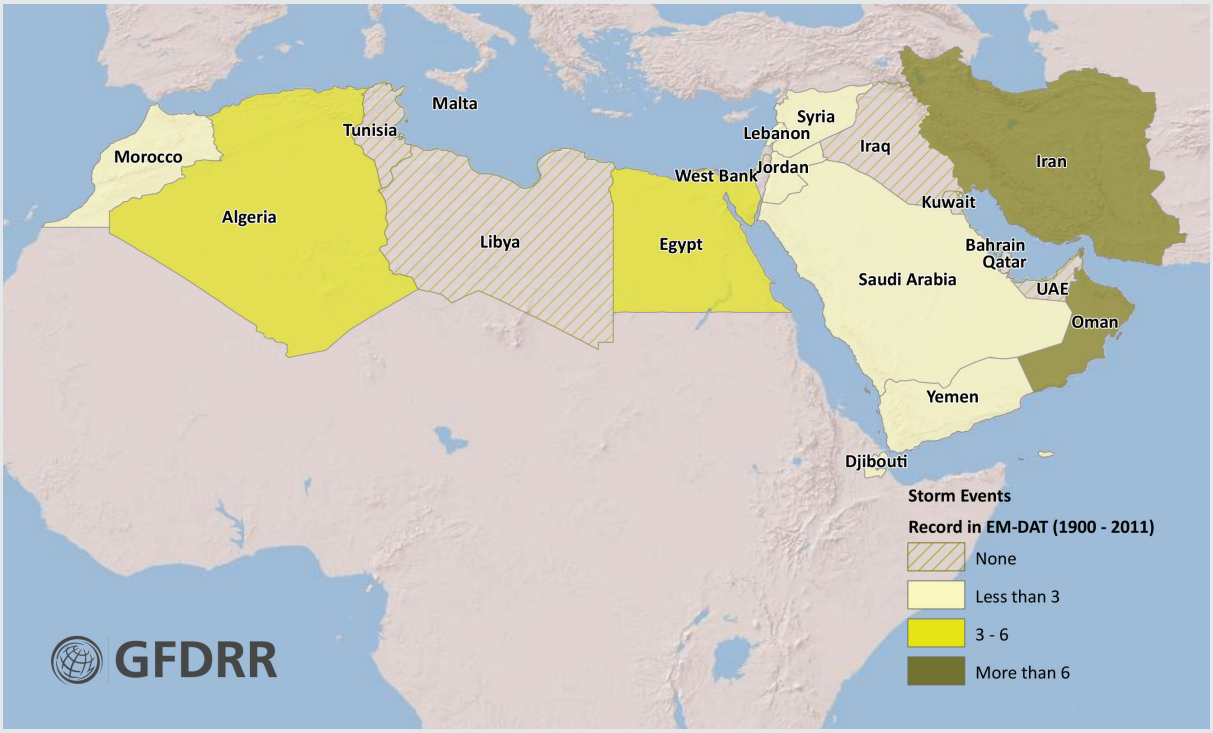


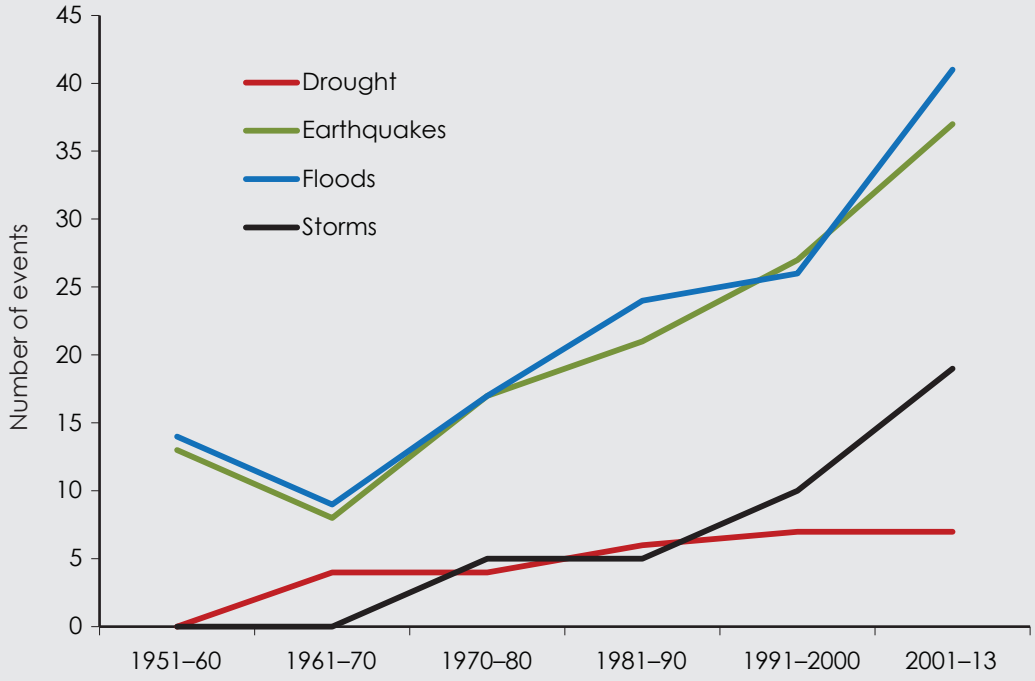
figure 2 continued on next page

FIGURE 2. *CONTINUED*

e. Earthquake hotspots: From 1900 to 2011, Algeria, Djibouti, Egypt, Iran, Morocco, and the Republic of Yemen have been affected by over 100 earthquakes that have killed almost 170,000 people and affected 4.5 million others.

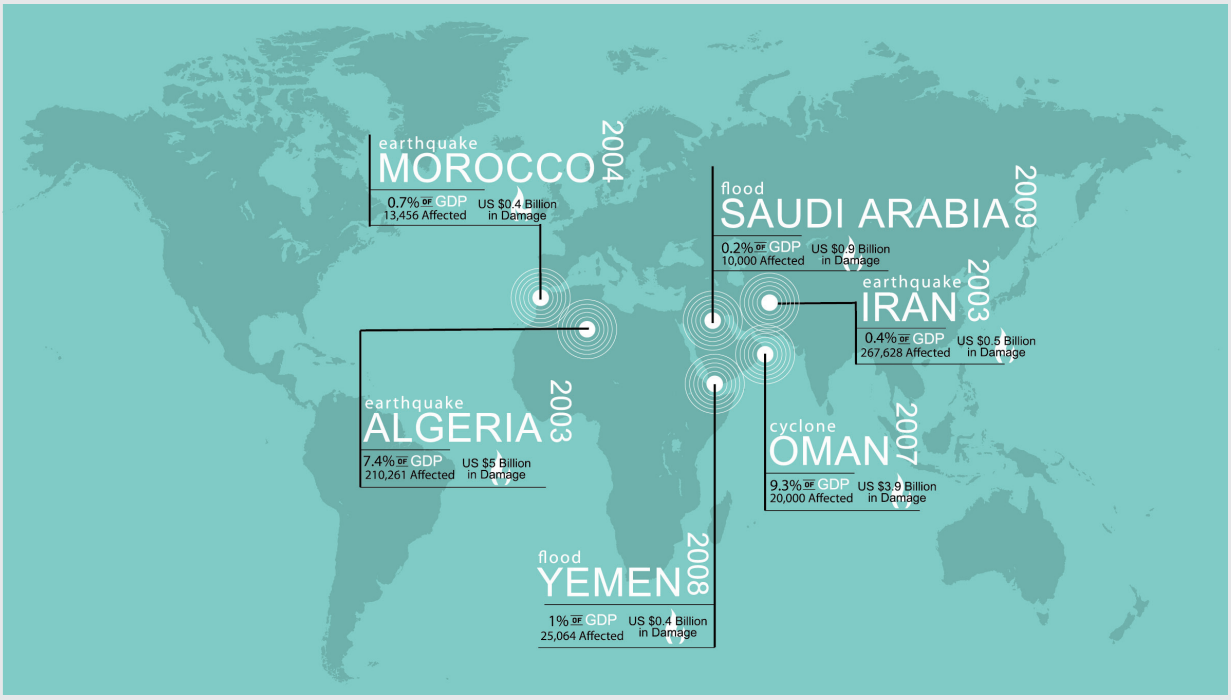
Source: EM-DAT (www.emdat.be), 1900–2011.

FIGURE 3. **AVERAGE NUMBER OF DISASTERS IN THE MNA REGION BY TIME, 1951–2005**



Source: EM-DAT, 1951–2005.

FIGURE 4. **ECONOMIC DAMAGE AND TOTAL NUMBER OF PEOPLE AFFECTED BY DISASTERS IN THE MNA REGION, 1981–2010**



Source: EM-DAT, 2012.

MNA's hazard risk is high. Between 1981 and 2010, more than 80 percent of the region's disaster events occurred in 6 countries: Algeria, Djibouti, Egypt, Iran, Morocco, and the Republic of Yemen. **Djibouti** is highly vulnerable to floods, droughts, desertification, and earthquakes, with approximately 33 percent of its population living in high-risk areas, and 35 percent of the economy vulnerable to natural disasters.[28] **Egypt** has faced 23 large disaster events in the last 20 years—floods, earthquakes, and landslides—causing over US$1.3 billion in damages.[29] **Iran and Algeria** are the most vulnerable to seismic hazards. Earthquakes are responsible for 95 percent of total mortality during disasters in Iran.[30] Ninety percent of Algeria's infrastructure and population are located in areas highly exposed to seismic risk. The **Republic of Yemen** and **Morocco** face recurrent floods, landslides, and earthquakes. Figure 4 shows the total number of people affected by disasters in the region from 1981–2010.

An increase in the frequency of disasters in less-hazard-prone countries has helped bring the DRM agenda to the forefront of development in the MNA Region. For example, since 2009, Saudi Arabia has suffered flash floods resulting in heavy economic and human loss; in 2007, Oman was impacted by cyclone Gonu; Bahrain has become one of the most

28 World Bank, "Natural Disaster Hotspots: A Global Risk Analysis."

29 PreventionWeb: Egypt—Disaster Statistics.

30 EM-DAT, 2011.

vulnerable countries in terms of climate change and frequent sand and dust storms; and Jordan has developed perennial drought conditions (annex 1).

Urban Vulnerability

The high concentration of both the region's population and its economic assets in urban areas is making disasters even more devastating, particularly in coastal areas. Given the MNA Region's arid, mountainous terrain, rural populations have historically concentrated in coastal strips, mountain valleys, and along rivers. As a consequence, 3 percent of MNA's surface is home to 92 percent of its population (approximately 352 million people).[31]

With an average annual population growth rate of about 2.1 percent, MNA has one of the world's most rapidly expanding populations. The region is approximately 62 percent urbanized, and its urban population is expected to double over the next 3 decades. By 2030, the region will have experienced a 45 percent increase in its urban population, corresponding to over 106 million additional urban inhabitants.[32] This rapid urbanization requires the progressive integration of DRM into urban development to limit the creation of new risks.

Urbanization and the youth population will continue to increase the demand for housing and urban services, putting pressure on local authorities to expand access to urban land and provide infrastructure. Affordable housing programs and progress made to date will not be sufficient to prevent the proliferation of informal settlements. The high concentration of youth[33] in urban areas is also causing informal settlements to expand.

In MNA, coastal clustering is exacerbating the effects of natural disasters. Twenty-five to 50 percent of the total populations of Alexandria, Casablanca, Djibouti-Ville, and Tripoli reside in informal settlements. Rapid urbanization, the absence of an integrated urban development strategy, and the lack of local financial and technical resources caused infrastructure backlogs and the inability to meet the growing demand for low-income housing, particularly in the poorer settlements on the outskirts of sprawling cities, mostly due to lack of connections to adequate primary systems. Under these conditions, particularly in North Africa, coastal flooding from increased climate change impacts will continue to threaten the lives of millions of urban residents.

Flooding is also a major risk for urban areas. It is often caused by buildings, infrastructure, and paved areas that prevent infiltration and is exacerbated by overwhelmed drainage systems. The flood that hit Sana'a, Republic of Yemen, in May 2010, is an example. Flooding occurred in low-lying residential areas with inadequate drainage systems, affecting hundreds of homes and killing 8 people. Floods have regularly disrupted livelihoods and society in MNA cities, mainly because of the limited structural protection, insufficient citywide drainage systems, and informal urbanization of catchment areas. Across the region, nonstructural flood mitigation measures are mostly inadequate; early

31 UN-HABITAT, *The State of Arab Cities*.

32 Ibid.

33 The MNA population aged 15 to 29 totals almost 130 million, approximately a quarter of the total population.

warning systems are either only partially functional or have yet to be developed; and emergency plans are not fully operational.[34]

Climate-Related Hazards

Within the region, the synergy of natural hazards, climate change, water scarcity, and food insecurity has emerged as a serious challenge for policy and planning for all countries. Over the past 30 years, climate-related disasters have affected 50 million people in MNA, with a reported cost of US$11.5 billion.[35] This figure captures only partial damages, lacks a systematic assessment, and unfortunately does not capture the suffering and recovery costs that follow the loss of lives and livelihoods.[36]

The effects of climate change are already being felt throughout the region. The year 2010 was the hottest in the region since the 1800s, and 19 countries set new national temperature highs.[37] Recent trends in the region show that, in most areas, temperatures have been rising by 0.2–0.3°C per decade. Additionally, climate models, even at the low end of the range, suggest that sea-level rise, as well as the frequency and intensity of natural hazards, will likely increase in MNA. While these trends have affected or will soon affect most of MNA's population, of major concern are the 100 million poor who have limited resources to adapt. According to the climate projections of the *Fourth Assessment Report of the Intergovernmental Panel on Climate Change*,[38] temperatures in MNA will rise by 3–4°C by the end of the century—a significant 1.5 percent faster than the global average.

Water scarcity makes the region even more vulnerable. MNA is the most water-scarce region in the world, and its water stress is likely to worsen. In 1950, per capita renewable water resources were 4,000 cubic meters (m^3) per year. This figure is currently at 1,100 m^3 per year. Projections indicate that per capita renewable water will drop by half, reaching 550 m^3 in 2050. These figures are very alarming compared to the global average of 8,900 m^3 per person per year today, and about 6,000 m^3 per person per year in 2050, when the world's population will reach more than 9 billion.[39] This trend will have serious consequences for the region's already stressed aquifers and natural hydrological systems.

While the socioeconomic impact of climate change is less clear, recent estimates are concerning. Studies show that the long-term implications of climate change in Tunisia, and the Republic of Yemen are likely to lead to a cumulative decrease in household incomes of, respectively, US$1.8 billion (6.8 percent of GDP) and US$5.7 billion (23.9 percent of GDP) over the next 30 to 40 years.[40]

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34 This is particularly true in MNA's low-income countries. For instance, the Gulf Cooperation Countries have more advanced nonstructural systems.

35 EM-DAT, 2010.

36 World Bank, *Adaptation to a Changing Climate in Arab Countries*.

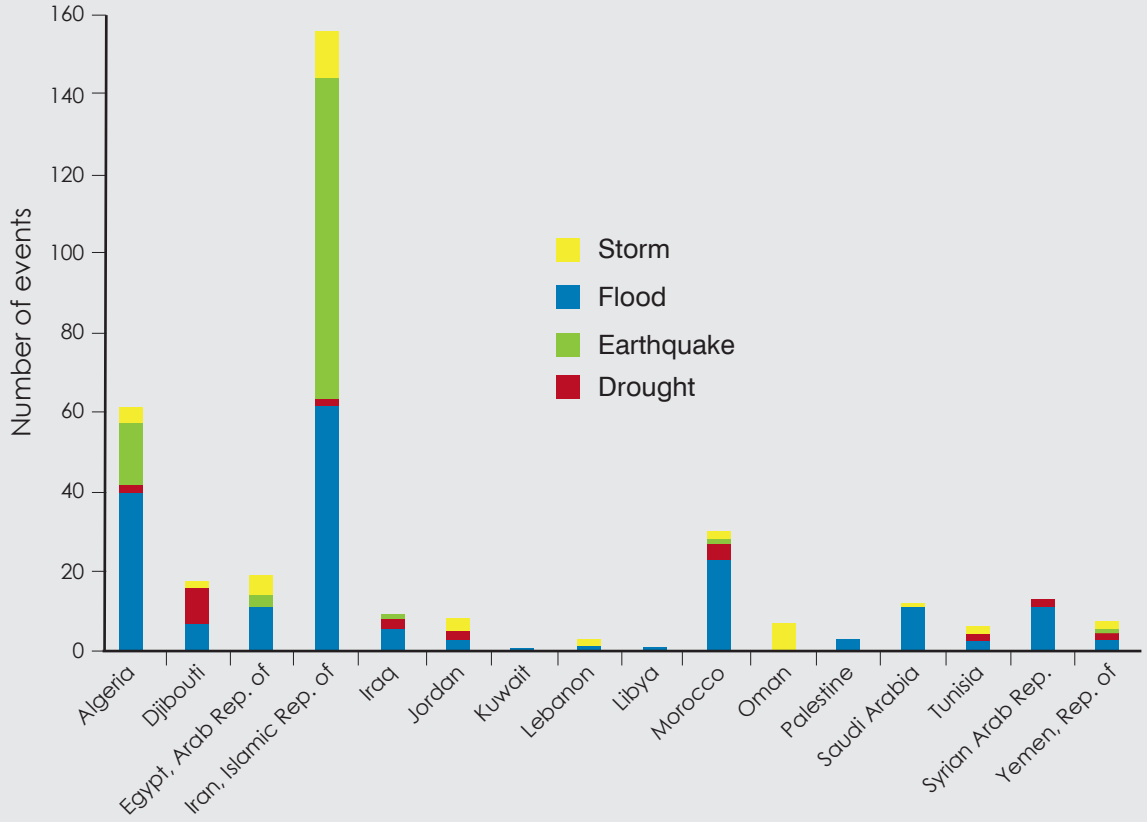
37 Ibid.

