Health and health care in a One Planet Region

Conversations for a One Planet Region
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Outline

1. Thinking about health and health care
2. Health in the Anthropocene
3. Health care in the Anthropocene
4. Healthier alternatives
5. A health care system for a One Planet Region

A word about words

- Health v illness
- Medicine v health
- Health care system v illness care system
- Health system v health/illness care system

How important for health is health care?

- It has recently been estimated that medical care explains only 10 to 20% of health over the life-course
- Meaning that 80 – 90% is determined by other factors.

McGovern, Miller and Hughes-Cromwick, 2014

Move beyond health care

- **This means that most of the major determinants of health are located outside the health care system**
  - **So outside the scope and jurisdiction of the Minister of Health**
  - **. . . who is really the Minister of Illness Care**

The determinants of health

- "the health of the population . . . as influenced by
  - social, economic and physical environments,
  - personal health practices,
  - individual capacity and coping skills,
  - human biology,
  - early childhood development,
  - health services and
  - gender and culture."

Federal/Provincial/Territorial Advisory Committee on Population Health, 1997

So who is responsible for the health of the population?

- The government as a whole
  - Needs inter-departmental action
- The community as a whole
- Society as a whole
  - Both need inter-sectoral action

Society shapes health and the health care system

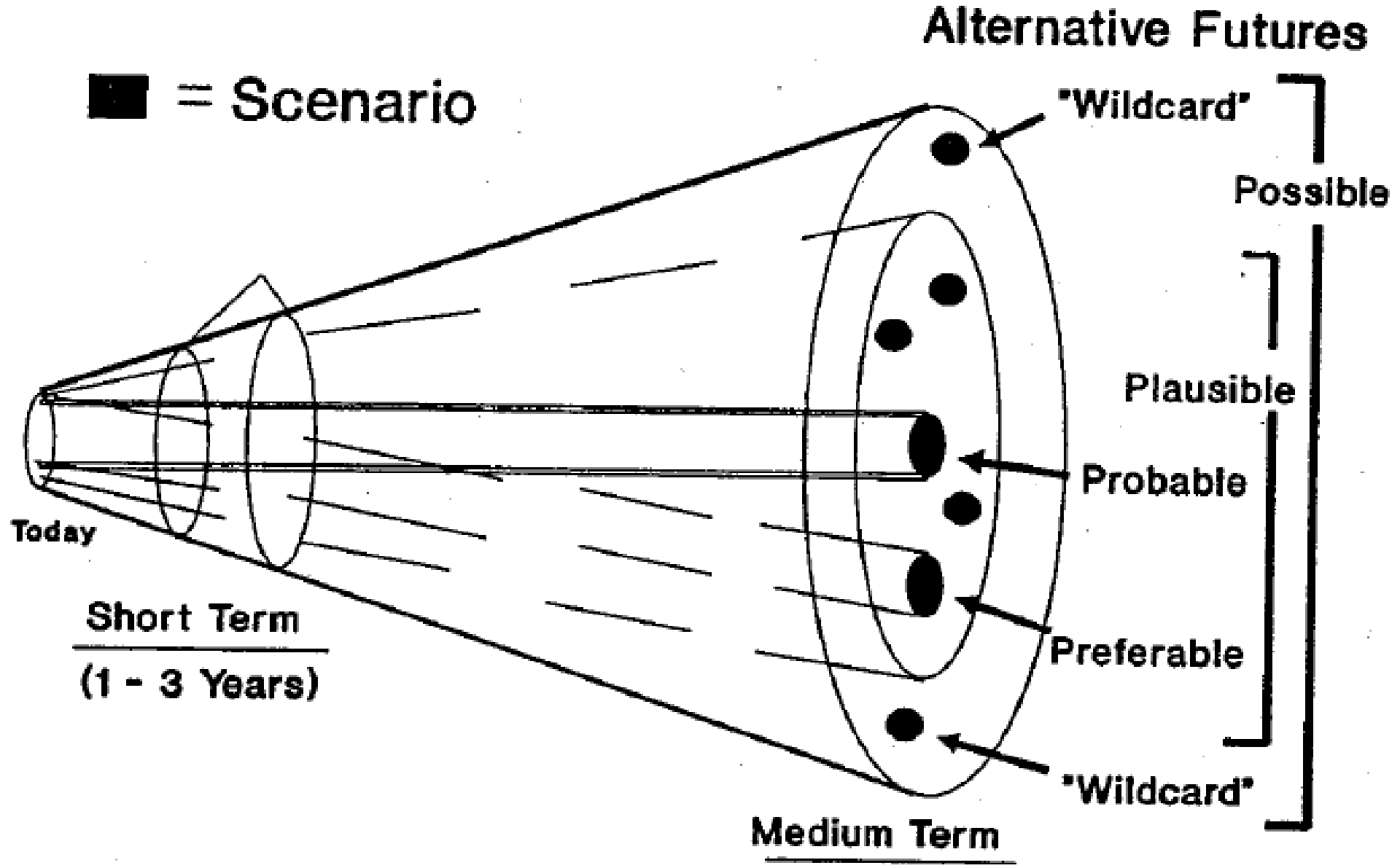
- **Both health status and the health care system of the future will reflect the society of which they are a part – not the other way around**

