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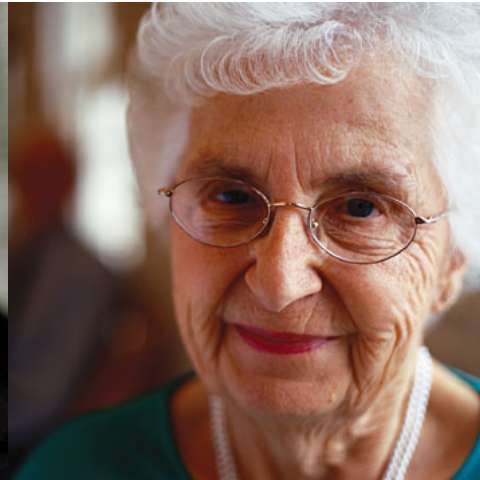
*Votre santé et votre  
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# Climate Change and Extreme Heat Events – Protecting the Health of Vulnerable Canadians

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## OCCIAR Meeting with City of Ottawa

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Health Canada



Canada 

# Key Messages

- Health risks from climate change are real
- Many Canadians are vulnerable to the hazards such as extreme heat
- Adaptation is needed to protect Canadians
- We can learn from others
- Health Canada is supporting adaptation through its extreme heat initiative

# Climate Change Health Risks Are Real and Are Growing



# Recent Climate Change and Health Reports

World Health Organization (2008) – Protecting Health in Europe from a Changing Climate

USA (2008) - Analyses of the Effects of Global Change on Human Health and Welfare and Human Systems Final Report, Synthesis and Assessment Product

European Environment Agency (2008) – Impacts of Europe's Changing Climate

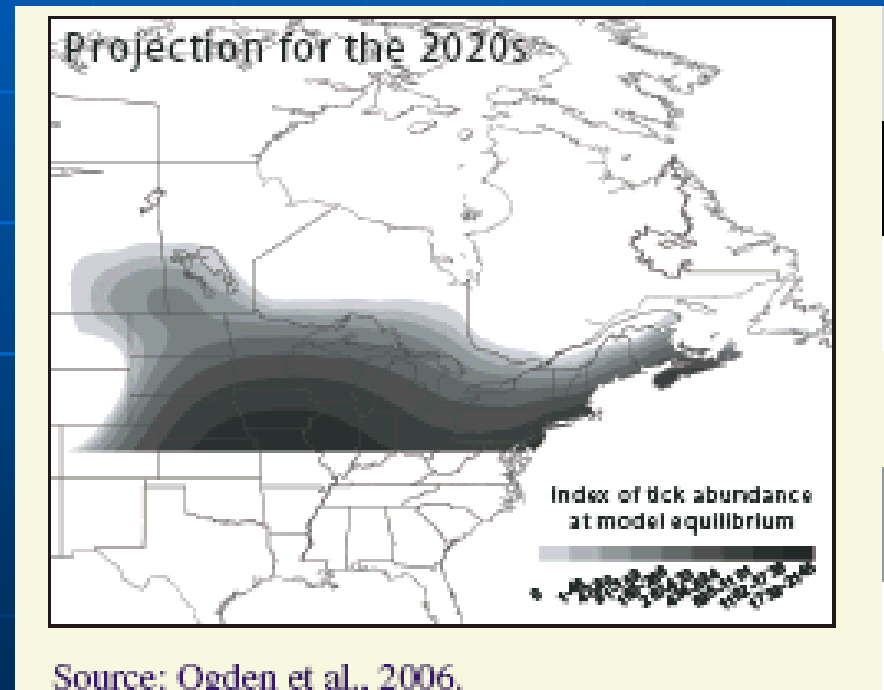
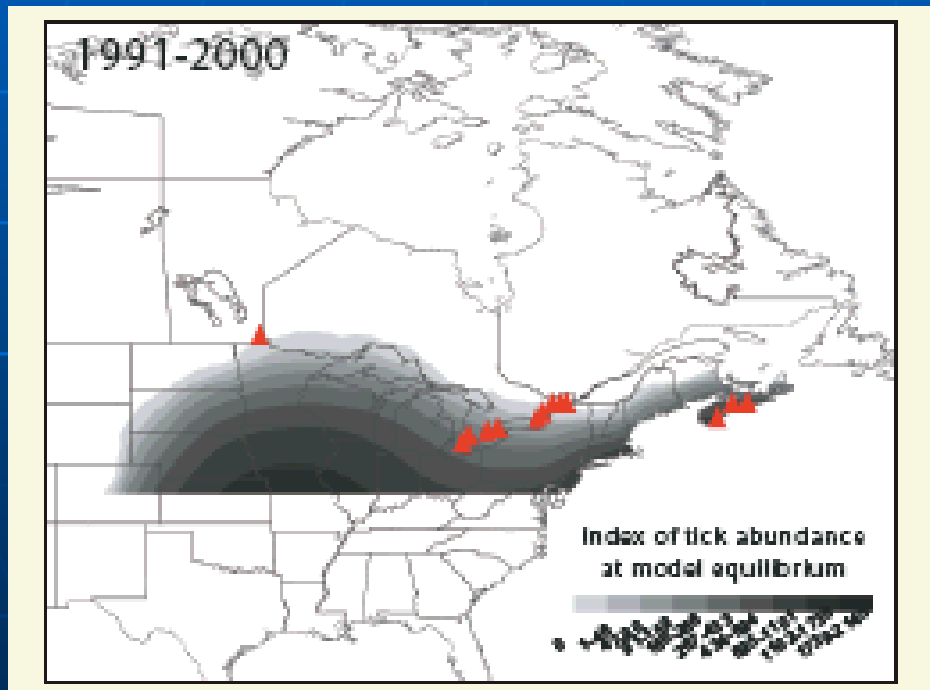
Australia - Climate Change in Australia (2008)

