

Climate Change and Increasing Risks in Urban Areas

Presentation to the WCDR
Kobe, Japan, January, 2005

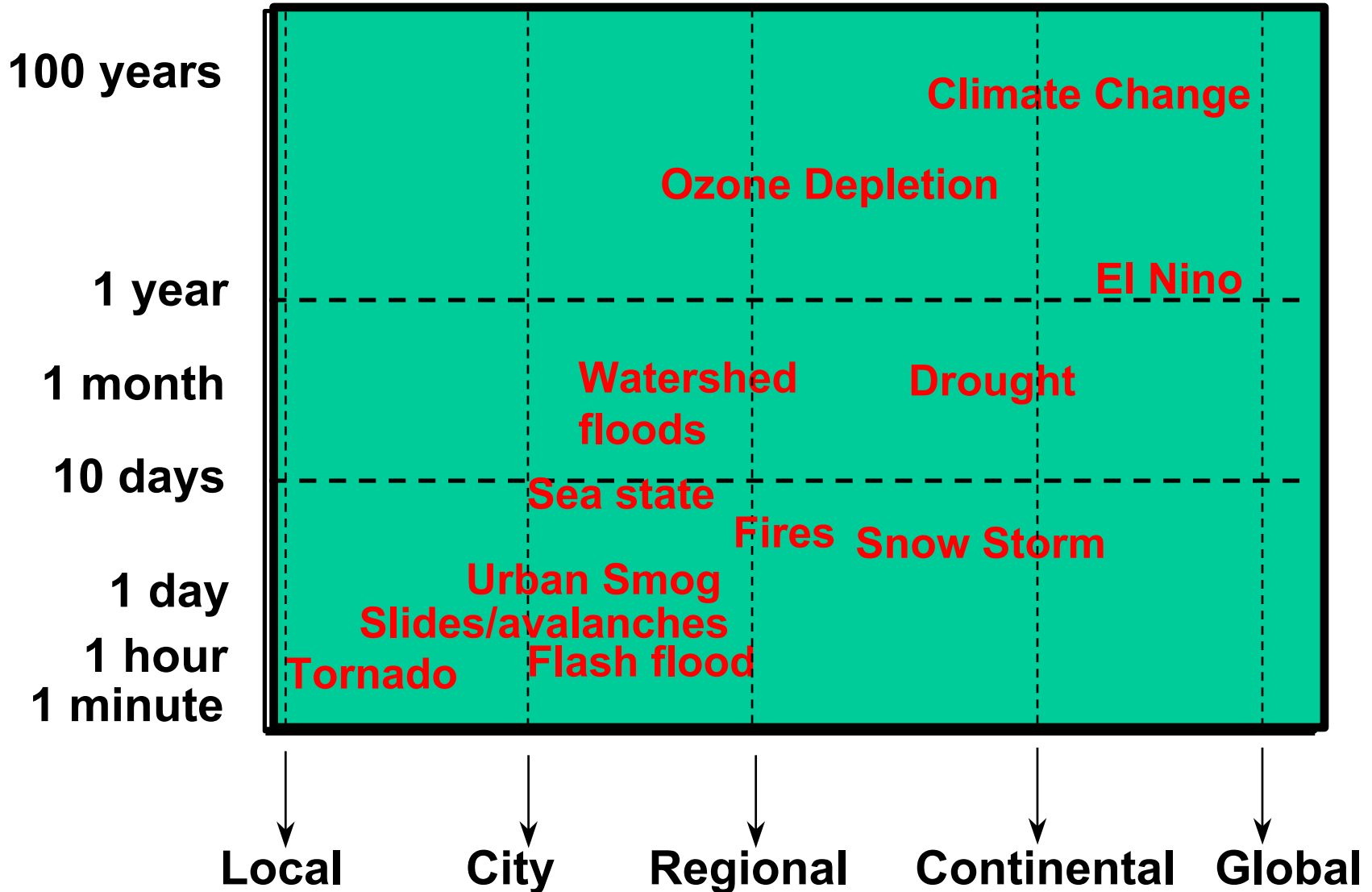


Institute for Catastrophic
Loss Reduction
Institut de Prévention des
Sinistres Catastrophiques

Gordon McBean, Ph.D., FRSC
Institute for Catastrophic Loss Reduction
The University of Western Ontario
London, Ontario, CANADA

Barrie 1985

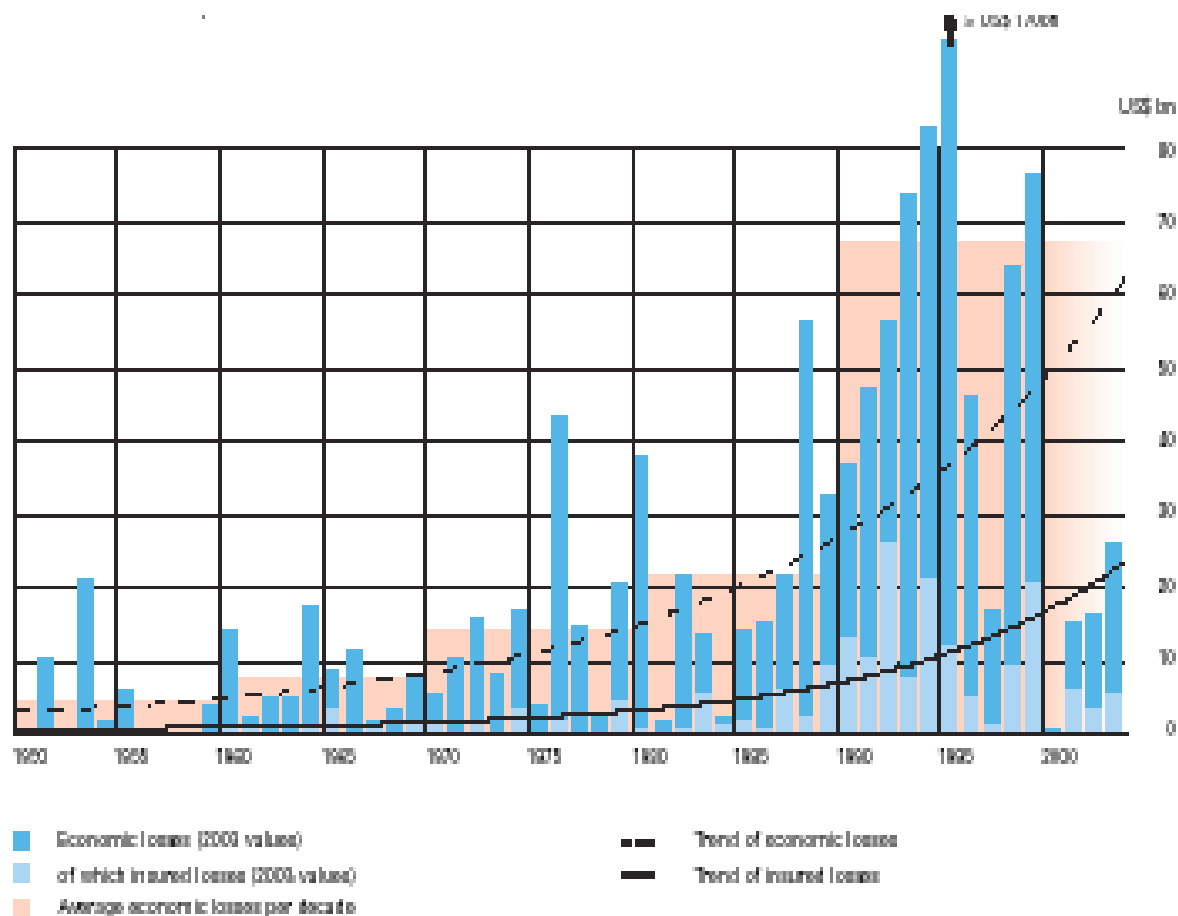
Weather-related events occur on time scales of today to the next decades – each bringing a set of hazards



