



Capacity Assessment of the Disaster Risk Management System in Jordan

May 2017

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Photo credit cover page: Saraya News Website, 2015 flash flood in Amman

Contents

ACKNOWLEDGMENT	2
List of acronyms	5
Executive summary	7
1. Introduction: Context and Rationale.....	9
1.1 Jordan vulnerability and exposure to disaster risk.....	9
1.2 The Rationale for the CADRI Partnership engagement in Jordan	12
2 Capacity Assessment Methodology and Process	14
2.1 Definition	14
2.2 Methodology	14
2.3 Assessment team composition	15
2.4 Data collection and analysis	16
3 Capacity Assessment Results and Recommendations	17
3.1 Priority I: Understanding disaster risk	19
3.1.1 Risk data and information: Collection, analysis, monitoring and dissemination	19
3.2 Priority II - Strengthening governance and institutions to manage disaster risk.....	30
3.2.1 Awareness	30
3.2.2 Legislative, policy and planning frameworks for DRM	30
3.2.3 Institutional framework and coordination mechanisms for DRM	35
3.2.4 Financing for DRM	41
3.3 Priority III - Investing in disaster risk reduction for resilience.....	44
3.3.1 Integration of disaster and climate risk management in national and local planning processes	44
3.3.2 Integration of disaster risk management and climate change action.....	50
3.3.3 Construction / Housing sector.....	52
3.3.4 Infrastructure sector.....	55
3.3.5 Agriculture sector	58
3.3.6 Environment sector	65
3.3.7 Water Resources Management sector.....	73
3.3.8 Cultural Heritage sector	78
3.3.9 Education sector	83
3.3.10 Health sector	85

3.4 Priority IV - Enhancing preparedness for effective response, and building back better in recovery and reconstruction 91

 3.4.1 Hazard/ Risk analysis and early warning 91

 3.4.2 Information management and communication 94

 3.4.3 Legislative framework for EPR..... 97

 3.4.4 Resource allocation and funding for Emergency Preparedness and Response 99

 3.4.5 Institutional and coordination arrangements for Emergency Preparedness and Response 101

 3.4.6 Preparedness and contingency/ response planning 105

 3.4.7 Training and exercises 109

 3.4.8 Emergency services and prepositioning 111

List of National Institutions met..... 112

Bibliography..... 116

List of acronyms

ARD	Agricultural Research and Development
ASEZA	Aqaba Special Economic Zone Authority
BRP	The Badia Environment Restoration Programme
CADRI	Capacity for Disaster Reduction Initiative
CBD	Convention on Biological Diversity
CBRN	Chemical Biological Radioactive Nuclear risk
CM	Crisis Management
CRM	Climate risk management
CSR	Corporate Social Responsibility
DOS	Department of Statistics
DRR	Disaster Risk Reduction
DRM	Disaster Risk Management
EDP	Executive Development Programs
EMIS	Education Management Information System
EOC	Emergency Operations centers
EUCP	European Union Civil Protection
EWS	Early Warning System
FMA	Foreign Military Assets
FAO	Food and Agriculture Organization
GAM	Greater Amman Municipality
GCF	Green Climate Fund
GEM	Global Earthquake Model
GIS	Geographic Information System
HIS	Hospital Information System
IERS	Interactive Electronic Reporting System
JIDIS	Jordan Infectious Diseases Information System
JVA	Jordan Valley Authority
JWA	Jordan Water Authority
JRC	Jordan Red Crescent
ICT	Information Communication Technology
INFORM	Index for Risk Management
IM	Information management
I/NGOs	International/ Non-governmental Organizations
IOM	International Organization for Migration
INDC	Intended Nationally Determined Contributions
INSARAG	International Search and Rescue Advisory Group
IPC	Infection Prevention and Control
IUCN	International Union for the Conservation of Nature
JCD	Jordan Civil Defence
JMD	Jordan Meteorological Department
PDTRG	Petra Development Tourism Region Authorities
MoH	Ministry of Health
MSD	Ministry of Social Development
MoPIC	Ministry of Planning and International Cooperation
MPH	Ministry of Public Works and Housing
MoT	Ministry of Transport
MoI	Ministry of Interior
MICT	Ministry of Information and Communications Technology
MoE	Ministry of Education

MMA	Ministry of Municipal Affairs
MoA	Ministry of Agriculture
MEMR	Ministry of Energy and Mineral Resources
MWI	Ministry of Water and Irrigation
MoEnv	Ministry of Environment
NAIS	National Agriculture Information System
NAP	National Adaptation Plan
NBC	National Biodiversity Committee
NCARE	National Centre for Agriculture Research Extension
NCCC	National Committee on Climate Change
NCSCM	National Center for Security and Crisis Management
NDC	Nationally Determined Contributions
NGOs	Non-governmental Organizations
RFSAN	The Regional Food Security Analysis Network
RJGC	Royal Jordanian Geographic Centre
RJAF	Royal Jordan Armed Forces
RSCN	Royal Society for the Conservation of Nature
SDC	Swiss Development Cooperation
TNC	The Third National Communication on climate change
UN	United Nations
UNCCD	UN Convention to Combat Desertification
UNCT	United Nations Country Team
UNDAC	United Nations Disaster Assessment and Coordination
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
UNICEF	United Nations Children’s Fund
UNISDR	United Nations International Strategy for Disaster Reduction
WAJ	Water Authority of Jordan
WASH	Water Sanitation and Hygiene
WFP	World Food Programme
WHO	World Health Organization

Executive summary

Jordan's hazards profile is characterized by exposure to multiple hazards including geophysical (i.e. earthquakes), hydrogeological (i.e. flash floods, drought), biological (i.e. locust invasions, epidemics) as well as technological (i.e. dam failures, industrial pollution, toxic wastes, chemical spills). The occurrence of natural, biological and technological hazards is relatively low. However, given the high population density in the cities, the increasing number of disenfranchised population especially amongst the refugees and the overstretched capacity of social services and physical infrastructures, even a mild earthquake could have a serious impact. Moreover, the occurrence and severity of climatic hazards such as drought, flash floods and cold waves is expected to augment with climate change and cause significant socio-economic and environmental losses. Rapid unplanned urbanization, unsustainable water management practices and uncoordinated land use planning are the main underlying risk drivers in Jordan.

Investing in disaster preparedness and prevention is a building block of Jordan national security and economic development. Climate Change is expected to increase the occurrence and intensity of natural hazards, epidemics and pest. Living to the ambition of the Jordan 2025 and achieving the Government's Economic Growth Plan as well as the Jordan Sustainable Development Goals (SDGs) targets would require targeted investment in building capacities in key sectors to integrate disaster and climate risk reduction measures at national and local levels.

On September 16-October 1st 2017, at the request of the Hashemite Kingdom of Jordan, the CADRI Partnership facilitated a capacity assessment of the Disaster Risk Management system in Jordan. As a result of the scoping mission, **four main issues were prioritized**: i) information management, ii) coordination, iii) clarification of mandates, roles and responsibilities, and iv) preparedness arrangements, as well as **eight socio-economic sectors**: CONSTRUCTION, INFRASTRUCTURE, ENVIRONMENT, WATER/WASH, AGRICULTURE, CULTURAL HERITAGE, EDUCATION, HEALTH.

The capacity assessment recommendations are expected to inform the development of the national Disaster Risk Management strategy ([Sendai Framework for Disaster Risk Reduction](#) global target e).

The Disaster Risk Management system in Jordan can rely on solid country assets such as good access to social services, the elevated level of education of its population, and significant investment in response capacities, in particular skills and equipment. Over the past decade, central and local government have gained a better understanding of disaster risks and have taken proactive steps to strengthen response systems and capacities. There remains however limited awareness amongst policy makers and general population and investment in preparedness and prevention is limited within and across sectors, with the exception of the Public Works and Water sectors.

Building on its strong regulatory framework, Jordan can significantly enhance its disaster risk management system by implementing six **priority recommendations** with limited budgetary implications:

- 1) Access to risk information.

The lack of information management system hinders disaster risk management in Jordan. Data collection and mapping capacities exist but risk information is not accessible to decision makers at national and local level and even less to the population. An **integrated disaster risk information system**, centralizing hazard, exposure and vulnerability information produced by different stakeholders, must be established with clear data sharing protocols. Risk information

must be accessible free of charge to public and private sector stakeholders. Such system should be supplemented with training on application of risk information in planning and budgeting.

2) Disaster Risk Management Law and land use policy

A review of the **legislative and institutional framework** is required to increase the effectiveness of the disaster risk management system. Mandates and responsibilities at central level, and between the central and local level, must be clarified through an **umbrella DRM law** and an **updated national DRR strategy**. This must be complemented by a stronger **land use and urban planning** policy framework.

3) Integrating Disaster Risk Reduction measures in ministries and municipalities budgets

The disaster risk management system is highly centralized under the responsibility of the State Security apparatus and would need to be better **integrated in development and humanitarian interventions**. Municipalities and sector ministries must access and use disaster risk assessment information to protect public investment in public works, infrastructure, water, environment, agriculture, cultural heritage, infrastructure, health, and education.

4) Protection

The **needs and demands of vulnerable population groups** (vulnerable women and children; disabled, migrants and refugees) must systematically inform the development of the national DRM strategy, of the municipality disaster management plans, contingency as well as response and post disaster recovery plans.

5) People-centered Early Warning systems

Preparedness systems at national and local level must be strengthened through **targeted investment in drought monitoring** as well as in **flood early warning system (EWS)** for wadis in high population density areas. Roles and responsibilities for early action across sectors at national and local level must be clarified. Early warning systems must be designed to empower communities and people to protect their lives and livelihoods.

6) Community empowerment

Communities must be empowered to make risk informed decisions through **public awareness** campaigns, school **education** programs and **access to risk assessment information** and **early warning signals**.

Prioritizing investment in Disaster Risk Management in a country where the refugees' crisis has heavily affected the economic and social fabric and where government institutional and operational capacity is overstretched, is a challenge. In this respect, the role of the National Security and Crisis Management Center to raise awareness and coordinate efforts from humanitarian and development actors is critical. The focus of the Jordan Response Plan 2016-2018 on building resilience of host communities through livelihoods interventions and the strengthening of municipality service delivery is an opportunity to increase capacities to reduce disaster risk.

1. Introduction: Context and Rationale

Jordan is an upper middle-income country with high levels of human development. The occurrence of natural and human-induced hazards is relatively low. However, given the high population density in the cities, the increasing number of disenfranchised population especially amongst the refugees and the overstretched capacity of social services and physical infrastructures, even a mild earthquake could have a serious impact. Moreover, the occurrence and severity of climatic hazards such as drought, flash floods and cold waves is expected to augment with climate and cause significant socio-economic and environmental losses.

Rapid population growth, unplanned urbanization, unsustainable land use and water management practices are the main risk drivers in Jordan. It is therefore possible to reduce exposure and vulnerability to disaster and climate risks through investing in capacity development in prevention and preparedness across socio-economic and environmental sectors.

Living to the ambition of the Jordan 2025 and achieving the Government's Economic Growth Plan targets as well as the Jordan Sustainable Development Goals (SDGs) would require targeted investment in key sectors to protect socio-economic and environmental assets against the impact of future hazards. Those key sectors include: Construction, Infrastructure, Tourism and Cultural Heritage, Environment, Water and Agriculture, Education, Health, and WASH.

1.1 Jordan vulnerability and exposure to disaster risk

Jordan has a medium risk profile, with increasing socio-economic vulnerability being a particular area of concern, according to INFORM 2017 risk index¹.

Jordan Hazard profile

Jordan's hazards profile is characterized by exposure to earthquakes, flash floods, drought, snow storms, frost, heat waves and cold waves, forest fires, landslides, technological/ industrial hazards (oil spill, explosion etc.) and epidemics.

Earthquake. Jordan lies along the Dead Sea Transform Fault which experiences frequent seismic activity, with estimates predicting a major earthquake every 100 year. Major cities including Amman, Aqaba, Petra, Zarka, Irbid and As Salt are located very close to the Dead Sea Fault System. It is therefore estimated that more than 75% of the population lives within just 30km of the main fault line. The last significant earthquakes were recorded on 22 November 1995 in the Gulf of Aqaba with a magnitude of 7.1 and on 11 March 2004 in Amman Governorate with a 5.2-magnitude

Flood. Flood risk, especially flash floods, are increasing due to rapid unplanned urbanization and the insufficient capacity of drainage systems. Flood risks are particularly acute for households that are encroaching on natural drainage areas (wadis).

Drought. Recurrent episodes of drought have also caused significant economic stress especially in the agriculture sector, with adverse implications for food security and rural livelihoods. The worst recorded was in 1999- 2000. More recently, in 2007 and 2010, a severe drought affected Jordan and Syria. When it is not managed, a drought can act as a conflict risk multiplier, triggering migration and amplifying inequalities in access to water services and water resources.

Forest fire. About 177 forest fires were reported between January 2016 and January 2017 (Ajoun forest, Kamaliyah forest, Dibbeen forest, Al-Kamaliyah forest).

¹ INFORM Index for Risk Management, <http://www.inform-index.org/>

Technological / Industrial hazards. Industries (phosphates and potash, textile and pharmaceutical chemicals) are sources of toxic and hazardous waste and wastewaters. Transport of hazardous substance by road and sea increases the potential for technological and industrial hazards.

Epidemics. A measles outbreak occurred in 2013. There are increasing cases of imported leishmaniasis. Jordan has reported cases of Middle East respiratory syndrome coronavirus MERS-CoV (2015), severe acute respiratory infection (SARI) and avian influenza outbreaks (2009).

Transboundary Animal Diseases and Trans-boundary crop pests and plants diseases. Cases of lumpy skin disease, pest, petites ruminants, rabies and external & internal parasites, zoonotic rickettsia influenza & corona viruses have been reported between 2010 and 2015.

Climate Change impact. Climate change (CC) is expected to affect sustainable development, economic growth and society in Jordan. Based on outcomes from the latest Third National Communication Report to UNFCCC (2014), serious vulnerability and impacts results are expected based on modeling and projections analyses, with decrease in annual precipitation. CC is predicted to increase the frequency and intensity of extreme weather events such as drought and extreme temperatures (TNC 2014). As a result, CC will further exacerbate water scarcity. Jordan is already the fourth most water stressed country in the world. The scarcity of water and its secondary effects are considered as the highest security threat especially for the Agriculture and Health sectors. CC is considered as one of the main contributors to land degradation. The highest vulnerable ecosystems to CC are forests/rangelands (especially in the north) and fresh water ecosystems (especially in Jordan Rift Valley). CC impact on Health will be felt through increase in water and food-borne diseases; vector-borne diseases; respiratory diseases; malnutrition and food insecurity.

Population exposure and vulnerability to hazards

Population profile. The population has grown exponentially to reach 9.5 million with an annual growth rate standing at 2.4 percent. It is expected to double by 2047. More than half of the Jordanians are under the age of 25². More than 80% of the population lives in cities (2012) and 60% are concentrated in Amman and the three governorates adjacent to it.

More than 75% of the population lives within just 30km of the main fault line. The high population density found in the relatively most fertile land of highlands extending from Irbid area in the north to Karak area has imposed serious stress on natural resources (land and water). The lack of urban planning has resulted in insufficient drainage systems and encroachment of population on the wadis. The proportion of population living in slums was evaluated at 15.8% in 2015 but is on the increase with the influx of refugee populations.

Poverty headcount stands at 14% with the highest concentration of poor in Amman, Irbid and Zarka. Access to social services is high which is a critical strength to protect the population from the impact of hazards. It is however estimated that 50% of the Jordanians work in the informal economy, hence are not necessarily covered by the national welfare system³ at time of disasters.

Gender equity. Despite having the highest female literacy rate in the region, political and economic participation of women remains limited. This constitute a barrier to the integration of women demands in relation to risk management in national and local plans and to women empowerment to manage disaster risk.

Impact of the refugee crisis on increasing vulnerability to disaster and climate risk. By increasing the number of vulnerable population living in Jordan, by putting additional pressure on natural resources, and by straining the capacities of the infrastructure and institutions, the refugee crisis has a considerable impact on the capacity of local communities and government at central and local level to manage climate and disaster risks.

² Jordan Department of Statistics, 2015

³ United Nations Common Country Assessment, 2018

The total number of Syrian refugees is 1.2 million out of which 80% has settled in host communities in urban areas, predominantly located in the Northern governorates and in Amman. Refugees, who have a lower socio-economic status, are more vulnerable to the potential impact of disasters. The 2015 Vulnerability Assessment found that over 85% of Syrian refugee households live under the Jordanian poverty line, 51% of them are children, and 4% are elderly.

The social service delivery capacities of the Northern Governorates and Amman municipalities are overstretched, especially in Solid Waste Management, WASH; Environment and more generally in Urban Planning⁴. “The provision of water supply is regularly interrupted across northern areas,”⁵. Water and soil pollution have increased due to the inadequate waste collection and disposal capacities, thus increasing vulnerability to **water borne-disease risk**. Moreover, limited capacities in urban planning resulted in informal settlements which considerably increases exposure to **earthquake, flash flood and epidemics risks**. More generally, the crisis has exacerbated vulnerabilities for the poorest segments of the Jordanian population and deteriorated access to quality basic services in the most affected governorates.⁶

The impact of the crisis on disaster management capacities is felt well beyond the slum areas of the Northern Governorates. The Syria crisis affects all state institutions, all socio-economic sectors and – with varying degrees of intensity – all geographic areas^{7,8}. The capacities of the Health, Education, WASH, Energy sectors are diverted to face increased demand for public services. The crisis also affects, to a lesser extent, the Environment and Agriculture sectors with a heightened risk of land degradation due to overgrazing, deforestation, and transboundary animal diseases and crop pests. More generally, the impact of the Syrian crisis on the government capacities has caused delays in implementing reforms (for instance the national education reform plan, the national health climate change adaptation strategy and early warning system) and has diverted the attention of the government to emergency assistance⁹.

Disaster Risk Hot Spots in Jordan

- ❖ Major cities (Amman, Aquaba, Petra, Zarka, Irbid and As Salt) located very close to the Dead Sea Fault System.
- ❖ Ababa Port and its Industrial and Chemical complex is a hazard prone zone in view of the density of storage of hazardous substances.
- ❖ Amman, Zarqa, Irbid, and Mafraq are more vulnerable to flash floods and epidemics due to high concentrations of Syrian refugees which exercise pressure on social services and infrastructure for water and sanitation, drainage and waste management.
- ❖ Jordan southern highlands concentrates the country poorest farmer communities who are severely affected by cumulative impacts from extensive weather-related disasters, such as the prolonged drought in 2007-2010.

Jordan economy exposure and vulnerability to hazard

4 Comprehensive Vulnerability Assessment, MOPIC, Jordan Response Plan Platform, 2015

5 Drying up The growing water crisis facing Syria and the region, UNICEF, 2014

6 “Needs Assessment Review of the Impact of the Syria crisis on Jordan”, MoPIC, 2013

7 Jordan Response Plan for the Syria crisis, 2018-2020

8 UNDP, ‘The Indirect Impact of the Syrian Crisis on Jordan’s Economy: A Quantitative and Qualitative Approach’. 2016, Abu Ghazaleh Consulting

9 United Nations Development Assistance Framework, 2018-2022

Jordan is a serviced based economy that is relatively diversified. The industries (textile, pharmaceutical) account for 18% of GDP, Tourism for 10%, Construction 5%, Agriculture 4% and ICT 4%¹⁰. The Jordan Economic Growth Plan 2018 – 2022 foresees significant investment in **social and housing infrastructure** (construction, WASH, Education), **transport, agriculture and tourism**.

Public infrastructure in urban areas (housing, sanitation, schools and hospitals, ICT) are exposed to earthquake and flash flood risk. The **agriculture** sector growth is particularly vulnerable to climate related hazards and climate variability. The tourism sector, which draws revenues from cultural heritage and eco-tourism, is vulnerable to flash floods risk. Finally, the **Port of Ababa** and its Industrial and Chemical complex, which represents a significant share of the country GDP, can be considered as a hazard prone zone in view of the concentration of economic assets and the density of storage of hazardous substances.

1.2 The Rationale for the CADRI Partnership engagement in Jordan

The Jordan Economic Growth Plan 2018 – 2022 foresees significant investments in public urban infrastructure (housing, water and sanitation, schools and hospitals, ICT), agriculture and tourism.

Capacities of central and local government to protect those investments from disruptions and losses that can result from flash floods, drought or even an earthquake, must be assessed and strengthened.

Similarly, in view of the projected impact of Climate Change on the occurrence and severity of drought, flash floods, and water scarcity in the region, capacities must be in place to ensure that those risks are considered and strategically managed in the design of Executive Development Programmes (EDP), the Sustainable Development Goals roadmap, and the Jordan Response Plan for the Syria crisis.

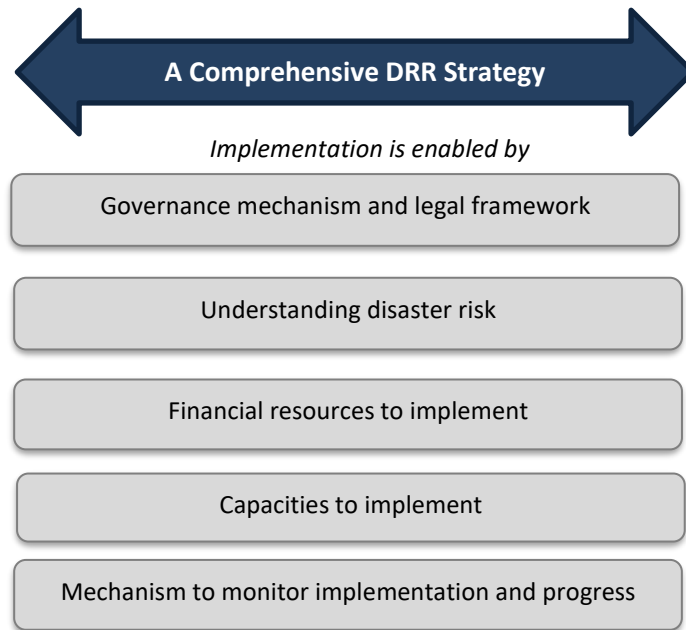
The CADRI Partnership was mobilized at the request of the Hashemite Kingdom of Jordan to the UN Resident Coordinator. During the CADRI 3-day scoping mission, based on consultations with the Directorate of Civil Defence, the National Security and Crisis Management Center, the Ministry of Agriculture and the Ministry of Environment, as well as the UN Country Team, **four priority issues** were identified: i) information management, ii) coordination, iii) clarification of mandates, roles and responsibilities, and iv) preparedness, as well as eight sectors: **CONSTRUCTION, INFRASTRUCTURE, ENVIRONMENT, WATER/WASH, AGRICULTURE, CULTURAL HERITAGE, EDUCATION, HEALTH**.

The capacity assessment recommendations are expected to inform the development of the Jordan Disaster Risk Management strategy ([Sendai Framework for Disaster Risk Reduction](#) global target e).

As per the [Words Into Action Guide on National Disaster Risk Reduction Strategies](#), a national disaster risk reduction strategy must be underpinned by five elements: a mechanism to manage an inclusive process of developing the DRR strategy and enabling its implementation (*typically a national multi-stakeholders platform*); a comprehensive understanding of disaster risk (*a national risk information management system*); **a capacity assessment & capacity development plan**; financial resources dedicated to implement the strategy; and a mechanism to monitor and report on progress (the Sendai Monitor).

¹⁰ Department of Statistics. 2016 Tertiary sector , Jordan Economic Growth Plan 2018 – 2022, Economic Policy Council

Source: UNISDR Words Into Action Guide on National Disaster Risk Reduction Strategies, 2017



2 Capacity Assessment Methodology and Process

2.1 Definition

Disaster risk management refers to the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses¹¹.

Disaster management, on the other hand, is defined as organization, planning and application of measures preparing for, responding to and recovering from disasters¹². A holistic understanding of disaster risk management thus comprises: prevention, mitigation, preparedness, response, recovery and reconstruction.

In this report, the term “disaster risk management” is used interchangeably with “disaster risk reduction”.

2.2 Methodology

The capacity assessment of the DRM system in Jordan was facilitated using the CADRI Capacity Assessment and Planning Tool for Disaster Risk Management. This methodology was developed to support the assessment of existing capacities, gaps and challenges at national and local level according to the four priority areas of the [Sendai Framework for Disaster Risk Reduction](#) (2015-2030) (see figure 1).



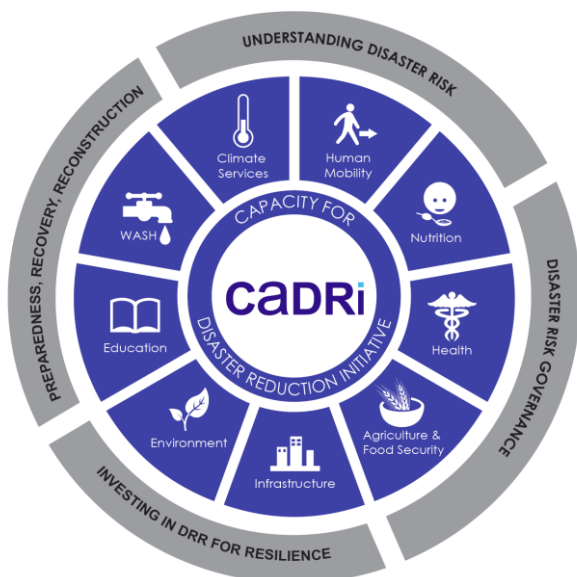
Figure 1. Four Priority Areas of the Sendai Framework for Disaster Risk Reduction (2015-2030)

The CADRI Tool is divided into a generic Disaster Risk Management questionnaire which is structured according to the four priority areas of action of the Sendai Framework (one of which is specifically focused on disaster response preparedness) and a number of sector/issue specific modules developed by the CADRI partner agencies¹³.

¹¹ Source: UNISDR Terminology, 03 February 2017 update, available at: <https://www.unisdr.org/we/inform/terminology#letter-d>

¹² Idem.

¹³ Health; Infrastructure; Agriculture and food security; Human mobility; Education; Environment; WASH; Nutrition; Climate services.



During the CADRI scoping mission, the government prioritized six sectors: Infrastructure, Tourism and Cultural Heritage¹⁴; Environment and Water Resources Management; Health; WASH and Education; and the corresponding CADRI assessment tools were used as well as the tool for Agriculture and Food Security. To respond to government special interest in the analysis of preparedness systems, CADRI mobilized additional expertise through the United Nations Disaster Assessment and Coordination (UNDAC) as well as the European Union Civil Protection (EUCP) deployment mechanisms notably in the areas of information management and civil-military coordination. The UNDAC questionnaire complemented the CADRI tool to deepen the analysis of capacities in emergency preparedness and response.

2.3 Assessment team composition

The capacity assessment was jointly carried out by a multi-disciplinary team composed of selected experts from the UN System, the IFRC, UNDAC and EUCP; Government representatives from the National Center for Security and Crisis Management and the Jordan Civil Defence, as well as the Jordan Red Crescent (see figure 2).

Government	<ul style="list-style-type: none"> • National Center for Security and Crisis Management • Jordan Civil Defence
UN / Red Crescent in Jordan	<ul style="list-style-type: none"> • FAO, IOM, UNDP, UNESCO, WHO • Red Crescent
CADRI/ UNDAC/UNISDR international team	<ul style="list-style-type: none"> • FAO, IFRC, OCHA, UNDP, UNICEF, UNEP, UNISDR, UNDAC and EUCP

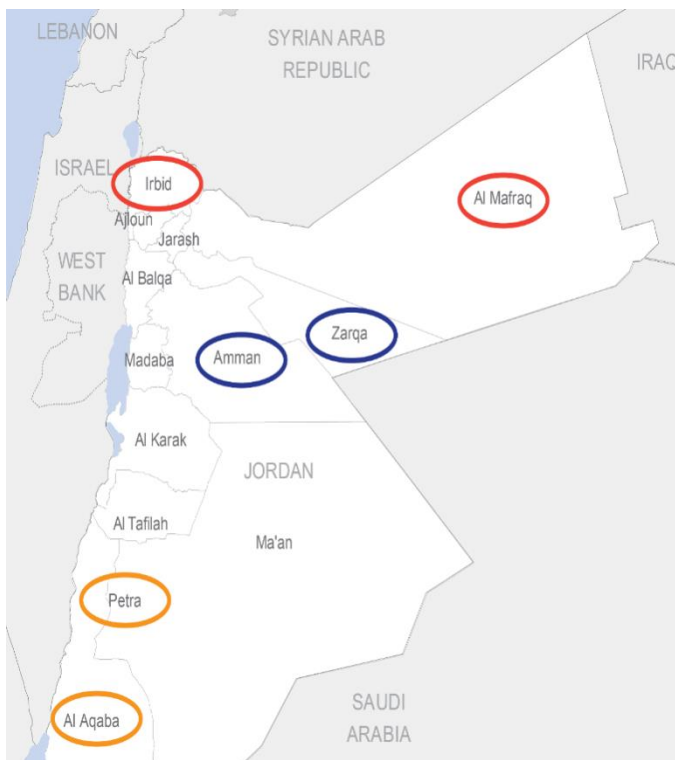
Figure 2. CADRI Capacity Assessment Team composition

¹⁴ For the Cultural Heritage sector analysis, in the absence of a proper CADRI assessment tool, UNESCO applied the CADRI generic assessment and planning tool.

2.4 Data collection and analysis

The assessment was a comprehensive exercise led by the Government of Jordan and facilitated by the CADRI Partnership. It consisted of semi-structured interviews with government and non-government institutions at national and local level, as well as an analytical desk review of the legislative and policy frameworks. The assessment also built on various analysis of the DRM system that are referenced and listed in the bibliography.

The interviews and desk review was completed by a multi-stakeholder workshop on national and local capacities to assess disaster risk facilitated by UNISDR with the expertise of the UK Cabinet on risk assessment. The workshop built on the INFORM mapping of hazard and risk information to facilitate a dialogue on bottlenecks to building a functional national risk information system. The interactive sessions attended by 80 participants from the national and municipal level enabled the identification of key recommendations on risk information.



The team met with 96 Government Institutions (54 national institutions and 42 local institutions) and visited 3 regions:

- **North of Jordan:** Mafrq Governorate (14 institutions) and Irbid Governorate (10 institutions)
- **Central of Jordan:** Amman Governorate (4 institutions) and Zarqa Governorate (6 institutions)
- **South of Jordan:** Petra (3 institutions) and Aqaba Governorate (5 institutions)

The team also conducted interviews with UN agencies, bilateral and multilateral organizations, and non-governmental organizations working in Jordan.