Stockholm Environment Institute - Growing Old in a Changing Climate (2008)

UN Food and Agriculture Organization – Climate Change: Implications for Food Safety

# Climate change will increase risks associated with some infectious diseases

## Possible spread of *I. Scapularis* in Canada under climate change



Source: Ogden et al., 2006.

# Air Quality

- Under 4 degree increase in temperature ozone levels would increase in Canadian communities
- Most affected areas – Montreal, Toronto, Vancouver, Calgary, Edmonton, and Winnipeg
- Largest increase in Windsor – Quebec corridor
- **312** more deaths
- 4.6% increase in health burden to Canadian society related to air pollution over 3-month summer period (**\$1.3 Bil**)
- PM<sub>2.5</sub> levels to decrease

# No Synergistic health effects between air pollution and heat



**Implications for Heat Alert and  
Response Systems ?**

# Natural Hazards

**Table 8.2** Regions in Canada affected by natural hazards

Hazard	Most Affected Areas
Avalanches, Rock- Mud- and Landslides, Debris Flows	All regions of Canada—particularly Rocky Mountains in Alberta, British Columbia, Yukon, southern and northeastern Quebec and Labrador, Atlantic coastline, Great Lakes, St. Lawrence shorelines
Heat Waves	All regions of Canada—particularly Windsor to Quebec corridor, along Lake Erie, Lake Ontario and St. Lawrence River, Prairies, Atlantic Canada, British Columbia
Cold Snaps	All regions of Canada
Drought	Prairie provinces most affected Other areas of southern Canada can be at risk
Wildfires and Forest Fires	Most provinces and territories of Canada-particularly Ontario, Quebec, Manitoba, Saskatchewan, British Columbia, Northwest Territories, Yukon
Thunderstorms, Lightning, Hail, Tornadoes, Hurricanes	Thunderstorms: Many regions of Canada Lightning: Low-lying areas in southern Canada Tornadoes: Nova Scotia, Ontario, Quebec, Alberta, Saskatchewan, Manitoba Hurricanes: Eastern Canada-particularly Atlantic Canada Hailstorms: Southern Saskatchewan, southern and northwestern Alberta, southwestern interior British Columbia, less frequently in Ontario and Quebec
Floods	Large parts of Canada's inhabited areas-particularly New Brunswick, southern Ontario, southern Quebec, Manitoba