Distribution of natural disasters: by origin (1900-2003, by decades*)

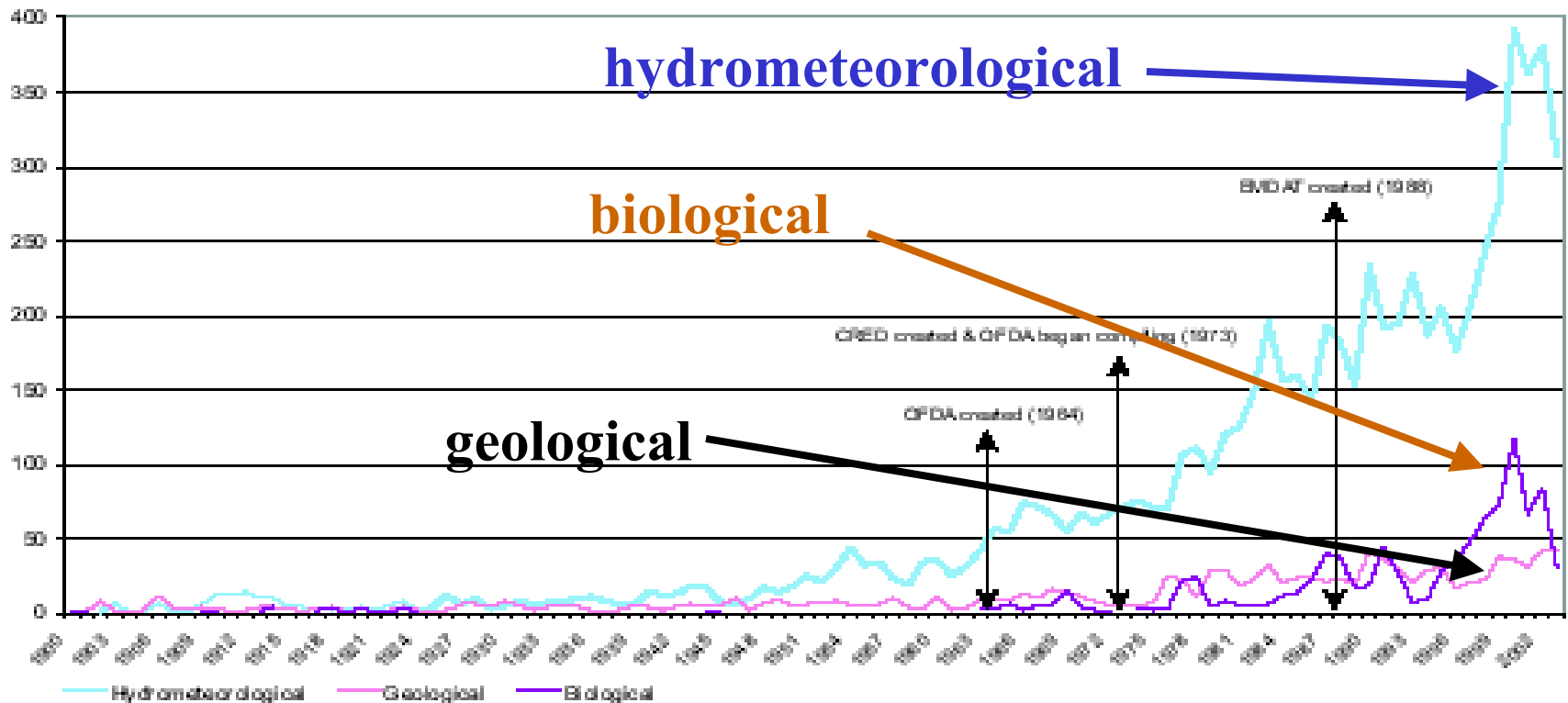
	1900-1909	1910-1919	1920-1929	1930-1939	1940-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2003	Total
Hydrometeorological	28	75	56	74	128	280	511	795	1575	2139	1444	7105
Geological	36	26	32	38	53	58	94	128	234	283	152	1134
Biological	5	12	10	3	3	3	40	65	167	351	297	956
Total	69	113	98	115	184	341	645	988	1976	2773	1893	9195

Global Impacts Of Natural Hazards



The upward trend has been most dramatic for hydrometeorological (weather-related) events

