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OF THE HYOGO FRAMEWORK  
FOR ACTION:**

**MIDDLE EAST & NORTH AFRICA**

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United Nations  
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## **Preliminary Regional Stocktaking of Natural Hazard Risk and Disaster Management Capacity: Middle East and North Africa**

World Bank and the  
United Nations International Strategy for Disaster Reduction

### **“Building Partnerships for Disaster Risk Reduction and Natural Hazard Risk Management”**

#### **The Middle East and North Africa Region: Hazard and Risk Profile**

### **PURPOSE OF THE REPORT**

This report presents interim conclusions regarding:

- the exposure to natural hazards in the Middle East and North Africa region (MENA), and
- existing hazard risk management arrangements in MENA (which includes: Algeria, Bahrain, Djibouti, Egypt, Iran, Islamic Republic, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, Tunisia, United Arab Emirates, Yemen, West Bank and Gaza)

This report is a preliminary document in support of the Cairo Regional Workshop, jointly organized by the UN/ISDR and the World Bank, and with the support of the Government of Arab Republic of Egypt. This activity will be the first in a series financed by the Global Facility for Disaster Reduction and Recovery, aimed at building awareness and partnerships around disaster risk reduction as a critical and increasing development challenge for many countries in the region.

Such objectives may be achieved in various ways including:

- Developing strategies to integrate disaster risk reduction, national development and economic growth;
- Strengthening national, regional and local capacity for disaster risk reduction;
- Strengthening cross-country partnerships between governments and relevant organizations engaged in activities (directly and indirectly) related to disaster risk reduction;
- Fostering regional collaborations; and
- Developing a shared regional body of sector knowledge on hazard risk management (HRM) approaches.

This report describes the hazard profile of the Middle East and North Africa in relation to rapid onset natural hazards.

As discussed below the findings and conclusions in this report are tentative given the relative lack of rigorous data for the MENA region.

### **BACKGROUND**

#### **Global overview: a changing risk landscape**

Reported hazards and disaster impacts are increasing across the world. This applies to the number of events annually, to losses (including deaths, injuries and damage) and to the number of people exposed to natural hazard events. Natural hazards become a development concern when they threaten people, communities, business and the environment. A disaster occurs only where a natural hazard event affects a vulnerable community.

Much of this growth in disasters due to natural hazards is attributable to an increase in vulnerability. The reasons behind these changes are complex, but they include:

- The growth in population numbers, resulting in more people being exposed to hazards
- The movement of large numbers of people to urban areas and to coastal areas, in particular to mega-cities
- Poor land use and inadequate enforcement of planning, design and building standards
- The growth in the amount and value of assets and infrastructure exposed to hazards, including private properties (including dwellings), economic assets and public infrastructure.

Available figures clearly show the following global trends:

- The number of people killed annually by natural disasters appears to be decreasing
- The number of reported natural disasters is rising sharply
- The number of people affected annually by natural disasters is increasing
- The amount of estimated damage is increasing sharply

As the following charts show, this appreciation of growing global risk is also documented by the insurance industry.

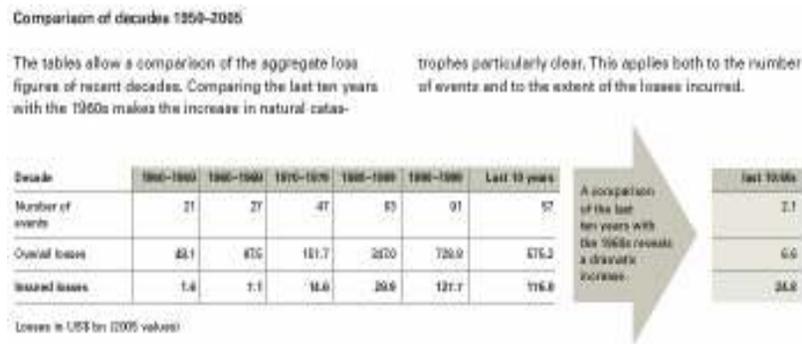


Figure 1: Aggregate losses by decade: source Munich Re

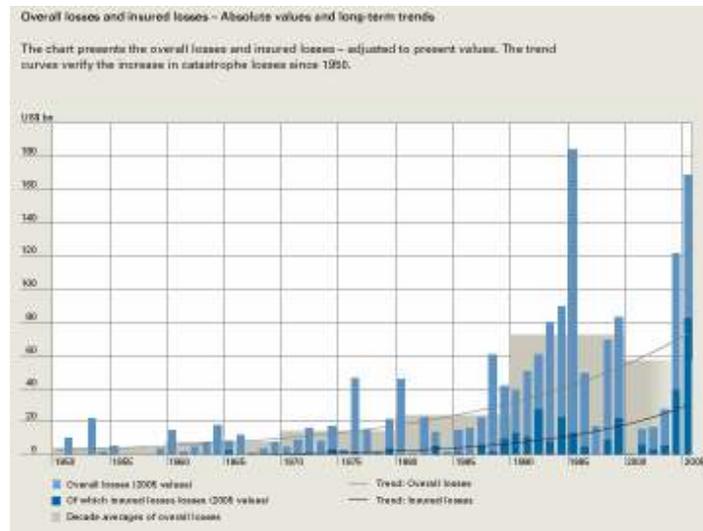


Figure 2 Losses and long term trends: source: Munich Re

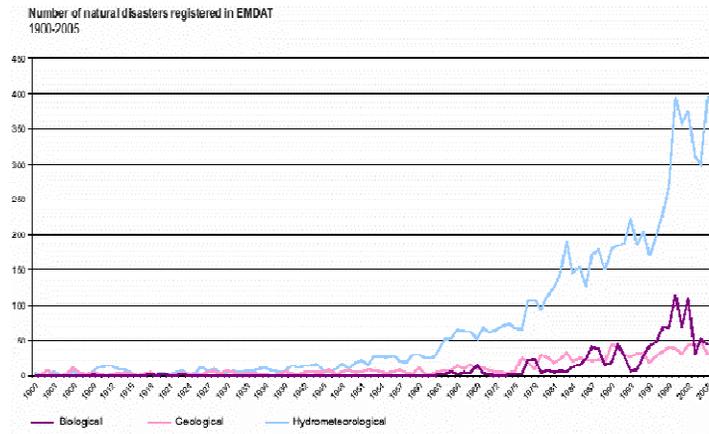


Figure 3 Long term trends source: EM-DAT

### Meanings of Risk

There are numerous different definitions of the central concepts of Disaster Risk Reduction risk, hazard, vulnerability and resilience (sometimes known as capacity or capability). The differences between the various definitions little relevance to policy development and management programmes. The following definition of risk is taken from the United Nations International Strategy for Disaster Reduction [www.unisdr.org](http://www.unisdr.org):

The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.

*Conventionally risk is expressed by the notation  $Risk = Hazards \times Vulnerability$ . Some disciplines also include the concept of exposure to refer particularly to the physical aspects of vulnerability.*

*Beyond expressing a possibility of physical harm, it is crucial to recognize that risks are inherent or can be created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share the same perceptions of risk and their underlying causes*

#### **Hurricane Katrina: Inappropriate Development, Inadequate Planning**

In August 2005 Hurricane Katrina struck the City of New Orleans in Louisiana, United States. Although the city and State had emergency plans in place and had erected structural protective measures, levees, these were inadequate to prevent 80% of the city being flooded and 80% of the citizens being evacuated. The number of people killed directly is estimated at about 1500.

In the richest country in the world the impact of Hurricane Katrina demonstrated a number of key points for hazard risk management:

Structural works to prevent disasters work to a certain level of hazard magnitude. If this design level is exceeded then catastrophe can follow as the protective works fail. In fact, structural works can encourage inappropriate siting and development in their 'shadow'.

Planning for response and recovery requires a proper risk assessment of hazards and elements exposed at risk. Increasing the capacity of the levees would have been a cheap option in light of the deaths, injuries, losses, opportunity costs and costs of reconstruction.

The greatest impacts fell on the most vulnerable groups in the New Orleans population, namely those people lacking the resources or capacity to insure their property adequately, those people such as the ill, disabled and poor lacking the capability or resources to evacuate and to then return and restore their losses.

There were numerous reports of confusion and delay in response and this may be attributed, in part, to inadequate planning and a poor understanding of the risks to which the city was exposed.

## METHODOLOGY

This report has drawn upon an extensive search of the available literature through relevant journals, through available hazard and disaster databases and other sources publicly available and accessible via the internet.