38 IPCC, *Climate Change 2007*.

39 FAO AQUASTAT (http://www.fao.org/nr/water/aquastat/main/index.stm).

40 World Bank, *Adaptation to a Changing Climate in Arab Countries*.

FIGURE 5. **COMPARISON OF TOTAL NUMBER AND TYPE OF NATURAL HAZARDS IN MNA, 1980–2010**



Source: EMDAT, 2011.

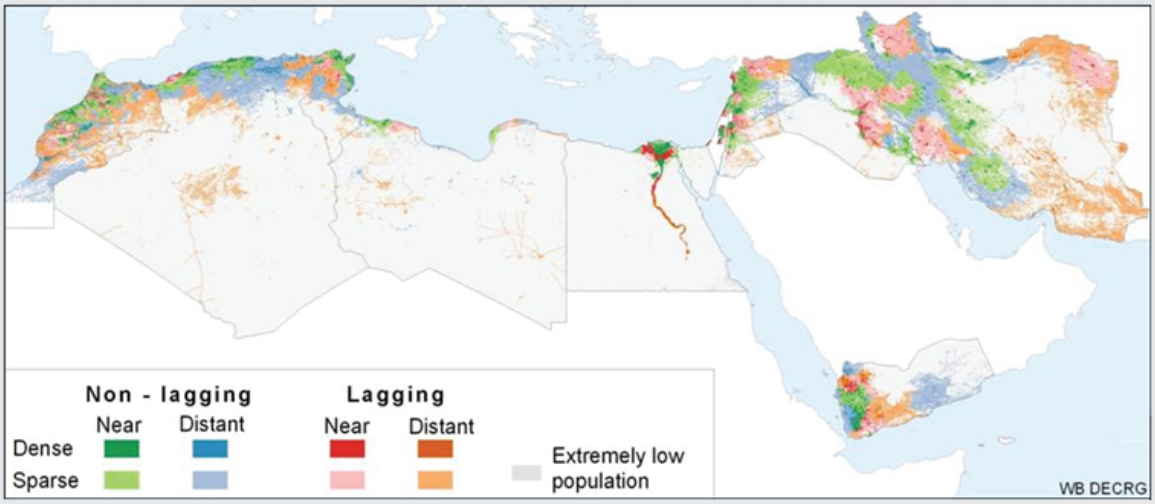
Climate change could make natural disasters more intense and more frequent. According to the Intergovernmental Panel on Climate Change (IPCC),[41] North Africa is the world's second most vulnerable region to emerging climate-related risks. Higher seas would compound storm surges, increasing the risks of marine inundation and coastal erosion. During 2010–30, Alexandria, Casablanca, and Tunis individually will face potential cumulative economic losses of US$1 billion from floods, earthquakes, coastal erosion, ground instability, marine inundation, tsunamis, and water scarcity.[42] The increased frequency of flooding and drought events could expose up to 25 million urban dwellers to floods and droughts. These same climate change effects could lead to a 30–50 percent drop in water availability, exacerbating the existing severe water scarcity.

Climate events could also lead to increased internal migration and displacement. Particularly in rural areas, climate shocks and variability often result in losses in income and assets, such as crops and livestock. Poor households' inability to adjust and recover rap-

41 IPCC, *Climate Change 2007*.

42 World Bank, *Climate Change Adaptation*.

FIGURE 6. **MNA POPULATION DENSITY ESTIMATES, 2011**



Source: World Bank DECRG.

idly results in temporary and sometimes permanent migration, mostly to urban centers. Climatic factors could justify 10–20 percent of rural–urban migration in MNA. Although most migrants' remittances do not actually reach climate-stricken areas, when they do, such remittances can play an important adaptation role.[43]

Sea-level rise induced by climate change exacerbates risk to MNA's coastal cities. Although the World Resource Institute's (WRI) 21st century climate projections carry uncertainty, even the most conservative scenario indicates that sea-level rise will exacerbate existing hazard risks for the North African cities.

Turn down the Heat: Why a 4°C Warmer World Must Be Avoided,[44] is a recent report commissioned by the World Bank that summarizes a range of the direct and indirect climatic consequences under the current global path for greenhouse gas emissions. The report shows that extreme heat waves, which without global warming would be expected to occur once every several hundred years, will be experienced during almost all summer months in many regions. However, the effects would not be evenly distributed. The largest increases in temperature would be expected to occur over land and range from 4–10°C. Increases of 6°C or more in average monthly summer temperatures would be expected in the Mediterranean, North Africa, Middle East, and parts of the United States.

43 World Bank, *Climate Change Adaptation*.

44 World Bank, *Turn down the Heat*.

II. Regional Progress

DRM Efforts and Remaining Challenges

The devastation caused by disasters in MNA has provided opportunities for assessing how risks can be managed. The findings of these assessments have led many MNA governments to take action to build capacities and institutions to manage risks. The 2011 drought in Djibouti, for example, led the government to undertake a Post-Disaster Needs Assessment (PDNA) to understand the impact of the drought and to develop a recovery framework to build long-term resilience. This framework included creating an emergency fund to respond effectively to the drought while establishing cooperation with neighboring drought-affected countries such as Ethiopia, Kenya, and Somalia.

In this rapidly changing environment, the risk management dialogue has deepened, resulting in the strengthening of DRM institutions and the development of policies, action plans, and programs. Disaster risk assessments, early warning systems, risk management laboratories, and knowledge centers have been established. Furthermore, Algeria, Djibouti, Egypt, Lebanon, Morocco, and the Republic of Yemen have established DRM units. However, these units often lack technical and financial capacity and/or a mandate to influence policy decisions.

Significant efforts have also been made to design and enforce new DRM policies, plans, and legislation. Algeria, Djibouti, Egypt, Lebanon, Morocco, and the Republic of Yemen are a few of the countries that have designed policies and established DRM units to strengthen coordination. Such achievements should not be underestimated, even though policies and plans have only rarely been based on reliable information from comprehensive multihazard risk assessments. Policies and plans are also not supported by adequate budgets, and implementation is often dependent on donor support. Additionally, local governments, which play a critical role in DRM, are often not aware of DRM policy changes and lack the know-how to contribute effectively to disaster response and/or mitigation.

Despite the encouraging progress, more needs to be done at regional, national, and local levels. To date there has been limited cooperation among neighboring MNA countries, notwithstanding their common risks, which often transcend borders. However, both the Islamic and Arab regions have developed DRM/disaster risk reduction (DRR) strategies and implementation plans. Within this context, several regional institutions are leading disaster coordination. For example, the Organization of Islamic Conference (OIC),[45] the League of Arab States (LAS),[46] and the Islamic Educational, Scientific and Cultural Organization (ISESCO) are working to enable countries facing similar disaster risks or affected by transboundary disasters to cooperate effectively.

Solid systems that would guarantee dialogue, information exchange, and strategic and operational coordination among different administrative levels and across key sectors

45 www.oic-oci.org.

46 www.lasportal.org.

BOX 1. **NATURAL DISASTERS, CONFLICT, AND MIGRATION**

Natural disasters and conflict are two of the major reasons why some countries remain trapped in poverty. Natural hazards and conflict can undermine social cohesion, create high levels of insecurity, and hinder residents' ability to provide for themselves and progress. When a natural hazard strikes a community that is affected by conflict, it tends to exacerbate the pre-existing inequalities and tensions, impacting vulnerable parts of the population in a disproportionate manner.

To date, the strategies developed for DRR have largely overlooked the interplay between conflict and natural disasters, even though multiple recent examples have shown higher devastation in areas where these two issues intersect. For instance, extensive literature reported that the 2011 Somali famine was the product of drought and extended social and political conflict. At the same time, the Horn of Africa region was also food insecure, but only in Somalia was famine declared. Even within the Somali boundaries, the regions most affected by conflict accounted for the largest number of deaths and refugees.

Natural hazards can, therefore, lead to a disaster situation when combined with pre-existing conflict. But they can also be the source of the conflict in and of themselves. A natural hazard that hits suddenly, such as flash floods and earthquakes, has a more noticeable impact on people's lives than a slow advancing drought. Nevertheless, transboundary water scarcity, which is a major problem in MNA, is increasingly becoming a cause of conflict, leading communities to fight over water-irrigated pastures and forcing people to leave their homes looking for safe access to water. In Darfur, drought was the trigger of a latent dissension—a threat multiplier that led to the displacement of 2 million people, with spillover effects in the neighboring countries taking in the refugees.

DRM strategies of the future need to look at the challenging interaction between conflict, natural hazards, and migration. For all the three issues, the underlying solution is reducing the people's vulnerability.

Source: World Bank.

have yet to emerge. The effectiveness of public awareness campaigns and formal education programs has suffered from a lack of clear, long-term strategies and harmonization of the various objectives pursued across the region. More targeted, hazard- and sector-specific inputs are needed for curricula and training modules and for the identification and activation of local knowledge. In several countries, these targeted inputs include, for example, addressing training needs in safe building techniques. With the exception of some efforts in Dhamar, Republic of Yemen, following the 1982 earthquake, Bam, Iran, following the earthquake in 2003, and Boumerdès, Algeria, after the 2003 earthquake, learning about and applying risk reduction measures too often are pursued in isolation.

Disaster risk financing and insurance (DRFI) instruments are not used in MNA countries. However, the World Bank, the IDB, the Swiss State Secretariat for Economic Affairs (SECO), and the International Finance Corporation (IFC) are collaborating in the development of a feasibility study to assess penetration potential of risk financing instruments in MNA countries.

Few DRM systems have utilized land-use planning and management and influenced investment policies to encourage effective integrated risk management. Instead, different public and private institutions transform the landscape of metropolitan areas; they push different agendas and operate outside the overall coherent risk management framework.

Highlights of Progress at the Regional Level

Some progress has been made in DRM at the regional level. For many years, the focus of governments and regional entities has been disaster response, but lately governments are focusing their efforts on preventive risk management. This shift has been driven by both the rise in human and economic losses from natural disasters and the growing understanding that effective DRM could lead to more resilient economies and livelihoods. The United Nations Office for Disaster Risk Reduction (UNISDR) has continued to promote the campaign, "Making Cities Resilient," to support cities in managing disaster events. Almost 300 municipalities in the region have joined the campaign—20 percent of the global participation.[47] Furthermore, disaster loss databases[48] have been established in eight MNA countries, enabling them to collect and analyze disaster data to better assess disaster trends and impacts.

Regional DRM is facilitated mainly by intergovernmental organizations such as the OIC, League of Arab States (LAS), and their specialized technical agencies, namely ISESCO; the Arab Organization for Agricultural Development; the Arab Academy for Science, Technology and Maritime Transport (AASTMT); the Arab Center for the Study of Arid Zones and Dry Lands; and the Statistical, Economic and Social Research and Training Center for Islamic Countries (SESRIC).

A number of regional initiatives have emerged over the last few years, indicating the rise in importance of DRM in the region. The first is the Arab Cooperation Agreement, which called for the organization of relief operations, approved by the LAS in 1987 and updated in 2009. In 2007, the Arab Ministerial Declaration on Climate Change, drafted by the Council of Arab Ministers Responsible for the Environment (CAMRE), called for the integration of DRR into environmental management and climate change adaptation policies. Furthermore, in 2008, a draft Arab Protocol on Cooperation was developed to enable immediate response within Arab countries[49] and to transfer equipment and expertise in cases of disasters and emergencies. Thereafter, the Regional Centre for Risk Reduction (RCDRR) was established as a joint initiative among the AASTMT, UNISDR, and the chair of both Arab and Islamic Bureau of Environment Ministers. In 2010, an Arab Strategy for DRR 2020 was endorsed by the CAMRE, and the Fourth Islamic Conference of Environment Ministers adopted the Islamic Strategy for Disaster Risk Reduction and Management (ISDRRM). Subsequently, in 2012, the Fifth Islamic Conference of Environment Ministers adopted an executive work plan to implement the strategy. Also in 2012, the first Arab Conference for Disaster Risk Reduc-

47 www.unisdr.org/campaign/resilientcities.

48 DesInventar is a joint effort of UNISDR, GFDRR, UNDP, UN-ESCWA, and SDC. It has been established in Djibouti, Egypt, Jordan, Lebanon, Morocco, Syria, Tunisia, and the Republic of Yemen (www.desinventar.net).

49 "Arab countries" refers to the members of the League of Arab States.

tion, organized by UNISDR, UNDP, the Swiss Agency for Development and Cooperation (SDC), and LAS in Jordan, led to the Aqaba Declaration on DRR in Arab Cities. The declaration sets goals and indicators for reducing disaster risks in the region by 2017. Furthermore, UNISDR leads the MNA DRR Network, which aims to continue improving regional coordination.

Starting in 2012, the ISDRRM and its associated executive work plan put in place a two-phase, eight-year approach for building regional resilience to disasters. The first phase will focus on:

(i) Strengthening DRR capacity in Islamic countries[50]

(ii) Improving understanding of risks and data access

(iii) Advancing regional initiatives for DRR

(iv) Promoting disaster risk financing and insurance strategies

(v) Helping countries prepare for disasters and strengthen post-disaster response and reconstruction capacity

(vi) Laying the foundation for the second phase, which will focus on implementing comprehensive DRM programs.

The ISDRRM aims to provide a harmonizing guideline for building regional resilience to disasters.

International institutions are increasingly working together to build disaster and climate resilience in MNA. Since the beginning of the GFDRR-funded DRM program in MNA in 2007, cooperation among the World Bank, the UNDP, UNISDR, the European Union, the Islamic Development Bank, and others has improved considerably. Improvement is in part demonstrated by the effective completion of the flood PDNA in the Republic of Yemen in 2009, and the drought PDNA in Djibouti in 2011. However, these international actors should build on these encouraging results and continue cooperating with other stakeholders to ensure continued improvement in aid effectiveness and coherence.

Highlights of Progress at the National Level

The following priorities for action are based on the Hyogo Framework for Action (HFA), which is the internationally agreed framework for DRR offering a practical guide and principles for building disaster resilience (figure 7). These HFA priorities aim to reduce disaster losses at national and community levels. Overall, since the establishment of the HFA in 2005, most MNA countries have obtained institutional commitment with-

50 "Islamic countries" refers to: Afghanistan, Albania, Algeria, Azerbaijan, Bahrain, Bangladesh, Benin, Brunei-Darussalam, Cameroon, Chad, Côte d'Ivoire, Djibouti, Egypt, Gabon, The Gambia, Guinea, Guinea-Bissau, Guyana, Indonesia, Iran, Iraq, Jordan, Kazakhstan, Kuwait, Kyrgyz Republic, Lebanon, Libya, Malaysia, Maldives, Mali, Mauritania, Morocco, Mozambique, Niger, Nigeria, Oman, Pakistan, Palestine, Qatar, Saudi Arabia, Senegal, Sierra Leone, Somalia, Sudan, Suriname, Syria, Tajikistan, Togo, Tunisia, Turkey, Turkmenistan, Uganda, the Comoros, the United Arab Emirates, Upper Volta, Uzbekistan, and the Republic of Yemen.

BOX 2. **INTEGRATED RISK MANAGEMENT IN MOROCCO**

In 2008, Morocco requested assistance from the World Bank to manage its exposure to risks that have the potential to significantly impact its budget and severely affect local communities, livelihoods, and social stability. These risks were prioritized by the government as: (i) commodity price volatility, (ii) natural disaster risk, and (iii) risk in the agricultural sector.