Number of natural disasters registered in EMDAT
1900-2003

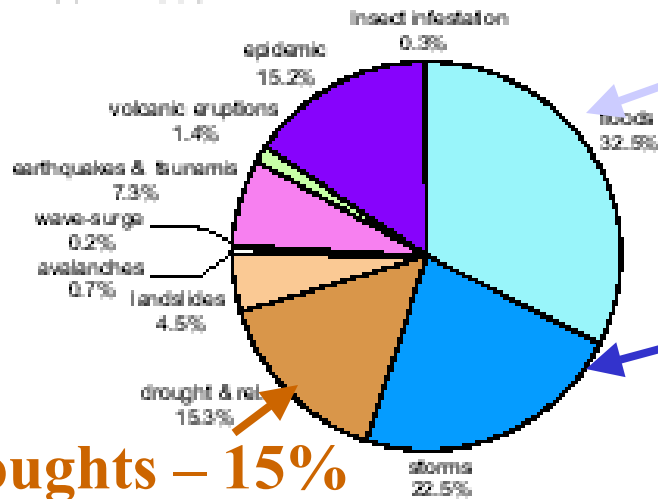


**World distribution of disasters:
by triggering hazards
1994 - 2003**

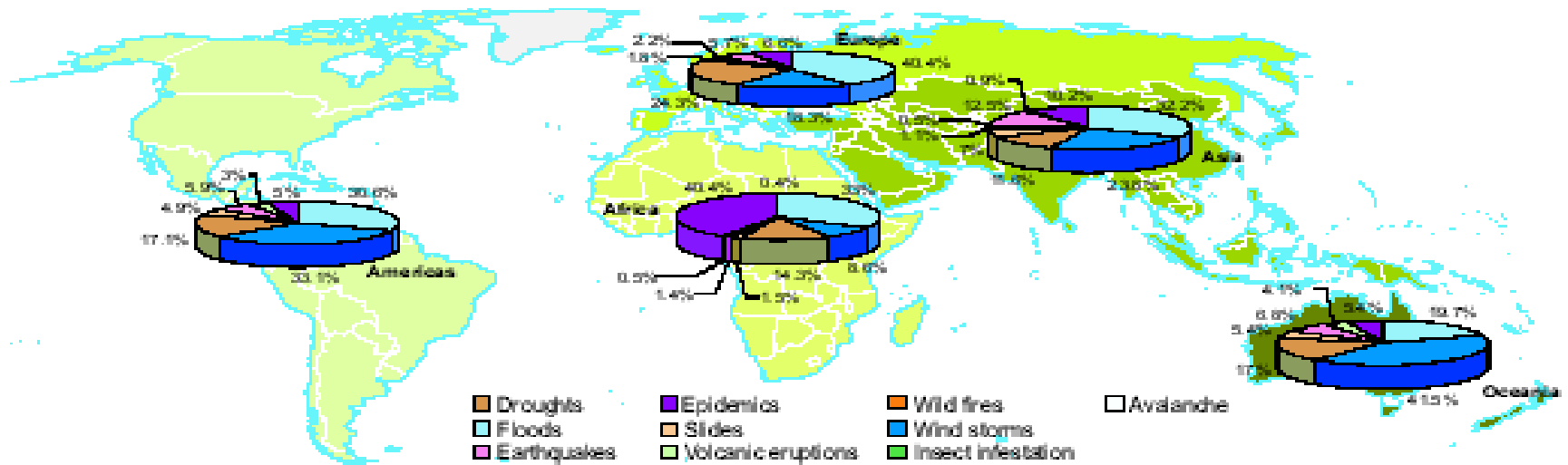
Floods – 33%

Storms – 23%

Droughts – 15%



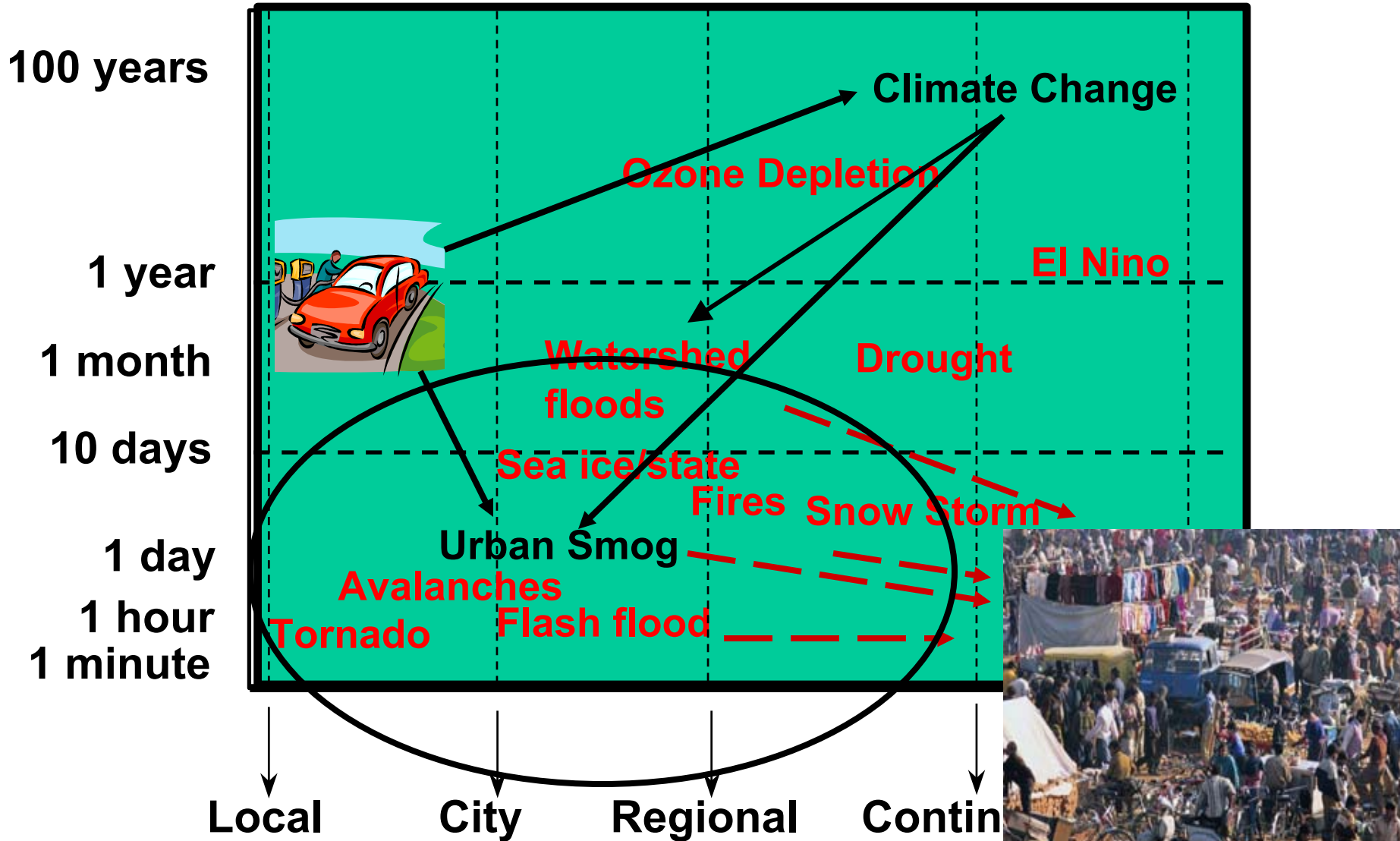
**Regional distribution of disasters: by triggering hazards
1994 - 2003**