**Canadians are exposed to a range of climate-related health risks**



# Deaths from climate-related hazards are decreasing

Figure 3.1 A century of natural disasters in Canada

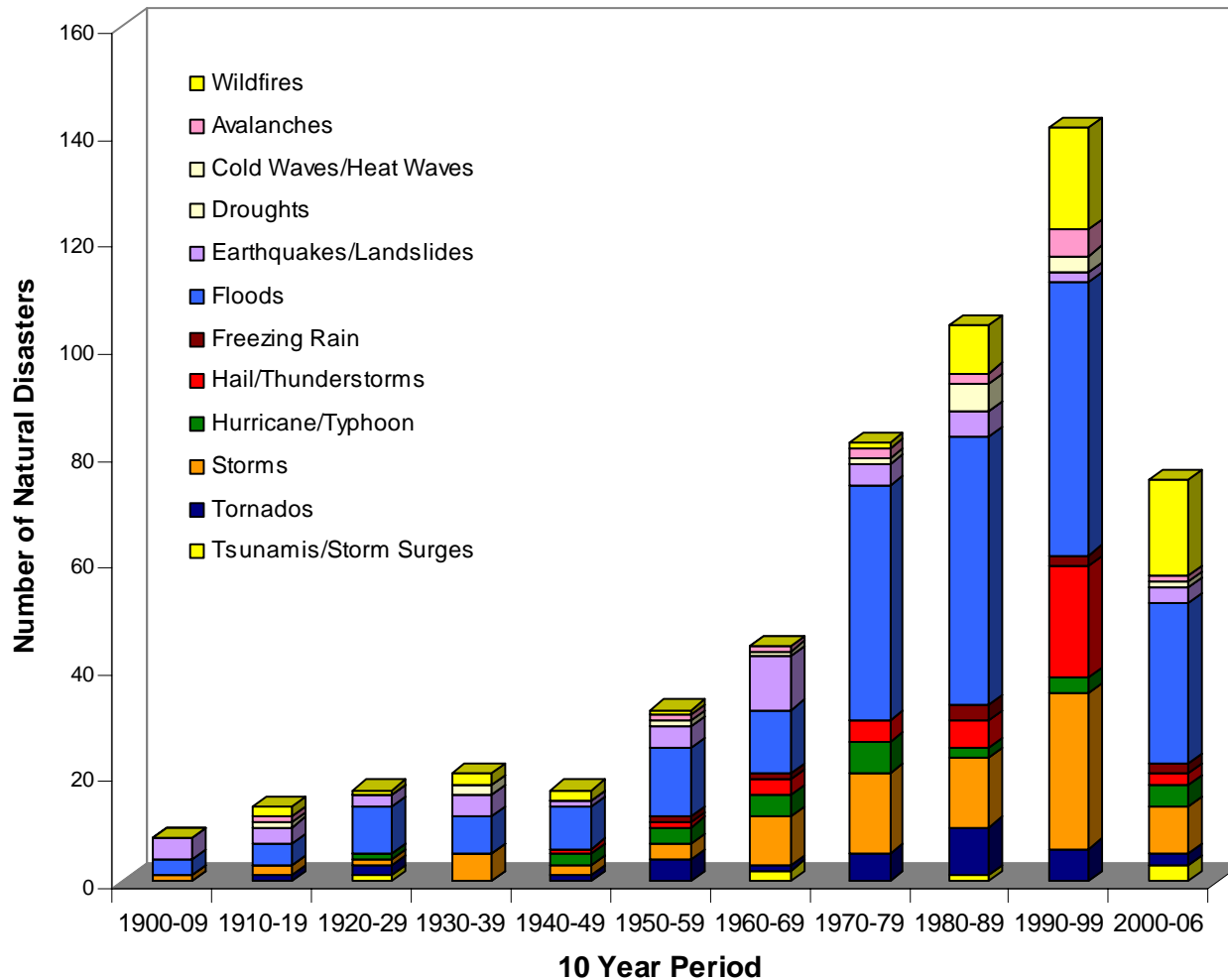
	1900–1960s	1970s	1980s	1990s	2000–2002
Estimated number of disasters	160	92	114	151	29
Estimated number of deaths*	3,010	114	283	179	18
Estimated number of affected*, †	162,462	25,477	50,285	712,625	154
Estimated direct damage costs (CAN\$)‡, §	4,882 billion	9,712 billion	17,617 billion	13,710 billion	0.203 billion

