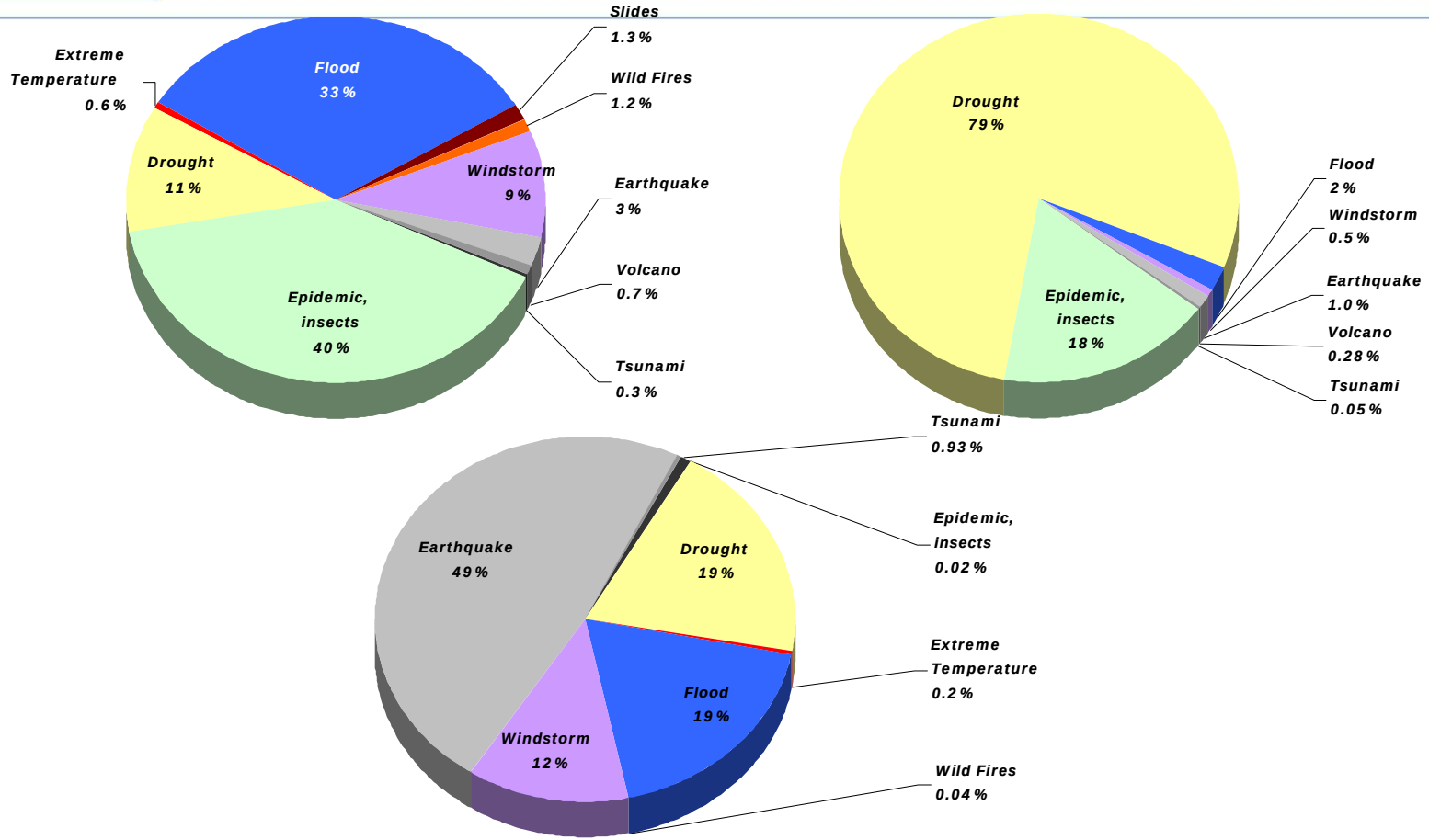
Risk identificatication, monitoring and Early Waning: Tools and Practices

By

Filipe D. Freires Lúcio
Disaster Risk Reduction Programme
World Meteorological Organization

Distribution of Natural Disasters Events in Africa (1978-2007)



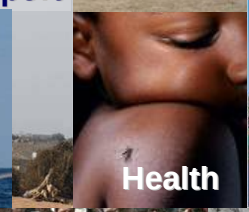
95% of natural disasters, 98 % of casualties and more than 45 % of economical loses are related to Climate or Meteorological / Hydrological hazards.

