



**WMO**

**World Meteorological Organization**

Working together in weather, climate and water

# Challenges and Opportunities with Development of Meteorological, Hydrological and Climate Services for DRR and Climate Adaptation

## **A framework for scaling UP**

**Maryam Golnaraghi, PhD**

**Chief, Disaster Risk Reduction Programme**

**13-15 May 2014, Almaty, Kazakhstan**

**Central Asia Climate Knowledge Forum: Moving Towards Regional Climate Resilience**



# Agenda

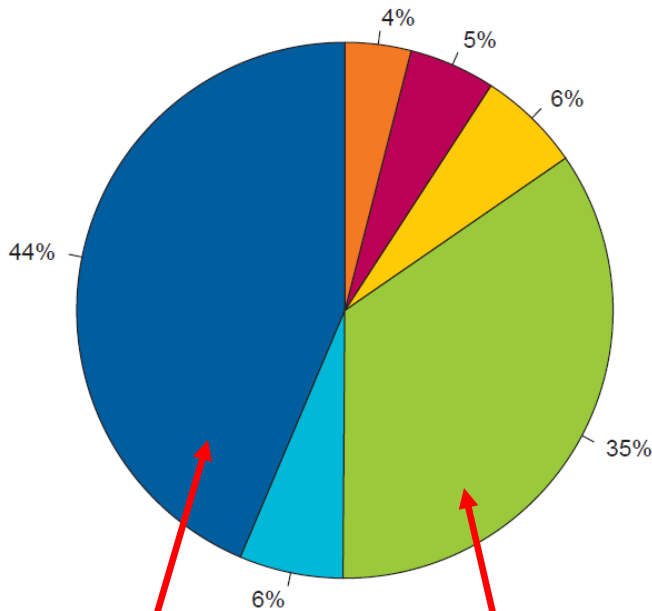
- Managing risks associated with climate
  - Concerns, challenges and opportunities
- Harnessing WMO research and operational systems
  - Scaling up the development of meteorological and climate services
- Conclusions

# Global Distribution of Reported Disasters Caused by Weather Extremes (1970-2012)

## Events

Global Distribution of Disasters per Hazard Type (1970-2012)

Total = 8 835 disasters



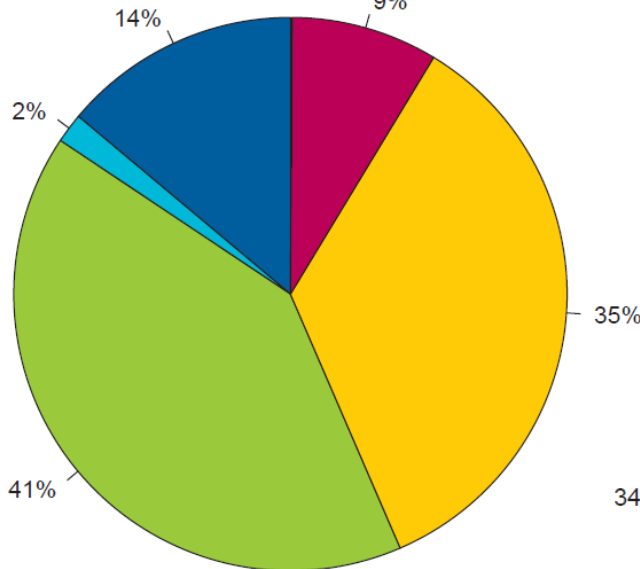
Floods

Storms

## Deaths

Global Distribution of Deaths per Hazard Type (1970-2012)

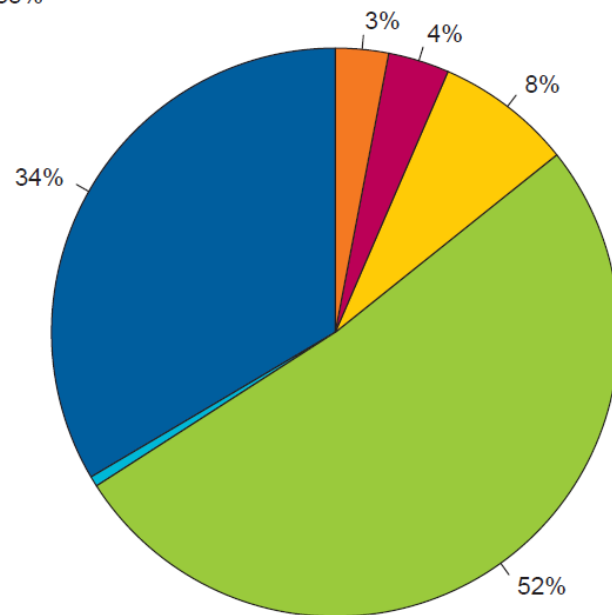
Total = 1 944 653 deaths



## Economic Losses

Global Distribution of Economic Losses per Hazard Type (1970-2012)

Total = US\$ 2 390.7 billion (adjusted to 2012)



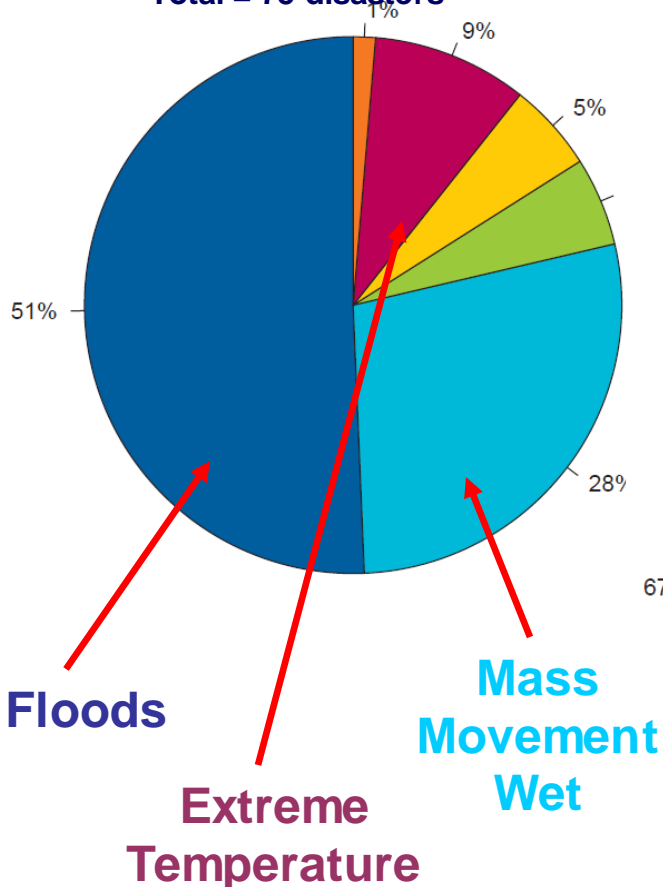
Floods
  Mass Movement Wet
  Storms
  Droughts
  Extreme Temperature

# Distribution of Reported Disasters Caused by Weather Extremes (1970-2012) in Central Asia

## Events

Global Distribution of Disasters  
per Hazard Type (1970-2012)

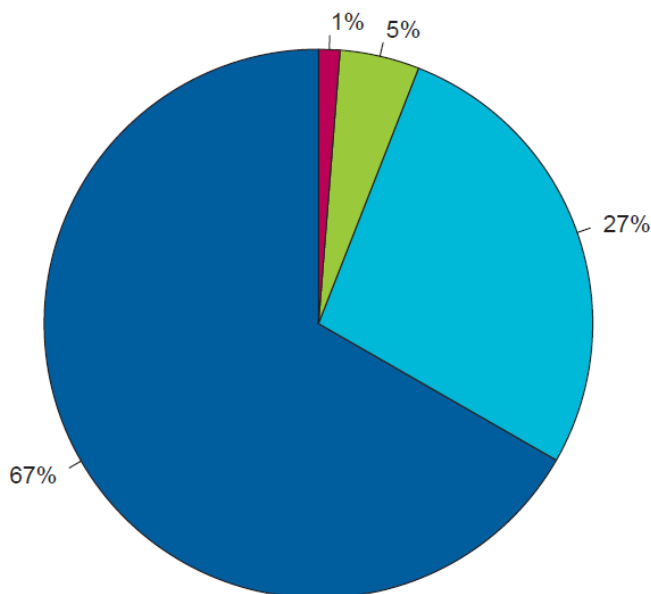
Total = 75 disasters



## Deaths

Global Distribution of Deaths  
per Hazard Type (1970-2012)

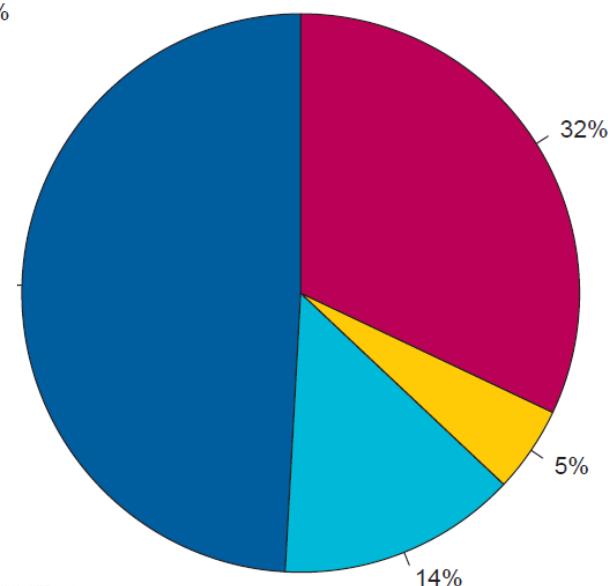
Total = 2 472 deaths



## Economic Losses

Global Distribution of Economic  
Losses per Hazard Type (1970-2012)