Notes: Data compiled using natural disaster information about meteorological events.

**BUT** – the number of people affected and economic costs are rising rapidly

# Frequency of Natural Disasters in Canada

Frequency of Natural Disasters in Canada (1900-2006)



Canadian Disaster Database, 2006

# Exposure will increase in the future

**Table 3.3** Recent trends and projections for extreme weather events for which there is an observed late 20th-century trend

Phenomenon and direction of trend	Likelihood that trend occurred in late 20th century	Likelihood of future trends based on projections for the 21st century using SRES scenarios
Warmer and fewer cold days and nights over most land areas	Very likely	Virtually certain
Warmer and more frequent hot days and nights over most land areas	Very likely	Virtually certain
Warm spells/heat waves. Frequency increases over most land areas	Likely	Very Likely
Heavy precipitation events. Frequency (or proportion of total rainfall from heavy falls) increases over most areas	Likely	Very likely
Areas affected by droughts increases	Likely in many regions since 1970	Likely
Intense tropical cyclone activity increases	Likely in many regions since 1970	Likely
Increased incidence of extreme high sea level (excludes tsunamis)	Likely	Likely

Source: Adapted from IPCC, 2007c.  
*Climate Change 2007: The Physical Science Basis* (Table SPM.2, p.8)

“Very likely” 90 – 99% chance

# Climate System Surprises

## Ocean Acidification



## Melting of Polar Ice

# Vulnerability of Canadians

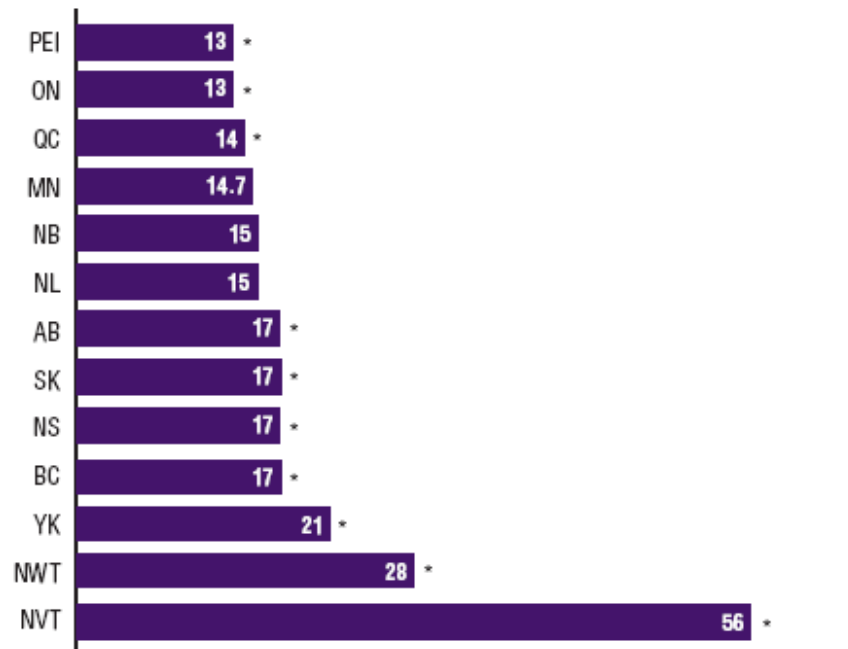
- Exposure
- Sensitivity
- **Adaptive Capacity**



