World Meteorological Organization

Working together in weather, climate and water

Meteorological, Hydrological and Climate Services for DRR and Adaptation

WMO DRR Programme and GFCS

Dr. Maryam Golnaraghi,

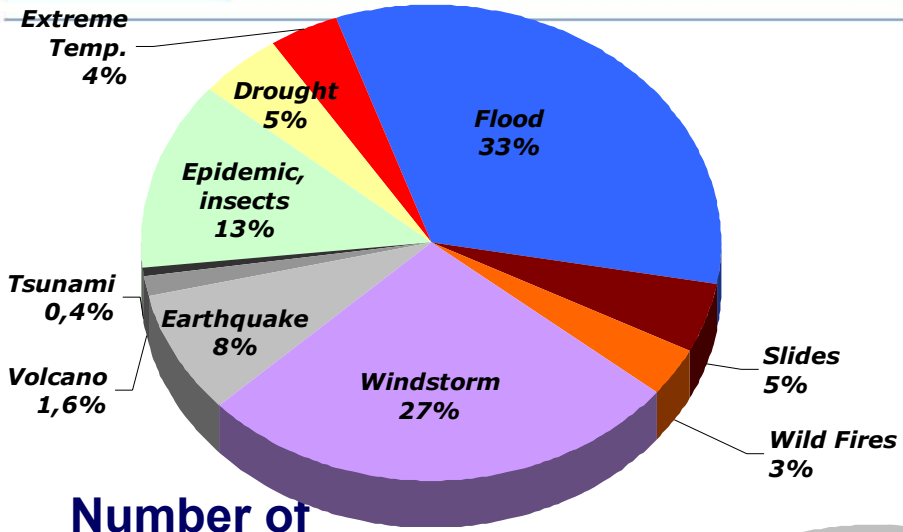
Chief, WMO Disaster Risk Reduction Programme

UNFCCC Workshop on Gaps and Challenges in Risk Management

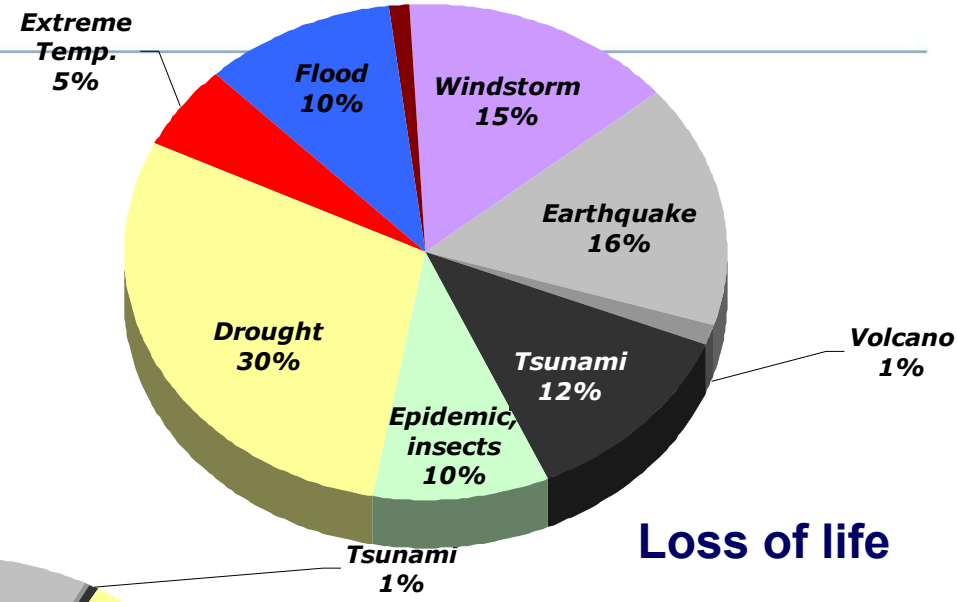
Lima, Peru

10-12 October 2011

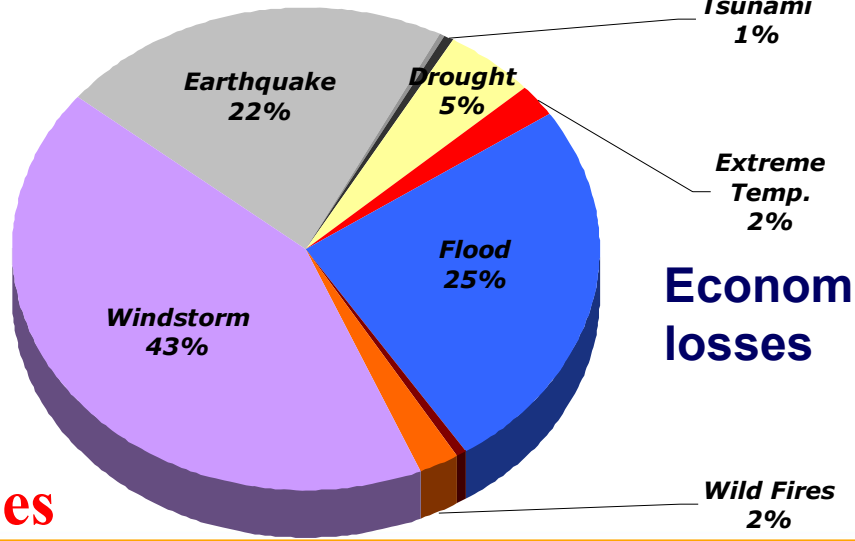
Global Distribution of Disasters Caused by Natural Hazards and their Impacts (1980-2007)



Number of events



Loss of life



Economic losses

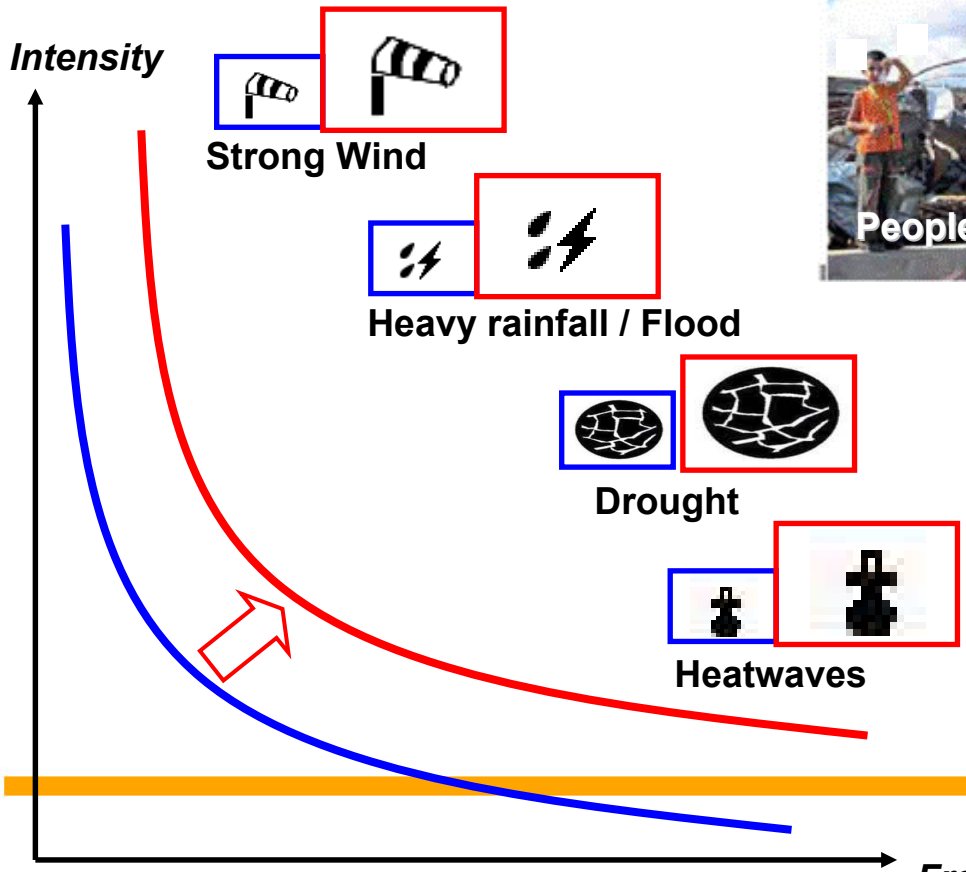
Source: *EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain - Brussels - Belgiumc*

90% of events
70% of casualties
75% of economic losses

are related to hydro-meteorological hazards and conditions.

Socio-economic Impacts of Climate-Related Extremes on the Rise !