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

Conclusions from 4th IPCC Assessment Report WG II for Africa

Phenomenon	Likelihood	Major projected impacts
Increased frequency of **heat waves**	Very likely	Increased risk of heat-related mortality
Increased frequency of **heavy precipitation** events	Very likely	Increased loss of life and property due to flooding, and infectious, respiratory and skin diseases
Area affected by **drought increases**	Likely	Increased risk of food and water shortage
Intense **tropical cyclone activity** increases	Likely	Increased risk of deaths, injuries, water- and food-borne diseases; Disruption by flood and high winds; Potential for population migrations, loss of property
Increased incidence of **extreme high sea level**	Likely	Increased risk of deaths and injuries by drowning in floods; Potential for movement of populations and infrastructure

Increasing Risks under a Changing Climate



Strong Wind

Coastal Marine Hazards

Tropical Cyclones

Heavy rainfall / Flood

Heatwaves

Intensity

Frequency

Hazards' intensity and frequency are increasing

Exposure is increasing !

Need for disaster risk management

In Summary, Disaster risks are increasing, due to:

- Increasing intensity and frequency of hydrometeorological hazards;
- Increasing value of exposed elements due to development and demographic expansion.

Disaster risk management is a critical component of climate change adaptation.

We cannot avoid hazards









…but we can Prevent Them from Becoming Disasters

One Dollar spent on disaster preparedness can prevent 5 - 10 Dollar of disaster-related losses

Source: World Resources Institute

Brief Overview of WMO

- Specialized Scientific and Technical Agency of the United Nations Responsible for Observing, Monitoring, Detecting, Forecasting and Warnings of Meteorological, Hydrological and Climate Conditions

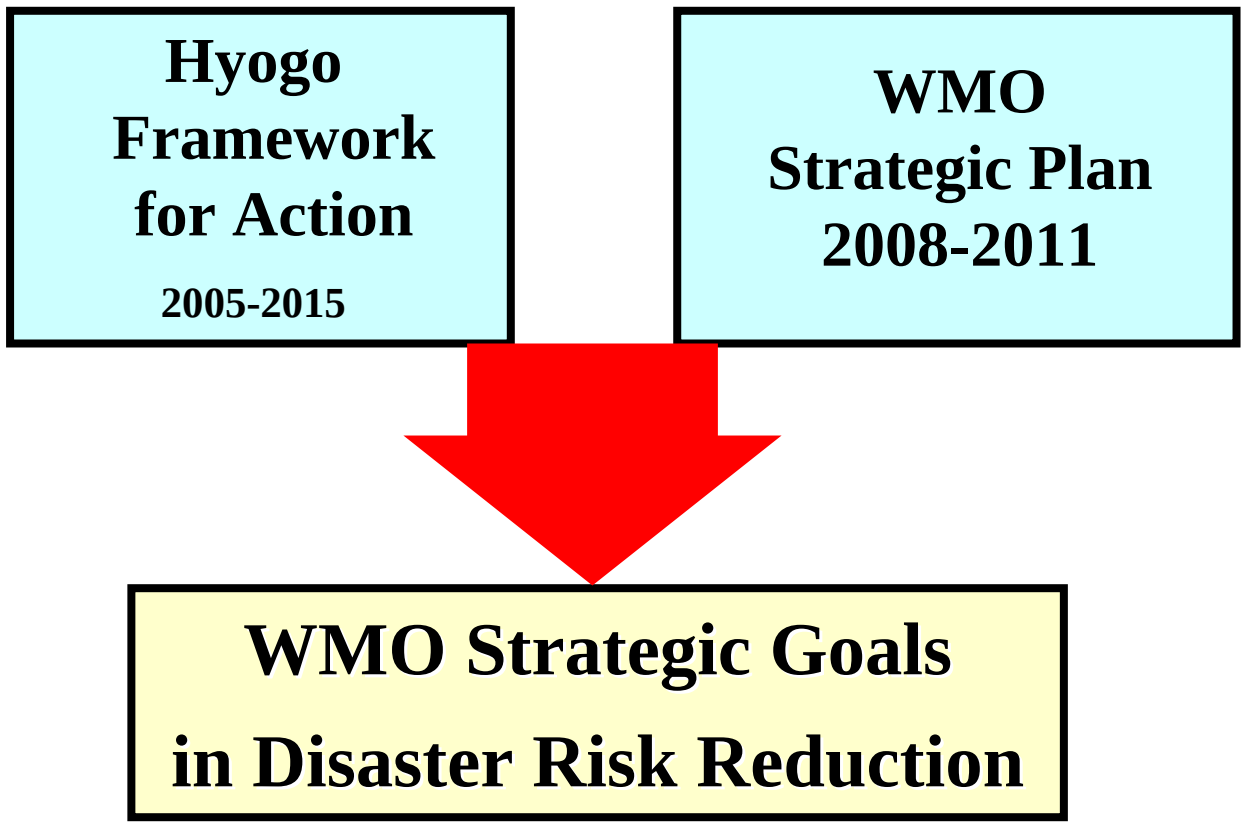
- 188 Members, Represented by the Heads of the National Meteorological and Hydrological Services at the