Discussions with selected experts in the field of hazard and risk management and reduction have taken place.

Questionnaires have been distributed to the Governments of the MENA region, to selected individual experts and research institutions within MENA and also globally, and also to the International Federation of Red Cross and Red Crescent Societies, the United Nations Development Programme (with request to both of the former for distribution to their respective country offices) and to selected international Non-Government Organisations.

This report has also drawn on available reports on hazard and risk management including early warning and the country reports prepared for the World Conference on Disaster Reduction held in Kobe, Japan, in 2005

The research has specifically explored for relevant databases listing for the MENA region hazards, disasters and disaster related impacts.

Significant sites which have information on hazards and the MENA region include:

- EM-DAT (EM-DAT: the International Disaster Database, Center for Research on the Epidemiology of Disasters <http://www.em-dat.net/>)
- Munich Re (Munich Re Group [http://www.munichre.com/en/ts/geo\\_risks/default.aspx](http://www.munichre.com/en/ts/geo_risks/default.aspx))
- Swiss Re (Swiss Re <http://www.swissre.com/>)
- The Global Hotspots project (Center for Hazards and Risk Research at Columbia University <http://www.ldeo.columbia.edu/chrr/research/hotspots/>)
- The Disaster Risk Index (UNDP) (United Nations Development Programme, Bureau of Crisis Prevention and Recovery (Natural Disasters <http://www.undp.org/bcpr/>)
- The United Nations International Strategy for Disaster Reduction (Country Information <http://www.unisdr.org/eng/country-inform/introduction.htm>)

Data for losses and disaster events has been used for the period 1980 – 2006 (where this is available), as data prior to 1980 has a lower level of reliability.

The analysis in this report focuses on rapid onset natural hazards. These include earthquakes, tsunamis, cyclones, storm surges, floods, land and mudslides, and volcanic eruptions. Environment management, water management and desertification are important issues on their own merit but the discussion of those issues lie outside the scope of this report.

### **RAPID ONSET NATURAL HAZARDS, DISASTERS AND RISK IN THE MIDDLE EAST AND NORTH AFRICA (MENA) REGION**

MENA shares with the rest of the world a growing exposure to natural hazards and associated risks. But MENA region presents some particular characteristics that bear directly on hazard exposure, vulnerability and resilience. Some of these are

- The MENA region is geographically extensive and socially diverse (though sharing important commonalities in an Arab culture and a Muslim faith), extending from the Atlantic and the Western part of North Africa through the Middle East, north central East Africa and into the western part of Asia. The commonalities provide a basis for information sharing and exchange and for cooperative action, but the size of the region may make this a challenge to be overcome.
- MENA is characterized climatically by being generally hot in summer (though there are parts subject to very cold winters) and being for the most part dry, where water is often scarce and

that needs to be prudently managed. This region is characterised by a difficult and in many places harsh natural environment that provides little natural resilience to natural hazard events. Under these conditions the cumulative effect of a harsh natural environment and even relative small climatic variations can produce natural hazards that may result in disasters.

- The countries in North Africa in particular, and some also in the Gulf, have the bulk of their population, physical assets, seats of government and administrative centres close to the coast and on the edge of the national border. This exposes large proportions of the population, major resource centres, industrial and economic centres and management capability to a number of hydro-meteorological hazards; conversely the sparsely populated hinterland is characterized by low numbers of people at risk but who face disproportionate problems in accessing resources for mitigation, response, relief and development.
- The MENA region has two of the world's mega-cities, Tehran and Cairo, which have particular risks of their own. In addition, most countries are characterised by a high degree of dependence on the capital city.

The map below shows that the MENA region is subject to a range of natural hazards, but these natural hazards are not evenly distributed. In particular, in some cases major population centers along coasts, including Algiers, Alexandria, Beirut and Tunis, are at significant risk. In other countries such as Iran, Syria and Jordan their inland capital cities are also exposed to significant risk.

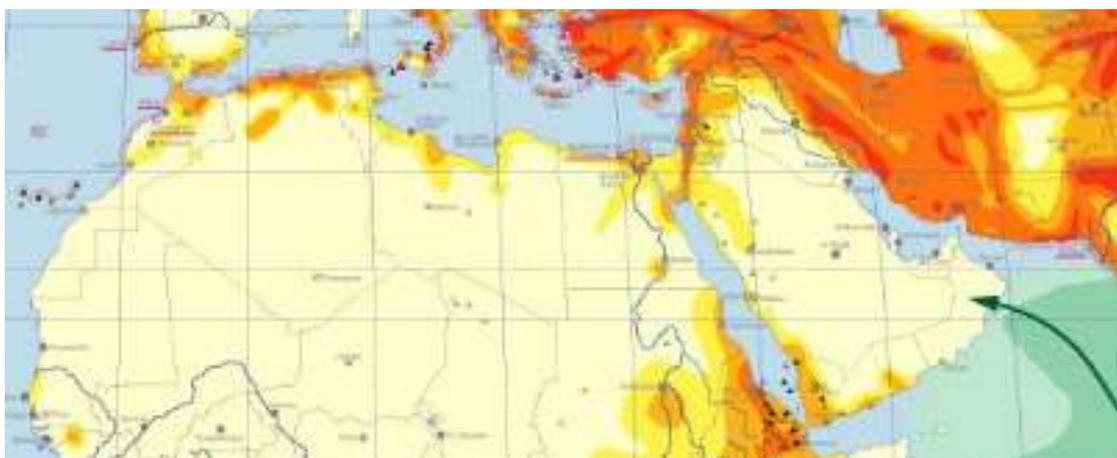


Figure 4 MENA major hazard areas (extract of world map of natural hazards) source Munich Re

As the following table and chart show for the period 1980–2006 the region as a whole has been subject to a range of different types of rapid onset disasters, and within that to numerous specific events.

<b>Disasters and their impacts MENA region 1980 - 2006</b>	
Total events	276
Total people killed	90,574
Total people injured	180,166
Total people homeless	1,791,895
Total people affected	9,728,074

Table 1: MENA Rapid Onset Natural Hazards 1980 – 2006

Source: EM-DAT

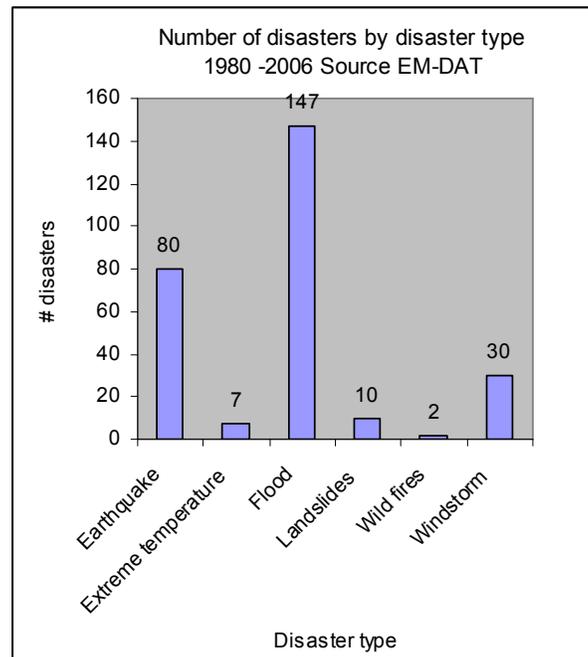


Figure 5: MENA region number of disasters by disaster type 1980 – 2006 source: EM-DAT

Floods may be the most frequent event across the region but the most damaging in human and economic terms are earthquakes. Tehran, Amman and Algiers are all exposed to significant earthquake hazard.

It is highly probable that the figures for deaths, injuries, homelessness and people affected are significantly underestimated. These figures do not include many small events that have not been recorded as major disaster events.

There is a significant lack of documentation and understanding of the economic cost of disasters in MENA. Figures available from different datasets vary considerably. EM-DAT, for instance, suggests that the total costs of disasters in the period from 1980 -2006 is equivalent to \$US 30,740,201. This figure is obviously erroneous. The World Bank has in this period provided close to \$US 1 billion for disaster reconstruction to Iran and Algeria alone (four events), and some of the estimates for the Algiers' earthquake of May 2003 report direct losses of US\$5 billion.

