First Technical Workshop on Standards for Hazard Monitoring, Data, Metadata and Analysis to Support Risk Assessment

10-14 June 2013

WMO Headquarters

Geneva, Switzerland

Salle B

Webpage:
http://www.wmo.int/pages/prog/drr/projects/Thematic/HazardRisk/2013-04-TechWks/index_en.html

Concept Note

(3 June 2013)

Background

Impacts of weather-, water-, and climate-related hazards in a changing Climate

Vulnerability and exposure to disasters is increasing as more people and assets locate in areas of high risk. When a disaster happens, it sets back socio-economic development by years if not decades, particularly in the less developed countries.

Since 1970, the world's population has grown by 87 per cent. During the same time, the proportion of people living in flood-prone river basins increased by 114 per cent and on cyclone-exposed coastlines by 192 per cent. Rapid urbanization will increase exposure to natural hazards, especially in coastal zones.[1] Since the year 2000, deaths related to natural hazards have exceeded 1.1 million; and over 2.7 billion people have been affected. Another concern is the economic impact of disasters. Over the last 12 years USD 1.3 trillion has been lost to disasters. The trend is rising and now exceeds, on average, USD 100 million per year over the last decade.[2] According to OECD, the risk of losing wealth in weather-related disasters is now outstripping the rate at which the wealth itself is being created. The 2011 floods in Thailand similarly led to an estimated 2.5 per cent drop in global industrial production and caused damages of USD 40 billion.[3] On the other hand, in Africa, droughts have led to the highest proportion of deaths, 97% of all lives lost to hydro-meteorological and climate related disasters. Droughts in the United States from 2000 – 2011 have caused an estimated 13.7 billion USD in economic losses.

According to the latest Intergovernmental Panel on Climate Change's (IPCC) special report "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX)" the frequency and severity of a number of hydro-meteorological hazards are on the rise, posing challenges to sustainable development and building resilience in both developing and developed nations.[4]

Hyogo Framework for Action 2005-2015 – The Foundation of WMO Disaster Risk Reduction Priorities and Initiatives[5]

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".[6] The adoption of the HFA by 168 countries, at the World Conference on Disaster Risk Reduction (Kobe, Hyogo, Japan January 2005), has

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[1] United Nations Office for Disaster Risk Reduction, Global Assessment Report 2011: Revealing Risk, Redefining Development (Geneva, 2011)

[2] EM-DAT, The International Database (CRED), available at http://www.emdat.be/

[3] United Nations Economic and Social Commission for Asia and the Pacific, Economic and Social Survey of Asia and the Pacific 2011 -Sustaining Dynamism and Inclusive Development: Connectivity in the Region and

Productively Capacity in Least Developed Countries (Bangkok, 2011)

[4] Sources:

- IPCC Fourth Assessment Report: Climate Change 2007 (AR4): https://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#1

- IPCC report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: https://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#SREX

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

[6] 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

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.