Mandate for Natural Hazards related to Weather, Climate and Water …

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

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

DRR Strategic Foundation



DRR Strategic Goals - Key Words Approved by WMO Governing Body

1. Analyzing and providing hazard information for risk assessment
2. Strengthening and sustainability of multi-hazard early warning systems
3. Delivery of timely and understandable warnings and specialized forecasts -- driven by user requirements
4. Strengthening WMO/NMHS cooperation and partnerships with disaster risk reduction organizations
5. Public outreach campaigns

WMO Action Plan for implementation of its Disaster Risk Reduction Programme

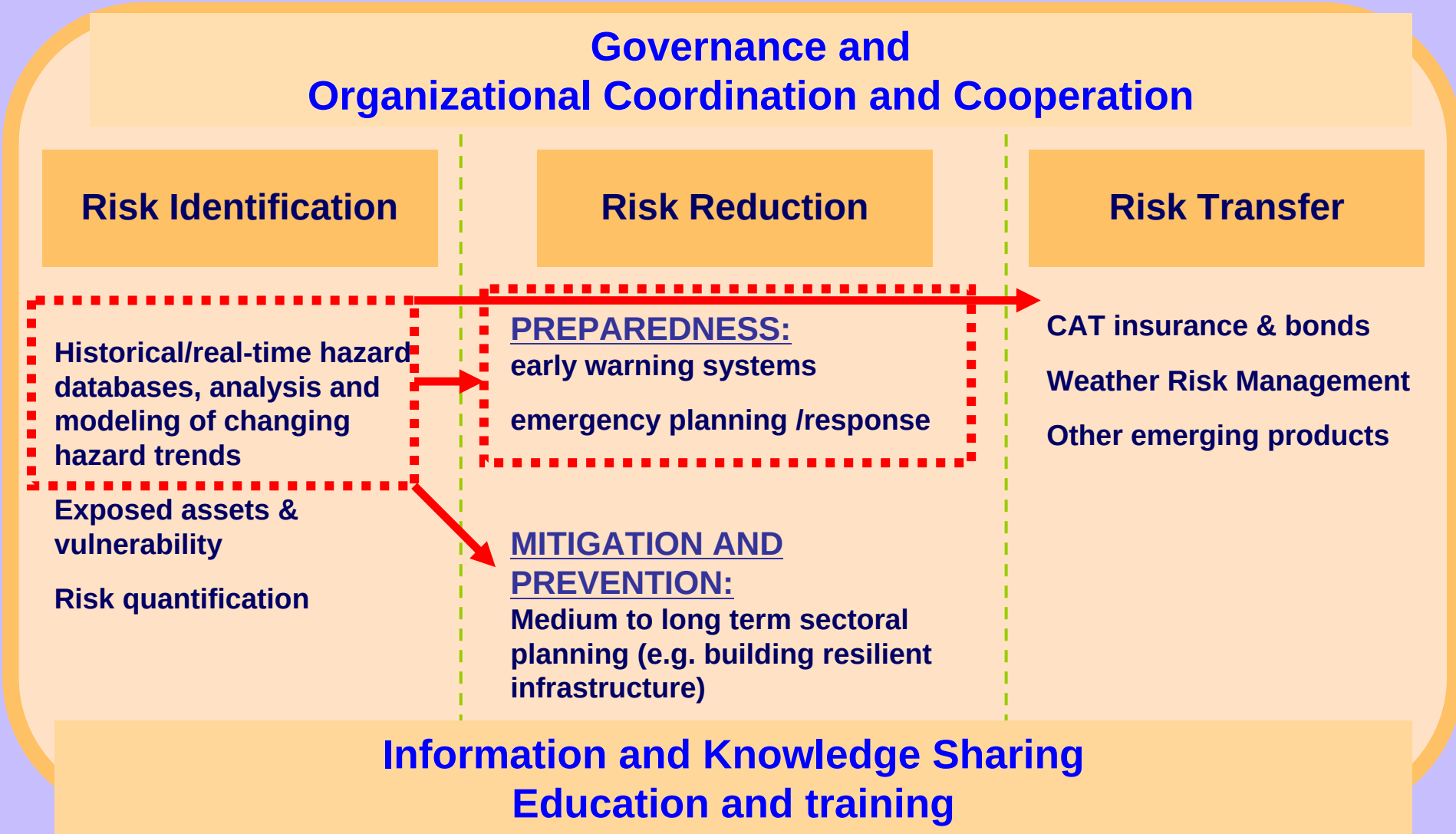
Implementation through regional and national projects, with following end results:

1. Modernized NMHSs and observing networks.
2. Strengthened national operational multi-hazard early warning systems.
3. Strengthened hazard analysis and hydro-meteorological risk assessment capacities.
4. Strengthened NMHSs cooperation and partnerships with civil protection and disaster risk management agencies.
5. Trained management and staff of NMHS
6. Enhanced ministerial and public awareness