Data from Swiss Re, the reinsurance company, suggest losses in the order of \$US7, 6 billion and this is only for the period 1997 to 2006. Figures compiled from available Munich Re data suggests that economic losses from 1980 – 2006 exceeded \$US19 billion (data was not available for a number of countries including, Bahrain, Djibouti, Kuwait, Qatar, Syria and United Arab Emirates).

Although different databases provide differing figures what this data does show with confidence, despite these different estimates, is that human and economic losses associated with natural hazard events are very significant. The level of the losses also suggests that there must be a tangible, direct and immediate impact on development in the region as resources are diverted to managing response and recovery activities.

Further, the incidence of disasters is increasing as the data from EM-DAT below shows. Bearing in mind that technological disasters and slow-onset disasters are not included in this study, table 2 shows that a number of countries are subject to multiple natural hazard risks:

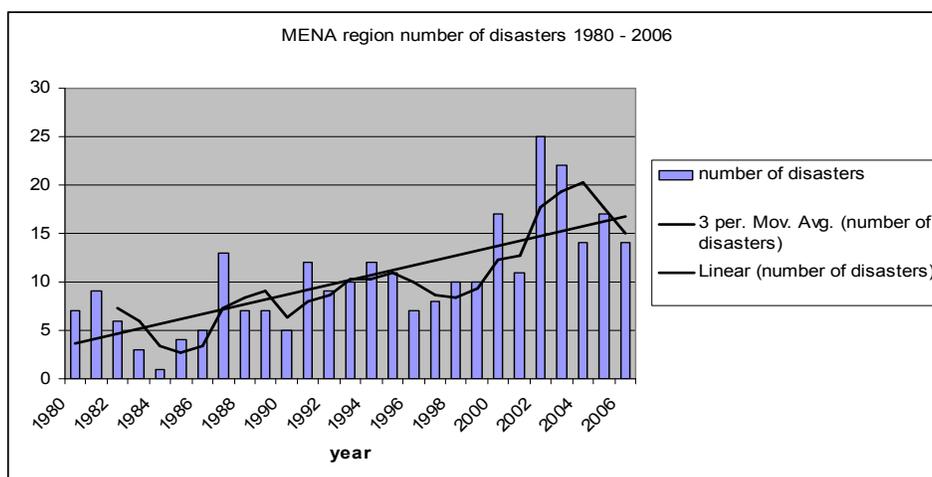


Figure 6: MENA region number of disasters by year 1980 – 2006 source: EM-DAT

Country	No. of disaster types by recorded event 1980-2006	Total no. of events 1980-2006
Algeria	5	48
Egypt	5	15
Iran	5	125
Morocco	5	19
Yemen	4	26
Jordan	3	7
Lebanon	3	5
Djibouti	2	6
Iraq	2	4
Saudi Arabia	2	8
Syria	2	4
Kuwait	1	1
Libya	1	1
Oman	1	3
Tunisia	1	5
Palestine	0	0
Qatar	no data	No data

Table 2 MENA region number of disasters by disaster type 1980 – 2006 (source: EM-DAT)

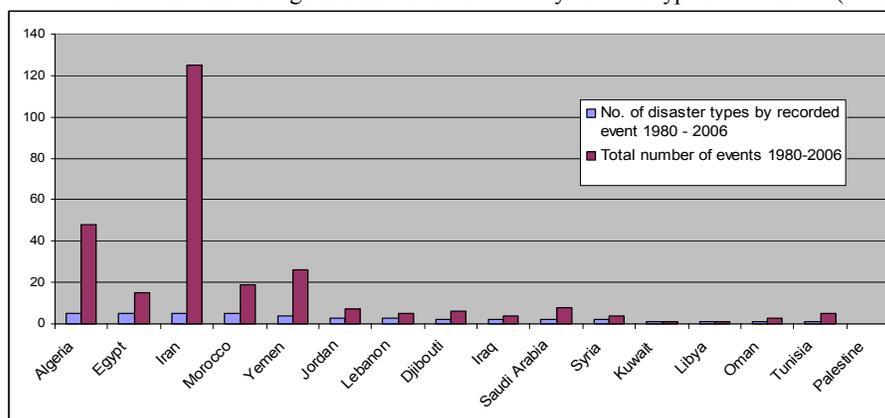


Figure 7: MENA number of disasters by event type and total number of events 1980–2006 source: EM-DAT

#### **Earthquake Bam, Iran 26 December 2006**

Tragedy hit Iran Bam on 26 December 2003 when a major earthquake registering 6.5 on the Richter scale hit its south-eastern province of Kerman at 05:28 (local time). The area most affected was the ancient city of Bam where more than 43,000 people were killed, an estimated 30,000 injured and up to 75,000 left homeless, according to official estimates. More than 80 per cent of all buildings were destroyed. The damage to heritage and culture was also enormous.

In stark contrast on December 22 the Californian city of San Simeon was also struck by hit by an earthquake of the same magnitude.

Both c were located on top of seismically active regions and occurred at a depth of eight kilometers below the earth's surface. Despite their similarities, their human consequences were vastly different. The California quake killed only 2 people and damaged only 40 houses.

This highlights the difference that appropriate building structure, codes and standards can make to people's exposure to risk

Apart from the deaths, injuries` and damage recovery and reconstruction processes themselves represents an ongoing human and financial cost for affected communities and governments. What is often overlooked is the additional burden placed on existing services and agencies and the opportunity cost to people who would otherwise use services on a day to day basis.

Locally there has been cooperative work between the Iranian Government, the IFRCRC and local communities to enhance local preparedness in non-structural ways by, for example, conducting disaster risk reduction training in:

- Disaster management – concept, terminologies and cycle,
- Disaster preparedness and response tools,
- Contingency planning – process, contents, format & structure (based on the Federation's new manual,
- "Disaster Response and Contingency y Planning Guidelines " drafted in June 2006),
- Standard operating procedures,
- Planning tools,
- Experiences in different operations and in the field.

Structural measures, laws and regulations properly enforced and non-structural mitigation measures need to used together to reduce risk.

<http://www.ifrc.org/what/disasters/response/iran.asp> and

[http://www.parstimes.com/news/archive/2004/washfile/quake\\_construction\\_codes.html](http://www.parstimes.com/news/archive/2004/washfile/quake_construction_codes.html)

#### **Global comparisons**

Munich Re state that of the world's 10 deadliest disasters in the period 1980 – 2006 the 5<sup>th</sup> and 7<sup>th</sup> were respectively the 21 June 1990 earthquake in Iran with overall losses of \$US7.1bn, \$US100M in insured losses and 40,000 deaths and the Bam earthquake in Iran on 26 December 2004 with \$US500M losses and \$US19M insured losses and 26,200 deaths. No other country besides Iran has had 2 disasters in the 10 most deadly in this time period.

It is also important to note the very dramatic difference between estimates of total losses and insured losses. The MENA region generally is characterized by lower than global averages of insurance which heightens individual, community and national vulnerability.

Of the 10 costliest earthquakes by overall losses in the period 1980 – 2006 the 21 June 1990 earthquake in Iran is ranked as the 10<sup>th</sup> most costly.

By contrast of the 10 costliest earthquakes by insured losses in the period 1980 – 2006 there was not one from the MENA region. (Munich Re NatCat service 2006

Hazards, disasters and their associated losses and costs are frequent and extremely disruptive events in the MENA region. Frequency of hazard events and impacts are increasing, losses are increasing and it is questionable whether national capacity to effectively manage risks is keeping pace.

### **Disasters, Development and Civil Conflict**

Conflict between or within nations is often driven by complex and long standing processes. A common and significant driver of conflict is the demand by people for security of access to food, water, other resources and basic services. Where these are absent or are threatened local populations may migrate or may engage in conflict to protect what they already possess or to obtain what they do not have and what they need.

The disaster and development linkage is understood, where the impacts of hazards may negatively affect development projects and, in turn, poorly designed and constructed development activities may generate increased or new risks for populations in the vicinity.

The nexus is then simply put between disaster impacts on development activities and vulnerable populations in consequence increasing human needs while reducing available resources. This scarcity of resources, the inability of remaining resources to meet needs, then may lead to civil conflict as people strive to ensure food and water security and access to services and entitlements.

This linkage and dynamic does not inevitably run from disaster to conflict, but in certain conditions of prevailing scarcity or vulnerability and reduced options for alternative supply a chain of probability may be established.

The progression from scarcity to conflict may perpetuate itself, where conflict torn communities will possess less capacity and resilience to manage the impacts of disasters. In turn, these communities may 'translate' their exposure to other areas or countries through internal migration or by becoming refugees.