This initiative, National Catastrophe Risk Assessment and Strategy in Morocco, looks at several types of risks simultaneously to provide a comprehensive analysis of risk management for a middle-income country, such as Morocco. Hence, a large number of partners came together in a truly "integrated" approach to provide nonlending technical assistance amounting to approximately US$2 million—including the World Bank and a government team with different specialties, with funding and technical assistance from GFDRR, the Swiss Cooperation, the First Initiative, and the Trust Fund for Environmentally and Socially Sustainable Development (TFESSD). Other partners include the German Agency for International Cooperation (GIZ), the Morocco Red Crescent Society, and UN agencies.

Destruction during Al-Hoceima earthquake, 2004

The project has three components:

(i) Commodity price volatility—Review of existing financial mechanisms that contribute to managing commodity price volatility in Morocco and the ability of the government to engage in a call option strategy to reduce Morocco's exposure to oil price volatility.

(ii) Natural disaster risk—

  (a) National probabilistic risk assessment—Provide a national probabilistic risk assessment (tsunami, earthquake, flood, landslide, and drought) that will lay the foundation for the preparation of a comprehensive national disaster risk prevention and management strategy and related investment to reduce Morocco's exposure to these hazard risks.

  (b) Community-based DRR—The team is working with the Ministry of Interior to design community-level resilience plans based on field surveys of risk perception to be integrated into the Community Development Plans of 2015.

  (c) Assessment of catastrophic risk insurance—The World Bank is working with the Department of Insurance and Social Protection of the Ministry of Finance, which has produced a draft law on catastrophic risk prepared by the Ministry of Finance and the Moroccan insurance sector.

(iii) Risk in the agricultural sector—The Ministry of Agriculture and Marine Fishery initiated a study to assess the potential risks affecting the agricultural sector to identify those that could be transferred to the insurance sector. Currently, one multirisk insurance product is available, and other insurance products to cover livestock and perennial crops are being developed.

Some important pieces of quantitative analysis were conducted over this period that reveal, for example, that Morocco is one of the countries most vulnerable to natural hazards in the MNA region. The national probabilistic risk assessment shows that over 30 percent of the Moroccan population and 33 percent of its GDP are at risk from two or more natural hazards, and the country suffers an average annual loss of over US$650 million from natural hazards.

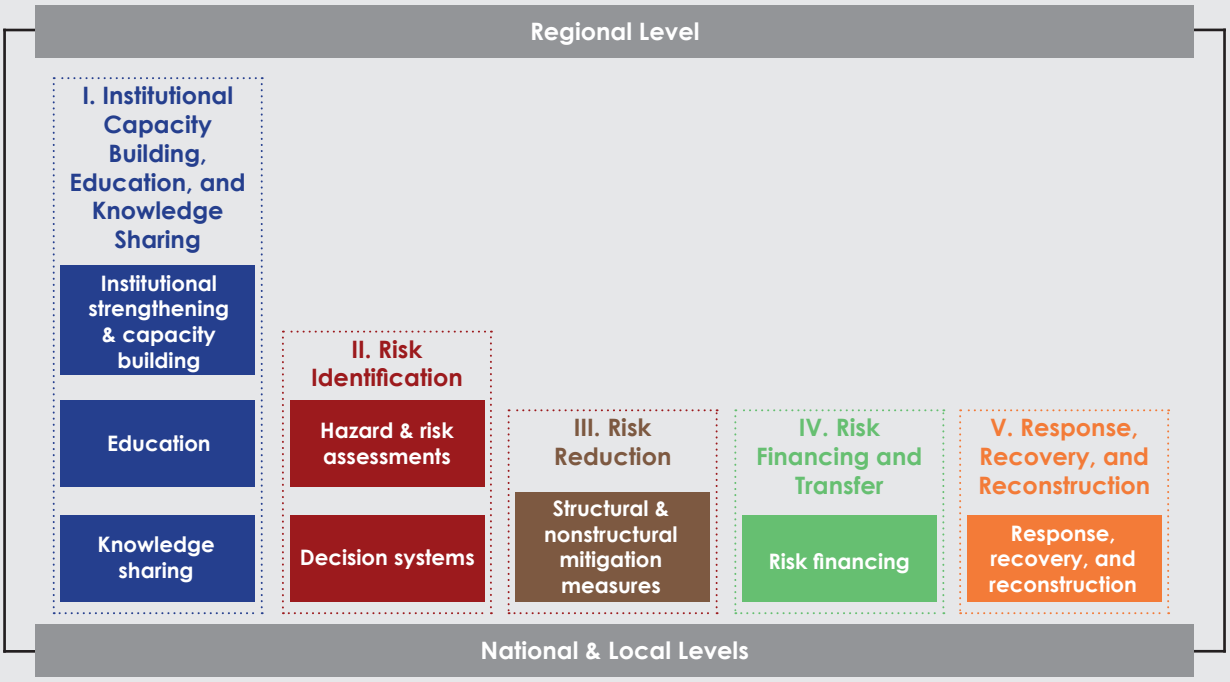
continued on next page

BOX 2. *CONTINUED*

Given the magnitude of risks faced by Morocco, the government is now engaging in a long-term integrated risk management project with the World Bank. The program aims to increase awareness of risks at all levels and apply integrated solutions to risk management, while embedding the concept in the policy-making apparatus of the government, with a focus on prevention and building resilience.

Source: Comprehensive Disaster Risk Management Program in Morocco, GFDRR.

FIGURE 7. **HYOGO FRAMEWORK FOR ACTION PILLARS**



Source: GFDRR and HFA.

out major achievements.[51] However, there have been five main progress drivers: (i) governments are increasingly taking a multihazard approach to DRR; (ii) gender is becoming recognized as a decisive factor; (iii) capacity development is recognized as a central element in reducing disaster risk; (iv) the socially and economically vulnerable are the most exposed; and (v) effective DRR requires strong community engagement.

The following pillars were chosen based on the MNA countries' HFA focus, given that most governments have been reporting on their DRM progress in achieving the HFA objectives. Nevertheless, the World Bank is also taking into account the principles highlighted by the GFDRR Pillars (figure 10) in the *Sendai Report* in 2012, which focus more on the DRM tools available rather than the outcomes.

51 *Implementation of the HFA—Summary of Reports* (2007–13), www.unisdr.org/we/inform/publications/32916.

Pillar I. Institutional Capacity Building, Education, and Knowledge Sharing

Political commitment: Leaders have demonstrated political commitment to DRM in several ways, including the approval of regional and national strategies. Following the devastating urban floods of 2009 and 2010, Saudi Arabia, in partnership with the World Bank, has been developing a comprehensive national risk assessment to reduce future impacts of natural hazards. In Morocco, similarly to Tunisia, the government is working to develop and employ state-of-the-art tools to better measure, manage, and finance several of its key risks. These range from commodity price volatility to natural disaster risks and risks in the agricultural sector (box 2). Some government commitment has improved at the local level as well. For example, in 2013, nine Arab cities reported for the first time on their progress and challenges in reducing disaster risk, using UNISDR's new Local Government Self-Assessment Tool.[52] However, while DRM is beginning to receive attention from decision makers, these encouraging initiatives remain isolated.

Frameworks: Given the region's high exposure to natural hazards, there is increasing agreement that hazard risks need to be addressed more strategically and systematically. The growing attention to DRM is also the result of the increasing alignment of national policy to the HFA, which brings together international stakeholders around a common coordinated system to take action and track progress in reducing the loss of lives and social, economic, and environmental assets by 2015.[53] Nevertheless, no MNA country yet has established a comprehensive national DRM framework.

Institutional arrangements: Many MNA countries have established national focal bodies for coordinating DRM activities in line with ministries or departments. Most of the time, these bodies are anchored in ministries of interior and environment, with the latter being responsible for sustainable development issues.

Coordination mechanisms: National coordination mechanisms exist in the form of national committees in multiple countries including Algeria, Bahrain, Djibouti, Egypt, Iraq, Morocco, and the Republic of Yemen.[54] The purpose of these bodies is to establish nationally owned and led multistakeholder forums on DRR and to serve as an advisory group on key priority areas requiring concerted action.

Policies: A number of DRM policies have been put in place in the region. In Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Lebanon, Morocco and the Republic of Yemen, DRM policies either have been developed or are being updated and/or developed. Other countries, including Jordan and Saudi Arabia, have begun the process, with technical support from GFDRR and other donors.

Integration of DRM into development plans: Although there are a few examples in the region, DRM has yet to be successfully integrated into country development planning processes. However, since 2010 in Djibouti, DRM has been integrated into the National Initiative for Social Solidarity, which is the country's main development plan. The document identifies key DRM and climate change adaptation (CCA) interventions, including

52 The cities were Aqaba (Jordan), Byblos (Lebanon), Choueifat (Lebanon), Dubai (United Arab Emirates), Tevragh Zeina (Mauritania), Petra (Jordan), Saida (Lebanon), Tyre Union Municipalities (Lebanon), and Tripoli (Lebanon).

53 The HFA is a 10-year plan to make the world safer from natural hazards. It was adopted by 168 member states of the United Nations in 2005 at the World Disaster Reduction Conference.

54 In Djibouti and the Republic of Yemen, these committees are not fully operational.

water management, climate monitoring, and community preparedness as key development priorities. Morocco is also integrating DRM into its community development plans.

DRM mainstreaming in educational modules: The AASTMT, through its Regional Center for DRR, has developed a DRM e-learning laboratory through which it has been providing DRM distance learning to MNA countries since 2010. Additionally, in early 2012, the University of Djibouti started providing quarterly DRM e-learning nationwide (through its distance education center). DRM modules also have been integrated into university curricula in both Djibouti and Lebanon. In Jordan, more than 2,000 officials have received training in DRR.

South–South knowledge exchange: To share DRM best practices, 3 South–South exchanges were organized in 2012–13. One consisted of a study tour of a Djibouti technical delegation to experience firsthand how Kenya and Mozambique have streamlined drought and flood management at the community level, with a strong focus on resilient agriculture. The second exchange involved Algiers (Algeria) and Jakarta (Indonesia) city-level officials, who exchanged views on mainstreaming DRM considerations in urban development planning. The discussion revolved around key challenges and opportunities identified, and the lessons learned to better manage DRM at the city level with large urban populations at risk. The third cooperation enabled the Moroccan and Vietnamese authorities to exchange their experiences in flood management at the community level.

Poverty Reduction Strategy Papers (PRSPs): Djibouti and the Republic of Yemen are good examples of progressive integration of DRM into their development strategies. In Djibouti, since 2010, the government has recognized[55] the need to address disaster response and mitigation. Through GFDRR grants, Djibouti has completed and expanded its national DRM action plans, early warning system, drought early warning system, hydro-meteorological stations network, and risk assessment and communication platform. In the Republic of Yemen, the government is prioritizing the shift from disaster response to more proactive multisectoral disaster mitigation by implementing the recommendations of the 3 comprehensive hazard risk assessments completed in 2010. Key activities will include: establishment of a national DRM fund and decision-support system (decree for its establishment was approved by the government in June 2012) for disaster preparedness, response, and reconstruction; bringing online of the five civil defense operational rooms; and establishment of a flood early warning system to enable effective disaster response.

Country Assistance Strategies (CASs) and Country Partnership Strategies (CPSs): The second pillar of Algeria's CAS is dedicated to DRM and environmental sustainability. Other CPSs, for example, Morocco's, acknowledge the impact of disasters and climate change while recognizing that vulnerability to climate change and natural disaster risks can pose a threat to the country's high-value assets in critical sectors in urban areas. Although no concrete mitigation and adaptation activities have been initiated, the government of Morocco is trying to raise awareness of climate change while strengthening coordination within DRM and CCA departments and agencies.

United Nations Development Assistance Framework (UNDAF): The latest UNDAFs for nine of the MNA countries make explicit references to DRM and disaster prevention,[56] as well

55 Since 2009, the Djibouti government has replaced the PRSP with the National Initiative for Social Development.

56 Algeria, Djibouti, Iraq, Jordan, Libya, Morocco, Palestine, Saudi Arabia, and Tunisia.

BOX 3. REDUCING AND AVOIDING RISK: MUNICIPAL DEVELOPMENT AND FLOOD PROTECTION IN THE REPUBLIC OF YEMEN

The city of Taiz and its surroundings have suffered severe flash flooding over the last two decades. Through the World Bank–financed Municipal Development and Flood Protection Project, major parts of Taiz, including downtown, were transformed into habitable and flash flood–secure neighborhoods. The project's impact on the lives and livelihoods of the people in Taiz is substantial. The structures built under the successive phases include 10 km of open channel, 21 km of covered channel, 85 km of stone and asphalt paved roads, 54 km of sewer line, 21 sedimentation traps, and 3.2 km of above-street-level retaining walls. Among many other benefits, the project contributed to lowering the number of deaths from flooding from an average of six people a year over the last decade to zero since project implementation.

Source: World Bank and GFDRR, *Sendai Report*.

as to CCA. UNISDR supported UN country teams to ensure mainstreaming of DRR into the planning documents. Most of the proposed activities focus on improving capacities and raising awareness among the population. Algeria, Iraq, and Morocco emphasize fighting drought and desertification, while in Djibouti, the resulting food insecurity is also a major concern. Jordan's and Morocco's UNDAFs advocate for green growth, and the Republic of Yemen's promotes building resilience to natural hazards at the community level.

Awareness and capacity building: Overall, the World Bank has provided programmatic capacity-building support resulting in considerable progress in raising DRM awareness among all stakeholders. In Djibouti and the Republic of Yemen, for instance, since 2008, periodic DRM, DRR, and CCA trainings have been organized collaboratively with UNDP, ministries responsible for DRM, and international partners. The same agencies have all participated in periodic international training and have shared their experiences with other regional DRM actors. Additionally, online DRM platforms and courses were transferred from the World Bank to the RCDRR in 2010 and to the University of Djibouti in 2012, enabling both institutions to successfully offer periodic DRM e-learning in English and French across the region, training at least 300 technical staff from MNA. The University of Djibouti also has a program to mainstream DRM modules in university courses such as engineering and geography.

Institutional development: To build stronger institutions for DRM, new types of training, including international seminars, South–South exchanges, and e-learning courses have been provided to policy makers, practitioners, and academics. However, no assessment has been conducted to determine what types of capacities need to be strengthened and how to translate these trainings into policy change. In particular, institutional capacity needs to be developed while remembering that:

- **Different skills needed for different aspects of DRM.** In MNA, in many ways, DRM is still equated with emergency management. The identification of capacity development for preparedness, response, reconstruction, and long-term planning by thematic area and sub-specialization needs has yet to take place.

- **No assessment of skills offered.** The most common risk reduction activity in MNA is training offered within and outside the region. However, assessment of training quality, including assessment of skills obtained, used, and retained, particularly to determine the gaps, needs to be carried out more systematically.
- **Insufficient dedicated resources and systems for capacity building.** Dedicated budgets and systematic national and local initiatives to build DRM capacity are limited. Countries require long-term skills development rather than one-off, project-driven interventions that may restrict the type of skills development to those based on project objectives.
- **Capacity retention and skills updating.** Processes for the retention of capacity and skills updating need to be strengthened. In disaster reconstruction, for example, stakeholders develop technical capacities that most often are not well retained after project completion. Government staff involved in reconstruction are either absorbed into parent agencies or transitioned to other government jobs.
- **Stronger DRM coordination.** An effective centralized coordinating office or agency for DRM can ensure that action is taken throughout line ministries and the government. Such coordination is often very effective if linked directly to the office of the prime minister.

DRM agenda not sufficiently decentralized: Most DRM activities continue to be conducted at the national level. However, in Algeria, Egypt, Morocco, Tunisia and the Republic of Yemen, a slow but progressive decentralization has begun. In Morocco, community DRM activities (community maps, training on construction standards, and community early warning systems) are being developed at the local level. Community DRM is particularly important because disasters often significantly impact communities, which therefore need to be empowered to manage risk. The 2012 *Sendai Report*[57] shows that an effective DRM strategy requires a decentralized approach and an appropriate division of resources (human and financial) at all tiers of government. At the local level, not only do city managers have a key role to play, but also civil society organizations can significantly contribute to building local resilience. As noted earlier, MNA countries are still among the most centralized in the world, with some of the lowest total local government expenditures (ranging from 3 percent in Jordan, 8 percent in Iran, and 18 percent in Egypt compared to the world average of about 22 percent). Nevertheless, several countries in the region are progressively moving toward greater devolution of powers to lower tiers of government. This shift represents an opportunity to strengthen cities and their capacity to manage development, and thus support the DRM agenda. City managers can implement a combination of structural and nonstructural measures to address urban flood risks in an integrated manner, not only tackling today's risks, but longer-term issues due to climate change, as was done in Sana'a, Yemen, and Tripoli, Lebanon (boxes 3 and 8).