Figure 3. Map of assessment areas in Jordan

The assessment team was divided into 3 sub-teams composed of government representatives, UNCT experts and regional/global experts. Sub-team 1 covered Agriculture, Environment and Water Resources Management; Sub-team 2 focused on Preparedness capacities across sectors; and Sub-team 3 covered Governance arrangements as well as the Infrastructure and Cultural Heritage sectors. The assessment analysis and recommendations are based on the views expressed by approximately 150 individuals met.

The findings and recommendations contained in this report are the outcomes of consultations with national and local stakeholders and triangulation of information between central and local government and other stakeholders (charities, NGOs, Multilateral and Bilateral Partners). The recommendations are derived from suggestions gathered from national and local stakeholders.

3 Capacity Assessment Results and Recommendations

Priority 1: Understanding disaster risk

“Policies and practices for disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Such knowledge can be leveraged for the purpose of pre-disaster risk assessment, for prevention and mitigation and for the development and implementation of appropriate preparedness and effective response to disasters”. **Sendai Framework Priority for Action 1.**

3.1 Priority I: Understanding disaster risk

Understanding disaster risk based on historical loss and damage data and assessment of hazard and vulnerability, as well as an estimation of risk levels is required to make sound decisions in planning public and private investment across sectors.

When we assess capacities to understand risk, what are we looking at?

- ✓ Regulatory frameworks for hazard and risk assessment
- ✓ Availability of raw data (soil, geology, exposure...)
- ✓ Availability of relevant hazard and risk information
- ✓ Integration between humanitarian and development and between CC and DRR data sets
- ✓ Mechanisms to share and access information easily, by all stakeholders (national/local, public/private)

3.1.1 Risk data and information: Collection, analysis, monitoring and dissemination

Existing capacities

Jordan has made substantial investment in capacities in satellite remote sensing and GIS to monitor environment and natural hazards, as well as in data collection on social, economic, environmental and physical vulnerabilities.

Legal framework for risk information

There is no legislation with regards to availability of disaster risk information to stakeholders at national or local level. Jordan is however taking steps to adopt “an open data policy and a security and information protection policy to provide the possibility to access data for free and encourage entrepreneurs to use this data to build business models¹⁵”. The **Open Government Partnership Initiative** coordinated by MOPIC is meant to strengthen the legislative framework governing access to information. The **Charter of Digital Rights** supported by Jordan Open Source is another entry point for more open government data to promote transparency and access to information for more efficient e-government.

Strength in data collection

Raw data required to conduct risk assessment are available in Jordan. Many institutions at national and local level are active in monitoring various hazards and collect different data sets that are crucial in conducting hazard and risk assessments.

¹⁵ Jordan Economic Growth Plan 2018-2022, Economic Policy Council, 2017

INSTITUTION	Technical skills Nature of data collected
Royal Jordanian Geographical Centre	Technical capacities in geospatial mapping and analysis by using remote sensing, aerial and satellite imagery, surveying and GIS mapping. Establish the geodetic networks and triangulation points which cover the entire country. Provides necessary data and information to the Department of Lands and Survey for the cadastral maps. Produces maps and data on topography, vegetation cover, infrastructure, river basins, urban zones, WASH and school facilities, geological maps. Services are <u>not</u> free of charge.
Royal Seismological Observatory	Technical capacities in geological surveys, seismic monitoring and mapping. Collects structural data through 40 sub stations and collaborates with Royal Jordanian Geography Centre and Jordan University. Produces seismic maps and sends daily reports to GCDC and NCSCM.
Department of Statistics	Collects population, socio-economic and environmental vulnerability data disaggregated by municipality through household surveys and census population.
Ministry of Water and Irrigation	Produces water availability table Vulnerability maps on water losses, unserved population and risk associated with wastewater treatment plant conditions (Waste Water Vulnerability maps with UNICEF support) (Open source drought monitoring system <u>under development</u> in collaboration with MoEnv, MoA, NCARE and Meteorology)
The Regional Food Security Analysis (RFSAN)¹⁶	Conducts land use mapping/vegetation cover assessment in collaboration with the Royal Jordanian Geographical Centre
Department of Rangeland	Produces land and green cover maps ¹⁷
Ministry of Energy and Mineral Resources	Produces data on geological structures and geological maps
Ministry of Public Work and Housing	Collects data on infrastructure vulnerability
Ministry of Health	Has technical capacities to conduct Integrated Case-based Disease Surveillance and produces weekly epidemiological public reports
Ministry of Education	Uses EMIS and GIS to produce geospatial mapping of schools
Jordan Meteorological Department	Collects data on rain fall and temperatures and has technical capacities to produce weather forecasts (up to four-day forecast) through met stations.
Ministry of Municipal Affairs	Produces land use maps

¹⁶ RFSAN was launched by FAO and iMMAP in 201

¹⁷ Interview with MoA on 28 Sep 2017

Municipalities	Collects data on building vulnerability (Stories, Age, Type)
Jordan Civil Defense	Coordinates the collection of disaster losses and damages data across sectors. DESINVENTAR database not updated since 2012.
Royal Society for the Conservation of Nature	Collects climate variability data and biodiversity losses data through the Protected Area Meteorological Stations.
Yarmouk University	Technical capacities to process data from European seismological center, Israel and Egypt as well as Jordan Seismological Observatory to produce seismic risk assessment.
Amman Urban Observatory	Collects and analyses data on migration and urbanization.
Badia Restoration Program	Collects data on eco-system conditions.

Strengths in conducting hazard and risk assessment

There are numerous hazard and risk assessment conducted in Jordan on various hazards, with different geographical coverage, or for different sectors. The differentiated vulnerability of different population groups (men and women, boys and girls, disabled, refugees, migrants) is not systematically measured.

The risk assessments undertaken in Jordan have been externally funded and partially outsourced. Significant capacities have been retained at **Yarmouk University** to process seismic data from the region as well as from the Jordan Seismological Observatory to produce seismic risk assessment (Irbid).

Capacities are higher in hazard assessment (especially for earthquake) and more limited in risk assessment. With the view to conduct a nationwide multi-hazard risk assessment, sporadic training on risk assessment approaches have been conducted between 2015 and 2017 (Euro-Med programme for the Prevention, Preparedness and Response to natural and man-made Disasters (PPRD); Training on EU Risk Assessment guidelines; INFORM Risk Index Pilot), but long-term collaboration arrangements and capacity transfer programs are very limited or non-existent.

The list below is a non-exhaustive. The mission was not able to assess the number and scope of risk assessments performed by private sector entities but based on the discussion with the Chamber of Industry, there are no legal provisions to undertake risk assessment except in the construction sector [refer to Priority 3 on Building Resilience in sectors).

VULNERABILITY ANALYSIS

- Vulnerability and Capacity Assessment (VCA) 2010 updated 2017, Jordan Red Crescent
- Comprehensive Vulnerability Assessment (CVA) 2015 – 2017 Ministry of Planning and International Cooperation (MOPIC) & Jordan Response Platform for the Syrian Crisis, focusing on refugees and host communities' vulnerabilities and public service delivery capacities.

MUNICIPAL LEVEL ASSESSMENTS

- Flood risk management for Greater Amman Municipality, on-going
- Earthquake risk assessment, Amman Municipality, 2007-2009
- Earthquake Risk Assessment & floods maps, Aqaba Special Economic Zone
- Earthquake, flash-flood, landslides and rock-fall risk assessment, Petra
- Seismic risk assessment, Irbid
- Earthquake, landslide and chemical risk assessment, Irbid, 2017

- Earthquake, landslide and chemical risk assessment, Mafraq 2017

HAZARD OR SECTOR SPECIFIC ASSESSMENTS

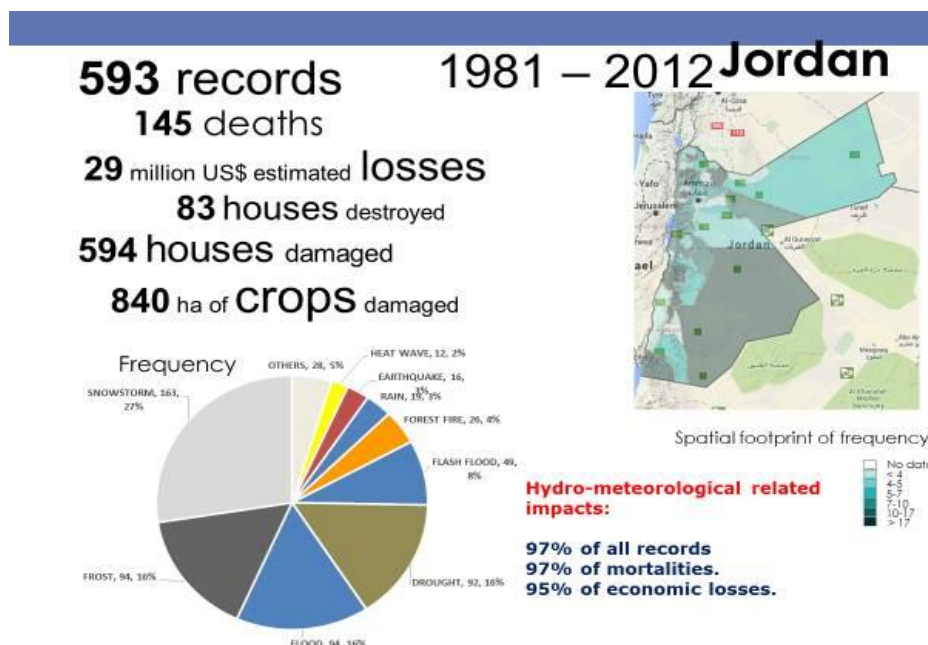
- DROUGHT and soil erosion mapping, National Center for Agriculture Research and extension
- WASH GIS municipal needs and consumption mapping, MOWI on-going
- SANITATION GIS municipal needs and consumption mapping, MOWI on-going
- HEALTH Integrated Case-based Disease Surveillance through IERS
- ATLAS OF JORDAN provides maps on drought, population density and distribution; migration and urbanization; land use planning and settlement patterns, Royal Geographic Centre, 2011 (not updated since then)

Historical Disaster loss and damage datasets

A disaster loss database using the DESINVENTAR software was maintained by JCD until 2012. Data collection continues sporadically but is not systematically recorded using Desinventar. General Directorate of Gendarmerie and MOPIC Department of Statistics under MOPIC collect data on disaster events but datasets are neither analyzed nor shared. No common methodology or data standard is used for loss and damage datasets among JCD and MOPIC Department of Statistics.

The 2017 Sendai Framework Data Readiness Review report¹⁸ suggests that losses and damages data are collected except for: physical damage to the agricultural sector, losses resulting from damaged critical infrastructure, disruptions to educational services and water supply attributed to disasters

In the period 1981-2012, the total economic losses caused by reported natural disasters (593 records) has reached an estimated US\$29 million. Hydro-meteorological impacts (i.e. snowstorms, frosts, droughts, flash floods) accounted for 97% of all records and 95% of economic losses. The crops loss is estimated at 840 ha during the period.



Source: DESINVENTAR database, Government of Jordan/UNISDR

University and Research

¹⁸ Sendai Framework Data Readiness Review Report, Government of Jordan, UNISDR, 2017

The **Royal Jordanian Geographical Centre College for Survey Sciences** trains and graduates many students from Jordan and other Arab countries in Survey Sciences, Data Technology, Satellite Imagery Analysis and Earth Sciences Applications. The College provides three major specializations for the two academic years of the diploma level. Those are: Topographic Surveying; Photography and Cartography, and Photography and Printing. The college has also introduced new specializations in the Surveying Engineering BSc programme.

Yarmouk University has a research capacity to process seismic data to produce seismic risk assessment (see above).

The **Jordan University of Science and Technology** organizes sensitization about disaster risk reduction and climate change (for instance on Health and Climate Change with WHO Regional Centre for Environmental Health Action (Irbid, 2015).

Al Balqa Applied University in Salt was formed by royal decree merging several colleges with a focus on applied technical studies. It has established the International Center for Water and Environmental Research that considers the impact of CC on water.

Prince Hussein Bin Abdullah II Academy of Civil Protection grants BA degree disaster management (with a focus on response).

There is no evidence of capacity to undertake climate change research including climate change modeling for application to sectors. Climate modeling on water and agriculture is outsourced to international research facilities.

Note: The CADRI mission was not able to schedule the appointments with the universities to complete the assessment of research and education capacities in CC and DRM.

Information Management Systems

Three (3) initiatives to consolidate risk data into one information management system were identified:

- **INFORM Risk Index** hosted by JCD and collecting vulnerability, exposure and hazard data on five (5) prioritized hazards: earthquakes, flash floods, landslides, extreme weather events and drought. Data sets requirements have been identified in 2017 through a participatory process.
- **NCSCM national database** consolidating risk information from various ministries on ten (10) hazards of national security, amongst which are: water availability, energy, earthquake, epidemics, environment emergencies, fire. This is the foundation for an integrated risk monitoring system at NCSCM.
- **Royal Jordanian Geographical Centre *Electronic National Geospatial Information Portal (GEO-PORTAL)* data management system**, co-led with MOPIC, to provide access to vulnerability and risk information to users. This was initiated by MOPIC Information Management Group established in 2014. Data sharing protocols with various ministries and entities are still under discussion.

Challenges

Despite the impressive investment in the collection and production of vulnerability and risk data, the remaining challenge is the lack of **comprehensive** risk information **accessible** to decision makers. The lack of consolidation and access limit the production of evidence needed to incentivize and hold accountable public and private decision makers to make risk informed investment decisions.

Two main bottlenecks must be addressed in order to strengthen the DRM system in Jordan:

- (i) the **fragmentation of information** between climate and disaster data, between humanitarian and development data, between sectors and ministries, between the national and municipal level
- (ii) the **lack of access** to risk information, across ministries, across municipalities as well as by private sector and the general population

Capacity gaps:

- There is no legislation with regards to availability of disaster risk information to public and private sector stakeholders at national or local level. This hinders any consistent progress and accountability for producing and making the risk information accessible to stakeholders.
- Data collection is not systematic. Data sets are often outdated. For instance, the risk assessments are a one-off event. In view of rapid urbanization, the flood risk assessments done for Aqaba or Amman become rapidly obsolete.
- Lack of system to share vulnerability and risk information between entities, ministries, central and local government
- Data collection and analysis is done in isolation by sectors/actors. Collaboration is limited (with the notable exception of the partnership between the Royal Seismological Observatory-Royal Geographical Centre & Yarmouk University; or the partnership between MWI-MoEnv, MoA, NCARE and Meteorology on drought monitoring)
- Overall coordination of climate information services is weak. There is no standardized exchange of information between the Meteorological Department, sectoral ministries and municipalities. Several public institutions reported using the services of Arabia weather deemed more reliable and accurate.
- Loss and damages data are neither systematically collected across sectors and localities, nor aggregated in the DESINVENTAR database, and the analysis is not made available to decision makers across socio-economic sectors. Disaster loss data are not integrated with climate loss data.
- The lack of information on the actual cost of disasters and climate change for the national and local economy is an impediment to convince public and private decision makers to invest in prevention and preparedness.
- Absence or limited technical skills in climate modeling and its application to sectors.

- Risk assessment:
 - Absence of standard guidelines or formalized methodology for conducting risk assessment
 - Users requirements are not identified early on, therefore the risk assessments are not designed to meet their specific needs.
 - Hazard and risk assessments are conducted mostly as a research exercise without clear link to the application of results in sectors (with the exception of seismic risk assessment that is applied to the construction and housing sector)
 - Risk assessments are conducted as a one-off project. They can become rapidly obsolete and need to be regularly updated.

- Access to information:
 - Risk information is generally not accessible to decision makers at national and local level and even less to the population and private sector entities.
 - Ownership of risk assessment information must be clarified. Risk assessment is often considered as the property of the “project manager” and is neither widely disseminated nor available on line or upon demand at no cost. It is noted that local risk assessments completed for Amman, Irbid and Mafrq are not widely circulated across the different services of the Governorate/Municipality. Only in the case of Aqaba, the risk assessment data were widely disseminated and used for spatial planning and public works investment.
 - Few institutions in Jordan have their reports and information data sets available online.

- Significant capacity gaps among central and local government in understanding risk information and its application (workshop participants and interviewees believed that concepts such as probability, return period, uncertainty, direct and indirect impact, various types of vulnerability and capacities, as well as possible applications to sectors are not commonly understood).

Recommendations

Conclusion: Significant mapping and data analysis capacities already exist. Raw data required to conduct risk assessment are available in Jordan. Multi-hazard risk assessments have been completed in Amman, Aqaba, Petra, Irbid and Mafrq thus covering more than 80% of the population of Jordan. In view of available resource, it is therefore not recommended to prioritize a nationwide risk assessment in Jordan. It is recommended to prioritize three actions: i) a disaster information management system that facilitates data sharing and accessibility of risk information to national and local stakeholders; ii) institutionalizing loss and damage accounting to document the cost of disaster and CC for the SDGs; and iii) institutionalizing risk assessment practices with a focus on the application of risk information to sectors.

- ❖ **Recommendation 1: Setting up a disaster and climate risk information management system to facilitate data sharing and accessibility of disaster data for stakeholders.** Few recommendations specific to disaster risk information management system are listed below.

There are three on-going initiatives to build a risk information management system: JCD INFORM Risk Index; NCSCM National database on 9 security threats/hazards; Royal Jordanian Geographical Centre-MOPIC GEO-PORTAL).

The main recommendation is to separate the disaster information database and the security information database. NCSCM should therefore maintain two separate databases. NCSCM monitors 9 security threats (Earthquake, Epidemics, Social violence, Energy crisis, Fires, Environment pollution, Terrorism, Refugees influx, Water scarcity). It is recommended that NCSCM establishes a separate open source disaster risk information database/platform with a sole focus on disaster risk: earthquakes, flash floods, landslides, extreme weather events (frost, drought), epidemics, technological hazards. Such disaster risk information database/platform shall provide free of charge access to risk information to public and private sector stakeholders with the view to inform preparedness and prevention efforts. The database can have different access rights depending on the sensitivity of the information.

RECOMMENDATION 1 - Setting up a disaster and climate risk information management system to facilitate data sharing and accessibility of disaster data for stakeholders
1.1 Establish the <u>disaster risk information database</u> in line with the <u>Government Open Data policy</u> and Security and information protection policy and the Open Government Partnership Initiative on access to information.
1.2 Acknowledging that risk information can be of sensitive nature, <u>separate</u> the open source disaster risk information platform from the security hazard information platform maintained by NCSCM
1.3 Establish the Open-source/Closed <u>disaster risk information database</u> with different user access rights for: i) national security institutions, ii) sector ministries, municipalities and governorates, and iii) general public and private sector
1.4 The <u>disaster risk information database</u> should integrate data sets and analysis from: i) sector ministries; ii) humanitarian and development actors; iii) climate change research (Ministry of Environment). Key sectors (i.e. agriculture, tourism, urban development, rural development, water resources, health) must commit to have their datasets connected to the central system at no cost.
1.5 Formalize the <u>Risk Information Management Platform</u> , to include sector ministries, Royal Jordanian Geographic Center, Statistics Department, bilateral and multilateral agencies, academia and NGOs i.e. all actors producing risk information (hazard and vulnerability data), chaired by NCSCM and co-chaired by MOPIC. The INFORM working group can be the starting points for such Risk Information Management Platform. STEP 1
1.6 Prepare a tool to collect, consolidate and analyze data related to risk mapping; STEP 2
1.7 Review and harmonize all data sets available from ministries relevant to DRR. STEP 3
1.8 Conduct a mapping of the geo-spatial data and capacities within the different ministries (lead agency Royal Jordanian Geographic Center) STEP 4
1.9 Standardize data collection templates tailored to each ministry through a participatory and consultative process and agree on data collection periodicity with clear roles STEP 5
1.10 Establish clear data sharing protocols including legal framework, data formats, metadata, and security measures to protect selected confidential security information on risk that should not be accessible to the general public STEP 6

1.11 To avoid bottlenecks and delays encountered since 2014 to reach agreement on data sharing protocols and access to information free of charge, elevate the initiative as a matter of public policy with the Prime Minister and above
1.12 Staff the disaster risk information management database with Information Management officers from the NCSCM, JCD and Royal Jordanian Geographical Center
1.13 Establish a small annual budget allocation to support the functioning of the disaster risk information platform to eliminate the practice of selling information
1.14 Establish a budget allocation for <u>Communication & Training</u> on use of the disaster risk information for the national platform members <u>as well as</u> policy and planning officers of each sector ministry and municipalities. Such training must be <u>repeated</u> on an annual basis

❖ **Recommendation 2: Institutionalize disaster loss and damage accounting to monitor socio economic and environmental cost of disasters.** Few specific recommendations are listed below.

The loss and damage databases provide valuable insights to the level and characteristics of extensive disaster risk. Most importantly the documentation of the socio-economic cost of disaster and climate change for the national and local economy is the main piece of evidence to advocate with decision makers about DRR. National DRR Platform should have a role in collecting and disseminating information on disaster losses. Loss databases are also a tool required for monitoring and reporting progress in achieving the global Sendai targets. The DESINVENTAR database system is migrating to the “Sendai Monitor”. International standards and guidelines can be customized to the context of Jordan risk and needs.¹⁹

RECOMMENDATION 2 - Institutionalize disaster loss and damage accounting to monitor socio-economic and environmental cost of disasters
2.1 Establish data collection standards and methodologies to be used across sectors and institutions at national and local level to gather loss and damage as per the DESINVENTAR / SENDAI MONITOR standards
2.2 Ensure legal provision and a small budget allocation are in place to back sustainable resourcing and accountability for maintaining the disaster loss database (Sendai target)
2.3 Ensure that the differentiated impact of disasters and climate change on vulnerable groups is recorded
2.4 Ensure that all sectoral datasets are collected, such as social, economic and environmental sectors, including critical infrastructure, cultural heritage, tourism etc.
2.5 Provide training to a large enough number of staffs to maintain a core of expertise in the long term
2.6 Build capacities to produce a short annual report on disaster losses and damages sent to Cabinet, MOPIC and all sector ministries and municipalities

Box 3 Core activities for establishing national disaster loss database:

1. Identifying key stakeholders and partners: host institution, data sources and end users.
2. Developing implementation plan with timelines, as well as roles and responsibilities for all actors involved.
3. Establishing recording methodology that should consider national legislation, context and existing practices. This includes deciding on the historical time frame and disaggregation level to collect data
4. Developing an official sustainability plan endorsed by the host agency and other relevant contributing agencies.
5. Setting up the computational environment for the database.
6. Recruiting data collectors and conducting training for the historical research.

¹⁹ For further information see: Guidance for Recording and Sharing Disaster Damage and Loss Data, European Commission Joint Research Centre, 2015 http://dr.jrc.ec.europa.eu/Portals/0/Loss/JRC_guidelines_loss_data_recording_v10.pdf

7. Conducting training on day-to-day collection of loss data, which is done by permanent staff of designated entities at subnational and national level.
8. Developing and implementing an overall quality control strategy.
9. Starting day-to-day collection of losses.

Source : UNISDR Words into Action Guidelines on National Disaster Risk Assessment 2017

❖ **Recommendation 3 - Institutionalize a practice of assessing and understanding risk across government.** Few specific recommendations in this regard are listed below.

It is not recommended to conduct a “nationwide risk assessment”, without a clear articulation of the use and application of such risk assessment and in the absence of clear demand from ministries or private sector. Instead it is recommended to build on existing risk information (local risk assessments currently cover more than 80% of the population), update existing data sets, and institutionalize a practice of understanding and applying risk information across government. A Word Into Action guideline on National Disaster Risk Assessment provides practical information on establishing a central system for risk assessment.²⁰

Recommendation 3 - Institutionalize a practice of assessing and understanding risk across government
3.1 It is <u>not</u> recommended to conduct a “nationwide risk assessment”, especially without a clear articulation of the use and application of such risk assessment and in the absence of clear demand from sector ministries or private sector stakeholders.
3.2 Establish the required legal framework for conducting and maintaining/updating multi-hazard risk assessment and providing clear and understandable risk information to all stakeholders. Experience from other countries shows that countries with such legal framework have a higher level of success in maintaining and updating hazard and risk information.
3.3 Update the existing data sets especially with respect to population density and population profile. Updated population information with sex, age and vulnerability disaggregated data and updated population density maps must be systematically integrated in the local risk assessment analysis to ensure that the special needs and demands of vulnerable groups are taken into consideration in investment decisions.
3.4 Establish a <u>risk assessment group</u> as a mechanism linking <i>producers</i> of hazard and risk information and <i>users</i> of such information (<u>expanding the existing NCSCM “risk assessment” team</u>). The members of the risk assessment group include the members of the Information Management Platform (see recommendation 1.4 above) as well as representatives of users (user of risk information can include farmers, infrastructure engineers, public works, municipalities, water users etc.)
3.5 Develop and implement a communication plan to provide <u>action oriented</u> risk information to different user groups (farmers, herders, construction, infrastructure, ministries, municipalities)
3.6 Invest in capacity development in scientific community to conduct assessments and modeling and in non-scientific community to understand disaster risk information and its applications

20 Words into Actions Guideline on National Disaster Risk Assessment, UNISDR, 2017.
http://www.unisdr.org/files/52828_nationaldisasterriskassessmentwiagu.pdf

Priority II: Strengthening governance and institutions to manage disaster risk

“Disaster risk governance at the national, regional and global levels is of great importance for an effective and efficient management of disaster risk. Clear vision, plans, competence, guidance and coordination within and across sectors, as well as participation of relevant stakeholders, are needed. Strengthening disaster risk governance for prevention, mitigation, preparedness, response, recovery and rehabilitation is therefore necessary and fosters collaboration and partnership across mechanisms and institutions for the implementation of instruments relevant to disaster risk reduction and sustainable development.”

Sendai Framework Priority for Action II.

3.2 Priority II - Strengthening governance and institutions to manage disaster risk

When we assess risk governance capacities, what are we looking at?

- ✓ Awareness (government, private sector, population)
- ✓ Legal and policy framework assigning roles and responsibilities
- ✓ Organizational and institutional arrangements effectiveness
- ✓ Coordination (inter-ministerial, central-local, public-private, DRR-CC)
- ✓ Financing

3.2.1 Awareness

Awareness about the exposure and vulnerability of the Jordan population and economy to natural and technological hazards is relatively low amongst central government institutions, with the notable exception of the Ministry of Water & Irrigation and the Ministry of Public Works. The low level of awareness is evidenced by the scarce acknowledgment of climate change and disaster risk in the government national development and growth strategies. Overall the management of disaster risk is considered to be the responsibility of the JCD and NCSCM. As one ministry representative explained: « *Without solid evidence [of the impact of disasters on the population and the economy], the government ministries will not tackle those issues and it will remain the domain of civil defense and NCSCM alone.* »

At local level however, the city resilience campaign was successful in bringing local government to recognize the vulnerability of Jordan cities to disaster and climate risks. The Aqaba declaration (March 2013) which committed Arab municipalities to prepare city's DRR strategy, led the way for Amman, Aqaba, Zarqa, Irbid, Madaba, Jarash, Salt and Mafraq to develop their own disaster management plans.

Awareness of the general population about disaster risk seems limited. In rural areas, resource scarcity (land and water) emerged as a key environmental risk during the household survey²¹. Community DRR is however limited. It is not uncommon that people cover manholes, or install their house or small businesses in wadi streams. In case of early warning, the population is not educated about its role and responsibilities. Awareness-raising campaigns towards school students and media have not been sufficient and need to be scaled up.

3.2.2 Legislative, policy and planning frameworks for DRM

Existing capacities

The regulatory frameworks for DRR or 'DRR legislation' is an ensemble of laws and rules that cuts across sectoral laws and regulations.

Legislative framework

²¹ Disaster risk reduction assessment report: understanding livelihood resilience in Jordan, Regional Food Security Analysis Network, FAO, REACH, 2016.

There is no Disaster Risk Management law but several laws make provisions for different aspects of disaster management in relation to natural, biological, technological, industrial hazards, environmental emergencies etc. The analytical study on legislation related to disaster management has mapped as many as twenty (20) laws or regulations relating to disaster management²². To name only a few:

- The Jordanian Constitution (1952) and its Amendments
- Public Security Law (1965) and its Amendments
- Jordan National Red Crescent Society Law (1969)
- Marine Disasters Regulation (1961)
- Building and Planning Regulation in the City of Amman and its amendments (1979)
- Regulation for the Ministry of Energy and Mineral Resources (1985) and its amendments
- Defence Law (1992)
- Jordanian National Construction Law (1993) and its Amendments
- Civil Defence Law of 1999 (amended in 2003) establishing the Higher Council of Civil Defense
- Jordanian Armed Forces Temporary Law (2001)
- Nuclear Energy and Radiation Protection Law (2001)
- Public Health Law (2008)
- Agricultural Law (2016)
- Environment Protection Law (2016)
- Municipalities Law (2011)
- National Center for Security and Crises Management Regulation (2015)
- Decentralization law (2015)

These laws give risk management responsibilities to different organizations at different points in time thus creating possible overlaps in institutional mandates. This is particularly evident in the allocation of role and responsibility for the coordination of disaster response efforts. The Civil Defence Law of 1999 (amended in 2003) allocates roles and responsibilities to deal with disasters and major accidents. It establishes the Higher Council of Civil Defence (HCCD) to *coordinate disaster management efforts* and support training. The bi-law of 2015 established the National Center for Security and Crises Management (NCSCM) also responsible to *coordinate the national crisis response* and support capacity development. Finally, for major threats to State and people security, the Armed Forces can be called upon to *coordinate disaster response* efforts.

The **Municipalities Law** (2011) give considerable disaster risk management responsibilities to the municipalities. The 100 municipalities are supervised by the Ministry of Municipality Affairs (MoMA) except for Greater Amman Municipality (GAM) and Aqaba Special Economic Zone Authority (ASEZA). The law gives them responsibility for: i) Building licenses, monitoring and demolitions; ii) Prevent damage caused by floods and overflowing stream; iii) Prevent fire; iv) Protect people and property.