Four sorts of future

- possible, i.e., what may happen
- plausible, i.e., what could happen
- probable, i.e., what will likely happen, and,
- preferable, i.e., what we want to have happen

Norman Henchey

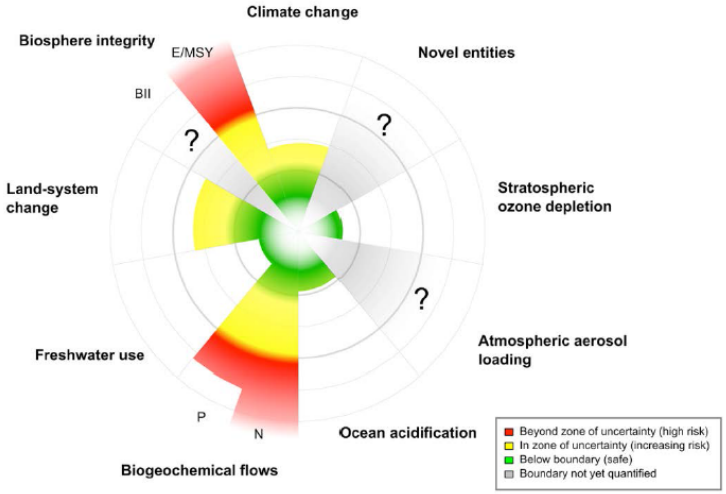
Types of Futures

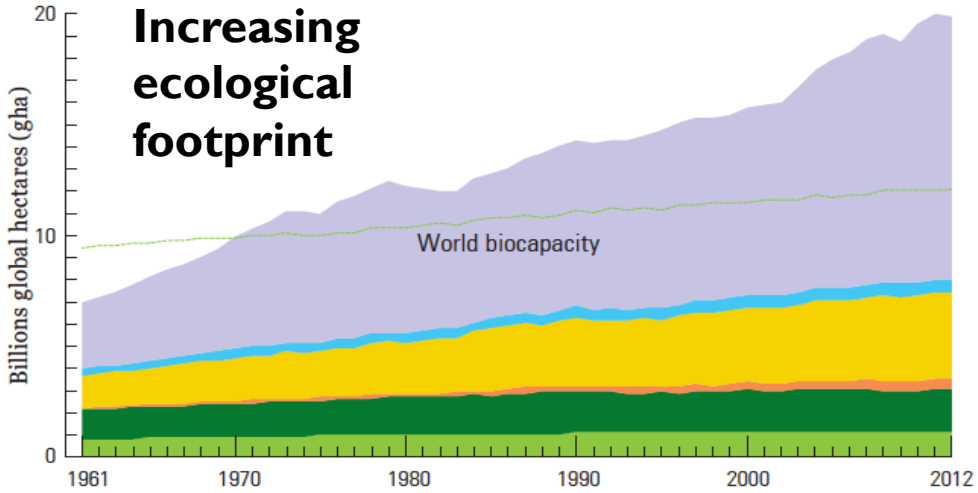


Decline is plausible

- **Decline and collapse is a plausible scenario that**
  - **we prefer to overlook**
  - **will have severe adverse effects on health, equity and peace**
  - **we should try to avoid**
  - **needs to be managed effectively if we can't avoid it**