Pillar II. Risk Identification

Risk information: The provision of risk information is the first crucial step of any DRM program and a precondition for effective identification of risk accompanied by the

57 World Bank and GFDRR, *Sendai Report*.

appropriate interventions. The level of understanding of risks based on risk assessments in the MNA Region is generally low and needs to be strengthened. Following requests from national and local governments in MNA, the World Bank assisted in conducting hazard and risk assessments in Djibouti, Lebanon (Tripoli[58]), Morocco, and the Republic of Yemen, with upcoming assessments in Saudi Arabia. There are also some international initiatives such as the Global Earthquake Model, which develops earthquake risk models for countries including Algeria and Egypt, although significant data gaps exist in risk information. Basic components of risk assessments include historical events, hazard maps, and information on infrastructure characteristics, administrative boundaries, and census data, which are often difficult to obtain. Hydro-meteorological and geological data are very limited throughout the region. Additionally, a geospatial map of residential and public assets is seldom available or comprehensive.

Integration of DRM with the climate change agenda: Although the climate change and DRM agendas are highly intertwined, they have not often been dealt with in a mutually reinforcing manner. However, encouraging efforts for their integration have been undertaken in North Africa (Egypt, Morocco, and Tunisia) through the GFDRR-funded *Climate Change Adaptation and Natural Disasters Preparedness in the Coastal Cities of North Africa* study (completed in 2011).[59] This report has enabled identification and prioritization of city-level CCA and DRM investments while building local awareness of climate and hazard risk. Other examples in which CCA and DRM have come together are in Egypt, through its CCA strategy (launched in 2012), and in the Republic of Yemen, through its Pilot Program for Climate Resilience (PPCR). PPCR aims to expand the national climate data system to help operationalize weather forecasting, data management, and early warning systems.

Furthermore, to better integrate the climate adaptation debate into DRM, in 2012 the region launched a 10-year Arab Strategy for Disaster Risk Reduction. This strategy included the reduction of climate change impacts and disaster losses through identification of strategic priorities; enhancement of coordination mechanisms; and monitoring at the national, regional, and local levels.

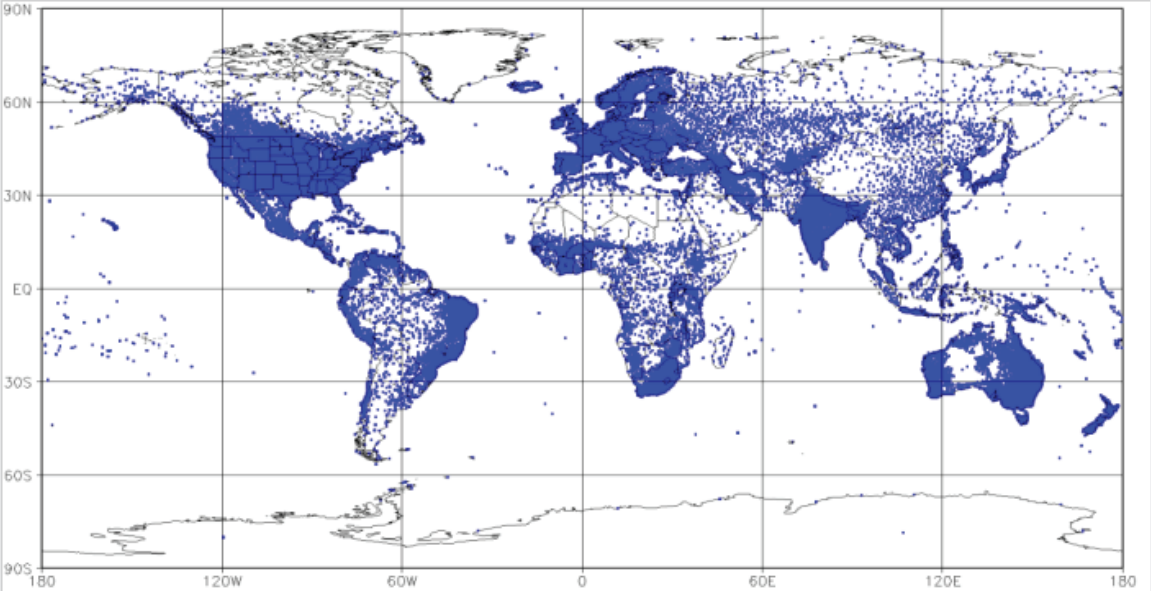
Hazard and climate data: Meteorological stations' coverage is not uniform across MNA countries, thus potentially hindering their ability to effectively predict and communicate hydro-meteorological events (figure 8). Numerous meteorological stations exist along the Nile and the coast of the Mediterranean Sea. However, in the less inhabited areas, coverage is very limited. Sparse data are available for countries and economies, including Djibouti, Libya, Saudi Arabia, West Bank and Gaza, and the Republic of Yemen. For other countries, including Algeria, Tunisia, Egypt and Iraq, data are probably available but not readily accessible. Moving forward, the establishment and/or replacement of observation sites and automatic weather station monitoring will be necessary to build more rigorous weather forecasting and modeling systems.[60]

58 The risk assessment performed in Tripoli, Lebanon, was not a comprehensive hazard risk assessment, but rather a rapid hazard risk assessment, including a hazard inventory compiling all the relevant data and studies performed.

59 World Bank, *Climate Change Adaptation and Natural Disasters Preparedness in the Coastal Cities of North Africa.*

60 World Bank, *Adaptation to a Changing Climate in Arab Countries.*

FIGURE 8. **SPATIAL DISTRIBUTION OF MONTHLY STATIONS WITH AT LEAST 10 YEARS OF DATA**



Source: World Bank, *Adaptation to a Changing Climate in Arab Countries.*

Pillar III. Risk Reduction

From disaster response to risk reduction: Several MNA countries have progressed in this area, shifting focus from disaster response to risk reduction. This shift can be attributed to their commitment to HFA objectives. This policy shift varies from country to country, depending on each country's governance capacity and socioeconomic parameters. Djibouti, Egypt, Morocco, and the Republic of Yemen have made significant progress in shifting from post-disaster relief to disaster preparedness, mitigation, and risk reduction. For example, in Morocco, the government is considering investing in risk reduction infrastructure such as constructing dams in flood-prone areas and retrofitting schools and key public assets in seismic areas based on identified risk zones. In the city of Taiz, Republic of Yemen, through successive International Development Association (IDA) financing of US$16 million, US$45 million, and US$20 million, flood-control structures were built that have significantly reduced residents vulnerability, improved their health, and increased land values (box 3).

Building codes: Several MNA countries, including the most earthquake prone—Algeria, Iran and the Republic of Yemen—have incorporated standards and codes for construction practices relating to structural safety from natural hazards, in addition to zoning guidelines such as buffer zones in coastal belts. However, the biggest difficulty for MNA countries concerns the enforcement of codes and regulations arising from complex land tenure conditions and the lack of clearly designated authority and ability to impose sanctions. Furthermore, there is a general perception that adding disaster resilient features into structural design may be costly and ineffective. Another challenge lies in monitoring construction quality and in ensuring compliance with the prescribed norms. The

latter is aggravated by the unavailability of comprehensive and specific checklists for disaster impact assessment.

Pillar IV. Risk Financing and Transfer

Budgets: Although some contingency funds exist for emergency response in Djibouti, Morocco, and the Republic of Yemen, most countries do not systematically allocate budgets for DRM or relief operations. These funding mechanisms are established in the aftermath of a disaster, and tend to dissipate as memory of the disaster fades.

Given the multisectoral nature of hazard risks, an innovative concept of combining financing solutions for risks was developed in early 2010, when the Yemeni government decided to establish a single mechanism for risk management under the Prime Minister's Office. This mechanism is expected to function as a "one-stop shop" for the execution of government- and donor-funded risk management, whether these risks arise from natural hazards, climate change, food security, or water scarcity.

Risk financing:[61] The penetration of risk financing in the region has been relatively weak. However, many countries are finding it increasingly difficult to finance disaster recovery and reconstruction from government budgets. While appropriations are sometimes made for emergencies, actual budgetary outlays on such events often end up being well in excess of budgeted amounts and result in reallocations or increasing country deficits through borrowing. In Morocco, for example, the government is contemplating a law to add a compulsory guarantee against catastrophe risk to property insurance policies. This law would use risk-based pricing to increase coverage of private assets against disasters, thus indirectly reducing GoM's contingent liability. This law would follow international best practices in which governments are working to reduce their contingent liabilities for natural disasters. In Indonesia, the government is drafting a disaster-risk-financing strategy to ensure that funds can be immediately accessed after a disaster. Numerous other regions such as the members of Association of South East Asian Nations (ASEAN), southeastern Europe and the Caucasus, and the Caribbean Islands are increasing their economic integration by leveraging regional solidarity for risk pooling and by creating new investment opportunities for investor states through disaster risk financing and insurance.

Pillar V. Response, Recovery, and Reconstruction

Institutional arrangements: Institutional planning for DRM is still focused on emergency response. Most MNA countries manage DRM through a stand-alone coordinating agency that is responsible for coordinating risk profiling and mapping, supporting the development of policy and legislative documents, and leading preparedness and response planning. These agencies normally lack the know-how to perform all these tasks effectively, and do not have the political authority to influence policy decisions. Countries with effective DRM programs, such as Colombia, generally have specialized agencies with considerable political influence, often within the ministries of planning or finance.

61 For more information on disaster risk financing and insurance, see GFDRR: www.gfdrr.org/node/272.

World Bank instruments to assist MNA countries in emergency response: The Crisis Response Window (CRW) is a specific IDA funding window for concessional assistance for post-disaster recovery and reconstruction. This funding is in addition to IDA's country allocations. Piloted in 2009, the CRW was first triggered in response to the Horn of Africa Drought in 2011, which included Djibouti, Ethiopia, Kenya, and Somalia. In Djibouti, the CRW enabled the mobilization of US$13.2 million (box 4) for productive safety nets, water mobilization, and energy security.

BOX 4. **DJIBOUTI DROUGHT POST-DISASTER NEEDS ASSESSMENT**

- In 2011, the World Bank, the European Union, and the United Nations supported Djibouti in developing a Post-Disaster Needs Assessment (PDNA) as a response to the unprecedented period of drought. The assessment concluded that, during 2008–11, the drought in Djibouti negatively affected more than 120,000 malnourished, food-insecure, and already vulnerable rural poor. The number of refugees entering Djibouti, particularly from Somalia, increased considerably, from 395 per month in May 2011 to 875 in August. Half of the refugees interviewed explained that the drought was the main reason for their migration.
- The estimated economic losses from the drought totaled approximately 3.9 percent of GDP annually between 2008 and 2011. The largest damage and losses were in the agriculture, livestock, water and sanitation sectors, amounting to a cumulative US$96 million. Agricultural production and livestock losses due to the drought led to severe food insecurity in rural areas, causing a 25 percent reduction in food consumption and 50 percent decrease in the consumption of goods and services (education, health, and kerosene).
- Because of 80 percent less rainfall since 2007, the aquifers, the only source of water for Djibouti-ville, suffered a reduction in recharge equivalent to four years of water supply. The result was an overall drawdown of the water table and a severe increase in its salinity—by 40 percent. During the four years of drought, 100 percent of the traditional wells and 80 percent of the community wells in Djibouti were temporarily or permanently out of order due to water shortage or poor water quality, resulting in increased salinity in aquifers and other types of contaminations.
- The total identified need for drought and other hazard mitigation interventions for the next five years totals US$318 million.
- The process of integrating the findings of the PDNA is currently underway, however, an initial mobilization of US$13.2 million from the World Bank's Crisis Response Window (CRW) has been completed and it seeks to: (i) scale up safety nets in the country (US$5 million); (ii) expand the Rural Community Development and Water Mobilization Project to strengthen community resilience (US$3 million); and (iii) expand the Power Access and Diversification Project by enhancing water pumping and access to energy fuels (US$5.3 million).

Source: GFDRR, Djibouti PDNA, 2011.

III. World Bank Disaster Risk Management Programming in the MNA Region

World Bank Programming for Recovery and Risk Reduction

Since its inception, the World Bank has been involved in financing post-disaster reconstruction projects. Between 1984 and 2011, the World Bank approved more than US$36 billion in activities to build disaster resilience in 118 countries around the world. In the last 10 years alone (2002–11), the Bank approved almost US$18 billion in activities toward these types of activities to help protect the lives and livelihoods of people in 92 countries (boxes 5 and 6).

In the MNA Region, the World Bank financed several post-disaster recovery and reconstruction projects, including:

- Djibouti Flood Emergency Rehabilitation Project (US$6.5 million, 2004);
- Yemen Flood Protection and Emergency Reconstruction Project (US$41 million, 2008);
- Bam, Iran Earthquake Emergency Reconstruction Project (US$220 million, 2003);
- Djibouti Employment and Human Capital Safety Net Project (US$5 million, 2012);
- Djibouti Rural Community Development and Water Mobilization (US$3 million, 2012); and
- Djibouti Power Access and Diversification (US$5.2 million, 2012).

World Bank disaster reconstruction experiences in MNA have aimed to increase community resilience to future disasters. This work has included providing communities with safety nets, access to information, resources, and the opportunities and capacity to not only rebuild their lives at a moment when they are most vulnerable, but also increase their resilience to future risks. Many such interventions have helped safeguard communities and protect them from adopting adverse coping mechanisms that could have resulted in greater risk exposure. In the Republic of Yemen, the Taiz Municipal Development and Flood Protection Project launched in 2001 protected residents, economic activity, and infrastructure from the destructive effects of seasonal flooding, while restoring access to critical road infrastructure damaged by the disaster.

For the World Bank, recovery projects have been an opportunity to integrate DRR principles into the entire recovery process to reduce exposure to future hazard threats that communities may face.

Disaster mitigation initiatives include activities conducted before disaster events occur to reduce the potential impacts of hazards. These activities include preparedness and predisaster recovery planning; and structural and nonstructural interventions such as structural design, building codes, land-use planning, early warning systems, evacuation plans, public education, and emergency response. In this context, the World Bank is working with Algeria, Djibouti, Morocco, Saudi Arabia, and the Republic of Yemen to

BOX 5. **WORLD BANK RECOVERY & RISK REDUCTION INITIATIVES**

Yemen flood protection: Successive projects in the Republic of Yemen have built flood resilience across the country (1990, Taiz Municipal Development and Flood Protection Project, US$20 million; 1990 and 1997, Emergency Flood Rehabilitation Projects, US$10 million and US$30 million; 2008, Flood Protection and Emergency Reconstruction Project, US$41 million). These projects have helped repair and retrofit damaged infrastructure and restore the country's economic infrastructure and domestic food production capability. Additionally, they have facilitated access to production centers, markets, and social services while serving as a catalyst for donor financing and coordination of the reconstruction effort, including the creation of the Hadramout Reconstruction and Recovery Fund, which leveraged over US$200 million from national, regional, and international donors.

Bam Earthquake Reconstruction, Iran: In 2003, a US$220 million Bam Earthquake Emergency Reconstruction Project helped restore the living conditions of communities affected by the earthquake and improved emergency preparedness in the province of Kerman and the city of Bam. The World Bank later financed a US$180 million Earthquake Emergency Recovery Project to relieve socioeconomic hardships caused by the earthquake.

Flood Emergency Rehabilitation Project, Djibouti: The World Bank, the U.S. Agency for International Development (USAID), and the European Union responded to the April 2004 floods in Djibouti with a US$6.5 million Emergency Assistance Program focused on the immediate rehabilitation and reconstruction of damaged economic and social infrastructure, as well as the establishment of a preliminary siren system in the Ambouli dyke.

Source: World Bank database, 2011.

BOX 6. **YEMEN FLOODS POST-DISASTER NEEDS ASSESSMENT**

In response to torrential floods in the governorates of Hadramout and Al-Mahara, Yemen, in 2008, the World Bank conducted a Post-Disaster Needs Assessment (PDNA) in partnership with the UNDP and the European Union, under the leadership of Yemen's Ministry of International Cooperation and Development and Ministry of Public Works and Highways. The PDNA formed the basis for the development of the Yemen Flood Protection and Emergency Reconstruction Project (US$41 million), which was instrumental in supporting rehabilitation and rebuilding of critical damaged infrastructure. The PDNA catalyzed multisectoral national debate on DRM, resulting in the launch of national, governorate, and city-level probabilistic risk assessments and water management studies (US$1.4 million, funded by GFDRR). These studies provided the basis for the design of comprehensive DRM planning and mitigation measures in the country.

Source: GFDRR, Yemen PDNA, 2009.

identify priority actions for disaster mitigation through the completion and implementation of a comprehensive probabilistic risk assessment. These assessments are to be followed by development and implementation of national DRM programs.

