



World Meteorological Organization

Working together in weather, climate and water

**DRR Technical Conference during the XVth
Session of WMO Regional Association (RA) III**
Multi-Hazard Early Warning Systems

Background and objectives

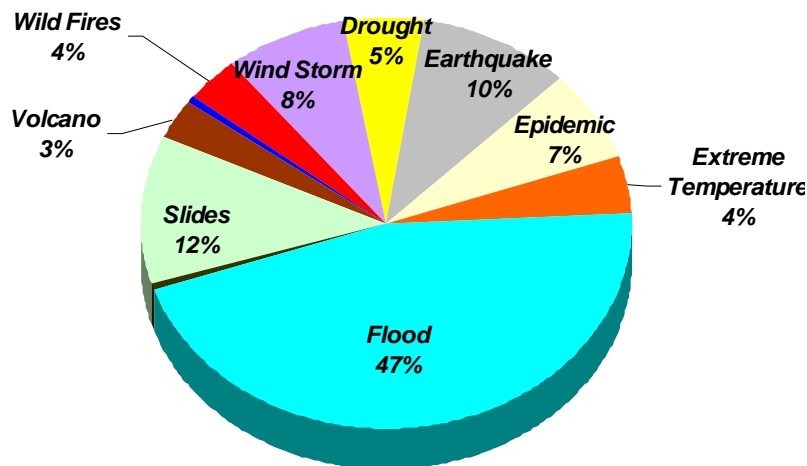
Maryam Golnaraghi, Ph.D.
Chief, Disaster Risk Reduction Programme

20 – 21 September 2010
Bogota, Colombia



Distribution of Disasters Caused by Natural Hazards and their impacts in South America 1980-2007

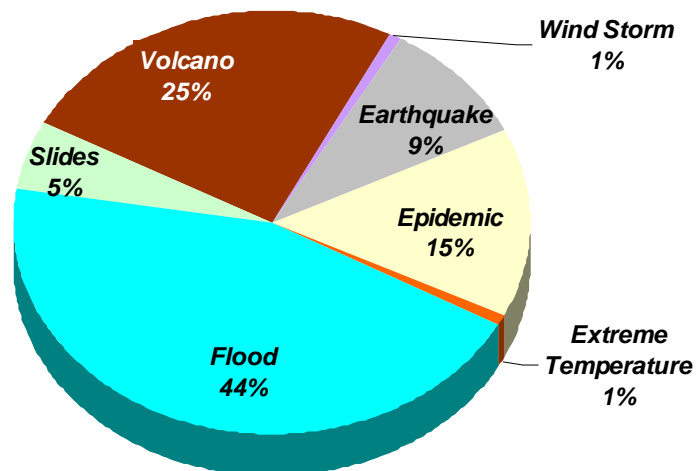
Number of events - 1980-2007 (RA III)



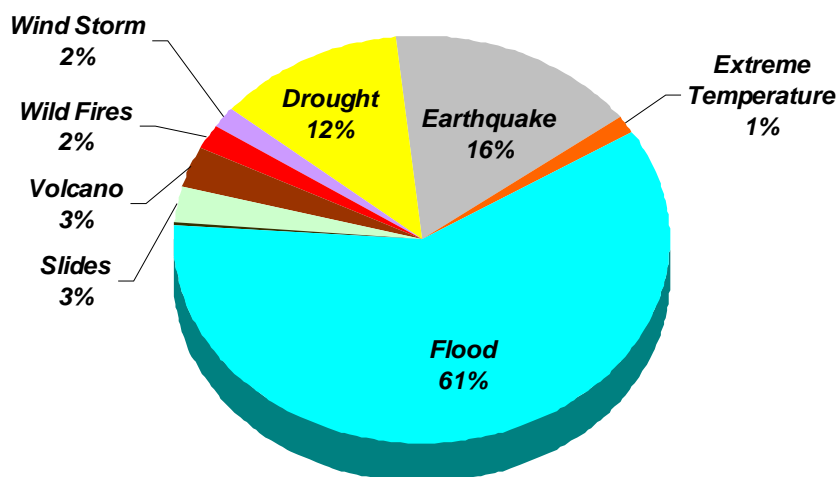
87 % of events
66 % of casualties
80 % of economic losses

are related to hydro-meteorological hazards and conditions.

Casualties - 1980-2007 (RA III)



Economic losses - 1980-2007 (RA III)

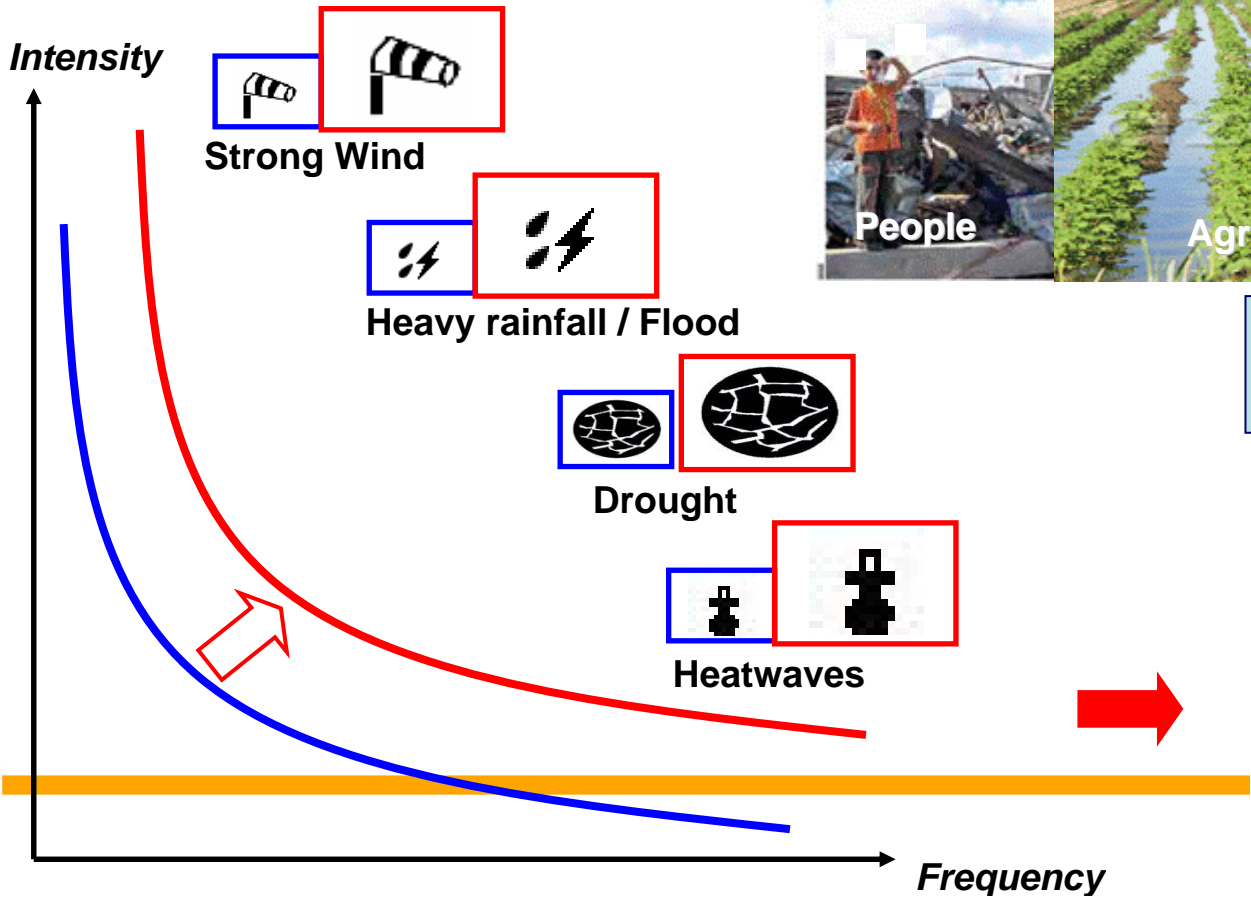


Source: EM-DAT: The OFDA/CRED International Disaster Database - www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium



IPCC 4th Assessment: 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



1st EC WG DRR &SD and EC 61 Endorsed WMO DRR Programme Framework

1 Alignment of clear policies, legislation, planning, resources at national to local Levels (Multi-sectoral, Multi-agency)

Risk Assessment

2
Historical Hazard databases
Hazard statistics
Climate forecasting and forward looking hazard trend analysis
Exposed assets & vulnerability