**How well can we respond?**

# Vulnerability differs across Canada...

Figure 7.4 Prevalence of food insecurity by province and territory compared with the Canadian mean



Data source: 2000/01 Canadian Community Health Survey

\* Significantly different from estimate for Canada ( $P < 0.05$ )

Source: Statistics Canada, 2005.

## Food Insecurity – major threat to the North

# Extreme heat - vulnerable populations

## Seniors

- Pre-existing disease
- Social factors (living alone)
- Use of certain drugs (e.g., antidepressants, alcohol, diuretics)
- Impaired cognition (e.g., dementia)
- Housing (e.g., floor)
- Lack of air conditioning
- Physical activity – overexertion or inactivity



**2006 – seniors 13% of population**  
**2031 – seniors 25% of population**

# Adaptation Matters – Heat alert and response systems

## Europe

WHO study indicated that most of the 70,000 heat wave deaths in Europe in 2003 were preventable

Recent study (2008) indicates that a similar heat wave in France in 2006 led to approx. 4,000 less deaths due to implementation of alert system

## United States

1995 heat wave in US mid-west caused 514 deaths in Chicago

Similar heat wave in 1999 resulted in only 119 deaths due to better response plans



# The adaptation imperative

“In the face of what we know about the serious threats posed by climate change to health, the question today is not whether public health action is necessary, **but what to do and how to do it.** Health systems should respond by helping to strengthen disease control and health protection.”