Global Facility for Disaster Reduction and Recovery

Since 2007, GFDRR[62] has provided financial and technical support to the MNA Region to launch DRM activities in Djibouti, Lebanon, Morocco, Saudi Arabia, and the Republic of Yemen. GFDRR piloted hazard risk management plans in the city development strategy process and promoted manageable emergency response strategies at the city level in Sana'a (Republic of Yemen) and Tripoli (Lebanon). GFDRR supported the development of risk mapping and DRM institutional assessments in Djibouti, and the development of a national disaster risk management strategy for agriculture and an integrated drought management strategy in Morocco. Over the years, this engagement has spread to 26 projects in 13 countries with a strong emphasis on DRM institutional capacity building, risk assessment, and risk communication.

GFDRR has also sought to increase the impact of its operations by deepening engagement in two priority countries (chosen by GFDRR donors) in the region: Djibouti and the Republic of Yemen, both highly prone to disasters and likely impacts of climate change. Efforts in these countries have been focused on developing a comprehensive program for DRM and CCA.

The Republic of Yemen

In the Republic of Yemen, GFDRR's ongoing activities include disaster risk assessment studies, capacity-building programs, and PDNAs. GFDRR recently conducted an assessment of Yemen's Fund for Disaster Reconstruction in Hadramout and Al-Mahara, and dialogue is underway for the establishment of a permanent financing mechanism to address disaster risks in the country. The DRM Country Program outlines a five-year work plan with two objectives: (i): to strengthen Yemen's institutional capacity for planning, coordinating, implementing, and monitoring disaster risk assessment and risk reduction activities, including the establishment of early warning systems at national, governorate, and community levels; and (ii) to jump start the implementation of a national civil works program for reducing flood risks. In 2008, a PDNA was launched after the floods in Al-Mahara and Hadramout governorates, with technical support from GFDRR (box 6).

In terms of CCA programming, the Pilot Program for Climate Resilience (PPCR) is being implemented in the Republic of Yemen. A major component of the PPCR is the modernization of Yemen's climate data system, which includes increasing the number and improving the operation of hydro-meteorological stations; improving hydrological, weather, and climate information management systems; and improving delivery of such information and services. The Strategic Program for Climate Resilience (SPCR) has also been endorsed. Its expected outcomes by 2015 include:

62 www.gfdrr.org.

(i) Building climatic resilience and adaptation capacity into the water and agricultural sectors as well as in coastal zones;

(ii) Improving food security by improving resilience of both the water and agriculture sectors;

(iii) Augmenting current agricultural production planning that does not account for future climate change; and

(iv) Improving sustainability of irrigated agriculture by resolving the groundwater regulation problem.

To ensure effective implementation of the DRM and PPCR programs, and thanks to financial support from GFDRR, in December 2013, the World Bank hired a local disaster risk management specialist.

Djibouti

Since 2007, GFDRR has assisted **Djibouti** in assessing and documenting its disaster vulnerabilities, while improving the country's capacity. Since then, a comprehensive risk assessment and communication platform has been established that has brought together seven national agencies. GFDRR support has catalyzed greater national attention to disaster risk management as a tool for development, paving the way for the development of the comprehensive DRM program, Natural Disaster Risk Assessment and Monitoring System (CARAD). The CARAD is a US$2.4 million program that integrates risk and vulnerability information to facilitate decision making. The Low Regret Climate Adaptation and Disaster Risk Reduction Options in the Republic of Djibouti program was also implemented to strengthen national capacities for analysis and communication of hazard risk and climate change information among vulnerable communities. As part of this technical assistance, a South–South cooperation among Djibouti, Kenya, and Mozambique was completed in December 2012 to enable these countries to exchange best practices on drought-resilient agriculture, flood management, and CCA.

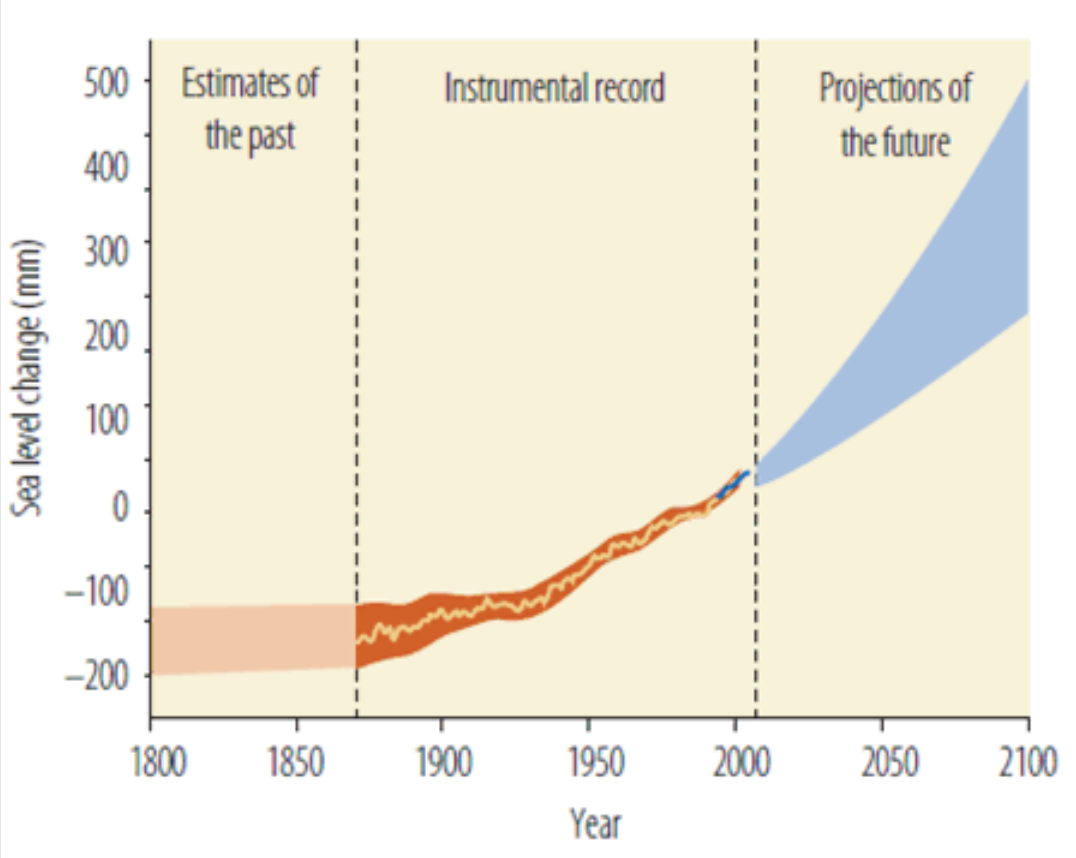
The creation of the Djibouti Center for Research Studies (CERD) Laboratory for Risk Management also stemmed from the GFDRR Djibouti country program. Funded by the government of Djibouti, the establishment of this laboratory demonstrates strong commitment to providing an integrated scientific and technical approach to risk management.

Other countries

In 2008, **Morocco** requested assistance from the World Bank to manage its exposure to risks. The government prioritized them as: (i) commodity price volatility, (ii) natural disaster risk, and (iii) agricultural sector risks. The project that resulted from this request is one of the most innovative global projects today, and looks at risks in an "integrated" framework (box 2).

In Egypt, GFDRR has supported capacity building in PDNA and risk assessment training and has conducted an institutional assessment of all DRM stakeholders at the national level.

FIGURE 9. **SEA-LEVEL RISE PROJECTIONS**



Source: WRI.

In Saudi Arabia, the National Hazard Risk Assessment is expected to start in early 2014 and provide a qualitative and quantitative overview of the main hazard risks in the country, an urban vulnerability study, and a comprehensive institutional analysis. The Saudi Presidency of Meteorology and Environment will lead the risk assessment in partnership with the King's Abdulaziz City for Science and Technology (KACST) and other DRM-related national institutions.

In Tripoli, Lebanon, a qualitative urban risk profile was completed in early 2012 by the Municipality of Tripoli, in partnership with the Lebanon DRM Center (box 7). The study is forming the foundation from which to start integrating DRM into urban development.

In Algeria, an urban risk and vulnerability assessment was launched in Algiers in 2012, led by the Marseille Center for Mediterranean Integration (CMI), jointly financed by the World Bank and France's Caisse des Dépôts et Consignations (CDC). The study identified climate variability, coastal erosion, river flooding, landslides, and earthquakes as the major hazard risks for the city, combined with the vulnerability posed by informal housing. The assessment does not claim to be exhaustive, but provides the local authorities with technical and economic recommendations to include in city planning (box 7).

Key DRM Projects

- Climate change adaptation paper (US$200,000)
- Flood emergency repair (US$6.5 million)

GFDRM Projects

- Disaster Management Information System at CERD
- Create the Natural Disaster Risk Assessment and Monitoring System Program
- Country disaster risk assessments

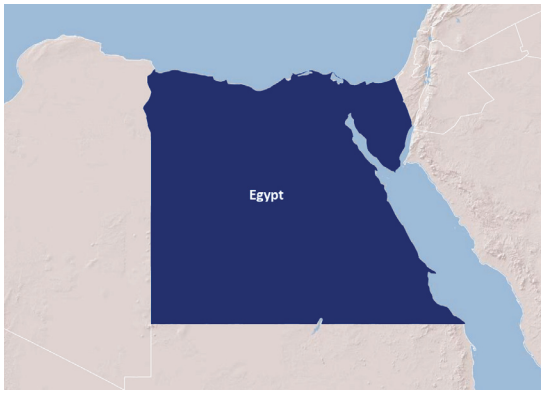
CAS

- CAS 2010–13 objective: Engage in activities to prepare for and cope with floods and droughts

Arab Republic of Egypt

Disaster Profile

2010 flood: 3,500 people affected



Egypt statistics	
Geographic area (in thousands of km^2)	1,001
GDP per capita, PPP (in US$)	$6,324
Population (in millions)	82.5
Population density (person/per km^2)	81
Urban population (% of total population)	43
HDI country rank (out of 187)	113

National Policy and Legislation

The responsibilities of the National Committee for Crisis/Disaster Management and Disaster Risk Reduction include:

- Assisting and participating in crisis and disaster management at the national level by coordinating with various concerned agencies and organizations
- Studying different disasters to clearly define the institutional arrangements required
- Exchanging experience and knowledge in disaster management to review and upgrade the procedures needed to deal with different crises
- National Strategy for Crisis/Disaster Management and Disaster Risk Reduction developed to improve the national system of crisis/disaster management and DRR

Disaster Risk Management Institutions

- Information and Decision Support Center
- National Committee for Crisis/Disaster Management and Disaster Risk Reduction
- Higher Council for Civil Defense
- Civil Defense
- Ministry of Environment

Reported Challenges/Gaps

- Inadequate dedicated resources to implement DRM plans and activities
- Lack of integrated early warning system
- Need to strengthen social safety networks
- Lack of capacity to implement DRM

Risk Assessment

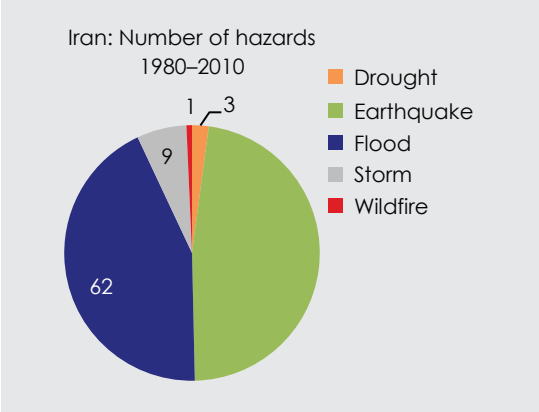
The development of multihazard maps is underway

Islamic Republic of Iran

Disaster Profile

- **Droughts:** From 1999–2001, 37 million people were affected by drought with US$3.3 billion in damages
- **Earthquakes:** In the 2003 Bam earthquake, approximately 27,000 people were killed, 270,000 million affected, with more than US$500 million in damages and losses; in 1990, the Manjil-Rudbar earthquake killed 40,000 people, affected 710,000, and caused US$8 billion in losses.
- **Floods:** 1.4 million people were affected between 2001 and 2002, causing more than 400 deaths

Iran statistics	
Geographic area (in km^2)	1,648,000
GDP per capita, PPP (in US$, 2009)	$11,467
Population (in millions)	74.8
Population density (person/per km^2)	45
Urban population (% of total population)	70
HDI country rank (out of 187)	88



National Policy and Legislation

- As provided in the 1998 National Plan on Natural Disasters Prevention, the Ministry of Interior has been legally assigned to function as the coordinator of all activities related to the protection and prevention of life and property losses—the plan has three main components: (i) monitoring and early warning, (ii) risk assessment, and (iii) mitigation and response
- National Committee for Natural Disaster Reduction (NCNDR) was formed in 1991, with nine specialized subcommittees presided over by the deputy ministers
- Provincial committees presided over by the General Governors, coordination committee presided over by the Minister of the Interior
- Annual budget for DRR amounting to 2.5 percent of the total annual budget of the country, 1.5 percent of which is allocated for advocacy, damage reduction, and emergency management; in addition, during serious catastrophes, a special part of the budget is used for reconstruction
- In 2003, the government approved the National Integrated Rescue and Relief Plan (NIRRP) as a replacement for NCNDR, based on Law No. 44

Disaster Risk Management Institutions

- Ministry of Interior
- National Committee for Mitigation of Natural Disaster Effects
- National Committee for Natural Disaster Reduction (NCNDR)
- Bureau for Research and Coordination of Safety and Reconstruction Affairs (BRCRA)
- National Disaster Task Force (NDTF)
- Tehran Disaster Mitigation and Management Center (TDMMC)
- International Institute of Earthquake Engineering and Seismology, Tehran
- Geological Survey of Iran
- Earthquake Risk Management Research Center, established in 2004
- Ministry of Urban and Housing, Earthquake and Landslide Expert Group
- Ministry of Energy, responsible for the management of rivers and dams and also directly involved in studying and applying mitigation measures against the rise of the Caspian Sea
- Ministry of Jihad Construction is mandated to supervise watersheds, forests, and rangelands
- Ministry of Health
- Ministry of Roads and Transportation
- Ministry of Agriculture Management and Planning Organization
- Iranian Red Crescent Society
- Islamic Republic of Iran Meteorological Organization
- National Climate Change Office, established in the Environmental Research Center of the Department of Environment

CAS

No CASs have been cited since 2005; in the United Nations Development Assistance Framework 2012–16, DRM and management were declared as two of five priority areas

Key DRM Projects

- DesInventar disaster information management system
- Public education and awareness campaigns
- Disaster management plans
- Capacity building for earthquake risk management
- Institutional arrangements for enforcement of building codes
- Tehran Master Plan on emergency management, 2004
- National Disaster Early Warning System

Reported Challenges/Gaps

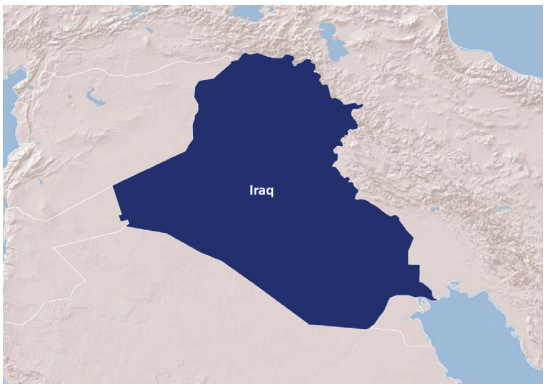
- Coordination has been a long-standing challenge in disaster management

- DRR should be increasingly emphasized, while ensuring the highest response capacity with well-executed plans
- Need reliable and timely hazard warnings, which are crucial for ensuring the health system is ready for effective service delivery during emergencies
- Closer collaboration with relevant organizations such as the meteorology organization
- Public awareness should be included as part of a cost-effective approach to build a culture of prevention in the community; the DRM system should consider the quality of competency-based training
- Effective management of international assistance, especially during national catastrophes
- More practice on intensive risk scenarios, like the Bam earthquake
- Relocation of the National Disaster Management Organization: currently located in a line ministry, it would be more effective and representative if moved to a higher level office of management and supervision
- Absence of stiff rules in the building code and of planning for responses and drills
- Lack of access to databases, such as those containing spatial and geographic information, and lack of communication and information exchange among organizations, which could cause major problems for disaster managers before and after disasters

Iraq

Disaster Profile

- Droughts have the largest human impact (2.4 percent of the population affected), followed by earthquakes and floods
- Highest damage recorded was for floods, of US$1.3 million



Iraq statistics	
Geographic area (in km^2)	438,300
GDP per capita, PPP (in US$)	$3,890
Population (in millions)	32.9
Population density (person/per km^2)	74
Urban population (% of total population)	66
HDI country rank (out of 187)	132