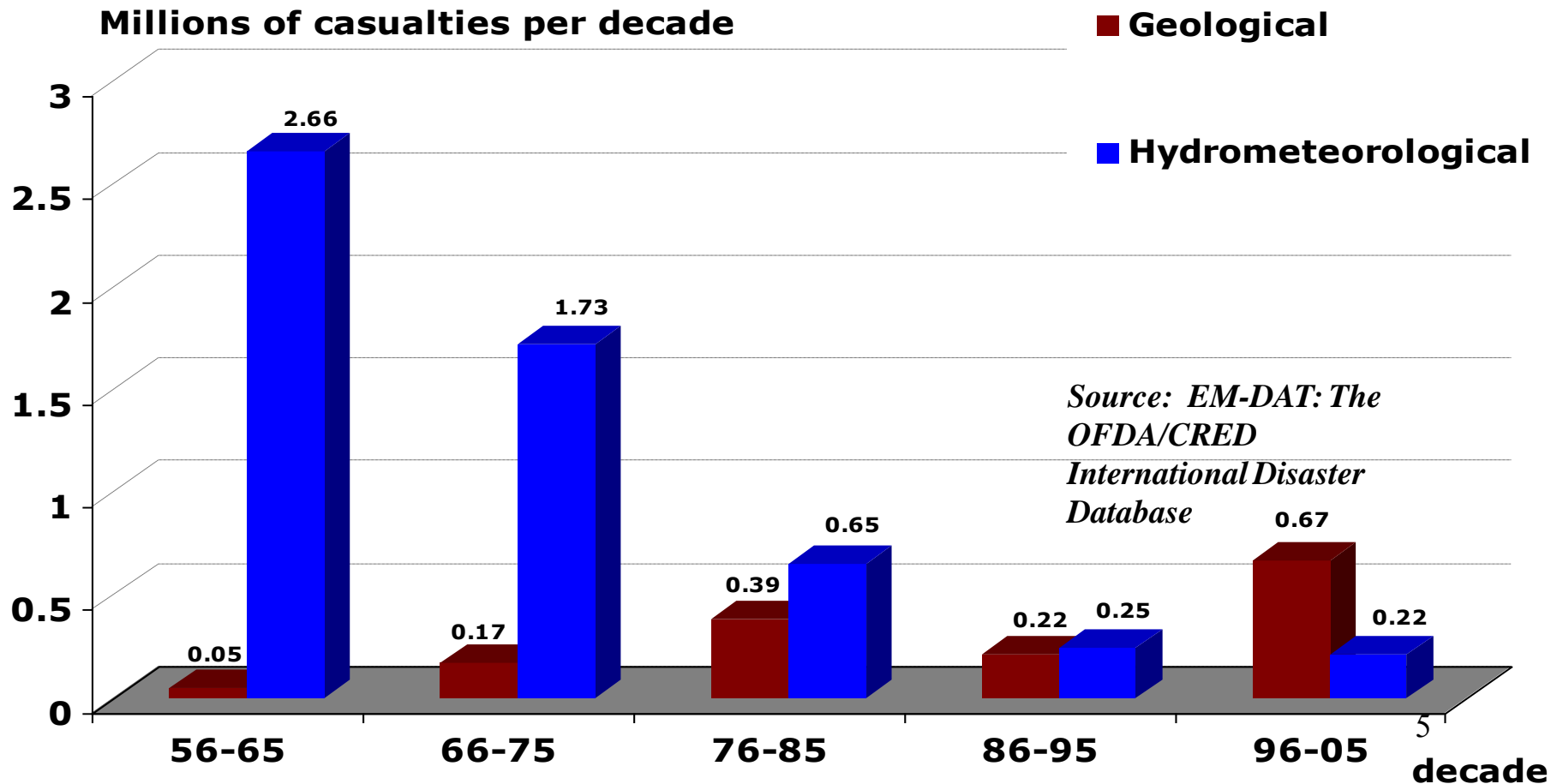
Total = US\$ 2.8 billion  
(adjusted to 2012)



■ Floods ■ Mass Movement Wet ■ Storms ■ Droughts ■ Extreme Temperature ■ Wildfires

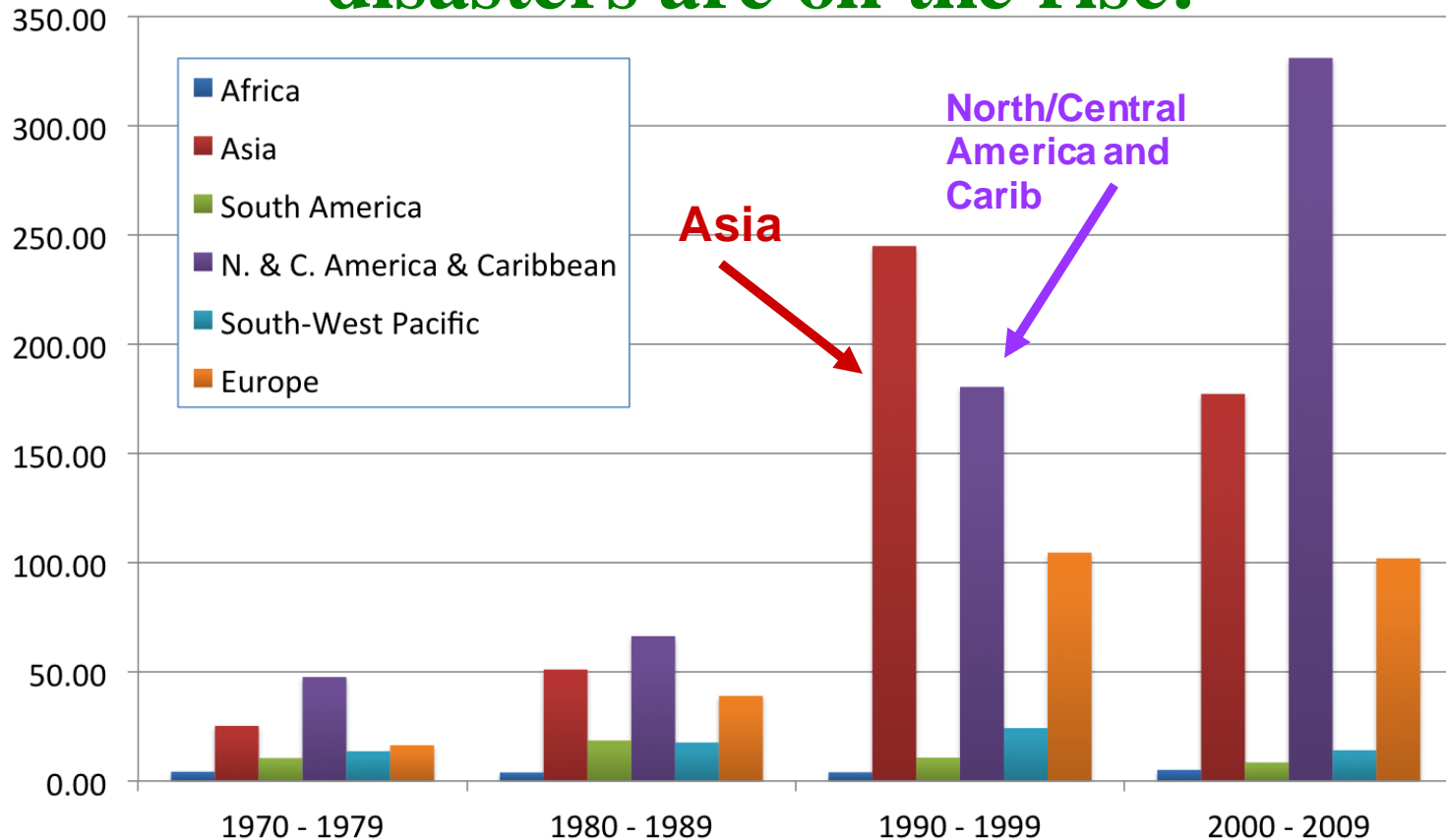
# First the good news.....

Loss of life related to hydro-meteorological hazards generally falling!



# Concerns...

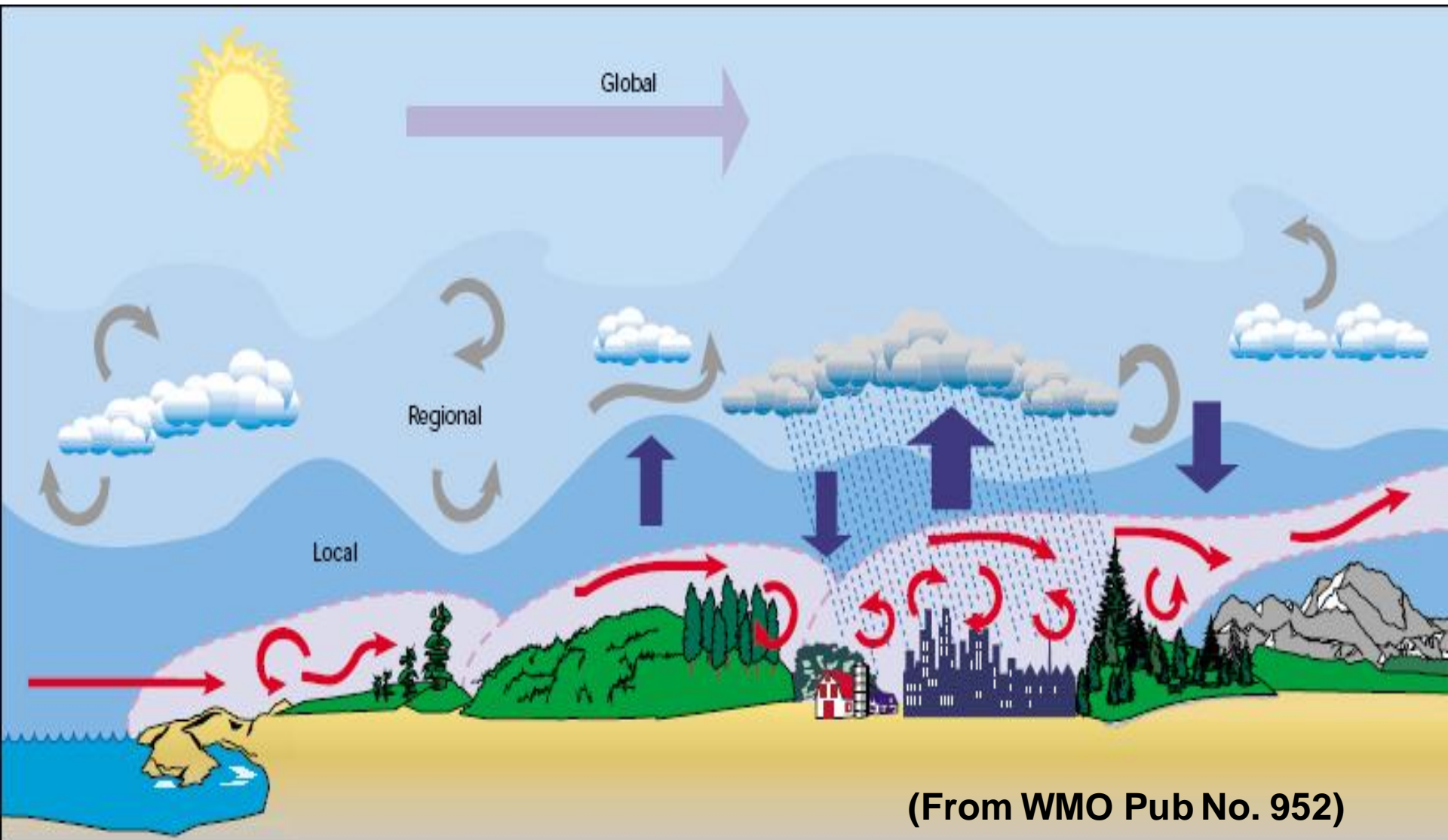
## Economic losses related to hydro-meteorological disasters are on the rise!



