The Intersection of Climate Change and Water and Risk Management Policies in the Context of Sustainable Development

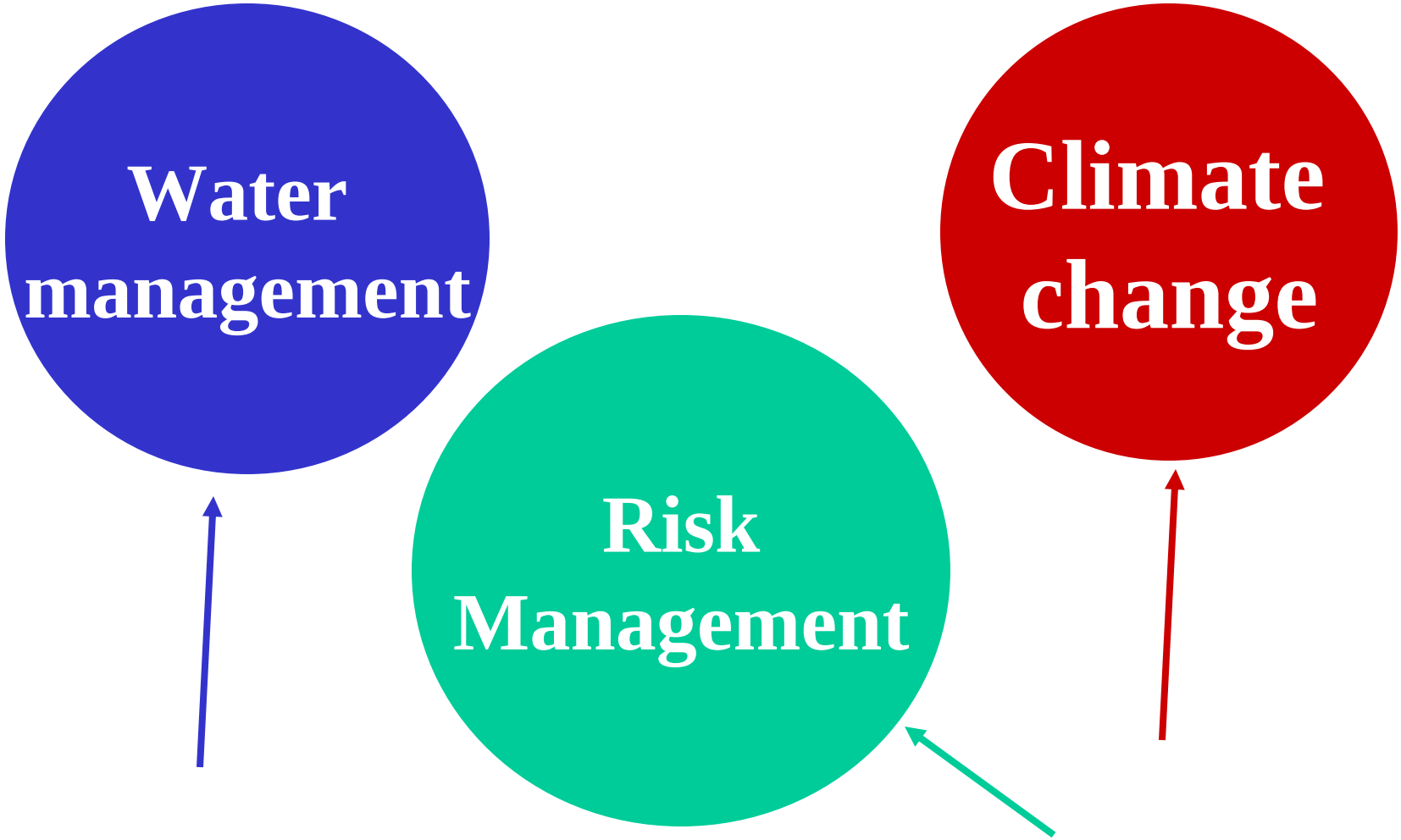
G.A. McBean, PhD, FRSC

Institute for Catastrophic Loss Reduction

The University of Western Ontario

Presentation to International Workshop on Water and Disasters, The University of Western Ontario, Dec., 2004

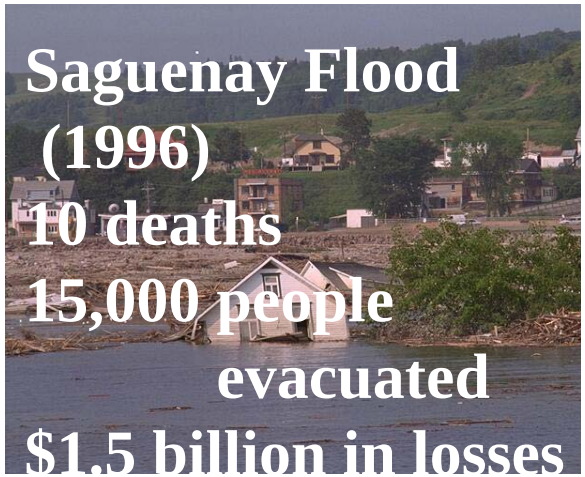
Policy Issues for Governments and individuals

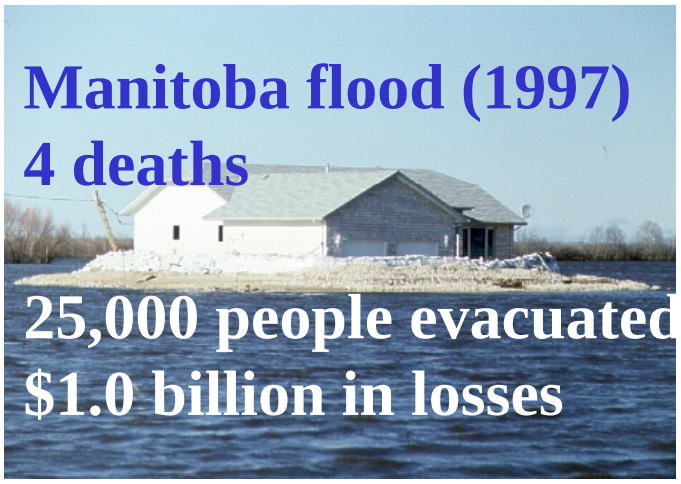


People are vulnerable to water-related hazards

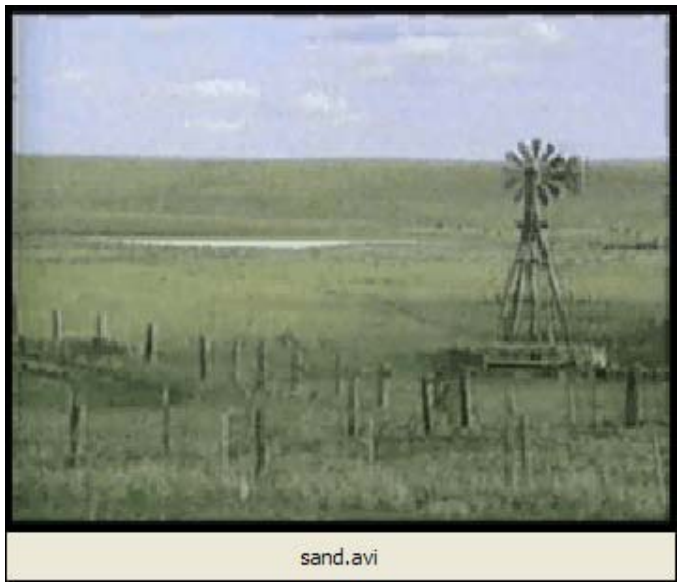
Canada has had an increasing toll in the the past decade

Too much water – floods – are a problem.