National Policy and Legislation

- August 2009, Strategic Framework for Natural Disaster and Risk Reduction in Iraq
- August 2009, Action Plan for Implementing Disaster Risk Reduction in Iraq
- United Nations Framework Convention on Climate Change was ratified in July 2009
- The federal budget allocates funding each fiscal year for an Emergency Fund, which is under the control of the prime minister, but so far it is mainly used for counterterrorism and unrests

Disaster Risk Management Institutions

- The National Operations Center's (NOC) main task is to respond to terrorism and civil unrest incidents, but it is now seeking to include natural disasters in its mandate
- The Crisis Action Cell, established in November 2006, is composed of the National Security Advisor, Ministers of Defense and Interior, and the Prime Minister's Chief of Staff
- The Interministerial Committee on Disaster Management, formed in 2007, comprised 10 ministries including Defense, Interior, Environment, Planning and Development Cooperation, Communications, Health, Water Resources, Foreign Affairs, Science and Technology, State Ministry of National Security, and the Secretariat General of the Council of Ministers

CAS

- No CAS was available for Iraq, however, there is a Country Water Resources Assistance Strategy (called the "Water-CAS")
- The United Nations Development Assistance Framework (UNDAF) states: "The United Nations Country Team…will support the development of a national disaster management institution, strengthened disaster preparedness, response and mitigation at national and sub-national levels, and development of a National Disaster Plan linked to the NDP"

Key DRM Projects

There are no known DRM projects in Iraq, with the exception of the DRM strategy studies carried out by UN/OCHA

Reported Challenges/Gaps

- Inadequate fiscal resources and manpower are the primary constraints impeding disaster response capacity
- Limited individual organizational capacity
- Limited access to professional equipment and training
- Absence of a central authority entrusted to create a strategic plan among all stakeholders, including nongovernmental organizations and civil society

Jordan

Disaster/Hazard Profile

Drought

- Jordan experienced eight consecutive years of drought leading up to 2001
- In 1999, rainfall decreased by 70 percent, affecting 200,000 people

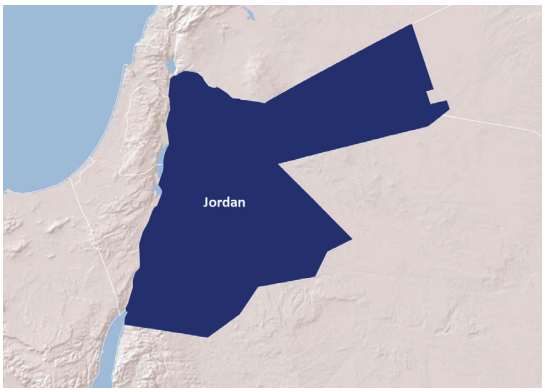
Earthquakes

- Dead Sea fault passes though Jordan
- Jordan's three largest cities (Amman, Zarqa, Irbid) are located within 30 km of the fault line and house more than 80 percent of Jordan's population
- Three areas located directly on the fault are thought be especially at risk: City of Aqaba, industrial zone at the south end of the Dead Sea basin, and the hotel zone at the northeast end of the Dead Sea

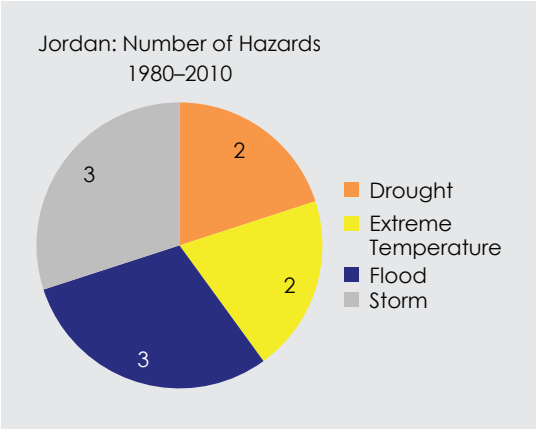
National Policy and Legislation

Disaster Risk Management Master Plan Framework of Amman (2008):

- Includes analysis on emergency management system; building code adoption, implementation, and enforcement; land use; and environmental management
- Provides goals, policies, and advice on DRM to cities and national institutions
- Conforms to international standards
- Evaluates legal and institutional framework regarding governance, operations, and maintenance
- Higher Council of Civil Defense (HCCD) is the Coordinating Agency for Emergency Management (Civil Defense Law 18, 1999); it established three committees on media, relief, and earthquakes



Jordan statistics	
Geographic area (in km^2)	89,340
GDP per capita, PPP (in US$)	$6,007
Population (in millions)	6.2
Population density (person/per km^2)	68
Urban population (% of total population)	79
HDI country rank (out of 187)	95



Disaster Risk Management Institutions

- HCCD, in the Ministry of Interior
- Ministry of Planning and International Cooperation
- National Center for Security
- DRM National Building Council
- Natural Resources Authority of the Hashemite Kingdom of Jordan

CAS

DRM and climate change are not cited in CAS

Key DRM Projects

Establishment of a disaster information management system, DesInventar

GFDRM Projects

- Country disaster risk profiling and assessment
- National DRM system, including necessary legal and institutional frameworks for inter-ministerial coordination
- Increase institutional capacity

UNDP Projects

- Building National Capacity for Earthquake Risk Reduction in Amman
- Building National Capacity for Earthquake Risk Reduction in Aqaba Special Economic Zone
- Strengthening of key civil defense buildings in relation to seismic and flash flood risks in the governorates of Amman, Zarqa, and Salt
- Inclusion of provisions for seismic structural assessment and retrofitting design in the Jordan Building Code
- Early warning system for floods and droughts in Petra (under development)

Reported Challenges/Gaps

- Lack of financial support for institutions
- DRM laws do not support local ownership
- Ministry of Planning and International Cooperation has not integrated DRM strategy into Executive Program

Risk Assessment

- Seismic Risk Assessment in Greater Amman, late 2008, sponsored by UNDP
- Seismic Hazard Assessment for Building Codes, 2000–2007, sponsored by USAID and USGS
- Seismic Risk Assessment for Aqaba, 2011, sponsored by UNDP and the SDC
- A joint assessment report for Jordan; a seismic hazard map was produced for the region to benefit practitioners and policy makers concerned with seismic design

Kuwait

Disaster Risk Reduction Institutions

- Kuwait Civil Defense in Ministry of Interior
- Fire Service Department
- Emergency Medical Services
- Al-Ahmadi Governorate Security Directorate
- Coastguards
- Kuwait Red Crescent Society

Key DRM Project

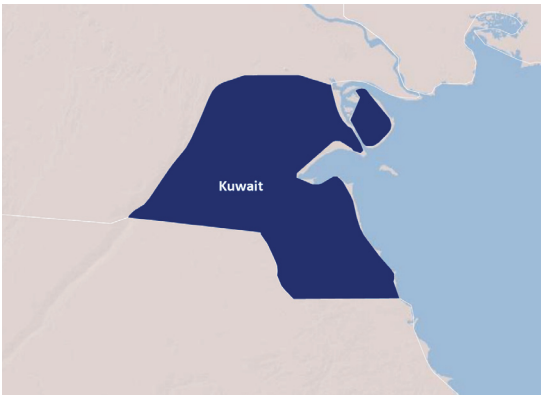
Development of expert rapid response team under centralized command to assist field teams

Reported Challenges/Gaps

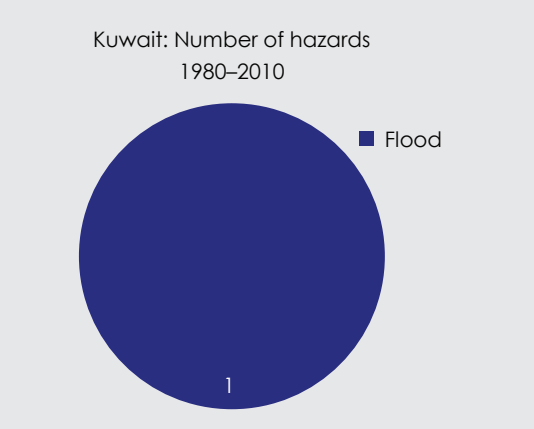
- Rapid urbanization is affecting key resources
- Limited institutional capacity and resources to link DRM to urban planning, economics, and sustainable development policies

Risk Assessment

No assessment available



Kuwait statistics	
Geographic area (in km^2)	17, 820
GDP per capita, PPP (in US$)	$54,654
Population (in millions)	2.8
Population density (person/per km^2)	154
Urban population (% of total population)	98
HDI country rank (out of 187)	63



Lebanon

National Policy and Legislation

The 2004 Construction Law and Appendices Law 646 were superseded by the 2005 Public Safety Law 14293, which details the:

- Establishment of a building code for design and analysis of buildings greater than 10 m (three stories) in regard to earthquakes

Safety Law 14293 provides additional measures, including:

- Fire hazard and protection for buildings, industries, and factories that have not obtained a planning permit
- Buildings under construction require a certificate of compliance from a reputable Bureau of Verifiers

Through the Environment Protection Law 444 of 2002, the National Environmental Council is responsible for:

- Identifying national environmental objectives and action plans
- Chapter 9, article 50 states national hazard mitigation action plans are a priority for the country and should be developed soon to provide adequate DRM tools in case of natural hazard or war

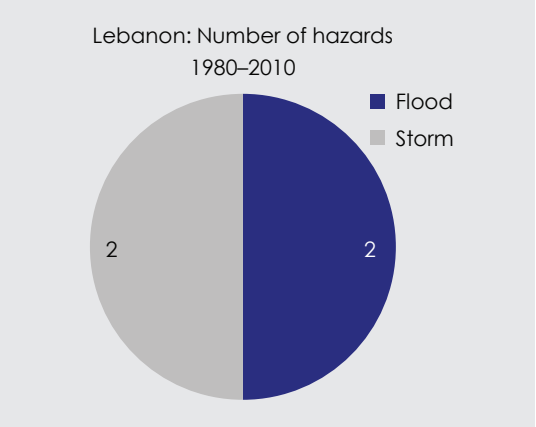
CAS

- No mention of DRM in CAS (2006–9)
- DRM was accounted for in the Forest Fire Strategy approved by the Council of Ministers in 2009

Key DRM Projects

- **UNDP and Italian Civil Protection:** Build national and municipal DRM capacity. Since 2009, under the supervision of the Prime Minister's office, UNDP is developing the Disaster Reduction and Management in Lebanon project, until 2014. This has led to the establishment of a National Response Framework and the upgrading of civil defense capacities. Further, a Flood Risk Management, Water Harvesting, and Soil Conservation project was completed in 2011.

Lebanon statistics	
Geographic area (in km^2)	10,450
GDP per capita, PPP (in US$)	$14,709
Population (in millions)	4.3
Population density (person/per km^2)	413
Urban population (% of total population)	87
HDI country rank (out of 187)	71



- **World Bank and GFDRR Project:** In cooperation with UNISDR, develop partnerships for DRM exchange and best practices.
- **Al-Fayhaa Sustainable Development Strategy (AFSDS):** In 2011, begin integrating and assessing DRM risk into urban planning and municipal management.

Risk Assessment

- Map of flood-prone areas produced in 2008
- According to HFA report, a National Risk Assessment Profile was planned for April 2011
- Map of landslide areas has been produced
- Tripoli risk profile

Libya

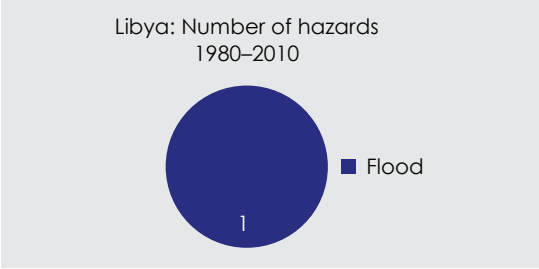
Disaster/Hazard Profile

- **Flood (1995):** Damages totaling US$42.2 million
- **Food security:** In 1990s, Libya imported 60 percent of its food; deserts in Libya are subject to drought
- **Climate change:** Increasing vulnerability of livestock because of lack of water resources and loss of grazing sites; increasing salinity in the northern area

Risk Assessment

No assessment available

Libya statistics	
Geographic area (in km^2)	1,760
GDP per capita, PPP (in US$, 2009)	$16,855
Population (in millions)	0.64
Population density (person/per km^2)	4
Urban population (% of total population)	78
HDI country rank (out of 187)	64



Malta

Disaster/Hazard Profile

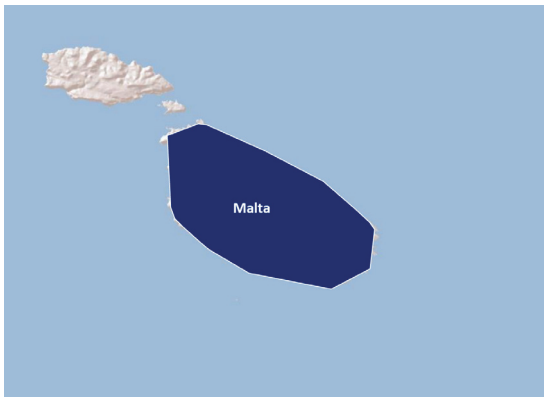
Malta has not reported a disaster between 1980–2010

Water supply

- During tourist seasons, the population triples, which puts a strain on groundwater resources

Climate change

- Sea-level rise will have a significant impact on drinking water
- Interface between freshwater and seawater will decrease by 1 m, so high salinity will be close to extraction
- 50 percent chance that there is a 3 degree increase in mean temperature by 2100
- 50 percent chance that there is a 17 percent decrease in precipitation by 2100



Malta statistics	
Geographic area (in km^2)	316
GDP per capita, PPP (in US$)	$27,294
Population (in millions)	0.419
Population density (person/per km^2)	1,300
Urban population (% of total population)	94.7
HDI country rank (out of 187)	36

Key DRM Projects

- Construction of desalination plants

UN Framework Convention on Climate Change (UNFCCC) First National Communications:

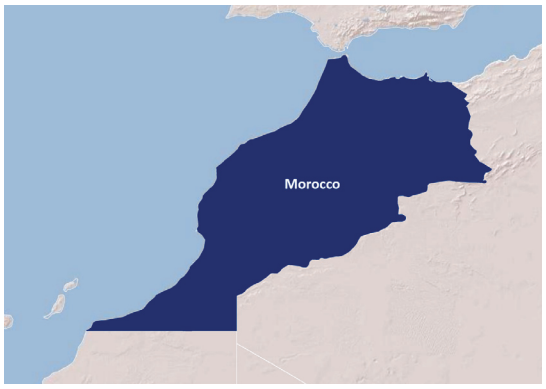
- Compilation of annual greenhouse gas inventory from 1990–2000
- Performing greenhouse gas abatement analysis
- Creating public awareness through workshop, publications, Web site, TV, news, and others

Morocco

Disaster/Hazard Profile

Hotspots

- World Bank 2004 study ranked the country 58 among top 85 countries at risk, estimating 30.4 percent of the population and 33.4 percent of GDP are at risk from two or more hazards
- Safi-Casablanca axis is the main hazard hotspot

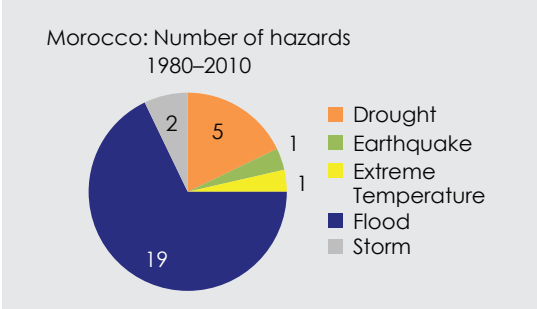


National Policy and Legislation

Water and Environment Department, UNDP, and national strategy for DRM in 2007:

- Enhance governance and institutional effectiveness
- Reinforce monitoring mechanisms and emergency response capacity
- Foster a culture of prevention and security
- Reduce latent risks
- Improve catastrophe forecasting
- The Ministry of Economic and General Affairs created a technical DRM committee in 2009 in cooperation with the Ministry of Finance and Ministry of Interior

Morocco statistics	
Geographic area (in km^2)	446,600
GDP per capita, PPP (in US$)	$4,986
Population (in millions)	32.3
Population density (person/per km^2)	72
Urban population (% of total population)	57
HDI country rank (out of 187)	130



Disaster Risk Management Institutions

- Water and Environment Department of the State Secretariat for the Energy, Mines, Water, and Environment Ministry (WED)
- Ministry of Economics and General Affairs
- Ministry of Finance
- Ministry of Interior

