WMO Activities in Developing Capacities of National Meteorological and Hydrological Services for Hazard Analysis

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Session 13: Role of National Meteorological and Hydrological Services for Hazard Mapping

Understanding Risk Forum
2-6 July, 2012
Cape Town, South Africa
Agenda

• About WMO

• WMO DRR Programme (national, regional, and global)

• WMO initiatives to support hazard analysis
WMO Institutional Structure

Technical

Programmatic
Supported by 8 Technical Commission

Basic Observations (space and in situ), forecasting, telecommunication systems

Climate

Meteorology

Hydrology

Agricultural Meteorology

Transport (Marine, Aeronautical)

Disaster Risk Reduction

Development and regional activities

WMO Secretariat (Geneva)

Support technical capacity development to 189 Members ‘National Meteorological and Hydrological Services (NMHSs)’

Global/Regional

3 World Meteorological Centres (WMC)

6 Regional Association (platform for consultations and building consensus)

Global & Regional Climate Centers

40 Regional Specialised Meteorological Centres (RSMC)

30 Regional Training Centres (RMTC)
WMO develops standards and technical guidelines …

- Meteorological, hydrological and climate instrumentation, observing networks, monitoring
- Meteorological, hydrological and climate related hazards, databases, metadata
- Forecasting tools (Weather, water and climate)
- Quality assurance and verification (data, tools, methodologies, etc)
- International data sharing policies
  - Resolution 40 “WMO Policy and Practice for the Exchange of Meteorological and Related Data …” was adopted by 12th WMO Congress in 1995.
  - Resolution 25 “Exchange of Hydrological Data and Products” was adopted by the 13th WMO Congress in 1999”
WMO Coordinates International Research Programmes in Weather and Climate

World Climate Research Programme, World Weather Research Programme

Climate change

Climate variability

El Niño

Pacific Decadal Oscillation

Northern Atlantic Oscillation

Tropical cyclones

Storm surges

Ice storms

Dust storms

Hail and lightning

Flash floods

Avalanches

Tornadoes

Hot and cold spells

Droughts

River basin flooding

Heavy precipitations (rain or snow)

Storm (winds)

Wildland fires and haze

Mud and landslides

IPCC Assessments

National Operational forecasting systems

UNFCCC negotiations

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National Meteorological and Hydrological Services (NMHS)

Mission: Observing and understanding weather, water and climate and in providing services in support of national needs:

- Protection of life and property;
- Safeguarding the environment;
- Contributing to sustainable development;
- Ensuring continuity of the observations of meteorological and related data including climatological data;
- Promotion of endogenous capacity building;
- Meeting international commitments; and
- Contributing to international cooperation.
WMO Coordinates a Global Operational Network

189 Members
Tropical Cyclone Programme
(6 Regional Centers & 5 Regional Coordination Committees)
Network of WMO Global and Regional Meteorological and Climate Centres

- Global Producing Centres of Long Range Forecasts (GPCs)
- Regional Climate Centres (RCCs)
- RCC Network Nodes (Pilot)
- Regional Specialized Meteorological Centres with Activity Specialization
- Regional Specialized Meteorological Centres with Geographical Specialization
- Regional climate institutions with strong WMO support
- Sand & Dust Storm Warning & Assessment System Centres

LC-SVSLRF: Lead Centre for Standardized Verification System for Long Range Forecasts
LC-LRFMME: Lead Centre for Long Range Forecast Multi-Model Ensemble

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Seamless Meteorological and Climate Services to support risk analysis and management
Global Framework for Climate Services

To Operational science-based climate information and prediction building on the WMO globally coordinated operational framework
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Meteorological, Hydrological and Climate Services are critical to risk assessment and DRR decision-making


Governance and Institutional Framework (Policy, Legislation, legal framework, institutional coordination)
(Multi-sector, Multi-level, Multi-Hazard)

Risk Assessment

1. QUANTITATIVE MULTI-HAZARD-MULTI-LEVEL, MULTI-SECTOR RISK ANALYSIS
   
   Hazard, exposure and vulnerability databases
   
   Statistical and forward looking approaches

Risk Reduction

2. PREPAREDNESS:
   early warning systems
   emergency planning

3. PREVENTION and MITIGATION:
   Sectoral Medium to long term planning (e.g. zoning, infrastructure, agriculture...)

Risk Financing and Transfer

4. Gov Investments, trust funds (ex-ante, post disaster)

5. CAT insurance & bonds
   Weather-indexed insurance and derivatives
   Other emerging products

Information and Knowledge Sharing

6. Education and training

Governance and Institutional Framework (Policy, Legislation, legal framework, institutional coordination)
(Multi-sector, Multi-level, Multi-Hazard)
Critical need for historical and forward looking multi-hazard data and analysis to support risk assessment...

Source: WMO Disaster Risk Reduction Programme
Droughts, Flash and river floods, forest and wild fires, heat waves and cold spells, land- and mud-slides, marine and aviation hazards, strong winds and severe storms, tropical cyclones and storm surges

Other: volcanic ash transport, air pollution, locust swarms, health epidemics, tsunami, etc…
Capacity Assessment of NMHS

Source: 2006 WMO Country-level DRR survey
(http://www.wmo.int/pages/prog/drr/natRegCap_en.html)

- 70% need amendments of national policies and legislation
- 67% need modernization of meteorological infrastructure (e.g., observation networks, forecasting, telecommunication, data rescue,…)
- 80% need technical and management training
- 80% of need multi-sectoral institutional partnerships, coordination

Meteorological infrastructure/systems… high return on investment!

Status of Hazard Monitoring & databases

Source: 2006 WMO Country-level DRR survey
(http://www.wmo.int/pages/prog/drr/natRegCap_en.html)

Over 80% of meteorological in Africa, are challenged in delivering these services!

