

Climate Change in the Arctic Region: Sustainable Development, Social/Cultural and Health Issues

Peace and health 2007

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UIT

This Presentation.....

- 1. Sustainable development background
- 2. Climate change and health
- 3. Social and cultural disruption
- 4. Some conclusions

1. Sustainable Development Background

- “Each generation is entitled to the interest on the natural capital, but the principal should be handed on unimpaired.” *Canadian Commission on Conservation*, 1915
- “The capacity of the earth to produce vital renewable resources must be maintained and wherever practicable, restored or improved.” *UN Conference on Human Environments*, 1972
- **Our Common Future.** *Bruntland Commission*, 1987
- **UNCED and Agenda 21.** *Rio de Janeiro*, 1992, 2002

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1. Climate Change is a major SD issue...

Prediction: Global temperatures: 1° - 3.5° C greater

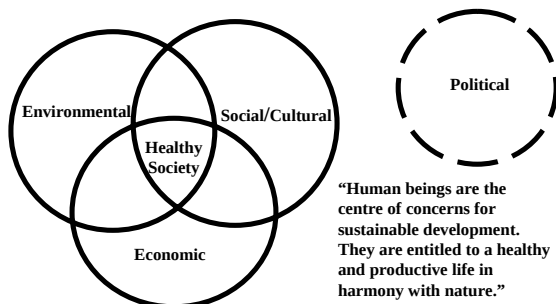
Evidence: Shrinking glaciers,
Reduced sea ice thickness,
Less permafrost,
Earlier plant flowering,
Bird/insect migration,
Animal population changes,
Increased desertification,
Disease reemergence, poorer air quality;
Increased variability in weather
Severe local ecosystem/social damage



Problem: Environmental, economic, social, cultural!

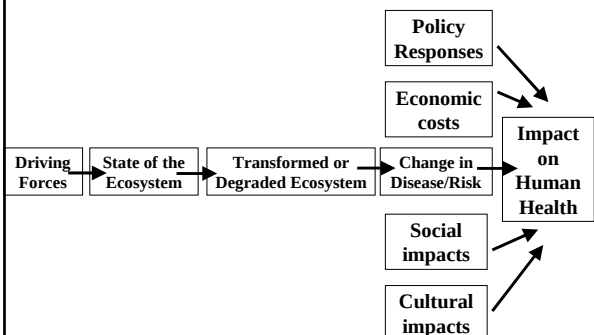
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1. A Sustainable Development Model



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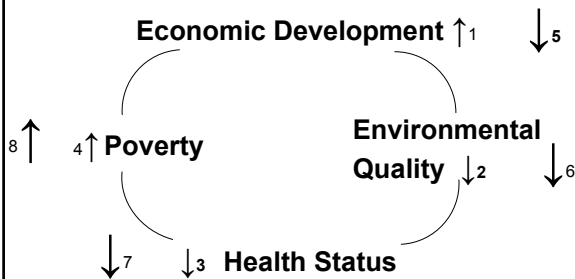
1. Human Health Impact Model



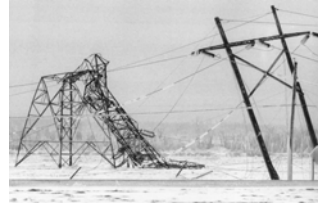
Adapted from UNEP model (June 2000)

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1. Dysfunctional development.... a fundamental relationship



1. Economic Costs: a single ice storm event (Eastern Canada, 1998) = \$5B



- infrastructure replacement, emergency mobilization response, farming losses, availability and disruption of services

- increased energy costs/pollution as hydroelectric potential decreases, increased taxation for utilities.



1. Arctic Climate Change and the Environment

- Climate change has caused rapid shifts in the marine ecosystem of the Bering Sea.
- Significant declines of sea lion, seal, fish and seabird populations have been observed, as well as the appearance of unusual species.
- The Arctic tundra has changed from a sink of CO₂ to a source.
- Resources systems in the Arctic are extensive but are vulnerable and fragile.