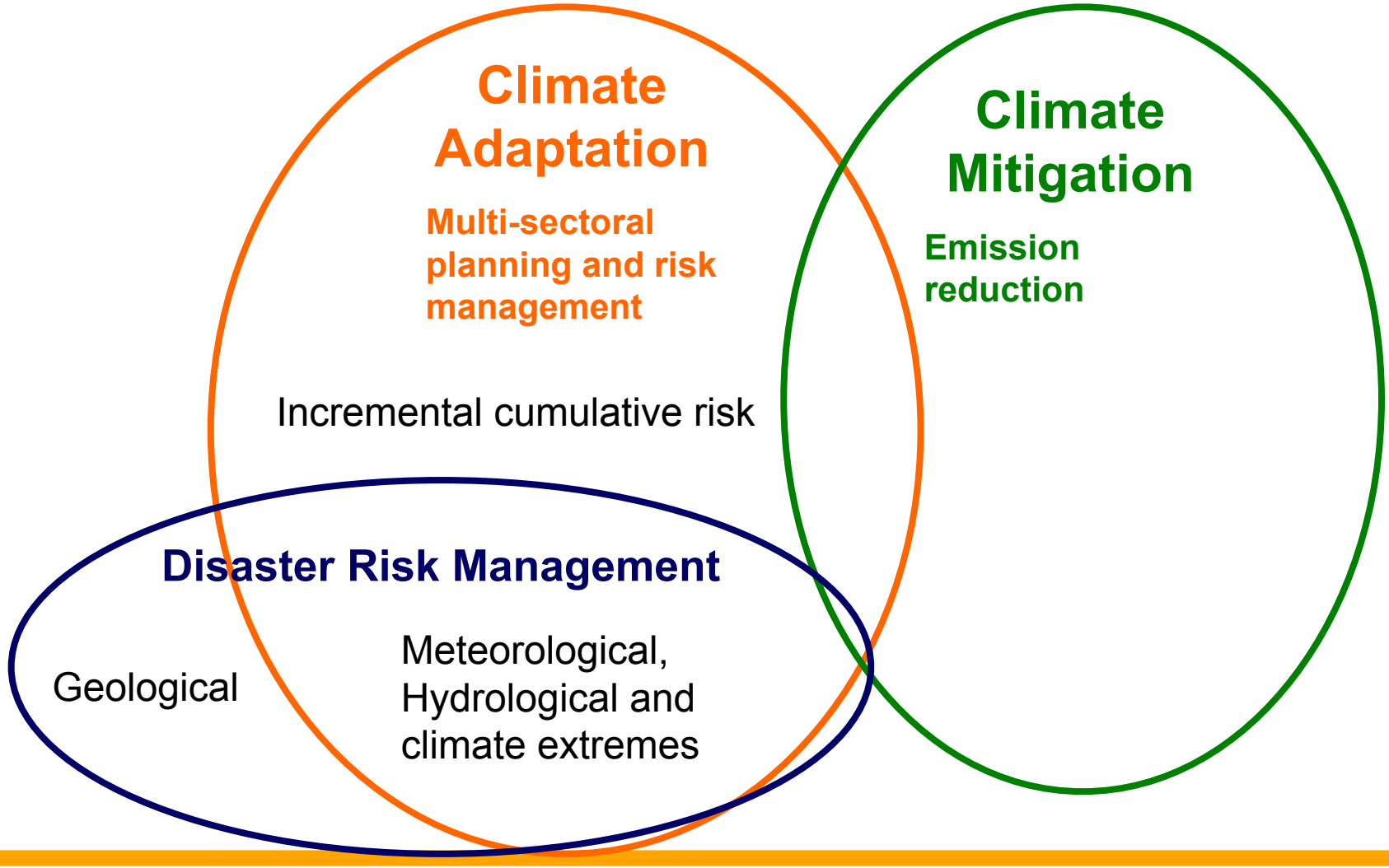
Hazard intensity and frequency increasing linked to climate variability and change!



Vulnerability and exposure on the rise !

Need for Multi-sectoral risk management

Inter-linkages: A story



Hyogo Framework for Action: A critical paradigm shift….

- Traditionally focused on post disaster response
- HFA shift to development focus: risk assessment, risk reduction and risk transfer
- Facilitated cooperation mechanisms at national, regional and global levels

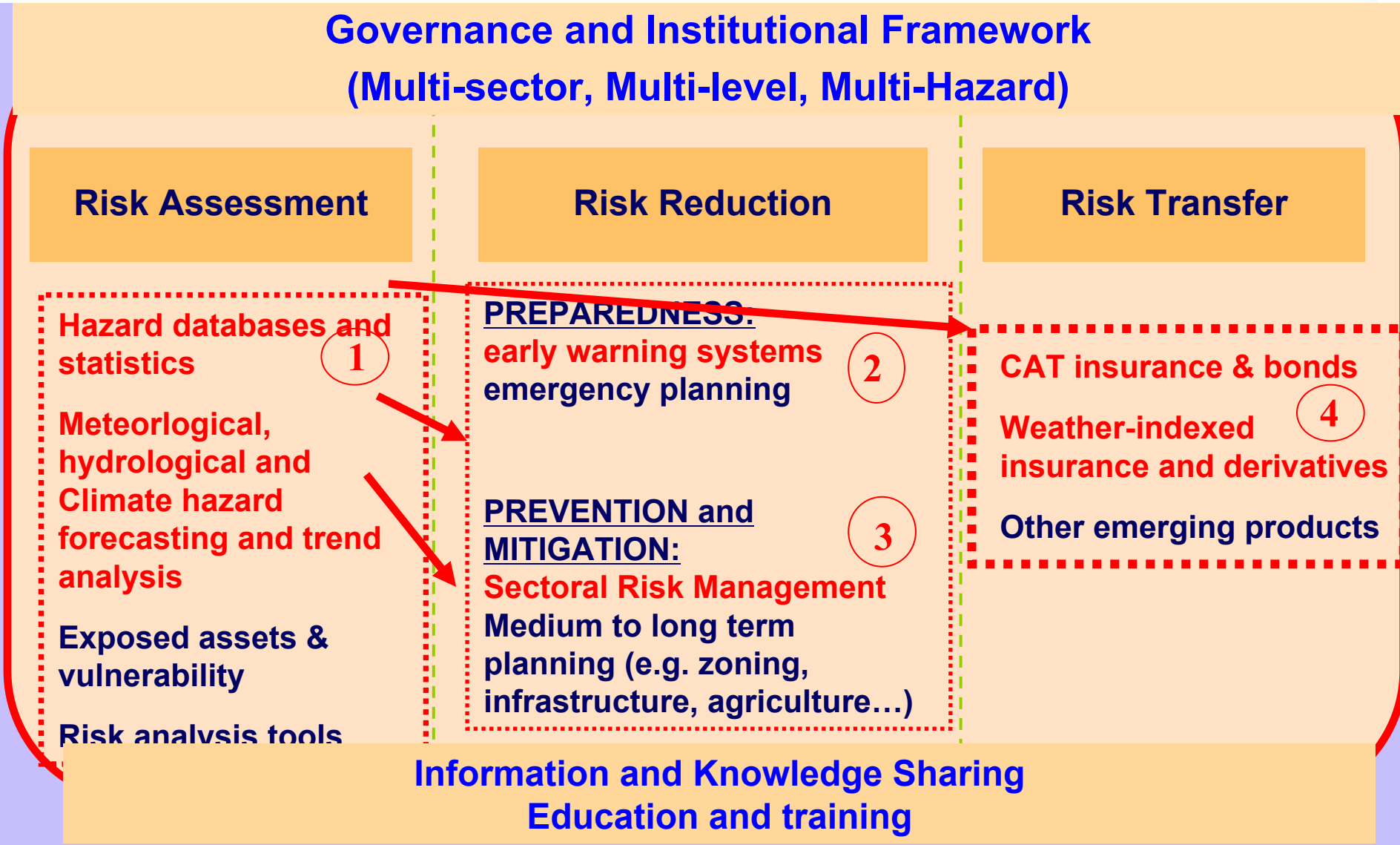
Implementation of the new paradigm in DRR requires meteorological, hydrological and climate services!

Three inter-related international negotiation processes ….

Linking Disaster Risk Reduction and Climate Adaptation ….

- United Nations Framework Convention on Climate Change (UNFCCC)
- Hyogo Framework for Action (HFA) – United Nations International Strategy for Disaster Reduction (UN-ISDR)
- Global Framework for Climate Services (GFCS)

Comprehensive Disaster Risk Management

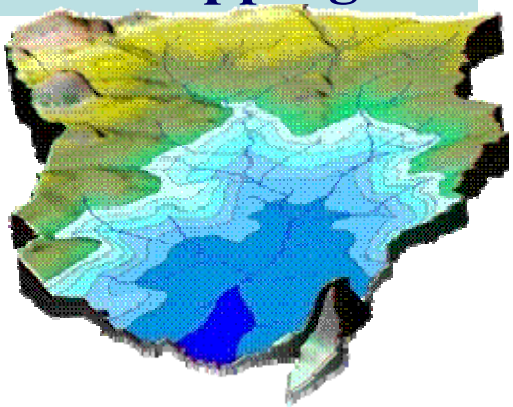


Understanding the risks is the foundation for risk management decision making!

- Dimensions to decision-making:
  - Spatial scale (Global, Regional, National, Provincial, Local)
  - Temporal scale (now to decades)
- Type of decisions
  - Policy and strategic, financial,
  - development planning and preparedness,
  - operational
- Variety of decision makers
  - Multi-sectoral
  - Multi-level
  - Public and Private Sector, NGOs, general public, international and regional actors,
  - etc

A highly simplified Example for risk assessment!

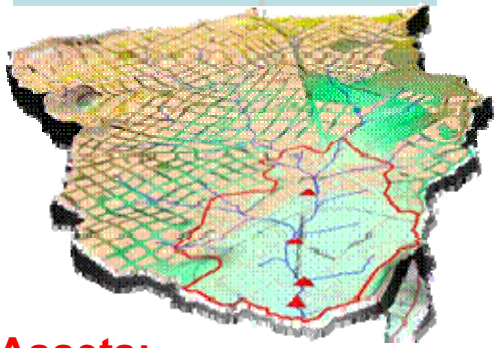
Hazard Analysis and Mapping



Heavy Precipitation and flood mapping

Need for historical and real time data
Statistical analysis tools meteorological, hydrological and climate forecasts and trend analysis

Exposure and Vulnerability



Assets:
- ✓ population density
- ✓ agricultural land
- ✓ urban grid
- ✓Infrastructure
- ✓Businesses