Dr. Marc Danzon  
WHO Regional Director for Europe  
2008

# Adaptation Priorities

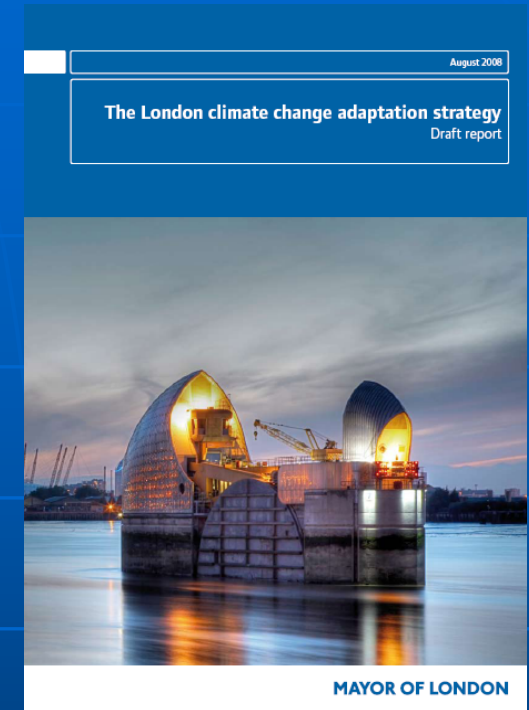
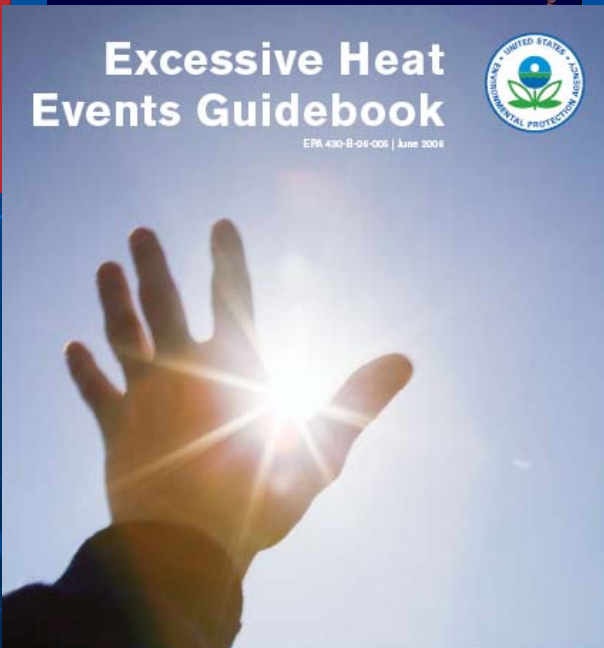
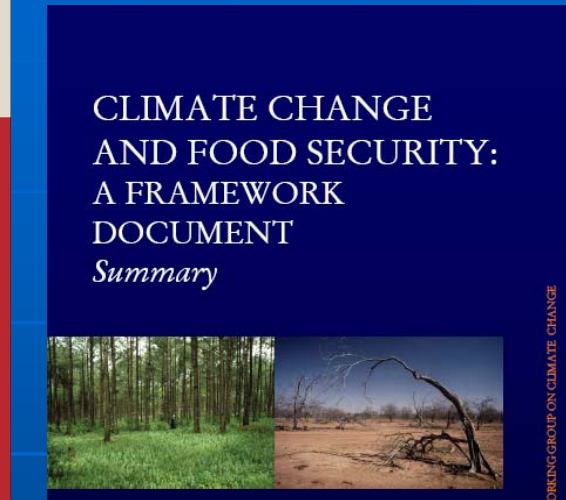
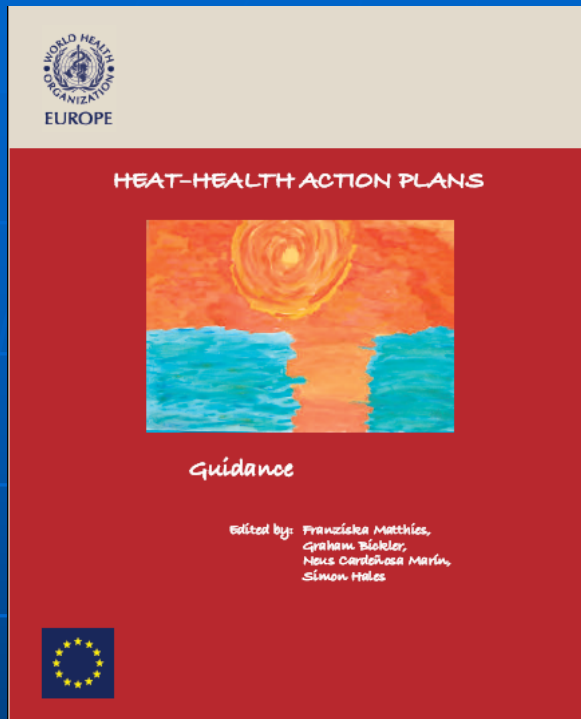
Modelling