1. Impacts of doubling of current CO₂ levels in Arctic Canada (western, central)



- 50% loss of discontinuous permafrost, increase in thermokarst.
- 5^o-7^o C increase over land, 1^o-2^o C over water
- 25% increase in precipitation
- 65% reduction of taiga/tundra ecosystems

- northward shift of fish/mammals, some extinctions, sea level rise of 30-50 cm.



2. Health Impacts of Climate Change

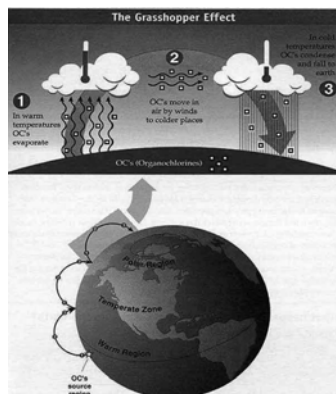
- Injuries related to travel hazard
- Illness related to sanitation issues
- Diet changes due to changes in traditional food
- Stress due to threats to village sites
- Increase in frequency of zoonotic disease, emergence of new diseases
- Increased movement of contaminants to the circumpolar north

2. Contaminants and Health

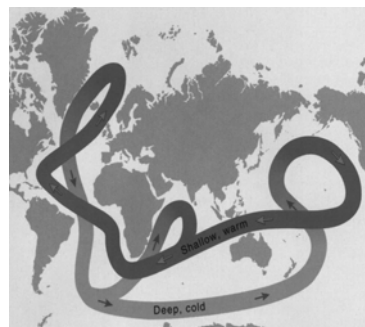
- **Contaminants:** Existing POPs and metals and emerging contaminants (mostly POPs) can affect health (toxicology and epidemiology data)
- **Groups at risk:** Fetus, child, pregnant women and women of child bearing age are most affected
- **Prenatal concerns:** Developmental biology is critical (neurological and hormonal, windows of gestation)
- **Post neonatal concerns:** Neurological, immune, reproductive, cancer, cardiovascular

2. THE GRASSHOPPER EFFECT ... Contaminants are not stationary

CACAR, 1997



2. ARCTIC INFLUENCE ON OCEAN CIRCULATION



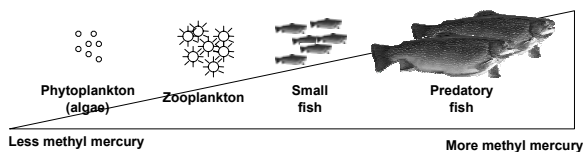
The polar front influences global ocean currents

The Arctic plays a fundamental role in circulation of water in the oceans of the world. When warm, salty North Atlantic water reaches the cold Arctic around Greenland and Iceland and in the Labrador Sea, it becomes denser as it cools, and therefore sinks to deeper layers of the ocean. This process of forming deep water is slow, but takes place over a huge area. Every winter, several million cubic kilometers of water sink to deeper layers, which move water slowly south along the bottom of the Atlantic Ocean.

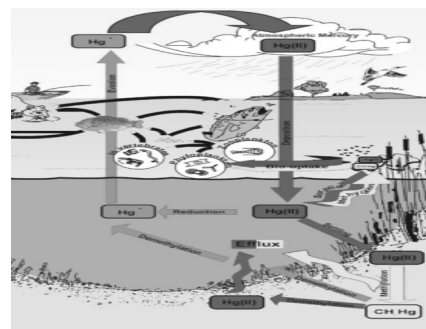
2. POPs and organo-metals are persistent

Bioconcentration, bioaccumulation, and biomagnification occur in the food chain.

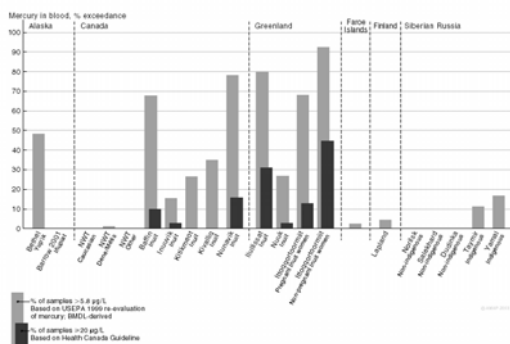
In the aquatic ecosystem...biomagnification from water to birds, mammals, humans is > 1,000,000.