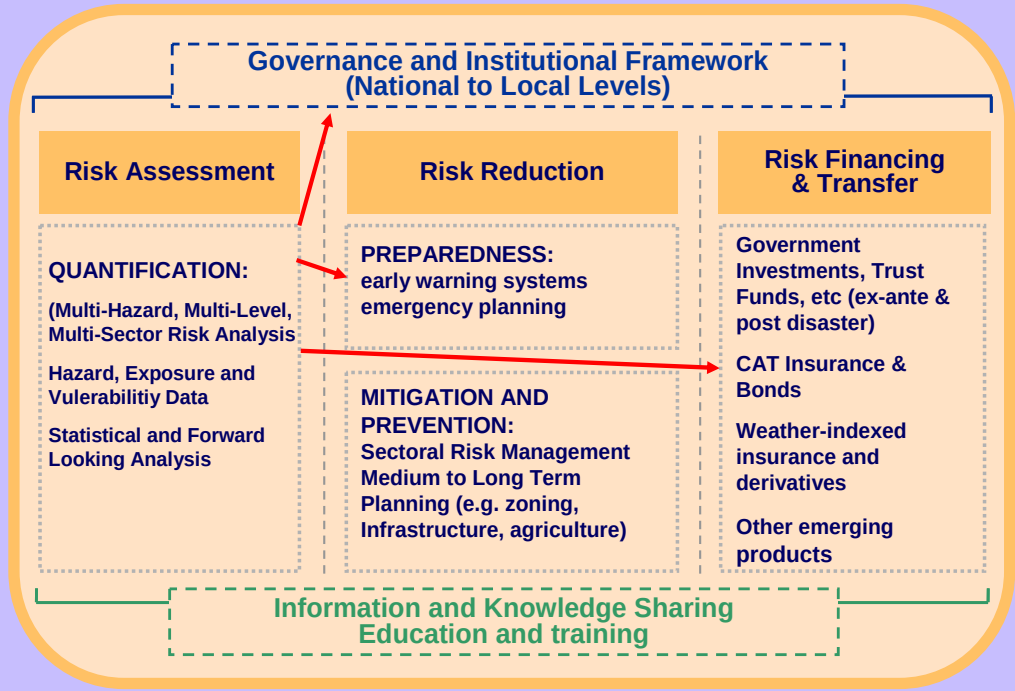
Hazard Information for Risk Analysis

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:

- 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, 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.[7] Furthermore, as accessing disaster information can be time

[7] - 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
- 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

consuming 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".[8]

In a capacity analysis survey conducted by the WMO in 2006,[9] 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.

Role of WMO for Development of Guidelines and International Standards

WMO is the specialized scientific and technical agency of the United Nations responsible for development of guidelines, standards and coordination of global network operated by the National Meteorological and Hydrological Services (NMHS) of its 191 Members for monitoring, detection, forecasting and analysis of weather-, climate- and water-related hazards and conditions.[10] Through its eight technical commissions and 10 technical programmes , WMO engages leading experts around the world to develop guidelines and standards for its Members consideration and adoption.[11]

Through it's DRR Programme, WMO is engaging its research and operational network, technical commissions and partners to address five strategic priorities derived from HFA and approved by WMO Congress XV in 2011, including:

1. Development, improvement and sustainability of early warning systems in particular related to scientific and technical infrastructures, systems and capabilities for research, observing, detecting, forecasting and warnings of weather-, water- and climate-related hazards;
2. Development, improvement and sustainability of standardized hazard databases and metadata, systems, methods, tools and applications of modern technologies such as geographical information systems for recording, analyzing and providing hazard

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

[8] 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.

[9] 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

[10] http://www.wmo.int/pages/about/index_en.html

[11] List of WMO Technical Commissions: http://www.wmo.int/pages/governance/tc/index_en.html

information for risk assessment, sectoral planning, risk transfer and other informed decision-making;

3. Development and delivery of warnings, specialized forecasts and other products and services that are timely, understandable to those at risk and driven by requirements of disaster risk reduction decision processes and operations engaging socio-economic sectors;
4. Stimulate a culture of resilience and prevention through strengthening of capacities for better integration of meteorological, hydrological and climate products and services in disaster risk reduction across all socio economic sectors, such as land use planning and infrastructure design and continued public education and outreach campaigns; and
5. Strengthening cooperation and partnerships of WMO and NMHSs in national, regional and international user forums, mechanisms and structures for implementation of disaster risk reduction.,

To this end, the 16th World Meteorological Congress in 2011, followed by the 64th session of its Executive Council,[12] adopted the WMO DRR Work Plan 2012-2015[13]. A critical deliverable of this work plan addresses the second strategic area of the WMO DRR Programme for development of guidelines and standards for hazard definition, monitoring and detection, databases and metadata and hazard analysis and forecasting tools, for weather-, climate- and hydrological hazards, building on the extensive work of the WMO technical commissions, a number of Members and key partners.

Furthermore, WMO is establishing a DRR User-Interface Expert Advisory Groups (UI-EAGs) on Hazard/Risk Analysis to provide user input and guidance towards the implementation of these guidelines and standards by the WMO Technical Commissions. [14] The first meeting of this UI-EAG will be held in 2014.