Monitoring

Mainstreaming



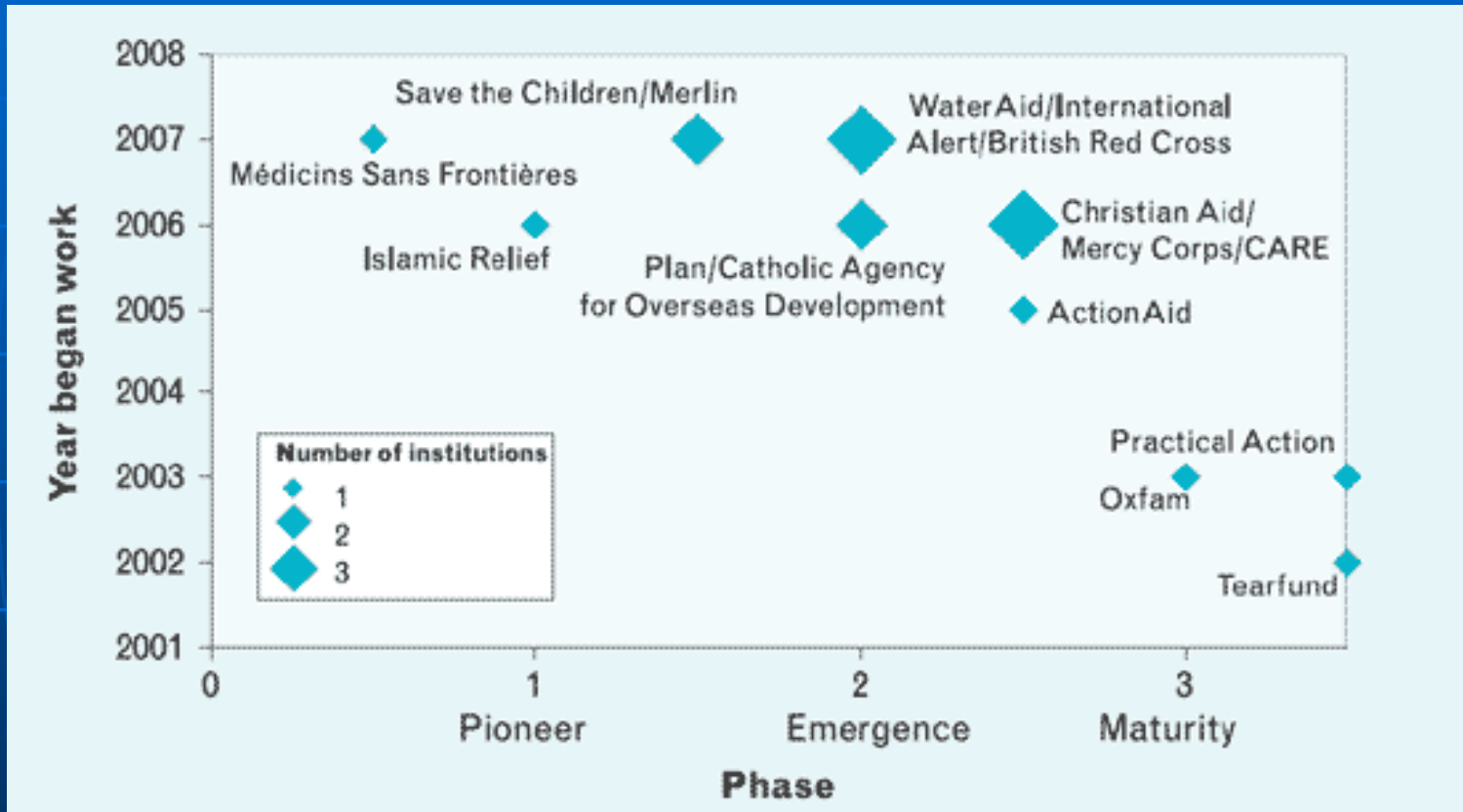
# Learning From Others



# Drinking Water Recommendations during Extreme Heat Events (WHO, 2008)

- “Drinking a lot” – ingesting the volume of water needed to compensate for the fluid deficit during hot conditions – by approximately 150%
- People must drink even if they do not feel thirsty (e.g., seniors)
- Each individual older person or patient needs to receive personalized drinking recommendations:
  - Healthy older adults
  - Vulnerable people
  - Patients with a history of stroke, hypertension, diabetes, coronary events, renal insufficiency or dementia
- Guidance must be adapted, accessible, and understandable to various categories of people; the lay public, health care professionals and medical staff

# Becoming a “Climate Smart” Organization



(Rowling, 2008)

# Tracking Progress.....Or ?

## // Sustainability Highlights //

Climate change is one of the world's leading sustainability challenges, and the energy sources we rely on play a determining role. Most scientists agree that greenhouse gas (GHG) emissions from human activities are adversely changing the earth's climate. The main sources of these GHGs include the burning of fossil fuels, as well as additional contributions from land use practices, including agriculture, landfills and forestry. This buildup of GHGs is contributing to rising average temperatures, changes in wind and precipitation patterns and increases in the frequency of severe weather events. In addition to lowering our output of GHG emissions, it is imperative that we prepare our communities to be more resilient to face impending climate variation and its impacts—both negative and positive.