Risk Reduction

3
Preparedness (saving lives):
early warning systems
emergency planning and response

4
Prevention (Reduction of economic losses):
Medium to long term **sectoral planning** (e.g. zoning, infrastructure, agriculture)

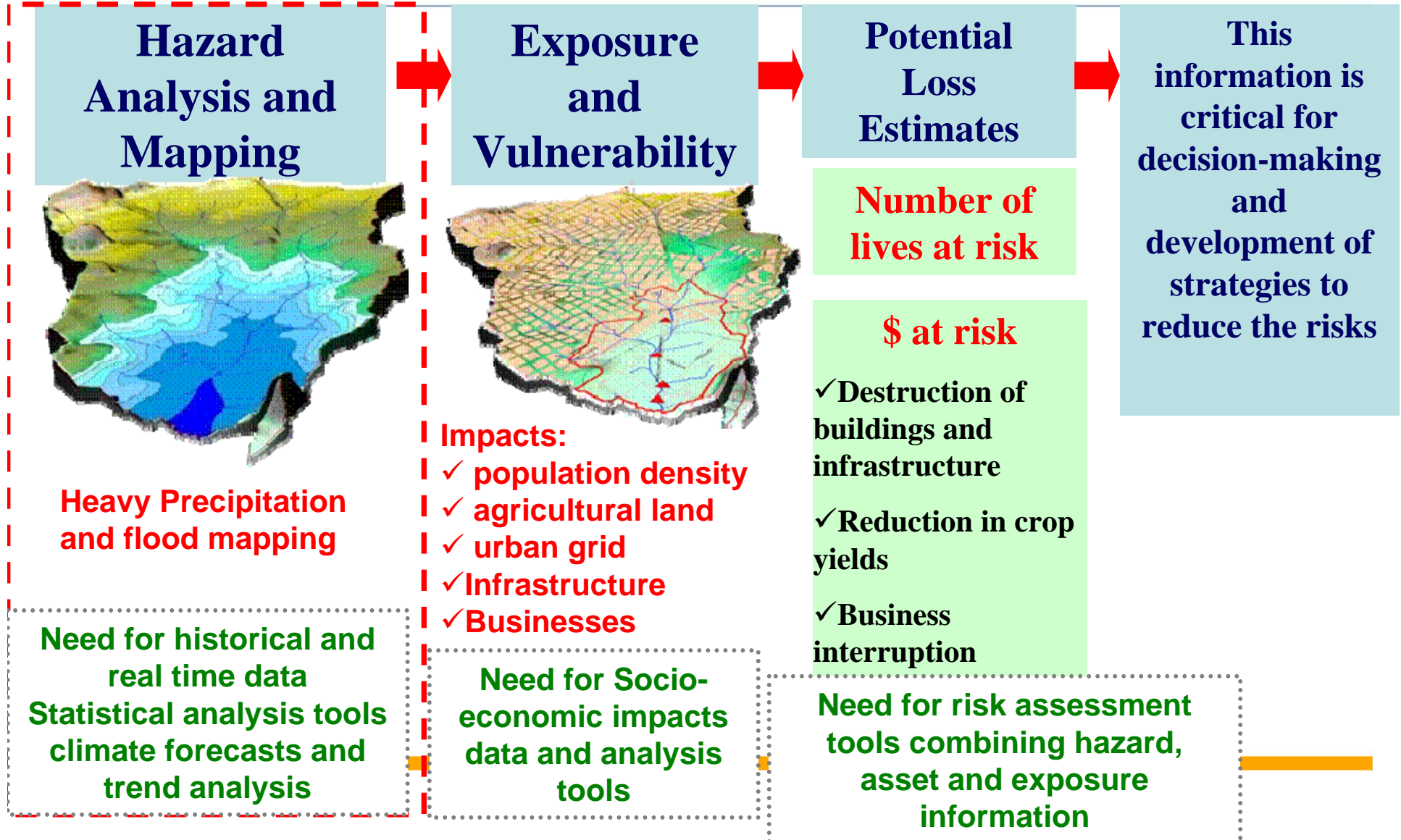
Risk Transfer

5
CATastrophe insurance & bonds
Weather-indexed insurance and derivatives

6
Information and Knowledge Sharing
Education and training across agencies

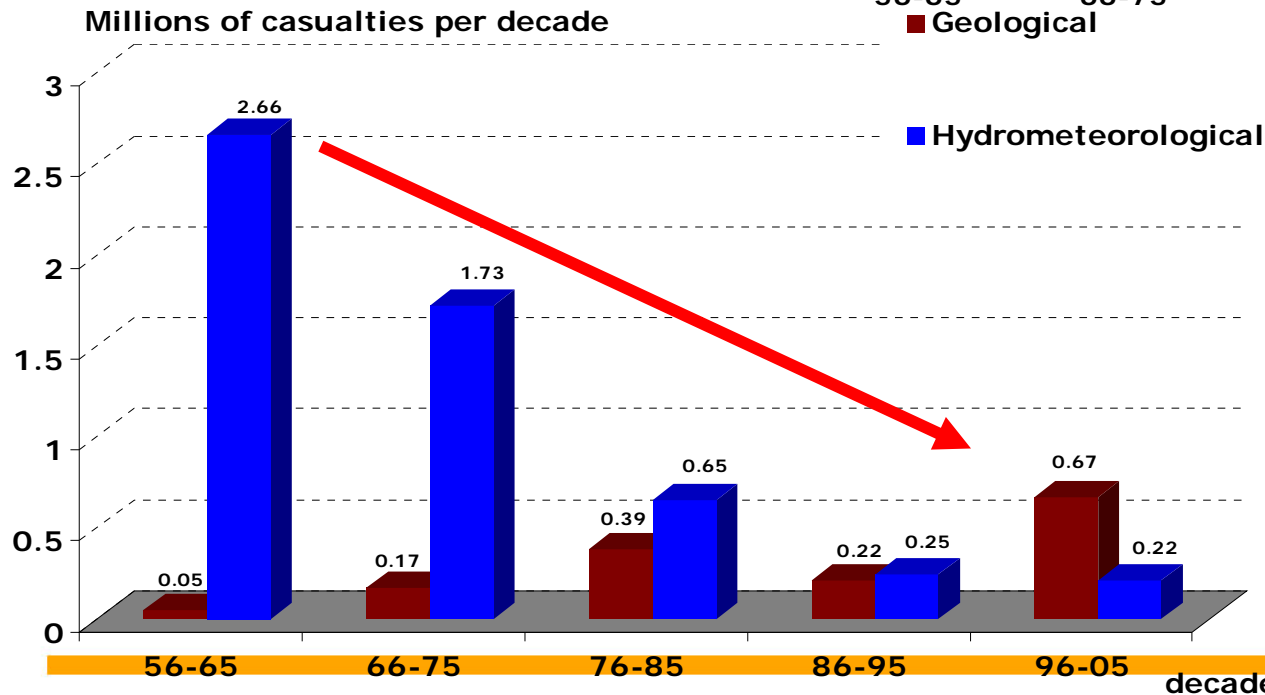
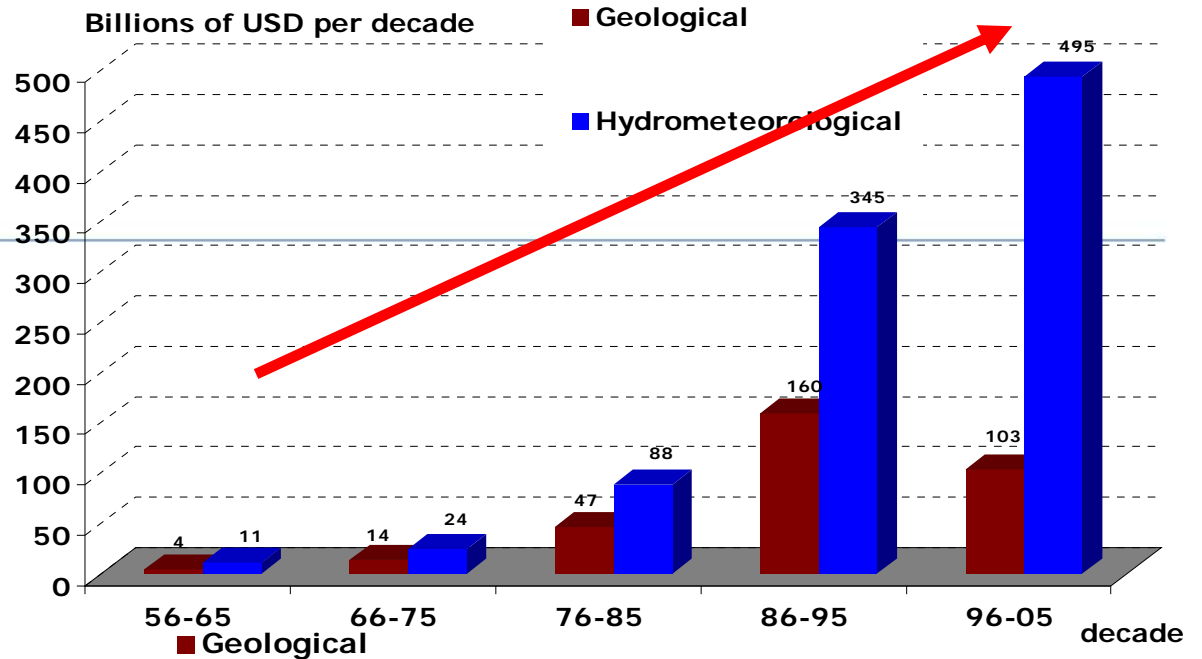