And is already underway – the Anthropocene

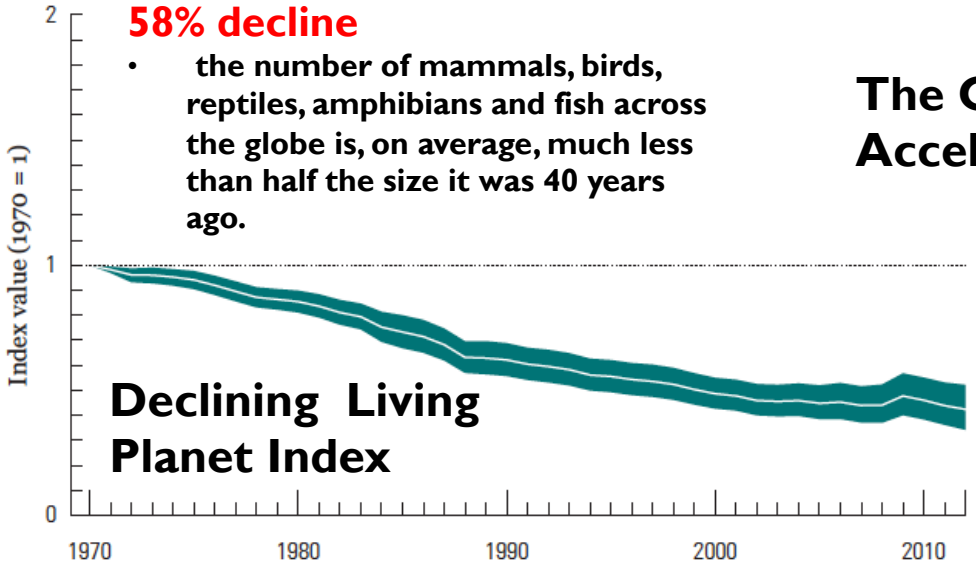




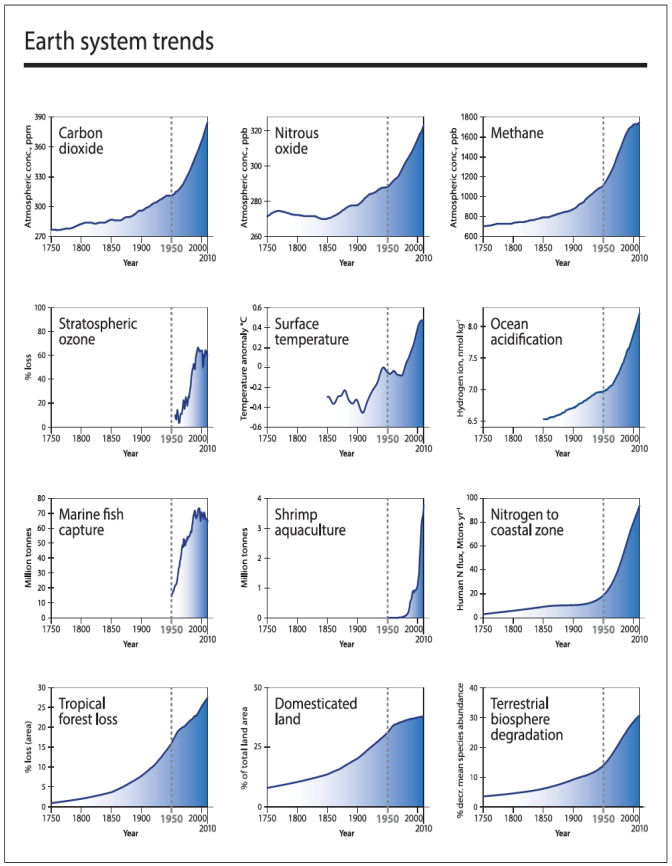
Crossing Planetary boundaries

58% decline

- the number of mammals, birds, reptiles, amphibians and fish across the globe is, on average, much less than half the size it was 40 years ago.



