Global Climate Change: Public Health Perspectives

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Planning for Lower Carbon Economies: Finding best measures for adapting to climate change; some key research perspectives

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Objectives …

To provide a sense of

- some of the likely or known public health effects of climate change as but one of many of the dangerous ecological changes underway
- how these are currently being studied or tracked
- what measures or initiatives are being taken to bring home to governments and the public the prospects at hand

To discuss the consequences of global ecological and climate change for human health and the sustainability of life on Earth
This presentation is compiled in a Western tradition. I regret not being equipped to inject an Eastern influence. However, the examples used here may be of great relevance elsewhere.

Epidemiology

The study of the distribution and determinants of disease in populations and its application to the control of health problems

Our focus is on preventing harms to populations (morbidity; premature mortality; and well-being)
Our job is to inform policy with a view to reducing harms by preventing disease and premature mortality at the community level.

How can we more effectively deliver on this obligation under global ecological change, including climate change?
On October 12, 2007

 Announcement of

 Al Gore and

 UN – IPCC

 as Nobel Peace Prize winners
Yet, …

While praiseworthy and highly significant, this award hijacks the “global change” agenda by causing us to focus too narrowly on climate change.

“Climate change” is only one part of “global change”

“Global change” is much bigger …
Contemporary global-scale issues with major human health implications

- **Global geo-climatic system changes** (e.g., global warming, sea level rise, ocean acidification); CO2 levels continue to rise
- **Population growth** with rapid urbanization and the development of mega-cities; Mass forced and voluntary migrations
- **Expansion of consumption-intensive lifestyles** (e.g., into China and India, each with 1B + populations)
- **Increasing global and within-country disparities**
- **Fresh water declines everywhere**
- **Resurgence of old diseases and emergence of new** (e.g., malaria and tuberculosis, HIV/AIDS, SARS)
- **Species extinctions**
- **The growth-bound paradigm is entrenched**
Levels at which we operate

- **Micro lens** – *e.g., physician-patient*
  - On the ground … (advocate for patients)

- **Meso lens** – *e.g., community*
  - From an elevation of about 100 meters
    (advocate for communities)

- **Macro lens** – *e.g., country/world*
  - From an elevation of about 10,000 meters
    (advocate for global health and well-being)
Why should epidemiologists and public health researchers and practitioners be concerned with matters of a global nature?
Traditional Public Health Domain

- Sanitation
- Water Quality
- Food Safety
- Air Quality

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- Vaccination programs
New Concerns of Public Health

As we tamper with the very fabric of life through expansion of the human enterprise, Nature’s Services are changed; these services we take for granted and assume free-of-charge in their support of life.

The effect is a net negative, with global impacts such as climate change, declines in air, water and soil quality, as well as food security issues.
Climate change may worsen health woes

Reuters
GENEVA

Climate change stands to exacerbate health crises in many countries already strained by inadequate hospitals, too few medical staff and uneven access to drugs, the head of the World Health Organization said on Monday.

WHO Director-General Margaret Chan said that new patterns of global rainfall, droughts and storms could accelerate the spread of diseases such as malaria and dengue fever in some regions, creating serious problems for poor nations.

"The climate change-sensitive diseases and conditions are already creating huge burdens in many countries. The impact of climate change can act as an amplifier," she told a news conference in Geneva, where the United Nations agency is based.

Confronting the health challenges from global warming will require concerted efforts to forecast changing weather patterns, fight mosquitoes and other disease-spreading bugs, distribute vaccinations and boost medical coverage, Chan said.

"We need to help countries develop their already-weak health systems so that they are better prepared for whatever may come," she said.

Emissions of heat-trapping carbon gases, mainly from burning fossil fuels in factories and cars, are rising sharply despite growing international attention to the risks of global warming.

The WHO warned that environmental shifts such as droughts, floods, heat waves and hurricanes could cause waterborne and parasitic blights, such as cholera and lyme disease, to spread to new areas.
The past 25 years have seen an ~50% reduction in biodiversity as measured by INDEPENDENTLY-DERIVED indicators.

**INDEX OF BIOTIC INTEGRITY**: James Karr, University of Washington, from his study of streams

**MEASURE OF MEAN FUNCTIONAL INTEGRITY**: Orie Loucks, University of Miami, from his study of soils and forests

**WWF**: 16 markers

**ECOLOGICAL FOOTPRINT**: William Rees
Changing Landscapes

- Expanding reach …
- Accelerating rates …
- Changing habitats …
- With this, shall we anticipate changes to public health practice?
- What, if any, is the role of Environmental Epidemiology, and other specialists?
- And, Environmental/Bio-Ethics?
- And Law?
For how long can human health be sustained while continuing to draw down ecological capital? while declines in ecological integrity accelerate?