Drought



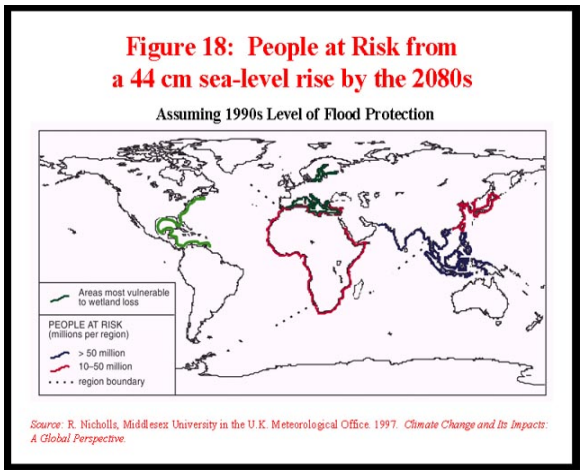
Changing lake and sea levels

1 metre drop in lake level possible

Great Lakes

Water Levels

Sea Level Rise 50cm by 2100
Storm surges
Access, affects on fresh water



Most Expensive Canadian Natural Disasters

• Ice Storm (‘98)	$5 B	16 deaths
• Drought (’02)	$??B	
• Drought (‘79/80)	$2.5 B	
• Drought (‘88)	$1.8 B	
• Drought (‘84)	$1 B	
• Saguenay Flood (‘96)	$1 B	10 deaths
• Pine Lake tornado (’00)		12 deaths
• Drought (‘61)	$0.7 B	
• Manitoba Flood (’97)	$0.4 B	4 deaths
• Calgary Hailstorm (’91)	$0.36 B	
• Barrie tornado (’85)	$0.2B	12 deaths
• BC Blizzard (’96)	$0.2 B	
• Winnipeg Flood (’93)	$0.16 B	
• Edmonton Tornado (’87)	$0.15 B	12 deaths
• Calgary Hailstorm (’96)	$0.14 B	

Approaches to Disaster Management

- **Response and recovery**
- **Preparedness**
- **Mitigation**
  - **ANTICIPATE through Forecasts and warnings**
  - advise people about impending events and advise on response strategy

  examples: 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" extremes

  examples: building codes;

Prevention

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

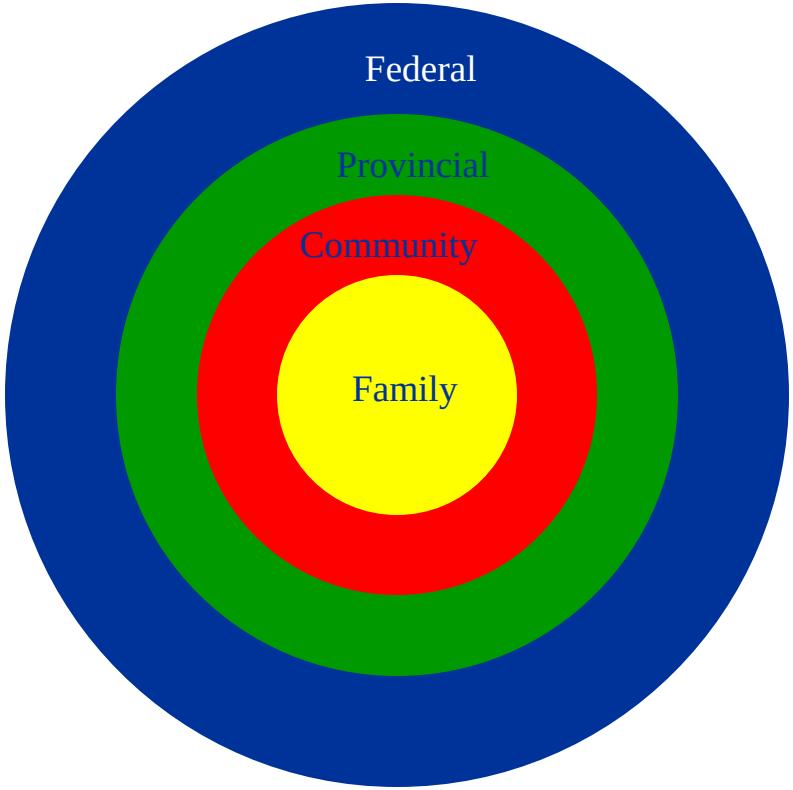
Why?

Public apathy

Public capacity

Act of God – won't strike twice

Role of insurance



Benefits/Costs of prevention - mitigation

Costs now – benefits later

Responsibility for mitigation

Credits – debits – politics

Scientific uncertainty

Canadian Model

**“There is no role more fundamental for government
than the protection of its citizens.”**

Federal Government Speech From the Throne – 2 Feb., 2004

“Global warming poses a greater long-term threat to humanity than terrorism.”

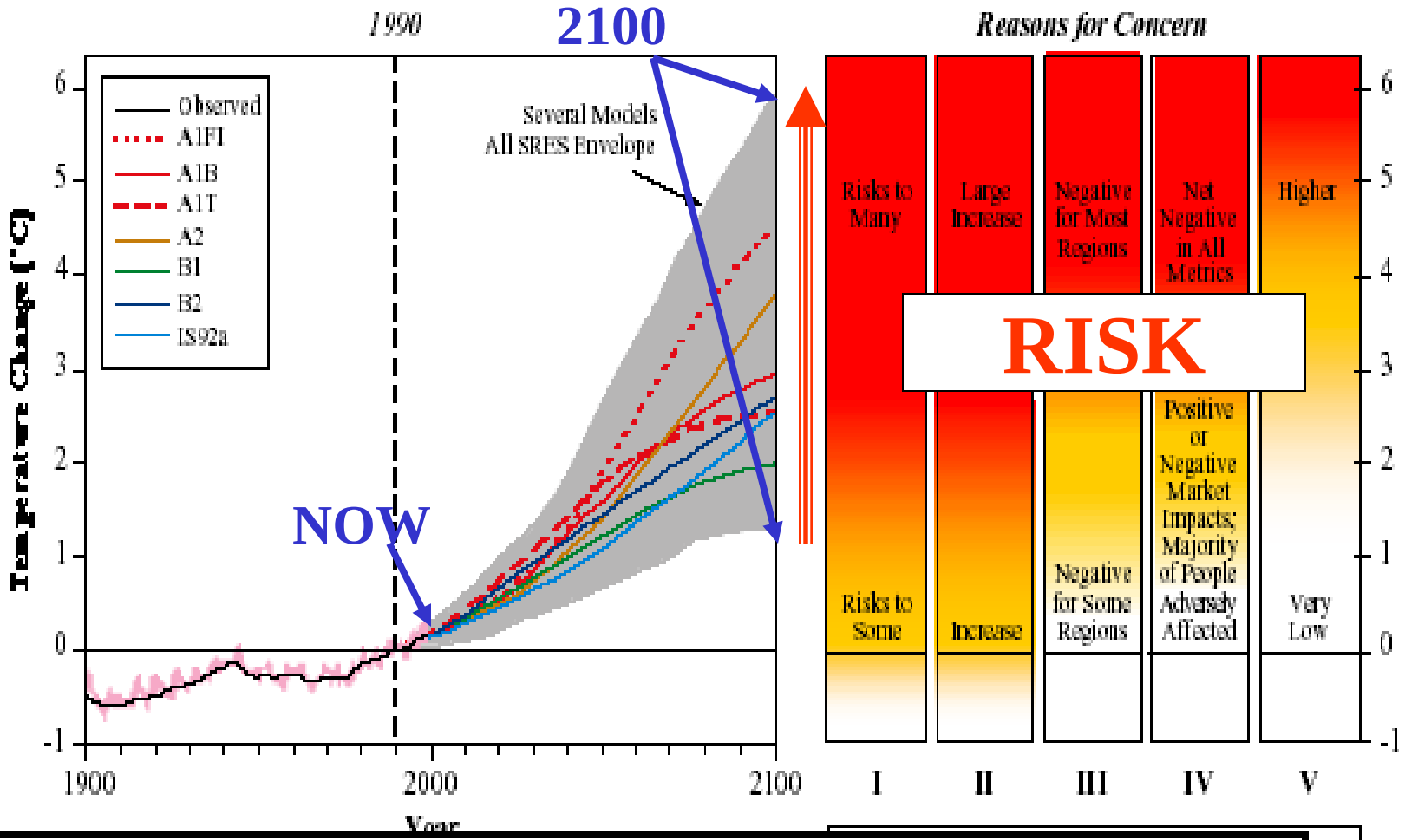
Minister D. Anderson, 6/Feb/2004

**“Unchecked climate change has the potential
to be catastrophic in both human and economic terms”**

Prime Minister Blair – UK Sept/04

**“Growing scientific evidence is confirming that the world’s climate is radically changing and
that human activity is now contributing to global warming”**

