Eco-Epidemiology: 
Connecting Ecosystem Health to Human Health

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WEBINAR
Canadian Society for Epidemiology and Biostatistics
First delivered on November 29, 2010
Updated and recorded on December 4, 2012
Questions to ponder prior to the Webinar

Are we as humans utterly dependent on the ecosystems in which we live (and, indeed, on the biosphere) for our health, well-being, and survival?

What do we mean by moral integrity? By structural integrity? By scientific integrity? By ecological integrity? And, by biological integrity?

What is our role as professionals, and as citizens of the world, in relation to conservation and sustainability?
Learning objectives (over 1.5 hours)

- Understand the link between ecological systems and human health by examining indicators that point to declines in ecological integrity, locally and globally.

- Identify ways in which eco-epidemiology can be applied for understanding the dynamics between ecosystem change and human health.

- Recognize the strengths and limitations of the eco-epidemiological approach for informing policy at the primordial prevention level by opening our minds.
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)
  - **Primordial prevention**
  - **Primary prevention** … avoid exposure
  - **Secondary prevention** … early detection
  - **Tertiary prevention** … restore best quality possible
Epidemiology is the science that is basic to rational (evidence-based) public health policy formulation

→ We bridge toxicologically demonstrated evidence with policy by examining the human evidence for what is found in research on animals
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?*

• *And, under expanding global and local disparities/inequalities?*
Traditional Public Health Domain

- Sanitation
- Water Quality
- Food Safety
- Air Quality
- Vaccination programs
Threshold health effect in a hypothetical time-trend study of a communicable disease

- Population exposed to an emergent pathogen
- Brief incubation period (sub-clinical disease)
- Negative health impacts
- Intervention

(time (days))
Non-threshold health effect in a hypothetical time-trend study of a chronic disease

disease incidence

increasing incidence over time

time (years)
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.
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 metres
    (advocate for communities)

- **Macro lens** — *e.g., country/world*
  - From an elevation of about 10,000 metres
    (advocate for global health and well-being)
Minimal **uncertainty** about global change, and pretty much certainty for the following selected indicators:
Contemporary global-scale issues with major human health implications

- Global geo-climatic system changes (e.g., global warming, sea level ↑, ocean acidification); Permafrost melting with releases of Methane (CH₄) and CO₂ levels continuing to ↑
- Population growth; rapid urbanization; development of mega-cities; Mass forced and voluntary migrations
- Expansion of consumption-intensive lifestyles (e.g., into China and India, each with 1B + populations)
- Over-fishing of the oceans; fish stock imbalances
- ↑ global & within-country disparities; ↑ social dis-ease
- Fresh water declines everywhere
- Resurgence of old diseases and emergence of new (e.g., malaria and tuberculosis, HIV/AIDS, SARS)
- Species extinctions; the loss of biodiversity
- Growth-bound paradigm is entrenched; consume & waste
- Global debt/money crisis; the threat of economic collapse
INTEGRITY ...

- Moral integrity: **People**
- Structural integrity: **Buildings**
- Scientific integrity: **Rigour and impartiality**
- Ecological integrity: **Environment-system functions**
- Biological integrity: **Life at the cellular level**
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.
Comparing average consumption

**Ecological Footprint (EF) (ha/person)**

<table>
<thead>
<tr>
<th>Country</th>
<th>1991</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>5.1</td>
<td>9.5</td>
</tr>
<tr>
<td>Canada</td>
<td>4.3</td>
<td>6.5</td>
</tr>
<tr>
<td>India</td>
<td>0.4</td>
<td>0.8</td>
</tr>
<tr>
<td>World</td>
<td>1.8</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Footprints are rising with rising energy and material consumption, even in the richest and most efficient countries, and fastest in the fastest growing countries, like China and India. The 2006 Living Planet Report shows the rising global EF since 1960, recognizing that the earlier years have wider margins of error.

**Sources:** Wackernagel & Rees. *Our Ecological Footprint* 1996; and the 2006 Living Planet Report
Five Stages of Grief
Elizabeth Kübler-Ross, 1969 “On Death and Dying”

- **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
Impact (or “Integrity”) = f(Population*Affluence*Technology)

*Ehrlich& Holdren, 1971*

Stresses the interdependence of forces which often are treated independently as needs for “population control,” “reduced consumption,” or “green technologies”. Helps in making our values and assumptions transparent.