Economic losses by decade and region (in billions of US \$ adjusted to 2000 values)

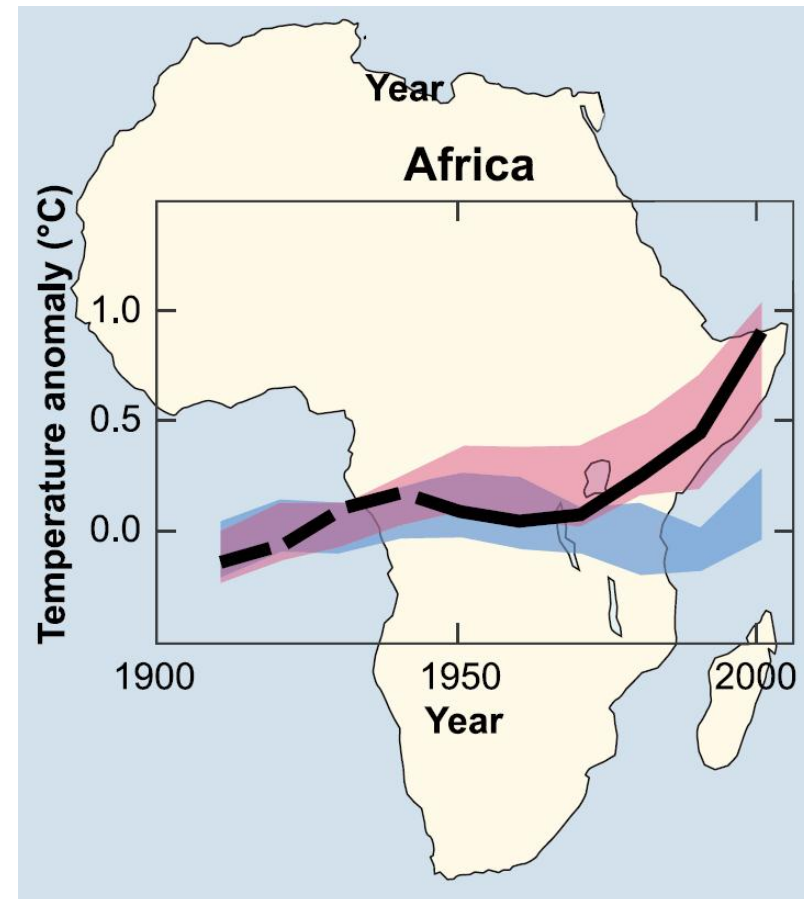
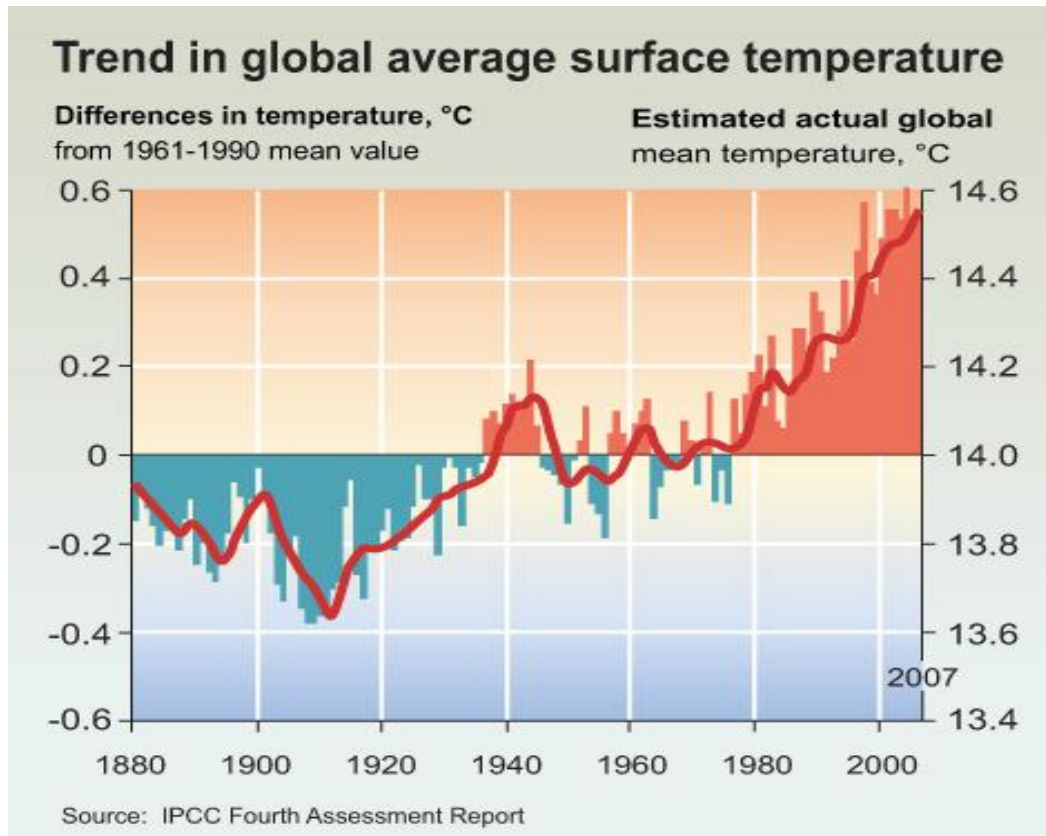
# Concerns...

**Multi-Scale Issue: Global, regional & local effects of climate affect different societies in different ways!**



# Concerns...

The past is no longer a trustworthy indicator of the future.....changes in location, severity and frequency of weather extremes!





# Concerns...

Exposure and vulnerability on the rise across sectors ..a major development Issue...

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

Intensity



Strong Wind



Heavy rainfall / Flood



Drought



Heatwaves



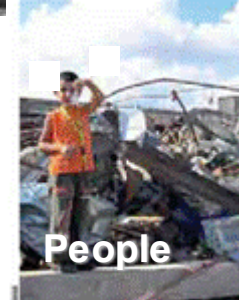
Energy



Water Resource Management



Transportation



People



Agriculture



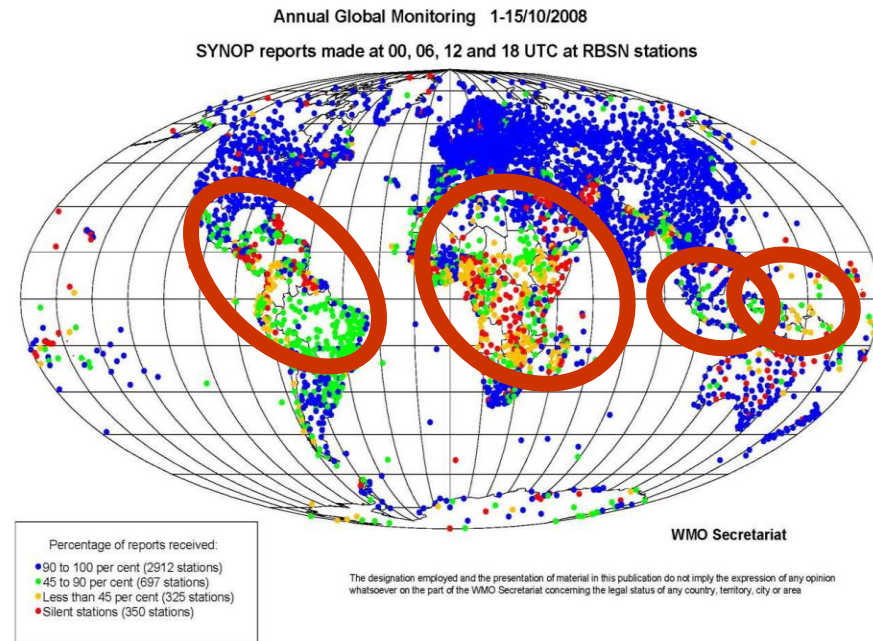
Urban areas

...need for informed risk management!

Frequency

# Challenges...

- Many countries lack the basic meteorological infrastructure, institutional, technical capacities!
- Institutional capacities in meteorology, hydrology climate services are highly varied across countries!!
- Need for service oriented culture!!!
- Sustainability!!!!



# Challenges

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

- 70% of NMHS need amendments of national policies and legislation
- 65% of NMHS need modernization of meteorological infrastructure (e.g., observation networks, forecasting, telecommunication, data rescue,...)
- 80% of NMHS need technical and management training
- 80% of NMHS need multi-sectoral institutional partnerships, coordination

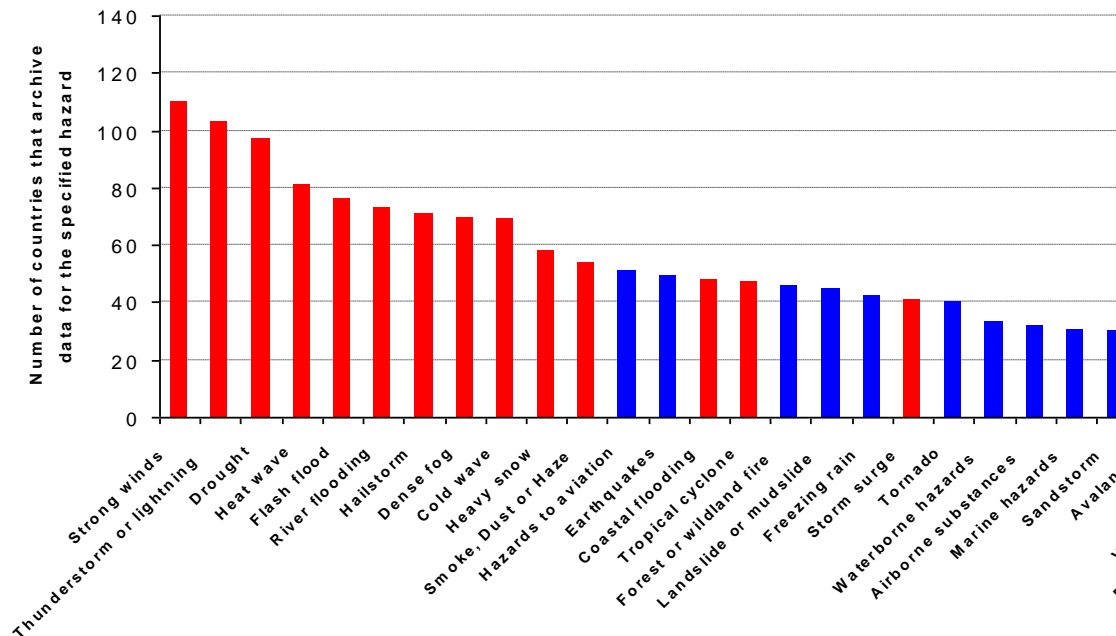


**Meteorological infrastructure/systems... high return on investment!**

Source: "Natural Hazard, UnNatural Disaster, Economics of Effective Prevention," World Bank and United Nation's Report (2010)

# Challenges

Over 80 % of National Meteorological Services....