Key DRM Projects

- Control against the effects of drought (US$338 million)
- Drought Emergency Program (US$650 million)
- Risk Perception of Communities and Communal Development Plan (US$200,000)
- Rainfed Agriculture Development Project

GFDRM Projects

- Country disaster risk assessments

Reported Challenges/Gaps

- No credible insurance mechanism for DRM

Oman

Disaster/Hazard Profile

Storms

- Gonu in 2007 and Phet in 2010 caused 24 fatalities and severely damaged infrastructure
- Storms have killed 155 people since 1980, with damages reaching US$3.95 billion

Droughts and flood

- Are periodic
- Approximately 5 percent of population exposed to drought

National Policy and Legislation

- Hyogo Framework
- Civil defense coordinates all activities
- In 2010, began reformulation of national plan for crisis management

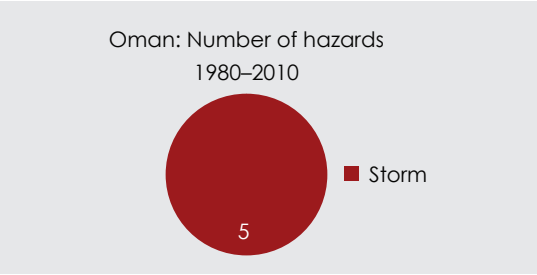
Oman statistics	
Geographic area (in km^2)	309,500
GDP per capita, PPP (in US$)	$28,880
Population (in millions)	2.8
Population density (person/per km^2)	9
Urban population (% of total population)	72
HDI country rank (out of 187)	89

Disaster Risk Management Institutions

- National Committee for Civil Defence

Key DRM Projects

- Established permanent centers to manage disasters
- Established quick response teams to manage catastrophic events



Reported Challenges/Gaps

- Disaster data are scarce
- Lack of coordination among government agencies working in emergency response
- The national-level committee responsible for emergency situations needs to meet periodically to plan for upcoming disasters
- Lack of proactive measures to face disasters
- Lack of proper preparation for storms despite their regular recurrence
- Insufficient warnings to people in remote villages and cities
- Vital lifeline structures were built in susceptible areas and were cut off from access during recent cyclones

Risk Assessment

No assessment available

Qatar

Disaster/Hazard Profile

- No reported disasters from 1980–2010
- Climate change could have an adverse effect in terms of sea level; according to the Arab Environment report, a 1 meter rise in sea level could reduce land area by 2.6 percent

National Policy and Legislation

Civil Defense is the lead agency for disaster risk management

Disaster Risk Management Institutions

- Civil Defense in Ministry of Interior
- Ministry of Environment
- Qatari Red Crescent

Key DRM Projects

Establishment of a regional center for disaster risk management

Risk Assessment

No risk assessment available

Qatar statistics	
Geographic area (in km^2)	11,440
GDP per capita, PPP (in US$)	$88,919
Population (in millions)	1.87
Population density (person/per km^2)	152
Urban population (% of total population)	96
HDI country rank (out of 187)	37

Saudi Arabia

Disaster/Hazard Profile

Floods

- Floods are the most recurrent natural hazard
- Major floods in Jeddah in 2009 and 2011
- The most severe losses and/or damages come from low-frequency events that go unnoticed

Droughts

- Source of concern due to large-scale migration
- Sandstorms affect entire country, used to be only eastern part

Earthquakes

- Risk is significant because country is located on Arabian tectonic plate
- Volcanic activity may affect earthquakes

National Policy and Legislation

General Directorate of Civil Defense (GDCD) is the main agency responsible for DRM and is responsible for the following:

- Disaster risk identification, response, or mitigation measures
- Establishment of an early warning system
- Ensuring critical infrastructure is operating after disaster

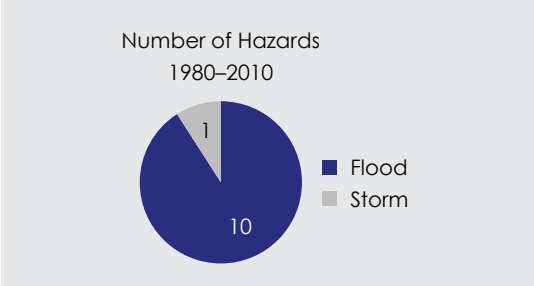
Presidency of Meteorology and Environment (PME) is the focal point for the Hyogo Framework and is responsible for the following:

- Coordinating DRM activities and building cross-sectoral ownership

Disaster Risk Management Institutions

- GDCD at the Ministry of Interior
- PME
- Ministry of Foreign Affairs
- Saudi Geological Survey
- King Abdulaziz City for Science and Technology

Saudi Arabia statistics	
Geographic area (in km^2)	2,150,000
GDP per capita, PPP (in US$)	$24,434
Population (in millions)	28.1
Population density (person/per km^2)	13
Urban population (% of total population)	82
HDI country rank (out of 187)	56



GFDRM Projects

- Country disaster risk profiling and assessment
- National DRM system, including necessary legal and institutional frameworks for inter-ministerial coordination
- Increasing institutional capacity

CAS

No CAS available

Reported Challenges/Gaps

- Lack of early warning system or emergency management plan
- Lack of institutional capacity
- DRM institutions are fragmented
- Lack of funding to perform necessary functions and coordinate effectively
- Collection of data limited

Risk Assessment

- Seismic and volcanic risk plans developed by USGS and World Bank
- City of Jeddah (US$5 million) for risk assessment and mitigation plans

Syrian Arab Republic

Disaster/Hazard Profile

- Droughts are most common disaster, over 2 million people exposed in past three decades, followed by floods and storms
- No major earthquakes have occurred, but several moderate quakes were recorded with no casualties

National Policy and Legislation

- Civil Defense law
- Procedures against marine pollution
- Seismic building codes

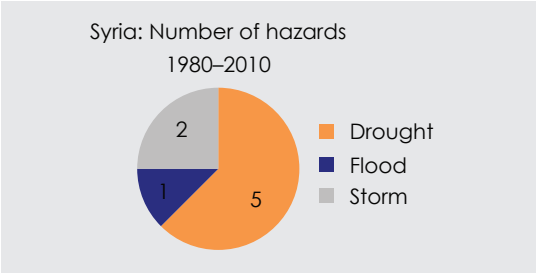
Disaster Risk Management Institutions

- Civil Defense
- Red Crescent

Key DRM Projects

- Preparation of a disaster information management system (DesInventar) database
- Strengthening Capacity Development for Disaster Risk Management (UNDP/SDC) with following objectives: strengthen, at the central and local levels, institutional framework and legislative systems for comprehensive DRM; improve access to reliable and comprehensive information on disaster risks and disaster risk management; and develop master plan and earthquake risk management framework for the city of Damascus
- Master of Science degree program in risk and disaster management (Damascus University/UNDP)
- National Drought Early Warning System (FAO/SDC)

Syria statistics	
Geographic area (in km^2)	185,200
GDP per capita, PPP (in US$, 2010)	$5,262
Population (in millions)	20.8
Population density (person/per km^2)	111
Urban population (% of total population)	55
HDI country rank (out of 187)	119



PRSP/CAS

Five Year Plan for Development 2011–2015 provides a chapter on disaster risk reduction

Reported Challenges/Gaps

- Lack of safety rules in designing buildings and infrastructure
- Lack of public awareness on safety rules and procedures
- Need laws and legislation and coordination mechanisms that organize the work of disasters
- Emergency management plans are still reactive
- Insufficient financial resources allocated for disaster risk reduction

Risk Assessment

No assessment available

Tunisia

Disaster/Hazard Profile

- Flood of October 2007: Affected Sabalet Ben Ammar region
- Water resources depletion: Rainfall is extremely scarce, but with high variability
- One-third of aquifers are overexploited, with many subject to saline intrusion
- Deteriorating water quality due to soil salinity

National Policy and Legislation

Water scarcity plans

- Invest in knowledge, monitoring, and water pricing to encourage farmers' efficiency
- Additional investments in wastewater reuse and aquifer recharge

Climate change

- Adaptation plans on health, agriculture, and tourism
- 12th Economic Development Plan will have water as a priority

Disaster Risk Management Institutions

- Ministry of Environment and Sustainable Development (MESD) has leading role on flooding, droughts, and earthquakes
- Sahara and Sahel Observatories are lead agencies for desertification
- National Office for Civil Protection (NCP) is lead agency for disaster response

Tunisia statistics	
Geographic area (in thousands of km^2)	163,600
GDP per capita, PPP (in US$)	$9,415
Population (in millions)	10.67
Population density (person/per km^2)	68
Urban population (% of total population)	67
HDI country rank (out of 187)	94

Key DRM Projects

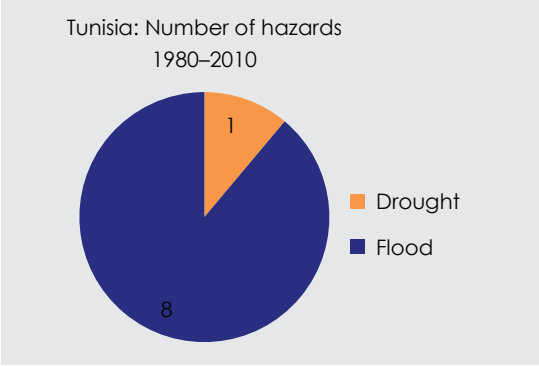
World Bank project on solid waste management, urban water supply, water sector investments, and cultural heritage

Reported Challenges/Gaps

- Lack of early warning system
- Governance interface issues between national and local governments

Risk Assessment

National Report on Disaster Prevention provides assessment of disaster reduction policies



United Arab Emirates

Disaster/Hazard Profile

- Dust storms are frequent hazards
- According to *Globe of Natural Hazards*, UAE lies in a very strong earthquake zone 2 (MM VII)
- Coastal areas are vulnerable to potential sea-level rise

United Arab Emirates statistics	
Geographic area (in km^2)	83,600
GDP per capita, PPP (in US$)	$48,222
Population (in millions)	7.9
Population density (person/per km^2)	90
Urban population (% of total population)	78
HDI country rank (out of 187)	30

Disaster Risk Management Institutions

- The National Crisis and Emergency Management Authority (NCEMA) of the Civil Defense (Ministry of Interior); part of the Higher National Security Council
- Tawazun Disaster Management City (TDMC, underway by 2015)

Key DRM Projects

- As part of climate adaptation measures, several initiatives to protect the environment and decrease carbon emissions include the launch of "Masdar City," the first carbon-free city in the world, as well as the launch of the largest program in sustainable energy, with initial investment exceeding US$18 billion in solar energy and the reduction and management of carbon emissions
- UAE also established the "Zaid Prize of Future Energy," with US$202 million allocated for innovations in sustainable energy

Reported Challenges/Gaps

There are no reported assessment studies on natural or climate-related hazards

Risk Assessment

No assessment available

West Bank and Gaza

Disaster/Hazard Profile

Earthquakes

- Historical earthquakes in the region range from 1 to 6.5 in terms of magnitude; the 1927 quake had a death toll of at least 500 people
- Existing geology will cause landslides, liquefaction, and amplification of seismic waves

Floods

- Flash flooding claimed the lives of hundreds of people in 2011
- Heavy rains damaged many farmlands in March 2003

Climate change

- Drought may increase due to severe water shortages, which are chronic in Gaza and part of the West Bank

National Policy and Legislation

Higher Council of Civil Defense (HCCD), based on Civil Defense Law No. 3 of 1998, is responsible for DRM by providing:

- Disaster risk identification, response, and mitigation measures
- Training for civilians for early response

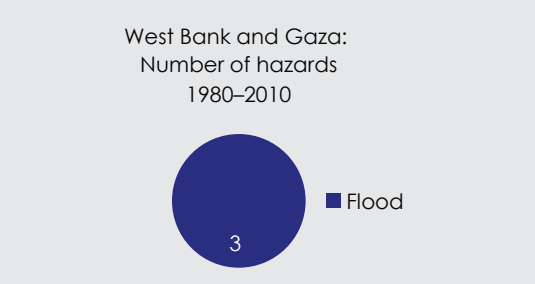
General Directorate of Civil Defense (GDCD) provides the following on DRM:

- Early warning system
- Coordination for disaster response
- Coordinates response between government organizations and NGO

Disaster Risk Management Institutions

- HCCD
- GDCD in Ministry of Interior
- Ministry of Local Government
- Ministry of Transport

West Bank and Gaza statistics	
Geographic area (in km^2)	6,020
Population (in millions, 2009)	3.9
Population density (person/ per km^2)	649
Urban population (% of total population)	72
GDP per capita, PPP (in US$)	
HDI country rank (out of 187)	114



- Ministry of Telecommunication and Information Technology
- Ministry of Agriculture
- Earth Science and Seismic Engineering Center (ESSEC) at An-Najah National University
- National Agency for Disaster Risk Mitigation (NADRM)
- Palestinian Red Crescent Society

Key DRM Projects

Disaster Risk Reduction Framework: Four Integrated Pillars, FAO

GFDRM Projects

Country disaster risk profiling and assessment

Reported Challenges/Gaps

- Lack of land-use planning or insufficient building codes
- Lack of institutional capacity
- Legal framework for DRM is limited
- DRM institutions are fragmented

Risk Assessment

- Assessment of Disaster Risk Reduction by UNDP
- Vulnerability of buildings in main cities (Jerusalem, Hebron, Ramallah, Nablus, Jenin, Tulkarem, and Jericho) was assessed by ESSEC between 2003 and 2007 as part of the joint "Earthquake Hazard Assessment for Building Codes" (2000–2007) sponsored by USAID and USGS—it benefits practitioners and policy makers concerned with seismic design

Republic of Yemen

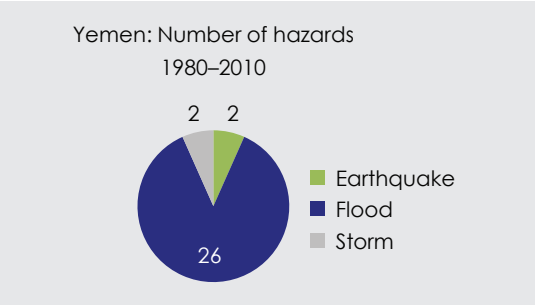
Disaster/Hazard Profile

- Annual average economic loss: US$200 million
- October 2008 floods caused damage of US$1.6 billion, about 6 percent of GDP

National Policy and Legislation

- In 1997, Decree No. 24 on Civil Defense (CD) provided a mandate of CD as a lead agency for disaster management
- In 1997, Cabinet Decree No. 52 formed a committee to prepare for disaster management
- In 1997, MoPIC Decree No. 123 formed a committee to establish an institution for managing natural disasters
- In 1997, Executive Bylaw No. 201 for CD defined the role of the Supreme Council of Civil Defense as providing the following:
  - Policy direction
  - Approval for plans for disaster preparedness and response
- In 1998, Decree No. 7 on the function of CD in the governorates and districts
- In 2002, Water Law No. 33 provided some sections on flood risk reduction
- In 2003, Decree No. 28 by the Minister of Water and Environment established the Environmental Emergency Unit
- In 2006, UNDP prepared a national DRM plan that has not been approved yet by the government

Yemen statistics	
Geographic area (in km^2)	523,000
GDP per capita, PPP (in US$)	$2,349
Population (in millions)	24.8
Population density (person/per km^2)	46
Urban population (% of total population)	32
HDI country rank (out of 187)	154



Key DRM Projects

UNDP

- Disaster Preparedness, Management, and Recovery (2003–9) with the aim of strengthening the capacity of national government institutions at the central and governorate levels in disaster management
- Prepared a disaster information management system (DesInventar) database

- Early Recovery Project for the Livelihoods Sector of the Flood-Affected Areas in Hadramout and Al-Mahara Governorates

Yemen Flood Control Protection

- City of Taiz and surrounding area (US$81 million approximately)
- Hadramout, infrastructure repair (US$10 million)
- Al-Mahara governorate, infrastructure repair (US$35 million)

GFDRM Projects

- Country disaster risk assessments; national DRM system, including necessary legal and strategic frameworks for interministerial and intersectoral coordination
- Pilot activities within certain sectors and/or cross-cutting themes
- Damage, loss, and needs assessment (DLNA) training in 2008 and 2011

CAS

CAS 2010–13 objectives:

- Preventive action to deal effectively with scarcity and risk
- Reduce depletion of water
- Mitigate impacts of natural disasters and climate change adaptation
- Establish a mechanism for integrated risk management for disasters, climate change, food insecurity, and water scarcity

Reported Challenges/Gaps

- Lack of early warning systems
- Lack of institutional capacity
- Lack of national codes of practice
- No sustained financing mechanism(s) for DRM
- Very weak coordination between government agencies during response to disaster events
- Insufficient budgets to procure minimum equipment

Risk Assessment

- Three probabilistic risk assessments completed (national level, for the city of Sana'a, and for Hadramout and Al-Mahara governorates)
- DLNA conducted in Hadramout and Al-Mahara governorates after floods of 2008

ANNEX 2. SUMMARY OF THE JEDDAH CONSULTATIVE WORKSHOP

MINUTES OF DRM WORKSHOP

November 17–18, 2013, Jeddah, Saudi Arabia

A Middle East and North Africa Regional consultation workshop was held in Jeddah, Saudi Arabia, on November 17 and 18, 2013, under the leadership of the Presidency of Meteorology and Environment (PME) of Saudi Arabia. Fifty representatives from 14 governments in MNA and international organizations attended the 2-day workshop to exchange DRM experiences and provide feedback on the current report. This annex contains a compilation of the main messages and participant's comments from the sessions.