Understanding the Risks Provides Evidence for Preventing Disaster Risks!





While economic losses are on the way up!



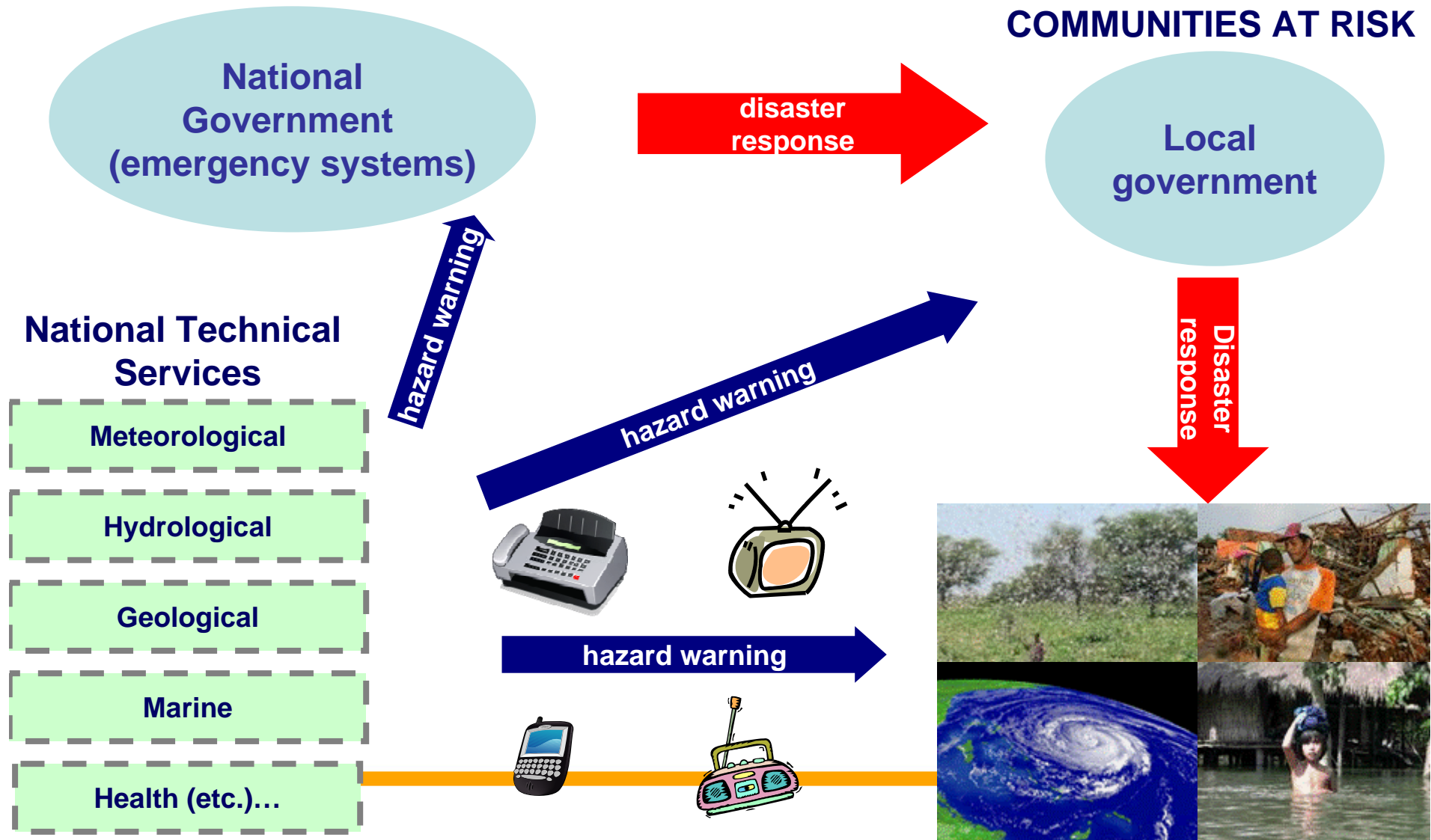
Loss of life from hydro-meteorological disasters are decreasing!

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



Many countries are still in response and relief mode!

COMMUNITIES AT RISK





Early Warning Systems Require Coordination Across Many Levels and Agencies

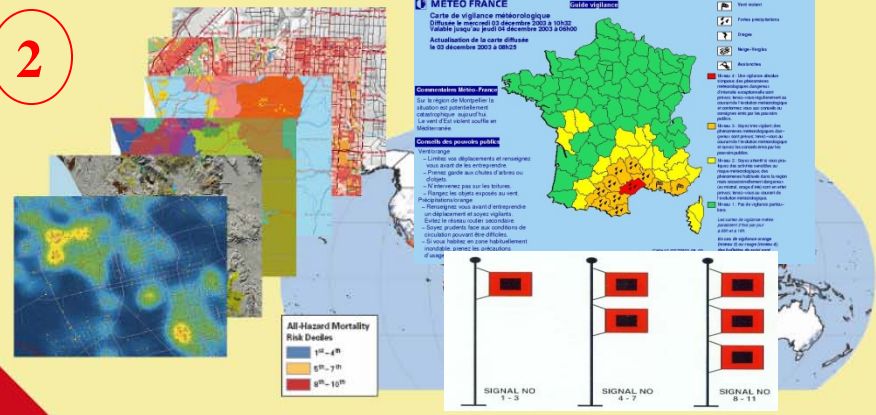
National to local disaster risk reduction plans, legislation and coordination mechanisms



