Hazard Risk: Background

Extract from the Concept Note of the "First Technical Workshop on Standards for Hazard Monitoring, Databases, Metadata and Analysis Techniques to Support Risk Assessment," in WMO Headquarters, Geneva, Switzerland from 10 to 14 June 2013 (http://www.wmo.int/pages/prog/drr/projects/Thematic/HazardRisk/2013-04-TechWks/index_en.html).

Hyogo Framework for Action 2005-2015 – The Foundation of WMO Disaster Risk Reduction Priorities and Initiatives linked to risk Analysis[1]

The Hyogo Framework for Action was conceived to bring focus and direction to the field of disaster risk reduction, shifting the paradigm from post disaster relief and response to "build the resilience of nations and communities to disasters".[2] The adoption of the HFA by 168 countries, at the World Conference on Disaster Risk Reduction (Kobe, Hyogo, Japan January 2005), has led to improved coordination and cooperation among the international development, humanitarian and financial institutions to leverage capacities and resources towards supporting the Member States with their development of their risk reduction capacities. While significant progress has been made, there is much work to be done ahead.

The second priority area of HFA is "to identify, assess and monitor disaster risks and enhance early warning." The starting point for reducing disaster risk and for promoting a culture of disaster resilience lies in the knowledge of the hazards and the physical, social, economic and environmental vulnerabilities to disasters that most societies face, and of the ways in which hazards and vulnerabilities are changing in the short and long term, followed by action taken on the basis of that knowledge.

Hazard Information for Risk Analysis

Quantitative risk assessment combines information about hazards with exposures and vulnerabilities of the population or assets across various economic sectors and communities (e.g., agricultural production, infrastructure and homes, etc). Hazard analysis must be augmented with socio-economic data that quantifies exposure and vulnerability (e.g., casualties, construction damages, crop yield reduction and water shortages). Depending on the types of decisions (local, national, regional and global levels), this analysis requires different data resolutions (temporal and spatial). Furthermore, risk information may need to be tailored to address sectoral and inter-sectoral issues. Equipped with the quantitative risk information, countries can develop risk reduction strategies using, (i) early warning systems to reduce casualties; (ii) medium and long-term sectoral planning and risk management (e.g., land zoning, infrastructure development, water resource management, agricultural planning) to reduce economic losses and build livelihood resilience, and, (iii) risk financing and transfer (e.g., insurance) to transfer and redistribute the financial impacts of disasters. This must be underpinned by effective policies, legislation and legal frameworks, and institutional coordination mechanisms as well as information and knowledge sharing, education and training (Figure 1).

Hazard events are characterized by magnitude, duration, location and timing. Calculating the probability of occurrence of hazard events in terms of these characteristics is the key task in fully documenting the hazard component of disaster impacts. These defining characteristics provide a basis for extracting information on hazard frequency and severity from observational datasets. A fundamental requirement of risk assessment is the availability of, and access to, high quality historical data. This requires:

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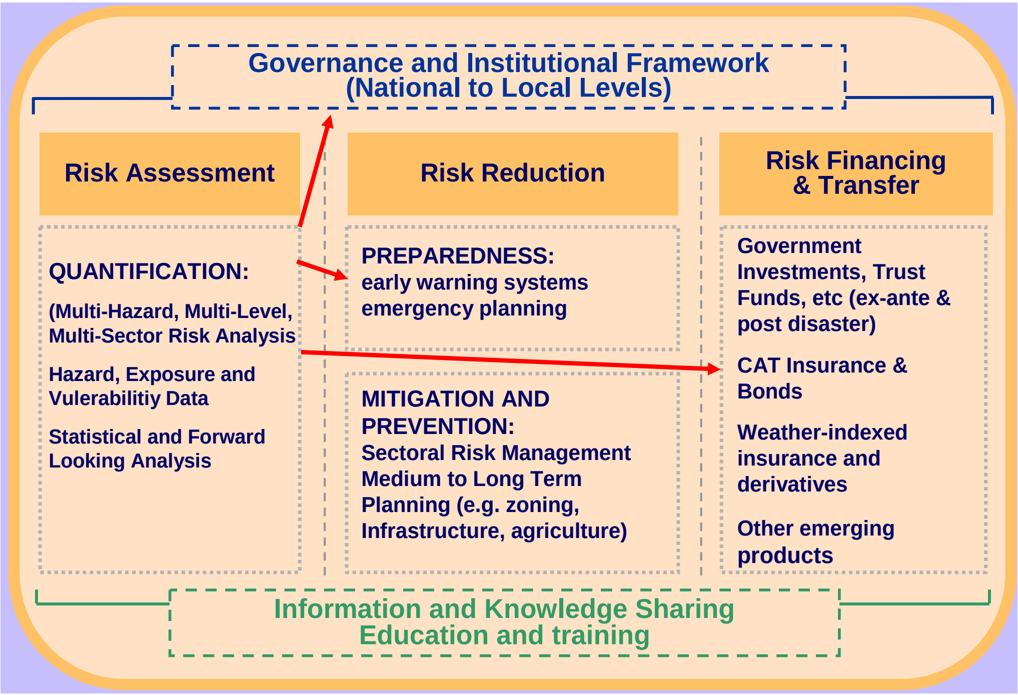
[1] Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters: http://www.unisdr.org/files/1037_hyogoframeworkforactionenglish.pdf

[2] Resilience is recognized as the ability of a system to reduce, prevent, anticipate, absorb and adapt, or recover from the effects of a hazardous event in a timely and efficient manner. This includes ensuring the preservation, restoration, or improvement of its essential basic structures and functions. Resilience is viewed as a common outcome that integrates poverty reduction, disaster risk reduction and climate change adaptation, as integral to sustainable development, although the indicators of resilience need to be further articulated

- Ongoing, systematic and consistent observations of hazard-relevant hydro-meteorological and other environmental parameters;
- Quality assurance and proper archiving of the data into temporally and geographically referenced and consistently catalogued datasets and related metadata;
- Ensuring that the data can be located and retrieved by users; and,
- Availability of hazard mapping and analysis tools

However, as the characteristics of weather, climate and hydrological hazards pertaining to their severity, frequency, and location are changing in relation with climate change, analysis of historical hazard data serves as a benchmark, and is no longer sufficient. For instance a 100-year flood or drought may become a 30-year flood or drought or, simply said, more severe events could happen more frequently in the future.



Source: WMO Disaster Risk Reduction Programme

Figure 1: Elements of a comprehensive DRR Framework based on the Hyogo Framework for Action 2005-2015

Latest scientific advancements in climate modeling and forecasting provide unprecedented opportunities for analyzing and providing predictions of these changing patterns with longer lead-time as input to risk assessment for disaster risk reduction measures. A new major initiative, the Global Framework for Climate Services (GFCS), is being implemented by the governments, with support from the World Meteorological Organization (WMO) and its partners in the UN System and outside to ensure development and availability of sector-relevant climate services to support risk analysis with a forward looking approach.

Over the years, significant efforts in the development of risk knowledge have been initiated, including efforts in academia and private sector for collection of global loss and damage data as well as International agencies such as the United nations Strategy for Disaster Risk Reduction (UN-ISDR), the United Nations Development Programme (UNDP) and the World Bank for development of capacities for risk analysis to support the implementation of HFA at the national, regional and global levels.[3] Furthermore, as accessing disaster information can be time consuming

[3] - Damage and Loss databases:

- Centre for Research on the Epidemiology of Disasters (CRED): http://www.emdat.be/
- Credcrunch 31: http://cred01.epid.ucl.ac.be/f/CredCrunch31.pdf

and laborious since data are scattered and the identification of a disaster may be confusing in countries with many disaster events, the Asian Disaster Reduction Center (ADRC) proposed a globally-common "Unique ID" code for disasters. This idea was shared and promoted by the Centre for Research on the Epidemiology of Disasters (CRED), OCHA/ReliefWeb, OCHA/FSCC, ISDR, UNDP, WMO, IFRC, OFDA-USAID, FAO, La Red and the World Bank and jointly launched as a new initiative known as "GLIDE".[4]

WMO DRR Survey 2006 and Members Gap and Needs

In a capacity analysis survey conducted by the WMO in 2006,[5] in which 139 countries participated, nearly 90% of the participating countries indicated the need for strengthening of their observing networks, need for guidelines and standards for monitoring, detection, development and maintenance of standard hazard databases and metadata, as hazard mapping tools and methodologies (based on statistical and forward looking forecasting and modeling approaches).

Furthermore, the WMO 2006 Survey and discussions at the 16th World Meteorological Congress (2011), along with numerous global risk assessment reports and analysis have confirmed that droughts, flash and river floods, strong winds and severe storms, tropical cyclones, storm surges, forest and wild land fires, heat waves, landslides, sand and dust storms, marine and aviation hazards, as well as rapid melting of the glaciers are among the top weather, climate and hydrological hazards of concern to WMO Members.

- Swiss Re Sigma yearly reports on Natural Catastrophes and Man-Made Disasters: http://www.swissre.com/sigma/
- Munich Re NatCatService database: http://www.munichre.com/en/reinsurance/business/non-life/georisks/natcatservice/default.aspx
- The La RED DesInventar system maintains national-level natural and technological disaster databases in Latin America and the Caribbean (http://www.desinventar.org/desinventar.html)

- World bank "Natural Disaster Hotspots: A Global Risk Analysis" (http://www.proventionconsortium.org/themes/default/pdfs/Hotspots.pdf

-United Nations Global Assessment Report (GAR) on Disaster Risk Reduction:

- GAR 2013: http://www.preventionweb.net/english/hyogo/gar/2013/en/home/download.html
- GAR 2011: http://www.preventionweb.net/english/hyogo/gar/2011/en/home/download.html
- GAR 2009: http://www.preventionweb.net/english/hyogo/gar/report/index.php?id=1130

- A comparative review of country-level and regional disaster loss and damage databases, UNDP 2013: http://www.undp.org/content/dam/undp/library/crisis%20prevention/disaster/asia_pacific/lossanddamagedatabase.pdf

- World Bank GFDRR Risk Lab: https://www.gfdrr.org/labs

[4] A GLIDE number comprises the following elements - two letters that identify the disaster type (e.g. EQ - earthquake); the year of occurrence of the disaster; a six-digit, sequential disaster number; and the three-letter ISO code for the country of occurrence. As an example, the GLIDE number for the 2001 West-India Earthquake is: EQ-2001-000033-IND. Beginning in 2002-2003, a GLobal IDEntifier number (GLIDE) was issued each week by EM-DAT at CRED for all new disaster events that meet the EM-DAT criteria (see http://www.cred.be). Since the beginning of 2004, an "Automatic GLIDE Generator" has been producing a GLIDE number for all new disaster events. Furthermore, the organizations mentioned above now include the relevant GLIDE number on all documents relating to a particular disaster. The inclusion of disasters that fall outside EM-DAT criteria has also been under study. The success of GLIDE depends on its widespread use and level of utility for practitioners. In addition, ReliefWeb, La Red and ADRC have activated a dedicated website http://www.glidenumber.net/ to promote GLIDE. Interested parties are encouraged to visit the GLIDE website with comments and suggestions for improvements being welcomed.

[5] Report of the WMO DRR Survey on "Capacity Assessment of National Meteorological and Hydrological Services in Support of Disaster Risk Reduction" (2006): http://www.wmo.int/pages/prog/drr/natRegCap_en.html