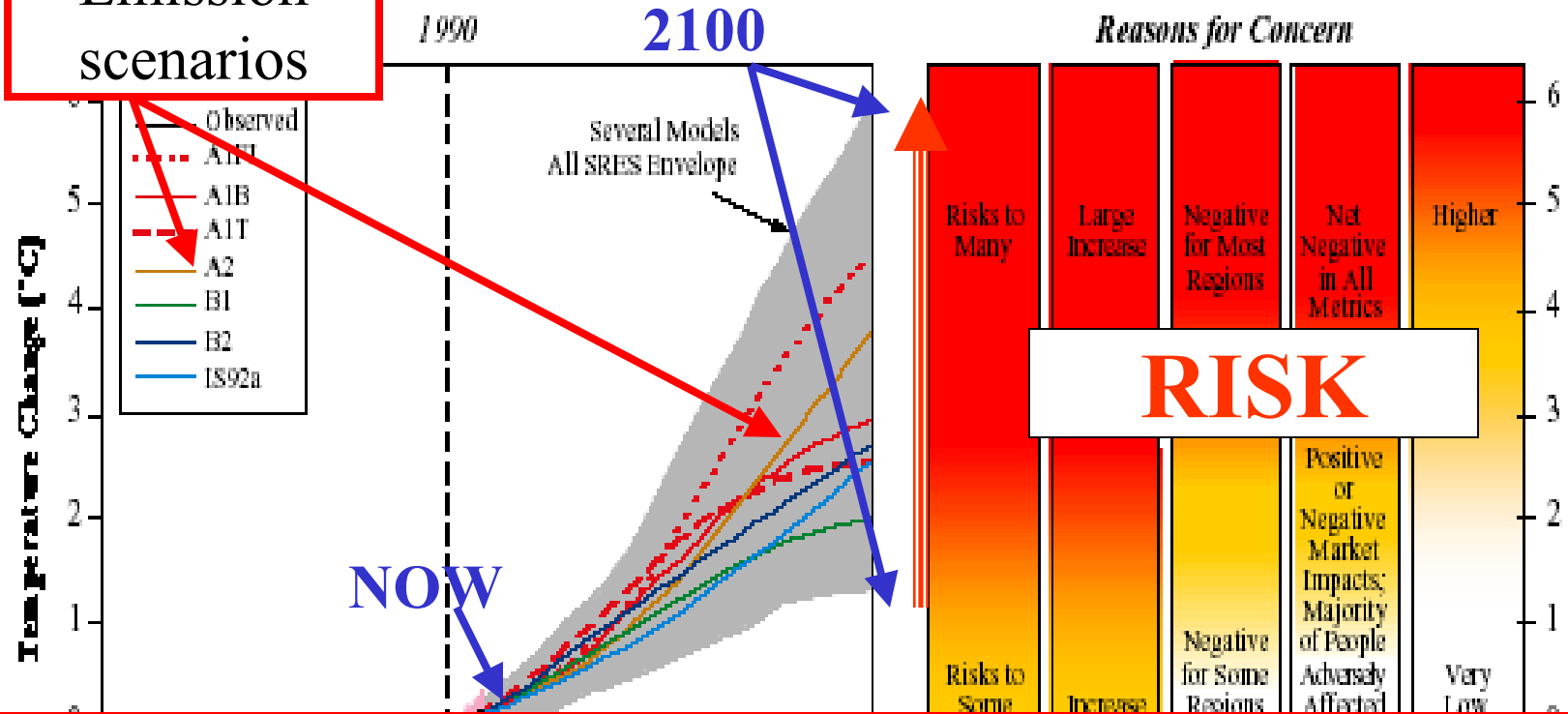
Why the increasing trends?

- **More people and more complex societies**
 - Great concentrations of people in urban areas
- **More structure – much of its aging**
 - Particularly in urban areas
- **Choices – where to live, work, play and travel**
 - Urbanization of societies – most along coasts and rivers
- **Human intervention in the environment**
 - Emission of pollutants and greenhouse gases

Natural and human events interact on time scales of today to the next decades



Emission scenarios

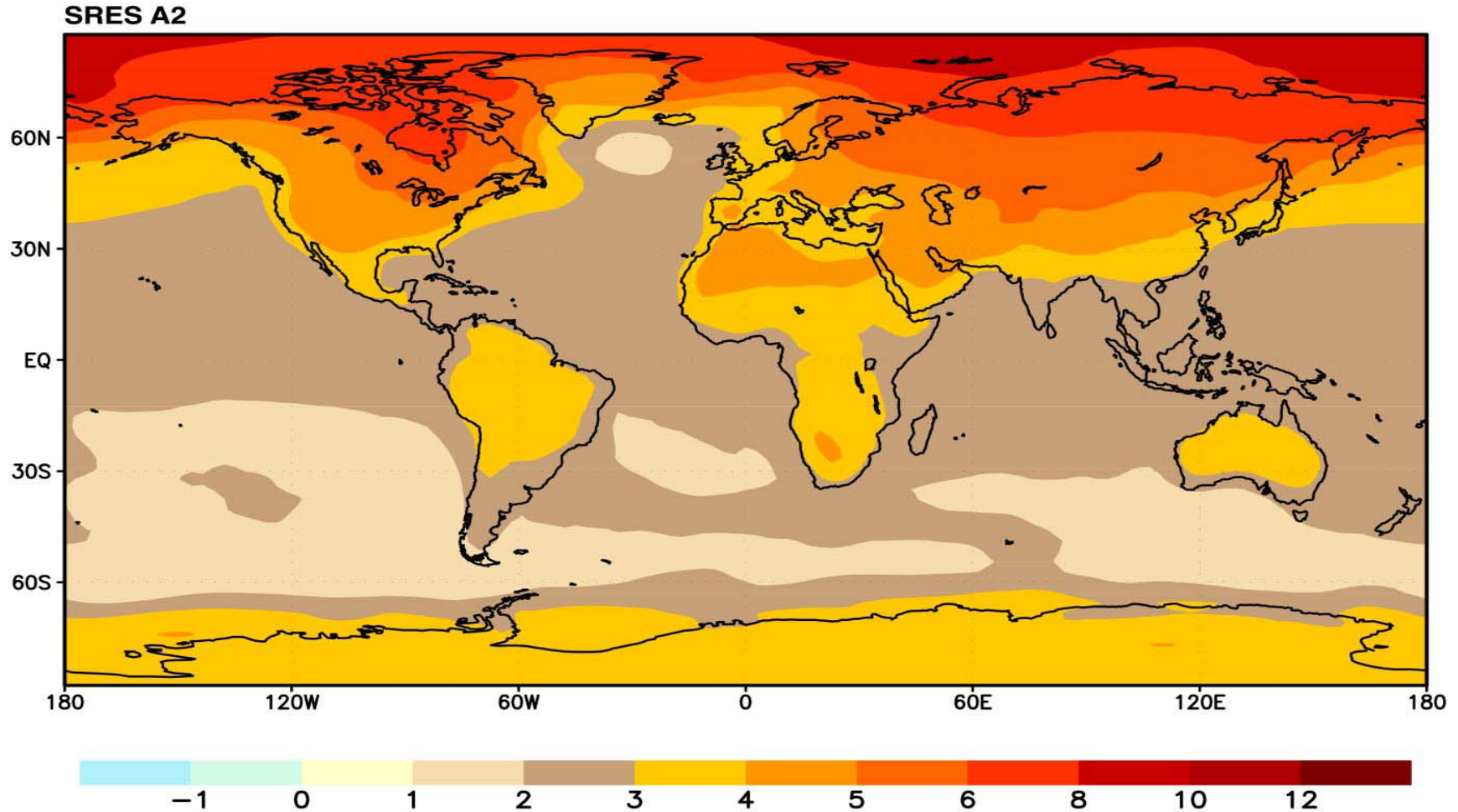


Human intervention – climate change

Kyoto Protocol starts the process of stabilizing GHG concentrations.