Only One World  >>  Planet Earth
Changing habitats and IDs

Niches, pathogens and immunity
Redistribution of basal cell carcinoma is an environmental health indicator
Redistribution of malaria is an environmental health indicator.
Environmentally speaking, the world is a seamless web: what goes around comes around ...
Five Stages of Grief


- **Denial**: It can't be happening!
- **Anger**: Why me? It's not fair!
- **Bargaining**: Just let me live to see my children graduate!
- **Depression**: I'm so sad, why bother with anything?
- **Acceptance**: It's going to be OK!

Laying blame: it’s someone else’s fault
Be aware of forces at play that influence both science and policy.

... Great vigilance and personal integrity are required to change course.
David Michaels’ work

“Doubt is Their Product: How Industry’s Assault on Science Threatens Your Health”

OUP, 2008

The policy-maker’s conundrum

the fomentation of uncertainty by vested interests. By increasing uncertainty, the policy-maker’s ability to implement health policy is made all the more difficult
7

NORTHERN HEMISPHERE

Data from thermometers (red) and from tree rings, corals, ice cores and historical records (blue).
Ethical dimensions of global climate change

November 6, 2007 (Courtesy J. Patz) -- Cartograms
China, India attack Western climate ‘hypocrites’

Daily Telegraph
BEIJING, NEW DELHI

China is insisting that rich countries commit to large cuts in emissions of greenhouse gases, while declining to put a ceiling on its own levels.

Four months before the Copenhagen negotiations, which aim to produce a successor to the Kyoto treaty, China’s chief climate change negotiator confirmed that the world’s leading polluter was holding out for developed countries to reduce emissions by 40 per cent by 2020 from 1990 levels.

“We have all along believed that due to the historical responsibility of the developed nations, they must continue to take the lead with large reductions beyond 2012,” said Yu Qingtai.

While China has developed green energy industries, it has also resisted any regulations that would dampen growth. It is not required to set emission targets since its per-capita rate is still far lower than those in Western countries.

Meanwhile, India’s climate change envoy said Wednesday that “hypocritical” Western countries must sacrifice some luxuries before asking developing countries to cut their greenhouse gas emissions.

Shyam Saran said the country would not take any measures that could restrict its growth. Instead, he said it would fund developments to reduce carbon emissions, increase green power generation and improve energy efficiency.

He added that any further measures demanded by developed countries would be taken only if full funding and technological support were provided.

Saran said his government planned to bring electricity to remote villages by transforming agricultural waste into power. But he said the government would not yield to pressure from the “hypocritical” West.

“No one is prepared to touch their living standards,” he said. “If Europe or the US increased fuel prices by $1 a litre, it would make a substantial change in private transport, a major source of emissions.”
BC/Yukon
Sea level rise - 30-50cm by 2050
Coastal flooding, sedimentation
Increased snowfall
Thawing permafrost, glacier retreat
More severe spring floods
S. coast and interior, summer drought

Arctic
Dramatic warming over most of Arctic, modest cooling of far east.
25% increase precipitation
Loss of permafrost, up to 2m retreat
Wildlife range shift 150km N per degree warming
N. hemisphere sea-ice decreasing.
Antarctic ice no change
40% decrease in Arctic sea-ice thickness in late summer 1976 and mid 1990's.

Prairies
Hotter, drier
Increased severity and length of drought
Decreased crop yield (10-30%)
Increased need for irrigation
Loss of wetlands

Ontario
3-6°C avg warming -
Increased heat stress, air pollution
Increased severity and length of drought
Increased risk of forest fires
Declines in Great Lakes levels

Atlantic
Increased sea-level, flooding
Reduced sea/river ice
Changed fish ranges

Quebec
Warming by 1-4°C (South)
Increased precipitation by to 2-6°C (North)
Lower water levels in St. Lawrence R.
Longer growing season
Increased risk of forest fires
Increased risk of forest fires

Slight COOLING trend in the North Atlantic
Adaptation → coping and adjusting to the ecosystem changes that are taking and will continue to unfold.

Mitigation → taking seriously (avoiding) the human influences in the damage that we cause to ecosystems with a view to lessening the severity, frequency and unpredictability of changes in future climate cycles.
So, what can the public health sciences contribute to this discussion?