National Disaster Risk Management Framework

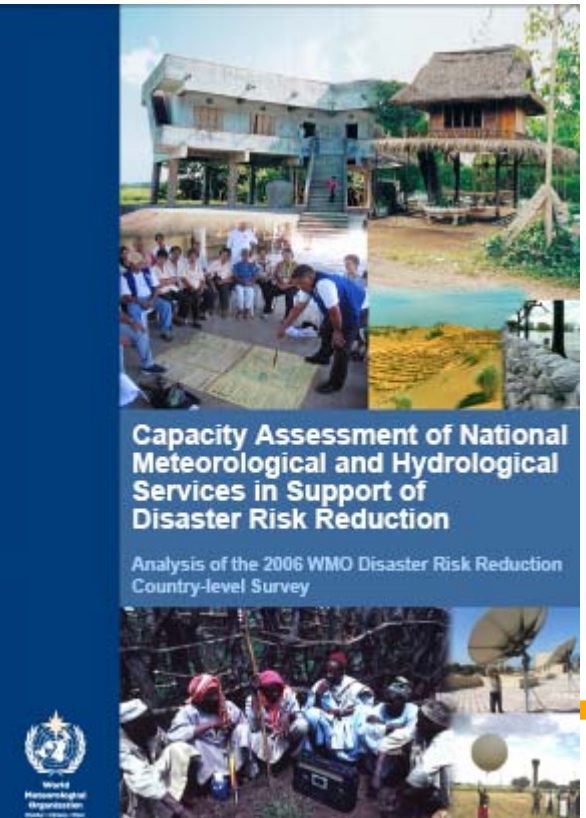
Derived from Hyogo Framework for Action 2005-2015

New Paradigm in Disaster Risk Management (DRM)



National DRR Capacity Assessment Survey (2006)

