Public Health in the Anthropocene

Colin L. Soskolne, PhD (Epidemiology)
Professor emeritus, University of Alberta, Edmonton, CANADA

URL: www.colinsoskolne.com (archive of PPT presentations)

Lecture initially prepared by Dr. Trevor Hancock
Professor and Senior Scholar
School of Public Health and Social Policy
University of Victoria, BC, Canada
and
Lead author and editor, Canadian Public Health Association (CPHA) report on the
Ecological Determinants of Health

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Outline

1. The Anthropocene
2. The ecological determinants of health
3. Key ecological changes underway
4. Human driving forces
5. Health and human development impacts
6. Imagination and hope
7. The public health agenda
1. The Anthropocene

- Our efforts to subdue nature have been so successful that the time in which we now live has been called the Anthropocene - it will show up in the geologic record
- Welcome to the Anthropocene!
Global change and public health – A Canadian Public Health Association (CPHA) project (2015)

- Document the potential health impacts of major global ecological changes
  - Climate and atmospheric change
  - Pollution and ecotoxicity
  - Resource depletion
  - Loss of species and biodiversity
- Identify the drivers of these changes
- Propose an action agenda for public health
Global Change and Public Health: Addressing the Ecological Determinants of Health

THE REPORT IN BRIEF

Available at https://www.cpha.ca/sites/default/files/assets/policy/edh-discussion_e.pdf
The Rockefeller Foundation–Lancet Commission on planetary health

Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health

Sarah Whitmee, Andy Haines, Chris Beyrer, Frederick Boltz, Anthony G Capon, Braulio Ferreira de Souza Dias, Alex Ezeh, Howard Frumkin, Peng Gong, Peter Head, Richard Horton, Georgina M Mace, Robert Marten, Samuel S Myers, Sania Nishtar, Steven A Osofsky, Subhrendu K Pattanayak, Montira J Pongsiri, Cristina Romanelli, Agnes Soucat, Jeanette Vega, Derek Yach
July 15, 2015

Sir Michael Marmot on the Social Determinants of Health

- https://www.youtube.com/watch?v=BHYBHKma3x8
2. The ecological determinants of health

- We have become so fixated on the social determinants of health that we have neglected the ecological determinants of health
  - *Population health has been ecologically blind*
The ecological determinants of health

We depend on ecosystems for the very stuff of life:

- Air
- Water
- Food
- Fuel and materials
- Protection from UV radiation
- Waste recycling and detoxification and
- A relatively stable and livable climate.

[Frogs in a beaker on a Bunsen Burner?]
3. Key ecological changes underway
Its more than climate change!

Global ecological change includes

- Climate and atmospheric change
- Resource depletion
- Pollution and ecotoxicity
- Loss of species and biodiversity
The state of planet Earth’s ecosystems

Nine Earth System Processes (Steffen et al, 2015)

• Climate Change
• Biospheric integrity
• Biogeochemical flows (Nitrogen & Phosphorus Cycle)
• Ozone Depletion
• Ocean acidification
• Global freshwater use
• Land-system change
• Novel entities*
• Atmospheric aerosol loading

* new substances, new forms of existing substances and modified life-forms that have the potential for unwanted geophysical and/or biological effects e.g. POPs, heavy metals, nano-particles, genetically engineered organisms
Crossing Planetary Boundaries (PBs)

- Genetic diversity = extinctions per million species-years (E/MSY)
- Functional diversity = Biodiversity Intactness Index (BII)

Novel entities = POPs, heavy metals, nano-particles etc

Steffen et al, 2015
Core boundaries

Two core boundaries - climate change and biosphere integrity - have been identified

- are highly integrated, emergent system-level phenomena
- connected to all of the other PBs
- each has the potential on its own to drive the Earth System into a new state should they be substantially and persistently transgressed

Steffen et al, 2015
The threat of ‘state shift’

- The various global ecological changes interact, so the totality of their impacts is greater than the sum of their parts. (MAHB, 2013)

- State shift - rapid non-linear change.

- An emergent property of many complex adaptive systems e.g.
  - the ‘Big Five’ mass extinctions in geological history,
  - the loss of Arctic sea ice
  - methane release from permafrost

Barnosky et al, 2012
Ecological footprint, 1961 - 2010

Figure 3: The Ecological Footprint components: the carbon component makes up more than half of the total global Ecological Footprint. (Global Footprint Network, 2014).

Key

- Carbon
- Fishing grounds
- Cropland
- Built-up land
- Forest products
- Grazing products

Living Planet Index 1970 - 2010

52% decline
- the number of mammals, birds, reptiles, amphibians and fish across the globe is, on average, about half the size it was 40 years ago.

Latin America shows the most dramatic decline – a fall of 83 per cent.