The **Decentralization Law** (2015) with the election of local community councils and the transformation of municipal and governorate councils into indirectly elected bodies, is an opportunity for more participatory decision-making on budget allocation to address risk affecting local communities (municipal councils and mayors used to be appointed by the cabinet). So far, opportunities for local stakeholders (CSOs and community members) to share their concerns about local risk facing the communities have been limited and are not reflected in local development plans (Governorate Development Plans).

²² Analytical Study on Legislations effective Related to Disasters & Disaster Management, JCD, UNDP 2014

Policy and planning framework at national and local level

Jordan has a **Disaster Management Strategy** focused on disaster response. This Strategy is being updated to align it with the Sendai Framework for Disaster Risk Reduction. Several partners (UNISDR, SDC, France through the EU twinning project) have expressed interest to support the development of a comprehensive DRM strategy.

The Government also has a National Disaster Risk Management Program (2004) which contains provisions for disaster response [described under Priority IV – Preparedness for Response and Recovery].

The DRM policy framework in Jordan is made of other important policies such as the national climate change policy, the food security strategy, the national strategy and action plan to combat desertification and the national water strategy [described under Priority III – Disaster Resilience in sectors].

At the local level, Jordan has made outstanding advances in the design of DRM plans or strategies:

- The Disaster Risk Management Master Plan for Amman (2009) based on the earthquake risk assessment
- The Disaster Risk Management Master Plan for Aqaba (2010) based on the earthquake risk assessment and flood hazard map
- The Resilience Action Plans for Zarqa, Irbid, Madaba, Jarash and Salt
- The Local Emergency and Risk Management Plan for Irbid (2017) based on the earthquake, landslide and chemical risk assessment
- The Local Emergency and Risk Management Plan for Mafraq (2017) based on the earthquake, landslide and chemical risk assessment
- The Amman city resilience strategy (2017)

Challenges

The legislative and policy framework for DRM in Jordan is still nascent.

Two main bottlenecks must be addressed in order to strengthen the DRM system:

- (i) The **overlap and lack of clarity in the allocation of mandates**, roles and responsibilities between institutions at central and between the central and local level
- (ii) The **lack of common vision for DRM** i.e. commonly agreed objectives and targets across sectors and levels to fulfill the country's commitment to the Sendai Framework for Disaster Risk Reduction and ultimately the SDGs.

Capacity gaps in the legislative and policy framework:

- The absence of a clear legislative framework for DRM creates confusion with respect to the allocation of mandates, roles and responsibilities and prevents the creation of a culture of accountability.
- In the absence of a law, it is also difficult to justify a consistent budget allocation to DRM

- The absence of a comprehensive DRM strategy is an impediment to set up clear objectives and targets across sectors in DRM.
- The legislative and policy framework is focused on emergency response and does not make provisions for preparedness and prevention.
- None withstanding the spectacular progress made at local level in adopting disaster management plans in eight (8) Municipalities, these initiatives are often externally driven (UNISDR, UNDP, UN Habitat, 100RC), the degree of ownership and the extent to which the local disaster management plans are being implemented varies significantly between those municipalities.
- The local DRM strategies are stand alone and disconnected from the local development plans (Governorates / Municipality plans) and disconnected from the national DRM Strategy.

Recommendations

Conclusion: The absence of a clear and comprehensive legislative and policy framework is an impediment for the efficiency of the disaster management system due to the lack of clarity on mandates, roles and responsibilities, accountability lines and objectives and targets. Spectacular progress has been made at local level in adopting DRM plans (Amman, Aqaba, Zarqa, Irbid, Madaba, Jarash, Salt, Mafraq) but the extent to which those plans are being implemented varies. It is therefore recommended to prioritize i) a legislative review of the DRM system that could inform the development of a DRM law; ii) a comprehensive national disaster risk management strategy; and iii) a clear articulation of the local DRM plans with the new national disaster risk management strategy and the local development plans.

- ❖ **Recommendation 1: Conduct a legislative review of the DRM system to inform the development of an umbrella DRM law.** Few recommendations specific to the legislative framework are listed below.

The legal framework for DRR is meant to: i) clarify institutional mandates, ii) establish the responsibility and accountability of relevant actors across *sectors* and *levels*, iii) ensure allocation of dedicated resources, iv) ensure the participation of civil society and private sector in DRR. A legal framework for DRR is especially useful to regulate EWS and make specific provisions for risk mapping and/or risk assessments (see Priority 1).

There are different types of DRM law ranging from a general overarching framework to a very detailed law specifying mandates and sector responsibilities. The most effective model depends on the local context and method of resource allocation. International standards and guidelines can be customized to the context of Jordan risk and needs. In this respect, the [check list on Law and Disaster Risk Reduction](#) (2015)²³ provides practical guidance to the review process of national/sectoral level laws and regulations that can enhance DRR; as well as guidance on how to bring national legal frameworks in line with the Sendai Framework for Disaster Risk Reduction 2015-2030. The Checklist also aims to foster a more integrated approach to disaster risk reduction by taking into account climate change and sustainable development considerations within the review of legislation.

²³ The Check List on Law on Disaster Risk Reduction, IFRC-UNDP, 2015

Recommendation 1**Conduct a legislative review of the DRM system to inform the development of an umbrella DRM law**

1.1 The legal framework for DRR shall achieve consistency between the regulatory framework for emergency response (currently the Civil Defense Law of 1999 amended in 2003 as well as the NCSCM 2015 By-Law), the regulatory frameworks for building safety and construction, land use and spatial planning, the environmental regulations, as well as the decentralization laws.

1.2 The DRM law shall cover all key DRM functions such as prevention, mitigation, preparedness, response and recovery. The law shall promote a multi-hazard approach (geological, climatic, biological, technological and industrial hazards).

1.3 A preliminary step to the selection of the most adapted regulatory framework for Jordan is the conduct of a legislative review of the DRM system. It should build on the legislative review undertaken in 2004 and the National Disaster Law consultation held in 2015

❖ **Recommendation 2: Develop a comprehensive national DRM strategy.** Few recommendations specific to DRM Strategy are listed below.

International standards and guidelines can be customized to the context of Jordan. A [Word into Action guideline on National Disaster Risk Reduction Strategies](#) provides practical information on developing and implementing a comprehensive strategy (Sendai target e).²⁴

Recommendation 2 - Develop a comprehensive national DRM strategy to establish clear objectives and targets for all sectors and stakeholders

2.1 The DRM Strategy should be developed through a series of inclusive consultations leading to the prioritization and sequencing of measures. Such process must involve all sector ministries, as well as a diverse representation of local authorities and public/private sector stakeholders (including for instance the Royal Jordanian Geographic Centre, the Royal Society for the Conservation of Nature, the Chambers of Commerce and Industry, the Badia Programme, and the Jordan Red Crescent to name a few)

2.2 The DRM Strategy must be reflective of the needs and demands of vulnerable groups (women, children, disabled, migrants, displaced, refugees) as well as the needs and demands of private sector stakeholders (construction, tourism, ICT for instance)

2.3 The National Platform for DRR established under NCSCM leadership can serve as a consultative mechanism for the development of the DRM Strategy provided the membership includes both Emergency Response focal points appointed to NCSCM as well as Directors of Planning from all sector ministries to cover aspects of prevention.

2.4 For the Strategy to be nationally own and driven, the design process should provide sufficient time for internal review (six months to one year).

2.5 For the DRM Strategy to be contextualized, it must be based on a common understanding of the exposure and vulnerability of different population groups (including refugees), and the exposure and vulnerability of the Jordan economy to climate and disaster risks. In this respect, the national disaster profile shall be updated with current population data and complemented with selected data from the local risk assessments for Amman, Aqaba, Petra, Irbid, Mafraq.

²⁴ Words into Actions Guideline on National Disaster Risk Reduction Strategies, UNISDR, 2017.

2.6 The DRM Strategy shall be built around Jordan socio-economic priorities spelled out in Jordan 2025, the SDGs and the Jordan Economic Growth Plan 2018-2022, and identify concrete DRM actions that will protect public investment against climate change and disaster risks (i.e. safe schools and hospitals, resilient agriculture, resilient cultural heritage and tourism, and resilient cities).

2.7 The DRM Strategy shall identify clear synergies with other DRM policy documents such as the climate change policy, the food security strategy, the strategy and action plan to combat desertification, the water strategy, the urbanization policy

2.8 The DRM Strategy shall include a clear M&E Framework linked to the Sendai Monitor and supported by a participatory M&E mechanism linked to the SDG monitoring mechanism under MOPIC.

2.9 The DRM Strategy must be supported by a communication and plan and budget for dissemination to all sector ministries, governorates and municipalities, as well as key entities such as the Chambers of Commerce and Industry.

2.10 Gender equity and women empowerment must be a motor for the implementation of the DRM Strategy through: promoting the systematic production of gender disaggregated data on losses and vulnerabilities; the promotion of women participation in planning and prioritization processes; the design of gender sensitive risk informed strategies as well as gender sensitive preparedness, response and recovery plans.

Development Partners' support to the design of the DRM Strategy must be coordinated to ensure that resources are well distributed between: i) the dissemination of the Jordan Disaster Profile; ii) the consultations with sector ministries, private sector, selected municipalities and selected communities and CSO groups to develop and validate the Strategy at different stages; iii) the communication and dissemination of the national DRM strategy.

3.2.3 Institutional framework and coordination mechanisms for DRM

Jordan is a constitutional monarchy. The King however holds wide executive and legislative powers. He serves as Head of State and Commander-in-Chief and appoints the executive branch consisting of the Prime Minister, the Cabinet, and regional governors. The system is highly centralized. The 12 governorates are headed by a governor who is appointed by the King through the Ministry of Interior who acts, together with the de-concentrated directorates of line ministries, as an extension of the central government. The central level provides all basic services including water, electricity, gas, sewerage, primary education, healthcare, among others, which are delivered through the de-concentrated services of the Governorates.

Jordan institutional framework and coordination arrangements have been developed to manage disaster events, while institutional and coordination arrangements for preparedness and prevention are still under development.

Existing capacities

There are three main institutions with a recognized role to manage disasters and crisis situations: the Jordan Civil Defence, the High Council of Civil Defence, and the National Committee for Security and Crisis Management.

The **Jordan Civil Defence (JCD)** was established in 1959 with an operational mandate to undertake disaster management / response activities: Ambulance, Firefighting, Rescue; Supervision and control of security arrangements in facilities; and Awareness raising through JCD Disaster Management Department. It is supplemented by *Civil Defence Directorates* in all twelve (12) governorates. JCD runs a network of 187 *civil defence centers* throughout the country. Women participation in JCD leadership and DRM activities is limited.

The **Higher Council of Civil Defence (HCCD)** or “Supreme Council” was established by virtue of the civil defence law amended in 2003. It is chaired by the Minister of Interior with the Director General of Civil Defence as vice-chair. It is composed of sector ministries representatives and is mandated by law to manage disaster and emergency situations in all phases (preparedness, response and recovery) including training on early warning. The HCCD established three technical committees: media, relief, and earthquake.

The **National Council for Security and Crisis Management (NCSCM)** was established in 2015 (by-law) under the leadership of His Majesty King Abdullah II. It coordinates national crisis management efforts and capacities across government, private sector, NGOs and humanitarian aid agencies to prepare for and manage a crisis. It functions as a National Command and Control Center at time of crisis with the appointment of a Crisis Commander. It is headed by a Board of Directors composed of security agencies. In relation to disaster management, NCSCM is expected to support an Integrated Early Warning System through a comprehensive national database [see Sendai Priority 1 above], the development of Contingency Plans by sectors. It is supplemented by a network of *Operations Centers in governorates* and *Operations Centers in ministries*. Women participation in NCSCM leadership and DRM activities is limited.

With respect to coordination, there are two mechanisms that could coordinate DRM efforts: The **National DRR Platform** under the leadership of NCSCM; and the **Higher National Committee for Sustainable Development** under the leadership of MOPIC. Both have the advantage to be supported by a national information system: NCSCM data base and MOPIC GEO-PORTAL data management system with the Royal Jordanian Geographical Centre.

The **National DRR Platform** established under the umbrella of NCSCM in 2017 is not yet functional. It is composed of 54 members including military and security authorities, ministries, GAM, ASEZA, PDTRA, universities, Jordan Chambers of Industry and Trade, JRC. Its mandate is under development.

The **Higher National Committee for Sustainable Development** established under the umbrella of MOPIC was expanded in March 2017 to include all sectors and civil society representatives. The Coordination Committee ensures mainstreaming of the SDGs within the national plans, and connectedness between the 16 working groups.

There are other multi-sectoral coordination mechanisms who could potentially support the mainstreaming of DRM in sectors the national climate change committee and the high-level committee for natural resource management.

At local level the **Governorate Civil Defence Committee**, headed by the governor and composed of sector departments, director of civil defence, director of police, mayor, industry and trade chambers, armed forces and Red Crescent have a responsibility to coordinate disaster response efforts.

Challenges

Two main bottlenecks must be addressed to strengthen the DRM system in Jordan:

- (i) There is **no central entity capacitated** to lead disaster response, preparedness as well as prevention and recovery efforts across sectors and levels.
- (ii) There is **no effective mechanism to ensure coordination** of DRM activities between sectors and between the central and local level.

Capacity gaps:

- ❖ *Overlap in mandates between HCCD and NCSCM for the functions of coordination and strategic planning. Please see table below.*

	HCCD	NCSCM
Legal status	Mandated by law (2003) to manage disasters (preparedness, response, recovery)	Royal Decree approving the NCSCM's by-law (2015)
Leadership & convening power	Minister of Interior	HRH Prince Ali Ben Al-Hussein Can leverage security forces including armed forces as well as ministries emergency operations centers
Representation	All ministries; security agencies; GAM; JRC; Chambers of Industry and Commerce	Board of Director composed of security agencies and chaired by the Prime Minister
Mandate	Coordination and Strategy: Preparedness and Response Plans; Coordinates governorate civil defense committees' operations rooms; signs international cooperation agreement	Coordination and Strategy: Coordination of crisis management efforts; Early prediction of crisis; National Command and Control Center at time of crisis; Training; Consolidation of multi-threat contingency plans from all ministries;
Organization	Media, relief, and earthquake technical committees (see Priority IV)	Media, ICT (information management, Training, Operations, plans and risk assessments unit)
Local level	All governorates civil defense committees' operation rooms	Emergency Operations centers (EOC) in each ministry as well as in North, Central and South regions (not properly equipped)
Resources	Not capacitated with the required resources (budget and secretariat); Not operational.	Center is well equipped, staffed and operational.
Manpower	No Secretariat structure	Total manpower: 135 Liaison Officers from ministries: 23
Information management system	None	National database for early prediction of crisis/EWS
DRM skills	Could not be assessed	Skills and systems for crisis management; Limited understanding of DRM concepts

- ❖ *Overlap between NCSCM and JCD operational mandates for coordination of response & preparedness for response as well as training*

	JCD / GDCD	NCSCM
Legal status	Mandated by civil defense law (1959 / 1999)	Royal Decree approving the NCSCM's by-law (2015)
Leadership & convening power	Minister of Interior	HRH Prince Ali Ben Al-Hussein Can leverage security forces including armed forces as well as ministries emergency operations centers
Representation		Board of Director composed of security agencies and chaired by Prime Minister
Mandate	<p>Coordination of government and private sector <i>disaster risk management</i> efforts; Ambulance services, firefighting, and rescue operations; Annual public awareness campaigns;</p> <p>Training on response;</p> <p><u>Preparedness and Early warning</u> JCD alarm system to connect sirens across the territory (not yet functional)</p> <p><u>Protection / Prevention</u> Check availability of safety requirements for industrial, commercial, and tourist buildings;</p>	<p>Coordination of <i>crisis</i> management efforts; National Command and Control Center at time of crisis;</p> <p>Training (not yet operational);</p> <p><u>Preparedness & Early Warning:</u> Early prediction of crisis; Consolidation of multi-threat contingency plans from all ministries;</p>
Information management system	DESINVENTAR data base on recording disaster losses (no longer maintained)	National database for early prediction of crisis/EWS
Organization	Several departments including: Disaster Department; Training; Fire & Rescue; Awareness; Communication; Operational Civil Defense training center; Risk assessment project;	Several departments including: Media, ICT (information management, Training, Operations, plans and risk assessments unit)
Local level	Governorates civil defense directorates; Airport civil defense directorate; Royal Palace civil defense directorate;	Emergency Operations centers (EOC) in each ministry; North, Central and South EOC
Resources	Proven operational capacity; USD 49 million budget FY 2015.	Operational Center that is well equipped and staffed.
Manpower	25 000 employees	Total manpower 135 Liaison Officers from ministries: 23
DRM skills	Highly qualified staff to perform rapid and effective response; senior management team trained, and exposed to DRM concepts	Strong skills and systems for crisis management; Limited understanding of DRM concepts

❖ *Lack of functioning DRM coordination mechanism*

- Coordination between sectors, between the central and local levels, and between public and private sector stakeholders is weak. Similarly, information sharing is limited between sectors and levels.
- In view of its current composition (chief crisis response unit/chief emergency management)/chief administration), the **National DRR Platform** is set up to coordinate emergency response. It is not designed to coordinate disaster preparedness and prevention/mitigation efforts.
- The mandate that is currently being envisaged for the national DRR platform is too broad and the platform is not capacitated to fulfill it.
- Women are significantly under-represented in national and local coordination mechanisms.

❖ *Limited DRM capacities at local level*

- In the absence of political and financial autonomy, **municipalities** have limited capacities to fully exercise their DRM functions and integrate DRM in land use planning, infrastructure maintenance, waste management, drainage, building code enforcement, social service delivery, planning of social infrastructure. GAM and ASEZA which are both politically and financially autonomous, have more capacities to fulfil their DRM mandate.
- Municipalities have limited access to hazard and risk information. The largest municipalities (Amman, Aqaba, Petra, Irbid, Mafrqa) completed risk assessments [see above section on risk assessment] but risk assessment findings are neither widely disseminated nor available throughout the Governorates / Municipality services to inform the planning of public investment. ASEZA is the only municipality where there is consistent evidence of the application of risk information across sector departments.
- At local level, there are limited synergies between risk reduction efforts at municipality level, and disaster response efforts at the governorate level.
- Municipalities now include DRR in their organizational chart (there are DRR units in Petra, Aqaba for instance) but this is not yet the case in Governorates.

Recommendations

- ❖ **Recommendation 3: Clarify the institutional and organizational set up for DRM at national and local level.** Different options can be considered under a revised legislative framework that would clarify roles, responsibilities and accountability lines between NCSCM, HLCD/JCD, MOPIC, the sector ministries, governorates and municipalities [see more details above on the review and revision of the legislative framework].

<p>Recommendation 3 Clarify the institutional and organizational set up for DRM at national and local level</p>
<p>Coordination of crisis response and preparedness 3.1 Considering the undisputable convening power of NCSCM, establish NCSCM as the unique coordination authority for crisis/disaster response and preparedness efforts in Jordan (including coordination of public and private sector actors / assets) with a solid legal base</p>
<p>Strategic guidance to crisis response and preparedness 3.2 Maintain HCCD as a representative body for all sector ministries that can be convened by the Prime Minister to provide strategic guidance (response/contingency plans) on DRM (beyond security matters). Make NCSCM a former member of HCCD. HCCD to be headed by the Prime Minister with the Ministry of Interior as Deputy</p>
<p>Early Warning 3.3 Establish NCSCM as the central Early Warning coordinating entity drawing information from NCSCM national information database for early prediction of crisis, provided the database includes data on extreme weather events (floods and drought)</p>
<p>Operational role in crisis response 3.4 Recognize the JCD strong operational capacities in emergency response at national and local level. 3.5 Formally link governorates <i>civil defence committees' operation rooms</i> and <i>NCSCM emergency operations centers</i> clarifying who does what (based on each institution strength and comparative advantage), who directs operations at time of disaster at local level and what are the communication protocols and channels. 3.6 Clarify roles and responsibilities of JCD at central and local level under NCSCM strategic coordination. Disseminate information on division of NCSCM – JCD roles and responsibilities to all ministries, governorates, municipalities and media outlets.</p>
<p>Training 3.7 Establish JCD as the central technical entity for training and awareness building on disaster management and crisis response and preparedness.</p>
<p>Risk assessment 3.8 Establish JCD as the central technical entity for coordinating disaster risk assessment at national and local level, to guide and support a newly established risk assessment group. In this respect consider merging the INFORM working group and the NCSCM risk assessment team.</p>
<p>Prevention at national level 3.9 Establish and empower MOPIC to coordinate sector ministries efforts to integrate risk reduction measures in planning and budgeting [see Priority 3 below].</p>
<p>Prevention at local level 3.10 Empower municipalities to fulfill their mandate in DRM; Develop and implement a capacity building programme over 2 years for the municipalities to integrate risk information in their planning and budget allocation decisions in key sectors (Public Works, WASH, Environment, Water; Cultural Heritage), including training on use of risk information and mainstreaming tools and approaches. Integrate DRR in the organizational set up of the Governorates, for instance in the governorate unit on environment and safety</p>

❖ **Recommendation 4: Establish multi-sectoral and multi-stakeholders coordination mechanism for Disaster Risk Management at central level.** Few specific recommendations are listed below:

There is no single blue print for establishing a national DRR platform. The mandate and composition depend on the country needs. It can range from coordination of DRM activities to advocacy and awareness raising, to DRR mainstreaming in sectors. In Jordan, the focus of the national DRR platform is currently on coordination of emergency response and preparedness efforts, convened by NCSCM.

International standards and guidelines can be customized to the context of Jordan risk and needs. A Word into Action guideline on National Disaster Risk Reduction Platform provides practical information on setting up efficient and sustainable coordination mechanisms for DRR.²⁵

The newly established “DRR platform” is mainly composed of *emergency response* focal points. The DRR platform can potentially serve as the consultative mechanism for the development of the DRM law and/or the DRM Strategy [see legislative and policy framework above]. To serve this purpose, the composition of the platform should be significantly different.

Recommendation 4 - Establish a multi-sectoral and multi-stakeholder coordination mechanism for DRM
Composition: 4.1 Expand the membership of the national DRR platform to include the Directors of Planning of each sector ministry in order to cover both the “emergency” and “prevention” aspects of DRR. The DRR Platform should also include the chair of the National Committee on Climate Change.
Composition: 4.2 The DRR platform should be representative of the needs and demands of vulnerable groups (women and children, disabled, migrants, refugees), as well as the needs and demands of private sector (construction, transport, tourism, industries, ITC, agriculture). The current representation of private sector and NGOs on the platform is not representative enough of civil society and private sector.
Training: 4.3 Develop and implement a capacity building programme over 2 years for the national DRR platform on DRM concepts; Risk information applications to preparedness and prevention; Minimum and Advanced Preparedness Actions. Could include a study tour for selected platform members (health; infrastructure; public works; tourism) to neighboring countries with similar socio-economic / risk profile and common language.
4.4 Empower and train the <i>Higher National Committee for Sustainable Development</i> and its 16 working groups on DRR / CC concepts, on use and application of risk information in sectors, and on mainstreaming tools and approaches.

3.2.4 Financing for DRM

For more details on financing for Emergency Preparedness and Response (including through Social Protection and cash transfer) please refer to Section IV-Priority IV.

Existing capacities and challenges

There is no dedicated national budget allocation for DRM, neither for response and preparedness, nor for recovery, nor for prevention in sectors or at municipal level.

Out of an annual budget of USD49 million (2015), it is unclear how much JCD contributes to disaster management (training, awareness, warning and sirens).

There is however significant investment in DRM in the sector of Public Works and Water Resource Management at national and local level, but there is no mechanism to track budget allocation to DRM;

There are a number of ad hoc funding mechanisms for emergency relief [**refer to Priority IV** on Preparedness for Response and Recovery for more details] or for risk transfer [**refer to Priority III** Agriculture and Social Protection for more details].

²⁵ Words into Actions Guideline on National Disaster Risk Reduction Platforms, UNISDR, 2017.

Recommendations

Recommendation 5 - Establish by law the obligation for sector ministries and municipalities to allocate funding to risk reduction measures to protect public investment.

Recommendation 6 - Establish by law a predictable budget for response and recovery to be allocated to each sector ministry. Such budget should not be centralized.

Priority III: Investing in disaster risk reduction for resilience

“Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment. These can be drivers of innovation, growth and job creation. Such measures are cost-effective and instrumental to save lives, prevent and reduce losses and ensure effective recovery and rehabilitation”

Sendai Framework Priority for Action III.

3.3 Priority III - Investing in disaster risk reduction for resilience

When we assess capacities to invest in resilience, what are we looking at?

- ✓ Public investment to address disaster/ climate risk
- ✓ Degree of integration of DRR and CC in national and local plans
- ✓ Degree of integration of DRR and CC in sector policies and plans
- ✓ DRR and CC mainstreaming in budgetary and planning processes

3.3.1 Integration of disaster and climate risk management in national and local planning processes

Disaster and climate risks are not factored in the national planning process in Jordan. In a number of sector plans and strategies though, DRM interventions are planned and budgeted for on an ad hoc basis. At local level, municipalities have made significant efforts to develop disaster management plans and resilience strategies at various degrees of implementation.

Existing capacities

National planning capacities

The **Jordan Vision 2025** provides a ten-year socio-economic blueprint for guiding reform and development. It is operationalized through rolling multi-year **Executive Development Programmes** (EDP). The **Jordan Economic Growth Programme** (JEGP) 2018-2022 highlights the required policy interventions and public and private investments to double the economic growth over the next 5 years. The **Jordan Response Plan** (JRP) 2018-2020 aims to meet humanitarian and protection needs of Syrian refugees and Vulnerable Jordanians, as well as to upscale critical capacities in health, education, water and sanitation, waste, housing and energy, as well as environmental services. The SDGs are mainstreamed into the EDPs, in the Jordan Response Plan and, to a lesser extent, in the Governorates Development Plans.

The review of Jordan 2025, the EDP and the JEGP reveals that disasters and climate change impacts are not considered as variables in the country's development trajectory. Climate Change is merely mentioned in those documents and disasters are ignored. A number of national priorities however present co-benefits for disaster management:

- Water efficiency and safety technologies and practices
- Protection of groundwater resources from pollution
- Preservation of forest and biodiversity
- Efficient pest control practices
- Management of hazardous industrial and medical waste
- Developing the National Water Information System

The **Jordan Response Plan** makes a few provisions for disaster risk management, first in the agriculture sector (disaster risk management and early warning for food security), the WASTE sector (landfill capacity), and the environment sector (management of hazardous waste). The JRP does not acknowledge the vulnerability of the WASH sector to flood hazard, and its indirect impact on water

borne disease. The education sector does not include provisions for disaster safe schools (although it seems to have been the case in the previous JRP).

The **Ministry of Planning and International Cooperation (MOPIC)** supports the national planning process including its M&E function with the support of the Department of Statistics. It is responsible to build the institutional capacities of the ministries, governorates and municipalities to fulfill their planning and monitoring functions. The **Higher National Committee for Sustainable Development** is the multi-sectoral body overseeing the Roadmap to implement the 2030 Agenda with the support of 18 working groups. There is no specific guidance on the integration of risk management measures in the national planning process.

Local planning capacities

At local level, Governorate Development Plans (or “regional plans”) are completed by investment maps for each region based on their competitive advantages. Governorates Plans do not integrate risk reduction measures in the construction, water, social services, and tourism activities.

The review of a few Municipalities’ Local Development Plans reveals that drought and environmental pollution (Zarqa), desertification and water shortage (Amman), water scarcity (Irbid) are identified as “threats” but the management of drought and environmental risk is not integrated in planned interventions.

The availability of risk information at local level has enabled a number of Municipalities to develop DRM plans: Amman DRM Master Plan, Aqaba DRM Master Plan, Irbid Risk Management Plan, Mafraq Risk Management Plan. Zarqa, Irbid, Madaba, Jarash, Salt and Amman have developed broader resilience plans.

- The Disaster Risk Management Master Plan for Amman (2009) based on the earthquake risk assessment
- The Disaster Risk Management Master Plan for Aqaba (2010) based on the earthquake risk assessment and flood hazard map
- The Resilience Action Plans for Zarqa, Irbid, Madaba, Jarash and Salt
- The Local Emergency and Risk Management Plan for Irbid (2017) based on the earthquake, landslide and chemical risk assessment
- The Local Emergency and Risk Management Plan for Mafraq (2017) based on the earthquake, landslide and chemical risk assessment
- The Amman city resilience strategy (2017)

The **Ministry of Municipal Affairs** provides technical advice to local councils on planning, programming and budgeting, as well as tendering for infrastructure work, as well as on the functions of urban planning and solid waste management. There is no specific guidance on the integration of risk management measures in the local planning process.

There is no national spatial strategy providing a coherent framework for land use planning across the territory. In 2006, the **Planning Land Use System** developed by the Ministry of Municipal Affairs was based on various environmental parameters (soil, topography, rain fall, arability etc.) as well as on an analysis of disaster risk: flash floods prone wadi, potential for water pollution, potential land slide areas. The system was meant to protect metallurgical/ mineral areas, agricultural land and natural resources from misuse and encroachments. The Plan was not systematically enforced and several land

use plans were developed such as the Jordan Valley Land Use plan, the Amman Master Plan, the Aqaba Master Plan etc.

A **National Urban Policy** is under development to ensure coherence between the various legislation, sectorial strategies that guide urban development, coherence between public and private sector actors as well as coherence between the municipalities.

Challenges

Two main bottlenecks must be addressed in the planning system in order to strengthen DRM capacities:

- (i) Lack of a coherent planning framework between sectors and levels underpinned by a spatial / urban planning strategy
- (ii) Lack of technical skills and access to information to integrate DRM in national and local plans

Capacity gaps at national level

- Jordan national plans and planning tools do not make provisions for DRM or climate risk management. The management of disaster risk is considered to be the domain of NCSCM/JCD and there is limited awareness about the responsibility of the planning ministry and sectoral planning departments in preventing disasters and preventing the creation of new risk.
- In the absence of a centralized and accessible repository of risk information, neither MOPIC, nor the Higher National Committee for Sustainable Development are equipped to mainstream risk reduction in development planning.
- In the absence of a coherent spatial planning policy integrating land use and socio-economic infrastructure, there is a lack of coordination and convergence between sectoral investment decisions at the central level, and between the central and local level which has resulted into conflicting natural resource management and land use decisions at central and local level. Likewise, rapid urbanization and the lack of a urban planning policy has led to the expansion of cities without enough consideration to water supply and drainage infrastructure, thus creating vulnerability and exposure to disaster risk.