Need for Socio-economic impacts data and analysis tools

Potential Loss Estimates

Number of lives at risk

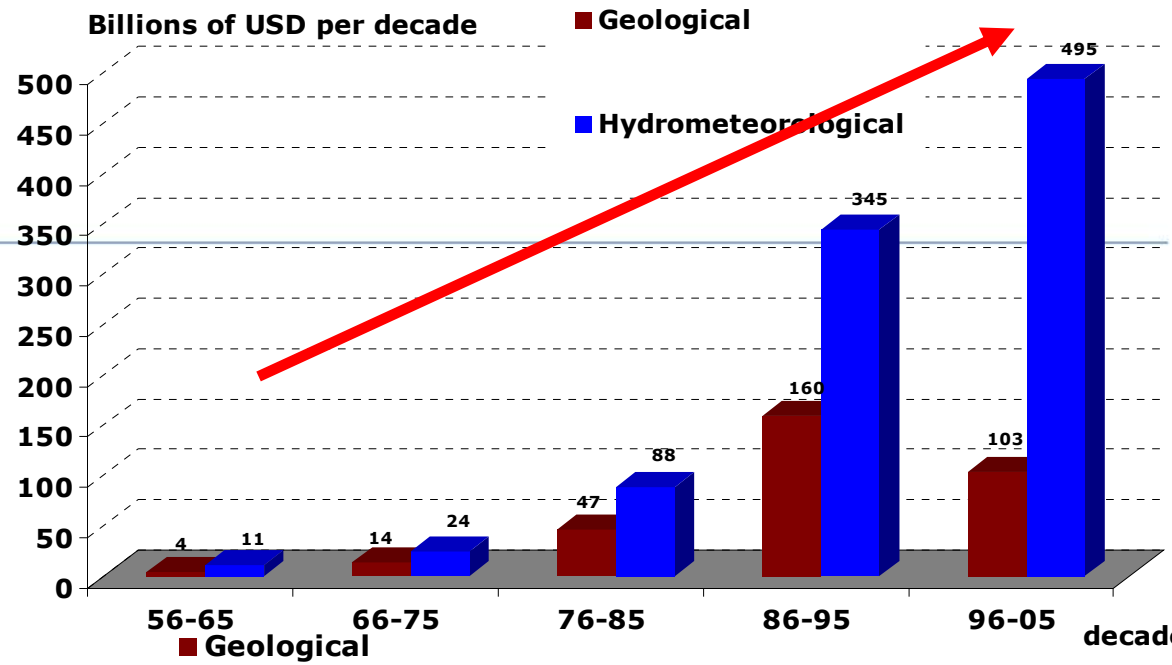
$ at risk

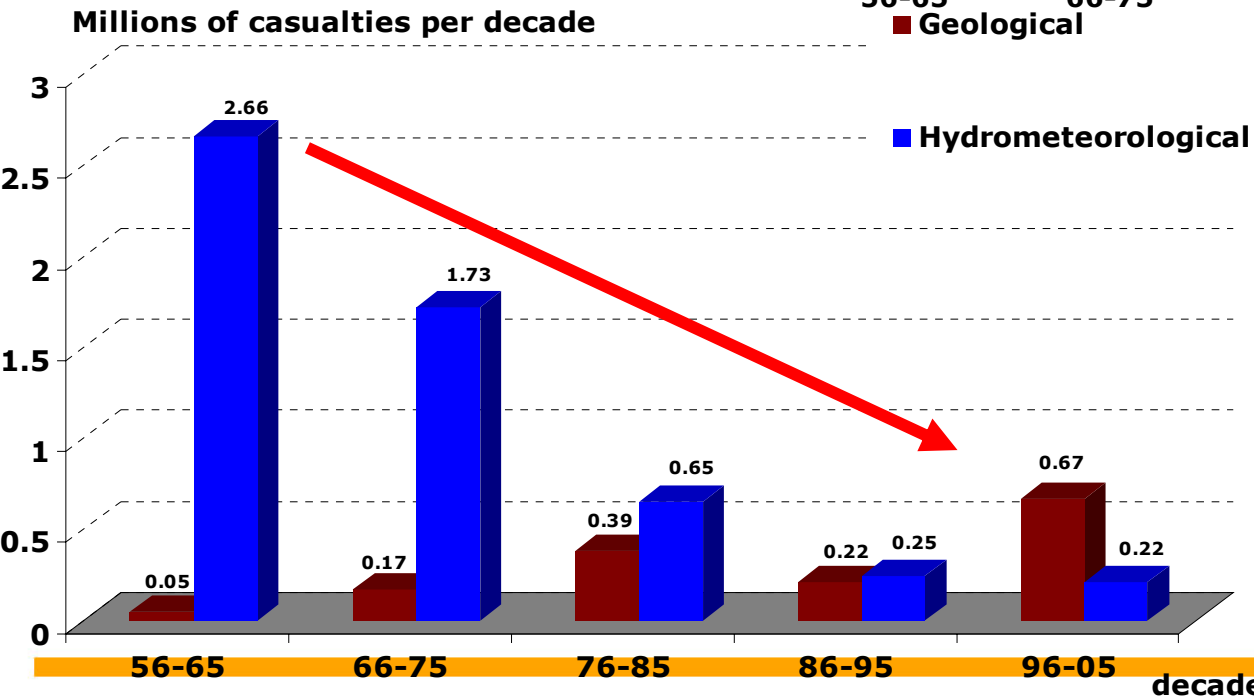
- ✓Destruction of buildings and infrastructure
- ✓Reduction in crop yields
- ✓Business interruption

Need for risk analysisi tools combining hazard, exposure and vulnerability information

This information is critical for decision-making and development of strategies to reduce the risks

While economic losses are on the way up!





Loss of life from hydro-meteorological disasters are decreasing!

Source: EM-DAT: The OFDA/CRED International Disaster Database

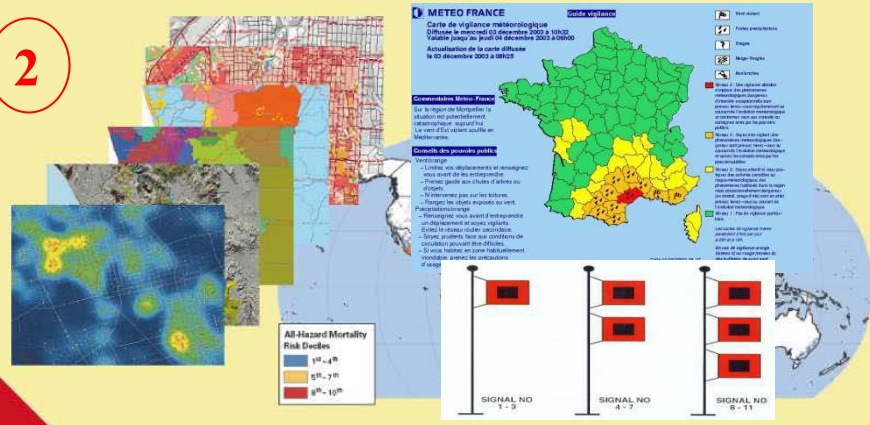
Early Warning Systems with Multi-Sectoral, Multi-Level, Multi-Hazard Approach

National to local disaster risk reduction plans, legislation and coordination mechanisms

1

Hazard Data and Forecasts

2



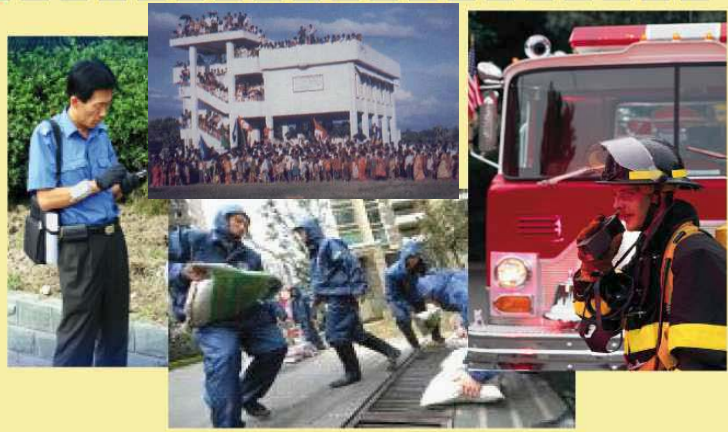
Risk Information

Coordination and Collaborations

Communication and Dissemination Mechanisms

3

4



Preparedness and Early Response

Recent advances in climate forecasting and trend analysis provide unprecedented opportunities….

…. to support sectoral risk assessment and management!

- Water resource management
- Land zoning
- Infrastructure and planning (urban, rural)
- Agricultural productivity and food security
- Health epidemics
- Insurance / Finance
- Tourism

Climate Services are Critical for (Re)Insurance Markets and other Risk Transfer Mechanisms

Which Risks?

Financial risks

What type of Financial tools?

CAT insurance & bonds

Weather-indexed insurance and derivatives

Regional Catastrophe Insurance Facilities

Other emerging products

Who Could Benefit?

Government

Companies

Individuals

Other

Requirements for Hydro-Met and climate Services?

Historical and real-time data (Fundamental for development of these markets!)