Disaster risk reduction is therefore in many circumstances an issue of human security public order and community safety as much as it is one of response management and hazard control

## **COUNTRY ASSESSMENTS: CAPACITY TO ENGAGE IN DISASTER RISK REDUCTION<sup>1</sup>**

This aspect of the capability assessment focuses on institutional arrangements within countries to manage the risks of natural hazards. These arrangements largely focus on the capacity of national governments who through their legal and civil responsibilities have a leading role in protecting life, property, the environment and the economy. However, there may be other partners who can play a significant role, including private sector companies, civil society organizations, faith groups and the community.

Assessing and comparing national capability across a diverse region can be problematic. Not least because there are no agreed standards for performance in risk management, risk reduction, emergency services or disaster preparedness. Experience does show that effective arrangements have certain core elements which are:

**A comprehensive approach:** all activities relevant to disaster risk reduction are included in the comprehensive approach which encompasses mitigation and prevention, preparedness, response and recovery and reconstruction.

**An integrated approach:** in an integrated approach all relevant agencies are included, not just emergency services.

**All-hazards approach:** the all hazards approach refers to the need to ensure that disaster risk reduction legislation and arrangements address all hazards, ensuring that no hazards are ignored and none are dealt with under a separate and independent system.

**Community engagement:** a prepared and aware community is a vital element of effective disaster risk reduction, as experience shows that local people are often first responders, that they have local knowledge of risks and they are vital to effective risk reduction and development.

**Appropriate resources need to be allocated** to mitigation, preparedness, response and recovery; in particular mitigation activities need to be acknowledged as a vital element. Additional elements that are required for arrangements to be soundly based include:

- **Risk assessments** being undertaken regularly and comprehensively
- **Planning** for all activities needs to be undertaken

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<sup>1</sup> This section is based upon country reports submitted to the World Disaster Conference, responses to the questionnaires distributed as part of this assessment and available reports and research papers. The available evidence is sufficient only for indicative comments and conclusions.

- **Training and education** of agency personnel and the wider community is necessary for arrangements to “work in practice”.

As an overview of institutional capacity in the MENA region a few specific points may be made.

Arrangements within most MENA countries exist for emergency management and are organised and coordinated at a national level, either through a specially constituted agency or through the office of the Prime Minister or President. These are typically arrangements for dealing with response activities, that is actions directed at containing and controlling the hazard event, immediate protecting life and critical property and with the short term aftermath of humanitarian aid, debris removal and maintaining public safety. As such **these arrangements do not deal with disaster risk reduction as a holistic approach** to managing natural hazards, disasters and development.

Having said this, most national arrangements do involve in varying degrees a wide range of agencies. Typically these may be classified as ‘first responders’ (the emergency services, Police and military) and ‘support agencies’ (such as health, agriculture and education agencies). This peripheral involvement of a wider group does provide a basis for a better integrated suite of arrangements. International aid and humanitarian organisations, such as Oxfam, the International Federation of Red Cross and Red Crescent Societies, Muslim Aid and Islamic Relief also play a part in immediate relief provision and are increasingly focusing on disaster risk reduction as a theme for their own activities.

There is no strong evidence that the private sector is involved in a significant way. MENA has a lower rate of private and commercial insurance than many other parts of the world. Otherwise the oil industry has its own arrangements which, because of the vital strategic significance of this sector, are often closely tied into national government arrangements. Overall the private sector, while perhaps managing risk at a company level, does not contribute in significant ways to national disaster risk reduction capacity. There appears to be a great potential to tap into this opportunity for some countries in the region.

In terms of **comprehensiveness** arrangements may nominally address mitigation and preparedness but in practice focus on responses activities, that is activities to control the event and to provide immediate relief, medical care and debris removal.

For the criterion of **integration** some of the countries do include a wider range of agencies beyond the emergency services. However it appears that many of these ‘support’ agencies take a secondary role. This focuses attention on response activities to the detriment of development options. Integration of the national to the local is not clear. Certainly community and civil society engagement in planning, preparedness and mitigation appears weak.

**Local Government and Disaster Risk Reduction: Tehran:**

The Tehran Master Plan on Emergency Management has been prepared during 2002 -2004 recognizing the critical place of Tehran in Iran. With a population of over 11.5 million Tehran by global standards is a major city. As the centre of Government and administration it has a critical role as a provider of expertise and support in the event of a major disaster. Tehran itself is highly exposed, particularly to earthquakes. It is the country’s transport and communications hub and over half the country’s industry is located there. Damage to Tehran would be felt throughout the country.

In the event of a major earthquake as many as 500,000 people could die in the city

In recognition of this the Tehran Disaster Mitigation and Management Centre has been established with planning and coordination functions delegated from the central Government its mandate includes mitigation, preparedness, and emergency response, and reconstruction and rehabilitation activities.

The vision is “To establish a safe and secure urban environment against a potential earthquake in the city”.

The **all-hazards approach** is generally followed by countries. This importantly acknowledges that all disasters can be dealt with using a common set of arrangements and that specific suites for different disasters leads to confusion and unnecessary bureaucracy. **Community engagement** appears generally to be low, except perhaps for the work of international and national humanitarian and development civil society agencies. However, the evidence is that preparedness and mitigation programmes will not work unless local people are involved and have a sense of ‘ownership’. In addition, the first people at disaster sites, and those who are most effective in the critical early stages of search and rescue, are

local people. **Resource commitment** is for all countries a necessity to understand and reduce the risk they face. Most countries acknowledge the need for reducing risk but few allocate a budget for it between disasters. Line agencies will in some cases have to wait for the next disaster in order to be granted resources they can then use for recovery and some risk reduction activities.

*In the period since 1980 the World Bank has been involved in more than 40 disaster related projects in the Middle East and North Africa. Globally the World Bank has contributed more than \$40 billion towards post disaster recovery projects. This involvement demonstrates not only the Bank's commitment and the commitment of the international community but also the willingness of MENA (and other) governments to collaborate in disaster management and disaster risk reduction projects.*

The projects briefly described below are based on the World Bank's strategy for disaster assistance which helps governments adopt preventive measures to reduce their vulnerability to disasters, to integrate disaster prevention into development activities and to build a national culture of prevention and preparedness. Examples of these disaster risk reduction projects include:

*Yemen: from 2001 to 2007 Taiz Municipal Development and Flood Protection Project was supported jointly by the World Bank and the Government of Yemen with more than \$50M. The project objectives are to protect city residents, businesses, and infrastructure from seasonal destructive flash flooding in the City of Taiz; to develop the city's capacity to carry out a major part of their responsibilities under the country's new Local Authorities Law; and to initiate support for Yemen's decentralization program. In this way the project links hazard management, disaster risk reduction and development. There are three main project components. The first involves engineering works to construct protective flood structures, and culverts constructed from reinforced cement and lined with paving stones. Street modifications are included to improve drainage. Funding is provided for deferred maintenance to the existing agricultural dam located downstream of the city and flood structures. It also contains engineering and construction supervision, funds for specialized equipment to clean the flood structures, plus support to undertake cleaning while local revenue sources are developed. The second component involves improvements to the site, new housing for the displaced population, cash settlement grants, and funds for a local nongovernmental organization. The third component provides for expert advice to the government in implementing decentralization.*

*Algeria: in Algiers from 2002 to 2007 more than \$125M was committed to health water, sanitation and flood protection and other social services as part of Urban Natural Hazard Vulnerability Reduction in the Wilaya of Algiers Project. This was targeted at the urban poor to reduce their vulnerability. This project strengthens Algeria's ability to respond to and manage natural disasters, while developing long-term preventive measures. The project will assist the Algerian government in rapid response to natural disasters by financing studies and training personnel in national agencies for civil protection, meteorology, and water resource management. The project also provides for the government purchasing equipment for search and rescue operations and medical evacuations and finances emergency reconstruction of homes finally, the project invests in water works and reforestation, in an effort to limit soil erosion and prevent future flooding.*

*Iran: The Bam Earthquake Emergency Reconstruction Project of over \$235 M had the objectives of restoring housing in Bam with improved safety standards and reducing their vulnerability to earthquakes. In addition, finances the redevelopment and reconstruction of telecommunication and transport infrastructure. While the project focuses mainly on physical reconstruction, it also seeks to improve Bam's preparedness for emergencies by ensuring that existing strategic public buildings are strengthened to become earthquake-resistant.*

This project has the twin objective of physical reconstruction and risk reduction through the enhancement of preparedness to ensure that in the future Bam is better able to respond to natural hazards. The United Nations Development Programme is another major partner across MENA and its country reports show that across the region there is a commitment to long term effectiveness in disaster management and to disaster risk reduction, although the capability has yet to be developed.