Source: 2006 WMO Country-level DRR survey

[http://www.wmo.int/pages/prog/drr/natRegCap\\_en.html](http://www.wmo.int/pages/prog/drr/natRegCap_en.html)

- Not maintaining hazard data systematically
- Need data rescue & Data Management Systems
- Need Standards for:
  - Monitoring
  - Hazard database and metadata
  - Analysis tools
    - ✓ Statistical analysis
    - ✓ Climate modelling
  - Human expertise

# Challenges...

## Data exchange within and across national boundaries ....

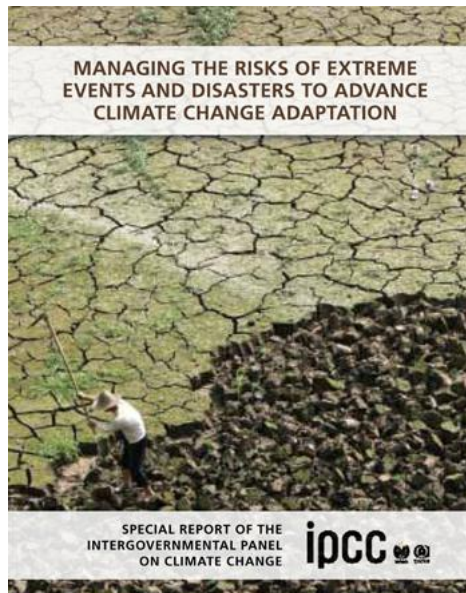
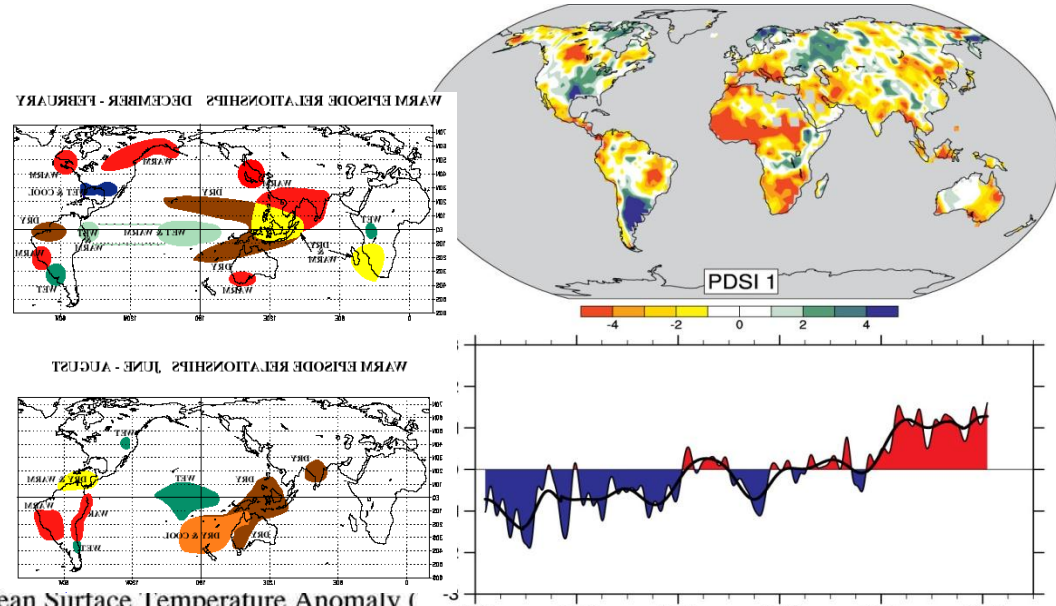
- International data sharing policies facilitated by WMO
  - **Resolution 40** “WMO Policy and Practice for the Exchange of Meteorological and Related Data ...” was adopted by 12th WMO Congress in 1995.
  - **Resolution 25** “Exchange of Hydrological Data and Products” was adopted by the 13th WMO Congress in 1999
- Challenges:
  - National security
  - Commercial to subsidize core infrastructure
  - Not available or need for data rescue
  - Institutional turfs and silos
- Need for high-level policy discussion within and across governments on the mutual values for open exchange of data



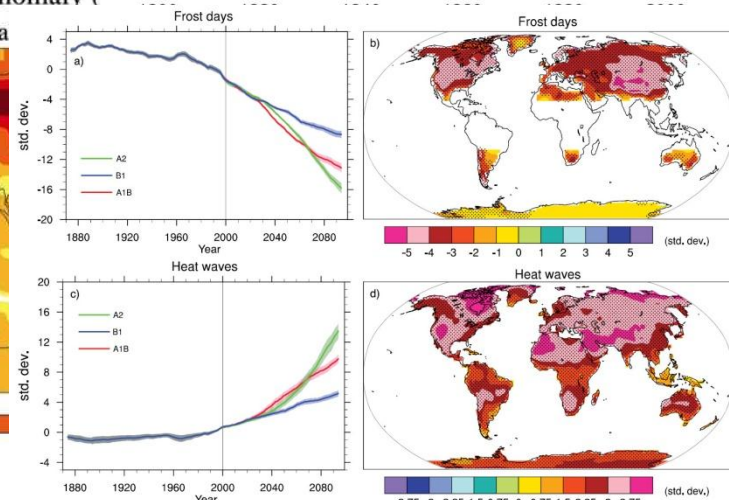
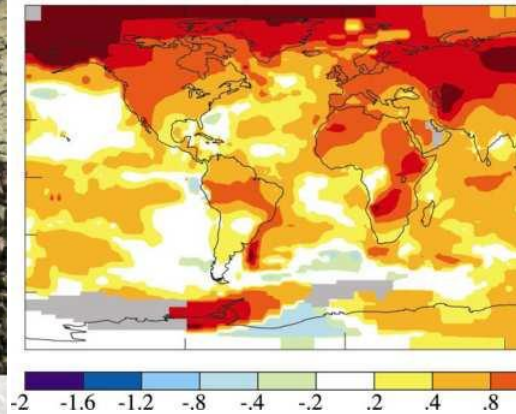
# Opportunities....

Continuous progress in understanding limits of predictability and forecasting...

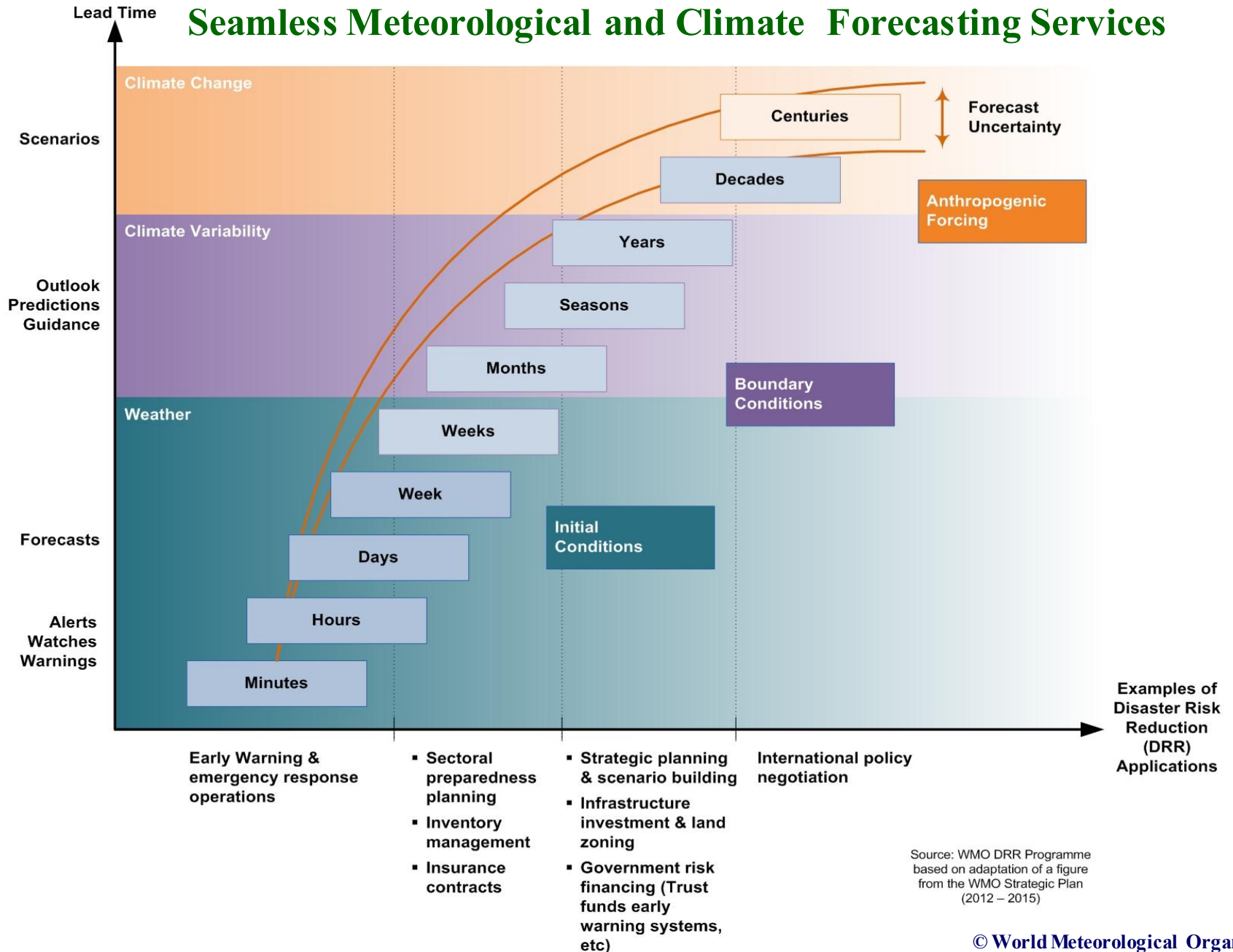
Need for operational production and provision of relevant climate information at different levels!