Hazard Data and Forecasts

1

2



Risk Information



Coordination and Collaborations



Communication and Dissemination Mechanisms

3

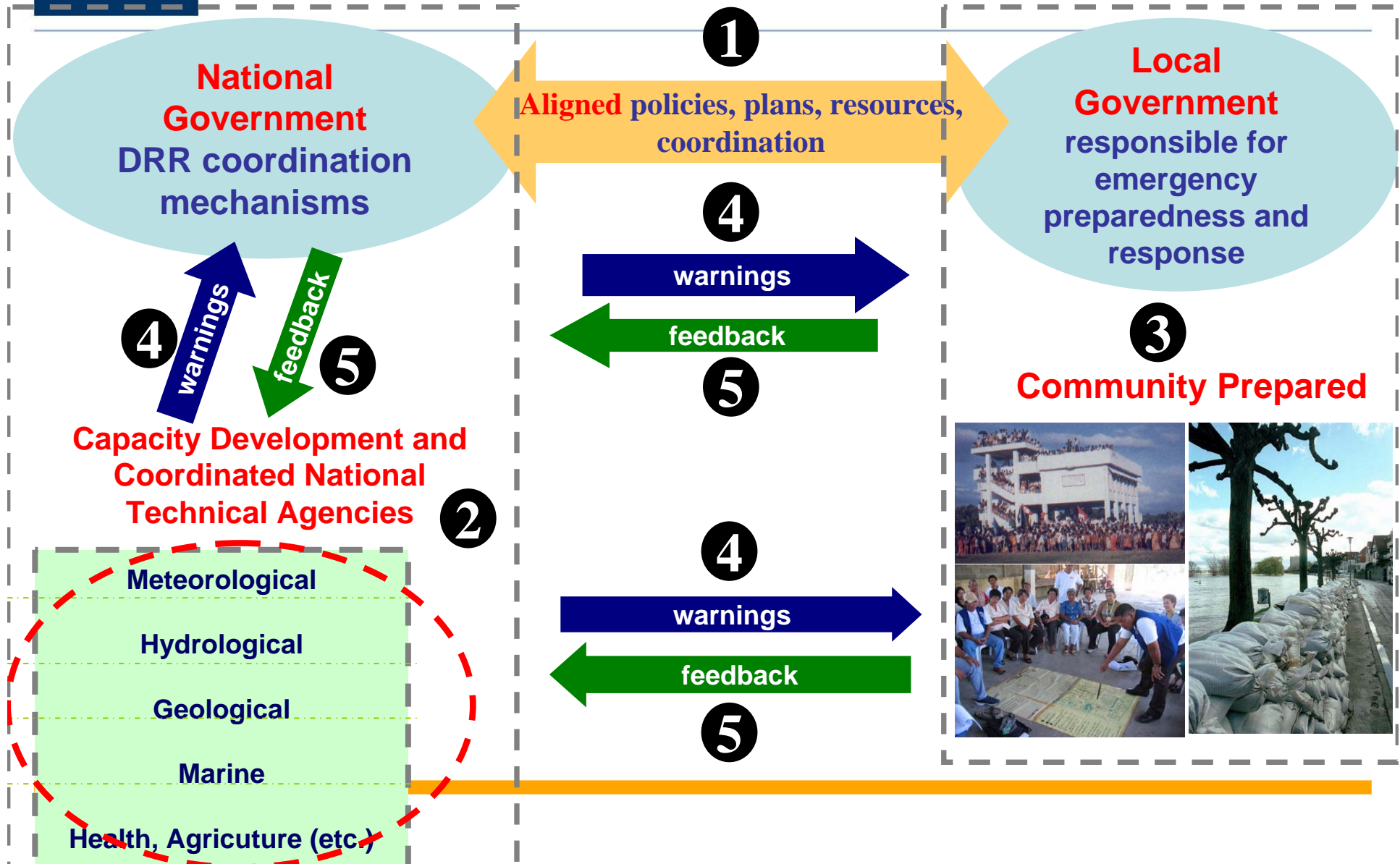
4



Preparedness and Early Response



There is need for investments in all Components of Early Warning Systems !





Climate forecasting and trend analysis tools provide unprecedented opportunities

.... to support sectoral risk assessment and management!

- Infrastructure and Urban planning
 - Land zoning
 - Insurance / Finance
 - Agricultural productivity and food security
 - Tourism
 - Health epidemics
 - Water resource management
 - Etc.....
-



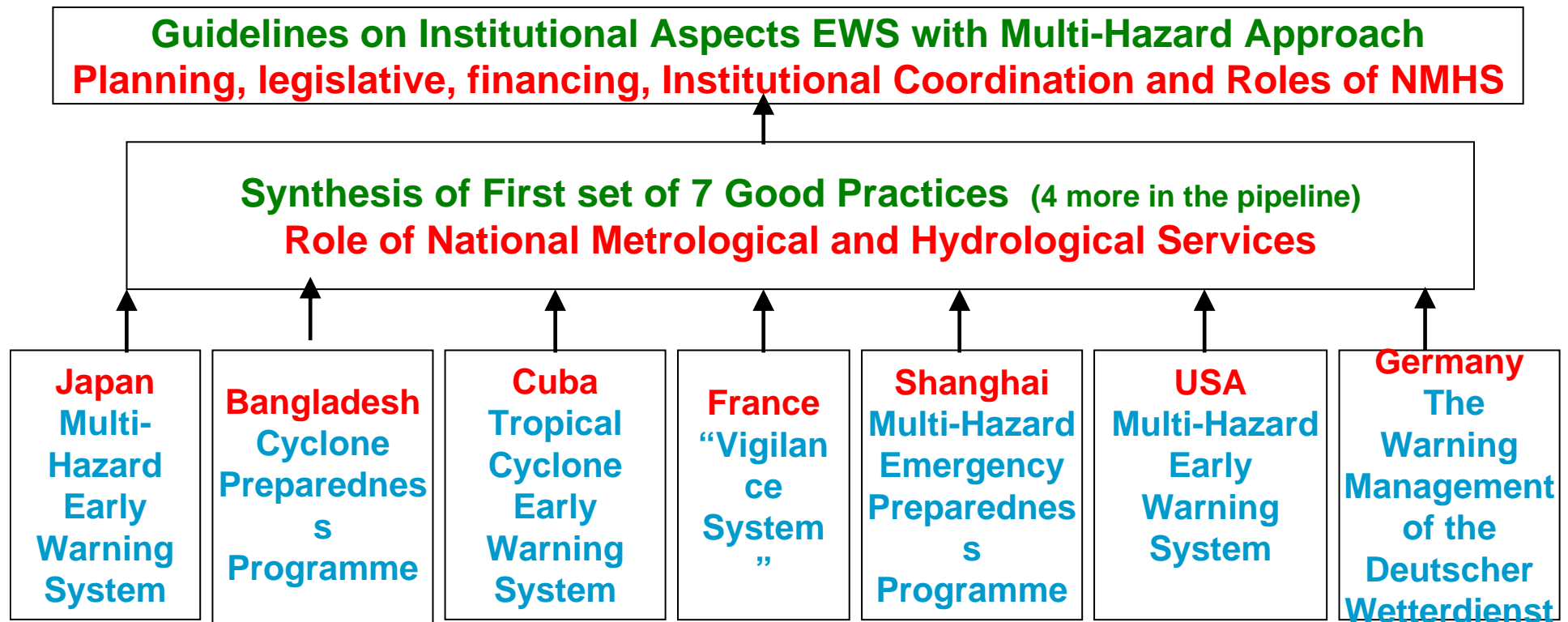
Seamless Warning and Information Services for Risk Reduction

(Many other examples exist)





To date: Documentation of Good Practices and develop Guidelines for Institutional Partnerships in Early Warning Systems



First EWS Publication of a series being published in 2010 and together with a technical WMO guidelines.

Next Phase: Concept of Operations and Service Delivery Issues



10 Basic principles for effective Early Warning Systems

1. **Political recognition** of the benefits of EWS along **with effective planning, legislation and budgeting**
2. **Effective EWS are built upon four components:**
 - (i) hazard detection, monitoring and forecasting;
 - (ii) analyzing risks and incorporation of risk information in emergency planning and warnings;
 - (iii) disseminating timely and “authoritative” warnings with clarity on the responsibilities and mandate for issuance of warnings;
 - (iv) community emergency planning and preparedness and the ability to activate emergency plans to prepare and respond
3. **Roles and responsibilities of all EWS stakeholders and coordination mechanisms clearly defined and documented**
4. **Capacities aligned with resources across national to local levels (sustainability)**
5. **Hazard, exposure and vulnerability information are used to carry-out risk assessments at different levels**