DAY 1

MORNING SESSION—OPENING AND PRESENTATION OF THE REPORT

H.E. Chairman of the Executive Bureau of Arab and Islamic Environment Ministers and President of the PME of Saudi Arabia, Abdul Aziz Al Jasser

Mr. Al Jasser opened the workshop by explaining the importance of having a preparedness strategy and performing risk assessments to limit damages and losses from events like floods. He described the long-term support provided by the Global Environment Facility (GEF) and the World Bank, which will help Islamic countries prepare for and manage emergencies. Mr. Al Jasser thanked the GFDRR for sponsoring the workshop, which will help advance the implementation of the Islamic Work Plan.

Franck Bousquet, Sector Manager, Social and Urban Development, Disaster Risk Management, MNA Region, World Bank

Mr. Bousquet described the world's current natural disaster landscape and pointed out that 2011 was the costliest year on record, with US$380 billion reported in damages and losses. Over the past 25 years, 40 million people have been affected by 370 natural disasters, floods being the most recurrent event. Given the impact of disasters in MNA countries' economies, developing systematic risk assessments, establishing early warning systems, and improving the capacity of governments to cope with natural hazards before and after they strike have become a top priority. Mr. Bousquet noted that the World Bank is working alongside the MNA governments to build their resilience and, hence, the purpose of the workshop was to gather feedback from countries' representatives to better address their needs. Mr. Bousquet praised the ongoing efforts of international organizations such as UNISDR, UNDP, and GFDRR in advancing this agenda.

Overview of Natural Disasters in MNA: Regional/National Progress and Proposed DRM Action—Andrea Zanon, Senior Disaster Risk Management Specialist, MNA Region, World Bank

The Task Team Leader for the report, *Natural Disasters in MNA: A Regional Overview*, Mr. Zanon presented the major trends regarding natural disasters in the region. Among the main issues that require attention are the rapid urbanization rates and informal coastal settlements that increase those populations' vulnerability to sea-level rise and flood risk. Furthermore, flash floods, the most extensive natural hazard in the region, often follow long periods of droughts. Earthquakes are the second deadliest events, accounting for 24 percent of total disasters. Mr. Zanon also outlined the main DRM initiatives, as detailed in the report, and invited the workshop participants to comment on the findings and proposed way forward.

FEEDBACK ON THE REPORT

The following comments were provided during the workshop by participants. To ensure maximal information, the World Bank MNA staff followed up with all participants after the workshop and received additional comments from several countries and partners. These comments were duly integrated into the report.

Potential use of the report

The workshop attendees praised the report for providing compelling disaster evidence that will guide MNA governments in their DRM decision making, progress, and strategies. Additionally, the report provides practical best practices from other countries and introduces the experience of international specialists.

Approach to DRM in MNA

As noted by one of the members from the Saudi Arabia delegation, most Arab countries manage disaster risk on a response and recovery basis. In contrast, it is important that the focus shifts toward a concerted effort that includes preparedness. In this sense, the World Bank team noted that most MNA countries do have preparedness plans, but they either are not implemented or outdated. Performing risk assessments would enable governments to quantify the stresses that natural disasters put on the balance sheet and governance of the country. This quantification then would facilitate the establishment or updating of disaster preparation plans. Additionally, as the Jordan representative pointed out, raising awareness among residents is an essential tool to build preparedness. Even when natural disasters are not so frequent, communities need to be ready. For that purpose, as highlighted by the Arab League representative, developing national preparedness plans is not enough: it also is necessary to perform drills and strengthen capacity building. He brought up the case of New Orleans in the aftermath of Hurricane Katrina. The city had appropriate DRM plans and an institutional structure, but the population had not been trained through emergency simulations. The Egyptian delegate sought clarification on how the World Bank prioritizes its DRM interventions in MNA countries. The World Bank explained that its DRM team, in collaboration with GFDRR and 65 international partners

(countries and international organizations), periodically identifies low-capacity and high-risk priority countries (20 globally) to guide DRM work decisions. The World Bank also clarified that it is currently developing DRM activities in eight MNA countries and that it aims to expand to other MNA countries, particularly those most vulnerable to disasters.

Lack of data

Risk assessments are a good starting point for solving the deficient data issue in most countries. If there are no historical data, it is difficult to predict potential disaster damages and losses or plan for disasters without risk assessments and vulnerability studies. UNISDR noted that DesInventar data are available in eight countries and have been inventoried by the countries themselves, as compared to the data provided by Em-Dat, which is a foreign institution that may not have access to all the correct information. Nevertheless, explained a Saudi delegate, the main issue with data is that governments do not always share what they regard as sensitive information. This sensitivity applies especially to data pertaining to the damage and loss assessments and risk assessments. The World Bank team highlighted that currently the lack of quantitative data has been compensated by qualitative studies, such as the rapid risk profiling performed in Tripoli, Lebanon, and in Djibouti. These studies look at the institutional framework and urban vulnerability. The mayor of Jeddah pointed out that there is, however, a growing understanding of the benefits of sharing data. Sharing is the reason that a center for compilation of data is being established in Saudi Arabia for OIC countries to access. It will be operational next year. The Deputy Minister of Public Works and Highway for the Republic of Yemen highlighted that the World Bank presentation did not capture all of the historical data on disasters. Mr. Zanon from the World Bank and Mr. Zubair from UNDP explained that the data used to develop the report's hazard maps (which are based on the EM-DAT database) use data provided by national governments, which in many cases do not capture small-scale disasters, such as those in the Republic of Yemen and in Djibouti in 2013.

National and international coordination on the agenda and its operationalization

Several participants, in particular, the Egyptian, Jordanian, Lebanese, Saudi, and Tunisian delegates, underscored that a higher degree of cooperation is necessary at both the national and international levels. At the national level, and horizontally, different ministries and institutions need to work together and share information. This cooperation will help overcome some of the data deficiencies and the fragmentation of initiatives. Often, DRM efforts are spread across different agencies and none of them have enough authority or responsibility to lead and improve the DRM strategy. The national level, vertical cooperation also is necessary, enabling communication and synchronization of work from the national government to the provincial and local authorities, and vice versa. At the international level, international institutions working on DRM need to coordinate to avoid duplication of efforts and to improve results. International organizations should also partner with national governments to help the latter program potential budget expenditures on DRM measures.

Integration of conflict into preparedness policies

The mayor of Tripoli emphasized the relevance of including conflict as a variable when considering national and urban preparedness plans. Conflicts burden budgets as well,

and some of these conflicts relate to environmental issues, such as water scarcity. However, as the UNDP delegate explained, in countries that are affected by conflict, it is even more difficult to assess disaster vulnerabilities. The World Bank team emphasized that the scope of this report was to assess the risks posed by natural hazards and describe how the region is coping with them. Nevertheless, this platform of risk management could be used to build a multisectoral risk reduction plan, because risk management is a cross-cutting sector. The methodology being used for risk assessments on the effects of the Syrian refugee crisis is the same as that of the natural hazard risk assessment, but this methodology is not included in the scope of the present report.

AFTERNOON SESSION—CASE STUDIES

The DRM Pakistani Experience—Lieutenant General Nadeem Ahmed, Former Chairman, National Disaster Management Authority in Pakistan

Mr. Ahmed provided an overview of Pakistan's experience in DRM at the national level, which is relevant to other countries in MNA. Pakistan faces risks from various types of natural disasters including cyclones, flooding, landslides, and earthquakes. The severe 2005 earthquake that hit northern Pakistan highlighted the country's high vulnerability to disaster risks. Since then, the government has taken significant steps toward establishing a comprehensive DRM framework. It includes an integrated DRM mechanism that links the vital functions of preparedness/risk reduction and early disaster recovery to longer-term reconstruction and rehabilitation.

During the comments session, it was acknowledged by the countries' representatives that such a system can be adapted to MNA countries. A very similar organizational cluster structure already exists in some countries such as Lebanon, where the High Relief Commission is directly linked to the prime minister. Nonetheless, the main emphasis in this type of structure, which leads from the national level to the provinces and then to the municipalities, is to ensure that those levels are well connected and that information does not get lost.

Building Resilience to Natural Disasters and Climate Change in Djibouti—Samatar Abdi Osman, GIS Specialist, Djibouti Centre for Research Studies (CERD)

Djibouti is vulnerable to droughts, flash floods, earthquakes, and volcanism. Mr. Abdi presented Djibouti's risk profile, noting that the country suffered a 4-year drought between 2008 and 2011 that resulted in a 3.9 percent GDP contraction per year. The large impact of the drought led to the implementation of the first drought Post-Disaster Needs Assessment (PDNA) in the world, which helped the country to globally leverage more than US$40 million for recovery. These funds have been used to improve Djibouti's resilience to external shocks. Since 2007, a number of DRM efforts have been put in place, including a risk assessment and communication platform. The latter comprises completed disaster preparedness plans, a hydro-meteorological network, seismic and flood risk vulnerability assessments, and operational flood and drought early warning systems.

UNDP's Activities in MNA—Zubair Murshed, Regional Deputy Resident Representative, Adviser for Arab States, UN Regional Centre in Cairo, UNDP

Mr. Murshed's presentation showcased UNDP's ongoing and planned DRM programs, which have assisted MNA countries in reducing their risk and impacts from natural disas-

ters while promoting a "build back better" legal and cultural framework. Priority areas for UNDP in MNA are policy formulation; institutional strengthening; risk assessments and early warning systems; education, training, and awareness; and urban risk reduction. Mr. Murshed also highlighted that UNDP has identified disaster finance, capacity of officers, and land use as regional needs for development.

DRM Country Program in the Republic of Yemen—Abdulmalek Al-Jolahy, Deputy Minister of Public Works and Highways, Republic of Yemen

Mr. Al-Jolahy began his presentation by offering a background on the 32 natural disasters that occurred in the Republic of Yemen in the past 30 years, which caused about US$6 billion of economic losses. Flooding was the most recurrent catastrophe, followed by landslides, earthquakes, and droughts. The October 2008 flood in Hadramout and Al-Mahara cost more than US$1.6 billion, equivalent to 6 percent of the country's GDP. This devastating flood demonstrated the Republic of Yemen's high vulnerability to disaster risks as well as the ineffectiveness of the existing reactive DRM system, which needs a serious shift from disaster response to proactive risk management. Since 2007, the World Bank and GFDRR have begun strengthening the Republic of Yemen's national system for DRM in view of HFA priorities.

The GFDRR financed four studies on hazard risk assessments (at the national level and for Al-Mahara and Hadramout governorates and Sana'a), as well as flood and water-harvesting feasibility studies. Furthermore, thanks to GFDRR, the Republic of Yemen conducted a PDNA following the 2008 floods, as well as DLNA capacity-building and training programs for Yemeni officials. The DRM country program, which slowed due to political unrest in late 2010, prioritized 5 activities for implementation in 2014: (i) development of the National DRM System (legal and strategic frameworks) to ensure coordination from the national to the community level; (ii) dissemination of the risk assessments; (iii) establishment of DRM curricula; (iv) operationalization of emergency operations rooms; and (v) establishment of city-level early warning systems. After his presentation, Mr. Al-Jolahy showed two videos on national-level DRM progress, including the urban flood mitigation measures (Sayla project) and the drought mitigation and water-harvesting plans.

DAY 2

MORNING SESSION

DRM for Sustainable Development—Raja Rehan Arshad, Team Leader, Sustainable Recovery, Global Facility for Disaster Reduction and Recovery, World Bank

The increased frequency and intensity of natural disasters is threatening the world's sustainable development and poverty reduction initiatives. The loss of human lives and economic assets, and the increased cost of reconstruction have led governments to see DRM as an effective tool for decreasing economic shocks while improving early recovery. DRM policies and measures need to be implemented to build disaster-resilient societies and communities. The objectives are twofold: (i) reduce the level of risk in societies, while (ii) ensuring that development efforts do not increase the vulnerability to hazards,

but purposely reduce such vulnerability. Mr. Rehan's presentation was divided into three parts: (i) a brief presentation of the GFDRR mechanism; (ii) a general description of DRM as an effective platform for sustainable development; and (iii) an introduction of the PDNA and early recovery mechanisms.

The Role of Disaster Risk Financing in DRM, Including the Possibility for MNA Countries—Emily White, Disaster Risk Financing Specialist, World Bank

Ms. White, via videoconference, introduced the disaster risk financing and insurance (DRFI) framework and explained the burden that natural disasters place on countries' budgets. Often, governments in developing countries have limited capacity to quickly mobilize adequate post-disaster financing. Inadequate disaster financing can exacerbate the adverse socioeconomic consequences of disasters. DRFI enables countries to increase their post-disaster financial response capacities and reduce the economic and fiscal burdens of natural disasters by developing an integrated strategy to connect with the broader DRM agenda. GFDRR supports developing countries in incorporating DRFI as part of their national disaster risk management strategies by providing capacity building and technical assistance for the design and implementation of affordable and cost-effective DRFI programs. DRFI can be classified into four broad categories: sovereign disaster risk financing, property catastrophe risk insurance, agricultural insurance, and disaster microinsurance. Although the categories overlap, they are useful for organizing DRFI projects by objectives and scope.

Urban Risk Assessment in Tripoli, Lebanon—Nader Ghazal, Mayor of Tripoli

Lebanon is mainstreaming DRM into urban development. This effort led to the development of a qualitative rapid urban risk profile, which was completed in early 2012 by the Municipality of Tripoli, in partnership with the Lebanon DRM Center and the World Bank. The study is now considered to be the foundation to start mainstreaming DRM into urban development. Dr. Ghazal presented the findings of the risk profile and the recommendations, which revolved around the decentralization of DRM decision making. Keeping DRM at the municipal and community level has already proven beneficial, since it has helped the city to adapt to, among other issues, the Syrian refugees, who have flooded Tripoli over the past two years. A risk perception survey and a pilot project for community-based DRM are planned as next steps of the cooperation between the World Bank and Tripoli.

AFTERNOON SESSION

Implementation of Disaster Risk Financing Programs: The Indonesian Experience—Bintang Susmanto, Inspector General, National Agency for Disaster Management (BNPB), Indonesia

The presentation by Mr. Susmanto underscored Indonesia's vulnerability to natural hazards and how its DRM strategy stemmed from a risk-financing approach. With a population of 240 million, Indonesia, a country spanning across 3 time zones, is the world's fourth most populated country. It is exposed regularly to seismic events, since the country sits on an active seismic belt, resulting in yearly earthquakes, volcanic eruptions, and liquefaction. Additionally, severe floods and tsunamis frequently hit the country. The most devas-

tating recent natural disasters include the Indian Ocean Tsunami (2004), Mount Merapi eruption (2004), the Jogyakarta earthquake (2006), and the Padang Earthquake (2009). Among the lessons shared by Mr. Susmanto were the necessity for a clear legal framework to guide disaster risk financing and the importance of the leadership provided by the National Disaster Management Agency to strengthen coordination among different actors. The effective policy changes and financial allocation strategy introduced during the past decade have helped Indonesia build resilience to natural hazards.

CONCLUSION AND CLOSING REMARKS

Closing Remarks from the Presidency of the PME of Saudi Arabia

While the workshop was taking place in Jeddah, flash floods in Riyadh caused seven deaths. The PME eloquently reported that this tragedy underscored even more the need for countries to have a DRM strategy that includes monitoring systems and adequate preparedness and response measures.

Franck Bousquet, Sector Manager, Social and Urban Development, Disaster Risk Management, MNA Region, World Bank

Mr. Bousquet thanked the PME for hosting the workshop and providing the opportunity for the 14 country representatives and international organizations to exchange their DRM experiences. Among the workshop's key lessons, as stressed by Mr. Bousquet, are that DRFI and DRM decentralization are two potential next steps for the region's governments to take to address disaster risks and vulnerability. The World Bank stands ready to support MNA countries in DRM, in partnership with UNDP and UNISDR, leveraging best practices in the region and worldwide, as shown during the successful workshop.

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