As part of the preparatory work to undertake this initiative, WMO is hosting, 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.

Workshop Objectives

(1) Explore considerations and needs for hazard information to conduct risk analysis (particularly related to cascading hazards) and geo-referencing of damage and loss data;

(2) Document definitions and approaches of the participating Members, which are among good practices and to evaluate similarities and differences among their approaches;

(3) Review the mandate and related activities of the relevant WMO Technical Commissions related to the standardization of definitions, monitoring, detecting, as well as mapping and forecasting tools for different hazards;

(4) Explore challenges and opportunities for developing international guidelines, manual and standards in this area, and;

(5) Develop recommendations and priorities of action for consideration of the Management Groups of the WMO Technical Commissions for integration in their work planning and the first meeting of the EAG-HRA, which would be held in early 2014, particularly building on expertise of technical commissions and Members.

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[12] Sources:

- WMO Executive Council Reports (EC 58, 59, 60, 61, 62, 63, 64, 65): http://www.wmo.int/pages/governance/ec/ec_docs_en.html
- Sixteenth World Meteorological Congress Report (2011) (WMO-No. 1077): ftp://ftp.wmo.int/Documents/PublicWeb/mainweb/meetings/cbodies/governance/congress_reports/english/pdf/1077_en.pdf
- [13] WMO Disaster Risk Reduction Work Plan (2012-2015): http://www.wmo.int/pages/prog/drr/documents/2012.07.05-WMODRRWorkPlan2012-2015.pdf

[14] WMO DRR Work Plan (2012-2015) and 65th session of WMO Executive Council document i4.2, 2012.

Workshop Participants

Participants in this workshop include leading technical experts from:

(1) Several countries, which systematically monitor, maintain databases and analyze hazards, including Australia, Canada, China, France, Germany, Japan, Netherlands, Russian Federation, United States of America, and the United Kingdom of Great Britain and Northern Ireland;

(2) WMO Technical Commissions responsible for the development of technical standards and guidelines related to monitoring, detection, forecasting and analysis of weather, climate and water-related hazards,

(3) Organizations with extensive experience in risk assessment and collection of damage and loss data.

Guidelines for preparations of documents and presentations

(1) Guidelines for Experts nominated by the WMO Permanent Representatives: In preparation for the workshop, the participating experts from WMO Members are requested to coordinate documentation of their respective country's practices as per questions presented in Annex I, pertaining to definition of hazards and approaches to monitoring, detecting, maintaining databases and analytical techniques (statistical and forecasting) for meteorological, hydrological and climate-related hazards of concern to their country. Given that some of these hazards may be joint mandate or under primary mandate of another agency, it is requested that preparation of this document could be carried out in cooperation with other relevant agencies in the country. Each expert will have a 30-minute slot in the agenda to present the highlights of their document prepared for the workshop.

(2) Guidelines for Experts nominated by the WMO Technical Commission Presidents: In preparation for the workshop, the expert representing the technical commission is requested to review Annex II and in cooperation with the Commission's experts to prepare a document on relevant activities of the Commission related to the definition(s) and the development of guidelines, manuals and standards and approaches to monitoring, detecting, maintaining databases and analytical techniques (statistical and forecasting) for any of the primary meteorological, hydrological and climate-related hazards of concern to WMO Members. Each expert will have a 30-minute slot in the agenda to present the highlights of their document prepared for the workshop.

(3) Guideline for experts from organizations with expertise in damage and loss databases and risk analysis: Partners: Experts from partner agencies will be invited to prepare a document and a 30-minute presentation for discussion at the Workshop.