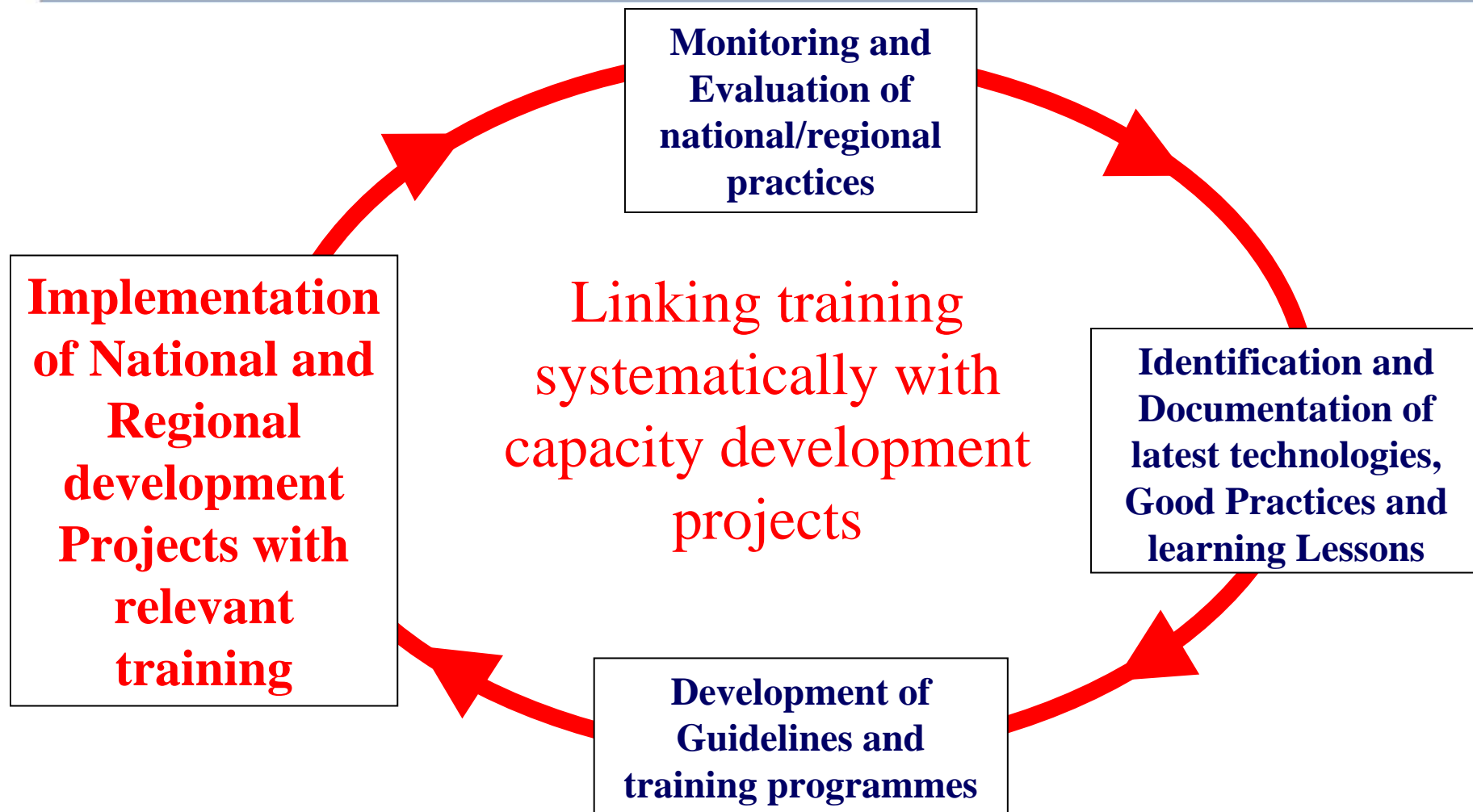


10 Basic principles for effective Early Warning System (Continued)

6. Clear, consistent and actionable **hazard warnings**, with **risk information** and issued from a single recognized **authoritative source**
 7. Timely, reliable, redundant and sustainable **warning dissemination mechanisms**
 8. **Emergency response plans targeted** to the individual needs of the vulnerable communities, authorities and emergency responders
 9. **Regular training and education programmes** in risk awareness and emergency response actions
 10. **Effective feedback mechanisms** throughout levels of the EWS for system improvement over time
-



Leveraging WMO Programmes, Commissions, RAs and the Partners in DRR cooperation regional/national projects





Engage in cooperation projects with **strategic partners** that influence National & Regional DRR Programmes, Capacities and Funding

Partners	Agency Type	Coordination	National DRR Implementation	Funding
World Bank (GFDRR)	Development		X	X
ISDR	Coordination	X	X	
UNDP	Development	X	X	X
WFP, FAO	Agriculture	X	X	X
UN- OCHA, IFRC	Humanitarian	X	X	
Donors (EC, bi-laterals)	Donor			X
Regional Centers and agencies		X	X	X



Building Close Relationship and Track Record with Strategic Donors...

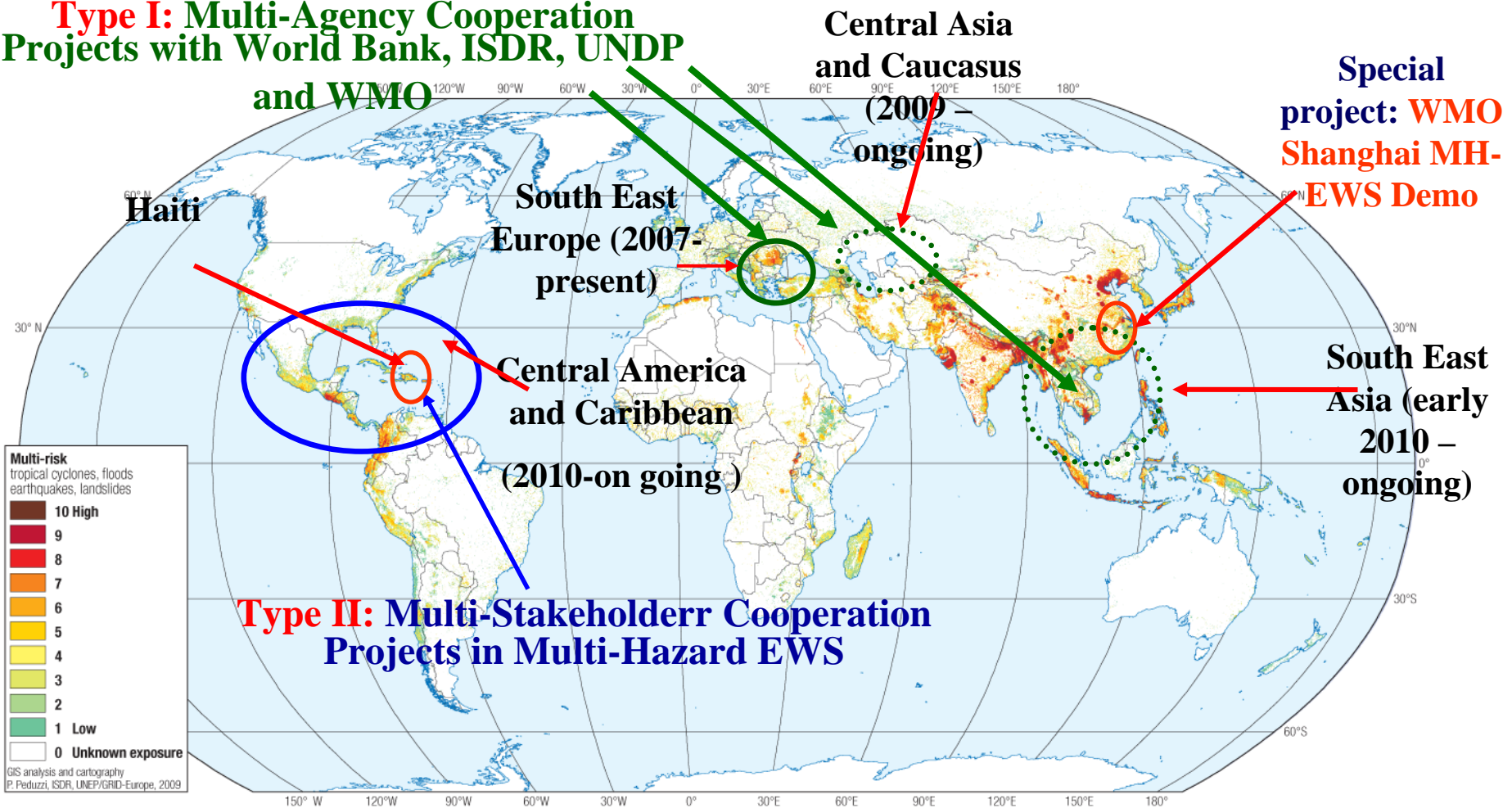
- 1. Identifying strategic partners and building long-term relationship:**
 - Identification and understanding of the priorities of strategic donors
 - Their engagement in the project development from the early stages
 - 2. Post-disasters Fund-raising opportunities for strengthening of the NMHS through the post disaster humanitarian and development mechanisms**
 - Flash Appeal (was used for upgrade of GTS in Indian Ocean, now for Haiti)
 - Post Disaster Needs Assessment and Country reconstruction plan (first time for Haiti)
-



Two Types of National/Regional DRR Cooperation Models Initiated

(2007 – Present)

Type I: Multi-Agency Cooperation
Projects with World Bank, ISDR, UNDP
and WMO





Training and Coordination Workshop on Multi-Hazard Early Warning Systems (RA IV)

(22-26 March 2010, Costa Rica)

http://www.wmo.int/pages/prog/drr/events/MHEWSCostaRica/index_en.html

SCOPE

Policy, planning, legislative, institutional partnerships and cooperation aspects of EWS at national level and recommendations for regional cooperation.