Mapping NMHSs' Capacities, Gaps and Needs

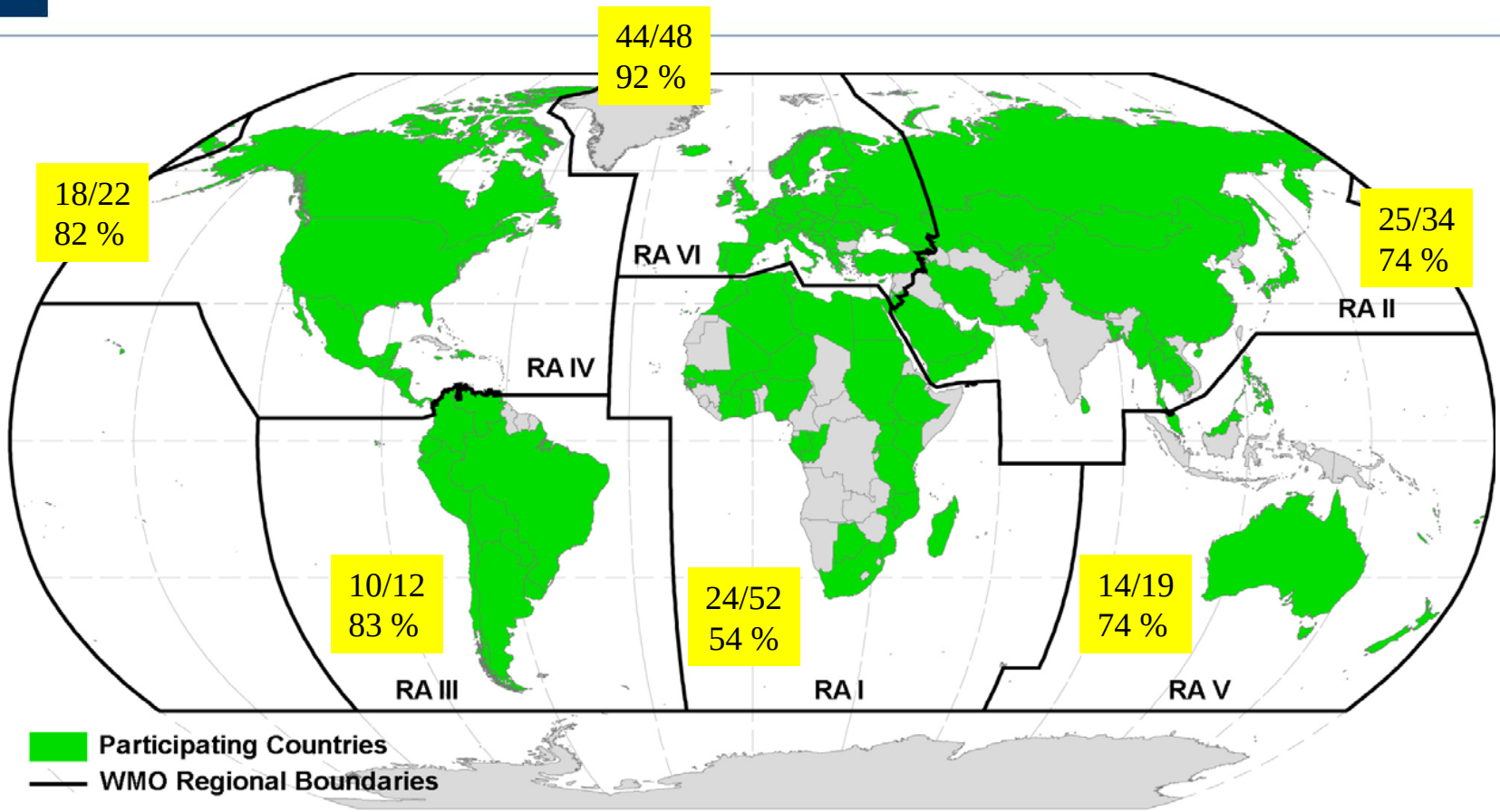


139 National Meteorological and Hydrological Services participated:

1. Role of NMHSs in planning, legislation and coordination mechanisms;
2. Monitoring, data management, forecasting and warning services;
3. Development and delivery of products and services and warnings;
4. Cooperation and coordination with other agencies and ministries.

National DRR Capacity Assessment Survey (2006)

Mapping NMHSs' Capacities, Gaps and Needs



139 out of 187 Countries responded

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

National DRR Capacity Assessment Survey (2006)

Country Responses

Scope	Number of surveys received	Total number of countries	% Response
Global (WMO Members)	139	187	74%
Developing countries	**85**	**137**	**62%**
Least Developed countries	**25**	**50**	**50%**
Africa (RA I)	28	52	54%
Asia (RA II)	25	34	74%
South America (RA III)	10	12	83%
Central and North America (RA IV)	18	22	82%
South-West Pacific (RA V)	14	19	74%
Europe (RA VI)	44	48	92%

National DRR Capacity Assessment Survey (2006)

Under estimated

NMHS Category	Planning & Legislation	Infrastructure Observation Forecasting Telecom.	Technical Capacities	Partnerships & Concept of Operations	% countries
1	Need for development in all areas				89
2	Need for improvements in all areas				11
3	Self sufficient		Need for improvements in these areas		-
4	Self sufficient Could benefit from sharing of good practices practices and guidelines				-

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

National DRR Capacity Assessment Survey (2006)

Gaps

Governance:

- Reflection of the role of NMHS's in DRR plans, legislation and coordination mechanisms

Technical:

- Need for Modernization: Observing networks, data management systems, data rescue, and forecasting services, telecommunications,
- Need for Hazard Analysis: data quality assurance, standardized databases, metadata and hazard analysis and mapping
- Need for 24/7 Operational forecasting and warning services

Organizational issues and partnerships:

- Need for identification of stakeholder and understanding of their needs and requirements
- Need for strengthening partnerships, definition of roles and responsibilities of every stakeholders
- Need for Concept of Operations

Education and Training:

- Technical Guidelines and technical training targeted at NMHS staff, management
- Guidelines and joint multi-disciplinary training of staff, management of NMHs & partner agencies
- Public outreach programmes

How is WMO assisting its Members?

Strategic partnerships with ISDR System Partners have been actively sought to leverage complementary capacities, expertise and funding for implementation of disaster risk reduction projects at national and regional levels.

Identified criteria for good practices in early warning systems…

SYMPOSIUM ON MULTI-HAZARD EARLY WARNING SYSTEMS
FOR INTEGRATED DISASTER RISK MANAGEMENT

23-24 May 2006, WMO Headquarters, Geneva, Switzerland

OUTCOME REPORT

1. Background

1.1. International Developments Related to Early Warning Systems

Over the last decade there has been an increasing political and public awareness on the importance of early warning systems as an integral part of disaster risk reduction, reflected in various international forums and publications. The Johannesburg Plan of Implementation of the World Summit on Sustainable Development, held in 2002, requests an integrated, multi-hazard, inclusive approach to address vulnerability, risk assessment and disaster management, including prevention, mitigation, preparedness, response and recovery.

In 2003, the Second International Conference on Early Warning (EWC-II, 16-18 October 2003, Bonn, Germany) provided principles and guidelines for national policymakers and policy advisors, and has set the goals and priorities for an International Early Warning Programme (IEWP) to advance the development of early warning systems worldwide. Following EWC-II, a Platform for Promotion of Early Warning was created as an organisational capacity to assist with the implementation of IEWP.