The Great Acceleration



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2. Health in the Anthropocene

The ecological determinants of health

We depend on ecosystems for the very stuff of life:

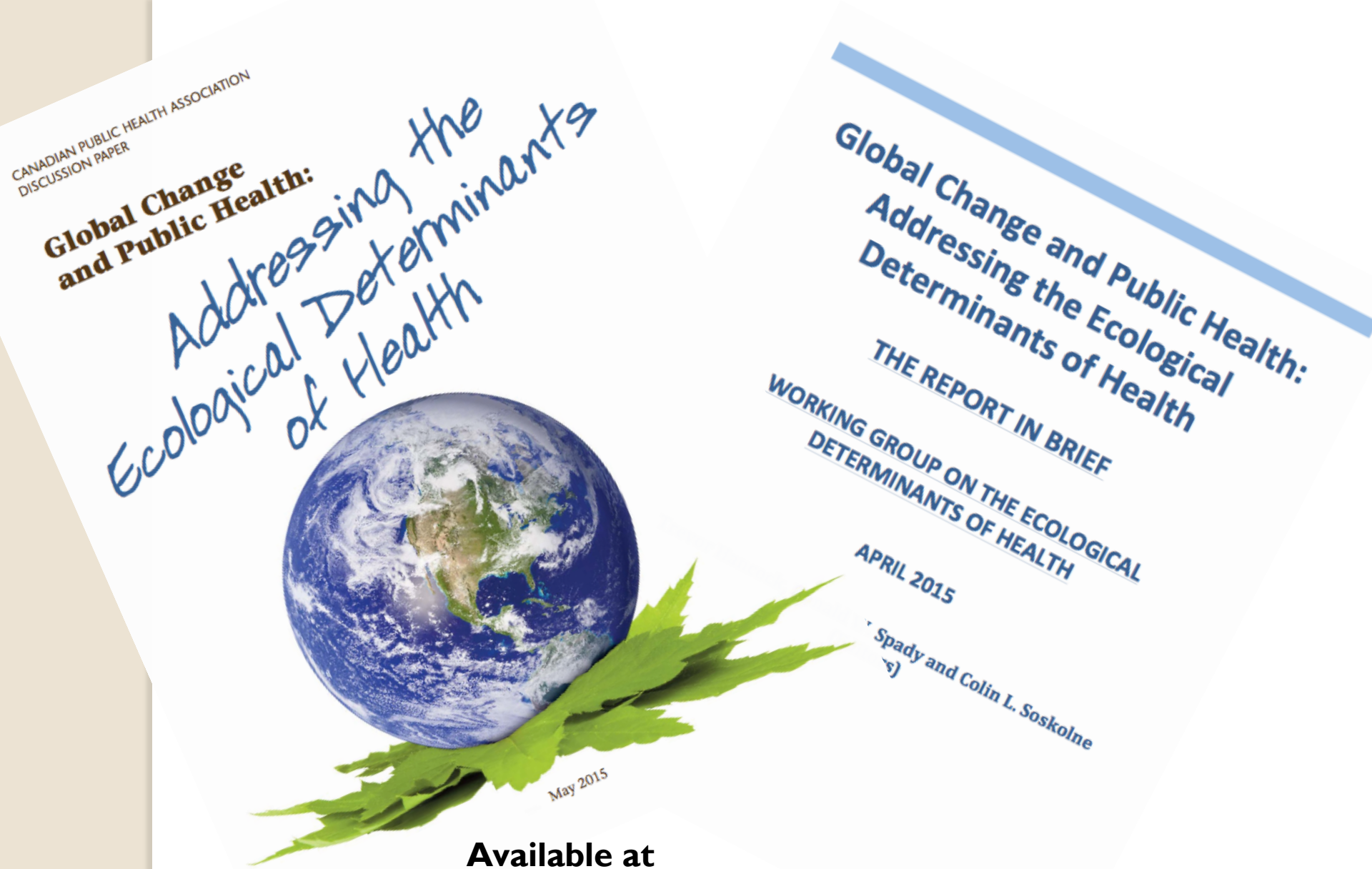
- **Air**
- **Water**
- **Food**
- **Fuel and materials**
- **Protection from UV radiation**
- **Waste recycling and detoxification and**
- **A relatively stable and livable climate.**

Global change and public health - CPHA Project

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**



Available at

http://www.cpha.ca/uploads/policy/edh-brief.pdf
http://www.cpha.ca/uploads/policy/edh-discussion_e.pdf
http://www.cpha.ca/uploads/policy/edh-discussion_f.pdf

The ROCKEFELLER FOUNDATION THE LANCET

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

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Planetary Health – An emerging field

- Lancet Planetary Health
- Professor of Planetary Health – Tony Capon, U of Sydney
- Planetary Health Alliance

One planet regions: planetary health at the local level

Trevor Hancock,
Anthony Capon,
Mark Dooris,
Rebecca Patrick

Lancet Planetary Health 1: e92 – 3
Open Access at
http://www.thelancet.com/pdfs/journals/lanplh/PIIS2542-5196(17)30044-X.pdf