AUDIENCE

- 36 Directors or Senior executives from National Meteorological and Hydrological Services
- Directors of 33 Directors of National Disaster Risk Management agencies
- 8 Regional agencies (ACS, **CDEMA**, **CEPREDENAC**, CIIFEN, CMO, CIMH, CRRH, OAS)
- 6 International Organizations (World Bank, UNDP, ISDR, UNESCO-IOC, IFRC, WFP)
- Donors (USA, Canada, Finland, Italy, Japan, Spain, World Bank)



CDEMA
The Caribbean Disaster
Emergency Management Agency





Lead to the Roadmap for the design of a Caribbean Regional MHEWS Programme with National Development Components

Milestones

- 2010: Development a 6-8 year programme with phased projects (2 year implementation/ evaluation / expansion cycles)
 - 2011:
 - Resource mobilisation strategy and coordination with the donors
 - Implementation planning institutional engagements
 - 2011-2012: Phase I Project to be Launched
-



Engaging and Coordinating across all Key Stakeholders

✓ **National:**

- National Meteorological and Hydrological Services (NMHS) and Disaster Risk Management (DRM) Agencies of the beneficiary countries.
- Other EWS stakeholders such as media, economic sectors (health, agriculture,) (TBD)

✓ **Regional:**

- Regional centers and agencies of CARICOM: CDEMA, CMO and its CIMH;
- WMO RA IV and its DRR Task Team, WMO RA IV Hurricane Committee, the WMO RSMC – Miami Hurricane Center,
- Regional agencies and platforms: ACS, OAS, the Eastern Caribbean Donor Group, Caribbean Development Bank (CDB) and IADB.
- Other regional partners (TBD)

✓ **International and donors:**

- UN and International Agencies: WMO, UNESCO-IOC, UN-ISDR, UNDP, IFRC, etc.
 - Bi-lat donors and development banks: World Bank, USAID/OFDA, Canada (CIDA), Finland (MFA), Spain (ACE), Japan (JICA), UK (DFID), EU, France, etc.
-



Example Type II :Development of Multi-Hazard EWS in the Caribbean



LOGOS OF OTHER REGIONAL AND INTERNATIONAL SPONSORS

Roadmap for the Design of a Caribbean Regional Programme in Multi-Hazard Early Warning Systems (MHEWS) with National Capacity Development (as of 03.09.2010)

I. INTRODUCTION

In the Caribbean region, between 1980 and 2007, nearly 98% of disasters, 99% of casualties and 99% of economic losses related to natural hazards were caused by recurrent meteorological, hydrological- and climate-related events such as tropical cyclones and storm surges, floods, droughts, and extreme temperature (EM-DAT).

The "Training and Coordination Workshop on Multi-Hazard Early Warning Systems with Focus on Institutional Partnerships and Coordination," (MHEWS Workshop, see Reference Section) was convened by the World Meteorological Organization (WMO) with the support of the United States National Oceanographic and Atmospheric Administration - National Weather Service (NOAA-NWS), the United Nations International Strategy for Disaster Risk Reduction (UN-ISDR), United Nations Development Programme (UNDP), the World Bank, International Federation of the Red Cross (IFRC), El Centro de Coordinación para la Prevención de los Desastres Naturales en América Central (CEPRENAC), and the Caribbean Disaster Emergency Management Agency (CDEMA) on 22-25 March 2010 in San Jose, Costa Rica. Participants included directors and high-level representatives from the National Meteorological and Hydrological Services (NMHS) and National Disaster Risk Management (DRM) Agencies of 36 Members from WMO Regional Association IV (North and Central

America and the Caribbean), eight regional agencies and centers, six UN and international organizations, and representatives from eight development and bi-lateral donors. The participants of MHEWS Workshop:

- Exchanged experiences and discussed lessons learnt from countries with good practices in MHEWS;
- Discussed the existing regional initiatives in support of disaster risk reduction and particularly EWS;
- Assessed national capacities and gaps related to planning, legislative, institutional and operational aspects of EWS;
- Identified and prioritized concrete areas for development and cooperation at national and (sub) regional levels in EWS with multi-hazard approach.

Building on the outcomes of the MHEWS Workshop and follow up consultations, a road map for the design of a Caribbean regional programme in MHEWS with national capacity development is outlined in this document.

II. OVERALL OBJECTIVES

A Caribbean regional programme in MHEWS (with a 6-8 year vision) will be developed together with phase I project (with 2-year implementation cycle) (see Table 1):

- To strengthen national and regional institutional capacities and cooperation among the NMHS and DRM agencies through development/strengthening of components of early warning systems with a multi-hazard approach for hydro-meteorological hazards;
- To enhance coordination among hydro-meteorological warning systems (building on the existing regional coordination for tropical cyclones) other hazards (e.g., tsunamis).

A phased approach is utilized including:

- In 2010, development of programmatic and technical aspects;
- In 2011 institutional partnerships, resource mobilization strategy and implementation, monitoring and evaluation processes; and

- In 2011-2012 to launch the programme and phase I project upon confirmation of available resources and funding.

III. SCOPE (ISSUES AND REGIONAL COVERAGE)

The MHEWS Workshop provided concrete recommendations for the development of a coordinated Caribbean MHEWS regional programme with national development component, including:

- Strengthening of disaster risk management and emergency preparedness coordination frameworks and governance as linked to MHEWS;
- Strengthening, regional harmonization, and interoperability of the observing networks and data sharing;
- Capacity development in risk assessment and modeling for hydro-meteorological hazards to support EWS and emergency management with considerations for risks associated with climate variability and change;
- Strengthening of operational forecasting capacities for hydro-meteorological and marine-related hazards and stronger coordination with the tsunami warning system;
- Strengthening of warning dissemination mechanisms, service delivery, operational cooperation and quality management systems engaging NMHS and DRM agencies;
- Building/improving national watch and warning systems, and exploring possible harmonization and coordination in the region;
- Strengthening coordination and interoperability of crosscutting activities across national and regional agencies in MHEWS;
- Educational programmes in MHEWS targeted at the public and officials.

The design of this programme will consider countries and territories (islands) of the Caribbean with expressed interest: Antigua and Barbuda, the Bahamas, Barbados, Bermudas, the

British Caribbean Territories, Cuba, Dominica, the Dominican Republic, the French West Indies, Grenada, Haiti, Jamaica, the Netherland Antilles and Aruba, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago.

IV. KEY STAKEHOLDERS

The design of the programme will engage extensive consultations with and input from various national, regional and international stakeholders:

National: NMHS and DRM Agencies of the beneficiary countries. Other EWS national stakeholders will be identified during the consultations.

Regional: Regional centers and agencies of the Caribbean Community (CARICOM) such as the Caribbean Disaster Emergency Management Agency (CDEMA), the Caribbean Meteorological Organization (CMO) and its technical and training branch, the Caribbean Institute of Meteorology and Hydrology (CIMH); WMO Regional association IV Management Group and its DRR Task Team, WMO RA IV Hurricane Committee, WMO Regional Specialized Meteorological Center (RSMC) – Miami Hurricane Center, and regional agencies such as the Organization of American State (OAS), the Association of the Caribbean States (ACS), the Eastern Caribbean Donor Group, Caribbean Development Bank (CDB) and the Inter-American Development Bank (IDB). Other regional partners will be identified during the consultations.

International and donors: United Nations and other international agencies such as the UN-ISDR, UNDP, IFRC, the development banks and donors including, the World Bank, USAID/OFDA, the Canadian International Development Agency (CIDA), the Finnish Ministry of Foreign Affairs, the Spanish International Cooperation Agency and the Japan International Cooperation Agency (JICA). Other international partners will be identified during the consultations.



Example Type II :Development of End to End Multi-Hazard EWS in Central America and the Caribbean

VI. CONSULTATIONS

Building on the outcomes of the MHEWS Workshop, two consultants are hired by WMO and UNDP to work jointly to carry out follow-up missions to further explore the gaps and needs and develop the first draft of the programme and Phase I Project with input from WMO technical programmes and RA IV DRR Task Team. The preliminary drafts would be further revised and enhanced during a technical workshop in Barbados engaging meteorological, hydrological and DRM experts from the region and other countries of good practices as well as the WMO RA IV DRR Task Team (see Table 1, Item 7). The second draft will be presented for further consultations during workshops and meeting outlined in Table 1 with DRM agencies (Items 3, 4, 5 and 12), and with NMHS (Item 9 and 10). The revised draft will be presented to the WMO RA IV Management Group and CDEMA Comprehensive Disaster Management Coordination and Harmonisation Council (CDM-CHC) in Jamaica on 6-9 December 2010, for their endorsement (Items 12 and 13).