During the Second World Conference on Disaster Reduction (Hyogo, Kobe, Japan, 18-22 January 2005), 168 countries adopted the Hyogo Framework for Action 2005-2015 (HFA) and identified five high priority areas of which the second stresses the need for "identifying, assessing and monitoring disaster risks and enhancing early warnings" as a critical component of disaster risk reduction. Furthermore, HFA stresses that disaster risk reduction must be addressed with an integrated and multi-hazard approach. Following the Second World Conference on Disaster Reduction, the G8 2005 Summit (Gleneagles, July 2005) recognised that early warning systems need to be multi-hazard and global, should cover as many hazards as possible, should build on existing systems at national and regional levels, and that agencies involved in early warning systems need to coordinate their activities. Furthermore, at the 2005 United Nations World Summit (New York, September 2005), Governments requested the establishment of worldwide early warning systems for all natural hazards, building on existing national and regional capacities to complement broader disaster preparedness and mitigation initiatives.

In 2006, the preliminary report of the Global Survey of Early Warning Systems[1] and the outcomes from the Third International Early Warning Conference (EWC-III, Bonn, Germany, 27-29 March 2006), have indicated that while there has been progress in different aspects of early warnings for different hazards, there still remain gaps and challenges to ensure that early warning systems are integrated in disaster risk reduction strategies, in all countries, particularly those with the least resources.

Initiatives worldwide have emerged towards development of national and regional strategic plans for disaster risk reduction. Furthermore, in 2005, an Integrated Work Programme (IWP) is being developed for the International Strategy for Disaster Reduction (ISDR) System for implementation of HFA, for consultations with governments and various organizations' networks.

[1] Global Survey of Early Warning Systems: the Survey was requested by UN Secretary-General, in his report "In Larger Freedom: towards development, security and human rights for all," A/59/2005, to the UN General Assembly on 21 March 2005. The preliminary report of this Survey was launched at the Third International Early Warning Conference, 27-29 March 2006, Bonn, Germany.

http://www.wmo.int/pages/prog/drr/events/ews_symposium_2006

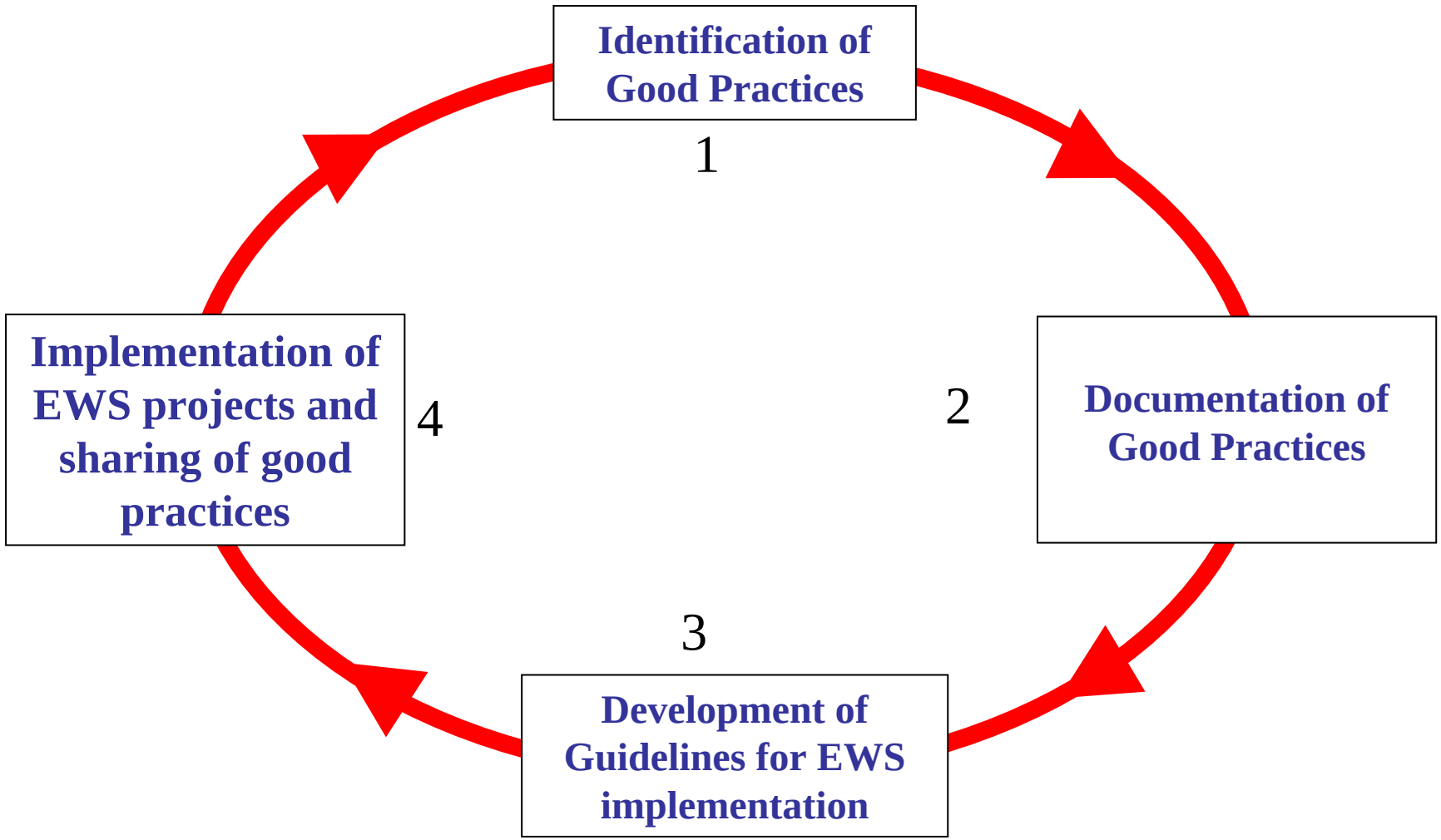
Coordination and Cooperation of NMHSs with Other Agencies in Early Warning Systems