Seasonal to inter-annual climate forecasts

Decadal climate trend analysis

Long term trend analysis (long-term market strategy)

WMO Workshop: http://www.wmo.int/pages/prog/drr/events/cat-insurance-wrm-markets-2007/index_en.html

WMO DRR Crosscutting Programme was established to leverage **expertise, resources and capacities** of **WMO Member States, programmes and network** with other **UN, international and regional partners** to support disaster risk management decision making

WMO Governance and Institutional Structure

Technical | **WMO Secretariat (Geneva)** | **Global/ Regional**

Programmatic

Basic Observations, forecasting, telecommunication systems

Climate

Meteorology

Hydrology

Agricultural Meteorology

Transport (Marine, Aeronautical)

Disaster Risk Reduction

These are supported by 8 expert commissions

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

3 World Meteorological Centres (WMC)

6 Regional Association (platform for consultations and consensus)

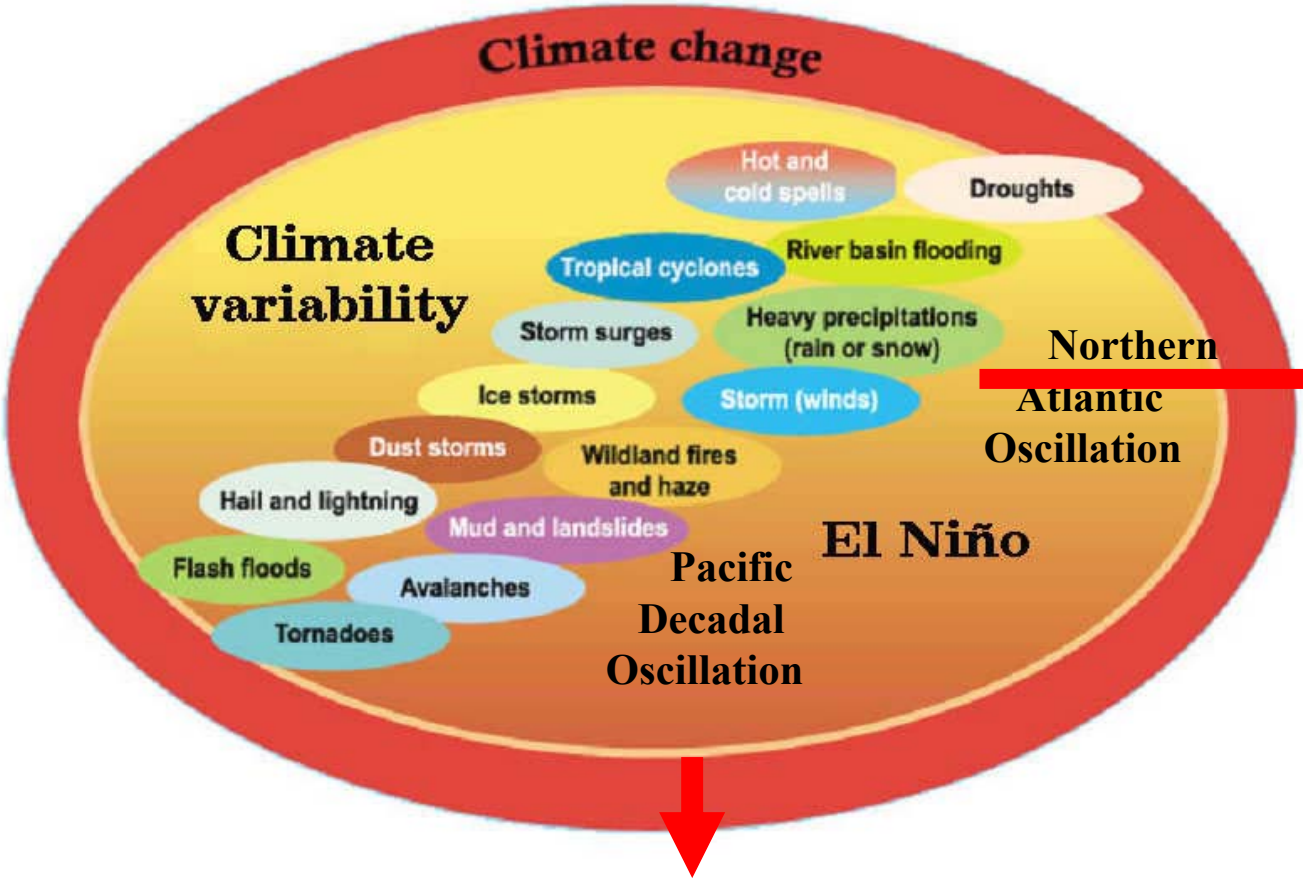
Global Climate Centers & Regional Climate Centers

40 Regional Specialised Meteorological Centres (RSMC)

30 Regional Training Centres (RMTC)

International Research Programmes in Weather and Climate

World Climate Research Programme, World Weather Research Programme



National Operational forecasting systems

IPCC Assessments

UNFCCC negotiations

WMO Operational network

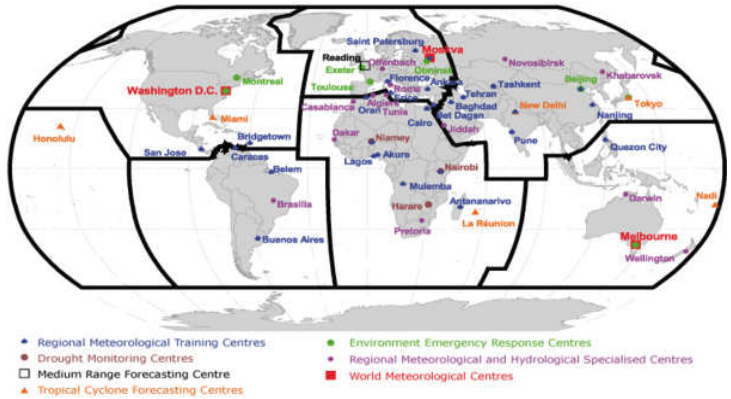
National Meteorological and Hydrological Services

Meteorological, hydrological and climate value-added products and warning advisories

Meteorological, hydrological and climate observations

189 Members

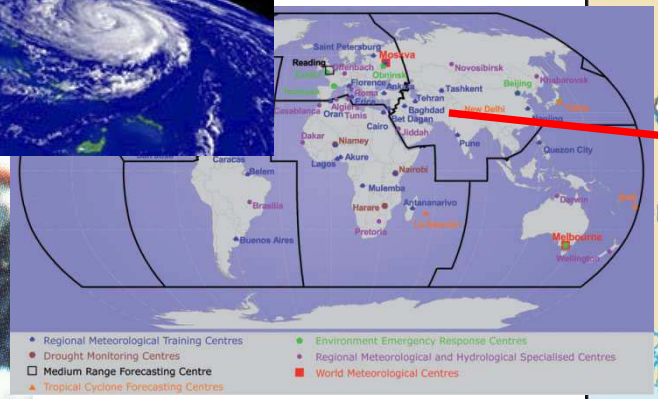
Global Telecommunication System

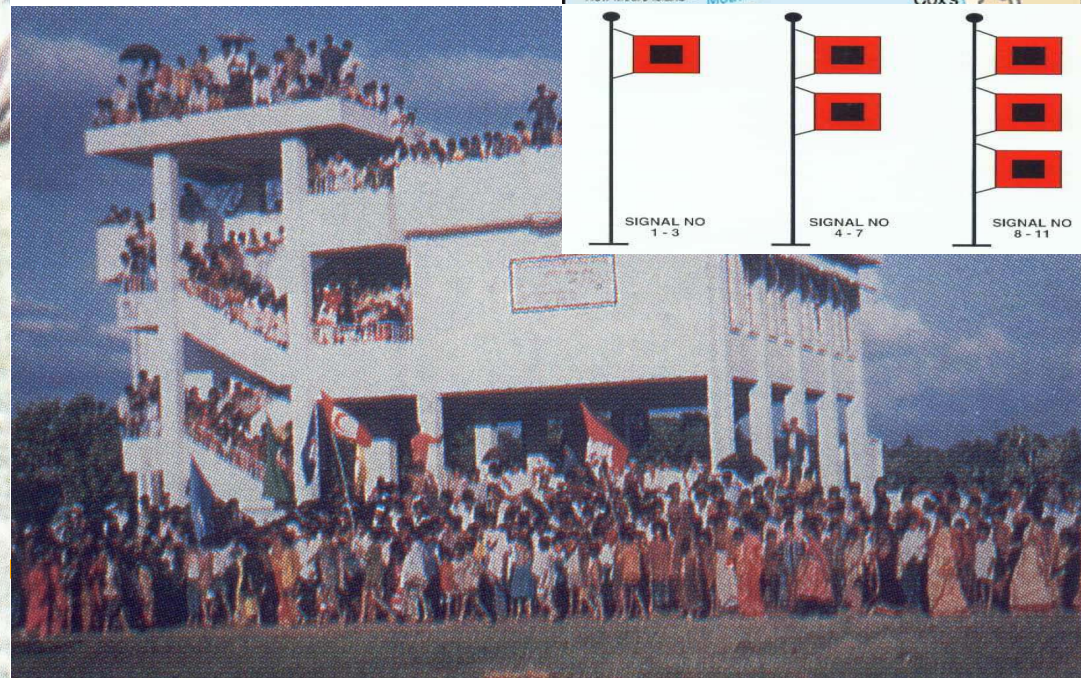


Global Data Processing and Forecasting System

Example of how the Operational WMO Network Supports National Early Warning Systems

Bangladesh Cyclone Preparedness Programme





DRR Programme's Strategic Foundation

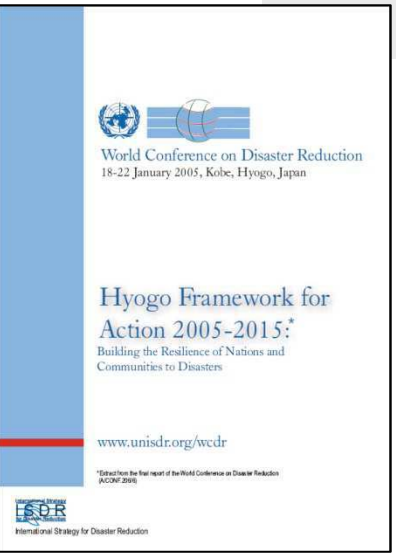
Hyogo Framework for Action

2005-2015

(World Conference on Disaster Reduction)

WMO Strategic Plan 2008-2015

(Top Level Objectives and Five Strategic Thrusts)



Consultations with WMO governing bodies, Regional and National network and partners