2001-2005 Mean Surface Temperature Anomaly (Base Period = 1951-1980) Globa

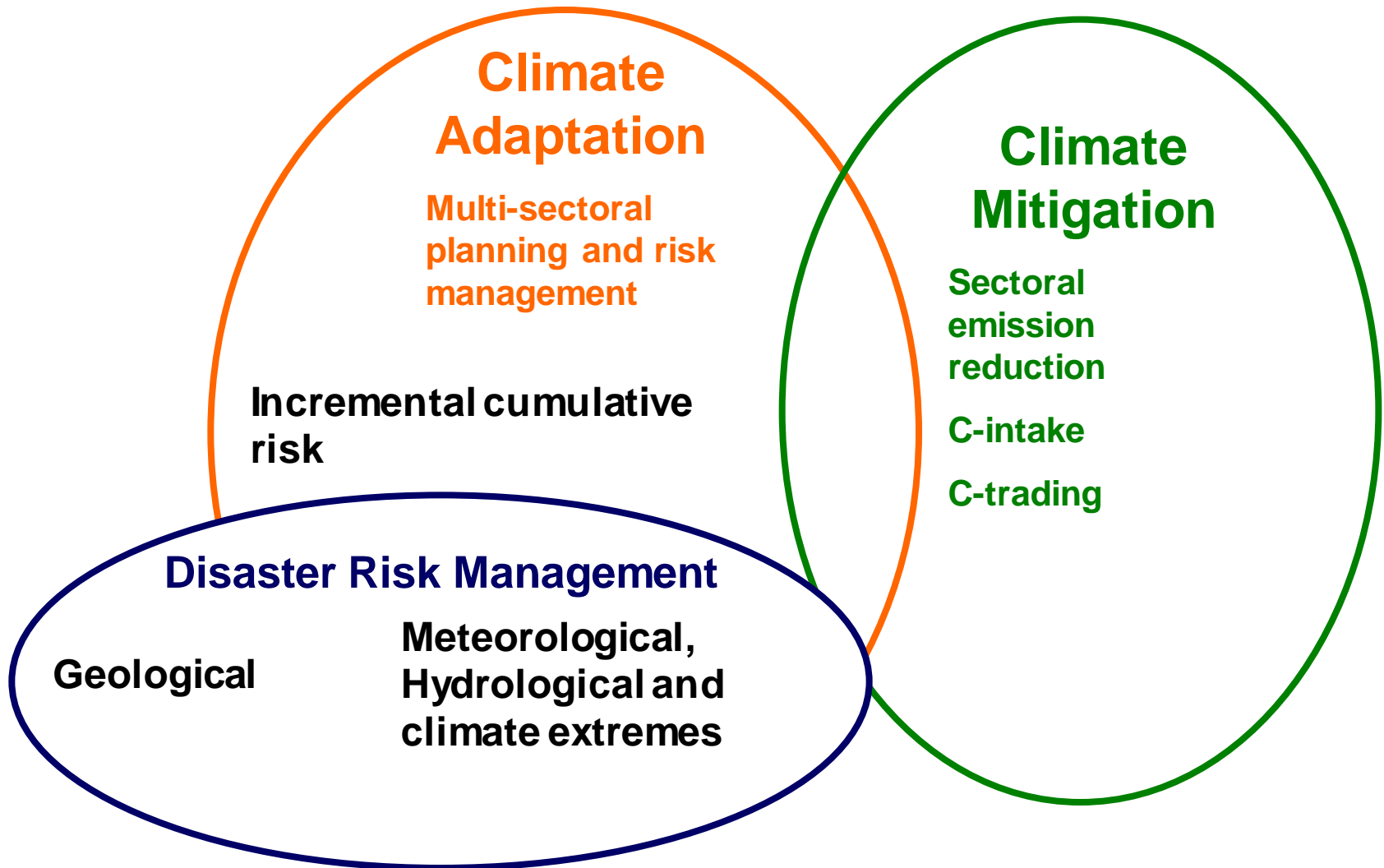


# Opportunities....



# Opportunities

## Decisions in Climate Mitigation, Adaptation and DRR are interlinked





# **WMO Disaster Risk Reduction Programme (established in 2004)**

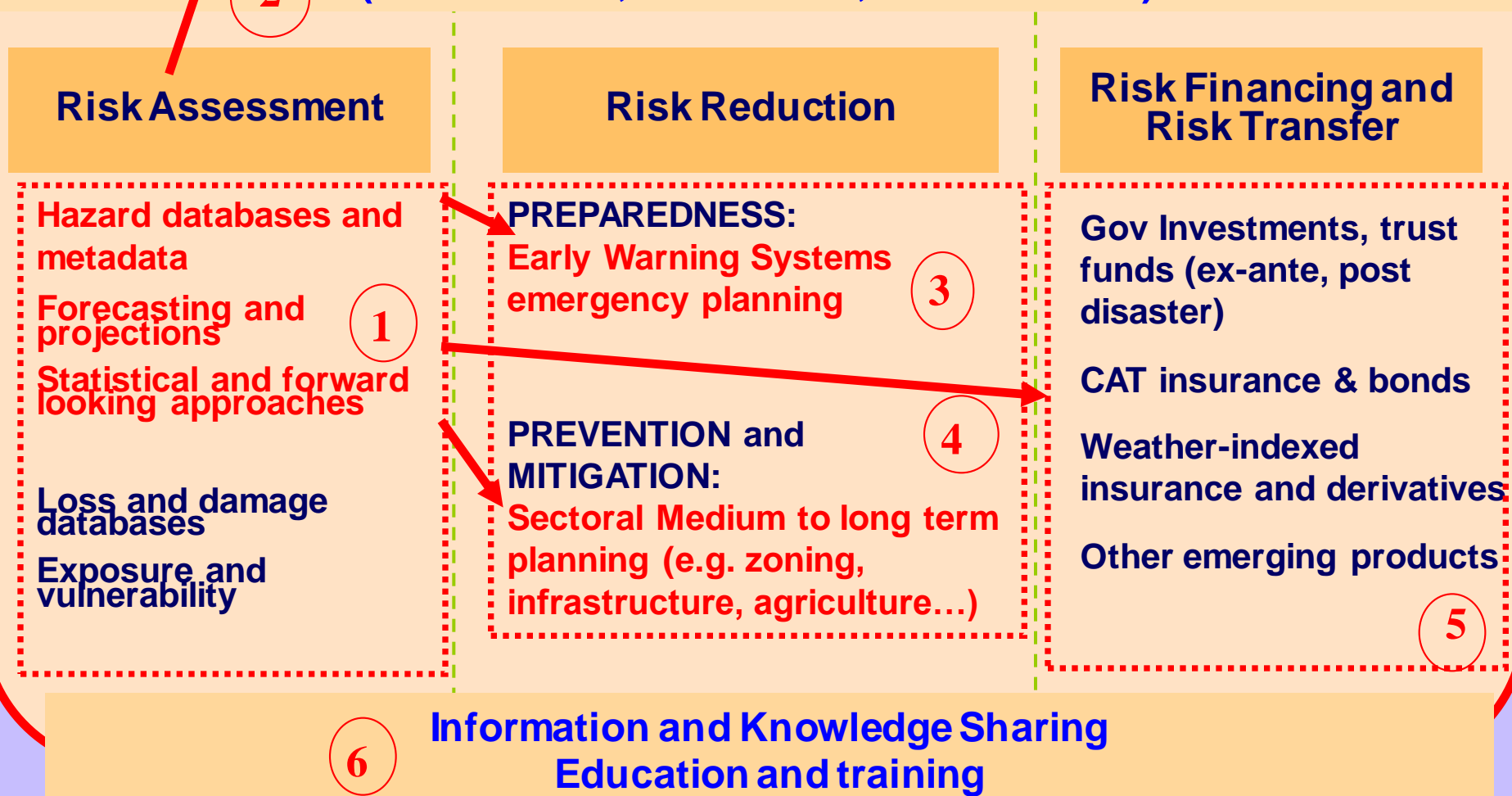
Harnessing WMO Sponsored research,  
expertise and operational capacities in  
meteorology, hydrology and climate

for improving early warning systems and  
preparedness, sectoral disaster risk  
reduction, risk financing and transfer  
decisions...

# Hyogo Framework for Action 2005-2015

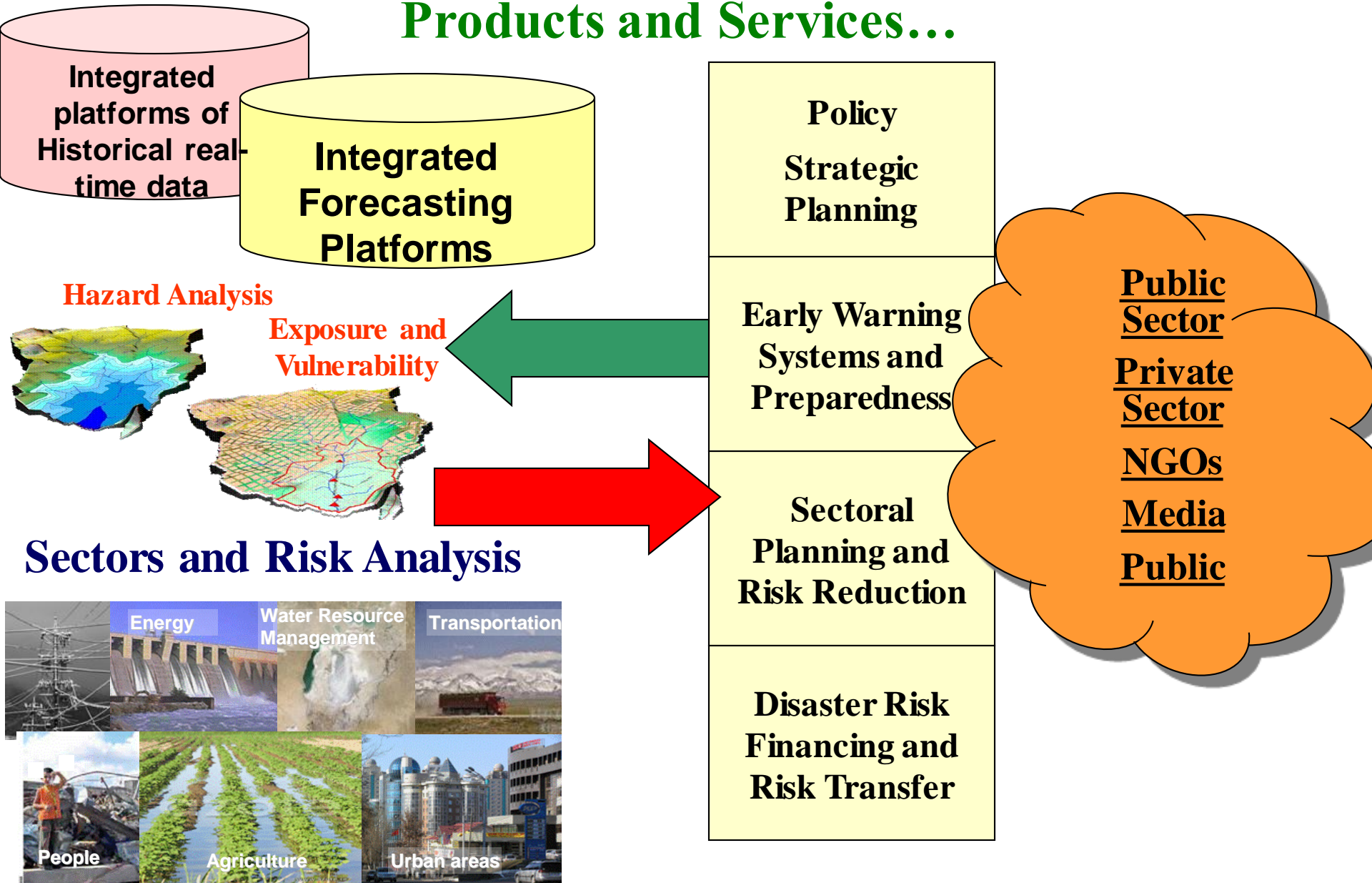
## Meteorological, Hydrological and Climate Services to support ....