Increasing level of direct coordination of NMHS with civil protection and risk management agencies for issuance of warnings

Type I	Type II	Type III
Hazard fully under the mandate of NMHS	Hazard under joint mandate with another technical agency	Hazard under mandate of other agencies but NMHS contribute
e.g. strong winds, strong rainfall, snow/ice, hail, tropical cyclone	e.g. floods, landslides, heat/health etc.	e.g. locust, epidemic, man-made hazards

Increasing level of coordination of NMHS with technical agencies for early detection, monitoring and development of warnings

WMO Approach to Assist its Members in Strengthening Their Early Warning Systems



Challenges identified along four technical components of EWS

1) Early Detection, Monitoring and Warning Services

- **Strengthen observation systems**
  - Coverage
  - Sustainability
  - Inter-operability
  - Multi-use of networks (where practical)
  - Built on "system of systems" concept
  - Data policies
- **Prediction and forecasting**
  - Methodologies, accuracy and lead time
  - Multi-disciplinary

2) Risk Knowledge and Integration in Warning Messages

- **Data gaps, quality, accessibility, sharing**
  - Hazard
  - Vulnerability (e.g. socio-economic, topographic…)
- **Standardized methodologies and expertise** (e.g. hazard analysis, risk modelling)
- **Understanding of the changing patterns of risk** (e.g. hazard, vulnerabilities)
- **Local capacities**

3) Dissemination and Communication

- **Effective warning messages**
  - Incorporation of information about risks in warning messages
  - Understandable warning messages
  - Authoritative warnings (Authentication of sources)
- **Dissemination networks**
  - Interoperability (use of international standards)
  - Redundancy and resilience of networks
  - Same distribution channels for warnings of different hazards (cost efficiency, reliability and effectiveness)
- **Standard warning terminologies** (nationwide, and across borders, traffic light concept)

4) Integration in Preparedness and Response Processes

- **Education and awareness** (emergency responders, authorities, risk managers, emergency responders, media, public…):
  - Understanding of warnings and uncertainties
  - Awareness of less frequent events
- **Cross-Training of Operational Agencies**
- **Operational planning**
  - Drills
  - Community preparedness