VII. RESOURCE MOBILIZATION

In coordination with the development banks and bilateral donors, a resource mobilization strategy is developed to ensure systematic and coordinated funding for the implementation of the project. Potential funding agencies will be invited to all technical consultations and meetings (Items 7 and 12) for drafting of the programme and project document.

VIII. REFERENCES

- EM-DAT is the International Disaster Database of the Center for Research on the Epidemiology of Disasters - Université de Louvain - Belgium - www.em-dat.net
- MHEWS Workshop website: http://www.wmo.int/pages/prog/drr/events/MHEWSCostaRica/index_en.html

For more information contact:

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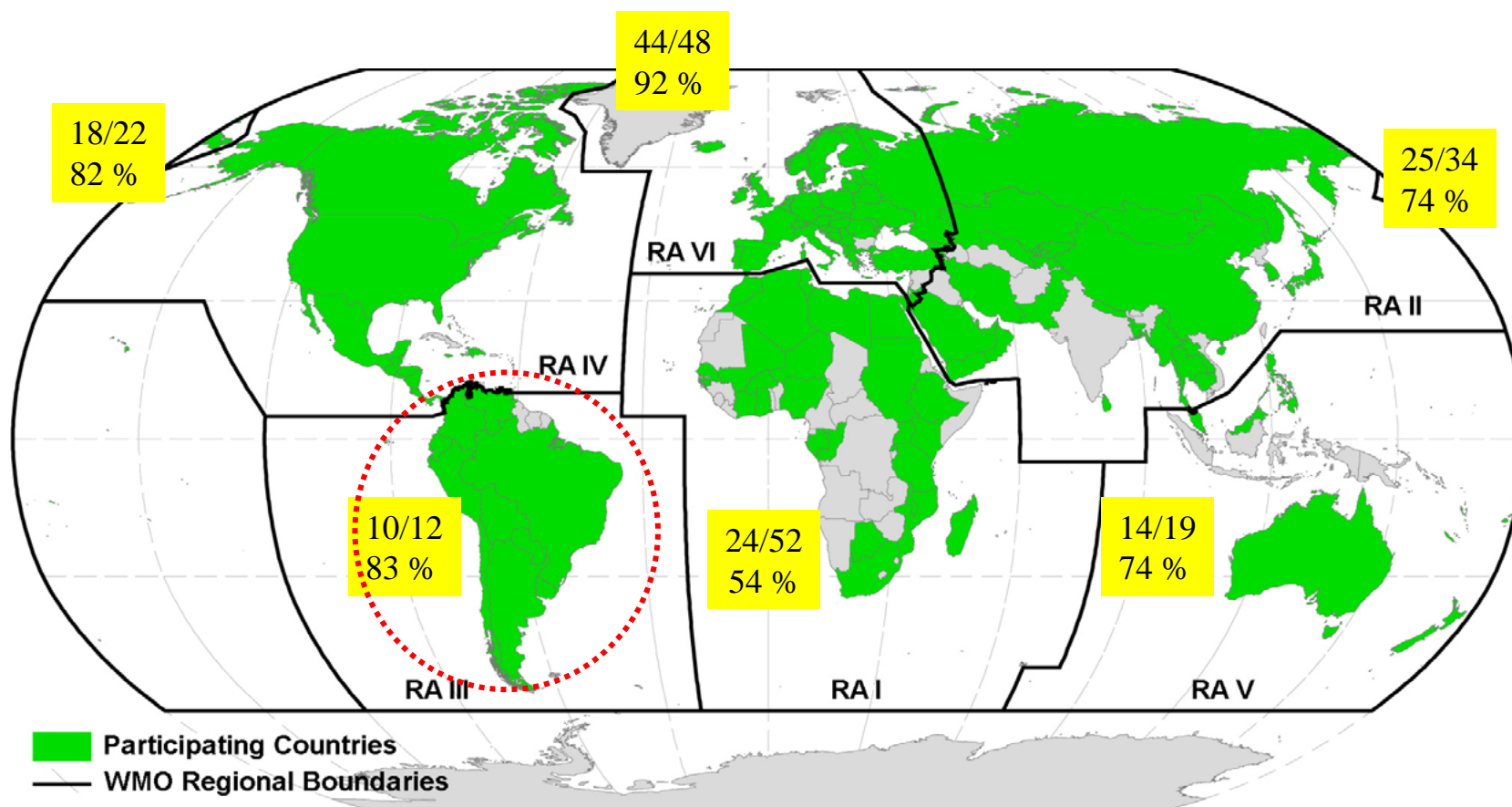
Table 1: Roadmap for the Design of the programmatic and technical aspects Caribbean Regional Programme in MHEWS with National Capacity Development in 2010

CONSULTATIONS AND DELIVERABLES	ORGANIZERS/SPONSORS	EXPECTED OUTCOMES	DATE & VENUE
1. Training and Coordination Workshop on Multi-Hazard Early Warning Systems with Focus on Institutional Partnerships and Coordination	WMO with NOAA, ISDR, CDEMA, CEPREDENAC, UNDP, World Bank, IFRC, NMHS and DRM of Costa Rica	• Identified and prioritized concrete areas for development and cooperation at national and (sub) regional levels in MHEWS	22 – 26 March 2010, San Jose Costa Rica
2. Consultants' missions in the region	WMO and UNDP	• Identification and confirmation of gaps and needs in MHEWS; • Identification of national, regional and international stakeholders; • Identification of priorities for design of the programme and phase I project.	1 July – 15 September 2010
3. Consultation at the 2nd Meeting of the Work Programme Development and Review Sub-Committee of the CDEMA Technical Advisory Committee	CDEMA	• Introduction of the roadmap and feedback.	21 July 2010, Barbados
4. Consultation at the Sixth (6th) Meeting of the Comprehensive Disaster Management Coordination and Harmonisation Council (CDM CHC) and 2010 Programming Consultation on Comprehensive Disaster Management (CDM)	CDEMA	• Introduction of the road map and feedback for incorporation of the Caribbean MHEWS Programme in CDM Programming	19 – 20 August 2010, Barbados
5. 18th meeting of the Committee on Disaster Risk Reduction	Association of Caribbean State (ACS)		9 – 10 Sept, 2010 Santo Domingo, DR
6. First draft of the Caribbean MHEWS programme and phase I project proposal			15 October 2010
7. Technical Workshop for the Development of Caribbean Regional Programme in Multi-Hazard EWS (MHEWS)	WMO, RA IV DRR TT with CMO/CIMH, CDEMA, UNDP, World Bank, NOAA, Finnish meteorological Institute and Ministry of Foreign Affairs, NMHS and DRM agencies of Barbados Other potential sponsors: ISDR, ACS, others (TED)	• Technical feedback by experts from NMHS and DRM from region on the first draft; • Prioritization of activities for Phase I project and development of a detailed project implementation plan.	1-5-November 2010 Barbados
8. Second revised draft of the Caribbean MHEWS programme and phase I project			15 November 2010
9. Consultation with Government Ministers and Directors of NMHS in CMO Member States at the 50th session of the Caribbean Meteorological Council	CMO	• Feedback on the second draft of the Caribbean Regional MHEWS programme and phase I project.	19 – 22 November 2010 Cayman Island
10. Consultations during the Conference of the Directors of the Inter-American Hydrometeorological Services	Inter-American Cooperation	• Feedback on the second draft of the Caribbean Regional MHEWS programme and phase I project	November, 2010 Chile
11. Third revised draft of the Caribbean MHEWS programme and phase I project			26 November 2010
12. 1/2-day High-level special session for finalisation of the Caribbean Regional Cooperation MHEWS Programme	WMO and its RA IV Management Committee with CDEMA, CMO/ CIMH, UNDP, NMHS and DRM of Jamaica Other potential sponsors: ISDR, World Bank, ACS, NOAA, Finland Meteorological Institute and Ministry of Foreign Affairs, others (TED)	• Final draft of the Caribbean MHEWS programme and phase I project • Endorsement by the WMO RA IV Management Group	6 December 2010 Montego Bay, Jamaica
13. Presentation of the Final Draft to the Seventh (7th) Meeting of CDM CHC	CDEMA	• Endorsement of the Final Draft of the Caribbean MHEWS Programme and Phase I Project in CDM Programming	6 – 9 December 2010 Montego Bay, Jamaica
14. Final draft of the Caribbean MHEWS programme + phase I project delivered to donors and other stakeholders			23 December 2010