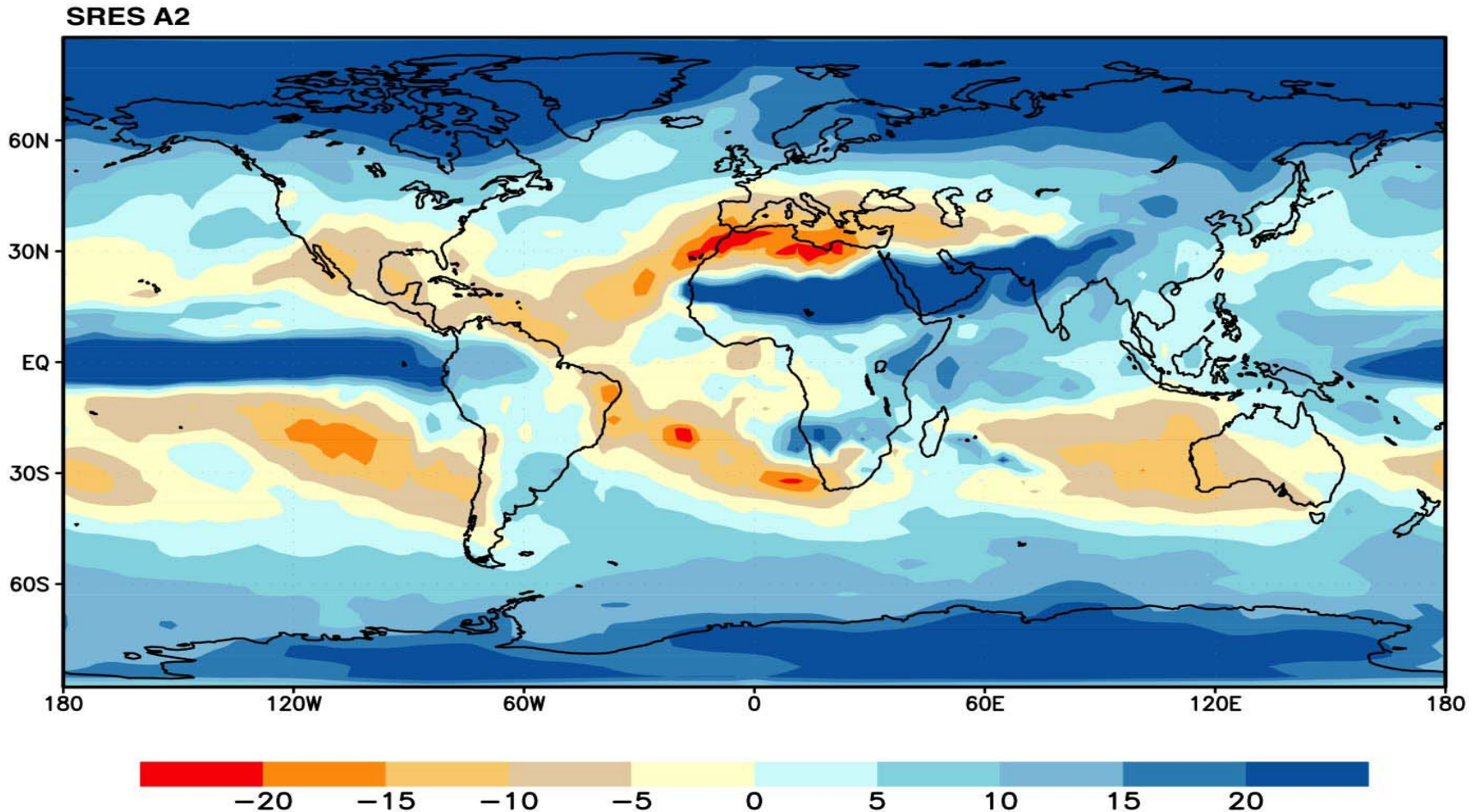
But the climate will be changing, at least for the next century.

Land areas are projected to warm more than the oceans with the greatest warming at high latitudes