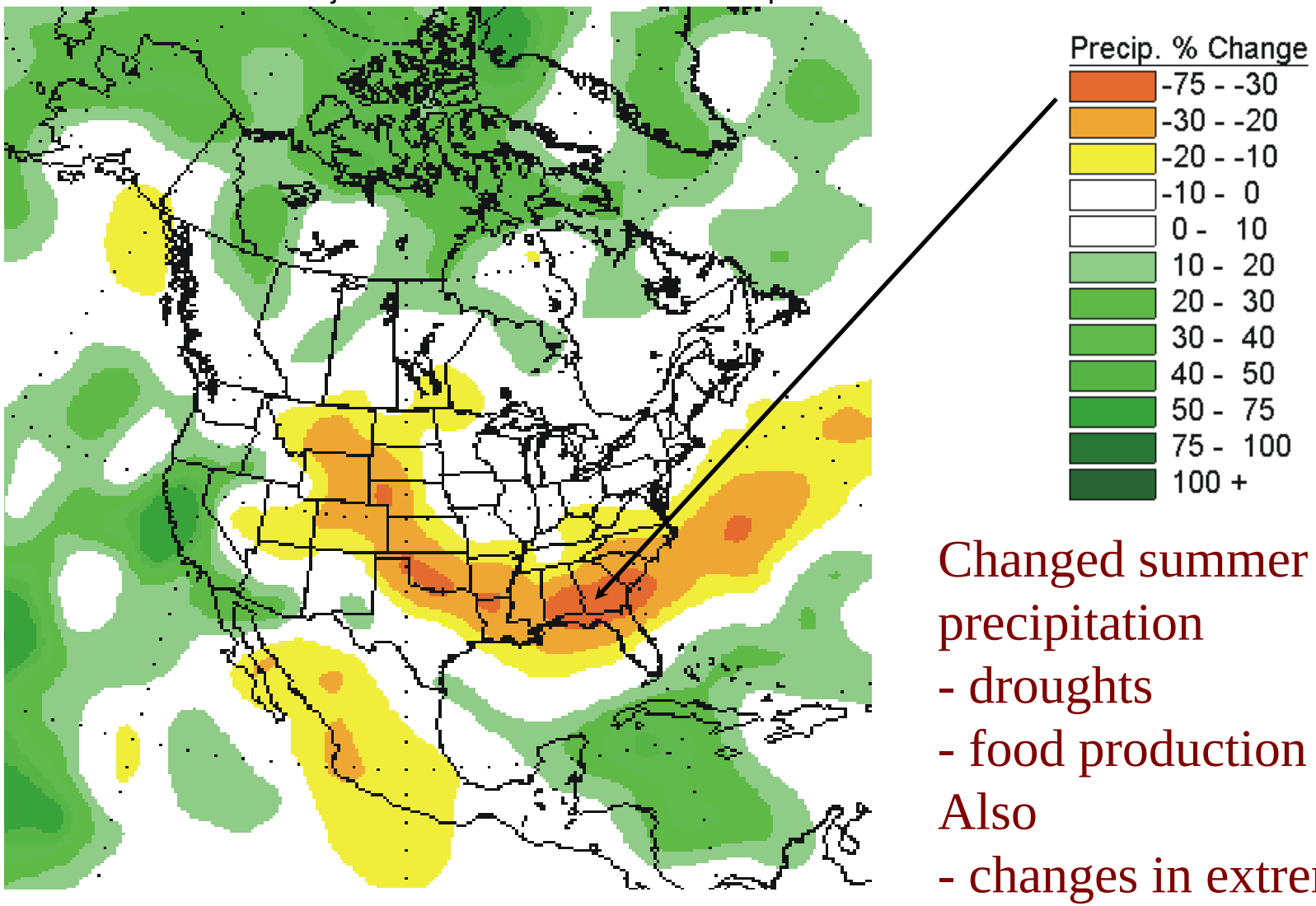
Report of the Conference Board 7/9/04



Climate Change

Projected Summer Precipitation Change Between 1975-1995 and 2080-2100

Combined Effects of Projected Greenhouse Gas and Sulphate Aerosol Increases - Canadian Model

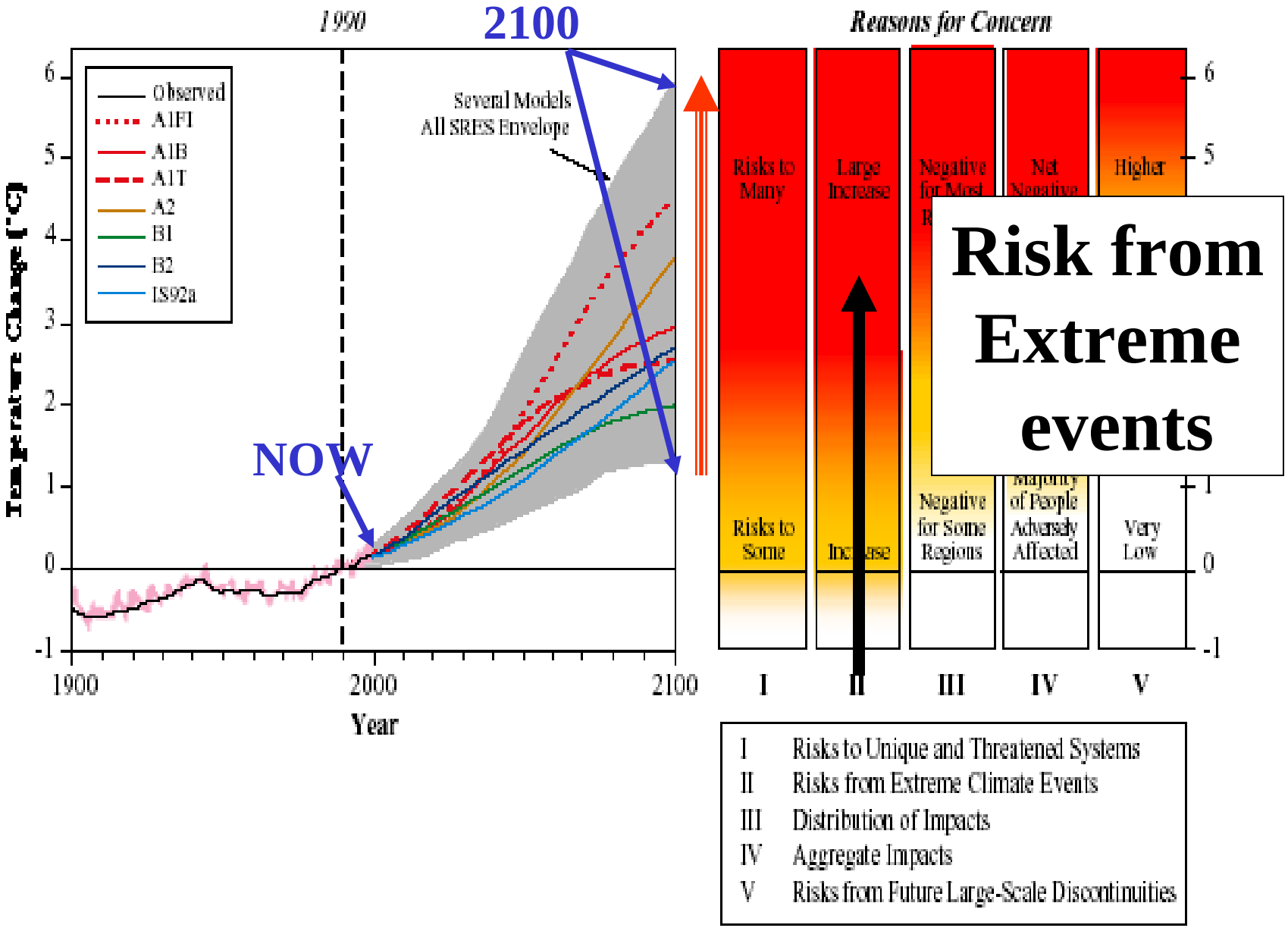


Changed summer precipitation
- droughts
- food production

Also
- changes in extremes

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**"


1990
2100
Reasons for Concern
Observed
A1FI
A1B
A1T
A2
B1
B2
IS92a
Several Models
All SRES Envelope
NOW
Risk from Extreme events
Risks to Many
Large Increase
Negative for Most
Net Negative
Higher
Risks to Some
Increase
Negative for Some Regions
Majority of People Adversely Affected
Very Low
Year
I Risks to Unique and Threatened Systems
II Risks from Extreme Climate Events
III Distribution of Impacts
IV Aggregate Impacts
V Risks from Future Large-Scale Discontinuities

IPCC Assessment

Confidence in observed changes (latter half of the 20th century)	Changes in Phenomenon	Confidence in projected changes (during the 21st century)
Likely	Higher maximum temperatures and more hot days over nearly all land areas	Very likely
Very likely	Higher minimum temperatures, fewer cold days and frost days over nearly all land areas	Very likely
Very likely	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
	Increase in tropical cyclone mean and peak precipitation intensities[c]	Likely, over some areas