Capacity gaps at local level

- Except AZIZA and GAM, the majority of municipalities have limited human and financial resources to address the challenges brought by the rapid increase in population, let alone disaster risk. The current urban planning and management practices are inadequate. Most of the municipalities lack planning capacities and qualified staff, as well as sufficient resources to respond effectively and timely to unforeseen urban problems. The highly centralized government system and the lack of delegation of resource and decision-making power does not incentivize municipalities to update and enforce regulations and policies.
- Despite its critical technical advice role to municipalities and newly elected councils in planning and budgeting, the Ministry of Municipal Affairs is not capacitated to provide specific guidance on the integration of risk management measures in the local planning process.

- None withstanding the spectacular progress made at local level in adopting disaster management plans in eight (8) Municipalities, these initiatives are often externally driven (UNISDR, UNDP, UN Habitat, 100RC), the degree of ownership and the extent to which the local disaster management plans are being implemented varies significantly between those municipalities.
- The lack of a coherent planning framework across sectors and levels underpinned by a spatial / urban planning policy is jeopardizing the implementation of the municipality disaster management plans. Those local DRM strategies are stand alone and disconnected from the local development plans (Governorates / Municipality plans). For instance, Irbid Local Development Plan makes reference neither to the Irbid Emergency and Risk Management Plan nor to the Irbid resilience plan. Likewise, Amman Local Development Plan makes no reference to Amman resilience strategy, Amman risk assessment, or Amman DRM plan. When DRM plans are disconnected from local socio-economic plans, there is little incentive for decision makers to allocate the required resource to the implementation of the local DRM plan.

Recommendations

With the approval of Jordan 2025, Jordan is strengthening its national and local planning process. MOPIC endeavors to harmonize governorate plans with municipal council plans and build stronger convergence between national and sector strategies at central level and governorate and municipal plans. There is a **unique opportunity** to integrate simple risk management measures in the national and local planning processes.

- ❖ **Recommendation 1 – Establish MOPIC role and responsibilities to integrate climate and disaster risk into development planning processes.** Few specific recommendations are listed below.

Recommendation 1 - Establish MOPIC role and responsibilities to integrate climate and disaster risk into development planning processes
1.1 Empower MOPIC to integrate risk reduction in national planning processes (EDP, SDGs, JEGP, JRP) through training on use and application of risk information, and integrating <i>guidance on mainstreaming DRR and CCA in the national planning process guideline</i>
1.2 Empower MOPIC to coordinate sector ministries efforts to integrate risk reduction / prevention measures in sectors
1.3 Train MOPIC and the 16 working groups of the <i>Higher National Committee for Sustainable Development</i> on DRR / CC concepts and on use and application of risk information in sectors
1.4 Make risk information and risk assessments available to the 16 working groups established to implement the SDG road map

- ❖ **Recommendation 2 – Empower municipalities to fulfill their mandate in DRM.** Few specific recommendations are listed below.

Recommendation 2 - Empower municipalities to fulfill their mandate in DRM
2.1 Clarify roles, responsibilities and accountability lines for DRM between the central government and municipalities [refer to Section II on Governance – recommendations on legislative and institutional framework]

2.2 Integrate guidance on mainstreaming risk reduction in the local planning process (in governorate regional plans & municipalities local development plans)
2.3 Equip and train Ministry of Municipal Affairs to capacitate municipalities on how to integrate risk management measures in the national and local planning process
2.4 Train the municipalities to integrate risk information in their planning and budget allocation decisions in key sectors (Public Works, WASH, Environment, Water; Cultural Heritage), including training on use of risk information and mainstreaming tools and approaches
2.5 Link the local DRM strategies with the local development plans (governorates / municipality plans); In the future, integrate the planning process for resilience building and the planning process for socio-economic development (instead of developing separate plans)
2.6 Document and disseminate best practices from GAM and AZEZA and other local government from the region. Use network of municipalities to share best practices on DRM at local level.
2.7 Ensure that the national strategy for spatial planning and the national urban policy both integrate provisions for DRM and CC

BEST PRACTICE - Greater Amman Municipality planning for Disaster Risk Management

Amman population is estimated at 4 million (42% of Jordan population) with one third of the population estimated to be foreigners including 178 000 Syrian refugees. Amman capital city concentrates more than half of Jordan GDP. Its population, local economy and socio-economic and environmental assets (water, waste, drainage, electricity, ICT, transports, airports, markets, schools, hospitals; business districts, cultural heritage, and parks) are exposed to various hazards: earthquake (2004); frequent flash floods (2015); frequent snow storms (2015); landslide; and drought. The uncontrolled sprawl of urban areas partially driven by the refugee crisis and characterized by informal settlements, informal economy and lower access to social services and social welfare increases Amman's vulnerability to any type of hazard. Greater Amman Municipality (GAM) is financially independent, with a large percentage of its revenues self-generated. It is divided into 22 districts, each with a high level of autonomy to deliver city services, except for zoning, planning, infrastructure, design and construction, which are carried out centrally in the Municipality main offices.

PROGRESSIVE RESILIENCE BUILDING POLICIES

The **Building and Planning Regulation in the City of Amman** adopted in 1979 was the first policy measure to protect buildings and infrastructures that was later completed by the introduction of the national seismic code. In 2006, the **Amman Master Plan** institutionalized a land use zoning system that included an earthquake zoning system based on the results of the **Amman earthquake risk assessment**. Three years later, Amman adopted its first **Disaster Risk Management Master Plan Framework**²⁶. The Master Plan includes actions in preparedness, emergency response and recovery planning, construction standards for earthquake resiliency, as well as land-use planning and environmental management. The seismic code and zoning system was recently updated. The new **Amman Strategic Master plan 2060** currently under development shall also integrate risk reduction measures. The **Strategic Master Plan for East Amman** cares for the needs and demands of marginalized populations and refugees.

Amman City Resilience Strategy adopted in 2017 identifies several disaster risk management measures:

- ✓ Develop a storm water drainage masterplan (including regulations for development and maintenance of drainage)
- ✓ Develop a Climate Change Action Plan to protect natural resources and ecosystems
- ✓ Promote water efficiency by implementing rainwater harvesting
- ✓ Develop and implement Waste Management Framework

TECHNICAL CAPACITIES TO MANAGE DISASTER AND CLIMATE RISKS

To respond to extreme climate events, the city has established protocols for emergency operations, including rapid-response communications centers and stronger coordination arrangements at local and community level.

GAM has also established technical capacities to reduce biological and environmental hazards²⁷ such as:

- ❖ Water management: specialized laboratories control water quality; water treatment locations through land use planning;
- ❖ Drainage: GAM invested 10 million JD in drainage network in 2017 to prevent flash floods; and a water reservoir in 2013;
- ❖ Waste management (Al-Ghabawi landfill expansion)

²⁶ Disaster Risk Management Master Plan Framework for Amman, GAM - Earthquake Mega Cities Initiative - UNDP, March 2009

²⁷ CADRI Interviews with GAM sectoral departments conducted on 28th September 2017.

- ❖ Building inspectors in each of the 22 districts to conduct post facto assessment of buildings and record violations (absence of building licenses or technical violations). The enforcement is under the authority of the Governor).

The plan to develop a centralized GIS database to harness city data can become a critical tool for DRM as it can promote an integrated approach to risk informed planning across sector departments, as well as improve service delivery to marginalized communities.

3.3.2 Integration of disaster risk management and climate change action

The existing climate variability and the forecasted climate change impacts have the potential for increased frequency and intensity of floods, drought, heat and cold waves. Over the past 30 years, 86% of the recorded damages that occurred to houses were due to climatic related risks. The primary responsibility for managing disasters and climate change impact lies with the sector ministries and the municipalities. Strategies to reduce impact of climate and disaster risks in key sectors (environment, water, health) are often complementary. Similar tools are used to monitor, analyze and address adverse consequences (vulnerability assessment, information management systems, loss and damage accounting and mainstreaming tools). Hence the **degree of integration of the DRM and CC work in a country is an indication of the efficiency and effectiveness** of its disaster risk management system.

Existing capacities

The **Climate Change Policy (2013-2020)** aims at integrating vulnerability and climate change impact assessment and the adaptation measures into key relevant sectors such as water, agriculture and food security, health, biodiversity and tourism, as well as its application to food security/production, desertification and land use planning. It is completed by Jordan's **Intended Nationally Determined Contribution (INDC)** which includes 54 climate adaptation measures and 23 climate mitigation measures. The **National Committee on Climate Change (NCCC)** composed of representatives from line sector ministries and agencies is the national coordinating mechanism for matters related to climate change.

There was a Plan on integrating climate change adaptation and DRR developed with the support of IUCN and UNDP in 2012. The Plan was not implemented.

Challenges

There is limited integration between the policy and institutional framework for DRM and CC in Jordan^{28, 29}. The information system for DRM and CC is not integrated.

The current national DRM strategy (under revision) does not identify synergies with the Climate Change policy developed around the same time (2013). More specifically the adaptation measures to climate change in agriculture, food security/ production, desertification, land-use planning and health are not referenced in the national DRM strategy.

On the contrary the Climate Change Policy 2013-2020 includes a full section on Climate Change Adaptation in Disaster Risk Reduction which makes clear recommendations for further integration through integrating the information management systems, integrating the research agendas and promoting knowledge sharing. It includes a very specific recommendation to integrate CC in the current DRR strategy and establish a practical link with the DRR stakeholders in Jordan.

The NCCC is not connected to the National DRM Platform. Neither of them is connected to the Higher National Committee for Sustainable Development. The Ministry of Environment representative invited

²⁸ Institutional Analysis "Mapping and assessing the existing and potential linkages between CCR and DRR in Jordan" September 2012

²⁹ National Climate Change Policy, Sector Guidance Framework, Ministry of Environment, 2013

on the National DRM Platform is not a representative of the NCCC (also chaired by Ministry of Environment).

Recommendations

❖ **Recommendation: Integrate the DRM and CC institutional, policy and programmatic frameworks.** Few specific recommendations are listed below.

Recommendation 3 - Integrate the DRM and CC institutional, policy and programmatic frameworks
3.1 Invite National Committee on Climate Change (NCCC) Chair (or co-Chair) to participate in the National DRR Platform, and invite the Chair (or co-Chair) of the National DRR Platform to participate in the NCCC
3.2 Identify clear synergies in the National DRR Platform's and the NCCC's workplans
3.3 Identify clear synergies between the <i>CC policy climate adaptation</i> measures (agriculture, food security/production, desertification, land-use planning and health) and the <i>54 NDC climate adaptation</i> measures, together with the new national DRM strategy
3.4 Integrate the CC and DRM data sets in the national risk information system hosted by MOPIC and operationalized by the Royal Institute of Geography
3.5 Invite NCCC and National DRR Platform Chairs (or Co Chairs) to participate in the Higher National Committee for Sustainable Development

3.3.3 Construction / Housing sector

While the construction sector accounts for 5% of GDP, the Jordan Economic Growth Plan 2018 – 2022 foresees significant investment in social and housing infrastructure to cater for the growing demand in urban areas. Public and private investment in construction of housing, schools and hospitals is vulnerable to earthquake and flash flood risk.

Capacities must be in place to ensure that those risks are considered and strategically managed to protect those physical investments from flash floods or earthquake. As Jordan is also positioning to compete in the reconstruction efforts in Syria and Iraq after the crisis, it must demonstrate its ability to implement resilient construction standards.

Existing capacities

The legislative and regulatory framework for the construction and housing sector is strong. It makes clear provisions to reduce exposure to earthquake. The **Jordanian National Construction Law** establishes the National Jordanian Construction Council headed by the **Minister of Public Works and Housing** and with the membership of all the ministries, institutions, and syndicates concerned with construction works. The construction law is completed by the Amman Building and Planning Regulation (1979) which includes provisions for the safety of all buildings and infrastructures (water pipes, electricity lines, sewage pipes).

The construction sector is the only sector where there is evidence of consistent use and application of risk information, however limited to seismic risk information. Under the construction law, construction works shall not commence without engineering blueprints that fulfill the technical rules and requirements in the approved construction codes. There are specific standards for critical infrastructure such as schools and hospitals.

The **Jordanian National Building Council (JNBC)** developed 35 codes to control and monitor the building constructions in Jordan. These codes represent the technical standards which must be followed as a minimum at the stage of design and execution of engineering construction work. Amongst them, the **earthquake resistance building code** was issued in 2005, updated in 2013 and will be updated again in 2018 by customizing the US UBC and ABC standards.

The **Jordan Engineering Association (JEA)** responsible for the “auditing” the engineering drawing of building as well as for random auditing of building post construction. Its pre-approval of all commercial residential building and public infrastructure is mandatory. JEA is well capacitated. It is also mandated for the educational development and training of engineers. It has established the engineers training center for continuing education of engineers. It has a Dedicated library on US FIM standards and developed a manual on Disaster Damage and Safety Assessment of Building³⁰. It has 17 sub offices. There are currently 25 licensed engineers studying retrofitting for critical buildings.

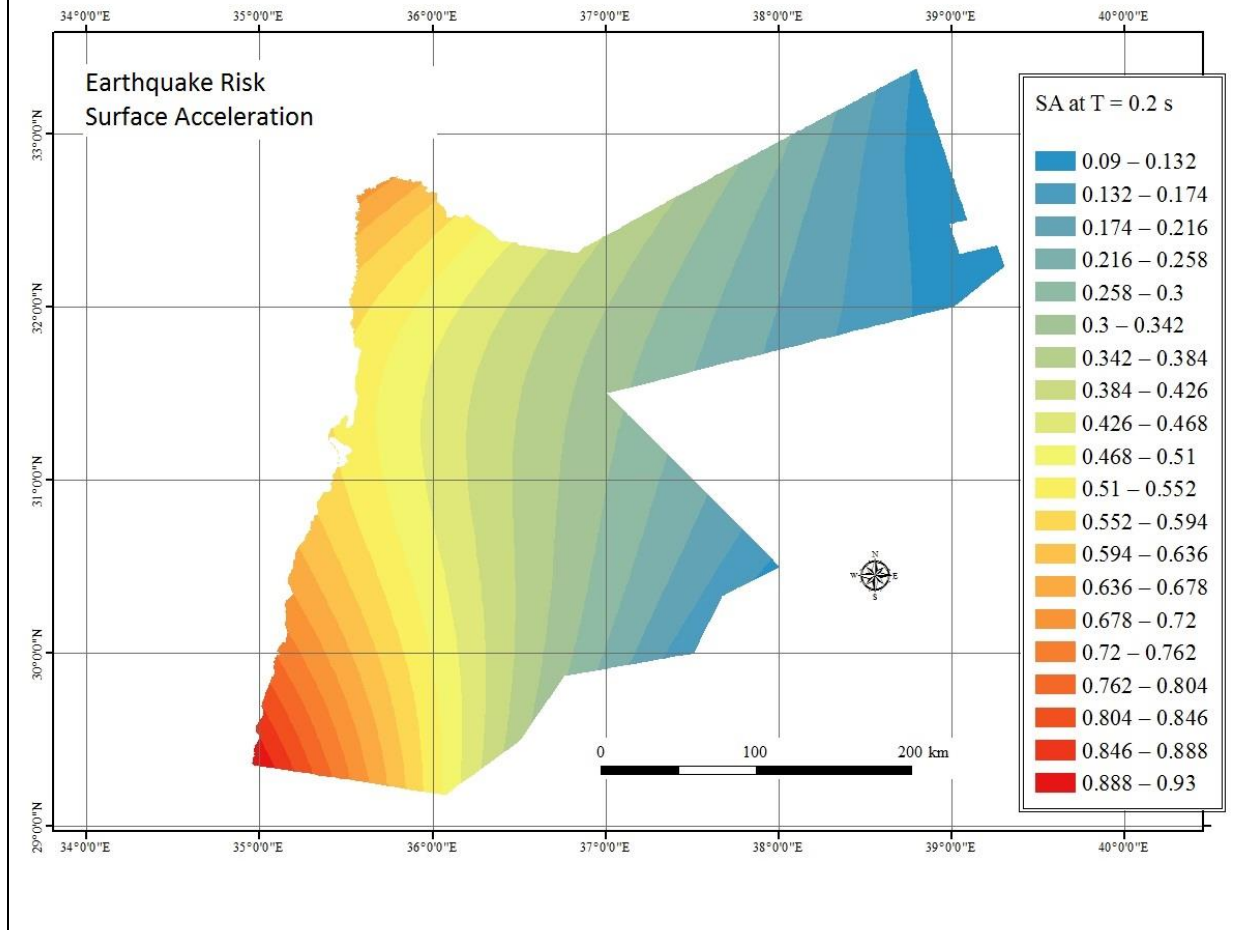
JEA role is complemented by the **Municipalities’** role in inspection of buildings. In Amman for instance, there are 6 to 7 building inspectors in each of the 22 districts.

Constructions built before 2005 did not integrate seismic resilient standards. There are limited provisions for retrofitting of critical infrastructure.

³⁰ Disaster Damage and Safety Assessment of Building, Jordan Engineers Association, SDC, 2016

BEST PRACTICE - Application of seismic risk zoning to the construction sector

The Jordan Building Code forces construction engineers to enforce seismic proof construction standards based on the country 3-zone map based (peak ground acceleration PGA) that was derived from the earthquake risk assessment supported by SDG / UNDP in 2013.



Challenges

Three main bottlenecks must be addressed to strengthen DRM capacities in the construction sector:

- (i) Lack of integration and convergence between land use planning, public works and planning of infrastructures at national level, and between the national and local level.

As a result, cities are expanding without enough consideration to water supply and drainage infrastructure, thus creating vulnerability and exposure to flood risk. Urban planning efforts pursued by municipalities must be better connected with infrastructure investment implemented by central government agencies.

- (ii) Lack of technical capacities to enforce the building codes, and integrate measures to reduce exposure to earthquake and flash floods in construction/housing investment.

The number of civil engineers with the technical knowhow is limited due to the limited offer of specialized university curricula. There is only one course on dynamics analysis and one course on seismic risk compared to the high number of students enrolled in construction engineering. This is further compounded by the absence of continuous training for engineers and architects, and the lack of dissemination of the codes including the seismic code. Additionally, there is no guidance on flash flood risk management for the construction sector.

(iii) Lack of a functioning legal framework to enforce existing codes and regulations.

- The regulations for the construction sector with respect to seismic risk are not consistently enforced in practice. The massive increase in population in the Northern Governorates due to the refugee crisis makes the enforcement of construction regulations extremely challenging politically. The enforcement is under the authority of the Governor. It takes several years of legal procedure to order the destruction of a hazardous / unsafe construction. As an example, only 5 houses were demolished in Amman in 2017. Additionally, the number of municipality field inspectors is too low and they are not necessarily equipped or incentivized to enforce the regulations. As a result, national authorities are not able to contain the increase in illegal settlements. The proportion of slums is increasing especially in Mafraq, Irbid and Ramtha.

Recommendations

Recommendation 4 – Better integrate urban planning efforts pursued by municipalities with construction and infrastructure development planned by central government
4.1 Develop a Master Plan for Public Works and Infrastructure with mechanisms to coordinate public investment decisions in construction and infrastructure at national and local level.
Recommendation 5 – Increase technical capacities to prevent seismic and flash flood risk in the construction sector
5.1 Ensure that disaster risk reduction measures are integrated into the new Urban Policy [refer to above recommendation]
5.2 Institutionalize training for engineers in structural / nonstructural assessment ex post and post-earthquake (new university curriculum for student and refresher training for engineers)
5.3 Approve small budget allocation for dissemination of the updated seismic code through various means (media, JEA training programme etc.)
5.4 Develop a rehabilitation plan for critical social infrastructure (schools and hospitals) as well as telecommunication and allocate budget for their retrofitting
Recommendation 6 - Increase municipality capacities to enforce the regulatory framework for construction
6. 1 Review the legal framework for the enforcement of the codes
6.2 Train and incentivize the building inspector’s teams to cover at least the most at-risk areas
6.3 Conduct local awareness campaigns about seismic, flash flood and landslide risk targeting different population groups in the Northern Governorates, make city risk assessment information available and create incentives for the general population and private sector to enforce minimum construction standards
6.4 Document and share lessons learnt from Iran and Turkey on construction standards enforcement

3.3.4 Infrastructure sector

Critical Infrastructure is an asset, system which is essential for the maintenance of societal functions, health, safety, security, economic or social well-being of people. They include social infrastructure (schools and hospitals) as well transportation, communications, power, and information technology which are considered the backbone of Jordan productivity and competitiveness. The Jordan Economic Growth Plan 2018 – 2022 foresees significant investment in infrastructure in relation to transport, hospitality and tourism, electricity and water and ICT. Investment in transport and ICT are expected to grow by 12% to make Jordan a logistics hub for the reconstruction effort for Syria and Iraq. Capacities must be in place to ensure that disaster and climate risk are considered and strategically managed. The Jordan Economic Growth Plan on infrastructure, including transport and ICT, does not make mention of “resilient” infrastructure.

Existing capacities and challenges

It is difficult to assess to what extent seismic, land slide and flood risk are taken into account in the planning of infrastructure investment. The impact of flash floods and landslides is not recorded on electricity grids / water infrastructure or roads. It is also worth noting that a large part of infrastructure is financed through foreign direct investment (Saudi Fund, Gulf Cooperation Council) and through public-private sector partnerships in tourism, ITC, etc.

The regulatory framework to integrate risk management in the planning of infrastructure exists. For instance, the Ministry of Public Works and the Ministry of Energy and Mineral Resources supervise and ensure that geological and geophysical surveys are conducted. For tenders above 1 million, it is mandatory for the constructor to conduct their own geological studies. There are also technical standards for earthquake resilient roads but they are not systematically enforced.

There is no unified guidance for the integration of risk information in the planning of critical infrastructure (telecom, energy, roads). It is considered costly to assess the local risk context and to quantify the benefits of investing in resilient infrastructure.

One recurrent challenge reported by all stakeholders is the lack of maintenance of infrastructure which makes them more vulnerable to any given hazard. This is further compounded by the pressure of the refugee population on existing infrastructure. For instance, the increase in truck traffic on the roads in the northern governorate to care for the needs of the refugee population led to a reduction of the life time of infrastructure especially roads.

Recommendations

Recommendation 1 - Adopt and disseminate principles of resilience in the infrastructure planning processes

7.1 Make local risk assessment information <u>available</u> to decision makers and part of the decision-making process on planning of critical infrastructure
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7.2 Disseminate resilient infrastructure principles to public and private sector actors

7.3 Develop and implement a Standard Operating Procedure for geology study for infrastructure

Recommendation 2 - Expand the training of engineers to include training on disaster resilient “finishes”

BEST PRACTICE - Aqaba Special Economic Zone Authority strides to reduce its exposure to disaster risk

Aqaba has a unique ecosystem where touristic (diving & beach) and industrial (phosphate & potash) facilities coexist. It is also a regional transport and logistics hub with a port on the Red Sea. It therefore concentrates a significant share of Jordan GDP. Its population, local economy and assets are exposed to a variety of hazards: earthquake (1995), flash floods (2006, 2012, 2014) as well as industrial and technological hazards in view of the density of storage of hazardous substances and its transport by sea and by road. The Gulf is a high-risk zone for sea pollution by oil spill, phosphate dust, chemical pollution from industries, thermal pollution from power plant.

The Aqaba Special Economic Zone Authority (ASEZA) is financially and administratively autonomous and vested with zoning, licensing, and other regulatory powers to develop Aqaba strategic assets. To take advantage of the reopening of the border with Iraq and the economic recovery in Syria, Aqaba Special Economic Zone Authority (ASEZA) places special attention on improving the quality of its infrastructure with respect to disaster risk management, environmental safeguards and security.

❖ **A progressive policy framework**

The ASEZA Master Plan 2001-2020 provided the policy tool for spatial development based on a zoning system with the view to promote sustainable development. The Disaster Risk Management Master Plan framework (2010) set priorities based on the earthquake and flood hazard map. To support its implementation across sectors, ASEZA established its Disaster Risk Management Unit in 2011. The integration of a hazard map in the Environmental Impact Assessment for all public investment projects in Aqaba is another policy innovation in support of disaster risk reduction. The 2009 flood hazard maps were updated in 2011 with a hydrology study providing 50-100 years projections on wadi behavior.

❖ **Protecting socio-economic assets and critical infrastructure against flash floods**

Aqaba is particularly exposed to flash floods. It is a catchment area for 22 wadis Flash floods and is surrounded by granite mountains. The expansion of the city to the Nord exposed infrastructure to flash flood risk. In 2006 flash floods in Wadi Mabrak and Wadi Yutum caused significant casualties as well as the destruction of water pipeline and damage to electric power and communication networks. The city was without water for six days. and damage to the airport. Repeated flash floods in 2012 and 2014 led the authorities to invest in a rain water diversion flood channel along the airport (JD 35 million) to decrease flood exposure of critical facilities. This investment was completed with the construction of 3 dams, 3 bridges as well as 3 drainage projects in 2016-2017 as well as investment in solid waste management.

❖ **Mitigating earthquake risk**

ASEZA took measures to enforce the mandatory implementation of the National Building Code through strengthening the building permit process in collaboration with the Jordanian Engineers Association local branch and the JCD.

❖ **Preparedness and response capacities for sea pollution**

Jordan is a signatory of the Jeddah convention for the conservation of the Red Sea which includes provisions for regional cooperation in combatting pollution in the Gulf of Aqaba including the establishment of Emergency Centers (Sharm El Sheikh & Eilat Marine Pollution control station) and regional contingency plans and drills. This regional arrangement complements Jordan preparedness and response capacities which are limited (oil spill emergency center equipment is obsolete). Integrated approaches to monitoring the environmental impacts along the Gulf of Aqaba coastal zone are promoted using GIS and remote sensing data.

❖ **Hazard Risk Assessment on Ammonia Storage**

The ammonia storage tanks in Aqaba Port is cause for concern of explosion and toxic accident. An analysis of the risks associated with the storage of liquid ammonia in an industrial facility (Jordan Phosphate Mines Company) was conducted to assess the effectiveness of the safety measures. Liquid ammonia is delivered to the facility in the Port and pumped through a 1.6 km long pipe to the two storage tanks of 30,000 and 10,000 ton. Additional safety measures to protect the storage and the pipeline from leakage were recommended, as well as emergency drill and simulation of contingency plan.

3.3.5 Agriculture sector

Agriculture plays a significant role in Jordanian economy, food security and rural development. The sector provides some 73 000 jobs, representing 6% of the total manpower, and 15% of the population depend on agriculture as source of income (FAO, 2015)³¹. The agriculture sector has doubled its share of GDP from 2-4% in the past 5 years driven by domestic demand and the Jordan Economic Growth Plan plans a 10% growth in 2018-2022. Flowers and vegetables constitute a significant share of export revenues.

As most of agricultural areas in Jordan are rain-fed, the sector growth is particularly vulnerable to natural hazards (including extreme events) and climate variability and change. Disaster and climate risk also bear a direct impact on the rural population who depends either directly or indirectly on agriculture for their livelihoods.

According to the latest Global Hunger Index (GHI), Jordan does not raise major concerns in terms of food access and availability. However, at sub-national level, Jordan maintains pockets of food insecurity that can reach up to 26% of the population, particularly in refugee host communities³².

Existing capacities

The Syrian crisis has had an indirect impact on worsening the vulnerability of the agriculture sector to disasters and climate change. On one hand, the risk of land degradation (and potential “desertification” in the Badia/rangeland) has increased due to overgrazing as Syrian nomads moved their livestock into Jordan. On the other hand, the risk of transboundary animal diseases has increased due to the uncontrolled movements of unvaccinated livestock across borders (i.e., lumpy skin disease, pest, petites ruminants, rabies and external & internal parasites, zoonotic rickettsia influenza & corona viruses have been reported in Jordan between 2010 and 2015), as well as the risk of trans-boundary crop pests and plants disease due to the weak phyto-sanitary inspection systems³³.

Existing legislative and policy frameworks

The **Agriculture Law**³⁴ aims at reorganizing the agriculture sector to increase food production without damaging the natural resources and environment. It includes provisions for risk management in relation to irrigation, animal and plant diseases and epidemics, scientific research and desertification control. It also includes the provisions for creating condition for investment in agriculture and rural development, increasing farmers income and lifestyle, and promoting agriculture cooperative works and associations. The Law regulates fishing, wildlife protection, hunting season, protected species, management of waste materials (i.e. insecticide or seeds) and inspections.

A **By-Law on Agriculture Risk Funds** issued in 2016 refer to risks to the property and agricultural products of beneficiaries, including natural hazards such as drought, snow, heavy rain, hail, storms, floods and frosts, as well as diseases such as epidemic diseases that may affect plants and animals in an epidemiological manner (Article 1). The By-Law (Article 12) makes provisions for a public treasury contribution of 15 million JOD to the Fund, eight million JOD paid in the first year of the establishment of the fund, four million JOD paid in the second year, and three million JOD paid in the third year.

³¹ FAO (2015). Jordan Annual Report for the period of January to December 2014.

³² Comprehensive Vulnerability Assessment, MOPIC, Jordan Response Plan Platform, 2015

³³ Jordan Response Plan, MOPIC, 2017

³⁴ Law No. 50 of 2016 amending Agriculture Law available at http://ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=102861

The MoA has a well-developed **Food Security Strategy**. Despite no clear mentioning of DRR/M, the Strategy highlights relevant policy options related to DRM including:

- improving resilience of insecure and vulnerable communities during/ after natural or manmade disasters;
- adaptation to climate change and desertification for better food security;
- national preparedness plan aiming to reduce the impact of unexpected emergency events on livelihoods of vulnerable or under-privileged groups enhanced;
- national plans to support vulnerable populations during emergency, food price fluctuations, and environmental disasters; and
- addressing research and extension on issues relevant to food quality and food safety, land degradation, climatic changes, post-harvest, biodiversity, innovative food production technologies.

Similarly, the Agriculture Sector strategy does not mention DRM and climate risk management. The MoA provided inputs to the Climate Change Policy and the Third National Communication on Climate Change on agriculture, but the CC and Agriculture policy documents are not connected.

The **National Rangeland Strategy** updated in 2013 in collaboration with the International Union for Conservation of Nature (IUCN) is an important policy tool for DRM as it addresses the underlying causes of rangelands deterioration. Drought is identified as a major risk for the rangeland sector. The Strategy includes several drought/disaster risk mitigation actions such as improving the plant cover quantitatively and qualitatively (monitoring land and green cover maps), an Action Plan to control desert locust and drought, a project of nurseries to propagate drought resistant plants/forage/grass, as well as local emergency plans in each governorate to combat forest fires.