- Algeria has a number of long term risk reduction projects underway focusing on institutional strengthening, disaster preparedness and response to sudden disasters and risk mapping; partners include a number of Ministries and the Algerian Red Crescent.

- In Djibouti a number of projects focus on capacity building, training, area-based development, community empowerment, housing and disaster management with partners including Government agencies, local NGOs and communities and international donors.
- Jordan has programmes focussing on training, information management and dissemination, coordination, disaster preparedness planning, response, and recovery management, capacity-building and institutional strengthening and public awareness and partners include Jordan Hashemite Charity Organisation, National Civil Defence, the Armed Forces, Security Services, Institute for Public Administration and the University of Balqa Applied Sciences.
- Saudi Arabia is working with UNDP and UN agencies on capacity-building, infrastructure development and disaster preparedness.
- Yemen with UNDP is working in the sectors of capacity-building, public awareness generation and training, multi-hazard preparedness, response, and mitigation planning, mainstreaming of disaster management into development plans, knowledge networking and institutional strengthening and partners include government agencies. Local government and Local and international NGOs working in the country (such as Yemeni Red Crescent, Oxfam, Medecins Sans Frontières).

This information leads to the conclusion the disaster risk reduction, per se, in the MENA region is under-developed and is not supported either by a robust institutional base or by effective and contemporary practice in risk assessment, mitigation and linkage with development activity. However, this analysis equally suggests that the capacity exists to build to achieve a holistic approach:

- Initial legislative frameworks exist in most countries
- There is political will and commitment to link hazards, disaster risk reduction and long term mitigation and remediation activities through better development policy and practice.
- A number of agencies beyond the emergency services are already involved at the periphery of the national DRR process.

#### **Australia: Managing Wildfires**

Australia shares a number of important characteristics with MENA countries. It has a small population, concentrated in a few cities along the coast. The Australian economy is still highly dependent on extractive industries and agriculture. The interior of the country is hot, dry and sparsely populated.

Each year Australia is subject to wildfire risk and with a drought that some claim is the worst in 100 years and others say is the worst in 1000 years this risk is currently extreme. With climate change likely to lead to increased temperatures and less but more sporadic rainfall, this threat is going to increase. In many instances of wildfire the fire crosses State boundaries and may 'run' for many weeks. Wildfires may be contained by fire services but once going they can rarely be stopped. Putting a fire out depends on weather changes. This therefore requires concerted and coordinated action by municipal, State and national governments all working together.

Australia plans for wildfire impacts and sees it as a social, environmental and economic priority. Lead agencies for wildfire response are not just the emergency services but government departments such as Agriculture and Human Services. Australia has a well established and equitable social security system that provides a 'safety-net' to people in need. In addition policy approaches and strategic decisions are informed by established disaster management practice, so drought response is coordinated and integrated across jurisdictions and involves communities, local government and State and national Governments.

Wildfire in Australia is approached as an issue that has political, social, economic and environmental dimensions, all of which need to be planned and managed in a coordinated manner if losses and damage are to be minimised and further risks are not to be generated. In some instances rural enterprises may be encouraged to move away from areas of frequent drought where agriculture is not sustainable. This is managed retreat supported by the Government and agreed with local communities.

## FINDINGS

Set out below are preliminary findings from a review of the various available data sets. As mentioned above the principal value of these databases is to give a sense of the type of problem or risk that exists, the magnitude of the risk in broad descriptive terms and trends in hazard occurrence and impact. The data does not justify drawing strong conclusions about detailed issues.

These findings need to be put into the context of our understanding of risk (see Appendix 2) which is a multi-dimensional concept. An important issue to resolve in any risk assessment is that spatial scale at which the assessment is to be made and what data is appropriate to that scale. Scaling up, from the individual to the local to regional and to the national level, and scaling down from nation to individual, is not well understood at present. It is clear from some research that risk and damage potential at a national level is more than the simple summation of losses at lower levels. In particular if an entire nation or autonomous region is affected the capacity to draw on post-disaster support may be limited (given that international humanitarian aid and other forms of assistance may be delayed in arriving, may be short term and may be substantially less than loss or needs).

Equally damage at national levels has an impact at lower levels as for the vast majority of local communities depend to some extent on services, information, communications and infrastructure from the national level. At national level agencies do not show high levels of horizontal integration, that is that at the same administrative level they are linked and work collaboratively but they display significant vertical integration and interdependencies

### **Critical sites**

Hazards, risk, vulnerability and capacity are not distributed evenly. In the MENA region it is posited that there are 4 critical areas:

**Capital cities** and other large cities are sources of services to a wider population and contain capacities that are not replicated, nor replicable, at lower levels. These include infrastructure such as ports, airports, transport nodes, health and medical facilities, educational facilities, significant business centres and the seat of Government legislative and executive arms and the judiciary. If these are damaged they impact resonates through the whole country. In addition inappropriate development in many large urban areas may increase vulnerability for individuals and households. Algiers, Damascus, Rabat, Sana'a, Tehran, and Tunis all face significant exposure to natural hazards.

**Coastal areas:** these may be more exposed to certain hazards, such as cyclones, tsunami, storms and sea level rise. In some countries there is a movement of population to the coast and this increases the vulnerability (while the hazard remains constant). Alexandria in Egypt, Bandar-E-Bas in Iran, and Aden in Yemen are some port cities that are exposed to natural hazards. A particular risk may be to tourist development where there are large numbers of people who have little social support in the country, significant infrastructure development, considerable modification of the marine and coastal environments and tourism as a significant earner of overseas income may be exposed.

**Remote Areas:** these may have low population numbers (though they may be high in particular clusters) and so the overall exposure and vulnerability for the nation may be low. However, for the communities at risk the vulnerability may be high as they have, routinely, poor access to essential and routine services. Also assistance post-disaster may be delayed in reaching remote or inaccessible areas.

**Cities as sources of concentrated risk: Algiers**

A large rainfall storm occurred on the northern slopes of the Atlas Mountains and this led on 10 November 2001 to a wave of mud engulfing houses in Algiers killing about 600 people, destroying houses and covering cars, trucks and buses. This rain storm had been forecast but there were no flood warnings or precautionary evacuations.

Previously the government had sealed a storm drainage system in Algiers because they feared that terrorists could use it as a hiding place. Would this additional drainage capacity would have mitigated the flood and mud flow.

The question can be asked whether prudent urban planning had been neglected, investment inadequate in urban infrastructure and inadequate housing that lead to severe overcrowding. An official of Algiers' office of civil protection said to Le Monde: "One could have avoided this catastrophe if some simple measures had been taken in good time" and went on to criticize the neglect of public works. Others called this disaster "genocide by negligence"

This is not an isolated case and points to the fact that cities are becoming increasingly exposed to risk, including natural hazards, technological hazards and social hazards. Dealing with one hazard may if not managed holistically increase the risk of other hazards.

Increasing urban populations are exposing more people to hazards and through overcrowding and unsafe land use exacerbating existing hazards or generating new hazards.

For many hazards the problem is less forecasting (especially with rain fall) and not technology. Neither warning systems nor engineering works are 'rocket science'. The real issue is political commitment to comprehensive disaster risk reduction that takes a long term, inclusive and holistic view. Legislation, enforcement mechanisms, management systems, capacity building and education and training are some of the techniques that nations can use to reduce risk.

**Source: Ben Wisner <http://www.radixonline.org/algeria.htm>**

**Supporting Vulnerable Communities: Yemen:**

Yemen ranks amongst the world's least developed countries and is relatively short of natural resources. It is undergoing rapid urbanisation and population growth and this is putting severe pressures on the natural environment and local people, 70% of who still live in small communities. Our past generation witnessed very few flash floods in the mountainous areas of Yemen. On the contrary, the new generations have been experiencing both floods and droughts at the same time,

Together with environmental degradation, desertification, soil erosion, and landslides There is a need for sound environmental proactive as a development and mitigation programme to reduce the exposure of local communities. Perhaps ironically the Government of Yemen has asked whether, environmental protection practices should rely more on the traditional habits of the past generations.