Intense Precipitation

Drought

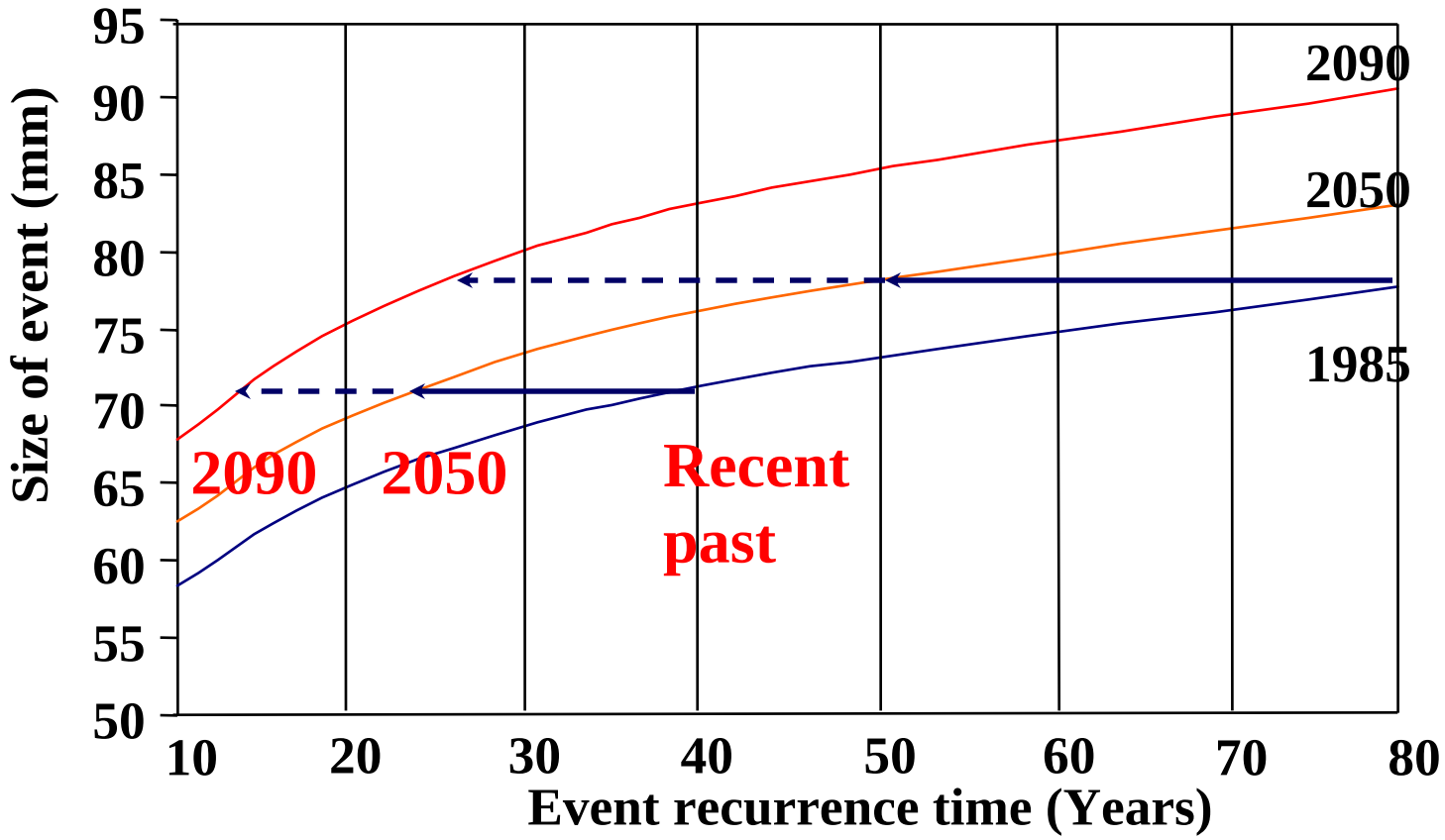
Hurricanes

90-99%

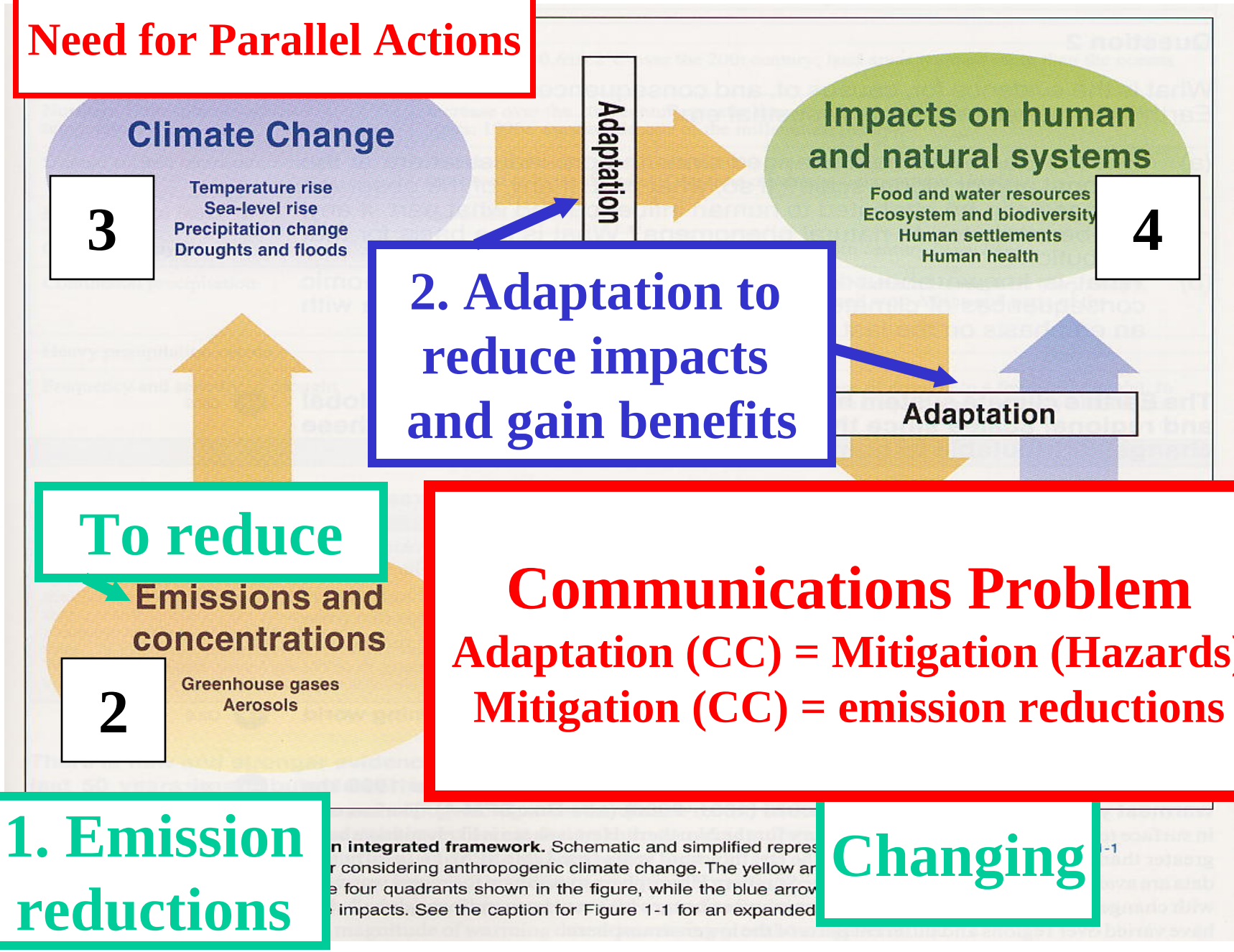
66-90%

Intense Precipitation

Extreme Precipitation Events (Canada)



Need for Parallel Actions



Communications Problem

Adaptation (CC) = Mitigation (Hazards)

Mitigation (CC) = emission reductions

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

- **…promote sustainable development. …**
- **(e) 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. …**

Investments in adaptation and disaster reduction can also result in emission reductions