WMO strategic priorities in Disaster Risk Reduction

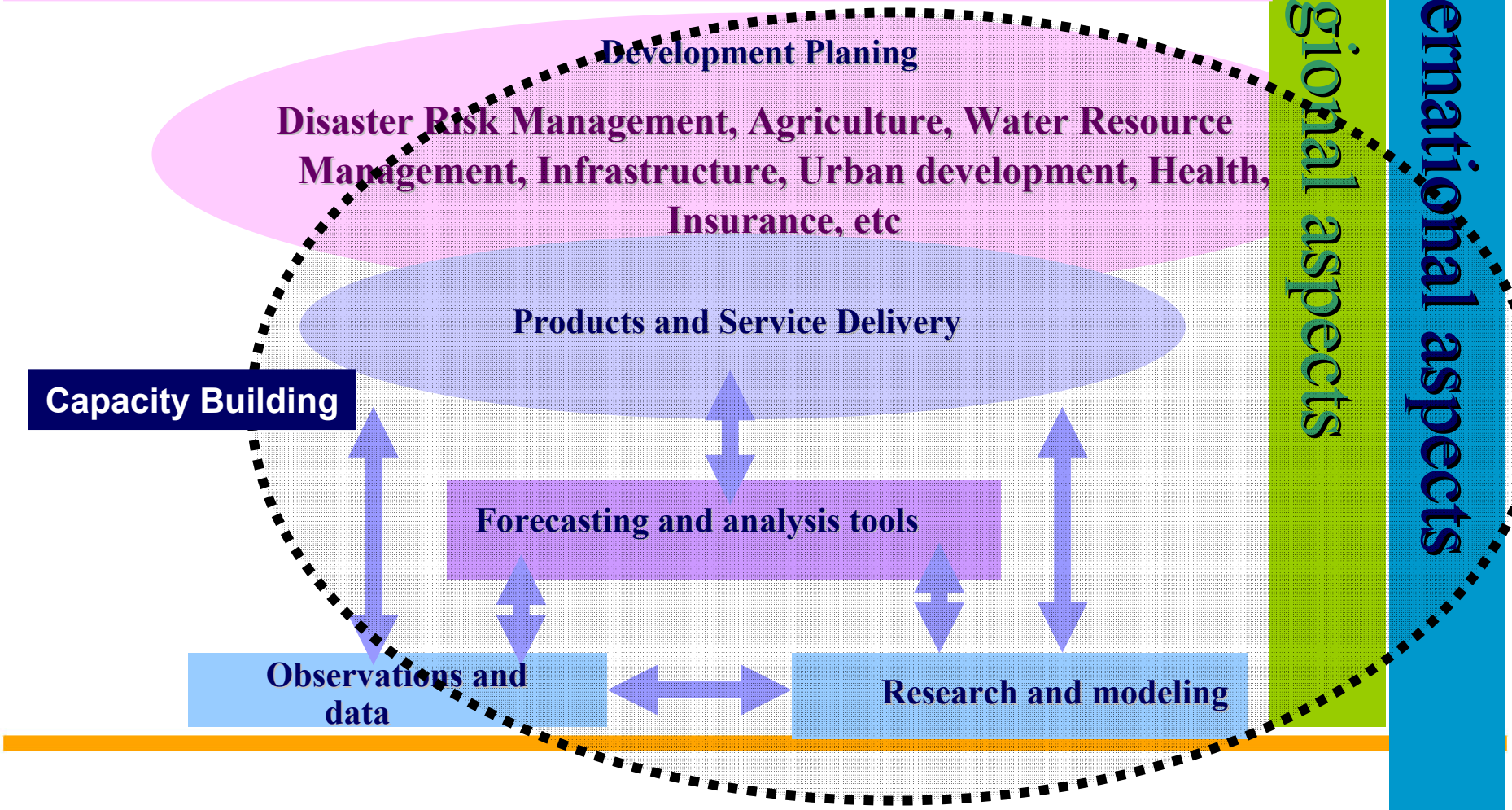
WMO DRR Programme

Vision

To **strengthen institutional capacities and partnerships** for provision of **meteorological, hydrological** and **climate services** to risk reduction within **socio-economic sectors** for **protection of lives, livelihoods and property** and contributing to sustainable development

Provision of meteorological, hydrological and climate services to support holistic risk management within a integrated service delivery model

National aspects, DRR Governance and institutional framework changing!



Natural Hazards related Weather, Climate and Water …

Primary mandate for: **Severe storms, tropical cyclones (hurricanes and typhoons), storm surges, floods, cold spells, heat waves, droughts, volcanic ash transport, air pollution, Sand and dust storms, etc.**

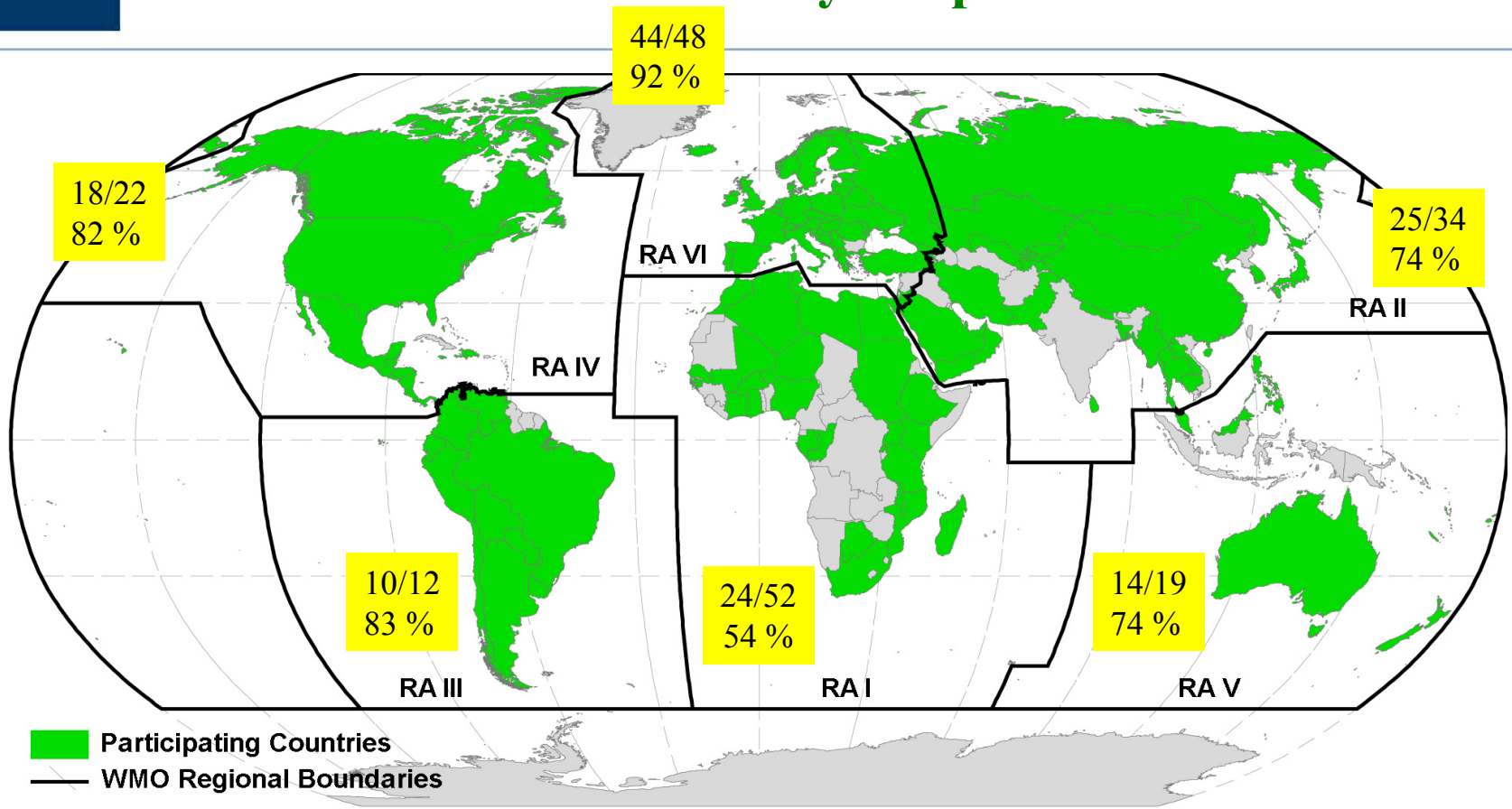
Contributing to: **Forest fires, locust swarms, health epidemics, tsunami, etc…**

Elements considered for the development of services ….

- Gaps and capacity assessment (Provider/User)
- Governance and Institutional Frameworks
- Partnerships, user interfaces
- Knowledge, tools, methodologies
- Service Delivery and Standard Operating Procedures
- Capacity development
  - Institutional (technical, management, human resources, etc)
  - Obs/Forecasting/telecommunication infrastructure and systems
- Sustainability

Country-level Capacity Assessment Survey (2006)