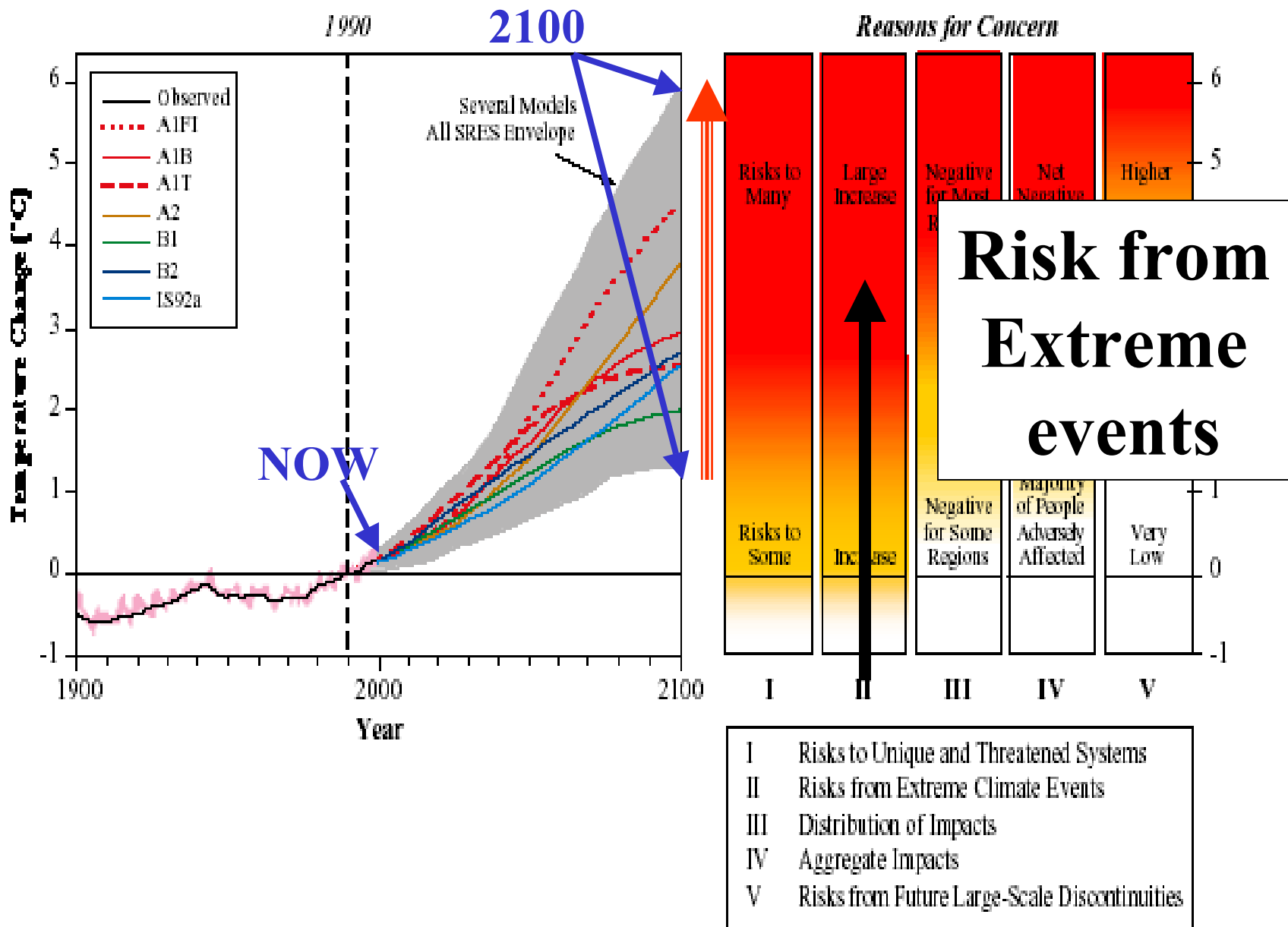


Annual mean temperature change, 2071 to 2100 relative to 1990: Global Average in 2085 = 3.1°C

Some areas are projected to become wetter, others drier with an overall increase projected



Annual mean precipitation change: 2071 to 2100 Relative to 1990



Dr. R. Watson – Chair of IPCC speaking to COP 6

“The overwhelming majority of scientific experts, whilst recognizing that scientific uncertainties exist, nonetheless believe that **human-induced climate change is inevitable**. ... the frequency and magnitude of these type of events: **heat waves, floods, droughts, fires and extreme weather events** leading to significant economic losses and loss of life, are predicted to **increase** in a warmer world”

IPCC Assessment

Confidence in observed changes (latter half of the 20th century)	Changes in Phenomenon	Confidence in projected changes (during the 21st century)
<p>Hotter days</p>	Higher maximum temperatures and more hot days over nearly all land areas	Very likely
	Higher minimum temperatures, fewer cold days and frost days over nearly all land areas	Very likely
<p>Less cold</p>	Reduced diurnal temperature range over most land areas	Very likely
	Increase of heat index ⁸ over land areas	Very likely, over most areas
	More intense precipitation events ^b	Very likely, over many areas
	Increased summer continental drying and associated risk of drought	Likely, over most mid-latitude continental interiors (Lack of consistent projections in other areas)
	Increase in tropical cyclone peak wind intensities ^c	Likely, over some areas
<p>Very likely</p> <p>Likely, in a few areas</p> <p>Not observed in the few analyses available</p> <p>Insufficient data for assessment</p>	Increase in tropical cyclone mean and peak precipitation intensities ^c	Likely, over some areas

90-99%

• **Increased mortality in old people in urban areas**

The Human Toll of Heat Waves: Selected Examples from Europe in August 2003

• Country	Deaths	Other Details
• France	14,802	40C Paris highest records began in 1873.
• Germany	7,000	41C hottest since records began in 1901
• Spain	4,230	High T + ozone > EU health-risk threshold.
• Italy	4,175	Increase 9C previous year.
• U. K.	2,045	First 38C recorded in London.
• Netherlands	1,400	8C warmer than normal.
• Portugal	1,316	> 40C throughout much of the country.
• Belgium	150	highest T since records began in 1833.

TOTAL OF ABOVE COUNTRIES 35,118

IPCC Assessment

Confidence in observed changes (latter half of the 20th century)	Changes in Phenomenon	Confidence in projected changes (during the 21st century)
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Floods, land slides, mudslides, ● impacts - people, property, costs

● drinking water, agricultural productivity, hydropower, ● wildfires

Intense Precipitation	Increase of heat index ⁸ over land areas	Very likely, over most areas	90-99%
	More intense precipitation events ^b	Very likely, over many areas	
Drought	Increased summer continental drying and associated risk of drought	Likely, over most mid-latitude continental interiors (Lack of consistent projections in other areas)	
Tropical Cyclones	Increase in tropical cyclone peak wind intensities ^c	Likely, over some areas	66-90%
	Increase in tropical cyclone mean and peak precipitation intensities ^c	Likely, over some areas	

● impacts – people, economic systems, property, ecology

Sea level rise will amplify the threats due to storm surges and coastal flooding.

Figure 18: People at Risk from a 44 cm sea-level rise by the 2080s

Assuming 1990s Level of Flood Protection



“It (climate change) could even threaten survival in small island States and in low-lying coastal, arid and semi-arid areas”

Ministerial Declaration – Second World Climate Conference

Vulnerability of urban areas

- Will increase due to risks from weather-related events.
- Future design criteria – not on the past but on the best estimates of future conditions.
- The Precautionary Principle
 - Principle 15 of the “1992 Rio Declaration on Environment and Development”
 - Reaffirmed in at WSSD – Johannesburg, 2002