Institutional capacities of MOA and its associated bodies

The MoA is a well-established institution with sub-sectoral departments dealing with livestock, rangeland, crop and plant production and others. The MoA has designed the Crisis Management Unit³⁵ and the Agricultural Risk Fund Unit in overseeing disaster management. Established in 2007, the Department of Crisis Managements the coordination body between MoA, NCSCM and JCD. The Department has developed crisis response plans for frost in the winter season. The Agriculture Risk Fund Unit was established in 2009 but only functioned properly in 2015. It is empowered by the By-Law on Agriculture Risk Funds issued in 2016. The Fund provides some compensation for damage/losses of horticultural products due to frost in the Jordan Valley. The Fund started to provide compensation to farmers in 2017 with a total budget of JD 2.5 million. The Fund is currently in the process of developing database management tools (please refer to Box 4 for more details).

BEST PRACTICE - The Agricultural Risk Fund compensates farmers for crop losses due to frost

The Agriculture Risk Fund aims to³⁶:

- ❖ Managing the risks to the agricultural sector and reducing its affects.
- ❖ Compensation of farmers affected by frost according to standards, mechanisms, and limits set by a by-law issued for this purpose.
- ❖ Compensation of beneficiaries in case of agricultural risks according to standards, mechanisms, and limits set by a by-law issued for this purpose, which will also include the determination beneficiaries' contributions.
- ❖ Encouraging farmers and beneficiaries to adopt modern means to minimize agricultural risks and develop control techniques to reduce losses
- ❖ Institutional capacity building in agricultural risk management.
- ❖ Contribution to sustainable agricultural development.

³⁵ Previously Department of Crisis Management (renamed after the capacity assessment mission)

³⁶ Article 4 of the By-Law on Agriculture Risk Fund

The Fund was established in 2009 but only started functioning properly with the adoption of a by-law issued in 2016 that makes provisions for a national budget allocation of 15 million JOD over a three-year period. The Fund also runs an insurance scheme to which, if farmers contribute, will allow them to access compensations for natural hazards other than frosts (such as droughts, storms, and floods). There is still little awareness of this scheme amongst farmers. As the penetration of the insurance culture remains limited in Jordan, farmers still feel little incentives to paying the monthly insurance fees. In the face of climate change, the Fund could however become an efficient risk management / risk transfer mechanism for the agriculture sector.

According to the Ministry of Agriculture,³⁷ In 2017, farms that sustained over 20% losses and damages during the frost spell the Jordan Valley and Tafileh Governorate qualified to receive a compensation from the Fund. A total of 416 farmers, who reported damage/losses of horticultural products received JD1.386.815 million in compensation for their losses. The frost spell that affected the Jordan Valley in November 2016 caused damage to vegetables crops in 18 greenhouses and 239 vegetable farms (over 2,730 dunums) as well as 173 citrus farms (over 3,905 dunums). In addition, a total of 427 dunum and one greenhouse of four farmers in Tafileh were affected.³⁷

As per animal health and welfare, there is one veterinary department in each Governorate and in total there are 135 Veterinarians, 28 mobile clinics (one vet, one assistant and one driver per clinic) to provide free vaccination for animals. The Animal Health Division works closely with the Ministry of Health through the **One Health Committee established in 2016** (consisting of six staff from veterinary department and six staff from health department). Currently, MoA is closely working with the WHO funded by Detra/American Army on Zoonotic disease.

Information management capacities

Disaster and climate data relevant to the agriculture sector are being collected: maps and data on vegetation cover, infrastructure, river basins (RJGC/RFSAN/department of rangeland), water availability table (MWI), weather forecast and data on rain fall and temperature trends (Meteorology), climate variability data and biodiversity losses data (NRSCN Protected Area Meteorological Stations) and eco-system conditions in rangelands (the Badia programme).

The **National Agriculture Information System (NAIS)** does not maintain an agricultural database but provides a platform for information and knowledge sharing mandated to support agriculture research and development and ensure food security based on needs and demands. It serves as an information repository from different sectors. Each agency has access to NAIS website for using and sharing the information.

The **National Center for Agricultural Research and Extension (NCARE)**³⁸ is an associated body of the MoA which was established in the late 1950's when the MoA's Department of Research and Extension was created. NCARE's key responsibilities include:

- organizing agricultural research and extension plans for sustainable development;
- adopting the latest agricultural techniques for local conditions; disseminate appropriate technologies to farmers through extension agents;
- enhancing knowledge and improve skills of researchers and extension agents through education and training activities; conduct socio- economic studies;
- evaluating the impact of economic factors on agricultural production; and
- building/developing capacity of researchers and extension agents in collaboration with local, national and international partners and provides training and cross-learning opportunities in order to better addressing agricultural development problems.

³⁷ The Jordan Times, 22 March 2017

³⁸ NCARE is under restructuring and extension will no longer be part of the its mandate

NCARE has strong capacities in agriculture research including in climate resilient agriculture research. It also produces meteorological information at the village level for agricultural research purposes. NCARE is equipped with drought monitoring capacity to monitor drought risks for agriculture research which was established in 2008 using remote sensing technology to monitor different vegetation index that were compiled with seasonal precipitation records. In 2017, NCARE joined force with other relevant ministries with the support from the International Centre for Biosaline Agriculture (ICBA) Nebraska-Lincoln University, USAID, FAO and UNDP to develop an **integrated drought monitoring system through an open-source and free-of-charge platform. The System will be housed at the Ministry of Water and Irrigation (see water section for details).**

Challenges

There are three main bottlenecks to address to strengthen DRM in the agriculture sector:

- (i) Absence of an **information management system** to share risk information within and across sectors
- (ii) Limited **technical skills** and knowledge to use and apply risk information effectively
- (iii) Limited **coordination** between MoA departments and between MoA and other ministries to implement coherent and cost effective DRM interventions

Capacity gaps

- MoA staff have limited technical skills to use and apply risk information to programming and policy development in the agriculture sector. The concepts of DRR/ DRM, climate risk management (CRM) and crises management (CM) are relatively new within the MoA. Hence, these were not reflected in the current Agriculture Sector Strategy as well as other agricultural policy and strategy documents.
- Know-how and skills are limited to systematically assess and monitor losses and damages from climate-induced disasters caused by different types of hazards such as drought, frost, zoonotic diseases, animal diseases in the agriculture sectors (i.e., crops, livestock, forestry, rangeland). The absence of historical data in the agricultural sector makes it difficult to convince the government and private sector stakeholders to invest in disaster and climate risk reduction in the agriculture sectors. It undermines the food, water, energy nexus security.
- Research capacities of NCARE are not fully utilized due to limited financial resources and lack of strategic direction from senior management. For example, it is estimated that the rangeland sector lost about 80% of its resources due to recent waves in drought affecting the region³⁹. However, no study to-date has been conducted on the impacts of drought on rangeland and animal diseases.
- The nascent information management system through NAIS is not yet designed to provide risk information to various users in the agriculture sector. It is currently limited to a repository platform. Water and other type of hazards are not included on NAIS website, and there is no “user-feedback” system to ensure that information meets the needs of the sectors. NAIS is not connected to the Agricultural statistics department.

³⁹ Interview with MoA on 28 Sep 2017

- The MoA governance and institutional setup is rather traditional in the sense that each department may have expertise in their own specialty, but there are limited effective collaboration and information sharing mechanism between departments. Each constituency is operating with limited capacity (due to constraints on human and finance resources) and in silos. This makes DRR/M mainstreaming across the departments/sub-sectors in the Ministry rather challenging.
- Staff shortage and staff retention is another capacity development challenge to strengthen DRM and CRM. For instance, staff turnover at NCARE is very high. Even if research capacities in climate resilient agriculture exist, there are limited human and financial capacities to scale up climate resilient practices. There is also significant shortage of staff to manage the existing 41 rangeland reserves (which cover 80% of the territory) as well as the spread of invasive species.

Early warning, Response and Preparedness

- There is no appropriate early warning system in place for slow- and sudden- onset disasters. The MoA early warning system on frost protection needs to be further developed. Similarly, the drought monitoring system established under NCARE a decade ago is not connected to other government institutions and not efficiently functioning. The project of an integrated and open source drought monitoring system under the leadership of the Ministry of Water and Irrigation is promising.
- Capacities to monitor zoonotic diseases and trans-boundary crop pests are limited. Field veterinary services are overwhelmed with the increase in uncontrolled movements of unvaccinated livestock across borders. Likewise, phyto-sanitary inspection systems at border crossings are too weak to contain the risk of trans-boundary crop pests.
- There is currently no national strategy/action plan on animal health and transboundary animal diseases to provide guidance on how to systematically and effectively prevent and prepare for the outbreak of zoonotic diseases and epidemics. The Animal Health and Livestock Division works closely with the Ministry of Health, through the One-Health Committee, but information sharing with other relevant ministries such as environment and water/Irrigation is limited. In the absence of an on-line livestock tracking system, it is challenging to manage epidemics risk. Analytical research is also limited. For instance, there is an increase in goat and sheep abortions as well as a rise in water borne disease, reported by MoA⁴⁰. This increase is believed to have caused by climate change; however, proper investigation has not been carried out due to limited capacity.
- The capacity of MoA crisis management unit is very limited with currently only one staff (the director) serving the department⁴¹. Information on damage and losses are therefore neither collected systematically nor shared with JCD DESINVENTAR database. There is are limited synergies and coordination between the crisis management unit and the agriculture risk fund unit.

Recommendations

Recommendation 9 - Establish risk information system for the agriculture sector
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9.1 Institutionalize the collection of data on damage and losses due to disasters and climate change impact in the agriculture sector by allocating clear role and responsibility to the relevant units. The

⁴⁰ CADRI Interview at MoA on 28 September 2017

⁴¹ CADRI Interview at MoA on 28 September 2017

<p>agriculture-specific data must be systematically collected and included in national and international disaster loss databases to better inform appropriate risk reduction policies and investments for and within the sector.</p>
<p>9.2 Data collected on loss and damages must be shared with JCD as well as with MoA cabinet on an annual basis. This will contribute to Jordan reporting against the Sendai and SDG Monitor (i.e. SFDRR's indicator C2, <i>Direct agricultural loss attributed to disasters</i> and SDG's indicator 1.5.2: <i>Direct disaster economic loss in relation to GDP</i>) and will be used to collect data and monitor the progress towards the global targets on resilience.</p>
<p>9.3 Conduct a study to assess socio-economic and environment impacts of drought on rangeland sector to provide evidence to decision makers at central and local level.</p>
<p>9.4 Optimize accessibility of disaster risk information for public and private stakeholders in the agriculture sector (NCARE agricultural research, loss and damage data, water and vegetation cover data) through the National Agriculture Information System - NAIS website. Review the mandate of NAIS as currently it does not function as an information system but rather as an information repository. Clarify user needs at central and local level.</p>
<p>Recommendation 10 - Strengthen synergies and coordination between the crisis management unit and the agriculture risk fund unit</p>
<p>Recommendation 11 - Support integration of CCM, DRR/M into agriculture policies and practices</p>
<p>11.1 Train MoA on use and application of risk information to mainstream CRM and DRR/M into agriculture policies, strategies and practices</p>
<p>11.2 Train MoA to integrate risk reduction / prevention measures in post disaster recovery efforts in agriculture</p>
<p>11.3 Establish and develop management plans for 41 rangeland reserves to ensure resilience and sustainability against climate and disaster risks</p>
<p>11.4 Apply the Water-Food-Energy Nexus concept as an approach for integrated planning given the significant interlinkages among these three sectors when facing climate change and drought</p>
<p>11.5 Invest in innovative research on drought/saline resistant crop varieties</p>
<p>11.6 Strengthen the capacity of Gene bank to conserve fragile and wild plant species to moderate the impact climate-induced drought risks on biodiversity</p>
<p>11.7 Scale up and replicate the Farmers Field School model to enhance local research and extension services</p>
<p>Recommendation 12 - Develop and implement a national strategy/action plan on animal health and transboundary animal diseases</p>
<p>12.1 Conduct a study on the impact of climate change on animal health using a participatory approach involving herders</p>
<p>12.2 Increase surveillance unit's capacities especially in the Northern governorates near the Syria border</p>
<p>12.3 Install on-line tracking system to share and consolidate data on animal disease and epidemic (integrated into the early warning system described below)</p>

12.4 Increase capacity of laboratory unit for disease diagnosis
12.5 Increase the size of mobile clinics
12.6 Increase capacity of the veterinary unit for effective response to disease outbreaks
Recommendation 13 - Develop a more integrated early warning system for slow- and sudden-onset disasters, in particular for drought, frost and animal diseases
13.1 Develop / upgrade the drought and frost monitoring system considering that droughts are predicted to increase in intensity and frequency in light of climate change (drought monitoring unit hosted at the Ministry of Water and Irrigation)
13.2 Clarifying triggers for early action and allocation of roles and responsibilities for early action at central and local levels
13.3 Establish a communication system to ensure that early warnings are shared with the general population, in particular the farmers and herders
13.4 Ensure the EWS for drought, frost and animal disease is linked to / integrated into NCSCM EWS

3.3.6 Environment sector

The management of environment resources is a key strategy to reduce disaster and climate risk. Forestry services to reduce the risk of drought, floods and landslides are a well-known example. The environment sector is also critical to reduce the risk of industrial accidents and hazardous water contamination.

Existing Capacities

Legislative and policy framework

The legislative and policy framework for the environment sector and the management of natural resources and eco-systems encompass international conventions, environmental laws, land use and waste management policies. The MoEnv is also leading the development of the Climate Change policy framework which is still recent and under development. All these laws and policies, without directly mentioning DRM, make important contribution to the management of climate and disaster risks.

Jordan has ratified a number of key international instruments that enshrine principles and objectives related to reducing disaster and climate risks through *inter alia* commitments to ensure sustainable development, sound natural resources management and biodiversity conservation. These include the Convention on Biological Diversity (CBD) 1993; the UN Framework Convention on Climate Change (UNFCCC) 1993; and the UN Convention to Combat Desertification (UNCCD) 1995.

Biodiversity

Biodiversity is addressed through three legal frameworks in Jordan. The first one is represented by the Environment Protection (EP) law (2017). The EP law is foreseen to enhance the legal framework on biodiversity with more focus on risks to biodiversity – fire, hunting, habitat loss. The law also provides for the revision of the Environmental Impact Assessment (EIA) Bylaw, introducing improved legal tools and mechanisms on biodiversity safeguards and management. The EP law describes MoEnv responsibilities in coordination of CC efforts including with respect to predicting CC impact on the different sectors. The EP law also identifies MoEnv role in DRR including identifying the areas/sites that require special protection from disaster risk. It also tackles the protection of water resources from pollution. Article 6 calls for the issuance of a bylaw to identify the type of hazardous material that are imported, stored or handled.

The second main legal framework for biodiversity is the **law of the Ministry of Agriculture** considering its historical precedence in the protection of wildlife, forests, and rangelands, as well as genetic resources. The third legal framework is represented by the Aqaba Economic Zone Authority (AZEZA) sub-national mandate over environmental protection and management derived from AZEZA autonomous status. **AZEZA by-laws address environmental protection, environmental impact assessment, as well as the special bylaw addressing the Wadi Rum Protected Area.**

There is no national spatial strategy providing a coherent framework for land use planning across the territory. In 2006, a **Planning Land Use System** was developed by the Ministry of Municipal Affairs based on various environmental parameters (soil, topography, rain fall, arability etc.) as well as on an analysis of disaster risk: flash floods prone wadi, potential for water pollution, potential land slide areas. The Plan was not systematically enforced and other land use plans were developed such as the **Jordan Valley Land Use plan**, the Amman Master Plan, the Aqaba Master Plan etc. Another land use plan is the updated **Rangeland Strategy for Jordan** (2013).

Solid waste management

Solid waste management became one of the major environmental problems in Jordan. It is also an important dimension of the capacity to manage disaster risk. Firstly, because it contributes to flood risk management in urban area, and secondly because improper management of solid waste can trigger epidemics and water contamination. For instance, Mafraq landfill is located on a geological fault and represents a threat to the groundwater aquifer. In Jordan, solid waste management falls under the responsibility of different government actors. MoEnv is responsible for policy and legislation, municipalities have the responsibility for municipal cleaning, waste collection, and disposal, MoMA supervises municipal functions and service delivery, MoH regulates medical waste management, MoA regulates agriculture waste etc. The **National Solid Waste Management Strategy (2015)** is meant to enhance coordination between those actors, address capacity gaps at central and municipality level and through this prevent the risk of pollution of ground water and soil and water borne diseases and epidemics.

Disaster Management for environmental emergencies

With respect to disaster management, the Emergency Management and Environmental Control Section is developing an **Emergency Plan** which covers environmental pollutions. Community awareness outreach programme on climate change adaptation and disaster risk reduction is currently under review.

Jordan is a signatory of the **Jeddah convention for the conservation of the Red Sea** which includes provisions for regional cooperation in combatting pollution in the Gulf of Aqaba including the establishment of Emergency Centers (Sharm El Sheikh & Eilat Marine Pollution control station) and regional contingency plans and drills.

Climate Change

The MoEnv is responsible for the legal and policy framework for climate change. It includes a comprehensive **Climate Change Policy (2013-2020)** which aims at integrating vulnerability and climate change impact assessment and the adaptation measures into relevant sectors such as water, agriculture and food security, health, biodiversity and tourism. Chapter 4.3 of the Policy concerns adaptation to climate change in agriculture, food security/production, desertification and land use planning. The Climate Change Policy includes a full section on Disaster Risk Reduction with clear recommendations for further integration of information management systems, research agendas and knowledge.

A Plan of Action on integrating climate change adaptation and DRR (developed/drafted by IUCN and UNDP in 2012) was never implemented.

The **National Strategy and Action Plan to Combat Desertification (2015-2020)**⁴² and the **National Biodiversity Strategy and Action Plan- NBSAP (2015-2020)** both include strong reference to the impact of CC and the adaptation strategies

Jordan's **Intended Nationally Determined Contribution (INDC)** includes 77 measures (i.e., 54 are adaptation and 23 are mitigation) with total costs US\$5-7 Billion. It is currently under revision.

⁴² The Action Plan addresses desertification, land degradation and drought or Desertification, Land Degradation, and Drought (DLDD) issues and its expected results include a DLDD platform for knowledge sharing and a national monitoring program on DLDD and sustainable land management.

A **National Adaptation Plan (NAP)** is being developed with the involvement from key stakeholders. NAP is considered to be a core vehicle to deliver on adaptation priorities, helping Jordan to achieve its NDC adaptation commitment. The NAP is now linked to funding sources from the Green Climate Fund (GCF) Readiness and Preparatory Support Programme. The NAP development process will entail a detailed stocktaking of progress in implementation, prioritization of adaptation goals, developing reporting mechanism and focusing on adaptation with mitigation co-benefits.

Finally, MoEnv has issued the **National Plan for Green Growth** and the **National Strategy for Sustainable Production and Consumption** which both includes provisions for climate change risks.

Institutional capacities to reduce disaster and climate risk in the environment and related sectors

MoEnv capacities are limited in climate research and policy development. The overwhelming majority of climate initiatives and projects in Jordan are still donor-driven. The recently established Directorate of Climate Change is expected to take a stronger leading role. The NAP development process is the opportunity to build the capacities of MoEnv Directorate for Climate Change, as well as MOPIC, MoA, MWI and MoH and the NCCC, with support from GIZ, FAO and UNDP.

The **National Committee on Climate Change (NCCC)** was established in 2014 by MoEnv as the coordinating mechanism for CC composed of representatives from sector ministries and agencies. It has not been very operational.

The MoEnv has developed its technical capacities in relation to biodiversity protection in an increasing trend of recognition of the modern approaches tackling ecosystem management and biodiversity conservation. The MoEnv / Directorate of Nature Protection has mandated the **Royal Society for Conservation of Nature (RSCN)**, which was established in 1966 - long before MoEnv (2003), to implement the **Bylaw on Protected Areas and National Parks** in what is considered a unique model where an NGO is mandated to implement government mandates. The RSCN is also mandated by MoA to enforce the regulations related to wildlife protection and hunting control. The RSCN plays a critical role in CC and DRR through its work in protected areas management and conservation and its "Studies & Research" department. It collects climate variability data and biodiversity losses data via the Protected Area Meteorological Stations. It monitors biodiversity status to inform natural resource management strategies. The development of a **national biodiversity database** will provide risk information such as early warning on potential biodiversity loss and damages.

The **National Biodiversity Committee (NBC)** was established in 2011 to guide the process of updating and implementing the National Biodiversity Strategy and Action Plan. By engaging civil society, local communities and private sector, the NBC can promote stronger enforcement of the legal framework for biodiversity conservation, good governance and shared outcomes.

There is extensive evidence of Jordan knowledge and extensive practice of ecosystem management as a means for disaster risk reduction and climate risk management, though not necessarily referred to as such. RSCN **Integrated Ecosystem Management Project in the Jordan Rift Valley (2008-2013)** developed ecological climate change adaptation strategies for Protected Areas and Special Conservation Areas. RSCN established a unit specialized in CC research and strategic planning.

The **National Report on the Implementation of the Convention on Biological Diversity** systematically report on the national efforts to manage the impact of climate change through biodiversity conservation.

Evidence of knowledge of, (e.g. Badia Programme, RSCN Protected Areas, Jordan River Land Use Plan) has potential for greater application across geographical areas and sectors, and it could be an entry point for strategy design and programming. Other programs like Wadi Rum Protected Area and Aqaba Marine Park require further investment in capacity development.

Ecosystem-based DRR

The Badia Restoration Programme (BRP) is multi-sectoral/operational initiative on adaptation and resilience in the country, housed in the Ministry of Environment (MoEnv) with the total funds of USD 160 million coming from the UN Compensation Commission (UNCC). The BRP is considered among the most important and successful environmental restoration projects in the region, and has piloted innovative approaches that have been taken up in other contexts across the region and beyond.

BEST PRACTICES- Badia Rangeland Restoration & Ecosystem based disaster risk reduction

The Badia area covers 80% of Jordan and contains the principal surface water and groundwater basins in the Kingdom. Open rangelands serve as pastures and grazing grounds for the livestock. Other parts of the Badia are cultivated through rain-fed agriculture. Land degradation is driven by overgrazing, unsustainable agricultural and water management practices. In turn, these are driven by rapid population growth, and the prevailing poverty that is forcing dryland farmers and herders increasingly to adopt non-sustainable land use practices. Those human factors are further compounded by climatic factors, mainly erratic rainfall and periodic droughts. Assessments show a high risk of desertification and parts of the Badia could lose its productivity.

The Badia Restoration Programme pursues three objectives:

- 1) integrated watershed management –micro-catchment water harvesting, planting of rangeland shrubs, rehabilitation of groundwater wells and facilitation of access of livestock
- 2) socio-economic development - livestock productivity
- 3) sustainability through establishment of cooperatives of livestock owners

The Badia Restoration Programme is the most concrete demonstration that **disaster risk reduction and climate risk management is most effective when sectoral interventions are coordinated and synergized**. The Jordan Valley Authority is responsible for implementing macro-catchment water harvesting to prevent and mitigate the risk of drought and water scarcity. The Ministry of Agriculture is involved in fodder shrubs and plantation, rangeland management, and mobile clinic and veterinary services to monitor and prevent animal disease. The Water Authority of Jordan is involved in preventing water contamination and improving water quality for ranchers and livestock. NCARE is involved in water harvesting, soil conservation, and conserving of livestock. Another important contribution to disaster risk management is the comprehensive database on ecosystem conditions in the Badia. The University of Jordan is an independent third party contracted for the development and implementation of M&E of the Programme.



Impact of the Syrian crisis on national and local capacities to manage climate and disaster risk in the environment sector

The Syrian crisis has had a significant impact on Jordan capacities to manage disaster and climate risk in the environment sector, especially in the area of Solid Waste Management, Waste water treatment; and Hazardous Waste, as well as in the forestry sector. It is estimated that 5% of solid waste are generated by Syrian refugees, reaching up to 20% in Northern Governorates.

Infringements on forestry areas are also increasing with the pressure of refugee populations. Forests fires are increasing as well as the use of illegal tree cutting to compensate for higher fuel prices, and overgrazing of livestock due to the high cost of fodder. This is evidenced by an increase in the number of court cases for environment-related violations: in 2014 the number of cases that were sent to court was unprecedented (1,483). The Royal Administration for Environment Protection has reported violent incidents of 177 forest fires, 25 woods cutting and 22 overgrazing during January 2016 to January 2017⁴³.

Challenges

There are three main bottlenecks to address to strengthen DRM in the environment sector:

- Limited **information management system** to share risk information within the sector
- Limited **technical skills** to produce, use and apply risk information
- Limited **financial, planning and maintenance capacity to manage waste**

Capacity gaps:

- Absence of a national mechanism for effective information sharing between producers (i.e., agencies producing climate and weather information) and users. Overall coordination of climate information services is weak. There is no standardized exchange of information between the Meteorological Department and the different MoEnv departments.
- The Department of Climate Change lacks capacities to generate climate data, carry out climate modelling and scenarios building in order to better understand emerging and future climate and disaster risks. Support for climate modelling under the national communication processes is outsourced.
- Limited capacity to support CC and DRR mainstreaming in environmental policies and plans. Limited capacity to develop comprehensive national adaptation plan (NAP).
- National Committee on Climate Change is not fully operational yet to ensure coherent implementation of climate actions at national and sub-national levels. The contribution of the National Committee for Climate Change in mainstreaming DDR/M into sectoral policies could be further maximized.

⁴³ Jordan Response Plan for the Syria crisis, 2018-2020

- The absence of a national spatial strategy providing a coherent framework for land use planning is one of the main impediment to eco-system and biodiversity conservation for DRR and CRM. In this respect, successful experience such as the Badia Programme can inform policy development.
- While the existing environmental legislative framework is strong, bylaws are ineffectively applied and local and regional economic development can pose challenges to its effective implementation.
- Capacity development is required to enable more effective risk management through biodiversity conservation and protected area management, e.g. from transfer and application of living modified organisms, which may endanger food security. This can be done through enhancing legislative frameworks, developing technical and logistical capacities and improving enforcement through monitoring and inspection.
- Insufficient capacity to conduct nation-wide awareness raising programmes on climate and disaster risks, and resilience building through natural resource management.
- Insufficient financial, technical and landfill capacities to manage the sharp increase in solid waste, especially in the Northern Governorates.
- Lack of awareness on the environmental and health impact of solid waste and the link with flood risk management.

Emergency preparedness for environmental disasters

- The Environmental Emergency Plan does not make provisions for the management of climate and disaster risks.
- Investments made to operationalize emergency preparedness for environmental disasters are most visible at the stage of strategy development and information sharing. However, there are limited practical steps taken towards operationalization. Hazard mapping was undertaken by the MoEnv but it is not clear if that has led to actual mitigation measures in cooperation with industrial facilities, communities, NCSCM and other stakeholders.
- At local level, department of environment have limited capacities in disaster risk management with the exception of the biggest municipalities such as AZEZA and GAM [Refer to boxes on best practices in AZEZA and GAM on environmental management]. In Disaster Management, JCD operational role is critical with respect to enforcement of minimum security requirements at industrial and commercial sites and with respect to forest fires.
- Jordan preparedness and response capacities in combatting marine pollution are limited. The visit of the oil spill emergency center at the Port of Aqaba revealed that equipment is obsolete.

Recommendations

- ❖ **Recommendation 1 – Optimize information sharing and access on climate information services and biodiversity conservation for the environment sector.** Few specific recommendations are listed below:

RECOMMENDATION 14 - Optimize information sharing and access on climate information services and
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biodiversity conservation
14.1 Optimize dissemination and access to climate information services produced by the Meteorological Department, the climate variability data collected through the RCSN Protected Area Meteorological Stations, the data produced by MWI and MoA to all MoEnv Departments , as well as to national and local stakeholders [refer to Priority recommendations on open source information system in collaboration with Royal Institute of Geography and Department of Statistics]
14.2 Enhance understanding and monitoring of CC impacts on biodiversity and eco-systems, through the establishment of a proper eco-system based information system, collecting information from government entities, NGOs, communities and academia
14.3 Strengthen capacity of MoEnv Climate Change department on climate modelling for enhanced adaptation planning and public awareness raising activities on climate risks
Recommendation 15 - Develop the National Adaptation Plan (NAP) to bring coherence to climate adaptation and DRR interventions within and across sectors
15.1 Ensure that the National Adaptation Plan (NAP) development process brings coherence to adaptation and DRR objectives and interventions within and across Agriculture and Water sectors; Use NAP as an entry point for DRR (and financing for adaptation and DRR under the Green Climate Fund).
15.2 Update and implement the 2012 Plan of Action on integrating CCA and DRR under the leadership of MoEnv in collaboration with NCSCM and MOPIC with the support from IUCN and UNDP [refer to Priority 2 recommendation on integration of CC and DRR above]
Recommendation 16 - Develop environment stakeholders' skills to integrate DRR in environment plans and programs
16.1 Empower MoEnv in its leading role to mainstream climate and disaster risks into environment sector policies and plans through training on use and application of risk information
16.2 MoEnv to support sector ministries to integrate climate risk information in national planning processes (EDP, SDGs, JEGP, JRP) drawing on findings and recommendations from the National Adaptation Plan and Nationally Determined Contribution
16.3 Strengthen the National Committee on Climate Change role to coordinate and ensure coherent implementation of climate actions at national and sub-national levels through training on use and application of risk information and mainstreaming tools
16.4 Clarify further the mandate of MoEnv and MoA with respect to environmental management with a view to ensure synergies in disaster and climate risk management strategies between both ministries
16.5 Promote integrated approaches to monitoring the environmental impacts along the Gulf of Aqaba coastal zone using GIS and remote sensing data through the collaboration between MoE and ASEZA. Update contingency plans and continue regular drills in cooperation with neighboring countries under the Jeddah convention for the conservation of the Red Sea
16.6 Building on AZIZA experience, integrate DRR criteria in the Environmental Impact Assessment [refer to Aqaba Disaster Risk Management best practices].
16.7 MoEnv to document and share the Badia experience of ecosystem-based DRR as a model for DRR. MoEnv to establish a coordination mechanism
16.7 Engaging NGOs in DRR/M especially on raising awareness and information dissemination
Recommendation 17 - Increase waste management capacities
17.1 Enhance the performance efficiency of the Solid Waste treatment and Wastewater treatment through: safe transfer and disposal, new transfer stations and sanitary landfills, rehabilitation of landfills, development of municipal solid waste management plans, establishment of national monitoring system)

17.2 Conduct awareness campaigns in urban areas on solid waste management and waste water treatment as matters of public health safety; Engaging NGOs in DRR/M especially on raising awareness and information dissemination

17.3 Enhance the capacities of collection, transport, and disposal of hazardous waste, including medical waste. Expand existing landfill capacity

Recommendation 18 - Strengthen man power and technical capacities to monitor, prevent forest encroachments and forest fires

3.3.7 Water Resources Management sector

Some definitions. A drought is a natural **hazard caused by large-scale climatic variability**. Water scarcity is a **long-term condition caused by the unsustainable use of water resources** where demand consistently exceeds supply, that can be addressed through resilient water management practices. Both phenomena can be worsened by Climate Change.