Country Responses



74% + response rate since 2006

http://www.wmo.int/pages/prog/drr/natRegCap_en.html

Major challenges for National Meteorological and Hydrological Services

Under estimated

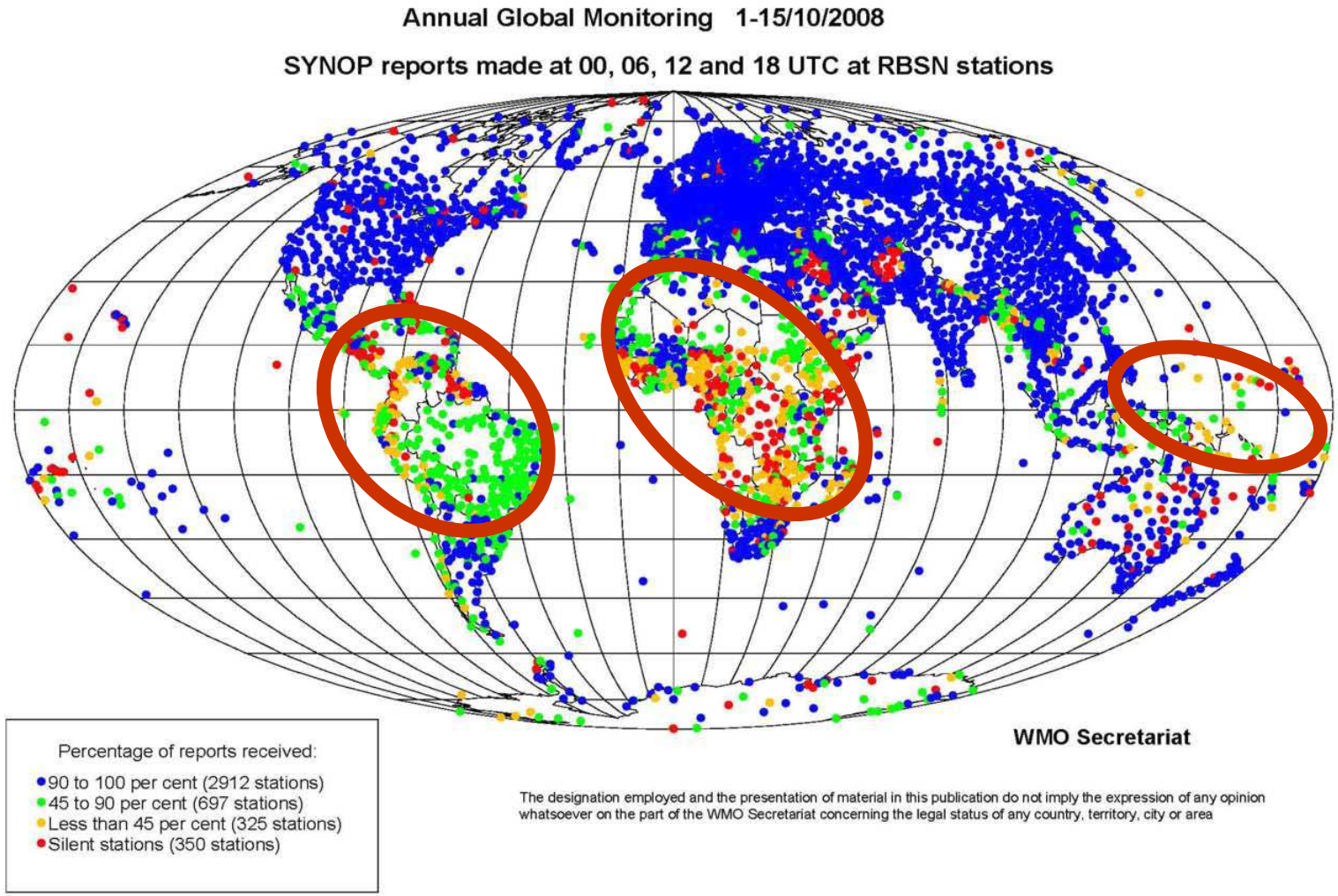
Category	Planning & Legislation	Infrastructure: Observation Forecasting Telecom.	Data, Analysis, forecasting Technical Capacities	Partnerships & Concept of Operations	% countries
1	Need for development in all areas				12
2	Need for improvements in all areas				42
3	Self sufficient		Need for improvements in these areas		26
4	Self sufficient Could benefit from sharing of good practices practices and guidelines				20

Around 60% of the NMHS are challenged in meeting needs in DRR!

Major challenges for National Meteorological and Hydrological Services

- 70% of countries need amendments or restructuring of their national policies and legislation
  - Reflection of the role of NMHS in policies, legislation, plans
- 65% NMHS need strengthening or full modernization of infrastructure
  - Observations, forecasting systems, communication, data management, etc
- 80% NMHS need technical and management training :
  - Hazard data bases, mapping and analysis and (meteorological, hydrological and climate) forecasting tools,
- 80% of NMHS need strengthening or building multi-sectoral institutional partnerships, coordination and service delivery

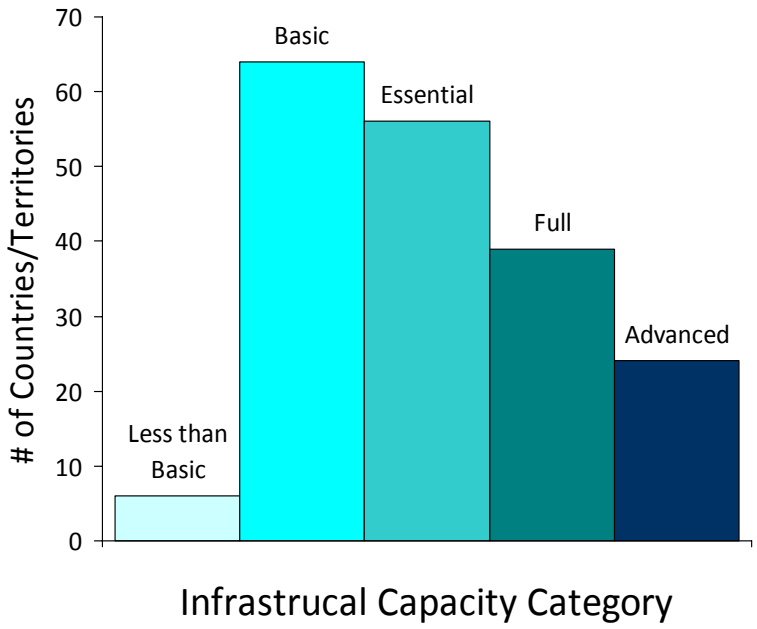
Synoptic report of global monitoring



Status of national climate services...

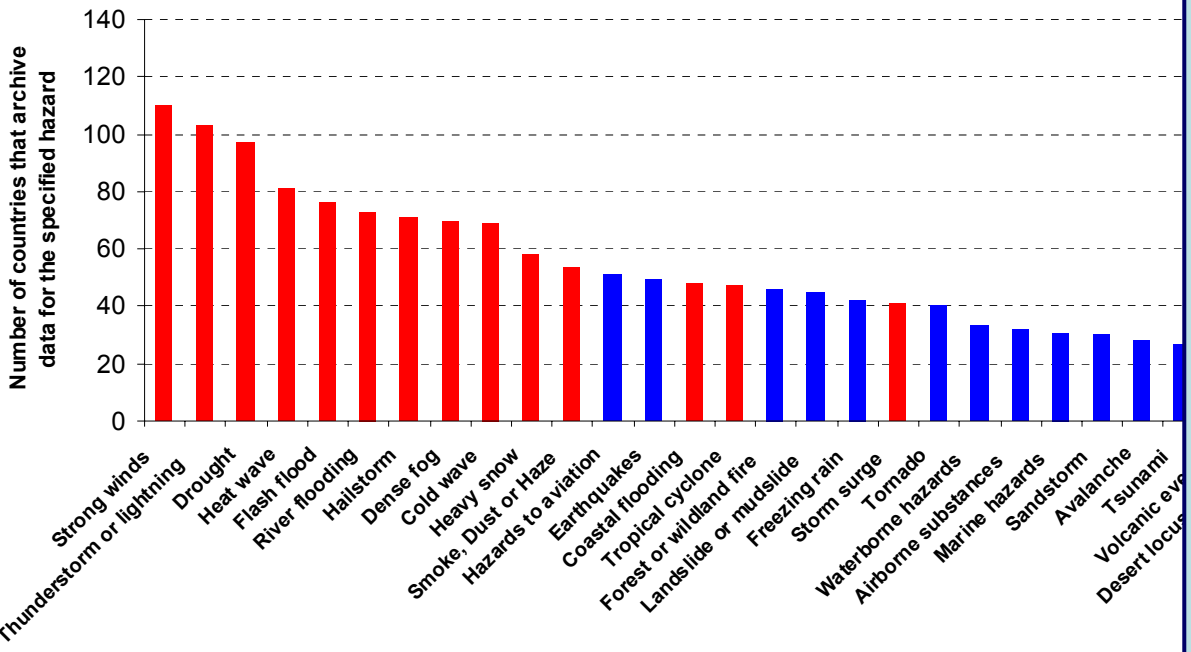
- Many countries lack the infrastructural, technical, human and institutional capacities to provide high-quality climate services.

Infrastructural Capacities of Countries as of Aug 2010 to provide Basic, Essential, Full and Advanced Climate Services.



National Meteorological and Hydrological Services provide hazard data and analysis to support risk assessment

Over 70 % of NMHS globally, are challenged in delivering these services!



Main Challenges:

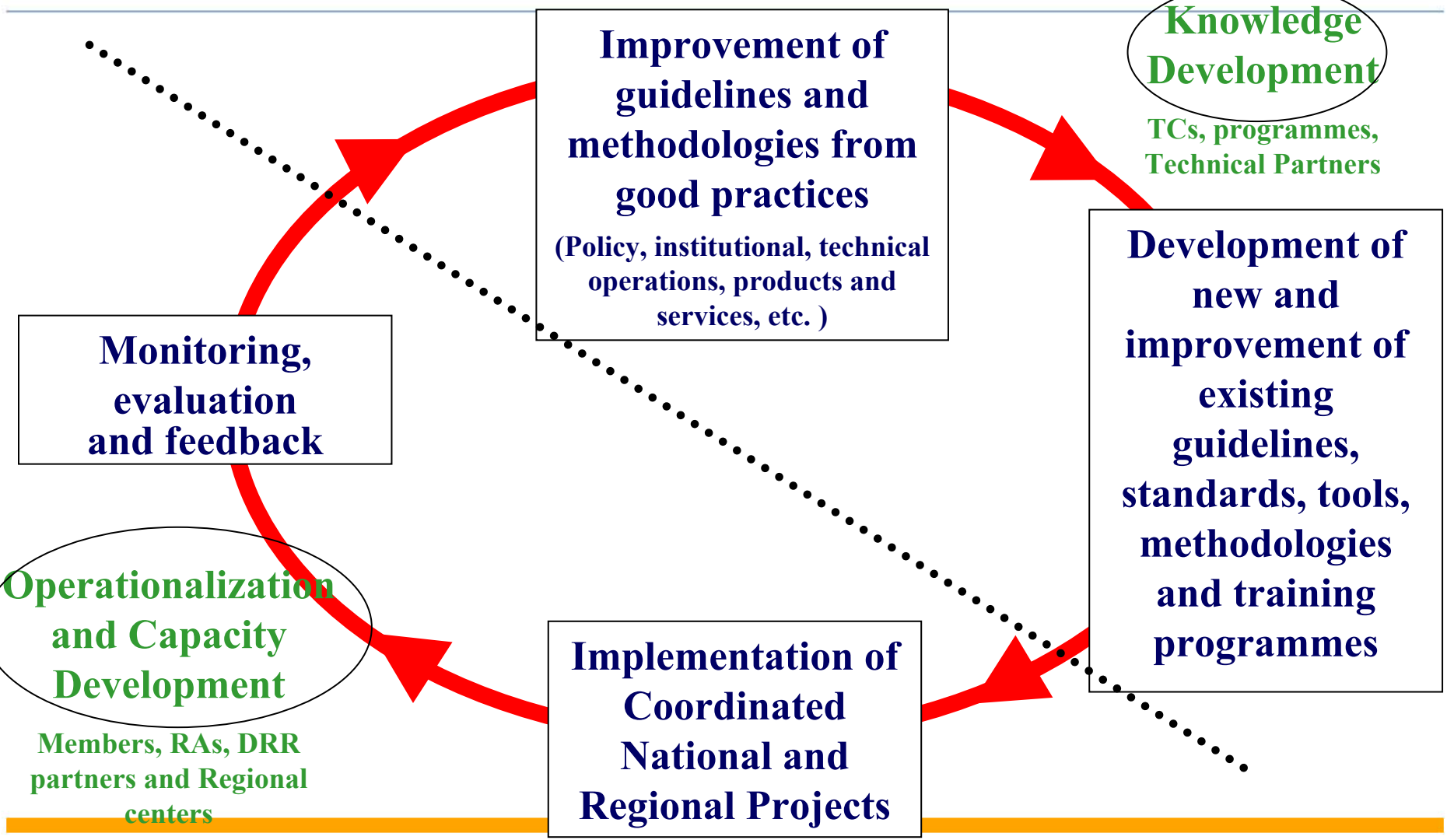
- Modernisation of observation networks
- Data rescue
- Data management systems
- Maintaining standard hazard database and metadata
- Hazard analysis and mapping tools
  - ✓ Statistical analysis
  - ✓ Climate modelling

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

Addressing the infrastructure modernization, capacity development and sustainability

1. Engagement of Governments
2. Engagement of development partners
3. Alignment of funding for national and regional development
   - Climate adaptation fund, development funding mechanisms
   - Post-disasters Fund-raising opportunities

DRR Programme Strategy and Capacity Development Cycle within a Service Delivery framework



Example of Strategic Partnerships

Partners	Agency Type	Coordination	National/Regional Implementation	Funding
World Bank, UNDP	Development	X	X	X
UN ISDR	Coordination	X	X	
Private sector	Development		X	X
Technical UNESCO-IOC, Space agencies, etc.	Technical	X	X	
WFP FAO	Agriculture	X	X	X
UN- OCHA IFRC	Humanitarian	X	X	
Donors	Donor			X
Regional Centers and agencies		X	X	X

Forthcoming Book: Institutional Partnerships in Multi-Hazard EWS: Lessons learned from 7 Good practices (Springer Verlag, 2011)

Guidelines on Institutional Aspects EWS with Multi-Hazard Approach
Planning, legislative, financing, Institutional Coordination and Roles of NMHS

Synthesis of First set of 7 Good Practices (4 more in the pipeline)
Role of National Metrological and Hydrological Services

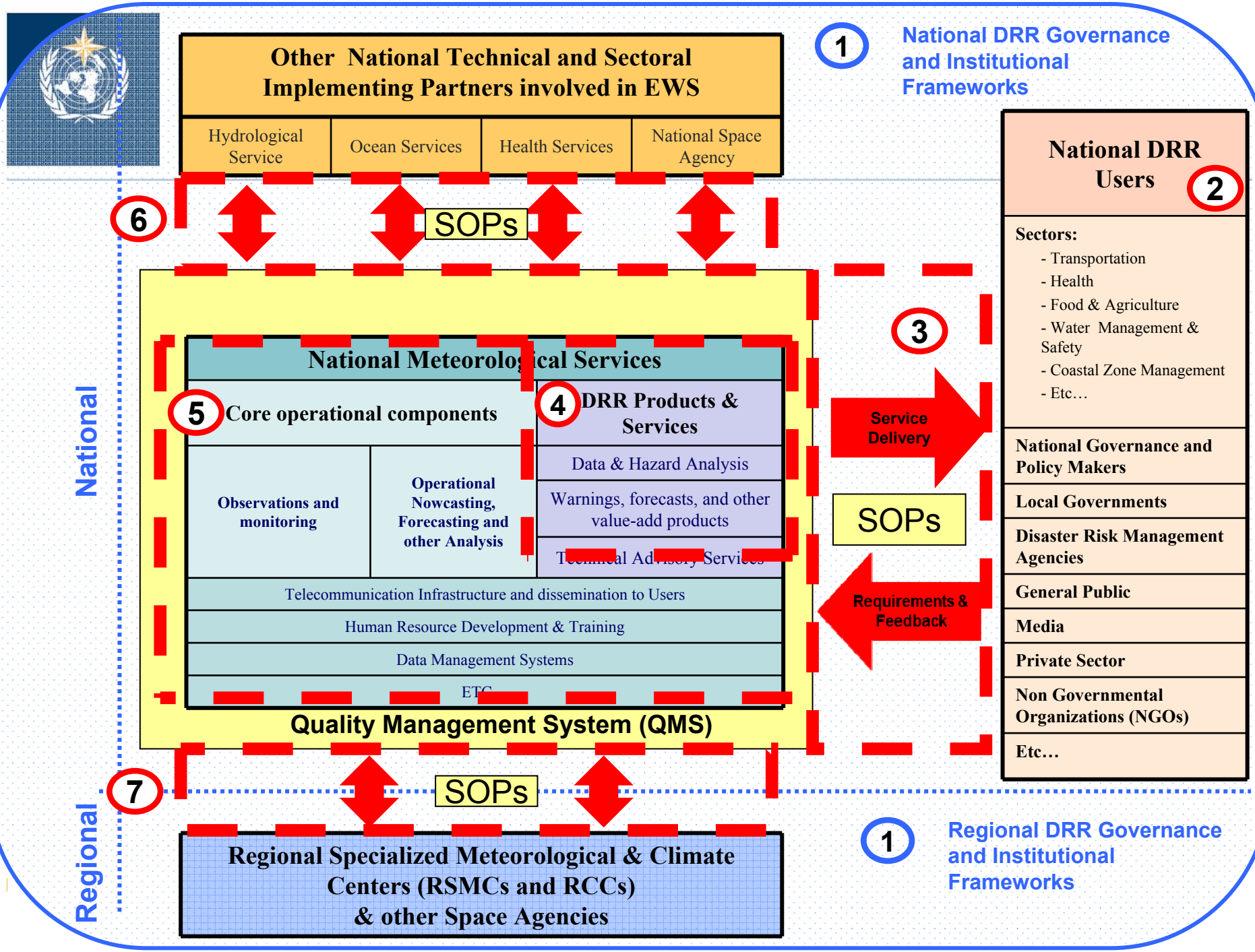
- Japan Multi-Hazard Early Warning System
- Bangladesh Cyclone Preparedness Programme
- Cuba Tropical Cyclone Early Warning System
- France and FWI "Vigilance System"
- Shanghai Multi-Hazard Emergency Preparedness Programme
- USA Multi-Hazard Early Warning System
- Germany The Warning Management of the Deutscher Wetterdienst

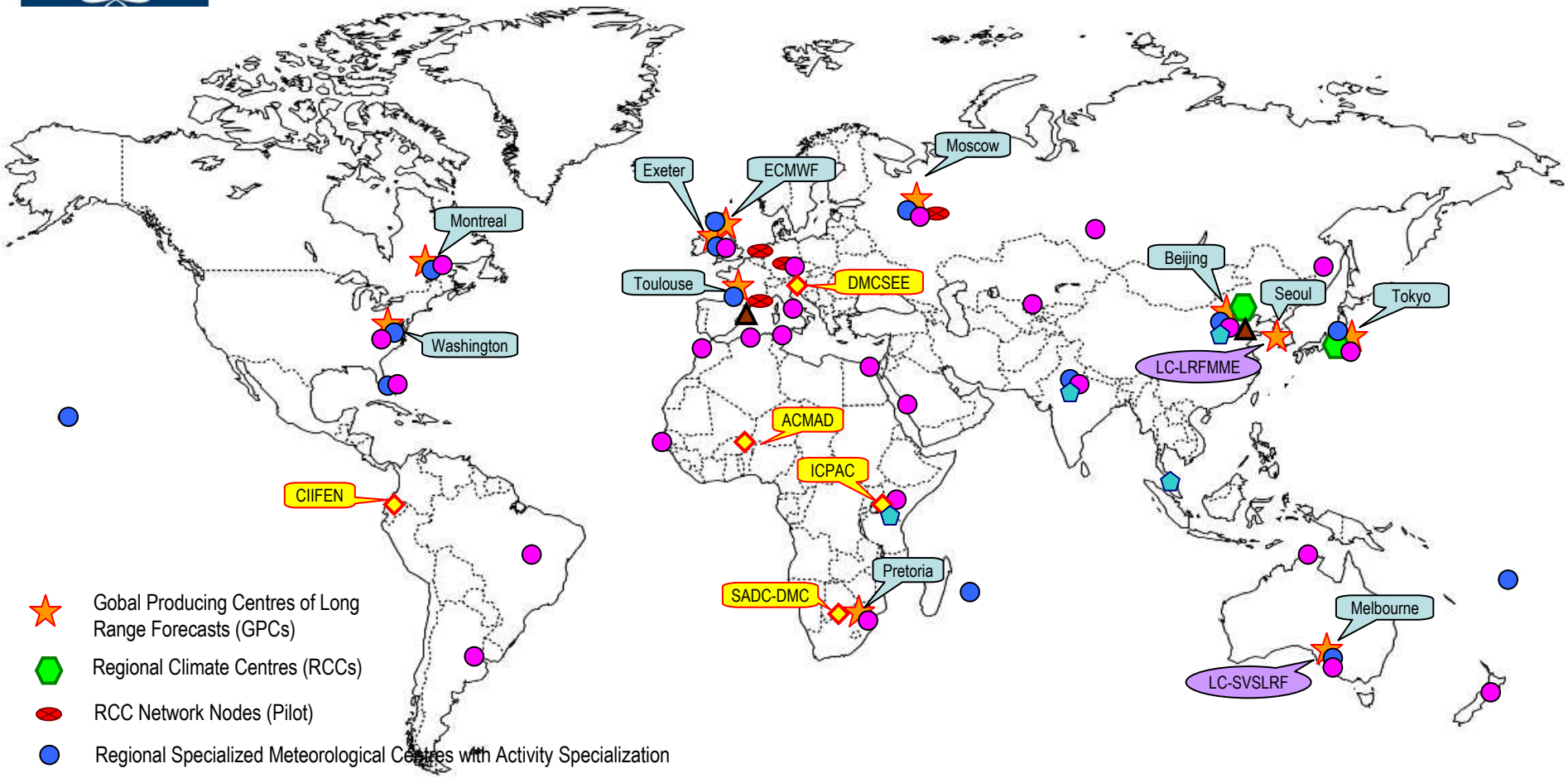
"Guidelines on institutional partnership and cooperation in Multi-Hazard Early Warning Systems" being published in 2011