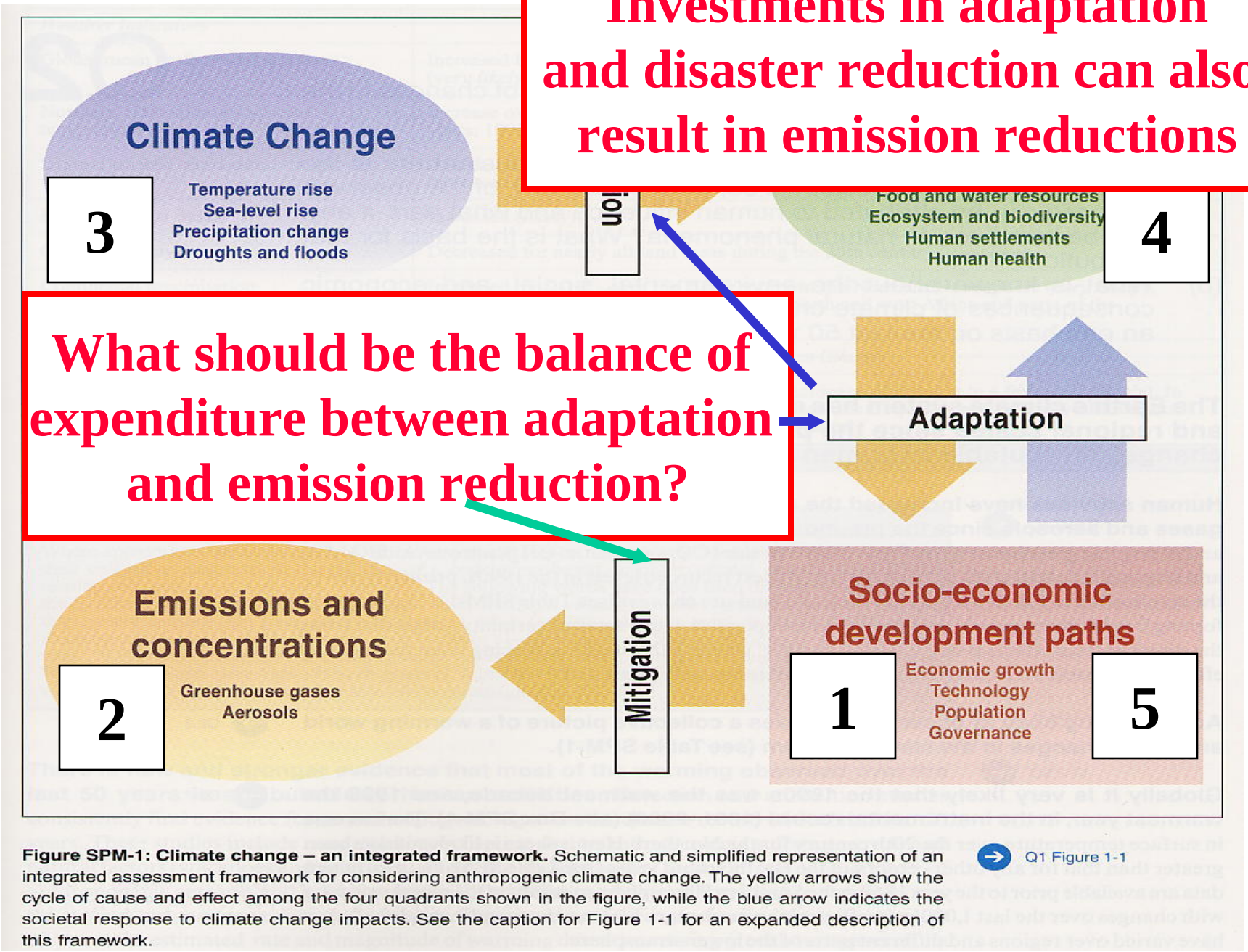
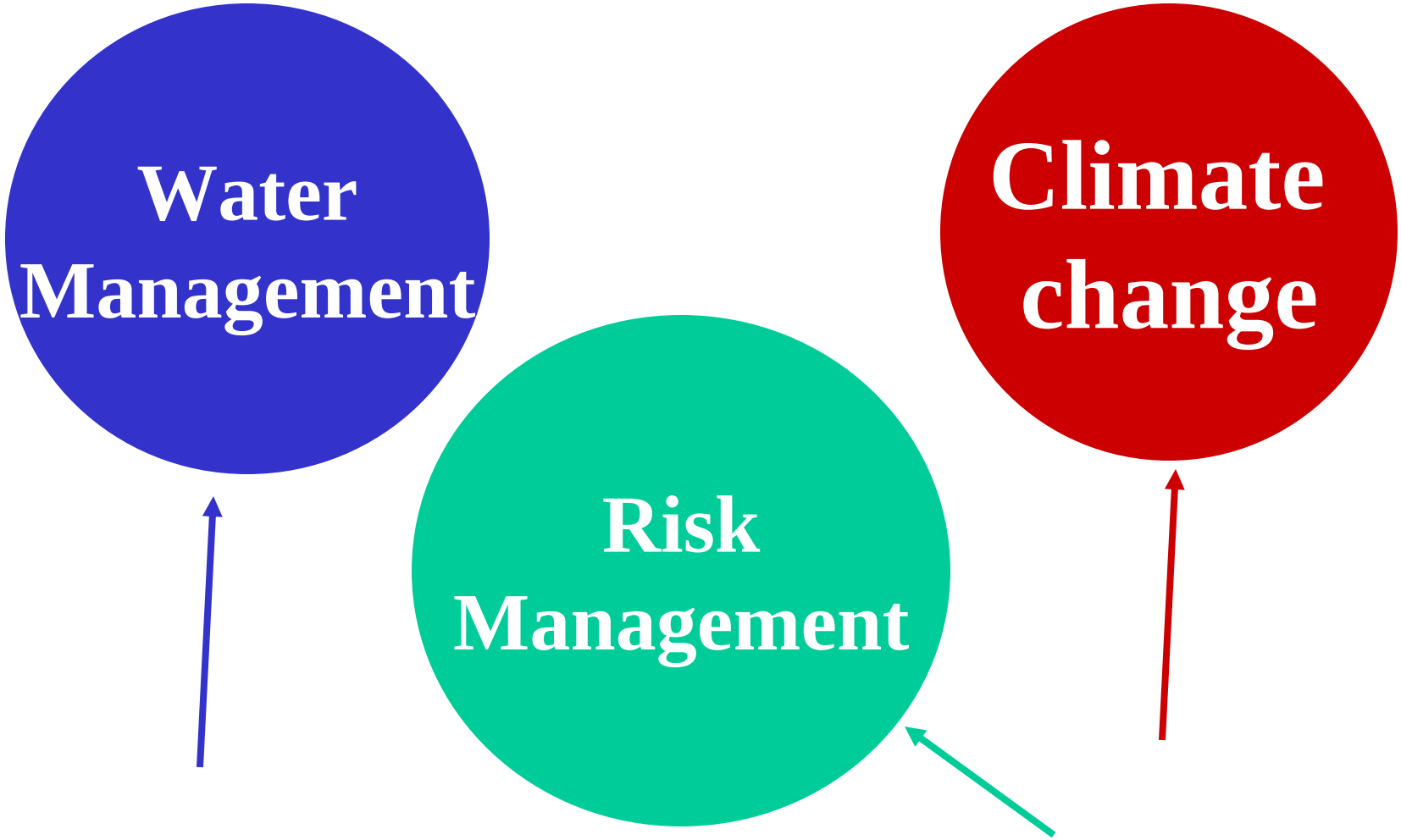


Figure SPM-1: Climate change – an integrated framework. Schematic and simplified representation of an integrated assessment framework for considering anthropogenic climate change. The yellow arrows show the cycle of cause and effect among the four quadrants shown in the figure, while the blue arrow indicates the societal response to climate change impacts. See the caption for Figure 1-1 for an expanded description of this framework.