**Critical industrial facilities** will often have their own inbuilt emergency management plans and capability and will have been designed and built to a specific level of acceptable risk. However risk is not just about exposure but also about what the loss potential is. The loss of critical industry will have financial and economic impacts, ranging from unemployment for workers to loss national income (through taxation for example) to the loss of markets and future income earning potential.

**Protecting vital oil facilities: Oman**

Damage to critical industrial facilities impacts not only on the facility and enterprise itself but also on the national economy. This was seen clearly after the Indian Ocean Tsunami of 2004 which led to significant shortfalls in tourism and tourism related business in the affected countries.

Oman has a national plan to protect its vital oil installations and this plan interfaces in a planned way with company plans. However, this plan appears to concentrate only on the threat to the facilities themselves. It does not integrate with other disaster risk reduction activities and it does not consider the downstream consequences of the loss of revenue and business that would follow from severe disruption and which impact directly and immediately on Oman's economy.

While this plan, in itself, may be well considered it does not address the broader and longer term aspects of risk management.

**TRENDS AND FUTURE DEVELOPMENTS**

As has been observed previously hazard events are increasing. In a sense however this is not the central issue. The point for Government's to focus on is whether the vulnerability of the country, population, infrastructure, environment and the economy is at increasing risk.

MENA is a rapidly developing part of the world, and change itself brings new or heightened risk as the basis on which planning has taken place changes. Across the world very few risk assessments look at trends and the future. Planning and preparedness is usually carried out for the situation at the present moment, and not for 2, 5 or 10 years in the future.

This is despite the severity of existing risks and the trend for hazard exposure and risk to be growing. The Global Hotspots Project (<http://www.ldeo.columbia.edu/chrr/research/hotspots/>) has drawn out some of the salient features of exposure in the MENA region.

Country	Countries at relatively high economic risk from two or more Hazards*	
	% of population in areas at risk	% of GDP in areas at risk
Algeria	49.3	48.3
Bahrain	-	-
Djibouti	31.7	35.3
Egypt	-	-
Iran	69.8	66.5
Iraq	-	-
Jordan	64.9	64.7
Kuwait	-	-
Lebanon	29.2	-
Libya	-	-
Morocco	30.4	33.4
Oman	-	-
Palestine	-	-
Qatar	-	-
Saudi Arabia	-	-
Syria	34.4	36.8
Tunisia	64.1	62.4
UAE	-	-
Yemen	-	-

Table 3 Countries at relatively high economic risk from 2 or more hazards  
Source: Natural Disaster Hotspots: A Global Risk Analysis

Country	total population in millions 1975	total population in millions 2004	total population in millions 2015	% annual population growth rate 1975-2004	% annual population growth rate 2004 -2015	Countries at relatively high economic risk from 2 or more hazards*	
						% of population in areas at risk	% of GDP in areas at risk
Algeria	16	32.4	38.1	2.4	1.5	49.3	48.3
Bahrain	0.3	0.7	0.9	3.3	1.6	-	-
Djibouti	0.2	0.8	0.9	4.3	1.6	31.7	35.3
Egypt	39.3	72.6	88.2	2.1	1.8	-	-
Iran	33.3	68.8	79.9	2.5	1.4	69.8	66.5
Iraq	12	28.1	36.5	2.9	2.4	-	-
Jordan	1.9	5.6	7	3.6	2	64.9	64.7
Kuwait	1	2.6	3.4	3.3	2.4	-	-
Lebanon	2.7	3.5	4	1	1	29.2	-
Libya	2.4	5.7	7	2.9	1.8	-	-
Morocco	17.3	31	36.2	2	1.4	30.4	33.4
Oman	0.9	2.5	3.2	3.5	2	-	-
Palestine	1.3	3.6	5	3.6	3	-	-
Qatar	0.2	0.8	1	5.2	2	-	-
Saudi Arabia	7.3	24	30.8	4.1	2.3	-	-
Syria	7.5	18.6	23.8	3.1	2.3	34.4	36.8
Tunisia	5.7	10	11.1	2	1	64.1	62.4
UAE	0.5	4.3	5.6	7.2	2.4	-	-
Yemen	7	20.3	28.5	3.7	3.1	-	-

Table 4 MENA selected social and demographic features (Human Development Report 2006, \*Natural Disaster Hotspots: A Global Risk Analysis)

#### **Inter Government Cooperation: the Caribbean "*Managing Disasters with Preparedness*"**

The Caribbean Strategy on Comprehensive Disaster Management (CDM) was launched in 2001 with the primary objective of providing a framework for structuring coordinated action towards disaster loss reduction. This Strategy fully endorsed and adopted at the national, regional sectoral and agency levels all across the Caribbean Region is accepted as the platform to transform the disaster management landscape in the region from being response focused to move to a holistic and integrated risk reduction approach for the sustainable development of the Caribbean.

CDERA's main function is to make an immediate and coordinated response to any disastrous event affecting any Participating State, once the state requests such assistance.

Other functions include:

- Securing, collating and channeling to interested governmental and non-governmental organizations, comprehensive and reliable information on disasters<sup>7</sup> affecting the region;
- Mitigating or eliminating as far as possible, the consequences of disasters affecting Participating States.  
Establishing and maintaining on a sustainable basis, adequate disaster response capabilities among Participating States; and,
- Mobilizing and coordinating disaster relief from governmental and non-governmental organizations for affected Participating States.

Such regional initiatives recognise that disasters do not respect boundaries, local, regional or national and that sometimes national governments require support from other governments in their region to effectively prepare for, respond to and recover from hazards and disasters.

Source: <http://www.cdera.org/>

There are many useful indicators of change. Two that are particularly significant are the rate of urbanization (being construed as the concentration of risk) and population growth, or how many *more* people are going to be exposed. The above tables provide a snapshot of each of these for the MENA region. What these figures show is an extremely rapid rise in population numbers across MENA and therefore more people at risk. It is estimated that Qatar will, in the 40 years from 1975 to 2015

increase its population fivefold, UAE will increase by 11 times over that period. Iran may only grow by 2.3 times its 1975 population but it will grow from 33.3 million inhabitants to 80 million. Although the rate of growth is slowing absolute numbers continue to grow at an almost alarming rate.

The trends in MENA both in terms of natural hazards and also of population, social and environmental dynamics are for more hazards and more risks; more people vulnerable and more assets threatened.

### **EMERGING RISK LANDSCAPES**

An increasing number of governments, disaster risk reduction practitioners and authors are recognizing that new risks are emerging that confront all parts of the planet. These risks are systemic, affect whole countries and nations and cannot be dealt with using conventional emergency management procedures. These risks are issues of development not of response or control.

The most notable driver is perhaps climate change. With MENA populations in global terms disproportionately exposed to high hazard areas, and coastal areas (or otherwise areas of water deficiency) these changes will impact equally disproportionately on MENA. Sea level rise, changes to water cycle regimes, increasing temperatures, estimated increases in hydro-meteorological hazards will be direct consequences of global climate change. These changes and potential risks are inevitable.

The systemic nature of the changing risk landscape is being driven by other issues too. Population growth will put an increasing burden on infrastructure and systems that are in many instances already inadequate for public health and safety. Increasing concentrations of people and assets in urban areas will unavoidably exaggerate the potential impact of negative events, particularly where planning procedures are inadequate or are not enforced. In many cases cities and towns are already experiencing difficulties in providing basic services such as transport or waste treatment. Environmental damage and over-exploitation will continue. Environmental systems, such as forests and reefs, natural estuaries, unencumbered flood plains, and vegetated slopes, act to reduce risk. Disturbance of these increases natural hazards, introduces them to areas where previously they were unknown. When allied with population growth the result is an increase in hazard exposure and of vulnerability and a reduction in resilience.

Socioeconomic structures are changing too and in parallel vulnerability to and perception of risk in society are evolving and community expectations of government support are increasing. In a globalised world Government's role in directly managing the economy has been shrinking over several decades, through privatisation, deregulation and regulatory reform. Attitudes and policy are increasingly influenced by international bodies, corporations, and nongovernmental organisations as well as by government, and risk management can be impaired by conflicts of interest among the various actors. These institutions may have little long term loyalty to or commitment to nations. As well as this, risks are becoming transnational, where no one country can manage all the risks it faces. Climate change is the prime example of this but it applies also to water scarcity and flood control and to other hazards.

The old approach to emergency management was to focus on the hazard agent and to try to contain it. We know now that stopping hazards is almost impossible and that the best means of reducing risk is by building capacity and planning for disaster proof development.