Next Phase: Concept of Operations

Knowledge, tools and methodologies from Research to Operations…

- Provision of meteorological, hydrological and climate services to support:
  - Risk analysis
  - Early Warning Systems with multi-hazard approach
  - Sectoral planning and risk management (e.g., Agriculture, Water Resource Management, energy, health, urban planning)
  - Financial Risk Transfer
- Development of global and regional reports to support international and regional policy negotiations

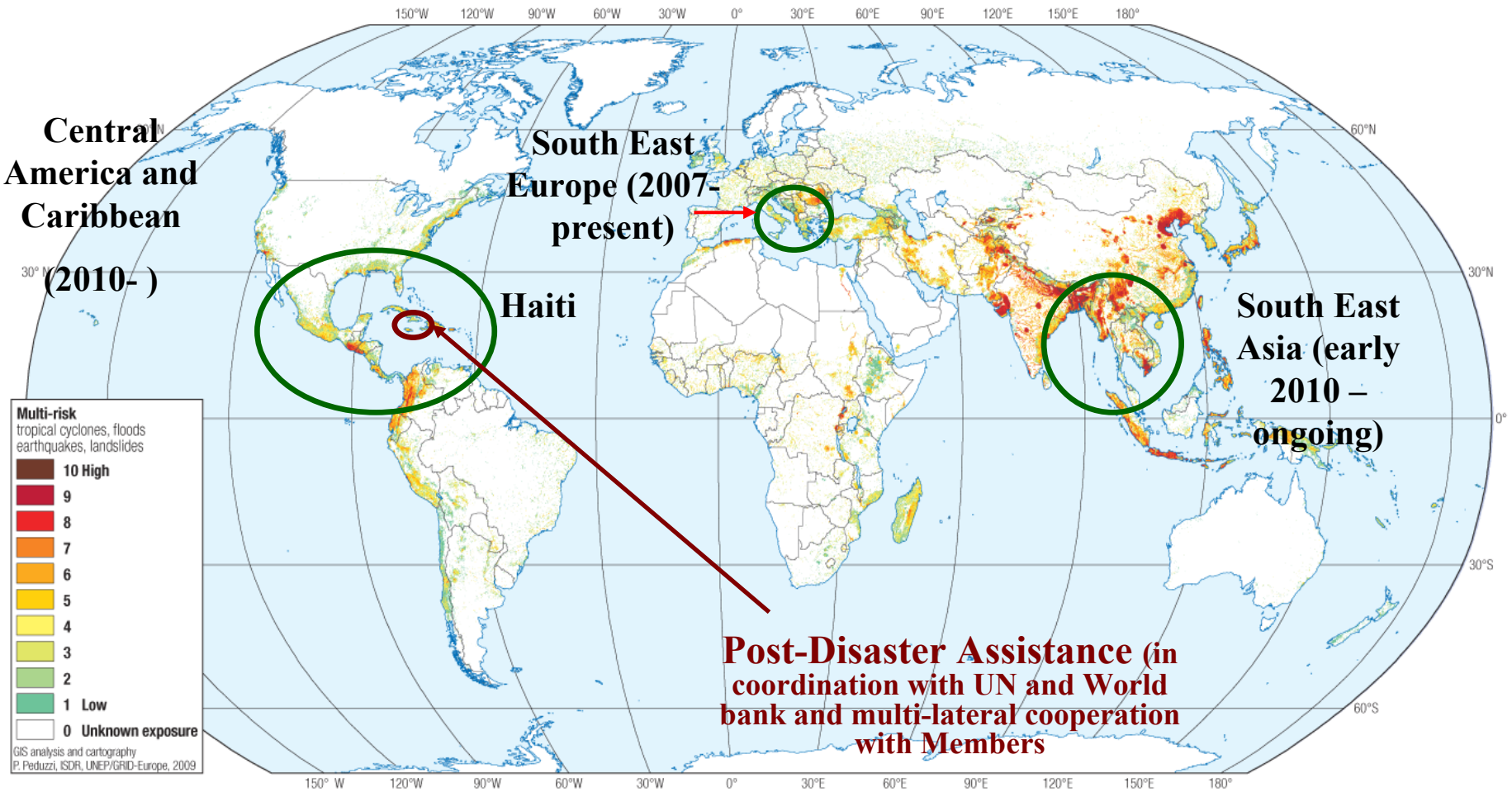

Other National Technical and Sectoral Implementing Partners involved in EWS
Hydrological Service
Ocean Services
Health Services
National Space Agency
1
National DRR Governance and Institutional Frameworks
National DRR Users
2
Sectors:
- Transportation
- Health
- Food & Agriculture
- Water Management & Safety
- Coastal Zone Management
- Etc…
National Governance and Policy Makers
Local Governments
Disaster Risk Management Agencies
General Public
Media
Private Sector
Non Governmental Organizations (NGOs)
Etc…
6
SOPs
National
National Meteorological Services
5
Core operational components
4
DRR Products & Services
Observations and monitoring
Operational Nowcasting, Forecasting and other Analysis
Data & Hazard Analysis
Warnings, forecasts, and other value-add products
Technical Advisory Services
Telecommunication Infrastructure and dissemination to Users
Human Resource Development & Training
Data Management Systems
ETC
Quality Management System (QMS)
3
Service Delivery
SOPs
Requirements & Feedback
7
SOPs
Regional
Regional Specialized Meteorological & Climate Centers (RSMCs and RCCs) & other Space Agencies
1
Regional DRR Governance and Institutional Frameworks



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

Holistic Capacity Development Projects

With WMO Members, Regional Associations, DRR and sectoral stakeholders and other key partners such as World Bank, ISDR, UNDP and WMO and DRR partners



Global Framework for Climate Services

Website and outcomes: http://www.wmo.int

Members of the High-Level Task Force of GFCS

Why a Framework for Climate Services?

- Present capabilities for providing climate services do not exploit all that we know about climate

- Present capabilities fall far short of meeting current and future needs and delivering their full and potential benefits, especially in developing countries

A Global Framework for Climate Services is aimed to build on existing capacities and leverage these through coordination to address these shortcomings

Global Framework for Climate Services: Status

- World Climate Conference -3 decided to establish a Global Framework for Climate Services (Sept 2009, Geneva)
- Intergovernmental meeting Geneva 11-12 Jan 2010 established TOR of High Level Task Force (HLT)
- HLT Final report was reviewed by WMO Congress XVI (May 2011)
- GFCS implementation plan under development
- WMO Extra-ordinary session of Congress (October 2012)

Global Framework for Climate Services

Five Major Thrusts:

- Understanding of information needs of at-risk sectors
  - Through partnerships (with UN, international and regional agencies)
- Designation and coordination of network of global and regional climate centers
  - to faciliate provision of forecasting and analysis tools and information to national centers
- Strengthen observation networks
- More targeted climate research
- Capacity development programme

The vision of the GFCS

A global system to routinely **generate** and electronically **exchange** an extensive set of defined climate data and data products

An initiative in developing countries to **upgrade the climate service capacities** and strategies of all vulnerable and low-capacity countries to a baseline level

A suite **of new knowledge products** – protocols, tools, products and services – developed through multiple initiatives on **user interfacing** and services development

An ongoing **governance mechanism** that drives the Framework's development, particularly by engaging and mobilising stakeholders, user communities and new resources

Conclusions and recommendations

- Need for leveraging various global framework discussions towards a coherent integrated approach to development planning and risk management (national, regional, global)
  - HFA offers good examples
- Holistic risk management as an integral part of national development policies and planning
- Strategic Institutional partnerships across different communities need to be strengthened to leverage capacities, resources and knowledge transfer
- Development of meteorological, hydrological and climate services should be an integral part of development and financial planning
- Need for knowledge, methodologies, tools, guidelines (Linking Research to operations and service delivery)
- Investments in meteorological, hydrological and climate observation and forecasting systems infrastructure is a high return on investment (2010 World Bank Report on Natural Hazards, Unnatural disasters)
- Sustainability of capacities should be considered as part of the planning

A Global Framework for Climate Services is aimed to build on existing capacities and leverage these through coordination to address these shortcomings

Thank You

For more information please contact:

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http://www.wmo.int/disasters