Q1 Figure 1-1

Policy Issues for Governments and individuals



Risk management – uncertainty – precautionary principle

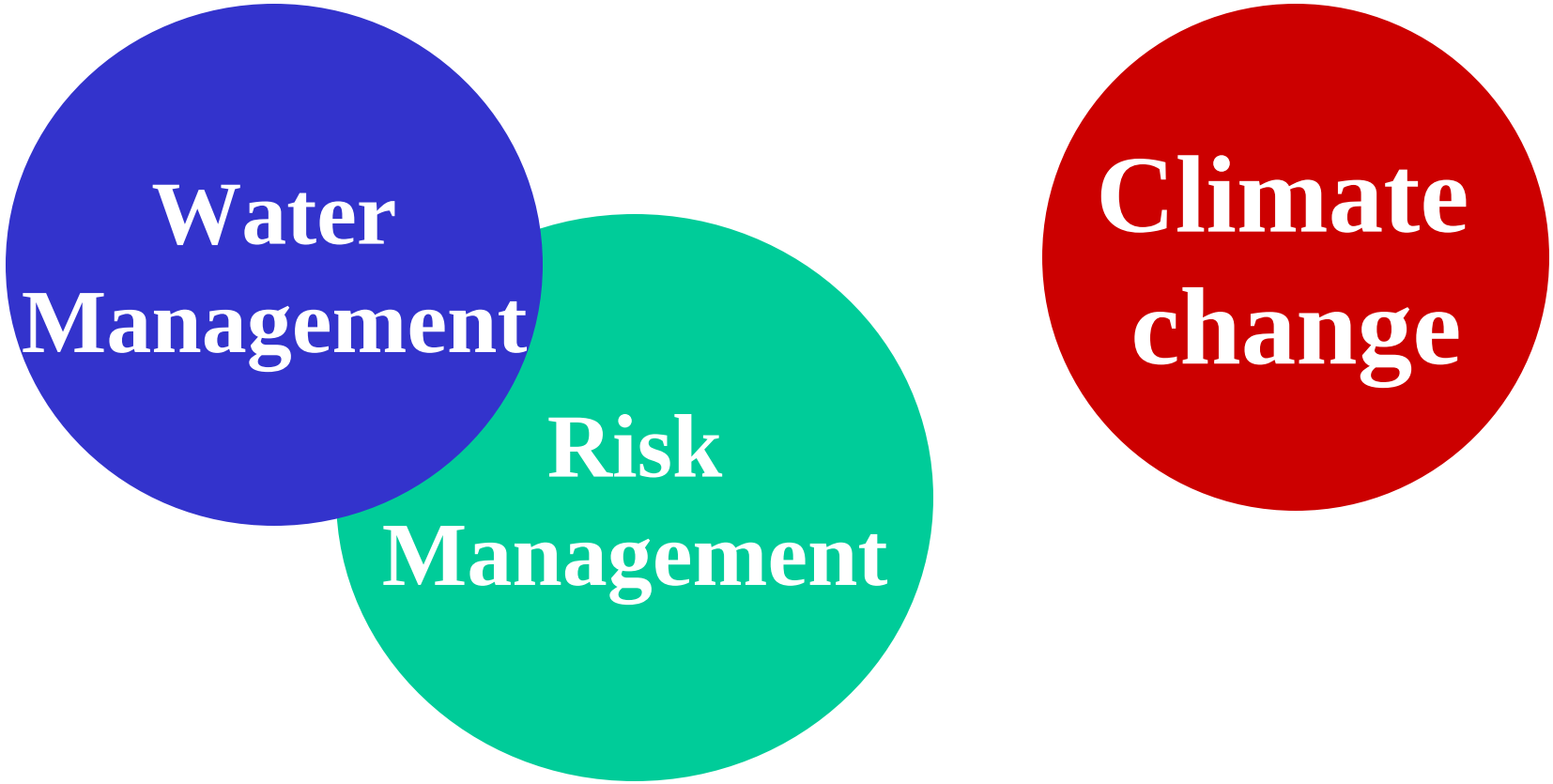
- Concern about risks,
  - where change is characterized by scientific uncertainty and the potential for serious or irreversible harm.
- Need for more effective strategies to manage risk and seize the opportunities.
- Public opinion surveys
  - Canadians want their governments to protect them from the risks.
- Need to manage issues where there is significant scientific uncertainty.
  - Cannot guarantee zero-risk risk management
  - Decisions will be based on “scientific evidence”.
  - Scientific community needs to provide advice
  - but the scientific information is sometimes characterized by uncertainty or disagreement, or both.
- Growing emphasis on the precautionary approach.
- It is ultimately guided by judgment, based on values and priorities.

Precautionary Principle

- **Canada supports the statement in Principle 15 of the "1992 Rio Declaration on Environment and Development":**
- ***"In order to protect the environment, the precautionary approach shall be widely applied by States according to their capability. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."***
- **Need to transfer this thinking to water management - flood and drought strategies**

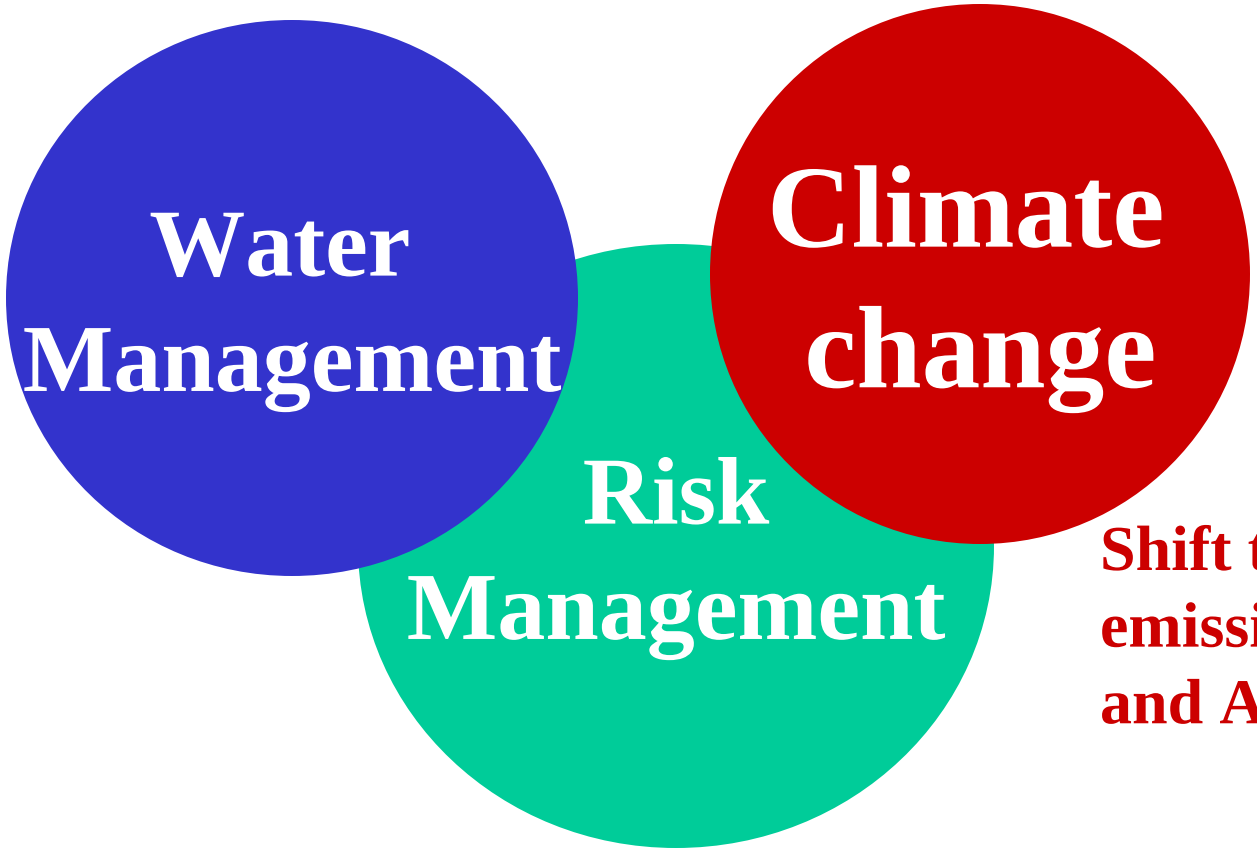
Policy Issues for Governments and individuals