Focus: Preventing natural hazards becoming natural disasters

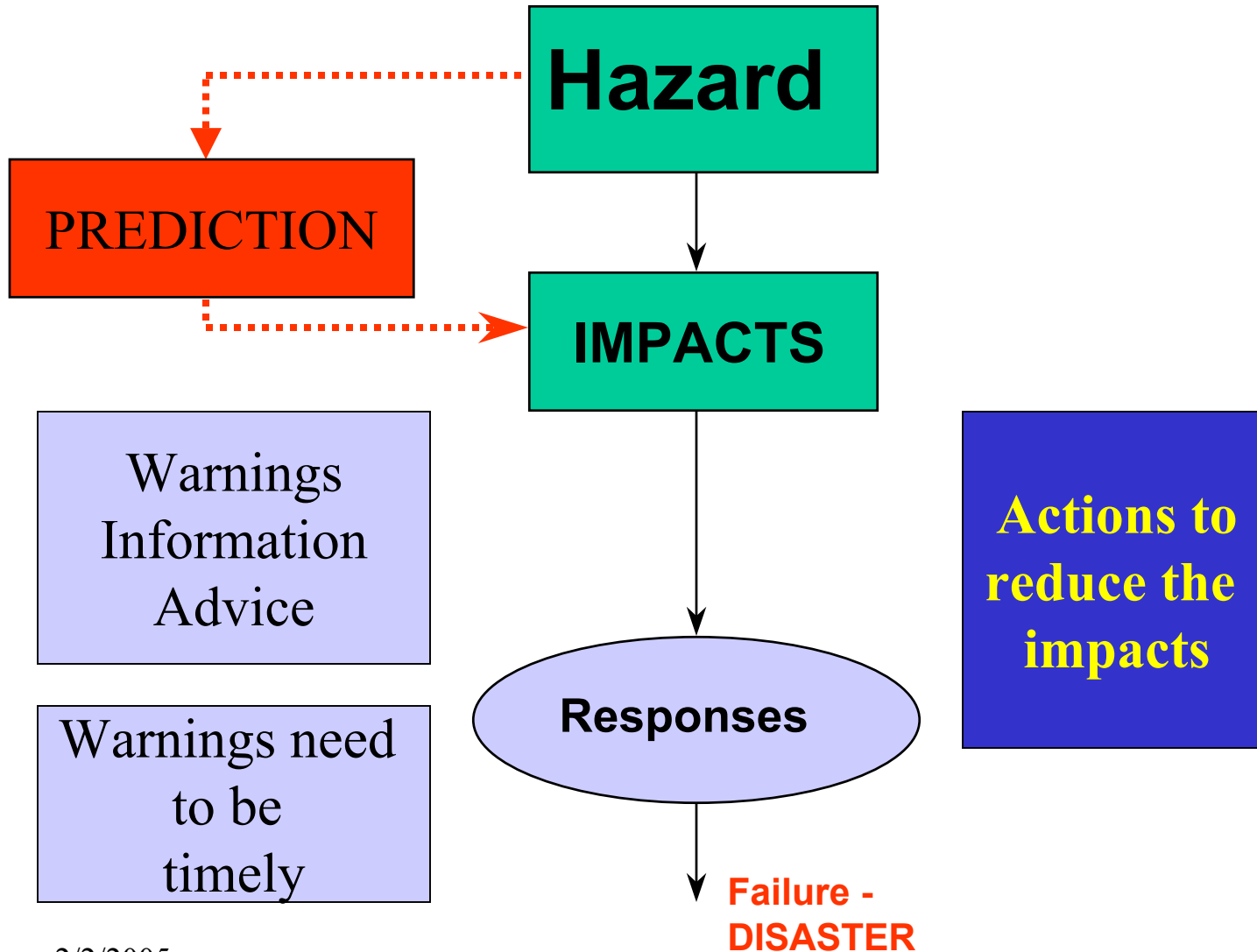
- **“There is no role more fundamental for government than the protection of its citizens.”**
 - Canadian Government Speech From the Throne – 2/2/2004
- **“Global warming poses a greater long-term threat to humanity than terrorism.”**
 - Canadian Environment Minister D. Anderson, 6/Feb/2004
- **“Unchecked climate change has the potential to be catastrophic in both human and economic terms”**
 - Prime Minister Blair – UK Sept/04

Hazard warning systems

- **Should become the keystone of governmental and international systems.**
- **Provide predictions of weather and weather-related events**
 - **on minutes-hours for tornadoes, flash floods and storm surges,**
 - **on a day-to-day basis for hurricanes and mid-latitude storms, and**
 - **on a seasonal and longer-term basis as input to planning.**
- **Predictions need to be seen in the context of this continuum of time, each with appropriate policy responses.**

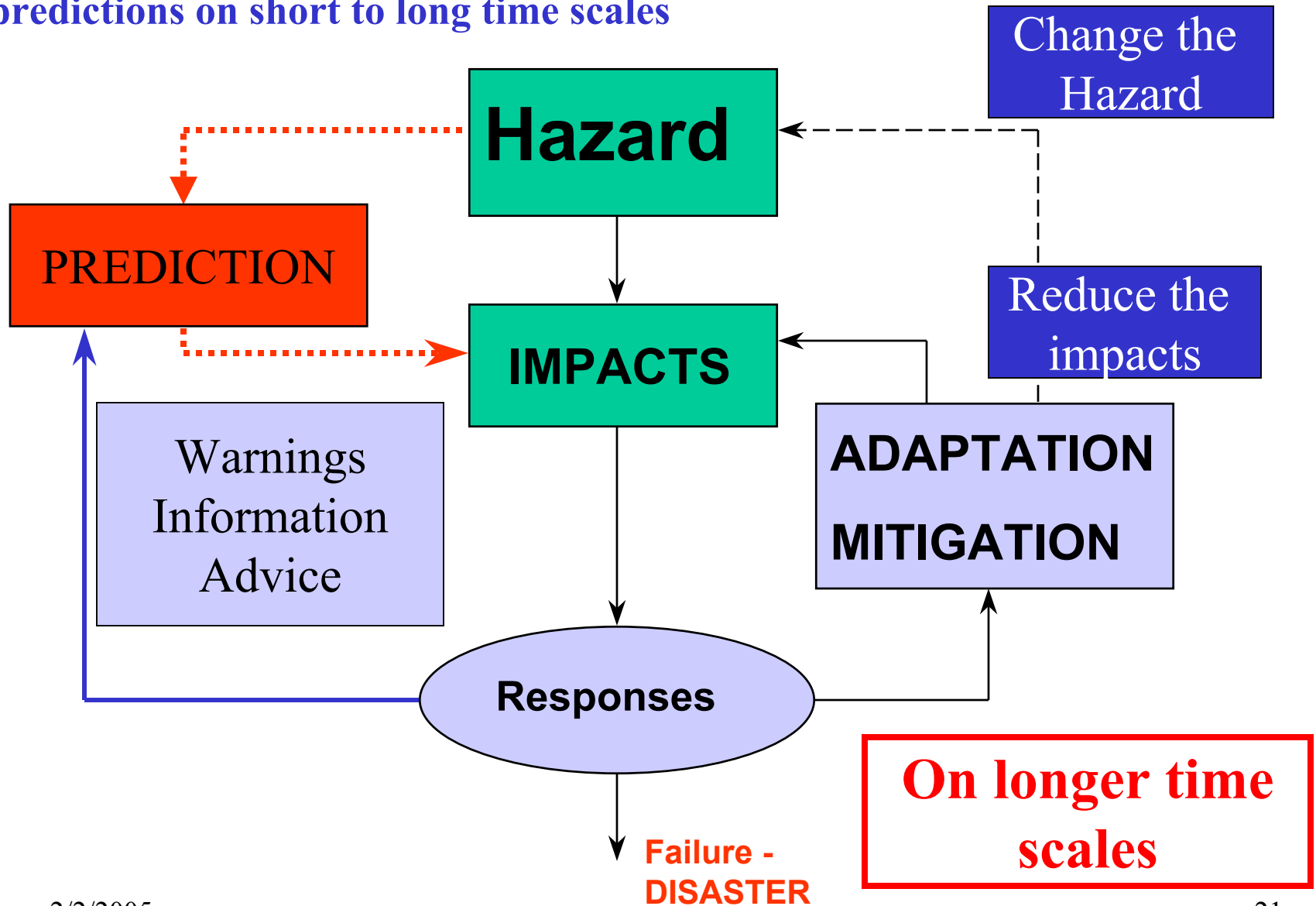
Responding to Hazards

ANTICIPATE through Forecasts and warnings – short time scale



Responding to Hazards

Anticipate - Adaptation-Mitigation – predictions on short to long time scales



Public education and communication.