### Governance and Institutional Framework (Multi-sector, Multi-level, Multi-Hazard)

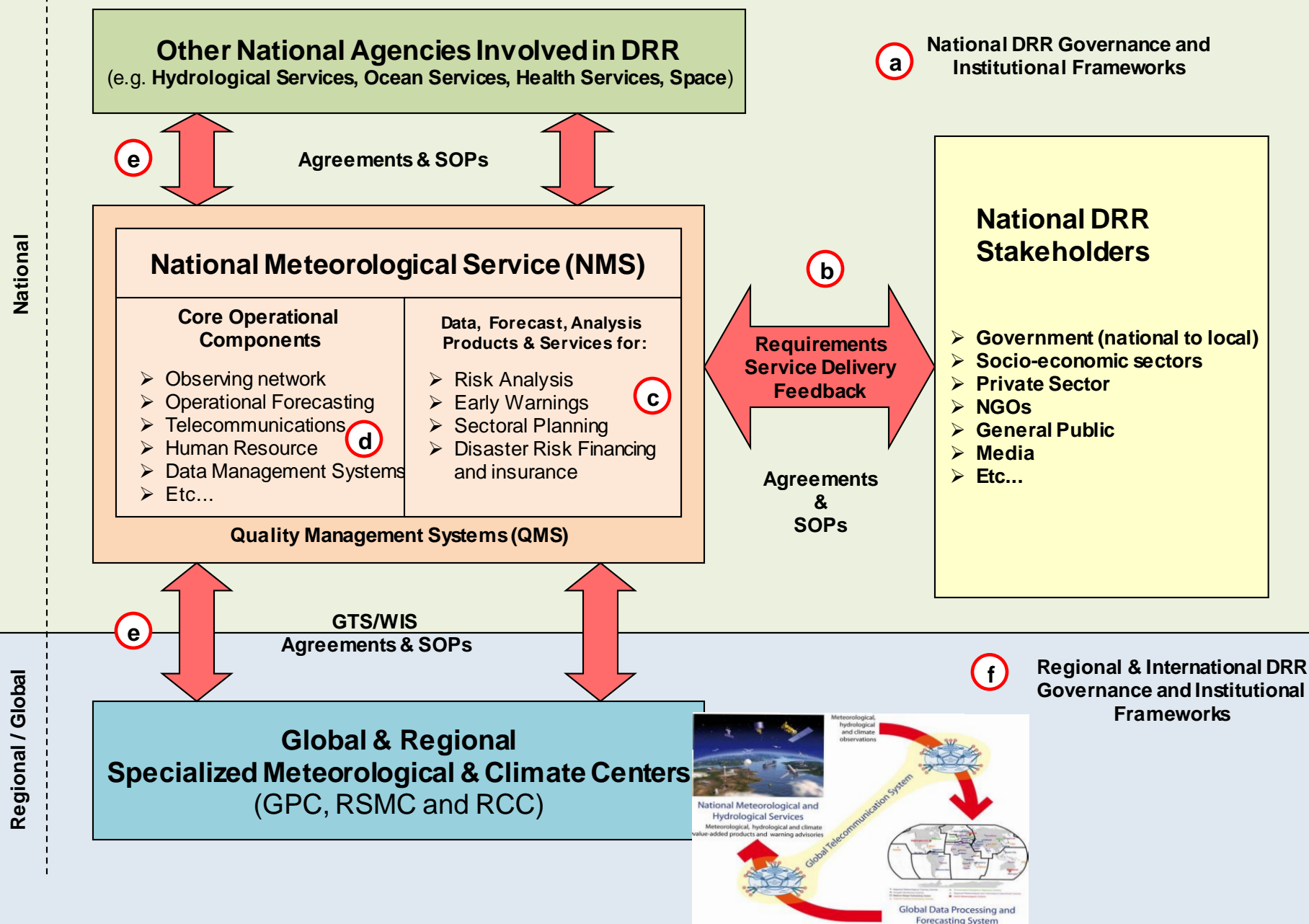


# WMO Actions

## Improving Meteorological, Hydrological and Climate Products and Services...



# Weather, Climate and Hydrological Services to support DRR Decision-Making



# Integrated Data, Forecasting and Service Delivery Platforms

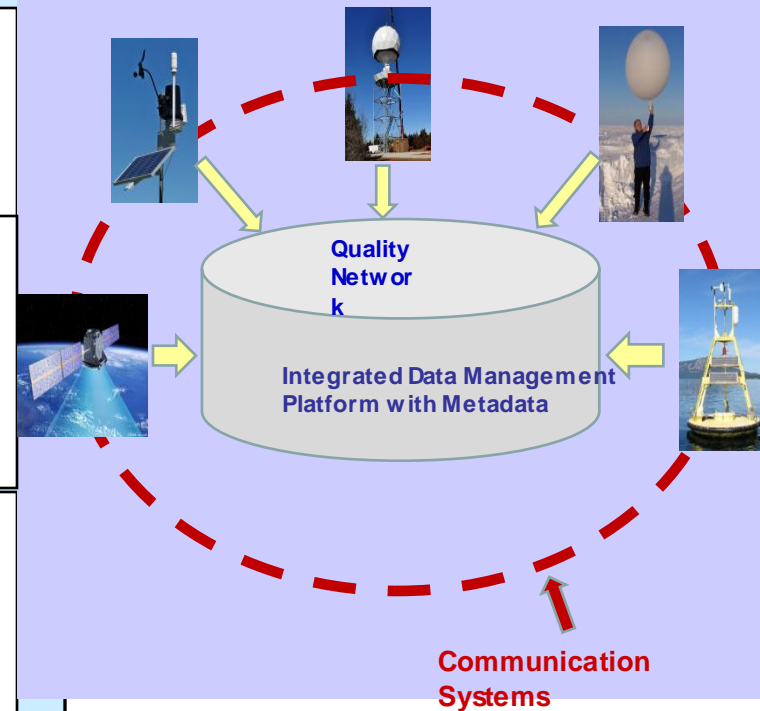
<b>Government Services</b> National to local Disaster Risk Management, Various	<b>Public &amp; Media</b>	<b>Commercial &amp; Industry Services</b> •Transport, Agriculture, Water, insurance
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## Product and Service Delivery Platforms and Service Delivery Models

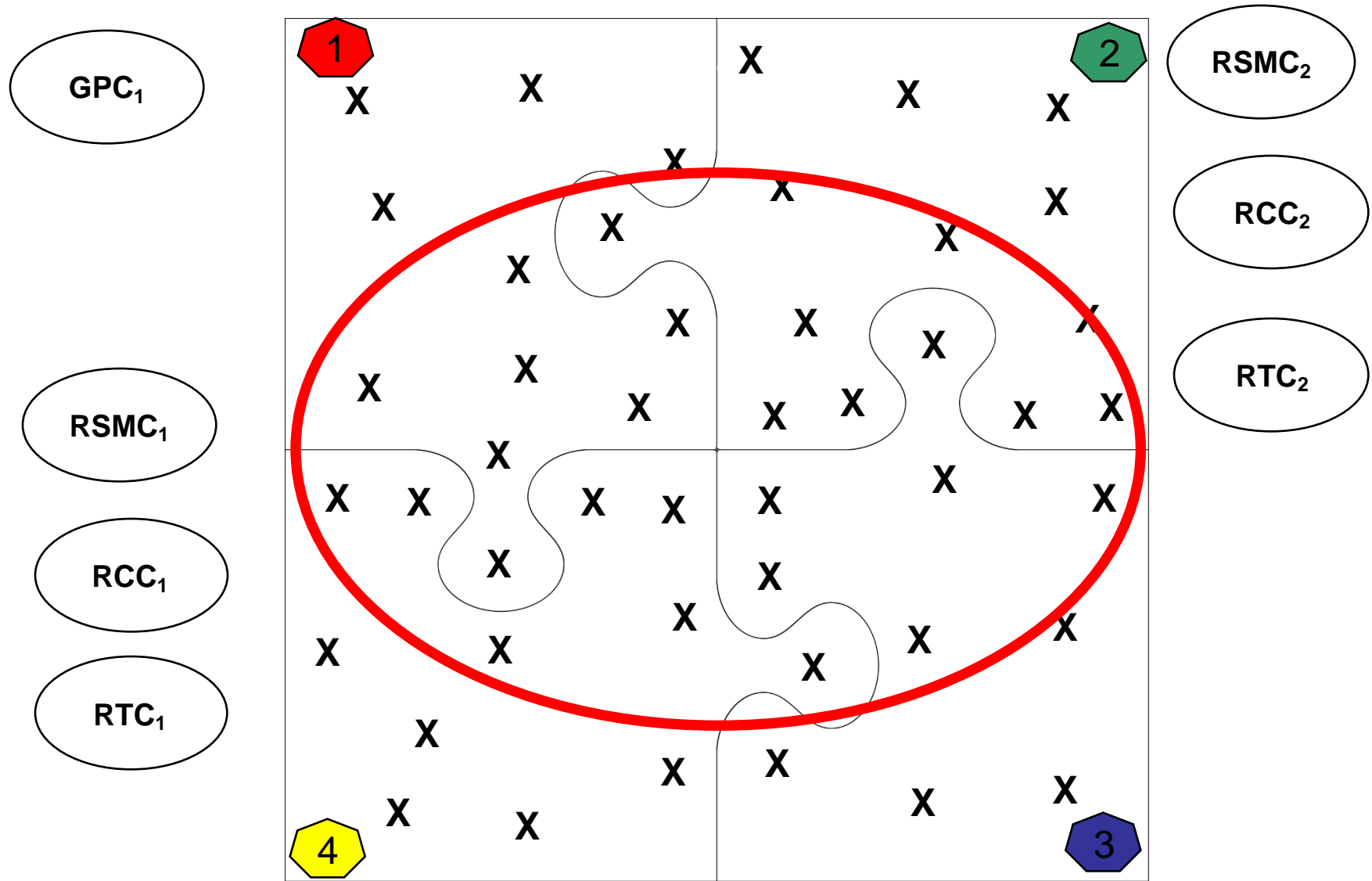
### Integrated Forecasting Platforms

<u><b>Marine &amp; Costal</b></u> •Tropical Cyclone, Storm Surges, High Waves, storms,	<u><b>Severe Weather</b></u> •Heavy precipitation (Rain& Snow), Severe Storms, Etc.
<u><b>Environmental</b></u> •Air Pollution / Air Quality , Heat Waves / Health, Etc.	<u><b>Hydrological forecasting</b></u>
<u><b>(Sub)Seasonal Forecasting</b></u> •Drought, heat wave forecast	<u><b>Emergency Response</b></u> •Nuclear, Biological, Volcanic Ash, Etc.