*Prevent* major harms to human health, well-being, and function; and the possible extinctions of sizeable communities

*Capacity* to buffer ourselves
Eco-epidemiology is a sub-specialty of epidemiology, focusing on the relationships between human health and the dynamics of global ecological change.
Traditional Health Indicators

- Life Expectancy
- Percent Low Birth Weight Babies
- Infant Mortality

- Intuitively linkable to measures of ecological degradation, but no association was found (Sieswerda et al., 2001)

- Wealth is the buffer

So, what happens to those who live in poverty without the buffer of wealth?
The Alberta GPI Indicators for Economic, Personal-Societal and Environmental Well-being - *Redefining Progress*, San Francisco; *Mark Anielski, Edmonton*

<table>
<thead>
<tr>
<th>Economic</th>
<th>Personal-Societal</th>
<th>Environmental</th>
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<tbody>
<tr>
<td>Economic growth</td>
<td>Poverty</td>
<td>Oil and gas reserve life</td>
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<td>Economic diversity</td>
<td>Income distribution</td>
<td>Oilsands reserve life</td>
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<td>Trade</td>
<td>Unemployment</td>
<td>Energy use intensity</td>
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<td>Disposable income</td>
<td>Underemployment</td>
<td>Agricultural sustainability</td>
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<td>Weekly wage rate</td>
<td>Paid work time</td>
<td>Timber sustainability</td>
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<td>Personal expenditures</td>
<td>Household work</td>
<td>Forest fragmentation</td>
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<td>Transportation expenditures</td>
<td>Parenting and eldercare</td>
<td>Parks and wilderness</td>
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<td>Taxes</td>
<td>Free time</td>
<td>Fish and wildlife</td>
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<td>Savings rate</td>
<td>Volunteerism</td>
<td>Wetlands</td>
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<td>Household debt</td>
<td>Commuting time</td>
<td>Peatlands</td>
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<td>Public infrastructure</td>
<td>Life expectancy</td>
<td>Water quality</td>
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<td>Household infrastructure</td>
<td>Premature mortality</td>
<td>Air quality-related emissions</td>
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<td></td>
<td>Infant mortality</td>
<td>Greenhouse gas emissions</td>
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<td>Obesity</td>
<td>Carbon budget deficit</td>
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<td>Suicide</td>
<td>Hazardous waste</td>
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<td>Drug use (youth)</td>
<td>Landfill waste</td>
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<td>Auto crashes</td>
<td>Ecological footprint</td>
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<td>Divorce (family breakdown)</td>
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<td>Crime</td>
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<td>Problem gambling</td>
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<td>Voter participation</td>
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<td>Educational attainment</td>
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The Alberta GPI Well-being Index versus Alberta GDP Index, 1961 to 1999

Source: Alberta GPI Accounts 1961-1999
Principles (from bioethics)

- Respect personal autonomy
  - Fidelity and veracity
- Do good (Beneficence)
- Do no harm (Non-Maleficence)
- Social and distributive justice
  - Equity in the distribution of benefits and risks of research and policy
- Integrity in research
Primary Principles in Public Health

Protect the most vulnerable in society (e.g., unborn, children, Inuit, frail elderly)

Involve communities in our research (ensure community relevance of our work)

Integrity in Public Health
  Serve the public health interest above any other interest
The principle of SOLIDARITY

- What goes around, comes around in our world that, environmentally, is a seamless web

- “Made in Canada”, “Made in Alberta” and “Voluntary compliance” are counter to this principle

- Too much self-interest ...
  - The fox guarding the hen house ...
The FUNDAMENTAL PRINCIPLES of BIOETHICS include (under Non-maleficence and Respect for Autonomy)

**PRECAUTIONARY PRINCIPLE**

where there is a risk from a certain agent, the presence of uncertainty shall not be used as a reason for postponing cost-effective measures to prevent such exposure

**POST-CAUTIONARY PRINCIPLE**

When we have missed the opportunity for precautionary action - as with climate change, we must plan for adaptation to prevent inevitable harms consequent to climate change  
(Lisa Heinzerling, Georgetown University, 2007)
The FUNDAMENTAL PRINCIPLES of BIOETHICS include (under Justice and Non-maleficence):

THE SEVENTH GENERATION PRINCIPLE

Consider consequences seven generations hence
What are the most promising solutions to these problems?
Anthropocentrism and eco/biocentrism

- Reconnecting humans to their complete dependence on the ecosystems in which they live ...