Water scarcity situation in Jordan has reached to a critical point. Climate change and drought are exacerbating the situation.

Jordan is one of the most water scarce countries in the world, facing chronic challenges to provide water services to its population. The dramatic increase in the population due to the refugee influx has exacerbated this critical situation, particularly in the north, where the population has increased by more than 60% in some areas. Although an estimated 97% of the population have access to a piped supply, water is often only available once a week, or in some areas, once a month. It is reported that all underground water aquifers have been explored and no more aquifers are available to extract water from⁴⁴. Most aquifers are being depleted. Three main aquifers facing over-pumping including Yarmouk, Azraq and Azraq/Amman – Azraq/Amman. If temperature continues to rise, evaporation will increase, even without a drought disaster, the gap will increase between supply and demand for water.

Existing capacities

Institutions

The **Ministry of Water and Irrigation** (MWI) is responsible for the overall monitoring of the water sector including, water supply and wastewater system. MWI also has a role in the formulation of national water strategies and policies, research and development, information system and the procurement of financial resources.

Within the MWI, the **Water Authority of Jordan** (WAJ) is responsible for water and sewage system, and the Jordan Valley Authority (JVA) is responsible for socio-economic development of the Jordan Rift Valley including water development and distribution of irrigation. This organizational set up reinforces MWI's roles and gives MWI strong capacities in managing water resources as well as managing disaster risk in the water related sectors.

Policy framework

The Water Sector is regarded as one of the top priority sectors as evidence in the national development strategy, Jordan 2025, the Jordan Economic Growth Plan and the Jordan Response Plan. The government has therefore developed several policy and operational tools that all contribute directly or indirectly to the management of disaster and climate risk.

The **Jordan National Water Strategy 2016-2025** promotes an integrated approach to water resources management and sustainable water and sanitation services through a multisectoral and multi-stakeholders engagement where individual and collective accountability and roles and responsibilities are clarified for all actors at all levels. The Strategy clearly spells out strategic actions in the agriculture, energy, industry and tourism sectors, as well as cross cutting issues such as gender, **climate change adaptation and disaster risk reduction**. Strategic measures include underground water recharge, water harvesting, increasing water use efficiency by the agriculture sector, and reducing water losses

⁴⁴ CADRI interview with MWI on 20 Sep 2017

from water distribution network, some of them with clear co-benefits for drought disaster resilience and climate resilience.

Parallel to the National Water Strategy, there is a **Water Sector Capital Investment Plan (2016-2025) developed** by MWI together with Water Authority Jordan and Jordan Valley Authority aiming to increase water storage capacity from 325 million m³- 400 million m³ by 2025. This Plan is meant to ensure that viable financing is available and to attract resources for implementation of the National Water Strategy 2016-2025. The Plan highlights the main areas to which the investment will be directed, and its implementation will be underpinned by an effective legal and institutional framework⁴⁵.

Equally important, **MWI** has established a dedicated **Department of Climate Change** who is taking a leading role in implementing **the Climate Change Policy for a Resilient Water Sector**⁴⁶ developed in 2016 in collaboration with other concerned departments and ministries. The Policy promotes Integrated Water Resources Management approaches. It does so in a systematic way by: i) prioritizing solutions according to a combination of climate specific and other (already established) criteria; ii) applying climate proofing steps to solutions or investments; and iii) monitoring and evaluating the results.

Climate Adaptation and Disaster Risk Reduction

Significant work has been undertaken on drought risk management since 2012 on assessing the conditions to install a drought early warning system; to set up a drought data analysis and information management system; on drought risk assessment and identification of the economic, environmental; and social impacts of the 1998-2000 drought. Various attempts have been made at developing a policy framework for drought starting with an action plan in 2014. There is now a draft national strategy for drought management that will be underpinned by a drought early warning system.

However, to date, there is no drought early warning system currently in operation in Jordan. A drought early warning unit was established in 2008 at NCARE but the system did not expand. In April 2017, a collaboration between MWI, MOA, MOEnv and Department of Meteorology (supported by the International Centre for Biosaline Agriculture (ICBA) Nebraska-Lincoln University, USAID and FAO and UNDP) was launched to set up an integrated drought monitoring system through an open-source and free-of-charge platform. A new institutional set-up is pending review by the Cabinet since August 2017. Once it is approved, the drought monitoring unit will serve as a lead coordinating body for drought management under the umbrella of MWI and in collaboration with MoEnv, MoA, NCARE, and Metrological Department.

Climate adaptation measures are being implemented in Zarqa River Basin, where extensive studies were conducted to assess and model climate change impacts on water quality and availability.

In terms of coordination there is a **Water Scarcity Platform**, established by MWI, to help coordinate and share information about drought and water scarcity. This platform aims to catalyze works between MWI, MoA, Metrological Center, JVA with other stakeholders. There are informal agreements of cooperation with research institutions and universities on water issues. The **Highland Water Forum** established by MWI in 2010 aims to promote multi-stakeholder dialogues between public and private sectors through **Water Basin Management Committees** to manage water resources in highland of Jordan. Each Basin Management Committee consists of the representatives of the water users (for

⁴⁵ MWI (2016): Jordan Water Sector Investment Plan 2016 – 2025

⁴⁶ Other water policies are: Energy Efficiency and Renewable Energy in the Water Sector Policy (2016); Decentralized Wastewater Management Policy (2016); Surface Water Utilization Policy (2016); Water Demand Management Policy (2016); Groundwater Sustainability Policy (2016); Water Reallocation Policy (2016); and Water Substitution and Reuse Policy (2016).

agricultural and municipal uses), the local communities, the water-governing institutions, and other relevant governmental and non-governmental organizations.

To address **water usage in the agriculture sector**, MWI invited line ministries, universities, other stakeholders and partners to explore ways to work together better on information sharing and exchange, as well as technology adoption and diffusion. Jordan is pioneering the use of treated waste water for irrigation.

With respect to **risk information**, MWI regularly produces water availability table which are widely shared with other ministries including with NCSCM. Progress has been made on networking and telemetric weather station that are operated by Jordan Meteorological department, NCARE and MWI. MWI operates about 70 automatic stations. The network will be the foundation for a centralized database on water that will become the integrated drought monitoring and early warning system. MWI also produces vulnerability maps focused on water losses, unserved population and risk associated with wastewater treatment plant operational condition. MWI in collaboration with UNICEF also produces Water and Sanitation Vulnerability Maps which are used for the prioritisation of areas for intervention. Finally, the IUCN Regional Knowledge Network on Water established in 2011 supports information sharing on Water Governance, Water and Climate Change, Water Energy and Food Nexus, and Innovative and Sustainable Water Technologies and promotes Systemic Approaches to Integrated Water Resources Management.

Another opportunity to reduce disaster and climate risks through water resource management is the on-going **regional collaboration in watershed management** for shared river systems between Palestinian, Jordanian, and Israeli since 2013, including increased releases of water by Israel from Lake Tiberias for use in Jordan. Such regional cooperation has a potential to help mitigate flood and drought risk on downstream countries, through regional cooperation in land use planning on the Jordan River, information sharing and the development of a regional monitoring and early warning systems.

With respect to **preparedness capacities in the WASH sector**, there are **significant improvements**:

- MWI Operations Centre is responsible to monitor all water supply systems.
- UNICEF works closely with MWI to develop *Water and Wastewater Vulnerability maps* to identify the most vulnerable areas and areas at risk
- Joint committee on water with MoEnv
- Joint collaboration with MoH to monitor water quality
- Customer service centre to receive all complaints and alerts
- A joint Committee of Utility representatives exists to share information/resources on any disaster, coordinated through Water Authority of Jordan in the event of any emergency
- MWI disaster management committees' focal points participate in all inter-ministerial committees on disaster response

Challenges

There are three main bottlenecks to address to strengthen DRM in the water resources management sector:

- Limited capacity in dealing with **flash flood risks**, addressing issues of **transboundary water resources ownership** and addressing the increasing **water demand** due to the increased population.

- Lack of **comprehensive land use mapping / land use plan** to inform integrated water resource management.
- Limited **coordination mechanisms amongst sectors in water use** and drought management.

Capacity gaps

- The MWI currently does not have appropriate capacity in dealing with flash flood risks. Historical flood data and capacity of processing, flood monitoring and prediction techniques are lacking. The existing emergency plans for flash floods include some precautions, e.g. drainage system, but they are not complete. For example, there is no comprehensive plan to capture and store flood water and this will create risks as the existing drainage system is insufficient. The best flood prevention approach remains to monitor and prevent activities in the wadis.
- Integrated water resource management as well as flood and drought risk management must be underpinned by comprehensive **land use mapping**. There is no national spatial strategy providing a coherent framework for land use planning across the territory. A land use mapping is a preliminary requirement to ensure a robust engagement of MWI at national and local levels in land use planning (the available database system set up by the RFSAN is yet to be endorsed by the Royal Jordanian Geographical Centre). There is limited GIS capacity in this sector.
- In terms of the water use in the agriculture sector, a coordination mechanism between MOA and MWI is being developed but has not been endorsed yet. Overall high level strategic coordination must be strengthened between MWI and MOA to ensure policy coherence between agriculture and water sectors. While Jordan is **pioneering the use of treated waste water for irrigation**, this practice should be generalized and scaled up whenever possible at governorate level (for instance in Mafraq) where the major withdrawal of groundwater is for irrigation.
- **As per drought management**, there is no established governmental unit responsible for drought management as yet, but there is a plan to host such unit at MWI as mentioned above. Once the proposal of creating such unit is approved by the Cabinet, emphasis will be placed on how to empower and institutionalize the unit. In particular the institutional structure needs to be significantly enhanced to ensure proper coordination across units in key ministries. There was a joint effort between MWI, scientific communities and universities, the Royal Scientific Society to explore scientific cooperation in managing drought. However, it is noted that the cooperation is informal, so this is a space where progress can be made.
- **Financing** is a challenge. Dam capacity needs to be increased from 330 million m³ to 400 million m³ – however, no funds have been allocated for dam construction. Likewise, desalination through pumping water from Dead Sea is constrained by high capital investment required and eventual cost of water once it reaches users. And on top of that, the Dead Sea is also shrinking. Public Private Sector Partnership are still limited.
- **Another challenge is the capacity to address issues of transboundary water resources ownership**. There are government agreements on sharing water resources between KSA/Jordan; Jordan/Syria; Jordan/Iraq; Jordan/Palestine. Implementation remains subject to the evolution of the political landscape. For instance, the absence of a functioning government in Syria to represent the country's stand on water ownership is a major bottleneck. There is a shared aquifer agreement respectively with Saudi Arabia and Israel. Due to the political situation in Syria, this agreement is not being upheld for shared resources from Yarmouk aquifer.

- **Innovation, Research & Development**– there is ongoing cooperation with Jordanian universities to raise awareness and build farmers capacity to adopt new technologies. However, new technology often comes at a higher cost that cannot be afforded by vulnerable farmers. For instance, a study on crop water cost /benefit analysis that analyses the water input per ton of crop and associated value of the crop might prove handy in deciding which crops’ cultivation can be put on hold as a water conservation measure, and import the crop instead.

Recommendations

Recommendation 19 - Strengthen the risk information system for the water management sector
19.1 Integrate database system on risk information for drought and flash floods using the future drought monitoring unit and early warning system as a foundation. The database must be linked with NCSCM database and surveillance system as well as with MOPIC – RJGC Geo Portal system -
19.2 Make a <u>comprehensive land use mapping available</u> (currently there is an available database system set up by the RFSAN, yet to be endorsed by the Royal Jordanian Geographical Centre). Such land use map should include protected zones not only for rangelands but also for water sources (aquifer) protection
19.3 Promote synergies between MWI, MoA and MoEnv on early warning system for drought i.e. allocate clear roles and responsibilities based on analysis of comparative advantage and complementarity
19.4 Strengthen MWI technical capacity on the use and application of disaster and climate data in water resources management for drought/floods mitigation and preparedness
19.5 Develop EWS for floods / flash floods in the most at risk / most populated wadis [Refer to Priority IV recommendation on EWS]
Recommendation 20 - Strengthen synergies in interventions between MWI and MoA and other actors
20.1 Strengthen the role of water scarcity committee and develop a joint water resource management collaboration to better coordinate between MWI and MoA to better manage ground water and water uses for agriculture purpose
20.2 Identify concrete synergetic actions in water resource management and drought mitigation and preparedness between MWI, MoA and MoEnv on early warning system for drought management
20.3 Improve collaboration between MWI, Meteorological Department, universities and other research institutions
Recommendation 21 - Develop tools and platforms to promote broader partnership approaches in the water management sector
21.1 Improve water security (water resources protection and facilities) by mainstreaming DRR and CRM to ensure viability of water supply facilities
21.2 Put in place a regulatory mechanism in way that the prioritization of water use can be implemented in a practical sense. For example; “if the water level in the major dams or overall water availability is down to certain percentage, irrigation of low value crops should be put on hold”. Farmers are then compensated for crop loss due to such actions, based on predefined cost per hectare for the

crops in question. Such a system would require either expanding the existing “agriculture risk fund” to incorporate crop losses due to such actions or establishing a similar arrangement
21.3 Increase investment in water harvesting technologies and water storage through Public Private Partnership (PPP). This could be done by promoting private sector investments to accelerate implementation of strategic water investment options defined by national water strategy
21.4 Strengthen the capacity of water users’ association of farmers towards a climate resilience practice (i.e., rain water harvesting, drip irrigation)
21.5 Knowledge sharing and technology transfer in the area of water harvesting, artificial recharge and reduction of losses. Also, more best practices on climate change adaptation and mitigation measures: changing classification of pump, measure water for irrigation – more efficient use of water
21.6 Strengthen regional cooperation to improve transboundary water resources protection and management, information sharing and development of a regional monitoring and early warning systems. Regional cooperation can also potentially help mitigate flood and drought risk on downstream countries
Recommendation 22 - Strengthen preparedness capacities in the WASH sector
22.1 Establish emergency cells at the utility level
22.2 Develop and budget contingency plans
22.3 Conduct community awareness to prevent groundwater and cross contamination. Encourage change in community behavior and practices regarding water quality, handling and storage. Implement an integrated package on social mobilization to educate refugees and host communities on water conservation, and the importance of personal hygiene in improving overall health

3.3.8 Cultural Heritage sector

The tourism sector has become a strong driver of economic growth in Jordan. After a significant drop during the Syria war, it started a steady recovery in recent years and is estimated to directly contribute to 10% and indirectly (induced) to 19% of GDP in 2016. Those figures are expected to increase significantly again in 2017 and 2018.

The tourism sector is mainly driven by the World Heritage site of Petra, by medical tourism and to a lesser extent by eco-tourism sites. Jordan 2025 and the Jordan Economic Growth Plan foresee a continuous increase in revenues generated from the sector underpinned by a strategy of public-private investment and diversification (eco-tourism).

Cultural heritage assets as well as eco-tourism assets are vulnerable to disaster and climate risks. The renowned UNESCO cultural World Heritage Site of Petra is exposed and vulnerable to flash floods and rock falls. Any earthquake could cause significant damage to the heritage sites of Petra and Jerash. The Aqaba beach and diving resort is exposed to the risk of marine pollution and industrial accident. Tourism, and in particular eco-tourism (for instance Dana Biosphere Nature Reserve), can also be directly and indirectly impacted by climate change due to increased incidence of flash floods, biodiversity loss, reduced landscape aesthetic, and coastal erosion.

Capacities must be in place to ensure that those risks are considered and strategically managed to protect tourists and cultural heritage sites and eco-systems assets from those risks.

Existing capacities

Neither the Jordan National Tourism Strategy (2015-2019) nor the Jordan economic growth plan make any mention of disaster management in the investment plan to “maintain and upgrade tourists’ sites and infrastructure”. Disaster risk management is not integrated in the legal framework, neither in the Jordan Tourism Law (1988) nor in the Jordan Antiquities Law (1988). The national Climate Change Policy (2013-2020) includes a succinct section on the potential impact of CC on the tourism sector as well as adaptation interventions.

Despite the absence of a regulatory framework for the tourism and cultural heritage sectors in relation to disaster and climate risk management, there are a number of initiatives at municipal level.

The Petra Development and Tourism Regional Authority (PTDRA) has set regulations for disaster sensitive land use, by identifying hazardous areas and disseminating this knowledge to the public and private investors in an attempt to reduce potential risks.

The **Petra Region Strategic Master Plan** (SMP) was developed in 2011 with the view to synergize archaeological, ecological and cultural preservation with population and tourism development. The SMP has mapped data on topography, hydrology, geology, vegetation cover, forest areas, agriculture zones, protected areas and archaeological sites, in order to produce a land use map. This is a critical planning tool for disaster risk reduction. For instance, the SMP identifies the water catchment areas in Petra that may cause flood during the rainy season. This was complemented with the **Petra Integrated Risk Assessment** (2013) which identifies which hazards are most likely to occur and have the biggest impact on a community’s or individual’s assets, focusing on Flash Flood, Land & Rock slide, and Earthquake.

The enhanced knowledge of risk and increased levels of awareness led the PTDRA to adopt risk management measures. The PTDRA established a Disaster Risk Reduction Unit (yet to be fully operational) and implemented a school training programme targeting 9000 students and 1000 teachers. With respect to cultural heritage protection, the PTDRA, working closely with the Department of Antiquities and UNESCO, is implementing since 2012 the "Siq Stability" project, a landslide risk preparedness and mitigation initiative to ensure the safety of tourists and the local community and the protection of the monuments within the archaeological site. While significant capacities have been established in monitoring and mitigating the risk of rock fall, there is limited awareness and capacity to tackle the risk of flash floods.

The **Wadi Musa Early Warning System** established in 2014 for the city of Petra is no longer functional three years only after its installation due to lack of maintenance. It was not designed to provide services to the archaeological park. Flash flood therefore remains a serious risk with respect to security of tourists and conservation of the archaeological site physical integrity.

With respect to eco-tourism sites, RSCN Protected Areas have meteorological stations for monitoring/prediction of climatic fluctuations. RSCN preparedness framework provides for a contingency plan to be included in each Protected Area management plans. In Wadi Mujib, there is coordination between the Jordan Valley Authority and the Directorate of Dams to check water level to take precautionary measures to prevent impact of flash floods.

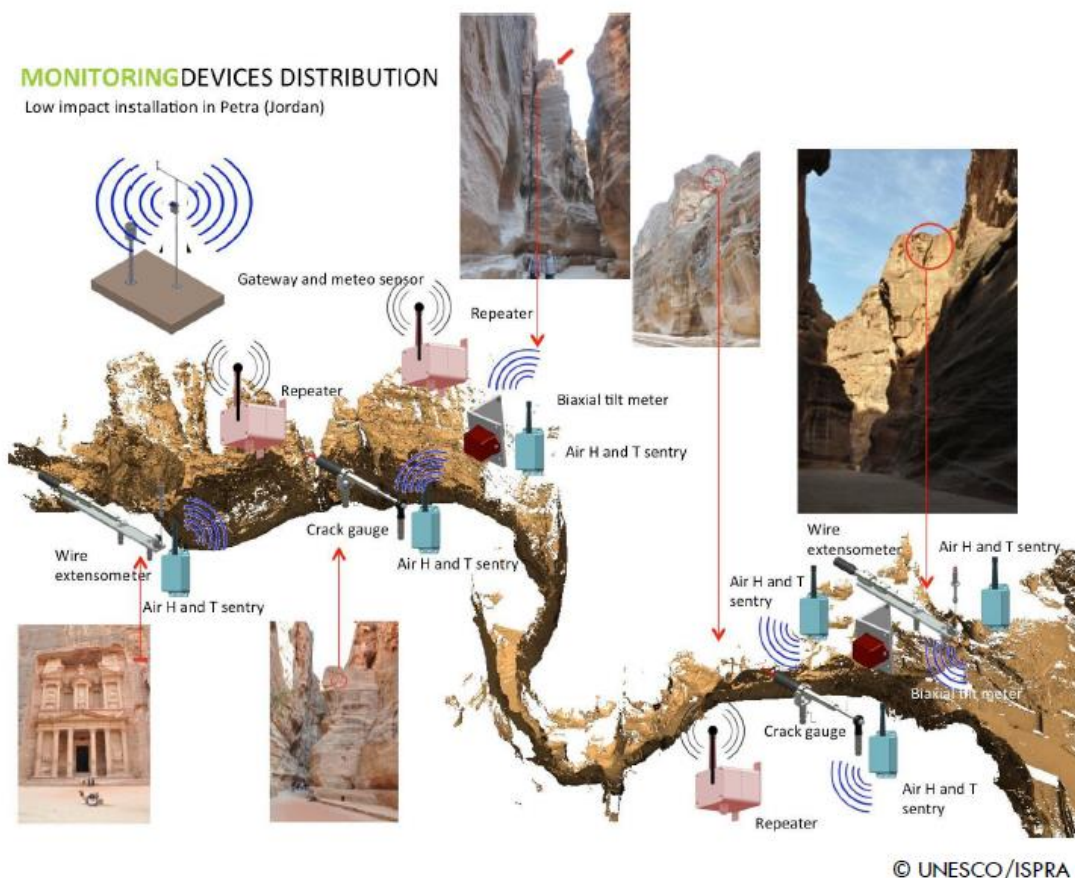
BEST PRACTICES - Mitigation of rock fall hazards to protect Petra World Heritage Site

The World Heritage site of Petra is the first tourism destination in Jordan. The number of foreign tourist visitors reached 470,167 in 2017, marking a 50% increase compared to 2016 and this fast growing trend is expected to continue in 2018. The red sandstone archaeological site is highly vulnerable to geological, hydrological and climate related hazards (rock falls, earthquake, landslide, flash floods). In 1963, flashflood caused death of 24 tourists in the 'Siq'. Rock falls in Petra have been recorded systematically from 2009 onwards.

The "Siq", a 1.2km naturally formed gorge that snakes through the sandstone cliffs, serving as the main entrance to the site, is one of the most endangered areas and with the highest risk of instability events potentially impacting the tourists within the Petra Archeological Park due to its specific geomorphology that makes it particularly prone to hydro-geological phenomena as rock falls and flashfloods. The site is particularly at risk due to its narrow pathway, limited access points and recent active slope processes that characterize the Umm Ishrin sandstone of which the site is composed. The highest concentration of visitors adds to the vulnerability of the area. In view of this, a process for analysis, monitoring and urgent and long-term mitigation of landslide risk in the 'Siq' has been undertaken by the Petra Tourism Regional Authority, the Department of Antiquities of Jordan and UNESCO Amman Office. A **pioneering wireless monitoring system** for rock block deformation was installed on six main hazardous locations along the 'Siq' and since 2012 monitoring techniques are used to assess the instability of the 'Siq' slopes, identify most at risk areas (e.g. a crack on a rock whose displacement is progressing beyond the set threshold) and take mitigation measures (e.g. consolidation, dislodgement, anchoring). Other mitigation measures include debris and small block removal from the 'Siq' top and along the 'Siq' walls and awareness raising on rockfall risks amongst the local population. Guidelines for landslide risk mitigation were developed as well as a feasibility study to address priority interventions for blocks of medium/large size. Two rangers, two local community members and two government representatives are trained on risk monitoring techniques and prevention/mitigation. As part of the third phase of the programme is the preparation of a **Disaster Risk Plan for Petra World Heritage Site** to be included in the Integrated Management Plan for the World Heritage Site, currently being prepared by UNESCO Amman, the Department of Antiquities of Jordan and the Petra Development and Tourism Regional Authority.

MONITORING DEVICES DISTRIBUTION

Low impact installation in Petra (Jordan)



Challenges

There are two main bottlenecks to address in order to strengthen DRM in the cultural heritage sector

- (i) Lack of information on risk within the sector
- (ii) Weak preparedness systems

Capacity gaps

- Lack of information on exposure to natural or industrial hazards impacting cultural/natural heritage (no risk assessment mandatory for critical cultural heritage assets) and lack of unique baseline on tourism assets (cultural and natural assets)
- Loss and damage data caused by different types of disasters are neither collected nor recorded (no historic data)
- Climate and disaster risk information are not integrated in national policies and plans for the tourism sector or for the cultural sector
- Lack of skills and capacity of technical staff to use and apply risk information to cultural heritage at national and local level
- The Municipalities disaster risk assessment completed in Amman, Aqaba, and Petra do not take into account exposure and vulnerability of cultural and natural heritage
- Limited capacity in maintenance of monitoring systems when in place as evidenced in Petra for the EWS for the Wadi Musa area installed in 2014 and already dysfunctional, or for the rock fall monitoring system which is still maintained by UNESCO.
- No preparedness plan for cultural heritage available at the national level and absence of contingency plans to protect cultural assets (including museum collections)
- Not clear lines of responsibility to take early action or respond to disasters at national and local level when it comes to protection and response on cultural heritage sites

Recommendations

Recommendation 23 - Strengthen the risk information system for the cultural sector (linked to the tourism sector)
23.1 Establish a comprehensive risk information management system for tourism assets
23.2 Record disaster impacting cultural or natural assets (and link with DESINVENTAR / Sendai Monitor database)
23.3 Mandatory multi-hazard risk assessment for critical cultural assets
23.4 Undertake a comprehensive flashflood risk assessment at the Petra World Heritage Site

23.5 Mandatory budget allocation from the Petra Site revenues to the maintenance of the rock fall monitoring system
23.6 Undertake a multi-risk (technological / industrial) assessment in Aqaba for the marine eco-system
Recommendation 24 – Strengthen the preparedness framework for the cultural heritage sector
24.1 Develop national preparedness plan for cultural/natural assets and museums
24.2 Clarify roles and responsibilities of various institutions and allocate responsibilities for early action (to act on early warning at national and local level including between JCD, the governorate and the municipality
21.3 Mainstream disaster and climate risk management in cultural sector and tourism policies
21.4 Ensure that public investment in the upgrading of the tourism sector sites and infrastructure that is budgeted under the national economic growth plan includes provisions for flash flood preparedness and mitigation including training.

3.3.9 Education sector

Existing capacities and challenges

The level of awareness about disaster and climate risk is limited amongst the general population and private sector stakeholders. The highly centralized state apparatus is not conducive for community empowerment in relation to disaster management. It is however largely demonstrated that community empowerment is highly efficient and effective for disaster risk management when people have access to risk information to make informed decisions about the risk affecting their livelihoods.

The integration of DRM in the education sector is crucial in order to increase awareness of the effects and causes of disasters amongst children and teachers, create a safe school culture, and in turn empower communities to take preventive and preparedness actions. The Ministry of Education has been an active member of the NCSCM and the HCCD, contributing to national efforts on DRM. Examples of MOE's involvement include sharing GPS coordinates and data on all public schools with the NCSCM, identifying schools that can be used as emergency shelters, making human resources available for preparedness efforts led by NCSCM such as simulation or data collection exercises, and maintaining a committee that regularly reviews and updates the Ministry's risk management strategy.

At the school level, the Ministry of Education works closely with JCD to provide students and educational personnel with awareness and education campaign, focusing on evacuation plans, firefighting and other type of risks. The Jordan Seismic Observation Center, UNESCO, UNICEF and the Jordan Red Crescent have also contributed to these efforts. There is a need however to ensure that awareness campaigns at school level are contextualized to the local risk profile and their impact more systematically tested and monitored. Information on disasters and disaster risk management is covered in the curriculum, within the science and civic education sections from grades 6 and above. Ensuring that the content is regularly reviewed to include updated risk information and identifying entry points for risk information to be disseminated in earlier grades would have a positive impact on building greater risk awareness in the Kingdom.

In 2016, UNICEF and ESTiDAMA worked together with the Ministry of Education to conduct an assessment of DRM in the education sector, with the objective of developing a DRM strategy and action plan for the Ministry, with the four following goals: 1) Improved quality of education response in emergencies and post-crisis transitions; 2) Increased resilience of education service delivery in chronic crises, arrested development and deteriorating contexts; 3) Increased education-sector contribution to better prediction, prevention and preparedness (the 3Ps) for emergencies due to natural disasters and conflict; and 4) Evidence-based policies, efficient operational strategies and fit-for-purpose financing instruments for Education in Emergencies & Post-crisis Transition (EEPCT) situations. This included a plan to include DRM training in 22 departments, 42 Directorates and 4000 schools in Jordan. No specific provisions to continue the process were made due to shifting priorities within the Ministry linked to the refugee crisis.

An essential step was however taken at the policy level, with the inclusion of a dedicated Risk and Crisis Management section within the MOE's 2018-2022 Education Strategic Plan, which proposes to address the following challenges:

- Lack of awareness on the importance of risk management and lack of plans to prevent such risks.
- The need to adopt risk management approaches within the institution at the administrative and technical levels.
- Lack of readiness to deal with risks at all levels of the educational system.
- Lack of financial allocations to ensure that risks are addressed.
- Poor efficiency and effectiveness of the means of communication and links with external partners at the local and external levels in case of risks.
- The need to prepare alternative scenarios to address the risks facing the system.