Policy Issues for Governments and individuals



Shift to balance on recovery and PREVENTION

Policy Issues for Governments and individuals

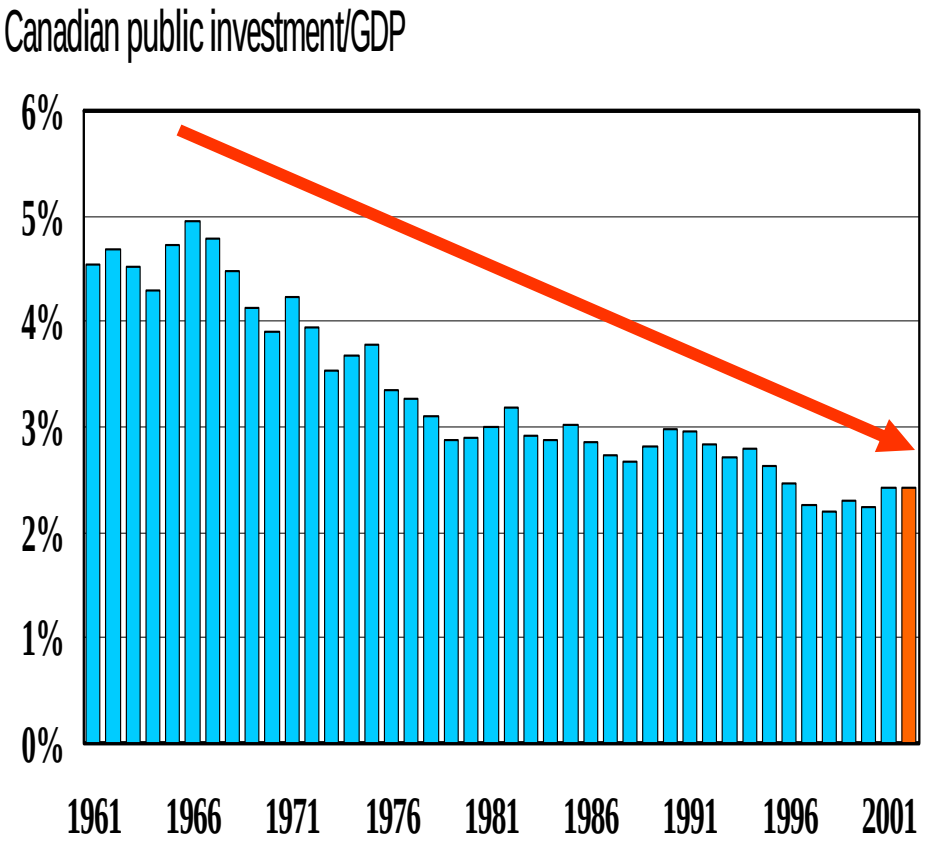


Shift to balance on emission reduction and ADAPTATION

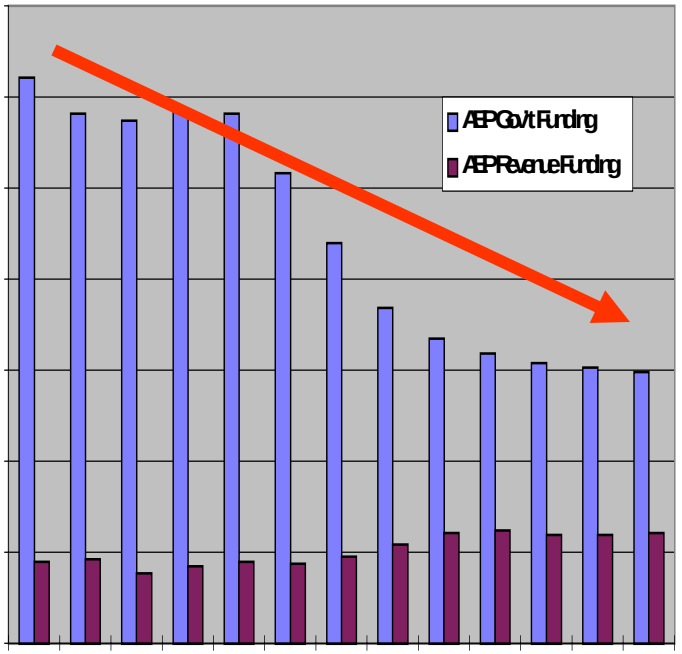
Shift to balance on recovery and PREVENTION

“There is no role more fundamental for government than the protection of its citizens.”