Outcomes

The Outcomes of the workshop:

(1) A comprehensive report of the prepared and presented in the workshop as the foundation knowledge underpinning the recommendations

(2) A set of recommendations and priorities for action for the next 2-8 years to develop and provide guidelines and standards for hazard definitions, , monitoring and detection, databases and metadata and hazard analysis and forecasting tools, for weather-, climate- and hydrological hazards

Next Steps

The outcomes of this workshop will be shared with the WMO technical programmes, management groups of technical commissions, and the President's of Technical Commissions meeting for deliberation and consideration to integrate into their respective work planning as a priority area. Furthermore, the workshop recommendations will be considered for development and or strengthening of the intra- and inter-commission collaboration for development of the recommended guidelines and standards

Annexes

Annex I: Survey Questionnaire for the countries

(Pages 10-14)

ANNEX II: Survey Questionnaire for Technical Commissions

(Pages 15-18)

Annex I: Survey Questionnaire for the countries

Please list the contact information for individuals who contributed to this questionnaire:

Title	First name	Last name	Country	Name of agency	Phone number	e-mail address

A) National Hazard Programme

1. Does your country have a National Hazard Programme that focuses on natural and man-made hazards occurring in your country? If yes, please provide the following details about the programme:
2. By what authority is the hazard programme established (e.g. government, legislation, and other legal instruments)?
3. What are the goals of your country's National Hazard Programme?
4. Please list the agencies that are involved in the programme by specifying whether there is :
    a. A lead agency and if so what is the agency and its mandate
    b. Other agencies and their roles and responsibilities
5. How is the National Hazard Programme coordinated institutionally, and operationally?
6. What are the concrete products and services of your country's National Hazard Programme (e.g., National Hazard Data Platform, analysis and advisories, etc.)? Who are the beneficiaries and how are they engaged in the product / service development process.
7. Who are the direct and indirect beneficiaries of your country's National Hazard Programme?
8. If your country has established a national hazard database, which hazards are included in this database? How have the standards for this database been developed?
9. For disasters caused by hydrometeorological and climate hazards in your country, does your country conduct a post disaster review and associated documentation? If yes, does the documentation include the historical data and information that characterized the hazard(s) that triggered the disaster? Where is this documentation archived and does the National Hazard Programme utilize the data and information or have access to it?

B) Hazard Definition, Detection and Monitoring

10. For each hazard listed in Table 1, please either fill in the Table or develop a document that provides information requested in each column.
11. For each hazard, please specify what is the observing network (in situ, satellite) that is used to collect the various parameters
12. Please describe your country's hazard monitoring capacities by specifying the Tools for hazard monitoring (e.g., software, visualization tools, etc.)

C) Hazard Observation Data Archival and Management

13. Please describe your country's hazard observation data archival processes by listing the:
    i. Agency(ies) responsible for maintaining the observation archives
    ii. Types of observation parameters archived, including the:
        a. How data quality is assured and by what standard.
        b. Archival frequency

c. Metadata information (please provide a sample),
d. Please provide a sample output of the database

14. Please describe your country's hazard data management processes by specifying the:
    i. Data policies and service delivery models:
    a. Including, if the data is freely accessible to the public? If not, what data is available and if there is a fee for access? Is the fee for "cost recovery" or for profit?
    i. Data archival standards
    ii. Timeframe(s) of reliable historical data archived
    iii. Quality control mechanisms
    iv. Data restoration and reconstruction efforts (digitization). Does your country have historical data that needs to be digitized? Please specify the timeframe and scope.

D) Hazard Analysis and Mapping

15. If your country has a National Hazard Programme, does it:
    i. Perform statistical analysis to identify the characteristics of natural hazards (e.g. intensity, frequency and probability) that affect your country? If yes, please:
        a. Describe the types of analysis that are conducted and for which hazards
        b. What tools do you utilize to develop these statistics?
        c. Are these analysis's accessible to the government agencies that are responsible for disaster risk management
        d. Are these analysis's accessible by the general public?
        e. Please attach some samples of these statistics.
    ii. Develop hazard maps to identify the geographical areas and communities that could be affected by natural hazards? If yes,:
        a. Describe the types of mapping that are conducted and for which hazards.
        b. What tools do you utilize to develop the hazard maps (e.g. GIS platform)?
        c. Are these hazard maps accessible to the government agencies that are responsible for disaster risk management?
        d. Are these hazard maps accessible to the general public?
        e. Please attach some samples of these maps.
    iii. Develop integrated hazard maps to assess the interaction of multiple natural hazards? If yes,
        a. Please indicate the types of hazards are addressed by these maps (e.g. interaction of river flooding from heavy rains and storm surge flooding from a tropical cyclone).
        b. Please attach samples.
    iv. Develop hazard forecasts (e.g. drought, heat wave, tropical cyclones)
        a. Return period calculations for specific hazards
        b. Climate change effects on intensity, severity, exposure patterns of specific hazards