### Integrated Data platform



# Concept: Integrated Observing & Monitoring Networks with Regional Cooperation Framework



# WMO is ISO Accredited Agency to set international standards....

- **WMO is a recognized by ISO as an international standardization body:**
  - through ISO Council Resolution 43/2007 - ([http://en.wikipedia.org/wiki/List\\_of\\_technical\\_standard\\_organisations](http://en.wikipedia.org/wiki/List_of_technical_standard_organisations))

## **On issues including:**

- **Observing networks**, instrumentation and data management systems
- **Forecasting** tools (Cascading from developed to developing countries)
- International **data sharing policies** and exchange mechanisms
- **WMO Information System:** Globally coordinated exchange of weather, water, climate and ocean observations



# 60 Years of National, Regional and Global Coordination Systematic Global Data Collection, Analysis and Forecasting



National Meteorological and  
Hydrological Services

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

Meteorological,  
hydrological  
and climate  
observations


**191 Member  
States**



and  
Climate  
Advisories

States

Global Telecommunication System  
/ WMO Information System (WIS)



Washington  
Honolulu  
San Jose



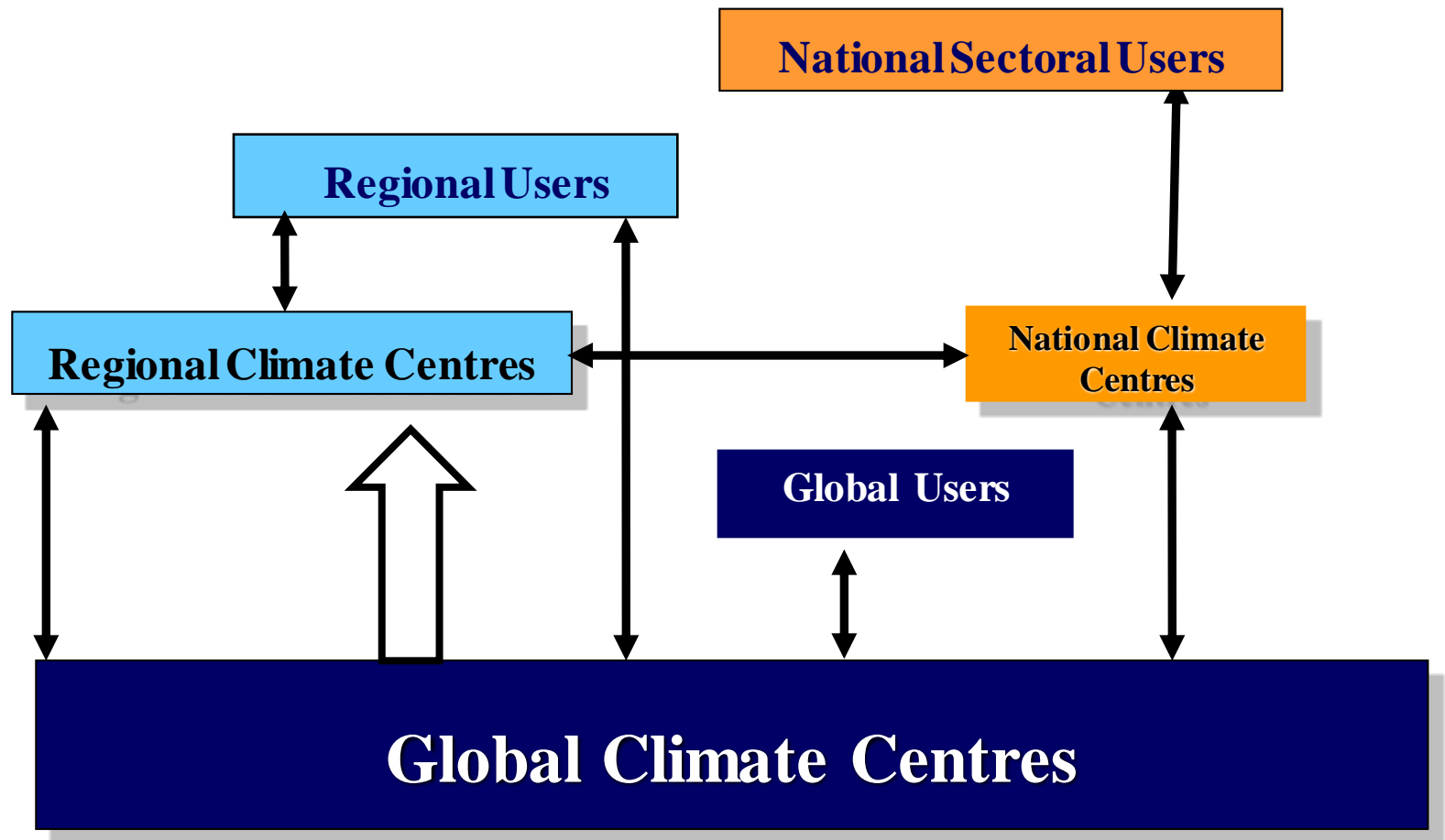
- ◆ Regional Meteorological Training Centres
- Drought Monitoring Centres
- Medium Range Forecasting Centre
- ▲ Tropical Cyclone Forecasting Centres
- Environment Emergency Response Centres
- ◆ Regional Meteorological and Hydrological Specialised Centres
- World Meteorological Centres