Main Challenges:
- Modernisation of observation networks
- Data rescue
- Data management systems
- Need for guidance for:
  - Maintaining standard hazard database and metadata
  - Hazard analysis and mapping tools
    ✓ Statistical analysis
    ✓ Climate modelling
Data Policy and Exchange

Source: 2006 WMO Country-level DRR survey
(http://www.wmo.int/pages/prog/drr/natRegCap_en.html)

• International data sharing policies
  ▪ Resolution 40 “WMO Policy and Practice for the Exchange of Meteorological and Related Data …” was adopted by 12th WMO Congress in 1995.
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• Challenges with data policy and exchange
  • National security
  • Commercial
  • Not available or need for data rescue
  • Institutional turfs and silos

• Need for high-level policy discussion within and across governments
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DRR Programme Two-tier Work Plan

Knowledge Development
(guidelines, standards & training)

Identification and documentation of:
**good practices**
(Policy, institutional, technical operations, products and services, etc.)

Monitoring, Evaluation and Feedback

Coordinated National and Regional Projects

Requirements, Guidelines, Standards, Tools, Methodologies and training

National/regional Capacity Development
User-Driven Expert Advisory Groups (EAG) to guide WMO DRR activities

- EAG Multi-Hazard Early Warning Systems
- EAG Hazard / Risk Analysis
  - Weather / Water / Climate
- EAG Humanitarian Preparedness
- EAG Disaster Risk Financing
- Others… TBD
### User-Driven Expert Advisory Groups (EAG) to guide WMO DRR Guidelines and Capacity development projects

<table>
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<tr>
<th>User-Driven DRR Expert Advisory Group or Coordination Mechanism</th>
<th>Participating experts from partner agencies</th>
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<tr>
<td><strong>EAG on Climate Services for Hazard/Risk Analysis</strong></td>
<td>World Bank, UNDP-GRIP, WFP, Experts from Risk Modelling Sectors, OECD, GEM, CRED, Munich Re, Swiss Re, WRN, UN-ISDR, UNFCCC, UNEP, UNESCO-IOC, UNITAR/UNOSAT, ESRI, CIMH, NMHS, RCCs.</td>
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<tr>
<td><strong>EAG on Climate Services for Disaster Risk Financing</strong></td>
<td>UNEP-FI, WFP, Willis Research Network, CIMH, CSIRO, ISDR, Munich Re, UNFCCC, World Bank, IFAD, Swiss Re, University of Kentucky, Geneva Association (Insurance), NMHS.</td>
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<td><strong>Ad-hoc Task Team on Meteorological, Hydrological and Climate Services for Humanitarian Preparedness</strong></td>
<td>UN- OCHA, UN-HCR, IFRC, UNICEF, UNITAR-UNOSAT, WFP, WHO, UNDP.</td>
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Knowledge Products in DRR: WMO Technical Hazard Guidelines

- Development of standards for meteorological, hydrological and climate hazards (on 10 primary hazards identified by WMO Members through the WMO DRR Survey 2006)
  - monitoring,
  - Databases and metadata
  - Hazard analysis tools (Statistical and forecasts) – GIS-based
- ISO certification and adoption by Members
- National/regional capacity development projects
Comprehensive Capacity Development DRR and Adaptation Projects Underway

Partners: WMO, World Bank, UN-ISDR, UNDP, Regional Socio-economic Groupings and regional DRR agencies, Regional Centers, WMO Regional Association, NMHS, National DRM agencies and economic line ministries

Central America and Caribbean (2010- present)
Costa Rica and all Caribbean Islands

South East Europe (2007- present)
8 countries

Haiti

Since 2010 with Members & UN

Central Asia and Caucasus (2009- present)
XX countries

South East Asia (2010 – present)
6 countries: Lao, Cambodia, Vietnam, Thailand, Philippines, Indonesia
Thank You

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<tr>
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<tr>
<td><strong>Book 1</strong>: partnerships in Multi Hazard Early Warning Systems, a compilation of seven good practices and Lessons Learned</td>
<td>March 2012 Springer Verlag</td>
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<td><strong>WMO Guidelines</strong>: Requirements of the International Humanitarian Sector for Meteorological, Hydrological and Climate Services to Support Preparedness Planning and Response</td>
<td>July 2012 September 2012 (4 languages)</td>
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<td><strong>WMO Guideline</strong>: Governance and Institutionnal Partnerships in MHEWS</td>
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<td><strong>Book 2</strong>: Climate services for Disaster Risk Financing: Documentation of good practices and lessons learned</td>
<td>December 2012</td>
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<tr>
<td><strong>WMO Guideline</strong>: Requirements for climate services for Disaster Risk financing</td>
<td>March 2013</td>
</tr>
<tr>
<td><strong>WMO / CRED Annual Publication</strong>: Socio-economic impacts of meteorological, hydrological and climate hazards</td>
<td>Pilot November 2012</td>
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<tr>
<td><strong>WMO Technical Hazard Guidelines</strong>: Standardisation of meteorological, hydrological and climate hazards monitoring, data, metadata and analysis and forecasting tools (on 10 primary hazards identified by WMO Members)</td>
<td>2013-2015</td>
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<td><strong>WMO Operational EWS guidelines</strong>: Operations and Quality Management Systems for MHEWS</td>
<td>2015</td>
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WMO-CRED Atlas: of Mortality and Economic Loss from Meteorological, Hydrological and Climate-Related Hazards

• Statistics:
  – Last 40 year, decadal, annual
  – Global, regional, sub-regional, national
  – By hazard type and aggregates

• Annual comparisons

• National initiative for verification of CRED and geo-referencing the data (NMHS and other agencies nationally)