Table 1: Hazard priorities, definitions and hazard data archiving

1. Please complete the following table regarding your country's priority hazards, hazard definitions and hazard data archiving. (Please note that this table is in A3 format to allow for space. To print this table in A4 or Letter format please specify in the printer properties "Fit to paper size" on the "Paper" tab.)

HAZARD	**Please provide your countries official definition for this hazard including: (i) text definition, and (ii) meteorological, hydrological and climate characteristics that define the hazard.**	**Please rank the hazard on a scale of 1-10 as to its associated impacts in your country (e.g., number of deaths, economic losses). 1= highest impact, 10 = lowest impact.**	**Does your country archive standardized meteorological / hydrological data & information (e.g. spatial, temporal) to characterize this hazard**	**Please specify the name of the agency/organization that is responsible for the hazard data.**	**Please specify the parameters that are archived for this hazard (e.g. temperature, wind, pressure, radar images, etc)**	**Please specify the criteria that determines when observational data and information is archived for the specified hazard occurrence (e.g. threshold values such as number of deaths, meteorological and hydrological parameters, etc)**	**How many years of data exist in the data archive for the hazard?** **Please specify year range, for example 1973 – 2012.**
Drought							
Flash and river floods							
Strong winds							
Tornado (rotational high winds)							
Hailstorm							
Thunderstorm or lightning							
Heavy snow							
Freezing rain							
Dense fog							
Tropical cyclone							
Storm surge							
Coastal flooding							

Table 1: Hazard priorities, definitions and hazard data archiving

1. Please complete the following table regarding your country's priority hazards, hazard definitions and hazard data archiving. (Please note that this table is in A3 format to allow for space. To print this table in A4 or Letter format please specify in the printer properties "Fit to paper size" on the "Paper" tab.)

HAZARD	Please provide your countries official definition for this hazard including: (i) text definition, and (ii) meteorological, hydrological and climate characteristics that define the hazard.	Please rank the hazard on a scale of 1-10 as to its associated impacts in your country (e.g., number of deaths, economic losses). 1= highest impact, 10 = lowest impact.	Does your country archive standardized meteorological / hydrological data & information (e.g. spatial, temporal) to characterize this hazard	Please specify the name of the agency/organization that is responsible for the hazard data.	Please specify the parameters that are archived for this hazard (e.g. temperature, wind, pressure, radar images, etc)	Please specify the criteria that determines when observational data and information is archived for the specified hazard occurrence (e.g. threshold values such as number of deaths, meteorological and hydrological parameters, etc)	How many years of data exist in the data archive for the hazard? Please specify year range, for example 1973 – 2012.
Heat wave: period of abnormally high temperatures							
Cold wave: period of abnormally low temperatures							
River flooding							
Marine hazards (storm, sea ice, icebergs, etc.)							
Sand and dust storms							
Landslide or mudslide							
Airborne hazardous substances (i.e., nuclear, biological, chemical, etc.)							
Waterborne hazards (i.e., nuclear, biological, chemical, oil spills, etc.)							
Desert locust swarm							
Hydrometeorological hazards to aviation (i.e., turbulence, icing)							
Avalanche							

Table 1: Hazard priorities, definitions and hazard data archiving

1. Please complete the following table regarding your country's priority hazards, hazard definitions and hazard data archiving. (Please note that this table is in A3 format to allow for space. To print this table in A4 or Letter format please specify in the printer properties "Fit to paper size" on the "Paper" tab.)