Source: WWF Living Planet Report 2014 Summary (p 8)
4. Human Driving Forces
The IPAT Equation: Impact = Population x Affluence x Technology

Ehrlich and Holdren (1971)

Societal & human forces driving change, 1900 – 2011
Impact over an 80 year lifespan

- 1% annual growth in population = 2.2x
- 3% annual growth in real GDP = 10.6x
- TOTAL OVER 80 YEARS = >23x

Even if our technology became 5 times more efficient, Impact is still >4x
There are Limits to Growth

“Troublingly, the original forecasts produced by the MIT group (*The Club of Rome*), which predicted a substantial collapse of the global ecosystem and economy during the mid-21st century period, appear to be on track forty years after they were generated.” (Turner, 2008)

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The **Business-As-Usual (BAU)** scenario “aligns well with historical data that has been updated in this paper” (Turner, 2014)
5. Health and Human Development Impacts
A limited understanding

- What we know about the health impacts of global ecological change is sketchy, preliminary, and often speculative.
- But these changes often interact, multiplying adverse effects and affecting the whole system. Thus knowledge of the health impacts has to reflect comprehension of overall system change and its health impacts.
“At the heart of this assessment is a stark warning. Human activity is putting such strain on the natural functions of Earth that the ability of the planet’s ecosystems to sustain future generations can no longer be taken for granted.”
Mortgaging the health of future generations

“we have been mortgaging the health of future generations to realise economic and development gains in the present. By unsustainably exploiting nature’s resources, human civilisation has flourished but now risks substantial health effects from the degradation of nature’s life support systems in the future.”

Rockefeller Foundation–Lancet Commission on Planetary Health
Our ultimate message

- The population health impacts of the ecological determinants of health are large, and comparable to the impact of the social determinants of health.
- The two interact and must be considered as a whole – we cannot continue to be ecologically blind.
6. Imagination and Hope

“Hope is . . . the commitment to positivity in the face of adversity”

Dutt and Brcic, 2014
"Hope is a state of mind, not of the world. Hope, in this deep and powerful sense, is not the same as joy that things are going well, or willingness to invest in enterprises that are obviously heading for success, but rather an ability to work for something because it is good, not just because it stands a chance to succeed. Hope is not the conviction that something will turn out well, but the certainty that something makes sense, regardless of how it turns out."

Messages of hope

1. The shift to a more ecologically sustainable society results in health gains from a healthier way of living.

2. We have successfully helped to create major societal shifts in favour of health before.

3. We are not alone; we have many potential partners.
4. For the most part we know what needs to be done, indeed we have known for a very long time.

5. We have made some progress, there are in fact many examples of people, organisations, businesses, communities, cities, even entire nations, who are doing the right things and setting an example.
Health co-benefits

All of the following have direct health co-benefits

- **Energy efficiency**
  - Air quality up (beware IAQ issues!)
  - Physical activity up
  - GHG emissions down

- **Public transport**
  - Fewer injuries, more exercise, fewer emissions, more social connections

- **Low meat diet**

- **Local economies**
  - Social connections
7. The public health agenda
Eco-social Model for Public Health Action

Ecological change

Social and economic change

Public health action

Population health
An expanded concept of public health ethics

- Adopt a combination of anthropocentrism and ecocentrism/biocentrism
- Incorporate inter-generational equity
- Recognize the right to a healthy environment
- Adopt the Principle of Environmental Justice
- Apply the Precautionary Principle

Two key mechanisms
- Apply comprehensive and integrated impact assessments
- Adopt the ‘Polluter Pays’ principle
A knowledge development and research strategy

- *Integrate* the EDH into our population health frameworks
- *Educate* public health professionals about the EDH
- *Monitor, assess and report* regularly on the EDH
- *Fund and support* research into the EDH
- *Request* the UN to establish a Commission on the Ecological Determinants of Health
Walk the talk: Environmentally responsible health care

• Expand our understanding of the ethical principle of *primum non nocere* – *first, do no harm* – embedded in the Hippocratic Oath

• include the obligation to do no harm to natural ecosystems and future generations
  ◦ Healthcare Without Harm
  ◦ Canadian Coalition for Green Health Care
Public health action

- Change social norms and values.
  - Change the focus of development and the way it is measured in both the public and private sectors, emphasizing human and social development and environmental sustainability as the new bottom line.
  - Challenge corporate power where it harms ecosystems, societies, communities and the health of the population
  - Change economic practices by supporting ethical purchasing and investment, boycotts and divestment.
• Protect people and communities from social and economic policies and practices that harm health or widen health inequity

  ◦ Seek ways to use public health legislation to investigate and report on the health threats of ecological change or those activities that contribute to it

    • e.g. a State-level report on the health impacts of fossil fuels or current and future (renewable) energy systems
Protect people and communities from adverse impacts of global ecological change.

- Explore in detail the dependence of the health care system upon and vulnerability to failure of essential infrastructure
- Reduce vulnerability and protect the vulnerable
- Increase resilience and adaptation
• Establish policies and practices that create more ecologically sustainable and healthier societies and communities

• The Earth Charter complements these proposed Public Health actions and can guide us in achieving them
DISCUSSION

www.colinsoskolne.com

colin.soskolne@ualberta.ca