Recommendations

Recommendation 25 - Strengthen DRM and CC information in school curriculum, as well as in teacher's curriculum
25.1 Map the science and civic education curriculum against updated risk information and make recommended changes and suggestions to include similar concepts in earlier grades and/or other subjects
25.2 Put special emphasis on the role of women in community / household disaster preparedness and response
Recommendation 26 - Implement safe school program in high risk areas
26.1 Develop planning for school shelters ' rehabilitation to make them more "shelter friendly" with adequate structures and equipments (e.g. guidelines for school defined as shelters need to be developed)
26.2 Establish a joint bilateral agreement between JCD and MOE to ensure quarterly awareness sessions including simulation exercises in all schools (consider gender issues in these sessions)
Recommendation 27 - Strengthening of information management system
27.1 Maintain an 'updated database' system of all schools (GPS, students, teachers) through the OPEN EMIS
27.2 Establish data sharing protocols between NCSCM and key information units in the MOE (Open EMIS, GIS, control rooms)
Recommendation 28 - Increase the number of specialized masters in DRM and CC at universities as well as engineering schools

3.3.10 Health sector

The Health sector is critical for the management of disaster and climate risks. Natural, biological and technological hazards put the health of vulnerable populations at risk. Epidemics, infestations of pests, chemical or radiological accidents, environmental contamination due to industrial accidents or mismanagement of waste, and increase in water borne disease as a consequence of floods or drought are a few examples. Disasters may cause ill-health directly or through the disruption of health systems, facilities and services. They also affect basic infrastructure such as water supplies and safe shelter which are essential for health.

Much has been achieved in communicable disease control in Jordan. The health sector capacities are relatively strong when it comes to epidemics surveillance and preparedness. However, findings from the health sector vulnerability assessment⁴⁷ indicate that services to 39 % of population may be inadequate as their local health centers cannot cope with increased demand from influx of refugee populations. In this respect, Amman governorate is categorized as “severely vulnerable”, and Irbid and Zarqa governorates are categorized as “highly vulnerable”. This jeopardizes the resilience of the health system in the event of a significant disaster such as floods, earthquake or technological accident.

Existing capacities

The evaluation of DRM capacities in the health sector takes stock of the Joint External Evaluation (JEE) of International Health Regulations that was facilitated by WHO in 2016 before the CADRI assessment.

According to the Joint External Evaluation of International Health Regulations⁴⁸, Jordan has established core capacities. Links are established across the human and animal health sectors in case of foodborne outbreaks and zoonotic disease with clear triggers and protocols for coordinated activity. Laboratory practices for clinical diagnosis of priority infectious diseases was judged as satisfactory. An indicator-based surveillance with an **automated electronic notification surveillance system** is in place in support of real-time surveillance and analysis. A national immunization programme translated into high vaccination coverage and protection of the population, including refugees.

The policy framework is relatively well developed in relation to disaster and climate risk including: the Public Health Law, the national health sector strategy, the National Health Climate Change Adaptation Strategy, and the national guideline for respiratory diseases and pandemic influenza preparedness.

The **Public Health Law** (2008) summarizes MOH responsibilities to counter disasters as follows:

- (1) Preserve of public health by taking all measures and actions and provision of preventive and remedial health services and supervision of all that may constitute a hazard on public health.
- (2) Concentrate the health education programs on the hazards and injuries that may occur to citizens because of disasters and how to provide the necessary first aid.
- (3) Train citizens, in coordination with Jordan Civil Defence, on how to provide first aid.
- (4) Provide adequate reserve of medicines and medical supplies.
- (5) Prepare all public and private hospitals and medical clinics to receive injuries caused by disasters and provide them with the first aid supplies in addition to medicines and cadres.

⁴⁷ Comprehensive Vulnerability Assessment, MOPIC, Jordan Response Plan Platform, 2015

⁴⁸ Jordan Joint External Evaluation of International Health Regulations, World Health Organization, 2017

- (6) Assist Jordan Civil Defence in providing field first aid to persons injured by disasters.
- (7) Render medical care services for evacuation and hospitality centers.
- (8) Fight epidemics that may spread as a result of a disaster.
- (9) Implement the basics and instructions of disaster medicine during handling injuries including classification and evacuation.
- (10) Coordinate with local medical bodies (Jordan Medical Association, Jordan Pharmaceutical Association, etc.) and external medical bodies to provide medical aid when necessary as well as organizing the tasks of these bodies during field work.
- (11) Establish field hospitals when necessary.

The **National Health Sector Strategy 2015-2019** is implemented under the guidance of the High Health Council. The Strategy identifies climate change as a threat but does not elaborate on adaptation to climate risk. It includes provisions for disaster emergency management (see below) but does not elaborate on prevention strategies.

The **National Health Climate Change Adaptation Strategy (2013-2017)** was developed in 2013 to protect health from the potential impacts of climate change. The Strategy provides a roadmap and elaborates on actions about heat waves, water and food-borne diseases; vector-borne diseases; nutrition and food security. It includes provisions for conducting health vulnerability assessments, public education, establishing an early warning system to trigger prompt public health intervention when certain variables exceed a defined threshold; developing climate-informed disease control programs and surveillance systems using meteorological services to target vector control in time and space, and adopting more effective and rapid electronic exchange of surveillance data for rapid intervention; and finally using GIS or Health Mapper to link environmental and climatic factors to health outcomes.

Progress in implementation of the national health climate change adaptation strategy and plan have however been limited. A national assessment of health vulnerability due to climate change was conducted, and the Jordanian health workforce teams responsible for managing climate-sensitive diseases were trained on vulnerability assessment and adaptation work modalities to enhance health sector resilience. There is however no evidence that the Plan was budgeted for. During the implementation period of the Strategy, much of the attention of MoH structures has been diverted to care for the increased demand for services caused by the influx of refugee population.

A notable progress has been the nascent collaboration established between MoA Animal Health Division and MoH through the **One Health Committee established in 2016** (consisting of six staff from veterinary department and six staff from health department) for the prevention of zoonotic diseases.

In terms of emergency preparedness, a number of concrete measures have been taken by MOH:

- Public Health Emergency Response Plan;
- Increased capacity in epidemic control;
- Public Health Emergency Operation Center (EOC), now inked to NCSCM;
- Joint External Evaluation (JEE) conducted in 2016 - main gaps addressed in 2017;
- Active IHR (International Health Regulations 2005) focal point in MOH

The National Health Sector (see above) includes provisions for **strengthening the readiness capacity of emergency health services**: Review of disaster and emergency rescue plans and update them in coordination with MOH, Civil Defence, Public Security Department, Royal Medical Services and municipalities; Develop training for those involved in the implementation of disaster, emergency and rescue plans; Raise the efficiency of emergency departments in public and private hospitals to deal with injuries, accidents, armed conflict and mass incidents; Support the development of the patient

and injured people transportation means and the effective use of electronic communications technology and e-health care in the ambulance and rescue services.

Since the adoption of this Strategy, MoH made significant progress with respect to public health emergency response planning. A **Public Health Emergency Response Plan** outlining detailed roles and responsibilities is guiding emergency response, including public health events. MoH established a **Crisis Management Unit** in 2008, with an Emergency Operations Centre (EOC) regrouping representatives from across the Ministry. The EOC is now integrated into NCSCM. MoH has one representative on the national DRM platform. Public health contingency plans for all hazards are available at the Queen Alya airport.

The National Committee for Radiological Emergencies drafted a **national radiological emergency plan** detailing the roles and responsibilities in responding to radiation emergencies, and a National Nuclear Security Committee has a published **policy on nuclear safety** and a national register of radiation sources⁴⁹.

With respect to **avian influenza or pandemic influenza preparedness**, Jordan has developed emergency preparedness and response plans. A national guideline for respiratory diseases and pandemic influenza preparedness (2017) outlines roles and responsibilities in Pre-Pandemic preparedness and in response, as well as protocols. The **Central Public Health Laboratory in Amman** has been recognized as a National Influenza Centre since 2012. Data are shared with the Ministry of Health and WHO through FluNet. Both systems have sentinel sites that are distributed in the country (south, centre, north⁵⁰). Healthcare staff have been trained on the management and control of avian influenza.

The physical proximity between Amman and the directorates is an advantage for the health system surveillance and preparedness: the furthest point from Amman is four hours away, allowing for rapid deployment of staff, Personal Protective equipment (PPE) or the rapid transport of lab specimens. However, there needs to be a mechanism to ensure local health units can respond on their own in case of emergencies.

Finally, with respect to information management, a robust, integrated health information systems (HIS) is required to ensure that appropriate information is available at the right time and place and in the right format. The growing need for health-related information by policy makers, program managers, donors, non-governmental organizations, the public at large and other stakeholders demands a unified well-defined system of data collection and reporting from the health facility to national level.

A positive development in epidemics preparedness is the **national program of public health surveillance** to monitor communicable and non-communicable diseases implemented across Jordan. As a result, an increased capacity in epidemic control has been established with **case-based, integrated disease surveillance** that is coded according to the International Classification of Disease (ICD-10) and **real-time reporting of information**. Information is made available within one hour via an online system with automated generation of SMS and email alerts and support for mapping and reporting, that is accessed at all levels of the Ministry of Health. Weekly epidemiological public reports are published online and distributed via e-mail.

⁴⁹ Jordan Joint External Evaluation of International Health Regulations, World Health Organization, 2017
⁵⁰ WHO EMRO

Challenges

- There is insufficient Public Health risk mapping. There was a preliminary national assessment of health vulnerability due to climate change. A more thorough assessment of the exposure and vulnerability of the health system to disaster and climate risks is required to inform policy development and budget allocation.
- The national public health strategy and plans are strong on disaster preparedness but relatively weak on prevention of disaster/climate health related risks. The health climate change strategy is not integrated with the national public health strategy. It appears to be an externally driven effort that is not internalized yet within the Ministry. There is therefore little incentive for decision makers to allocate the required resource to the implementation of the health CC strategy, especially in view of the current budgetary pressure induced by the refugee crisis.
- The health sector is **fragmented / diverse** between public and private sector, between ministries (health, water, environment) and within the different departments of MOH (for instance between communicable and non-communicable diseases). there is no single unified system for emergency response in the health sector. There is a need for clear roles and responsibilities for each health service provider, knowing what resources each have.
- The absence of a national database mapping available health resources and assets is one of the main impediments to efficient disaster response. Health assets are divided among private, public, military and external partners.
- There is lack of a comprehensive standardized disaster risk assessment within all health facilities, including a review of Chemical Biological Radioactive Nuclear risk (CBRN) capacity.
- There is a need to conduct an in-depth assessment of hospitals across the country.
- NCSCM can help in strengthening planning and coordination for health-related crisis provided the complementarity of roles and systems between NCSCM and MOH is well articulated at national and local level.

Recommendations

In view of the impact of the Syria crisis on the health sector capacities, it is proposed to focus the recommendations on strengthening health system preparedness capacities.

<p>Recommendation 29 - Strengthen Hospital Information System (HIS) to enable generation of timely and reliable evidence to assess the health situation and trends</p>

<p>29.1 Strengthen MOH IT Directorate through providing state-of-the art ICT infrastructure for an effective HIS. This should be accompanied by regular review of existing guidelines that define the business process of the MoH, the appropriate technologies within those processes and new technologies to collect and analyse data in real time thereby facilitating rapid decision making and deployment of support and response activities</p>
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<p>29.2 Guidelines and standardized operational procedures should be developed or harmonized for data management (data collection, storage), analysis, reporting, dissemination and utilization. In addition,</p>
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national health indicators metadata and agreed data sources should be developed to guide data collection, processing, and analysis
29.3 Developing data repository for the entire HIS to enable data extraction, linkage, triangulation with other sources such as population-based data (e.g. census) and institution-based data (e.g. service records) and compiled into usable statistics and information for in-depth analysis and comparison of various health indicators. Thus, information from non-routine sources and routine sources would provide data into the repository
Recommendation 30 - Clarify roles and responsibilities for each health service provider, knowing available resources
30.1 Conduct comprehensive standardized disaster management capacity assessment in both public and private sector health facilities; including chemical, biological, radiological, nuclear capacity
30.2 Establish real time database of available health resources
Recommendation 31 - Draft and implement an Infection and Prevention Control (IPC) national strategy for all health care providers and support agencies
31.1 IPC committee at MoH to guide and oversee implementation and adherence to guidelines at all institutions and support agencies
31.2 IPC focal point at national level linked to the Incident Management System at the Health Emergency Operation Center
31.3 IPC focal point / expert should be embedded in the JCD, at national and Governorate level
31.4 Eight-person ambulance use should be limited to events without any infectious disease risk or for patients (with life threatening conditions)

Priority IV: Strengthening governance and institutions to manage disaster risk

“The steady growth of disaster risk, including the increase of people and assets exposure, combined with the lessons learned from past disasters, indicates the need to further strengthen disaster preparedness for response, take action in anticipation of events, integrate disaster risk reduction in response preparedness and that ensure capacities are in place for effective response and recovery at all levels. Empowering women and persons with disabilities to publicly lead and promote gender equitable and universally accessible response, recovery rehabilitation and reconstruction approaches are key. Disasters have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of the disaster, is a critical opportunity to build back better, including through integrating disaster risk reduction into development measures, making nations and communities resilient to disasters.”

Sendai Framework Priority for Action IV.

3.4 Priority IV - Enhancing preparedness for effective response, and building back better in recovery and reconstruction

When we assess preparedness capacities, what are we looking at?

- ✓ Risk analysis and its application to early warning and surveillance
- ✓ Institutional and policy framework for preparedness
- ✓ Resource allocation for response, preparedness and recovery
- ✓ Contingency and response plans
- ✓ Training and exercises
- ✓ Emergency services, standby arrangements, prepositioning

3.4.1 Hazard/ Risk analysis and early warning

Existing capacities

Hazard / Risk Analysis for preparedness

The National Center for Security and Crisis Management (NCSCM) has a dedicated risk assessment team to coordinate the collection of information from various ministries and entities on ten (10) security related risks (energy, health, water, etc.).

Sector ministries capacities to produce, analyses and apply risk information greatly varies between institutions. Ministry of Water and Irrigation (MWI) and Ministry of Public Works (MPW) have strong capacities. An analytical table to date collected by various institutions is available under Priority 1 section of this report.

Some information is particularly relevant to disaster preparedness efforts:

- Mapping of WASH, Hospitals and School facilities
- Waste Water Vulnerability maps
- Water availability table widely shared with ministries and NCSCM
- Infrastructure building vulnerability
- Integrated Case-based Disease Surveillance
- Meteorological weather forecasts
- Migrations and urbanization data

There are a number of assessment conducted in Jordan on various hazards, with different geographical coverage, or for different sectors [Refer to Priority I section]. The differentiated vulnerability of different population groups (men and women, boys and girls, disabled, refugees, migrants) is not systematically measured. Capacities are higher in hazard assessment (especially for earthquake) and more limited in risk assessment.

Early Warning

The **Meteorological Department** produces early warning weather forecasts. Coordination and data exchange occurs within the WMO mechanism, as well as through regional exchanges. In view of the occurrence of flash floods in Jordan, a **Flash Flood Guidance System (FFGS)** is under development with WMO.

MWI operates about 70 automatic stations across the country. The network will be the foundation for an integrated **drought monitoring and early warning system (under development)**. Progress has been made on networking and telemetric weather station that are operated by the Meteorological department, NCARE and MWI.

An early warning system (EWS) for **water contamination** was reported to be installed with 13 fully automated monitoring stations dispersed along the Jordan River, Yarmouk River, Zarqa River, King Abdullah Canal and King Talal Dam's to monitor water contamination from industrial and chemical waste.

The Ministry of Agriculture (MOA) is in the process of developing an **early warning system on frost** protection [Refer to Priority III Agriculture sector].

The Ministry of Health (MOH) operates a **Case Based Integrated surveillance system for epidemics** surveillance. The Central Public Health Laboratory in Amman has been recognized as a National Influenza Centre since 2012 to monitor the risk of influenza epidemics [Refer to Priority III Health sector].

Capacities to monitor zoonotic diseases and trans-boundary crop pests are limited. Field veterinary services are overwhelmed with the increase in uncontrolled movements of unvaccinated livestock across borders. Likewise, phyto-sanitary inspection systems at border crossings are too weak to contain the risk of trans-boundary crop pests [Refer to Priority III Agriculture sector].

Various Early Warning initiatives were identified at local level:

An early warning system for flash floods in Wadi Musa/Petra was installed in 2014 but it is not functioning due to poor maintenance [Refer to Priority III Cultural Heritage sector].

An early warning system for flash floods in Aqaba is being prepared for a tender process. It was until now operated through man observation during the elevated risk season.

The monitoring system for instability of slopes in the 'Siq' in Petra Archaeological Park provides an advanced technical solution, although it is not integrated with other early warning systems [Refer to Priority III Cultural Heritage sector].

Jordan has early warning tools for sirens and voice messages covering critical areas of the country, with tools being activated manually by Jordan Civil Defence or local authorities.

Challenges

Available hazard and risk assessments are not used for preparedness purpose. In the best-case scenario, they are used to plan investment in prevention at the municipality level through urban planning processes. There was no evidence that JCD or the governorates councils develop contingency plans based on the various risk assessments that have been conducted at local level. There is a limited understanding of hazard monitoring and mapping at the sub national level/governorate level and their respective departments. Hazard and risk information are not systematically gender disaggregated.

Early Warning capacities are limited:

- There is no integrated early warning system in place for slow and rapid onset disasters.
- There is no systematic connection between forecasts and early warning.
- Thresholds, activation protocols, roles and responsibilities for “early action” are not clearly defined and communicated. Even with the best EWS hardware equipment, in the absence of clear accountability lines for early action, the system is not operational.
- To be successful EWS must be shared across relevant institutions (civil defence, municipality, Red Crescent, relevant line ministry departments, CSO/CBOs). Ownership of EWS cannot fall under one single institution or individual.
- EWS are not people centered. Community needs are not taken into account in the design of the EWS. There is a perception that citizens are not very receptive to weather forecasts from the Meteorological department. They appear not to act efficiently on issued weather warnings. People must be empowered on what to do when they get the warning. Community based awareness raising campaigns must be designed and implemented with the Red Crescent, and other civil society actors.
- There is limited readiness/capacity to ensure maintenance of early warning systems when in place (as evidenced in Petra for the Wadi Musa flood EWS installed in 2014 and dysfunctional in 2017, or for the rock fall monitoring system which is still maintained by UNESCO).

A drought early warning system has been in development for a despite the high vulnerability of the country to drought. MoA early warning system on frost protection needs to be further developed. In the absence of an on-line livestock tracking system, it is challenging to manage epidemics risk [Refer to Priority III section on Agriculture].

Recommendations

Recommendation 1 –Establish an “end-to-end” early warning system (EWS). Specific recommendations are listed below.

An “end-to-end” early warning system shall include four interrelated elements:

- (1) **disaster risk knowledge** based on the systematic collection of data and disaster risk assessments including gender disaggregated data;
- (2) **detection, monitoring, analysis and forecasting** of the hazards and possible consequences;
- (3) **dissemination and communication**, by an official source, of authoritative, **timely, accurate and actionable** warnings and associated information on likelihood and impact; and
- (4) preparedness at all levels to respond to the warnings received with clear roles and responsibilities for State and non-State actors and CBOs.

Recommendation 1 - Implement an end-to-end early warning system
1.1 Empower relevant central and local government institutions to apply risk information to preparedness, response and recovery plans through provide free and systematic access to existing hazard and risk maps and training on use and application of risk information for preparedness purpose

1.2 Ensure that risk and hazard analysis data are <u>gender disaggregated</u>
1.3 Establish thresholds and activation protocols linked to forecasts; Clarify triggers for early action and allocation of roles and responsibilities for early action at central and local level
1.4 Disseminate information on capacities and responsibilities of each monitoring Agency to Agencies mandated for emergency service provision, to ensure appropriate early warning and safety to the public at large
1.5 Conduct public / community awareness campaigns on what to do in case of warning with the involvement of various actors (JCD, Jordan Red Crescent, CSOs) with a special attention on the role of women in community preparedness and response
1.6 Establish NCSCM as the central Early Warning coordinating entity drawing information from NCSCM national information database for early prediction of crisis, provided the database includes other ministry warning systems on extreme weather events (floods, flash floods and drought); Ensure the EWS for drought, frost and animal disease is linked to / integrated into NCSCM EWS.
1.7 Ensure systematic <u>monitoring of maintenance</u> of EWS equipment by NCSCM and/or JCD through the governorates
Recommendation 2 - Invest in flash flood early warning in high population density areas
2.1 Address defaillance of Wadi Musa flood EWS and include Petra archeological site in the EWS coverage. Conduct community awareness campaign on action to take in case of warning
IV 2.2 Develop flash floods EWS in most at risk wadis in high population density area
IV 2.3 Pursue on-going regional cooperation to help mitigate flood risk on downstream countries through the development of a regional monitoring and early warning system
Recommendation 3 – Develop and institutionalize a drought monitoring system
3.1 Develop / upgrade the drought monitoring system (priority considering that droughts are predicted to increase in intensity and frequency in light of climate change)
3.2 Promote synergies between MWI, MoA and MoEnv i.e. allocate clear roles and responsibilities in the management of the drought monitoring unit based on analysis of comparative advantage and complementarity
3.3 Establish a communication system to ensure that early warnings are shared with the general population, in particular farmers and herders
Recommendation 4 - Install on-line tracking system to share and consolidate data on animal disease and epidemic (Reference to recommendation I3 under Priority III)
4.1 Consider possibility to broaden the scope of MOH Interactive Electronic Reporting System for epidemics to implement the “one health’ approach. Expand technical capacities to conduct Integrated Case-based Disease Surveillance and produces weekly reports on human-animal health.

3.4.2 Information management and communication

Existing capacities

A number of ministries have dedicated Information Management (IM), Geographic Information System (GIS) and analytical skills at their command. [For an analytical description of information management systems and hosting options, refer to Priority 1 section of this report].

NCSCM maintains a national database fed with data from all ministries. The information is updated irregularly and manually, through the assistance of Liaison Officers. NCSCM central data base collects relevant preparedness information from all ministries – e.g. how many beds in the hospitals, clinical materials, factories – used for disaster response planning.

NCSCM Risk Assessment Unit manages a comprehensive national database that is available to decision makers at time of crisis in 10 areas (such as energy, health, water, etc.). The data management responsibilities include:

- Sharing of Contingency Plans among ministries, for the clarification of lead roles;
- Collecting data from different ministries via the 23 Liaison Officers. The Unit has an Incident Management and Reporting System, based on an App;
- Modeling of scenarios to help map potentially affected groups;
- Providing recommendations on use of data (linking to the lessons learned unit in the Training Department);
- Provide a data recovery system, with a server based in the Center, to back-up relevant data and provide a physical location for staff to meet in the event their Ministry is affected by a crisis.

The RJGC provides various mapping and analysis services [described under Priority 1 section of this report]. It is affiliated to the Ministry of Defense and can conduct surveying information through Aerial Photography, and provide GIS services.

There is a CIMIC (Civil Military) information database, but is unclear how much detail it covers.

The Ministry of Telecommunications has an SMS center to issue alerts. The accredited telecom operators ensure a '911' line free of charge.

'Digitizing Jordan 2020' aims to ensure business continuity for the ministries by backing-up and restoring data.

Challenges

Information management and analysis skills across Disaster Management structures are low. Much of the data is not updated regularly or obsolete. Data from the national database is not accessible to all stakeholders (secured database). It remains unclear how access is granted. There is no link to the national DRR platform.

The coordination among the various IM systems (Standard Operating Procedures, etc.) is limited, and does not allow to effectively exchange preparedness, response, prevention, mitigation and recovery information.

There is no legislation on information management and communication protocols for DRM and DRR.

At the **National** level:

- Limited resources for centralized information management – there is a lack of NCSCM staff (GIS, IM, telecom experts);
- Data is held at the different ministries on all levels, but not regularly updated, not systematically shared based on established protocols, and not enough used/applied
- Data is often collected via phone or paper, without an agreed and common structure or standardization, and often not digitized into central databases;
- Current data is outdated and there is no mechanism for obtaining updated information;
- The App used by the NCSCM cannot be customized by the IM team;

- Common assessment methodologies are not in place and humanitarian concepts not clearly defined (e.g. the definition of “affected population”);

The NCSCM data base on preparedness information from hospitals, factories etc. can be used for disaster response planning. However, several challenges were highlighted:

- All information is centralized in NCSCM;
- No direct connection between data sets;
- No real-time information.

A critical bottleneck to the establishment of a functioning disaster management information system in Jordan is the restricted access to NCSCM central database. There is a need to separate the disaster information platform from security information platform as access to the security platform is restricted with encrypted data.

Telecom service providers do not have contingency plans and the Ministry of Information and Communications Technology does not have the capacity to provide support.

The cyber security policy expired in 2016 and critical infrastructure and services are not classified.

At **Governorate** level, most data are transmitted from the Governorate to the central ministries where they are analyzed. Each Governorate collects a different set of data with different level of detail and analysis.

Recommendations

For a comprehensive analysis and recommendations on Information Management for Disaster Risk Reduction, refer to Priority 1. The recommendations below are specific to the collection and application of risk information for preparedness and recovery.

Recommendation 5 – Develop clear Terms of Reference and Standard Operating Procedures for members of DRM platform on collection and use / application of risk information for preparedness and recovery

5.1 Standardize data collection for emergency preparedness purpose from relevant ministries, charities, NGOs, bilateral and multilateral agencies including their stocks and human resources

5.2 Establish official protocols on Information Management for preparedness and response purposes, that define roles and responsibilities, reporting mechanisms and accessibility and accuracy of data

5.3 Develop guideline and training for the National Platform on the application of risk information for preparedness for response

5.4 Establish capacity to support data collection, analysis on post disaster Damage Assessments with technical readiness to produce Damage maps using available Satellite Data and Aerial Photography

Recommendation 6 - Building public awareness on understading of risk information to promote Community Based Disaster Management and Preparedness

6.1. Develop participatory community based risk assessment methods to engage the most at risk community, working together with local authorities, in mapping hazards and vulnerabilities. Such assessment should identify a wide range of resources: coping strategies, local knowledge, social capital, community facilities, preparedness stocks or local evacuation plan

6.2 Conduct inter-sectoral awareness campaigns on critical risks and application of risk information to building codes enforcement; regulation for trash removal; and prevention of groundwater and cross contamination and disaster preparedness

3.4.3 Legislative framework for EPR

Existing capacities

Legislative and regulatory framework

Please refer to Priority 1 section for a detailed analysis of the legislative and regulatory framework for DRM and recommendations, as well as Priority III sector policies.

The assessment team did not have access to the main DM legislation to conduct a detailed review. A previous analytical study on legislation related to disaster management has mapped as many as twenty (20) laws or regulations relating to disaster management ⁵¹. A few are more relevant to disaster response and preparedness:

The Jordanian Constitution (1952) provides for a “Defence Law” to be announced by a Royal Decree in case of emergency which might threaten national security and general safety in all or one part of the kingdom.

- The Civil Defence Law (1999-amended in 2003) forming the General Directorate of Civil Defence (GDCCD) and establishing the Higher Council of Civil Defence (HCCD), includes the following regarding facing disasters:
 - Executing processes of fire extinguishing, rescue, and medical aid cases resulting from them, preparing persons eligible for these processes, educating citizens and training them on these processes, providing the necessary machinery, equipment, and means of communication, and preparing studies related to the works of the Civil Defence.
 - Providing methods and tools of warning from air raids and disasters and organize and monitor them.
 - Checking the readiness of the general shelters for use.
 - Detecting explosives, determining the areas of their existence, marking the area around them, and inviting the Public Security Forces to close the area and the specialized bodies in the Armed Forces to cancel their effect and remove them.
 - Participating in detecting any chemical or radioactive leakage in cooperation with the authorities specialized in dealing with it and avoiding its effects.
 - Training voluntary teams on the works of the Civil Defence from both the public and private

⁵¹ Analytical Study on Legislations effective in the Hashemite Kingdom of Jordan Related to Disasters & Disaster Management, JCD, UNDP 2014

sectors in all parts of the kingdom to support the Civil Defence.

- ❑ Article (14/b) authorizes the Director General of the Civil Defence to ask the civil, security and military authorities and the private sector institutions to take part in the emergency tasks of the Civil Defence and obligated these authorities to perform that immediately.

The Jordanian Armed Forces Temporary Law (2001) assigns a role to the Armed Forces in disaster management (helping in search, rescue, medical aid, sheltering and relief processes, and providing machinery and supplies; and supporting the security bodies in maintaining security and order)

The Public Security Law (1965) and its Amendments have determined the duties of Public Security Body in Article (4) through which its most important duties for facing emergencies and disasters can be drawn as follows:

- (1) Informing the concerned authorities of risks.
- (2) Warning persons at stake in order to get away from hazardous areas.
- (3) Keeping security and stability within the stricken area and managing the work of the public facilities and services.
- (4) Organizing and facilitating traffic for rescue, evacuation and medical aid units. (5) Executing legislated laws, regulations, and official orders.
- (5) Participating in rescue, evacuation and sheltering processes and providing the available human and machinery effort to for facing the disaster.

The Public Health Law (2008) summarizes the Ministry's responsibilities to counter disasters including working in close coordination with Jordan Civil Defence, on how to provide first aid, and fighting epidemics that may spread as a result of a disaster [Refer to Priority III on Health sector policy framework].

A review of the institutional set up for DRM is integrated in Priority 2 section on Risk Governance including specific recommendations on mandates, roles and responsibilities. The below section provides more details about the operational capacities of those institutions.

Challenges

Jordan does not at this point have a comprehensive central "umbrella instrument" to comprehensively identify roles and responsibilities in Disaster Response in Jordan. This instrument should guide the integration of DM in sectoral laws and strategies, like public health, environmental and land planning laws and regulations.

So far responsibilities for disaster response are centralized and concentrated with NCSCM; Civil Defense, Armed Forces, with potential overlap, and to some extent with a few sector ministries such as MoH. As successful Disaster Risk Management requires the involvement of entities beyond Civil Defense, the legislative instrument should set out the relation between all stakeholders involved, including relevant ministries, decentralized responsibilities at the municipal level and the responsibilities of the private sector. The legal framework, as it establishes obligations for stakeholders, should create accountability for all Agencies for implementation of their responsibilities in DRR.

The legal framework should clarify the role of Civil Defense as per Civil Defense Law Article 4 para. B, which allows HCCD to approve the necessary measures to respond to emergencies and disasters and to define the roles of each official and non-official entities, as well as NCSCM role which should have a

stronger legal basis. This effort of strengthening the legal framework for DRM should take advantage of regional and international best practices and expertise.