Further we now understand that structural or engineering solutions, such as levee banks, may indeed increase risk if they generate over-confidence of the structures to contain a hazard. This can lead to inappropriate development in sites of potential catastrophe. Structural works are effective up to a given point, but if (or when) they fail the ensuing damage may be much greater.

**Climate Change, Risk and Development**

The recently released reports of The Intergovernmental Panel on Climate Change suggest that climate and water related hazards in the Middle East and North Africa may change for the worse in the future. In Working Group II 's Summary for Policymakers' on climate changes impacts, Adaptation and Vulnerability the IPCC predicted likely increases in certain natural hazards globally such as droughts, floods and heat waves that will negatively affect crop production. Changes in storm frequency and intensity associated with sea level rise will expose coastal settlements and communities to higher risks. The IPCC specifically drew a link between lack of resources, poverty and increased risk exposure associated with reduced adaptive capacity. Some of these impacts will be exacerbated by human activity. It stated:

Projected climate change-related exposures are likely to affect the health status of millions of people, particularly those with low adaptive capacity, through:

- increases in malnutrition & consequent disorders with implications for child growth & development;
- increased deaths, disease and injury due to heat waves, floods, storms, fires and droughts;
- the increased burden of diarrhoeal disease;
- the increased frequency of cardio-respiratory diseases due to higher concentrations of ground level ozone related to climate change; and,
- the altered spatial distribution of some infectious disease vectors.

It went on to say:

Non-climate stresses can increase vulnerability to climate change by reducing resilience and can also reduce adaptive capacity because of resource deployment to competing needs. For example, current stresses on some coral reefs include marine pollution and chemical runoff from agriculture as well as increases in water temperature and ocean acidification. Vulnerable regions face multiple stresses that affect their exposure and sensitivity as well as their capacity to adapt. These stresses arise from, for example, current climate hazards, poverty and unequal access to resources, food insecurity, trends in economic globalisation, conflict, and incidence of disease such as HIV/AIDS... Adaptation measures are seldom undertaken in response to climate change alone but can be integrated within, for example, water resource management, coastal defence, and risk reduction strategies

Increased vulnerability and decreased resilience may be enhanced by other stress factors; the IPCC said:

This suggests the value of a portfolio or mix of strategies that includes mitigation, adaptation, technological development (to enhance both adaptation and mitigation) and research (on climate science, impacts, adaptation and mitigation). Such portfolios could combine policies with incentive based approaches, and actions at all levels from the individual citizen through to national governments and international organisations...One way of increasing adaptive capacity is by introducing the consideration of climate change impacts in development planning...for example, by:

- including adaptation measures in land-use planning and infrastructure design;
- including measures to reduce vulnerability in existing disaster risk reduction strategies

Comprehensive risk reduction policy with a robust institutional base is a prerequisite for effective risk mitigation and adaptation given likely increases in hazards, risks and the vulnerability of populations.

Source: IPCC <http://www.ipcc.ch/>

**CONCLUSIONS**

The available data on hazard exposure and disaster impacts from MENA region does not appear to be robust from a methodological point of view and databases seem incompatible. Yet paradoxically there seems no doubt that the evidence points conclusively to a picture of increasing risk. This is because despite their different areas of interests and methods they all draw the same conclusion: increasing public risk. As with the rest of the world the MENA region is experiencing an increase in hazard events and in damage and losses. Earthquakes and floods pose the most serious threats as individual hazards. Iran is the country at greatest risk through its exposure to repeated earthquakes, though no country in the region is entirely free of substantial risk from one or more hazards. Other countries such as Djibouti and Yemen may be at a lower *absolute* level of risk but because they have fewer available resources may be at an equal *relative* level of risk to larger or more hazard prone countries

Because of recent and current demographic trends, many countries and important urban areas in the region are likely to be at much higher risk to natural hazards than historic disaster data would indicate. This poses a potential critical threat to their sustained economic growth and development, but a threat which can be mitigated if acknowledged and systematically planned.

## Appendix 1: Millennium Development Goals and Disaster Risk Reduction

Hazard and risk management in many cases is as much as development issue as it is an issue for emergency management, humanitarian relief and mitigation. Increasingly the links between effective risk reduction and sustainable development are being identified and managed together within policy frameworks and management arrangements. At local levels there is often no clear distinction between the two subjects. ISDR has described some of the links between disaster risk reduction and the Millennium Development Goals (MDGs). (<http://www.unisdr.org/eng/mdgs-drr/link-mdg-drr.htm>, and <http://www.unisdr.org/eng/mdgs-drr/review-8mdgs.htm>). The MDGs and disaster risk reduction are mutually-reinforcing objectives. The MDGs are directly targeted at specific instances of need, inequality and exclusion and sustainable, healthy and secure living conditions; however, individually and collectively, they directly and indirectly help reduce vulnerability to natural hazard events and improve people's capacity. At the same time, disaster risk reduction activities help protect development investments as well as minimizing human suffering and economic loss.

The following table illustrates some of the many and often complex links between disaster risk reduction and the MDGs.

Millennium Development Goal targets	Direct impacts of disasters on targets	Indirect impacts of disasters on targets	Benefits to targets from disaster risk reduction
<b>1: Poverty &amp; hunger</b>	Reduced livelihood sustainability. Reduced health status for individuals.	Fiscal impacts on governments; forced sale of assets. Additional call on health care facilities.	Vulnerability reduction key to tackling poverty. Poverty reduction programmes may also reduce vulnerability.
<b>2: Education</b>	Infrastructure damaged; people displaced.	Educational opportunities for students disrupted. Less money for education.	Safer schools; more money for education. Improved education and awareness programmes relevant to disaster risk reduction.
<b>3: Gender</b>	Women left to care; bear brunt of 'coping'.	Domestic violence may increase. Family disruption and break-up may eventuate.	Women better protected, may organise for disaster risk reduction. Awareness programmes allow for pre-emptive action.
<b>4: Child mortality</b>	Children at special risk; health assets damaged.	More orphans and vulnerable children; water, food, medicines are in greater demand.	Children & their health services better protected.
<b>5: Maternal health</b>	Pregnant women at risk; health assets damaged.	More maternal stress; water, food are in greater demand.	Less stress, better health services for mothers.
<b>6: Diseases</b>	Weakened resistance; health assets damaged.	More exposure to disease after disaster. Reduced capacity to recover from impacts.	Public health risks reduced, assets protected.
<b>7: Environment</b>	Resources and infrastructure damaged.	More move to cities, more pressure on urban services	More commitment to tackling degradation.
<b>8: Partnerships</b>	SIDS programmes hit by storms, tsunamis.	Impacts on commitment to good governance & development.	Better governance for DRR, more help for SIDS.
<b>All MDGs</b>	Resources reallocated from development to response.		Resources reallocated to mitigation and disaster\ proof development.

## Appendix 2: Methodological issues

### Hazards

Defining ‘hazard’ and ‘disaster’ is never easy and rarely definitive. Political and public perceptions play a role in deciding which events are to be included in the definitions and which are not. Disasters are in some senses ‘socially constructed events’ to the extent that there is usually some form of human contribution to the creation of risk. Definitions will therefore vary from place to place and time to time even though core elements are usually constant. Various datasets used different, though not dissimilar) definitions of disaster and used different criteria for listing or not listing an event. This makes comparison between datasets difficult and at times contentious. This report only considers rapid onset natural hazards, the most significant of which for the MENA region include:

- Cyclone
- Earthquake
- Extreme temperature (heat wave and cold wave)
- Flood
- Landslide
- Storm (including windstorm, dust storm and cyclone)

There are other ‘natural’ events that were not included such as drought and epidemic. Drought belongs to a category of hazard usually referred to as ‘slow-onset’. These have particular characteristics that distinguish them from rapid onset events. Management of mitigation, response and recovery activities can usually be largely addressed by applying existing political, executive and management systems that belong to agencies that have a ‘day to day’ function in providing civic services to the nation, but where these agencies cannot be strictly defined as ‘emergency services’. Specific disaster services & systems are less likely to be called upon for slow onset events. Also, deciding where and when a slow onset event has begun and ended is difficult, in some conditions slow onset disasters are heightened states of general environmental conditions.

There are also arguments that slow onset and environmental disasters are, for some people, normal risks that they face daily and for which they can develop adaptive and coping strategies. Other events such as biological disasters (disease for example) are transmitted through humans (or animals or plants) and can be managed using augmented health, medical and social support systems. Rapid onset disasters however due to their speed and destructiveness and unpredictability require specialized services and measures and arrangements for mitigation, response and recovery.