# Global Data Processing and Forecasting System



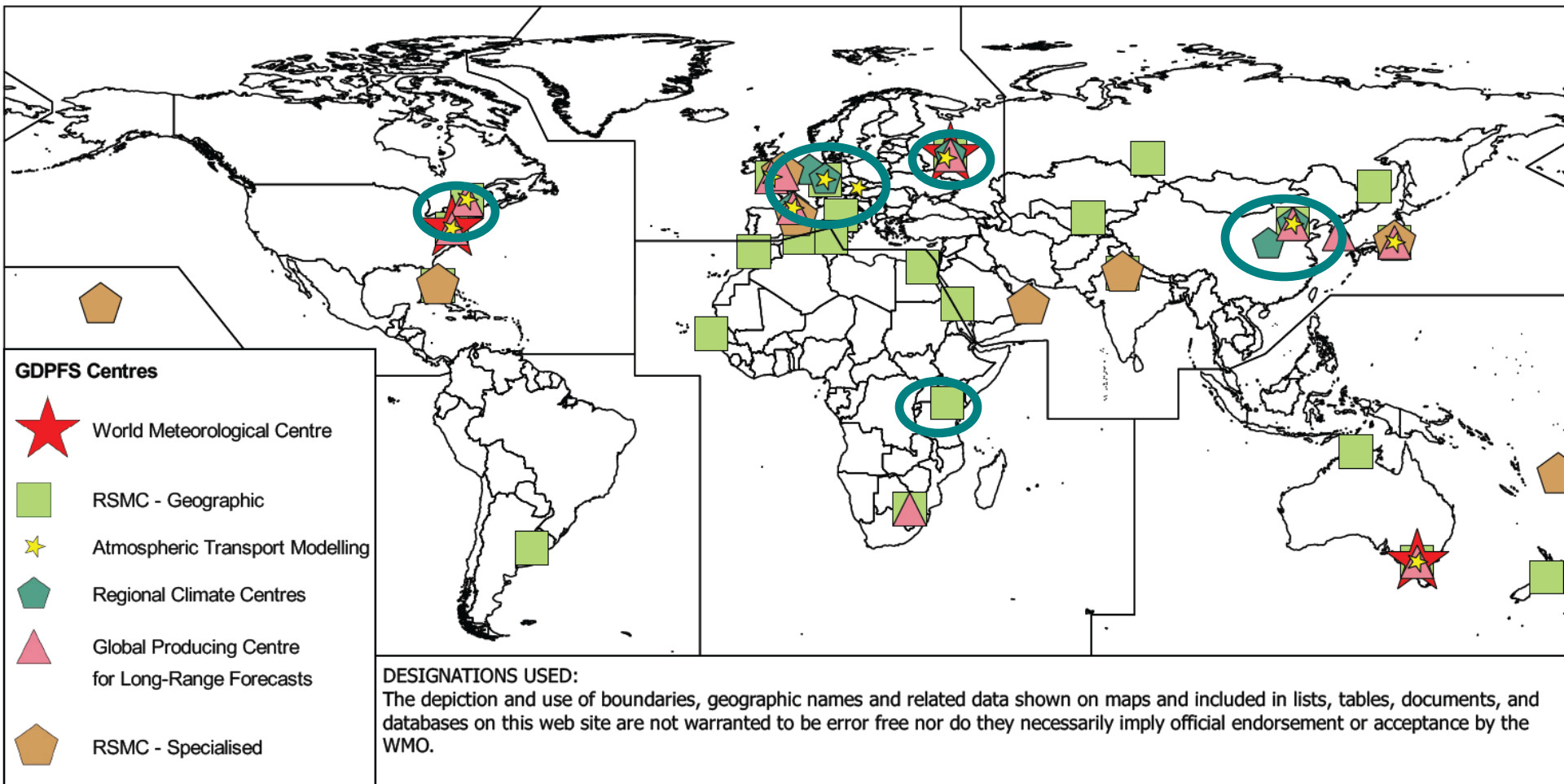
# Global Framework for Climate Services

## Climate Services Information System

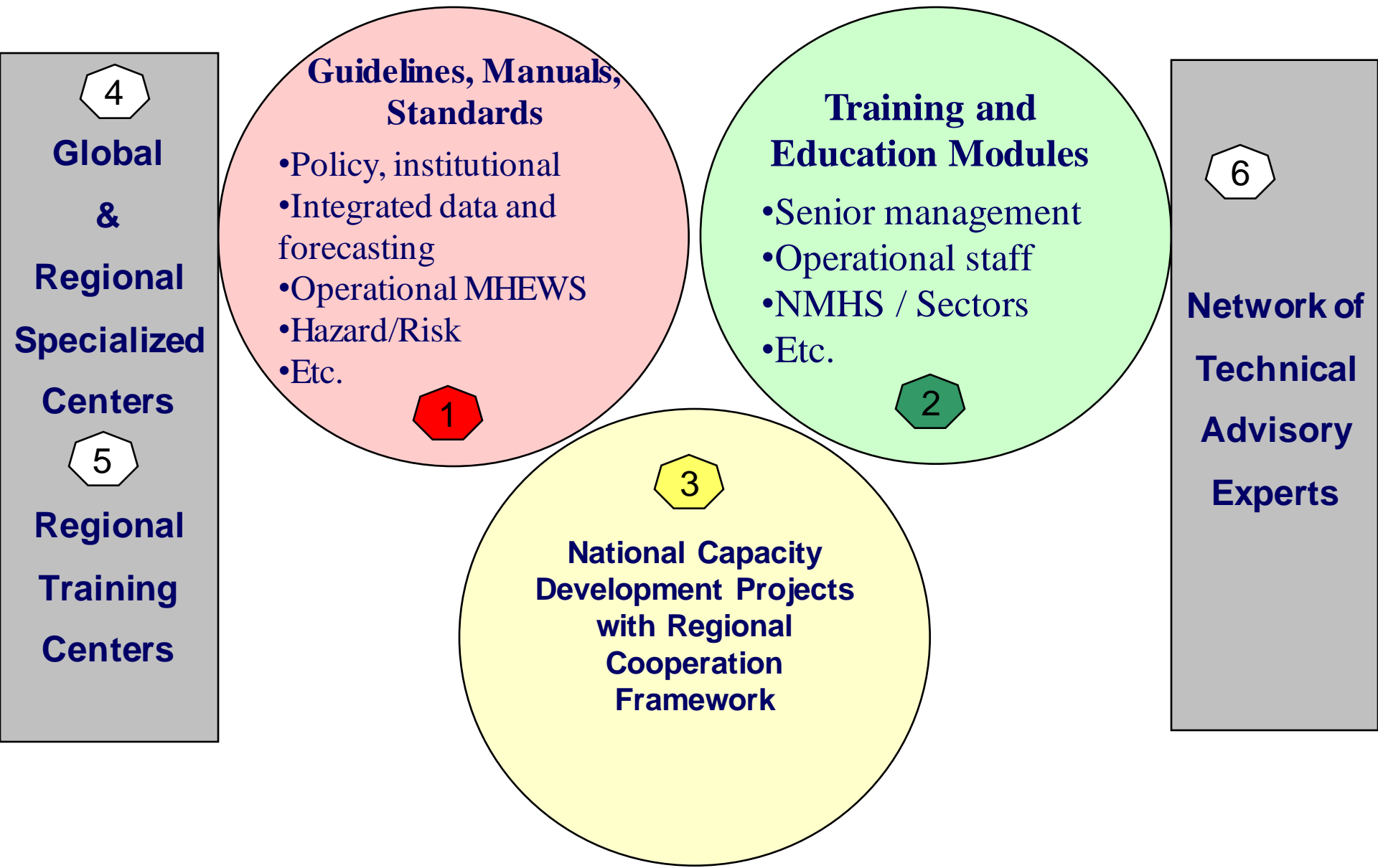


# WMO Actions

## WMO Regional Climate Centers are being established ...



# Building Blocks for Scaling Up



# WMO technical standardization process has been activated for DRR

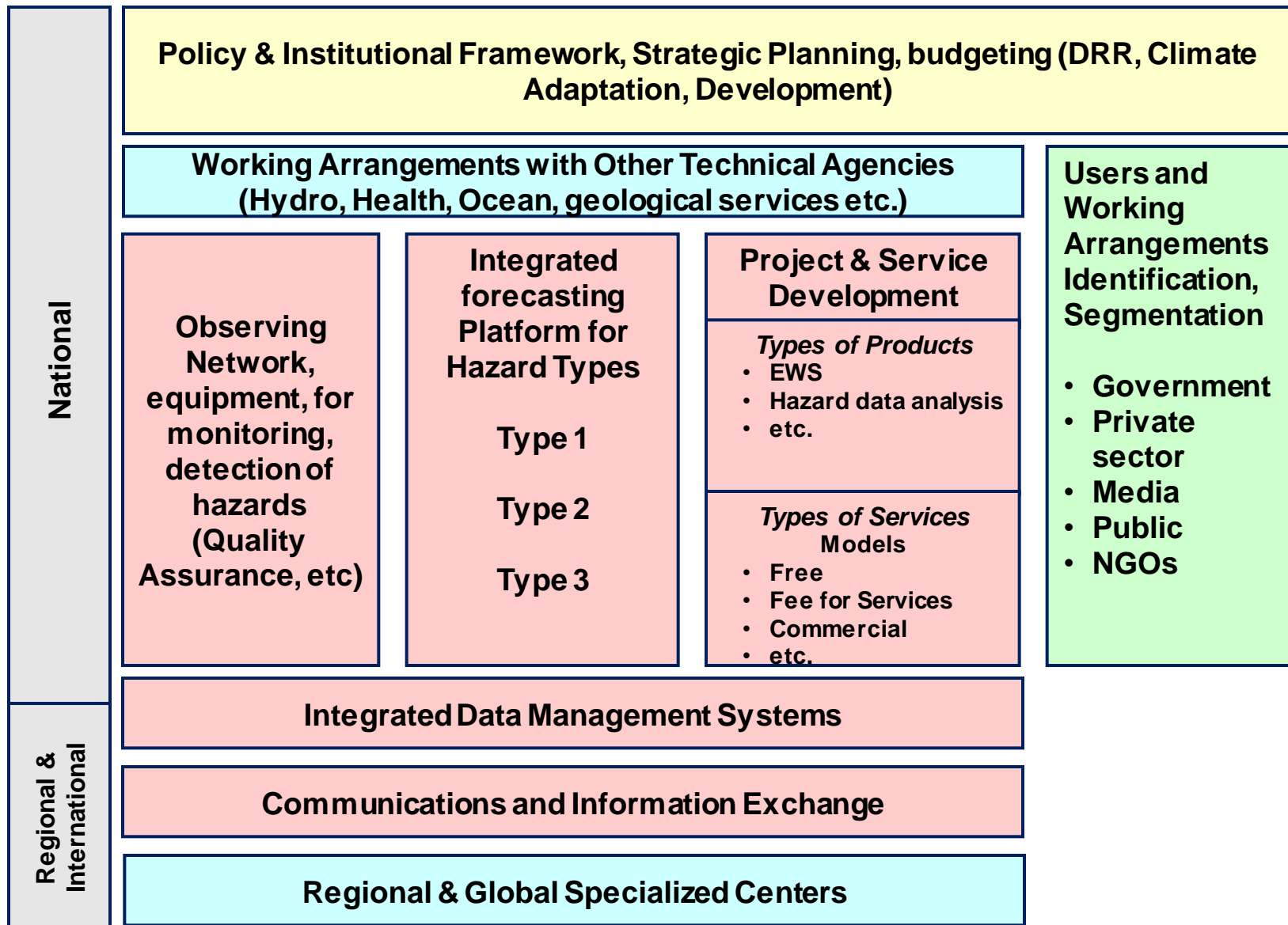


For nearly 20 hazards (cascading effects)

- (1) Guidelines and standards for hazard monitoring, databases, hazard analysis for risk analysis (2013-2015)
- (2) Guidelines and standards for operational multi-hazard early warning systems (2013-2017)
- (3) Requirements for Disaster Risk Financing and Insurance (2013-2014)

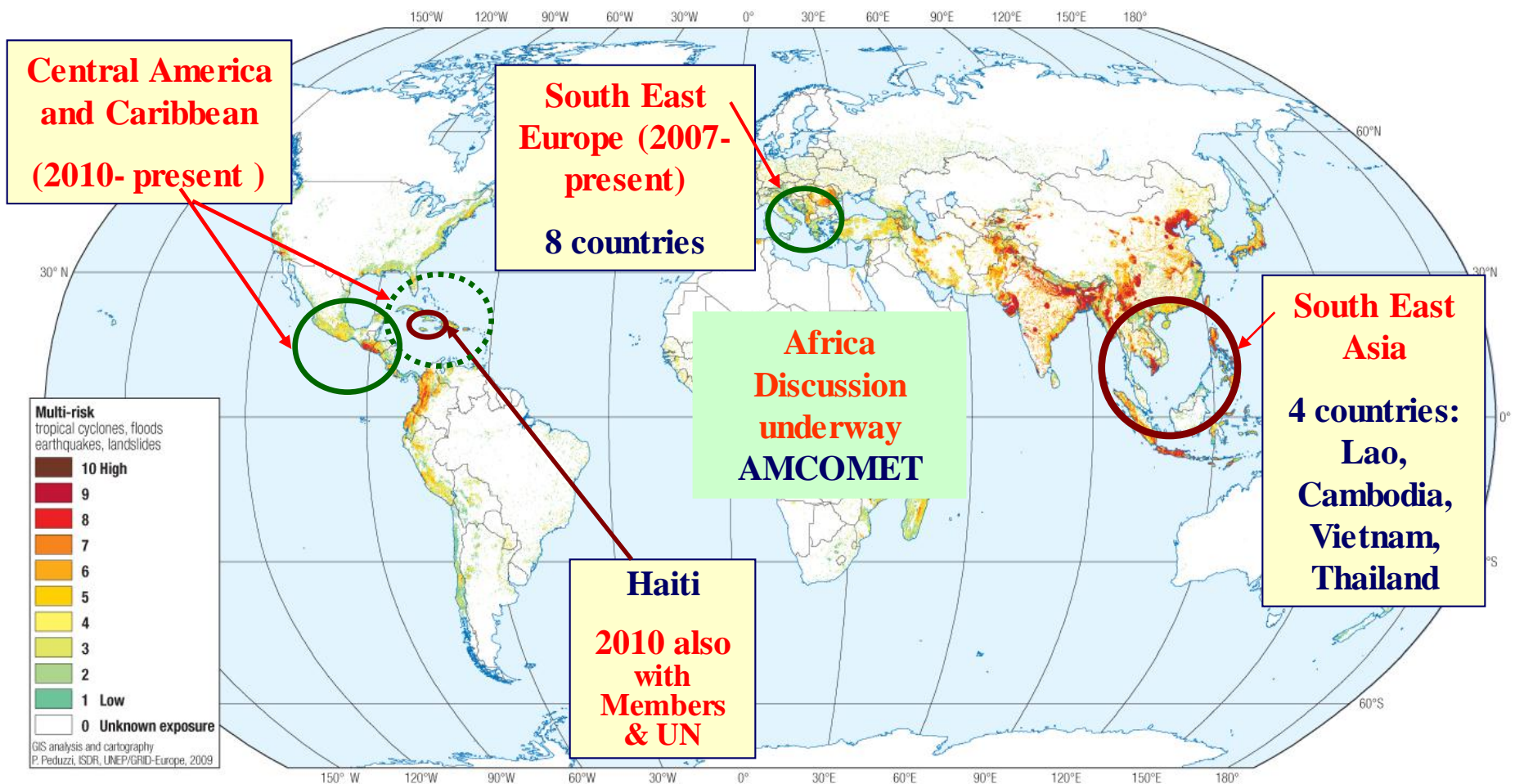
# Concept: WMO On-Line Help-Desk

Access to Comprehensive Guidelines, Manuals and Standards



# Comprehensive Phased National Capacity Development Projects with regional cooperation Framework

**Partners:** WMO, World Bank, UN-ISDR, UNDP, **Regional Socio-economic Groupings,** Regional Centers.....



# Conclusions

- Concerns, challenges and opportunities
- Anchor our cooperation in sectoral risk management
- Building a community of practice in risk analysis to underpin risk-based decision-making
- More systematic cooperation at national level to look at leveraging opportunities – DRR/Climate risk management as an integral part of development planning
- Leveraging regional cooperation to address more sustainable national development
- Leveraging the WMO network, expertise, guidelines standards and capacities
- Partnerships



# Thank you



Global Framework for Climate Services



**For more information contact:**

Maryam Golnaraghi

Chief

Disaster Risk Reduction Programme

World Meteorological Organization

Tel. +41.22.730.8006

Email. [MGolnaraghi@wmo.int](mailto:MGolnaraghi@wmo.int)

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