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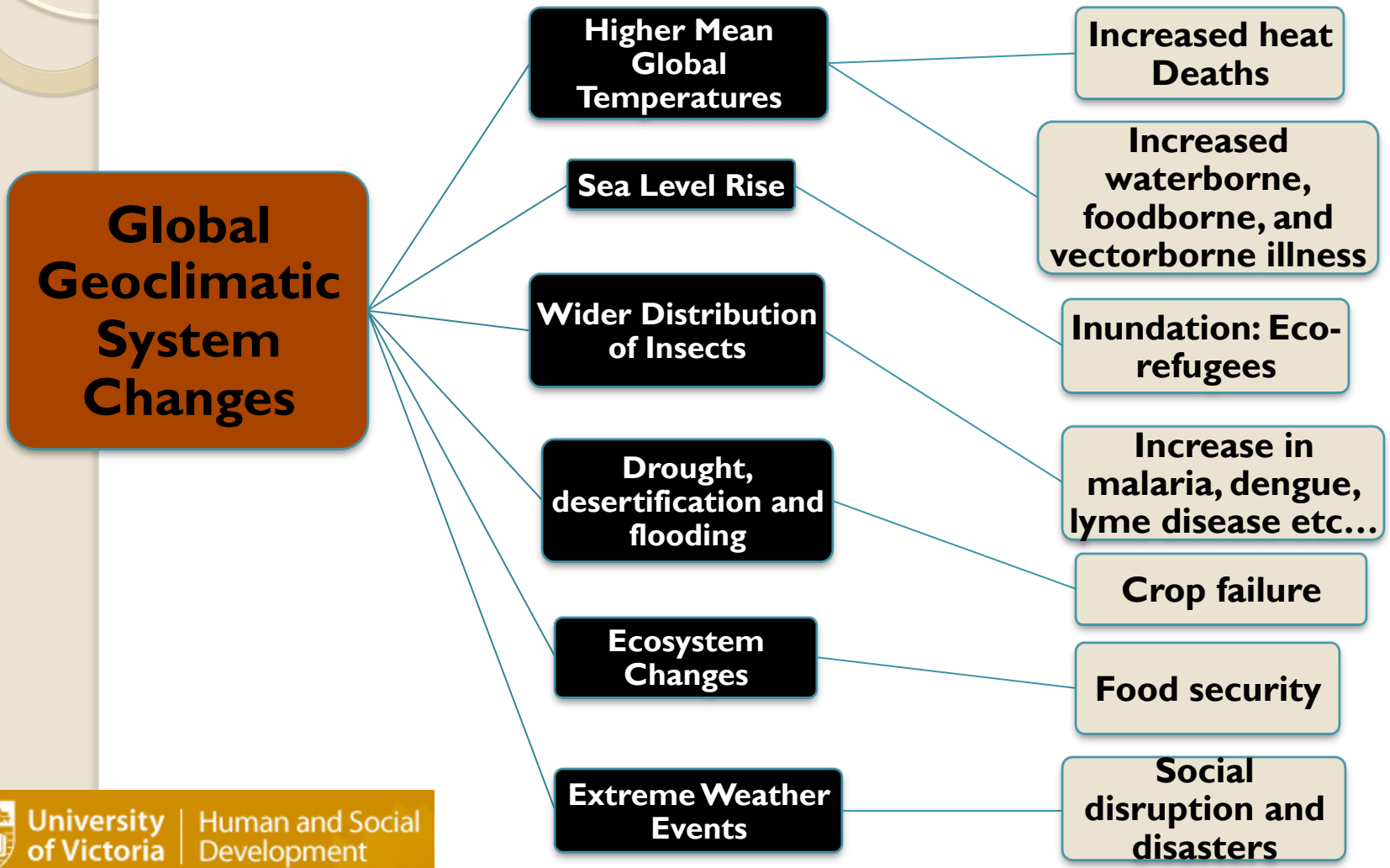
Discussion – What are likely health impacts of global ecological change

Climate change

Health impacts of climate change



Health impacts, IPCC 2014, Chapter 11 (Health)

Probability of major increases in ill health by the mid-21st century due to climate change

Very high confidence

- **Greater risk of injury, disease and death due to more intense heat waves and fires**
- **Increased risks of foodborne and waterborne diseases**

High confidence

- Increased risk of under-nutrition due to diminished food production in poor regions
- Consequences for health of lost work capacity and reduced labour productivity in vulnerable populations

Medium confidence

- Increased risks of vector-borne diseases

Health impacts in Canada

Already evident:

- **Urban heat events**
- **Respiratory disease resulting from wildfires**
- **Spread of the vector for Lyme disease**
- **Displacement of people due to floods or drought**
- **Changes in the diets of Indigenous people due to the effects of warming in the Arctic on wildlife.**

"Climate change can exacerbate many existing health concerns and present new risks to the health of Canadians."