### Criteria of disaster

There are numerous definitions in use and no one definition has universal agreement. The definition used for current purposes is that put forward by Centre for Research on the Epidemiology of Disasters (CRED)

- 10 or more people reported killed
- 100 people reported affected
- declaration of a state of emergency
- call for international assistance

These limits are arbitrary but do have a degree of international consensus.

### Considerations

The largest and most comprehensive database is EM-DAT, with other assessments such as the Disaster Risk Index (DRI) project essentially drawing their disaster data from this site. In this sense there is a degree of **circularity to some of these sources** as they draw upon, or refer to, common data sets.

Different organizations use different definitions of ‘disaster’ and this has two relevant outcomes for this research. First, data sets are not easily comparable. Data is collected in different ways, according to different criteria. Each database may be internally consistent and its rationale defensible but the differences between databases can be significant. Data of course is collected for specific purposes by each organisation and it is collected to meet identified functional needs.

Disasters are generally spatially referenced. However, **the boundaries of a disaster event are rarely clearly defined**, and often cannot be clearly specified. Impacts and losses vary from direct physical impacts that are immediately obvious to more diffuse impacts further from the site of the event or involving opportunity losses to otherwise unaffected populations due to loss of amenity through damage or the diversion of funds, assets and services to disaster relief and recovery. Disasters at the periphery of the impact area particularly may exacerbate existing deprivation and insecurity and become in practice indistinguishable from background conditions and processes, though they may exacerbate existing negative economic and social trends. There are clear difficulties with defining the area affected by and the start and end points of drought in particular; even distinguishing a drought event from ‘background’ or more or less normal dry conditions may be difficult.

The **data collected is usually collected within a short period of time**, often days or weeks, after an impact. This allows immediate identification of critical losses and needs. Some consequences, particularly relating to health, well-being and loss of commerce, become apparent only a 'long time' after the event and may persist for weeks, months or years; in certain extreme circumstances they may be irreversible. **Data quality is often dubious**. Collecting data in a disaster situation is notoriously difficult infrastructure is disrupted and the focus of much effort is on relief not needs and loss assessment. This is a long standing problem for effective disaster management and for recording losses. **Data focuses a limited number of categories of loss**, notably deaths, injuries, homelessness and the value (often replacement cost) of physical assets and commodities. There are good reasons for this data collection and it is the easiest to collect. However it does not include the full range of losses and in particular does not sub-divide data into specific elements (for instance, by gender, age or income). **Economic data is given in various formats and values**, discounted value, replacement costs and insured loss, but it is provided in a non-standardized format. What is it is the cost at the time of the event, or computed to end of year value. It is not given as a value for a given year. For example, losses for 1986 are in 1986 values, where 1996 losses are in 1996 values.

**Data is usually collected only for direct tangible losses**. Indirect or consequential losses and intangible losses are hard to define, difficult to identify and difficult to apply (if this is indeed justifiable) a common and consistent metric. However, the available research, much of it anecdotal, suggests that individuals, households and communities value intangible items as highly as they do physical assets. It is important to note that intangible impacts (such as on physical and mental health) may have direct and long term consequences for economic activity.

**For these reasons an estimate is made that the losses recorded by all available databases very significantly undervalue impacts, losses and needs. This point must be emphasised. The available data shows the lowest limit of losses only.** How much the data under estimates by is very difficult to ascertain. Certain estimates are that indirect and intangible losses are up to 3 times greater than direct, tangible losses; this does not take into account inadequate or incomplete data.

**Losses and damage do not equal risk**. Nor do most hazard or risk assessments look into the future. It is a common failing of risk assessment in the disaster and hazard management policy, management and research communities that they use the present as the locus for investigation rather than looking into the future. With changing natural, demographic and social environments perspective risk assessment is extremely difficult and contains high levels of uncertainty, but perhaps all the more necessary for that. Risk is commonly referred to a function of 3 elements:

1. The **hazard agent**
2. The **vulnerability** and exposure of elements at risk (which may include people, physical assets, natural systems, cultural and historical artefacts, systems (such as systems of information exchange, community networks and intangibles such as culture and values)
3. The capacity of the elements at risk to prevent, minimize or recovery from hazard impacts (**resilience**).

#### **Research activity**

Considerable research activity has been undertaken on certain natural hazards, notably perhaps earthquakes. This however is not disaster data and to be matched with 'disastrous events' it needs to be linked to data about losses and impacts. This has not happened often and is limited by the difficulty in identifying the essential elements of the key concepts, including risk, hazard, vulnerability and resilience, and of matching hazard data with demographic, social and economic data. **In short research on particular hazards is well established, but research on hazard risk management is less well established and for the MENA region is seriously deficient both in absolute terms and relative to other regions.**

There has been comparatively little research undertaken (at least in English language format and published in English language journals) on hazards, disasters and risks in MENA. This relative lack of research parallels the relative lack of data. Research findings and data are much easier to find to North America, Central and South America, the Caribbean, Europe, Australasia, South East Asia, South Asia, China and Japan and Sub-Saharan Africa.

**Of all the worlds regions and cultural and religious groups the MENA region (roughly coincident with the Arab World) is the least developed in terms of hazard and disaster relevant research and data.**

### Appendix 3: The Construction of Risk

There are many different definitions of risk, hazard, vulnerability and resilience (sometimes known as capacity or capability).

The differences between the various definitions are, in our opinion, slight and have little bearing on policy development, management or operational activity. The following definitions and commentary are taken from the United Nations International Strategy for Disaster Reduction [www.unisdr.org](http://www.unisdr.org)

**Capacity** A combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster.

*Capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management. Capacity may also be described as capability.*

**Disaster:** A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources.

*A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk*

**Hazard** A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

*Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterised by its location, intensity, frequency and probability*

**Natural hazards** Natural processes or phenomena occurring in the biosphere that may constitute a damaging event. *Natural hazards can be classified by origin namely: geological, hydrometeorological or biological. Hazardous events can vary in magnitude or intensity, frequency, duration, area of extent, speed of onset, spatial dispersion and temporal spacing*

**Risk** The probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.

*Conventionally risk is expressed by the notation  $Risk = Hazards \times Vulnerability$ . Some disciplines also include the concept of exposure to refer particularly to the physical aspects of vulnerability.*

*Beyond expressing a possibility of physical harm, it is crucial to recognize that risks are inherent or can be created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share the same perceptions of risk and their underlying causes.*

**Vulnerability** The conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards. *For positive factors, which increase the ability of people to cope with hazards, see definition of capacity.*

Natural hazards may be characterized by a number of elements that influence their damage including:

- Speed of onset
- Warning time
- Spatial extent
- Duration
- Predictability
- Energy release (per unit area per unit of time)
- Frequency

Vulnerability may be characterized in a number of ways. Typically it is applied to people as individuals and small groups (households and communities) but it has other dimensions too as is shown in a very simplified manner below:

<b>Individual</b>	<b>Family/Household/ Tribe/Clan</b>	<b>Community</b>	<b>Organization</b>	<b>Nation</b>
Potential for injury and death	Potential for injury or death to family members and friends	Loss of community owned assets	Injury and death to staff	Damage threats to public infrastructure including hospitals, transport, education facilities, tourism, trade etc
Threats to livelihood assets	Threats to livelihood assets	Loss of or damage to cultural, cultural and religious assets and facilities	Loss of assets	Overwhelming of capacity to provide emergency and routine services
Threats to homes	Threats to homes	Loss of public assets (such as parks)	Loss of trade and commerce	Social and political unrest resulting from impacts
Threats to health (physical and mental)	Threats to health		Loss of customers and clients and sources of supply	Environmental damage
Threats to wellbeing	Threats to wellbeing			
Loss of personal items	Loss of personal items			

Capacity is less well understood than vulnerability, but it too has various dimensions:

<b>Individual</b>	<b>Family/Household/ Tribe/Clan</b>	<b>Community</b>	<b>Organization</b>	<b>Nation</b>
Knowledge	Knowledge	Arrangements for mutual support	Trained staff	Robust social and economic systems
Skills	Skills	Robust internal networks and systems of support	Business continuity planning	Emergency management services
Resources	Resources	Experience and preparedness	Backup and redundant systems	Preparedness and mitigation activities
Access to services and social support	Access to services and social support			
Access to information	Access to information			