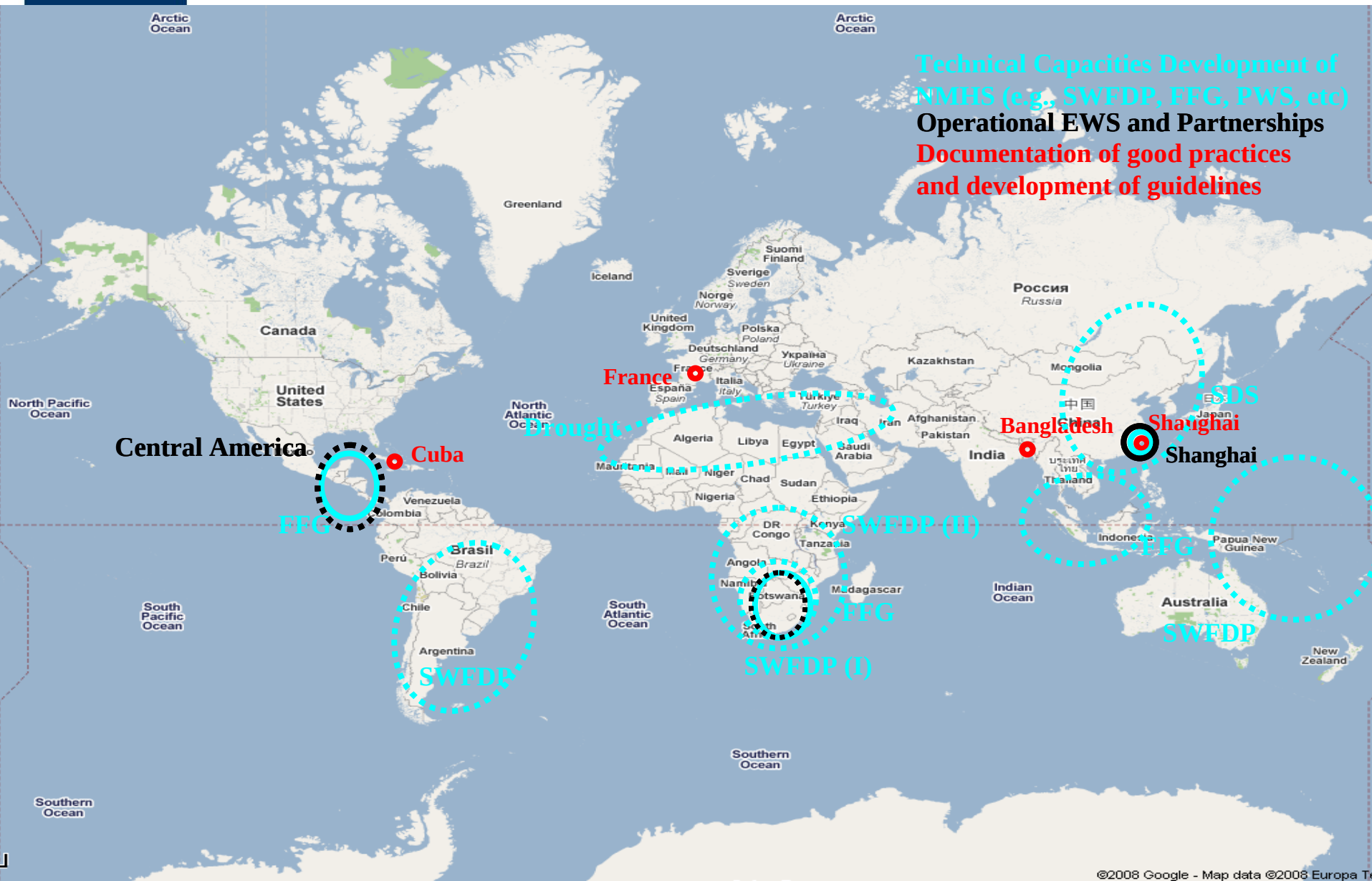
+ Need for Strong Governance, Organizational Coordination and Operational Processes

Projects in support of Risk Assessment and Early Warning Systems

Projects in support of Risk Assessment and EWS in Africa

Project type		Outcomes	Regions	Partners
Technical capacity Development of NMHSs	SWFDP and Nowcasting	Enhanced capabilities of NMHSs to operate hazard specific tools, methodologies for early warnings and hazard analysis	Southern Africa	NMHS, DMA
	Flash Flood Guidance System		Southern Africa	DMA, NOAA, HRC, OFDA
	Drought Assessment and Monitoring		Central and North Africa	WMO
	Sand and Dust Storms		North Africa	Spain, NMHSs
	Storm Surge Watch		South East Cost of Africa and West Africa	UNESCO-IOC, WMO RSMC (South Africa and La Reunion)
Pilot Projects on National EWS Partnerships and ConOPs	Use of EWS by the Heath and Disaster Management Sectors	NMHSs tools and products operationally utilized in emergency planning, preparedness and response at all levels	Southern Africa	NMHSs, DMA, Health Authorities, EC, (UNDP, IFRC, ISDR, OCHA)
Technical Guidelines	Meteorological hazards, Forecasting	Standardized guides to support operations		
	Good practices in EWS	Lessons learnt from countries with NMHSs meeting needs of users in DRM	Blangladesh, Cuba, France, Shanghai-China	
	Role of NMHSs in EWS	Raising awareness among NMHSs on developments in DRM		

Strengthening of EWS through National Projects



Projects in support of Weather Risk Management and Catastrophe Insurance Markets

Examples of Catastrophe (CAT) Insurance / Bond and Weather Risk Management Markets (WFP/IFAD)

Opportunities and Challenges

1. Opportunities through:

(i) Implementation of national projects demonstrating regional;

(ii) cooperation framework to develop NMHSs technical capacities;

(iii) Implementation of national projects demonstrating frameworks of operational engagement of NMHSs with DRM users, nationally;

(iv) Guidelines to support technical capacities of the NMHSs; and

(v) Documentation of good practices

2. Challenges for scaling up benefits to more Members:

(i) Need to realize partnerships and opportunities for funding and development that are primarily available at national and regional levels

(ii) Need to expand DRR demonstrated frameworks and lessons learnt more systematically at national and regional levels