Two initiatives were identified in support of the legislative review of the Jordan legislative framework for DRR:

- The EU “Twinning project” between the Administration of the General Directorate of Civil Defence and the Ministry of Interior of France, scheduled to start in October 2017. It includes support to the development of a law for disaster and crises management, as well as support to the amendment of the draft national DRR strategy (1 legal expert for 2 weeks).
- The Jordan Red Crescent in collaboration with the International Federation of Red Cross and Red Crescent Societies supported a National Disaster Law workshop in November 2015 which can be the foundation for the development of a comprehensive DRR legal framework.

Recommendations

For detailed recommendations about the development of the Disaster Risk Management legislative framework, please Refer to Priority I section on Risk Governance.

Specific recommendations on provisions for disaster response, preparedness and recovery are listed below and complement recommendations listed under Priority I:

<p>Recommendation 7 – Ensure that the new Disaster Risk Management law <i>incorporates preparedness for response and recovery principles</i> [Refer to Priority II recommendation 1 on legislative framework]</p>
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<p>7.1. Develop the DRM law including preparedness for response and recovery principles:</p>

- | |
|--|
| <ul style="list-style-type: none"> ○ Cohesion in inter-sectoral legislation ○ Legislation on lead organization to respond to oil spills ○ Legislation on right-of-passage for ambulances ○ Legislation on information management protocols |
|--|

<p>7.2 Ensure harmonization with the legal and regulatory framework for health preparedness, urban planning and waste management</p>

<p>7.3 Explore linkages with the Volunteerism law acted in 2010 that presents an opportunity for strengthening DRM</p>
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3.4.4 Resource allocation and funding for Emergency Preparedness and Response

Existing capacities

Some Ministries/Governorates manage specific resources for preparedness, response and recovery out of their budgets.

The **Ministry of Social Development** oversees the National Aid Fund, as well as the annual program for winterization of homes of vulnerable households.

- The **National Aid Fund** provides assistance to about 90,000 families (100 M JOD per year distributed) – average 50 JOD per person (max. 4 per family) per month. Assistance is provided in coordination by the Governor. However, the social welfare system cannot be accessed by the majority of those informally employed, thus making a part of the Jordanian working poor ineligible for NAF Assistance
- The **annual winterization program for vulnerable households**. The overall budget is JOD 100,000, including cash transfer for vulnerable groups.

In the event of disasters, the Prime Minister’s Office allocates additional resources as needed.

The Ministry of Planning has responsibility for coordinating international support including managing the necessary funding for development projects and developing aid coordination mechanisms

The Ministry of Transport does not have a budget allocated for preparedness, response and recovery activities. In the event of an emergency, the Prime Minister decides on cost coverage.

The Ministry of Agriculture has established a risk transfer mechanism to compensate farmers affected by frost [Refer to Priority III section on Agriculture].

Challenges

Absence of predictable budget for response and recovery at national and sub-national level.

The Government has not allocated funds to support emergency preparedness activities of local Governmental and Non-Governmental Organizations (such as the Jordan Red Crescent).

The by-law established Fund in the Ministry of Finance had not been activated.

Recommendations

Recommendation 8 –Establish a flexible funding mechanism to facilitate a more rapid and appropriate preparedness and response to disasters and recovery [Refer to Priority II recommendation 5 & 6 on financing]

8.1. Establish a predictable funding mechanism for response and recovery for people affected by disasters with **fast track procedure** for disbursement

8.2 Develop a new financial regulation for preparedness activities of local Government and NGOs (under MOPIC)

8.3 Establish a coordination mechanism for preparedness, response and recovery activity funding under the existing national system
Recommendation 9 –Establish Establish a Social Protection Cash Provision for the most vulnerables in high risk areas
9.1. Utilise cash transfer modalities to promote and protect livelihoods of most vulnerable and affected populations in high risk areas
9.2 Cash transfers criteria to be adjusted in risk context, to ensure the inclusion of the most vulnerable and affected population

3.4.5 Institutional and coordination arrangements for Emergency Preparedness and Response

Existing capacities

At **National** level:

The General Directorate of Civil Defence (GDCCD) was established in 1959, under the umbrella of the Ministry of the Interior, in order to protect human lives and properties by providing ambulance services, firefighting and rescue operations during emergencies and disasters. In total, it has 186 centres across the Governorates, with approximately 26,000 uniformed personnel. Operationally, the GDCCD dealt with 149,610 accidents between 2014 and the beginning of 2015, responding to an incident every 2.5 minutes on average.

The Jordan Civil Defense (JCD) is responsible for providing ambulance services to administer first aid to casualties arising from fire and other incidents. Since 2005, JCD is also responsible for providing paramedic and pre-hospital services. Operational capacity of the Jordan Civil Defense includes:

- Preparedness and response linkages within the JCD;
- Individual international agreements to coordinate in the event of emergencies (with France and Switzerland);
- Projects at national and regional level;
- Training and exercises with other Agencies – scenario for large scale disasters;
- Emergency warehouses in South, Central and North Governorates.
- Training of civil defence volunteers started in 2017 (in support of THW Germany);
- Volunteers scheme exist in the High Supreme Council.

The National Center for Security and Crisis Management (NCSCM) was established following a terrorist attack in Amman (2005), and it has taken ten years to set it up and to make it operational. NCSCM serves as a disaster recovery site / alternative location for civilian information, Central data bank. The bi-law of 2015 establishes NCSCM with the responsibility to *coordinate the national crisis response* with 4 Directorates, 2 Units, 135 Staff (23 Liaison officers from Ministries).

The Jordan Civil Defence are well equipped to perform solid field coordination. Furthermore, the Jordanian Armed Forces provide support to the Civilian Authorities when requested.

Through the Ministry of Social Development, the Government can rely on a network of, and coordination with, over 6,000 Non-Governmental Organizations.

There is an ongoing process to modernize Emergency Operation Centres (EOCs) at Governorate level.

As provided by the Civil Defence Law (1999), the Higher Council of Civil Defence (HCCD) is authorized to undertake the appropriate procedures to deal with disasters. The Minister of the Interior is its President, and the Director General of Civil Defence serves as Vice President, with membership drawn from deputies of all State-authorized ministries and institutions.

There is a newly established National Centre for Security and Crisis Management (accredited in 2015) to take overall coordination of DRM with:

- Modern and well equipped National Command and Control Centre and HQ building (2013);
- 4 Directorates, 2 Units, 135 Staff (23 Liaison officers from ministries);
- Led by a Board of Directors and chaired by the Prime Minister.

There is a coordination network of NCSCM, NCCC, and EOC's of responsible Ministries under development. Emergency Operation Centers/Rooms have been established in all Ministries (office space), but are not systematically equipped with proper IT and communication.

The National Disaster Risk Reduction Platform is currently under development [Refer to Priority II on Risk Governance for more analysis on the Platform]

Under the Armed Forces Law 2007, the Jordanian Armed Forces have to provide support to the Civilian Authorities when requested. They have an unclassified Crisis Management Coordination Centre with work stations for up to 30 representatives from Government, International Organizations and Non-Governmental Organizations. They also have three fully equipped mobile command centers.

Through the Ministry of Social Development, the Government can rely on a strong network of, and coordination with, non-governmental organizations:

- 3,600 smaller charities are registered with the Ministry and are spread across the country – they work with the Ministry to support affected populations.
- An additional 3,000 volunteer-based Organizations involved in politics, culture, tribal linkages, agriculture, etc., have diverse levels of engagement with 13 Ministries.

At Governorate level:

During the winter season there is a division into three EOC (North, Center, and South), each EOC is staffed, receives financial support through the municipality, and roles and responsibilities are defined by the municipality. There is one central EOC at governorate level, which is staffed permanently (24/7).

Communication between municipality and council: decisions are taken independently, endorsement by the mayor for quality control and a unified approach. Each local council meets four times a month; meetings between the local council and municipalities are taking place on a weekly basis.

There are six Regional Commands and these all have an Emergency Operations Centre for Inter-Agency coordination. The experience of communities/Governor Committee is self-organized, crisis management is a strong asset on which to build - this is a key opportunity.

Assessing disaster preparedness in Aqaba

In case of emergency, the Governorate Security Council coordinates ASEZA commissions, JCD, Army and Police response efforts under the Governor authority. The Governorate Operations Room covers all districts, while ASEZA operations room only covers ASEZA. NCSCM operations room is yet to be established. Flood and earthquake vulnerability hazard maps are outdated (2009) and not widely available.

In the absence of a functioning EWS for floods, the Governorate Emergency room cannot monitor flood risk. Instead a rudimentary flood EWS relies on an agreement with Saudi Arabia to share 7 days forecast (given that often flash floods come from Saudi Arabia) as well as on pre-positioning people to monitor the wadi levels during the raining season. Warning signals are centralized and not communicated to the general population. In 2018, ASEZA will establish a proper EWS for floods.

Pre-agreements exist with private sector to mobilize private sector assets in support of response and early recovery efforts.

The southern industrial area should be classified as high-risk area. It should have a common multi threat assessment, a common comprehensive multi hazard contingency plan, a common evacuation plan and regular drills involving NCSCM and JCD. The oil spill emergency center equipment and facility are outdated and should be upgraded.

BEST PRACTICE- Getting Airport Ready for Disasters in partnership with DHL

On 13-15 December 2016, the preparedness and response capacity of King Hussein International Airport (AQJ), Aqaba was assessed against the risk of earthquake and floods. A disaster simulation exercise was conducted with the participation of the Air Forces, the National Aviation Services, the Airport Civil Defense, the Customs, the Border Police, Aqaba and Amman airports, the Civil Aviation Regulatory Commission and the Ministry of Transport with the support of Deutsche Post DHL Group, OCHA and UNDP. The overall assessment of airport resources and processes was positive and little optimization potential was determined.

A number of recommendations included the increase of Cargo warehouse operations by acquiring manpower at Sea Port/ Industrial Area; Adequate pre-identified parking space for additional aircrafts bringing emergency supplies; Increase in Fuel storage capacity; Procedures for emergency protocols covering immigration and visas requirements for surge and rescue teams and humanitarian workers at time of disasters; and finally actions to avoid congestion of telecommunications.



Challenges

At National level:

There is no coordination mechanism to plan and implement preparedness interventions across sectors and levels, only during the response. The bi-law of 2015 establishes NCSCM with the responsibility to *coordinate the national crisis response*.

In the absence of an umbrella law for DRM, roles and responsibilities must be clarified in particular with respect to:

- Unclear division of responsibilities and functions between NCSCM and HCCD (strategic level);
- It is unclear who will be providing strategic guidance for NCSCM in DRM, if members of NCSCM Board of Directors - led by the Prime Minister - are focused on security-related matters;
- Unclear division of responsibilities and functions between the Emergency Operation Center of NCSCM and the Emergency Operation Center of JCD (operational) at Governorate level;

National procedures to receive foreign assistance are not established clearly

- There is a need to develop cooperation with WHO National procedures for receiving emergency medical teams (EMT) in case of need
- There is no plan for the reception of foreign military assistance in the event of a major disaster.
- According to the system presented, the Operations Centre of the Ministry of Foreign Affairs is responsible for the coordination of international assistance. It is unclear which entity will fulfill the role of National Disaster Management Agency/Local Emergency Management Agency.

At Governorate level:

Capacity varies a lot from one sector ministry department to the other. In newer or smaller ministries (such as the Environment department in Irbid), it is not uncommon for a Department to not have contingency plans, or that their Committee for emergencies be without Terms of Reference.

The role of CSOs and CBOs in response is not taken into account. The centralized institutional framework for response is not connected to community disaster management efforts.

Recommendations

Recommendation 10 – Develop a disaster response coordination structure that is vertically and horizontally integrated with clear roles, responsibilities and procedures at all levels (national, governorate, local linking with the community level) (Refer to Priority II on Risk Governance)

10.1. A functioning disaster management system must be understood as both a top-down and a bottom-up approach, where national institutions provide a support framework to strengthen resilience/preparedness and response efforts at the community level (both levels).
10.2 Clarify the coordination and leadership structure under the DRM law and national DRM strategy to clarify the chain of command in emergency situations
10.3 Review functioning of JCD and NCSCM Disaster Coordination platforms during Disaster Response scenarios in order to clarify coordination responsibilities (including through capitalizing on the expertise, resources, and knowledge of local communities, private sector and civil society organizations)
10.4 Establish a plan for the coordination of Foreign Military Assets (FMA)
10.5 Clarify how the field component of international disaster coordination mechanisms (such as the United Nations Disaster Assessment and Coordination (UNDAC), the International Search and Rescue Advisory Group (INSARAG) and the On-Site Operations Coordination Centre (OSOCC) fit into the preparedness and Crisis/Disaster Management system
10.6 At Governorate level Clarify relationship and mandates of NCSCM Emergency Operation Center and the Emergency Operation Center of JCD (operational) at Governorate level
Recommendation 11 – Recognize and include the role of national CBOs and CSOs in disaster response in NCSCM and JCD plans and coordination mechanisms
11.1. UN/NGO and governmental CBOs to be trained on basic risk management and disaster response skills
11.2 CSOs to be used as distribution points of Non Food Items (NFI)
11.3 CSOs to be used as alternative educational institutions and/or as shelters
11.4 CSOs to operate as operation rooms to reach out to and/or to collect data on the most affected populations

3.4.6 Preparedness and contingency/ response planning

Existing capacities

A National Comprehensive Plan for encountering Emergencies and Disasters has been developed but needs to be updated also taking into account NCSCM role.

Sector ministries and national agencies are expected to design their operational approach around **eight Contingency Plan scenarios** as per NCSCM guidance, primarily focused on security issues:

1. Mass refugee influx;
2. Counter terrorism;
3. Environmental pollution;
4. Large scale fires;
5. Energy crisis and implications;
6. Earthquake response;
7. Response to social disturbance;

8. Epidemics response.

The **Transportation Ministry** has a database on existing transportation resources, and ensures cooperation with the private sector for the mobilization of resources:

- The National Center contacts transport providers;
- The Civil Aviation Regulatory Commission forms part of the Ministry;
- Agreement for use: costs to be covered if required;
- Emergency funds are centralized (Prime Minister's budget);
- Land Transport Regulatory Commission require that 15% of the fleet be available in case of emergencies (but most operators have only 1 vehicle on standby).

For **telecommunications**, emergencies are under the authority of the Telecommunications Regulatory Commission. Each (of the three) telecoms operator (+ one landline) is expected to have its own contingency planning. Operators ensure connection free of charge to 911 (Public Security Directorate – Police).

The Jordanian Red Crescent Society (JRCS) relies on a base of 260 volunteers around the country, helping to deliver services in vocational training, community-based health, medical services, cash transfer programming and restoring family links, primarily for Syrian refugees and host communities. In relation to Disaster Risk Reduction and Response Preparedness, the JRCS trained 113 emergency responders in the first semester of 2017, in addition to its training courses on first aid. It plans to conduct 30 community-based risk assessments in 2018.

The **911 - Joint Command and Control Center (JC3)**, established in 2009 under the Public Security Directorate (Police), is the central body with 500 uniformed and civilian personnel for receiving, processing and allocating all incoming (security and civil defence) emergency calls from all over Jordan to the responding Agencies. The average number of calls per day (24 hours) is 24,000. Approximately 20% of the emergency calls is directed to Civil Defence (including ambulances) and approximately 20% is destined for the Traffic Police. JC3 has a capacity to receive 36 emergency calls simultaneously, with additional capacity to increase this to 100 calls.

At local level; every year, the **Governorates develop preparedness plans** in coordination with the Military to deal with different scenarios: Flooding, Earthquake, etc. JCD at Governorate level has a plan to conduct simulations.

- In the JCD Mafraq Directorate, there is no contingency plan for a relatively high risk scenario like drought;
- There is a need to update plans (only the Forest Fires Plan has a calculation/estimation of potentially affected people - MoSD);
- There is a need to have Comprehensive Risk Mapping and Analysis to review the list (additional needs) of existing Contingency Plans.

The National Emergency Health Plan is also customized to each Governorate.

Challenges

At **National** level:

- Knowledge of the actual risk is low, thus preventing targeted preparedness efforts.

- Needs, demands and capacities of groups with vulnerabilities are not taken into account in contingency plans. Contingency plans are not informed with gender disaggregated data.
- Preparedness efforts for responding to and recovering from disasters are ad hoc and uncoordinated resulting in weak disaster response capacities.
- The consolidation of the eight-threat Contingency Plan scenarios, under NCSCM leadership, is a good step. There is no consolidated preparedness plan and it is not disseminated to all actors down to the municipal level.
- Flood risk is not part of the eight-threat scenarios.
- There is no legal framework to impose disaster preparedness on the operators of critical infrastructure.
- There is no training capacity to support Operators in the contingency planning or simulation;
- The Cyber security policy expired in 2016 (currently under review).
- JC3 (Joint Command and Control Center - 911): In any large-scale emergency or disaster scenario there is a dramatic increase of incoming calls to JC3 and high risk for blocking vital emergency call service in all Jordan. Limited redundancy built into the system: all calls are centralized to the 911 unit, then dispatched to the corresponding Directorate, and from there to corresponding center.



Photo: The 911 Center in Amman / CADRI Partnership

At **Governorate** level:

- Access to data and information management is limited:
 - Each Ministry uses data within their own areas of responsibility;
 - No information is available locally on earthquakes / floods / landslides;
 - Risk mapping falls under the Military, there is no clear understanding as to what would be the most appropriate entity (with corresponding IT and GIS capacity) to host and disseminate risk data from the national level.

- There are no formal disaster risk national planning procedures in place. Different scenarios exist to clarify roles and responsibilities, but:
 - Emergency plans are reactive – plans are prepared according to the event - and they need to be updated regularly, which is not always possible. The focus is placed more on man-made crises – more external challenges related to neighboring States (Syria, Iraq, Gulf);
 - No clear flow to Governorate level of the eight National emergency scenarios – these will be disseminated later;
 - The plans are not tested (there have been proposed simulation exercises on weapons of mass destruction, but no buy-in yet);
 - The plans require coordination with the security apparatus;
 - Early prediction planning is based on assumptions within the information available in the Governorate;

The **Executive council of the Governorate** takes over for the management of natural disasters, but it is not a disaster entity, there is no link to HCCD. Participants met in Mafraq Governorate were not aware if there are Terms of Reference to clarify roles of the Executive Council.

Recommendations

Recommendation 12 – Develop Develop contingency planning arrangements at national and local level including for critical infrastructure
12.1. Disseminate the national preparedness plan (consolidating the contingency plan of various operators) to all actors down to the municipal level
12.2 Conduct a comprehensive stakeholder mapping (3Ws), with stakeholder profiles for governmental / non governmental organization engaged in disaster response (Name, date of establishment, membership, DRM roles and responsibilities, coverage area, assets, tools and systems, structure and coordination mechanisms, and when relevant coordination at regional or cross-border collaboration)
12.3 Exercise After-Action Reviews should be used to inform contingency planning at national and local level
12.4 Review contingency plans of critical infrastructure and service suppliers - Telecommunications Regulatory Commission; Aviation Authority etc. and include business continuity perspective in contingency planning
12.5 Conduct and systematize the classification of critical infrastructure and services that should be protected
12.6 Conduct a vulnerability assessment of the JC3 as single Emergency Call Centre concept to assess and analyze

the need of back-up capacity for this vital service and to draw up a Preparedness plan for Disaster scale emergencies
Recommendation 13 – Systematically ensure the integration of needs, demands and capacities of groups with vulnerabilities in the design and implementation of contingency / response plans
13.1. National and local preparedness/contingency/response plans must include refugee populations special needs (and when relevant refugee camps)
13.2 Representatives of groups with vulnerabilities, including vulnerable women, must be consulted on the design of contingency/response plans [Refer to Priority II recommendation on the need to change the composition of the national DRR platform to become more representative]
13.3 Ensure disaggregation of data by age groups and gender to address special needs of different groups
13.4 Provide a harmonized template for response plan to all Governorates to ensure that they cover all key elements
13.5 Reinforce Aqaba Port Authorities oil spill combat readiness and response capacity
13.6 Establish proper flood EWS in Aqaba

3.4.7 Training and exercises

Existing capacities

JCD Training Centre implements an annual plan on raising public awareness and promoting behavior change in cases of emergency targeting Schools, Hospitals, etc.; Such training is conducted at central and governorate level.

In the past two years, three major training exercises took place:

- A “Dirty Bomb” exercise conducted by NCSCM (2017);
- A Polio exercise conducted by CDC/WHO/Ministry Health (2016);
- Annual Civil-Military exercises such as Exercise “Eagle Lion” (2017);

Under the EU “Twinning project” between the Administration of the General Directorate of Civil Defence and the Ministry of Interior of France, there is a plan for a national exercise and training and testing exercises on the ground in partnership GCCD and JCD, so as to assess the strengths and the weaknesses of the emergency response system.

Likewise, the Trans-boundary Middle East Forest Fire simulation exercise (Jordan, Palestinian Authority and Israel, in collaboration with EU partners). The overall objective of this exercise will be to:

- To test the available capacities to simultaneously combat three major forest fires;
- To test the coordination and communication of the available terrestrial and aerial means as well as of all other Organizations involved;

- To test the capacity of the European Union Civil Protection Mechanism to cope with multiple big forest fires in a situation of significant political complexity.

BEST PRACTICE - Regional cooperation in Disaster Response Preparedness – Professional Dialogue

Israel, Jordan and the Palestinian Authority face common threats of earthquake, floods and forest fire. A Professional Dialogue involving emergency managers contribute to enhance regional emergency response preparedness levels. To date the Professional Dialogue has succeeded in building cooperative and collaborative working relationships between emergency response entities of Israel, Jordan and the Palestinian Authority. This has culminated in six professional dialogue meetings, during which delegations discussed gaps in the regional response framework, guidelines for information exchange, challenges bringing humanitarian assistance into the region – preparedness, coordination and access – as well as common events/training courses.

The Professional Dialogue is supported by the United Nations Office for the Coordination of Humanitarian Affairs and aims to further develop and strengthen the interoperability and cooperation between the respective disaster response systems, to reduce disaster impact on losses of lives and livelihoods. Proposals for a regional earthquake early warning system and an operational regional flood alert system have been developed.

Challenges

- Absence of disaster management training offer targeted at senior managers responsible for ensuring coordination of response and preparedness.
- Finding appropriate scenarios and getting appropriate participation from all key partners.
- Absence of specialized training for cleaning of ambulances - infection control.

Recommendations

Recommendation 14 – Standardize training at national and governorate level with monitoring system in place

14.1. Design and roll-out a single training methodology including on aspects of EWS, preparedness and crisis coordination

14.2 Expand and standardize the training of voluntary formations at community level for first response including through JRC

14.3 Open training courses for firefighters to both genders

14.4 Conduct annual Disaster Response team training in all Governorates:

- Earthquake response in Irbid: One exercise 12 years ago. Coordinated by the Jordan Valley Authority. Planning falls under the HCCD;

Evacuation simulation exercise organized every year, safe places for evacuation – hospitals included last couple months

14.5 Review the current DM training curriculum provided by Directorates to ensure consistency

14.6 NCSCM extension in Mafrq (link to Governorate EOC) should include training of field teams on preparedness

Recommendation 15 – Response Exercise with involvement of National Disaster and Crisis Management Coordination platforms and International components
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15.1. Conduct joint modeling exercises on different disaster risk scenarios
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15.2 Conduct mass casualty exercises that overwhelm the capacity of a single Directorate

3.4.8 Emergency services and prepositioning

Existing capacities

Contingency Plans based on eight scenarios have been developed.

Regional warehouses (the assessment could not access information on national / local warehouse capacities).

IFRC has a warehouse outside Amman.

Challenges

At **National** level:

- There is limited knowledge of the prepositioned resources available across the different entities / Ministries. Clarification of common of terms among all stakeholders is needed.

Recommendations

Recommendation 16 – Integrate the system of prepositioning of assets and resources

16.1. Conduct a mapping of existing prepositioned disaster response resources across the different entities (government, NGOs, Charitie, UN, JRC, Private sector) at national and local level
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16.2 Determine responsibility to update, maintain and disseminate widely the mapping to national and local stakeholders
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.....End of the Report.....

List of National Institutions met

Institution	Main Focal point*	Title
National Center for Security and Crisis Management	Mr. Ali Bani Yaseen	Director
Jordan Civil Defence HQ	Brigadier Marwan Bader	General Director Assistant
	Brigadier Khaled Shbailat	General Director Assistant
	Lieutenant Colonel Ghassan Al Zoubi	Director of Disaster Management Directorate
	Colonel Abdel Ayman Al Ma'ani	Director of Planning
Jordan Armed Forces	Col. Abusini	
Ministry of Planning and International Cooperation	Mr. Ziad Obaidat	Acting Secretary General
	Mr. Mutasin Al-Kilani	Head of Sustainable Development Division
Ministry of Public Works and Housing	Dr. Jamal Qtaishat	Secretary of Jordan Building Council
	Eng. Mahmoud H. Khliet	Director of Public Works Directorate
Ministry of Municipal Affairs	Eng. Bilal Al Momani	Secretary General Assistant
Ministry of Water and Irrigation	Eng. Awni Kloub	Director of Water Management Directorate
	Eng. Saleh Al Ouran	Director of Environment & Climate Change Directorate
Ministry of Energy and Natural Resource	Eng. Amani Al Azzam	Secretary General
	Dr. Ali Sawriah	Director of Geology Department
Jordan Seismological Observatory	Dr. Mahmoud Al Qarouti	Head
Ministry of Environment	Belal Qtishat	Head of Biodiversity Section
	Khaled Abukabar	Head of Emergency
	Belal Shqarin	Deputy Director of Climate Change Directorate
Ministry of Agriculture	Mahmoud Abujamous	Head of Policy

	Nayef Rawashdeh	Head of Crisis Management Department
	Basmaa Manaseer	Manager of Agriculture Information System Unit
	Eng. Rada	Department of Rangeland and Badia Development
National Centre for Agriculture Research and Extension	Dr Nizar Haddad	
Ministry of Tourism and Antiquities	Issa Gammoh	Secretary General
	Ansam Ousama Malkawi	Minister's Adviser
Royal Jordanian Geographic Center	Brigadier Awni Kkasawneh	General Director
	Lieutenant Colonel Ibrahim Badawi	General Director Assistant
Industry Chamber of Jordan	Eng. Maher AL Mahrooq	General Director
Command and Control Center	Lieutenant Colonel Nour Bani Yousef	Director Assistant
Ministry of Planning	Eng. Emad Al Hiari	Director of Transportation Safety and Environment
Ministry of Health	Dr. Mahmood Al Kayed	Director of Crises Management
Ministry of Information Technology and Communication	Mr. Ahmad Jaber	Nayef Khouri
Ministry of Social Development	Mr. Esam Al Shraideh	Head of Emergency Unit
Jordan Meteorological Department	Eng. Read Khattab	Director of weather Forecasting
Jordan Engineer Association	Eng. Nayef Khouri	
Department of Statistics	Dr. Qassim Saeed Al Zu'bi,	Director <i>General</i>
	Mr. Sudki Hamdan	Head of the Environment Statistics
Ministry of Higher Education and Scientific Research		
Aqaba Governorate	Dr. Saleh Al Mahameed	Governor of Aqaba City
Aqaba Special Economic Zone Authority	Eng. Mahmood Khlaifat	Director of Public Works
	Eng. Khaled Abu Aisheh	Director of Planning

	Dr. Ayman Al Uglat	Director of Environment
Aqaba Development Company	Eng. Mazen Rayyan	Technical Engineer
Aqaba Oil Spill Center		
Aqaba Civil Defence	Lieutenant Colonel Mohammad Al Habahbeh	Director of Aqaba Civil Defence Directorate
Petra Development and Tourism Region Authority	Dr. Mohammad Masalha	Deputy of Chief Commissioner
	Eng. Hussein Al Hasanat	Director of Local Development Directorate
Irbid Governorate	Radhwan Al Outoom	Governor of Irbid City
	Dr. Munther Al Okoor	Governor Assistant of Irbid City
	Faisal Al Smearan	Governor Assistant of Irbid City
Irbid Health Directorate	Dr. Gasem Mayyas	Director of Irbid Health Directorate
Irbid-Yarmouk Water Company	Eng. Salem Shlool	Director of Irbid-Yarmouk Water Company
Irbid Agriculture Directorate	Eng. Ali Abu Nogta	Director of Irbid Agriculture Directorate
Irbid Municipality	Eng. Hussein Bani Hani	Mayor of Irbid City
	Eng. Mohammad Ababneh	Director of Public Works
	Eng. Nafez Shatat	Director of Planning
Mafraq Governorate	Mr. Saleh Al Zoubi	Governor of Mafraq
Mafraq Municipality	Mr. Amer Al Doghmi	Mayor of Mafraq City
Amman Governorate	Mr. Sa'ad Shehab	Governor of Amman City
Greater Amman Municipality	Eng. Ahmad Malkawi	City Director Assistant
Zarqa Governorate	Mr. Mohammad Smairan	Governor of Zarqa City
Zarqa Municipality	Eng. Ali Abu Al Sokar	Mayor of Zarqa City
Zarqa Civil Defence Directorate	Lieutenant Colonel Abdel Hadi Saraiareh	Director of Zarqa Civil Defence Directorate
Middle Region Rescue and Support Directorate	Col. Firas Abu Al Sundos	Director of Middle Region Rescue and Support Directorate
Jordan Red Crescent	Eng. Raad Al Hadeed	Director of Training

International Union for the Conservation of Nature	Ali Hayaneh	Project Coordinator, Water and Climate Change Programme
International Union for the Conservation of Nature	Ali Hayaneh	Project Coordinator, Water and Climate Change Programme
911 Center	Lt. Col. Rami Al Dabbas	
Royal Society for the Conservation of Nature	Mr. Yehya Khaled,	Director General
Regional Food Security Analysis Network	Craig von Hagen	Adviser
GIZ	Batir Wardam	Senior expert Environment and Climate Programme
European Civil Protection and Humanitarian Operations	Yassine Gaba	Emergency preparedness
European Civil Protection and Humanitarian Operations	Yassine Gaba	Emergency preparedness
European Commission	Mauro Gioé	Water Transport Energy
	Omar Abu-Eid	Energy Environment Climate Change
International Federation of the Red Cross	Christopher George	Programme Coordinator
Japan International Cooperation Agency	Yassine Gaba	Emergency preparedness
Swiss Development Cooperation	Nayef Khouri	Programme Officer

* This list is not meant to be inclusive of all individuals met during the two-week capacity assessment.

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