HAZARD	Please provide your countries official definition for this hazard including: (i) text definition, and (ii) meteorological, hydrological and climate characteristics that define the hazard.	Please rank the hazard on a scale of 1-10 as to its associated impacts in your country (e.g., number of deaths, economic losses). 1= highest impact, 10 = lowest impact.	Does your country archive standardized meteorological / hydrological data & information (e.g. spatial, temporal) to characterize this hazard	Please specify the name of the agency/organization that is responsible for the hazard data.	Please specify the parameters that are archived for this hazard (e.g. temperature, wind, pressure, radar images, etc)	Please specify the criteria that determines when observational data and information is archived for the specified hazard occurrence (e.g. threshold values such as number of deaths, meteorological and hydrological parameters, etc)	How many years of data exist in the data archive for the hazard? Please specify year range, for example 1973 – 2012.
Forest or wild land fire							
Smoke, Dust or Haze							
Tsunami							
Rapid melting of glaciers							
Other:							

ANNEX II: Survey Questionnaire for Technical Commissions

Please list the contact information for individuals who contributed to this questionnaire:

Name of Technical Commission Focal Point:				
Title	**First name**	**Last name**	**Phone number**	**e-mail address**

Please provide the following information on who has been consulted to complete your response				
Title	**First name**	**Last name**	**Role within Technical Commission**	**e-mail address**

Table 1: Hazard priorities, definitions and hazard data archiving

Please complete the following table regarding your Technical Commission's activities related to standards for hazard monitoring, databases, metadata and analysis techniques to support risk assessment.

	If your Commission has activities related to the specific hazard, please specify the following:

	Activities		Hazard Monitoring & Detecting	Data / Metadata			Statistical, Analysis and Forecasting Techniques
HAZARD	**Please indicate if your commission has activities related to the specified hazard (Yes/No)**	**Please: (i) identify each activity, (ii) identify the entity that is responsible (e.g. OPAG, Working Group, Expert Team), and (iii) provide a short description of the activity.**	**Please indicate whether the identified activities are related to observation, detection and monitoring of meteorological / hydrological and climate hazards and provide a short description of why the activity is related.**	**Please indicate whether the identified activities are related to archival of standardized meteorological / hydrological data & information (e.g. spatial, temporal) to characterize the hazard and provide a short description of the activity.**	**Please indicate whether the identified activities related to standardization of archived parameters for the specified hazard and provide a short description of the activity.**	**Please indicate whether the identified activities are related to standardization of when observational data and information is to be archived for the specified hazard occurrence (e.g. threshold values such as number of deaths, meteorological and hydrological parameters, etc) and provide a short description of the activity.**	**Please indicate whether the identified activities are related statistical, analysis and forecasting techniques and provide a short description of the activity.**
Drought							
Flash and river floods							
Strong winds							
Tornado (rotational high winds)							
Hailstorm							
Thunderstorm or lightning							
Heavy snow							
Freezing rain							
Dense fog							
Tropical cyclone							

Storm surge							
Coastal flooding							
Heat wave: period of abnormally high temperatures							
Cold wave: period of abnormally low temperatures							
River flooding							
Marine hazards (storm, sea ice, icebergs, etc.)							
Sand and dust storms							
Landslide or mudslide							
Airborne hazardous substances (i.e., nuclear, biological, chemical, etc.)							
Waterborne hazards (i.e., nuclear, biological, chemical, oil spills, etc.)							
Desert locust swarm							
Hydrometeorological hazards to aviation (i.e., turbulence, icing)							
Avalanche							
Forest or wild land fire							
Smoke, Dust or Haze							
Tsunami							

Rapid melting of glaciers							

Table 2: Hazard priorities, definitions and hazard data archiving

Please list existing published materials (e.g., Standards, technical guidelines, technical notes, training and educational curricula, public information material) that your Technical Commission has produced that are related to standards for hazard monitoring, databases, metadata and analysis techniques to support risk assessment.

Publication number	Title of Publication	Please provide: i) A brief description of the scope of this publication and how it relates to the topic of this technical workshop, ii) Through which OPAG, Working Group, Expert Team it was produced, iii) if this publication is available electronically please provide download link.