WMO DRR Country-level Capacity Assessment Survey (2006)

Country Responses



74% + response rate

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



WMO DRR Country-level Capacity Assessment Survey (2006)

South America (RA III) Country Responses

- Top 10 Hazards + ENSO:
 - River flooding, flash floods and coastal flooding), strong winds, drought, forest and wild fires, thunderstorms and lightning, hailstorms, earthquakes, landslides and mudslides
 - 9/10 of NMHS requested guidance on standard methodologies for monitoring, archiving, analysis and mapping of these hazards.
 - 6/10 NMHS require assistance with legislation, infrastructure, technical and cooperation in DRR
 - 4/10 NMHS require assistance with technical and cooperation in DRR
-



**DRR Technical Conference:
XVth Session of WMO Regional Association (RA) III
Responses TO EWS SURVEY**

Results from 10 countries:

- **Argentina**
- **Brasil**
- **Chile**
- **Colombia**
- **Ecuador**
- **Guyana**
- **Peru**
- **Suriname**
- **Uruguay**
- **Venezuela**

Priorities highlighted in the EWS survey	
Governance and Institutional Arrangements	33 %
Development and utilization of hazard/risk information in emergency planning and warnings	60 %
Hazard monitoring, forecasting, and mandates for warning development	65 %
Warning harmonization and dissemination mechanisms	50 %
SOP and Service Delivery of NMHS to Emergency preparedness and response activities (national to local)	55 %



DRR Technical Conference at XVth Session of WMO Regional Association (RA) III

- **SCOPE**

Initiate a dialogue on Policy, planning, legislative, institutional partnerships and cooperation aspects of EWS.

- **EXPECTED OUTCOMES**

1. Participants will benefit from exchanging experiences and lessons learnt from good practices;
 2. Highlight DRR Developments in the region
 3. Explore a Roadmap for development of Regional/National MHEWS Programme to strengthen capacities in the region
-



DRR Technical Conference at the XVth Session of WMO Regional Association (RA) III

AGENDA

- **Session 1**
Opening and introduction
 - **Session 2**
Presentations of good practices in multi-hazard early warning systems
 - **Session 3**
Regional Initiatives in Disaster Risk Reduction and Early Warning Systems
 - **Session 4**
Status of EWS in RA III
 - **Session 5**
Plenary Discussion on regional cooperation for the strengthening of DRR and EWS
-



Thank You

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<http://www.wmo.int/disasters>

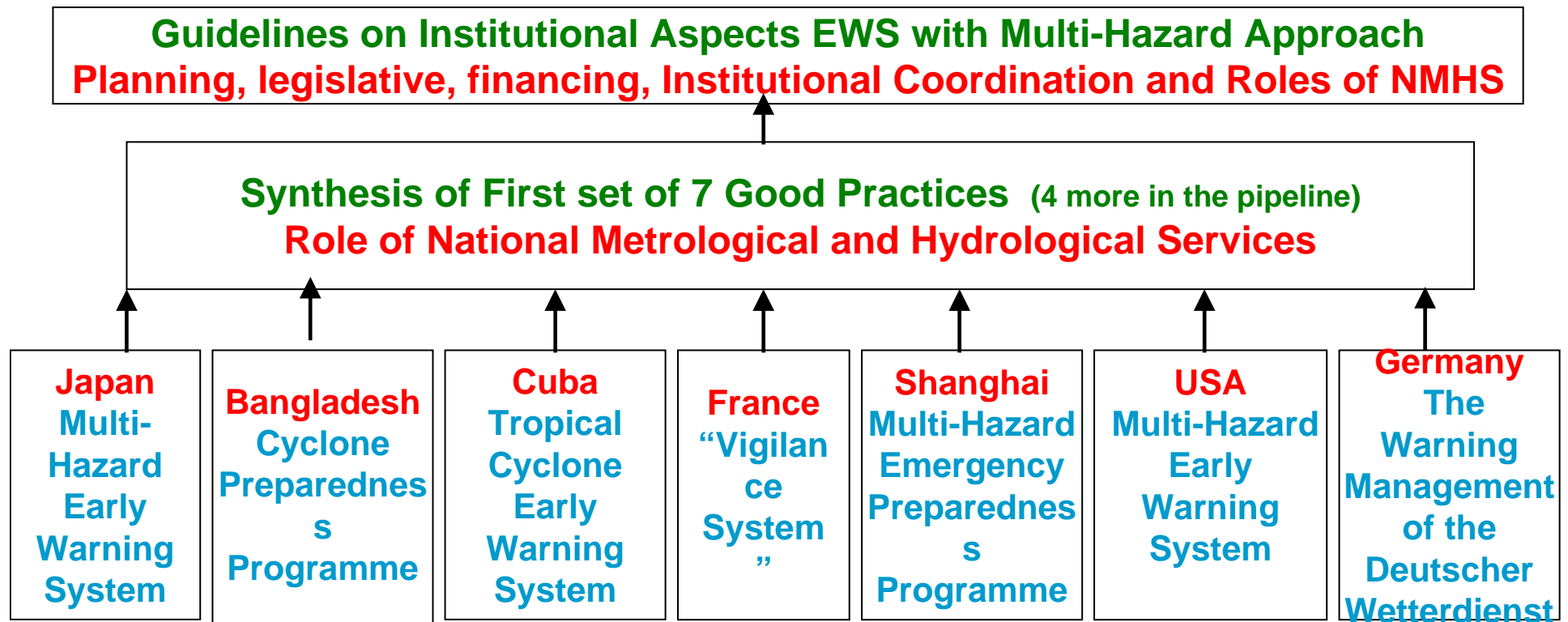


Session 2

Presentations of good practices in
multi-hazard early warning systems



To date: Documentation of Good Practices and develop Guidelines for Institutional Partnerships in Early Warning Systems



First EWS Publication of a series being published in 2010 and together with a technical WMO guidelines.

Next Phase: Concept of Operations and Service Delivery Issues



Basic principles for effective Early Warning Systems

1. **Political recognition of the benefits of EWS along with effective planning, legislation and budgeting (National to local)**
2. **Effective EWS are built upon four components:**
 - (i) hazard detection, monitoring and forecasting;
 - (ii) analyzing risks and incorporation of risk information in emergency planning and warnings;
 - (iii) disseminating timely and “authoritative” warnings with clarity on the responsibilities and mandate for issuance of warnings;
 - (iv) community emergency planning and preparedness and the ability to activate emergency plans to prepare and respond
3. **Roles and responsibilities of all EWS stakeholders and coordination mechanisms clearly defined, reflected in protocols and Procedures**
4. **Capacities aligned with resources across national to local levels (sustainability)**
5. **Hazard data/maps/analysis, exposure and vulnerability information are used to carry-out risk assessments at different levels**



Basic principles for effective Early Warning System (Continued)

6. Clear, consistent and actionable **hazard warnings**, with **risk information** and issued from a single recognized authoritative source,
 7. Level of threat linked to clear actions and behaviors (Color coded, flags)
 8. Timely, reliable, redundant and sustainable **warning dissemination mechanisms**
 9. **Emergency response plans targeted** to the individual needs of the vulnerable communities, authorities and emergency responders
 10. **Regular training and education programmes** in risk awareness and emergency response actions (formal, informal)
 11. **Effective feedback mechanisms** throughout levels of the EWS for system improvement over time
-



Training and Coordination Workshop on Multi-Hazard Early Warning Systems RA IV (2/2)

(22-26 March 2010, Costa Rica)

http://www.wmo.int/pages/prog/drr/events/MHEWSCostaRica/index_en.html

.OUTCOMES of the MH-EWS Workshop

- Exchange of experiences and lessons learnt from **good practices in Multi-Hazard Early Warning Systems**
- Discussion on the **existing regional initiatives** in EWS;
- **Assessment of national capacities and gaps** related to planning, legislative, institutional and operational aspects of EWS;
- **Identification and prioritization** of concrete areas of development and **cooperation** at national and (sub) regional levels in EWS in Central America and the Caribbean



CDEMA
The Caribbean Disaster
Emergency Management Agency