The interplay of all determinants is critical for their recognition, investigation, and in formulating policy.
“INTEGRITY” EQUALS “POPULATION” TIMES “AFFLUENCE” TIMES “TECHNOLOGY”

*Ehrlich's & Holdren, 1971*

- Exposes bias and self-interest when “North” blames “South”, and vice versa
- We must recognize our collective interest on this fragile planet and, whether we are “North” or “South”, we all have to change our ways in rather profound ways if our goal is “sustainability”
- Else, it is like rearranging the deck chairs on the Titanic as we approach the iceberg that causes us to sink
Hey, you up at the front! Stop breeding!
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.”
Life boat ethics, leading to gated communities and fortress nations as disparities continue to widen and we become increasingly polarized.
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 Eco- and Environmental Epidemiology, and other specialists?
- And, Environmental/Bio-Ethics?
- And Law?
Why should epidemiologists, all professions and, indeed, all people be concerned with matters of a global nature?

→ *Prevent harms on a massive scale*

→ *The Right to Life for both present and future generations*
Eco-epidemiology is a sub-specialty of epidemiology, focusing on the relationships between human health and the dynamics of global ecological change.
Threshold health effect in a hypothetical time-trend study, superimposed on an idealized relationship between ecological disintegrity and a sensitive health indicator.
Since 1996, they have spoken of the differentiation needed from the dominant paradigm for addressing risk factor epidemiology … *embracing higher-level determinants in a world of complexity*
Primordial Prevention: 

Eco-epidemiology’s domain …

Policy shifts for:

- Health Benefits

- Present and Future Generations

HOW BEST TO INFORM SUCH POLICIES?
Not necessarily
“Ecological study designs”
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>
</tr>
<tr>
<td>Economic diversity</td>
<td>Income distribution</td>
<td>Oilsands reserve life</td>
</tr>
<tr>
<td>Trade</td>
<td>Unemployment</td>
<td>Energy use intensity</td>
</tr>
<tr>
<td>Disposable income</td>
<td>Underemployment</td>
<td>Agricultural sustainability</td>
</tr>
<tr>
<td>Weekly wage rate</td>
<td>Paid work time</td>
<td>Timber sustainability</td>
</tr>
<tr>
<td>Personal expenditures</td>
<td>Household work</td>
<td>Forest fragmentation</td>
</tr>
<tr>
<td>Transportation expenditures</td>
<td>Parenting and eldercare</td>
<td>Parks and wilderness</td>
</tr>
<tr>
<td>Taxes</td>
<td>Free time</td>
<td>Fish and wildlife</td>
</tr>
<tr>
<td>Savings rate</td>
<td>Volunteerism</td>
<td>Wetlands</td>
</tr>
<tr>
<td>Household debt</td>
<td>Commuting time</td>
<td>Peatlands</td>
</tr>
<tr>
<td>Public infrastructure</td>
<td>Life expectancy</td>
<td>Water quality</td>
</tr>
<tr>
<td>Household infrastructure</td>
<td>Premature mortality</td>
<td>Air quality-related emissions</td>
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<tr>
<td></td>
<td>Infant mortality</td>
<td>Greenhouse gas emissions</td>
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<tr>
<td></td>
<td>Obesity</td>
<td>Carbon budget deficit</td>
</tr>
<tr>
<td></td>
<td>Suicide</td>
<td>Hazardous waste</td>
</tr>
<tr>
<td></td>
<td>Drug use (youth)</td>
<td>Landfill waste</td>
</tr>
<tr>
<td></td>
<td>Auto crashes</td>
<td>Ecological footprint</td>
</tr>
<tr>
<td></td>
<td>Divorce (family breakdown)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crime</td>
<td></td>
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<tr>
<td></td>
<td>Problem gambling</td>
<td></td>
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<tr>
<td></td>
<td>Voter participation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Educational attainment</td>
<td></td>
</tr>
</tbody>
</table>
The Alberta GPI Well-being Index versus Alberta GDP Index, 1961 to 1999

Source: Alberta GPI Accounts 1961-1999
Other eco-epi attempts

- Sieswerda, Soskolne et al. *Epidemiology* 2001
- Hitt and Hendryx. *EcoHealth*; April, 2010
Other authors of note bridging ecosystem change and health

- **McMichael**: *Planetary Overload*, 1993; *Human Frontiers, Env & Disease* … CUP, 2001
- **Aron and Patz**: *Ecosystem Change and Public Health*, 2001
- **Butler**: Many published papers, editorials and thought pieces
- **Rotman, Martens and Huynen**: *International Centre for Integrated Assessment and Sustainable Development*, Maastricht, The Netherlands
What goes into formulating an hypothesis?