Federal Government Speech From the Throne – 2 Feb., 2004

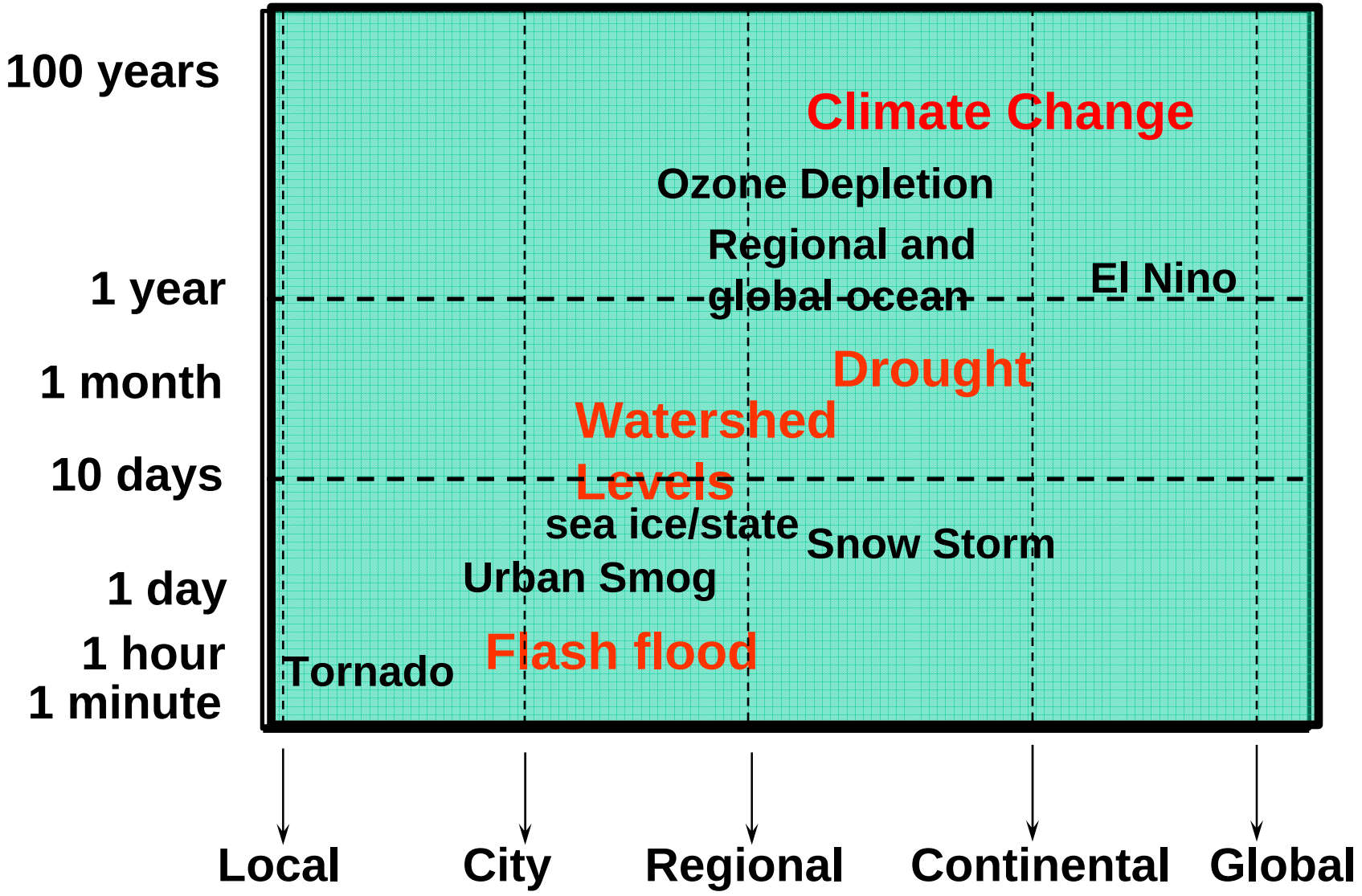


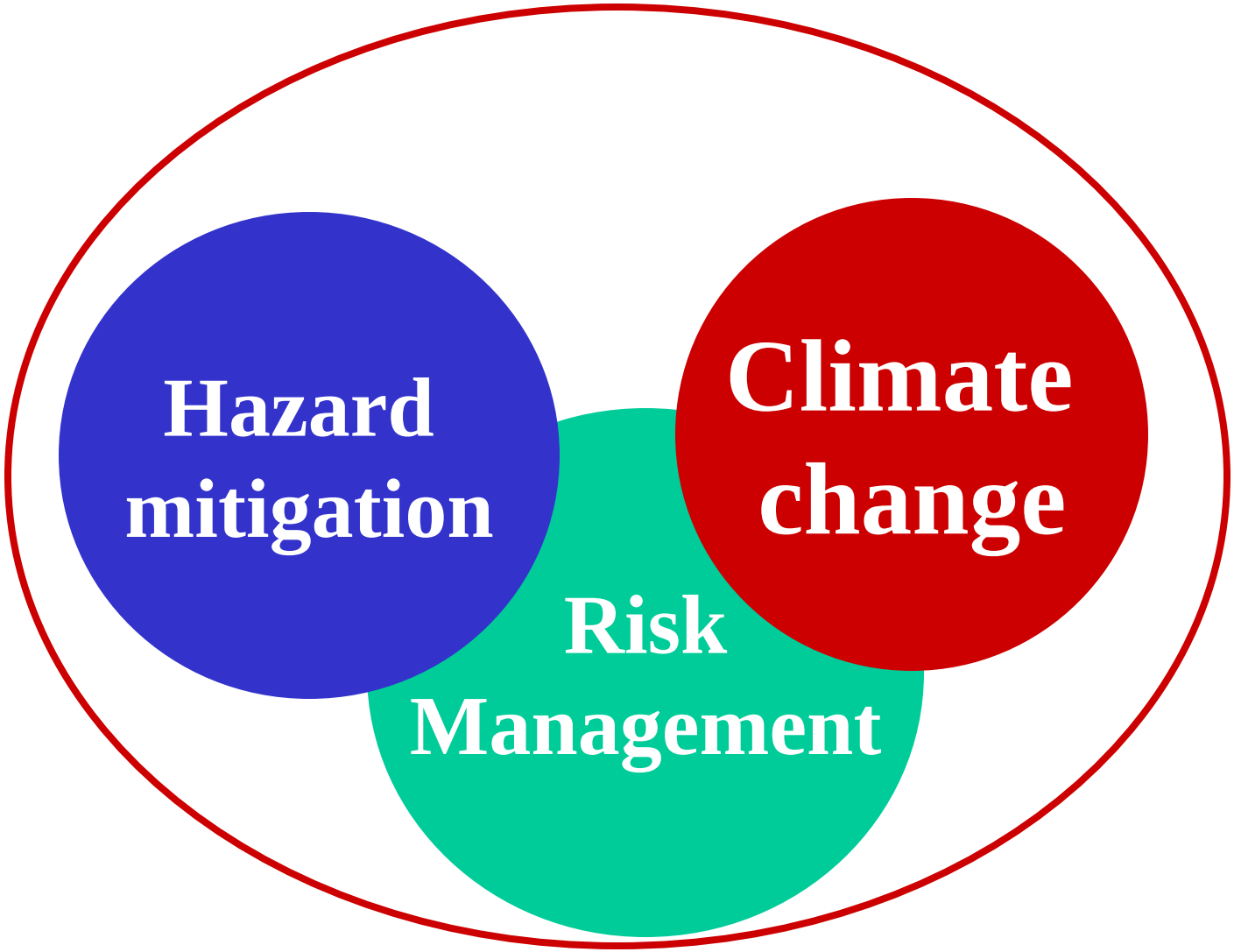
Public infrastructure spending



Canadian weather services investments – 1990-2000

Information needed for Prevention
Time scales of minutes to decades





A broader framework

World Summit on Sustainable Development - WSSD

2002, Johannesburg

- **Plan of Implementation**

  II.Poverty Eradication

  By 2015, halve the proportion of people who live on less than $1 per day (Millennium Development Goal)

  World solidarity fund to eradicate poverty

  Women's equal access …

  Child labour

  III.Changing unsustainable patterns of consumption and production

Connecting water-hazards-climate-hunger

resource base of economic and social development

Strengthen the role of the International Strategy for Disaster Reduction and encourage the international community to provide the necessary financial resources to its Trust Fund

Meet all the commitments and obligations under the UNFCCC

Halve by 2015 the proportion of the world's people:

who suffer from hunger …

who are unable to reach or cannot afford safe drinking water

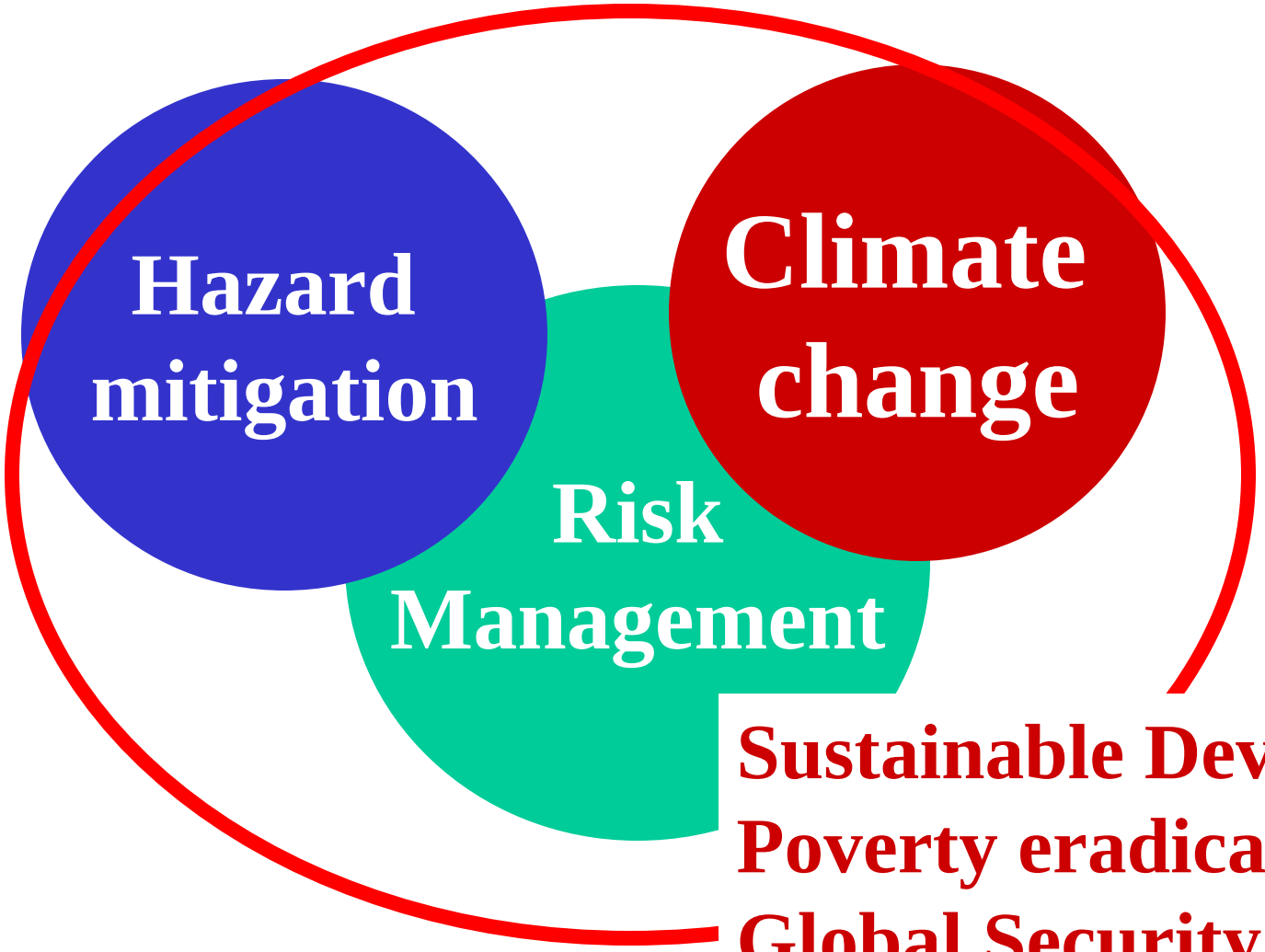
Means of implementation

Urge the developed countries … target of 0.7 per cent of GNP as ODA to developing countries …

Promote and improve science-based decision-making and reaffirm the precautionary principle … (Rio)

"Achieving universal primary education, ensuring that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling."

The Additional Dimensions



Research Alliance for Disaster Resilient Cities

RADR-Cities

Vision: **Canadians living and prospering in cities resilient to weather-related hazards.**

Research Themes

Weather and related hazards
Critical Infrastructure
International Development
Population Health
Public Policy

website: www.radr-cities.ca

Western

Institute for Catastrophic Loss Reduction

Institut de Prévention des Sinistres Catastrophiques

The End

Thank you for your attention