- Per capita GHG emissions in BC were 15.9 tonnes in 2004 (29% increase since 1990), compared with the Canadian average of 23.7 tonnes. Levels below the national average are largely due to BC's clean hydroelectric resources and the fact that the majority of the BC population lives in a relatively mild climate.
- Total emissions in BC increased by 30%, due mainly to changing energy consumption patterns and increases in natural gas production.

### Greenhouse Gas Emissions

**GETTING WORSE**—In 2004 both total and per capita GHG emissions were at their highest levels reported since 1990.

### Climate Change Impacts

**GETTING WORSE**—Average freshwater and air temperatures have already warmed over the past 50-100 years, and Fraser River peak flows are occurring earlier than in the past 85 years.

### Climate Change Adaptations

**GETTING BETTER**—Communities are assessing climate risks, initiating plans to adapt, and preparing for climate-related vulnerabilities such as flooding, drought and interface fires.

<http://www.fraserbasin.bc.ca/publications/documents/FBC-snapshotreport3.pdf>

# Reducing health risks from extreme heat

## Heat Alert and Response Systems

- Pilot systems in Canadian communities
- Best practices guidebook
- Health messaging to change behaviour

## Health Professional Interventions and Training

- Development of clinical guidelines
- Development of training materials

# ***Canadians possess the knowledge, institutions and skills to reduce climate change health risks***

**BUT** – these resources must be harnessed to address the challenges ahead:

- ✓ public health officials should be engaged and supported
- ✓ public health programs should be ``mainstreamed``
- ✓ best practices for adaptation must be identified
- ✓ collaborative partnerships must be built



# #1: Heat-health science

Objective: To address a number of critical knowledge gaps that currently hinder the effective diagnosis, prevention and management of heat-related morbidity and mortality.

Research Program and Outputs:

1. Assessing clinical knowledge of heat morbidity and mortality
2. Tracking and surveillance of heat morbidity and mortality
3. Evaluating existing Alert Systems and Response Plans
4. Measuring the healthcare costs associated with heat mortality and morbidity

# #2: Clinical competencies

Objective: To enable health professionals to better advise their clients / patients on how to prepare for heat events, and to rapidly diagnose / treat them, if they have experienced a heat illness

## Research Program and Outputs:

1. Increase awareness, by clinicians, of the significance of environmental factors, and the various codes and other approaches that exist to protect the public
2. Develop electronic training tools (PowerPoint presentations and web-based self-tutorials) that may be used within existing medical curricula, or as stand-alone professional development
3. Develop clinical guidelines on heat

# #3: Pilot heat alert and response systems

Objective: Develop, test, modify for smaller communities, and demonstrate the effectiveness of heat alert and response systems in four communities in Canada

## Research Programs and Outputs:

1. Operational heat alert and response systems in four communities
2. Draft Best Practices Extreme Heat Management Guidebook
3. Desktop simulation exercises completed in each community

# #4: Heat messaging

Objective: Identify best practices of heat-health messaging for enhancing personal adaptation to heat and for existing and future warning systems

Research Program and Outputs:

1. Summarization of perceived risks to climate change and to extreme heat
2. Development of a best practices for heat-health messaging that will be incorporated as a chapter in the Heat Guidebook
3. Production of heat-themed fact sheets based on demographic groups most at risk and examples of action being taken to adapt to heat. These will be included as appendices in the Heat Guidebook

# More information

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