- **A warning not heard, or, if heard, not appropriately acted upon, does not save lives and reduce damage and is a waste of resources.**
- **Public education is needed to advise people of how and when to respond to messages of impending events. People need to be advised on the appropriate actions.**
- **Communications system need be in place to warn people. These should be tailored to the local population: what works?**

National meteorological- hydrological services

- **Already exist to provide these services.**
- **Need support and augmentation**
- **Broaden the scope to all natural hazards
– and appropriate technological hazards**
- **Working together internationally can
help to provide the best services on a
local basis.**

Approaches to Disaster Management

Prevention

- **Response and recovery**
- **Preparedness**
- **Mitigation**
 - **ANTICIPATE through Forecasts and warnings**
 - advise people about impending events and advise on response strategyexamples: floods, ; seasonal drought; climate change
 - Flash flood – 10-30 minutes
 - run for high places
 - River cresting in next 5 days
 - Prepare for evacuation; implement emergency responses
- **CHANGE PRACTICES**
 - adopt standards and codes to protect infrastructure, people, etc., from “reasonable” extremesexamples: building codes;

Although analysis shows that investment in prevention pay off, most government \$ are still in RECOVERY

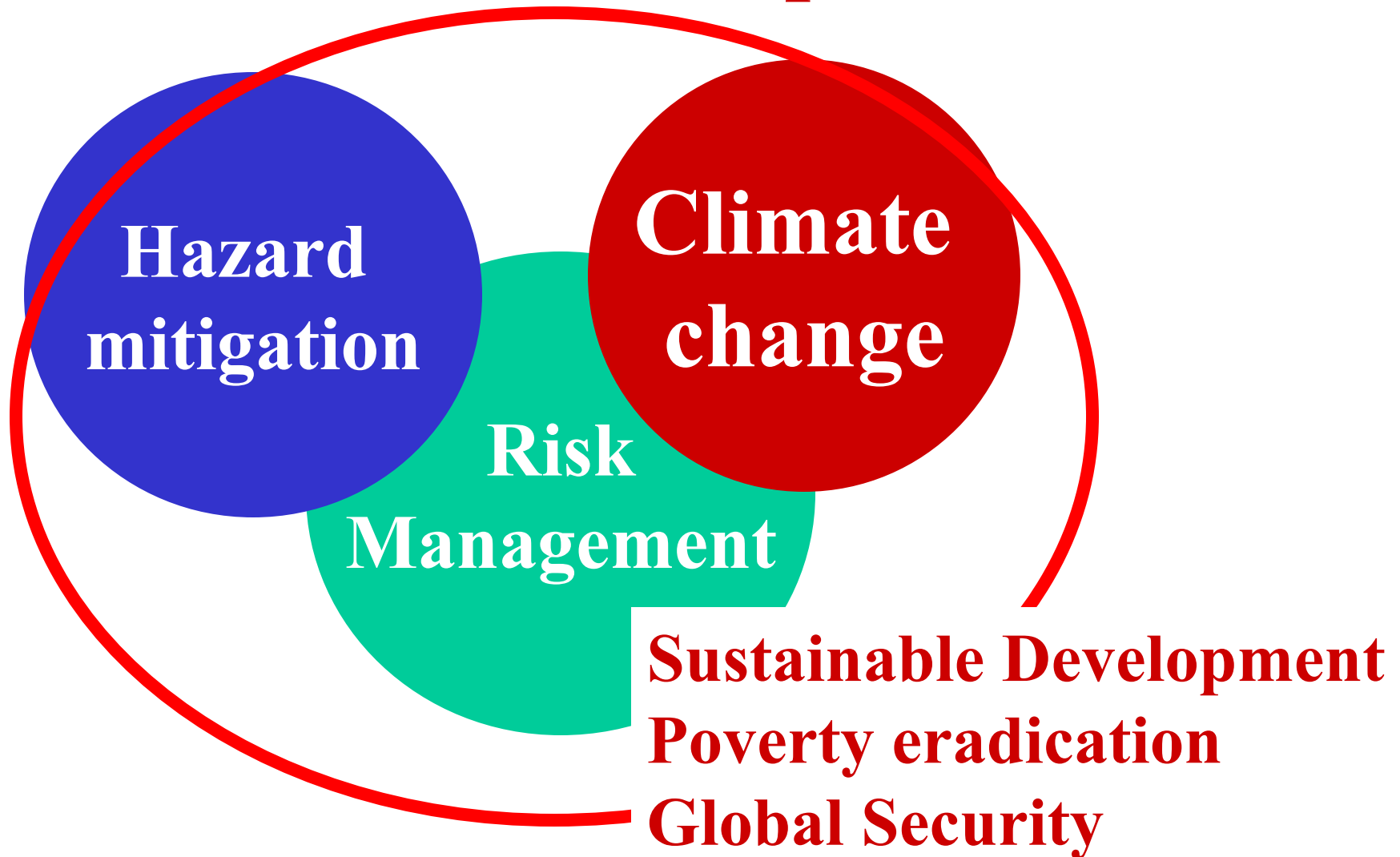
International and national assistance programs

- **Need to include prevention as well as response and recovery components.**
- **Climate change, balance between**
 - **emission reductions; and**
 - **adaptation**
 - **(actions to reduce the impacts of a changing climate).**

The Delhi (CoP8) Ministerial Declaration on Climate Change and Sustainable Development

“Adaptation to the adverse effects of climate change is of high priority for all countries. Developing countries are particularly vulnerable, especially the least developed countries and small island developing States. Adaptation requires urgent attention and action on the part of all countries.”

An integrated approach to human development



**Hazard
mitigation**

**Climate
change**

**Risk
Management**

**Sustainable Development
Poverty eradication
Global Security**



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The End

**Thank you for
your attention**