- New approaches are needed to move us from our silo-based and compartmentalized approaches
✓ “The significant problems we face today, from our current patterns of thinking, cannot be solved by the same pattern of thinking which created them.” – A. Einstein

✓ “Inside the Box” vs. “Outside the Box”

✓ “Linear Reductionism” vs. “Complexity”


✓ “Band-Aid Solutions” vs. “Systemic Solutions”

✓ THE EARTH CHARTER as a vision
Reductionism: Pursuit of single causes along linear paths to explain a phenomenon

- or -

Systems Approaches/Wholism: Integrative, multi-, inter- and transdisciplinary approaches to explaining a phenomenon; embraces complexity
Transdisciplinary approaches to Human Health are approaches that integrate the natural, social and health sciences in a humanities context, and in so doing transcend each of their traditional boundaries. Emergent concepts and methods are the hallmark of the transdisciplinary effort.
Newtonian vs. Complexity Sciences

- **Dualism** vs. Complexity/Systemic approach
- **Reductionism** vs. Holism
- **Linear** vs. non-linear
- **Predictability** vs. unpredictability
- **Uncertainties**: *Reduced* vs. acknowledged
- **Deterministic** vs. non-deterministic
- **System equilibrium** vs. instability
Sustaining Life on Earth: Environmental and Human Health through Global Governance

SUSTAINING LIFE ON EARTH

ENVIRONMENTAL AND HUMAN HEALTH THROUGH GLOBAL GOVERNANCE
EDITED BY COLIN L. SOSKOLNE
What jurisdictions are at the forefront in addressing large-scale environmental health problems?
Grave Challenges
Individually & Collectively

OPPORTUNITY and HOPE:

1. The Earth Charter
2. Constitution and Bill of Rights
3. Teaching about Sustainability
4. Conventions and Treaties
5. Local Land Ethic (Indiana Dunes)
6. Websites that are global
The Earth Charter

A soft law instrument … to save us from ourselves

Preamble

- Respect and care for the community of life
- Ecological integrity
- Social and economic justice
- Democracy, non-violence, and peace

The Way Forward

http://www.earthcharter.org/

Accessible in 35 different languages
The Earth Charter

- Encourages interdisciplinary and transdisciplinary approaches to addressing complex social policy questions that also integrate health

Distinguish between Rights and Duties
24. Environment
Everyone has the right
(a) To an environment that is not harmful to their health and well-being; and
(b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that
   (i) prevent pollution and ecological degradation;
   (ii) promote conservation; and
   (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable social and economic development.
And more countries since mid-1990s

- Brazil, Columbia, Ecuador, Cuba, Andorra, Ukraine, France, India, China, Philippines, Papua New Guinea, Montenegro, Iraq, Kenya, Bhutan

- and others …
NEW Interdisciplinary Course
Energy and the Environment
INT D 561
Values, Ethics, and Sustainability

Semester: Fall 2008
Class Times: Thursdays 18:30—21:30 (Sept. 4 – Nov 27, 2008)
Location: 170 Education Centre South
Instructor: Colin Soskolne, School of Public Health

This highly interdisciplinary course will reveal the extent to
which “the system” is broken, how we have come to the
point of systems collapse, and how a major overhaul might
be managed. It will frame the issues and equip new gener-
ations of graduates with the means for changing course, from
a world destined to collapse under current business-as-
usual approaches, to a sustainable world for both present
and future generations. Students will gain an appreciation
for how values and ethics impinge on decisions that are
needed to reconnect humans to the ecosystems upon
which we depend for a sustainable future.

Pre-requisites: At least one relevant course in any of the sciences, humanities,
or engineering disciplines AND written permission of the course coordinator (at
colin.soskolne@ualberta.ca), based on a brief explanation of why you are
motivated enough to take this course. The course coordinator MAY waive the
course requirement component for those students who can justify a waiver
based on work or life experience.

School of Energy and the Environment (SEE)

For more information, please contact Professor Colin Soskolne at
colin.soskolne@ualberta.ca or visit the School of Energy and the
Environment website at www.see.ualberta.ca.
Home (1 hour and 33 minutes)

http://www.youtube.com/watch?v=jqxENMKaeCU
A two-week meeting of over 190 countries’ governments in Nagoya, Japan, **October 2010.**

At the opening session, the very last sentence of Achim Steiner (the head of the United Nations Environment Program) was that

“we must approach biodiversity conservation from an ethical point of view” ...
An historic deal to halt the mass extinction of species was finally agreed last night in what conservationists see as the most important international treaty aimed at preventing the collapse of the world's wildlife. *London Independent, United Kingdom*

http://www.independent.co.uk/environment/nature/countries-join-forces-to-save-life-on-earth-2120487.html

*October, 2010*
The Challenges are to

- Influence values for sustainability
- Instill new ethical norms for sustainable behaviour in:
  - Individuals
  - Organizations (NGOs, professional societies, etc)
  - Institutions (financial, schools, universities, etc)
  - Corporations
  - Governments (local, national, supranational)
- Influence law and its enforcement
- Reduce & embrace scientific uncertainties
Questions?