Many factors!
Definitions and concepts to “open our minds”

- **BRAIN-WASHED**: Indoctrination by propaganda
- **DOGMA**: Something held as authoritative without substantiation
- **ENTITLEMENT**: A right to benefits
- **HUMILITY vs. ARROGANCE**
- **HYPOCRITE**: Putting on a false appearance of virtue or religion, or Not WALKING THE TALK: Not Doing what we preach
- **LIVE, SPEND, AND CONSUME AS IF THERE IS NO TOMORROW**: A self-fulfilling prophesy?
- **MANIPULATION**: To control for one’s own advantage
✓ The MILITARY-INDUSTRIAL-ACADEMIC COMPLEX: An alliance that influences government policy

✓ MYTH: An unfounded or false notion

✓ PARADIGM: A framework used to describe reality

✓ SELF-INTEREST: Concern for one’s own advantage

✓ SOCIOPATHS: Con artists who sway the exploitable with no regard to their rights in pursuit of power (psychopaths)

✓ DELUSIONAL: Believing strongly despite superior evidence to the contrary
Is science value-free?

OR

Is science value-neutral?

**Answer:** Science strives to be value-free and impartial, but the instrument of science (the scientist) cannot be value-free …
Libertarian Values

... in the USA

The individual’s right to “life, liberty and the pursuit of happiness”

Declaration of Independence

Benjamin Franklin, Thomas Jefferson,

... John Locke (1776)
Egalitarian Values

... in France

Liberty, Equality, and Fraternity

“If they cannot afford to eat bread, let them eat cake”

Louis XVI and Marie Antoinette
The French Revolution (1789-1792)
Communitarian values
... in Canada

Greater focus on community through “Peace, order and good government”

Constitution Act
“Fathers of Confederation” (1867)
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
Further principles that apply

- Precautionary Principle
- Post-Cautionary Principle
- Environmental Justice
- The Polluter Pays
- The Seventh Generation Principle
The principle of SOLIDARITY

This requires concerted action, especially on matters of a global nature. Why is it needed?

- 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 …
Be aware of forces at play that influence both science and policy.

... Great vigilance and personal integrity are required to change course.
The ‘Four D’s’ - Institutional

Applied to scientists studying that which does not support the *status quo*:

- **Deny** – blame the victim
- **Delay** – maintain the status quo
- **Divide** – create uncertainty, foment dissent
- **Discredit** – undermine your credibility

[ Dismiss ] [ Death – Meryl Streep in the movie Silkwood]
Fomenting uncertainty by vested interests ...

- D. Michaels, *Doubt is their Product, 2008* (Oxford University Press)


- By increasing uncertainty, the policy-maker’s ability to implement health policy is made all the more difficult …

→ *subversion and ambushing of science*
“Industry’s offensive against the regulation of health and safety hazards uses academics to downplay or deny the seriousness of the hazards...”

Clayson and Halpern
J. of Public Health Policy
September, 1983
TEFLON?... LINKED TO BIRTH DEFECTS?

DON'T WORRY, THE ACCUSATION WON'T STICK.
Climate change questioned in schools mailout

U.S. think-tank says it's trying to inject 'balance' by sending out 11,000 brochures and DVDs

Mike De Souza
Canwest News Service
Ottawa

An American think-tank has sent out more than 11,000 brochures and DVDs to Canadian schools urging them to teach their students that scientists are exaggerating how human activity is the driving force behind global warming.

The Chicago-based Heartland Institute said its goal is to ensure that students are provided with a "balanced" education about "an important and controversial issue," but critics, including a leading climate scientist, described it as a campaign of misinformation.

The mailout, sent in February, included results from international surveys of climate scientists conducted in 1996 and 2003, along with a 10-minute DVD called Unstoppable Solar Cycles, The Real Story of Greenland.

"It took me a while to figure out what they were up to," said Eric Betteridge, who teaches at Hillcrest High School in Ottawa.

The Heartland Institute says that it purchased a database list of addresses of 11,250 schools from across the country, including about 10,000 private or faith-based schools, for a massive mail campaign aimed at Canadian children in all provinces.

"All the kids in our school are being taught that climate change is a serious crisis and that we've got to reduce our CO2 and they're being taught that quite falsely," said Jay Lehr, the science director at the Heartland Institute who sent the package.

"We would like to educate people and basically give them the other side of the issue, so we send out materials only in hope of a little balance."

The Sierra Club of Canada said that the Heartland Institute's information was far from being balanced.

"It's alarming that an American think-tank is distributing misinformation on the most important issue of our time in Canadian schools, to actually create an illusion that there is a scientific debate," said Emilie Moorhouse, a spokeswoman for the environmental group.

The Heartland Institute describes itself as a national non-profit research and education organization whose mission is "to discover, develop, and promote free-market solutions to social and economic problems."