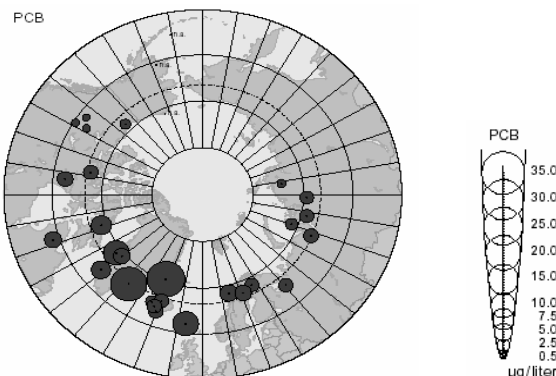
2. Interactions are complex (e.g., mercury) and climate change may increase fluxes



2. Risk Exposure Comparisons (Circumpolar Hg Guideline Exceedences)



2. Regional PCB survey in 8 Arctic countries Maternal blood values in ppb (AMAP, 2003)



2. Human Health and Built Environments at risk

- Sanitation infrastructure
- Transportation infrastructure
- Housing



2. Climate Change Impact Mechanisms

- Melting permafrost
- Rising Sea Levels
- Drought or Heavy Storms
- Increased Severity and Frequency of Coastal or River Flooding
- Coastal and Riverbank Erosion



Shishmaref, Alaska: A Community Impacted by Climate Change

- Accelerated Coastal Erosion
- Potential Water Source Contamination
- Destruction of Structures
- Costs to Move Homes
- Destruction of Roads



3. Social/Cultural Adaptation

- There are many examples of successful native adaptations to climate change across the Arctic, both in pre-history and in modern times, e.g., Canadian translocations in the 1950's.
- Subsistence harvesting of fish and game is critical to indigenous communities throughout the Arctic. Climate change is likely to have significant impacts on availability of key marine and terrestrial species.

3. Social impacts of Contaminants

- Developing fetus and children!
- Youth (developmental anomalies, depression, suicide, risk taking behavior in males, IQ potential.
- Tails effect of a drop in 4 I.Q. points.

3. Social/Cultural Impacts

- loss of traditional lifestyle (hunting/fishing/sharing/transportation) and traditional lands (communities, sacred lands)
- immigration and emigration due to tourism, jobs, education
- acceptance of ethnic groups and economic refugees
- loss of cultural identity
- Increased imbalance in 'haves' and 'have-nots', geopolitical attention.

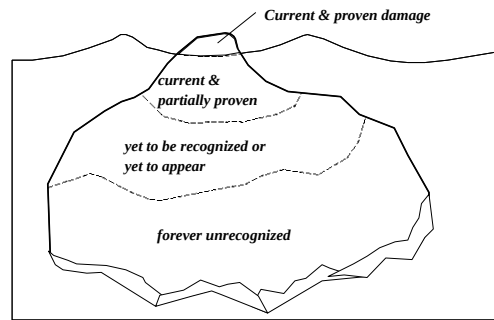


3. Social/Cultural Equity

- Women frequently most informed in communities and responsible for family health, wealth, nutrition, nurture/safety, organization at home and in the community
- Women disproportionately affected by impacts from contaminants, social and cultural change (poor jobs, education, esteem, domestic violence, etc.)



4. Conclusions: Tip of the Iceberg



(BHW A.05c)

4. Addressing the Climate Change Challenge

Global Action

The Challenge for each of us:

- to ensure the science, the messaging and the response is optimal;
- to ensure we build capacity outside the developed world now.

4. Recommendations

- Identify/prioritize communities with greatest infrastructure risk
- Create new/updated planning documents for protection of existing structures & construction of new structures
- Create monitoring plan for diseases in subsistence species that can be carried out by villages, with regional corporation & agency collaboration
- Create community based environmental monitoring network, with climate, permafrost, ice, & ecological observations

4. “The challenge is not whether to grow but how to develop”

Canadian Choices for Transitions to Sustainability, 1994



What you do will determine the quality of the future...how will you respond?