The brochure and DVD said that scientists were "deeply divided" about "the notion that climate change is mostly the result of human activities." It also suggested that the sun was the main factor behind recent warming recorded on the planet.

The package does not make reference to the conclusions reached by governments and scientists from around the world in their 2007 assessment of the latest peer-reviewed research on climate change.

The Intergovernmental Panel on Climate Change wrote that global warming is unequivocal and that there is a 90-per-cent chance it is being caused by humans.

After reviewing the Heartland Institute package, Betteridge said he was left feeling both amused and distressed that someone would try to promote this material to children in the classroom.

"I think I would be concerned because it was well written," he said.

The Heartland Institute has received $791,000 in funding from Exxon-Mobil since 1998, according to a recent analysis by Greenpeace USA.
✓ “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”
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.
**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
“Environmental Policy under Conditions of Complexity”

Newtonian vs. Complexity Paradigms

- Reductionism vs. Holism
- Predictability vs. unpredictability
- Linear vs. non-linear
- Uncertainties acknowledged
- Deterministic vs. non-deterministic
- System equilibrium vs. instability
Toolkit – a list of 8 tools

- Integrated Assessment
- Integrated Scenario Analysis
- Participatory methods
- Ecological Footprint Analysis (EFA) and Disaggregated EFA
- The DPSEEA model
- Product Life-Cycle Analysis (PLCA)
- I=PAT
- Kuznets curves
What are the most promising solutions to these problems?
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 to be more integrative in seeing how the parts are all connected …
Think globally …
Act locally

What are the cumulative consequences of local actions?
Grave Challenges

Individually & Collectively

BUT, OPPORTUNITY and HOPE:

1. The Earth Charter
2. Constitutions & Bills of Rights
3. Teaching about Sustainability
4. Local Land Ethic (Indiana Dunes)
5. The Localization Movement and Transition Towns
6. Websites that are global
e.g., www.thezeitgeistmovement.com
7. Pentagon, World Bank, and many reports warning about the threat of collapse
8. Foundations, NGOs: investing in paradigm change
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/
预防在焦点 –

为了支持所有生命及其相互依赖性

all
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

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 generations 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
2008: Lexington Books

SUSTAINING LIFE ON EARTH

ENVIRONMENTAL AND HUMAN HEALTH THROUGH GLOBAL GOVERNANCE
EDITED BY COLIN L. SOSKOLNE
Advance Praise …

“This book is a powerful attempt to prove that human intelligence, and the institutions it has created, possess power enough to blunt the force of our ecological destructiveness. It provides a light for the path, one that is badly needed.”

—Bill McKibben, author *Deep Economy*; and in “The Eleventh Hour” with Leonardo DiCaprio (2007)

—Bill McKibben, [WWW.350.ORG](http://WWW.350.ORG) (local actions)
Local Land Ethic

Indiana Dunes

http://www.humansandnature.org/
http://indianadunesethic.wikispaces.com/

Camrose, Alberta
(Augustana) next?
Websites

Edmonton and Area Land Trust
- http://www.ealt.ca/culture-connection/

V1 Newsletter: Promoting Spatial Design for a Sustainable Tomorrow
- http://www.vector1media.com/

Global Footprint Network (1.2 to 1.5 earths – overshoot)
Foundations, NGOs: investing in paradigm change. Here are some:

- Worldwatch Institute
- Earth Institute
- David Suzuki Foundation

And, many others …
Mainstream Institutions Seeing the Light

Pentagon, World Bank, and many reports warning about the threat of collapse

Of Climate and National Security, Nov 16, 2012
http://cen.acs.org/articles/90/i47/Climate-National-Security.html

WHO, UNDP, UNEP ...

Yet, where are our leaders?
And, beholden to whom?
Social Movements and Movies

❖ The Occupy Movement

❖ ZEITGEIST (spirit of the time)
  www.thezeitgeistmovement.com
  http://www.youtube.com/watch?v=4Z9WVZddH9w

❖ Journey of the Universe, 2011

❖ Home http://www.youtube.com/watch?v=jqxENMKaeCU
Mark Anielski, Genuine Wealth Inc (GPI and GWI work). The book: 
The Economics of Happiness

Helena Norberg-Hodge, Director of the International Society for Ecology and 
Culture (ISEC) and author of Ancient Futures. The movie: 
The Economics of Happiness
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” ...
Countries Join Forces to Save Life on Earth

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

*October, 2010*
You are encouraged to discuss what you have learned here with others.

Feel free to follow-up at:
colin.soskolne@ualberta.ca