Chief Public Health Officer of Canada (2015)

Resource depletion

Threats to food supply

- Land degradation
- Water supply
- Ocean acidification
- Overfishing

Degraded agricultural land

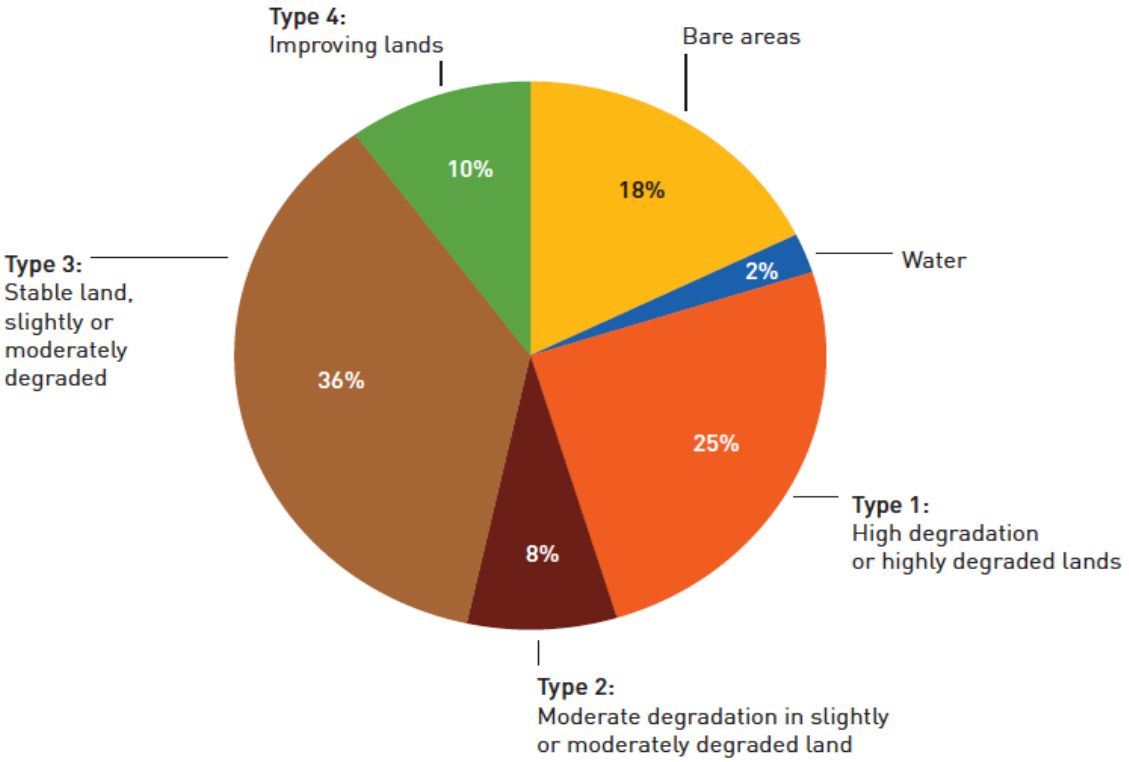
- **Agriculture is now the single largest global land use, covering about 38% of the Earth's ice-free land surface.**
- **But**
  - **25% of agricultural land is highly degraded**
  - **a further 8% is moderately degraded**

FAO 2011

Status and trends in global land degradation

Source: FAO, 2011

Typology of degradation of ecosystem benefits	Intervention options
Type 1 – High degradation trend or highly degraded lands	Rehabilitate if economically feasible; mitigate where degrading trends are high
Type 2 – Moderate degradation trend in slightly or moderately degraded land	Introduce measure to mitigate degradation
Type 3 – Stable land, slightly or moderately degraded	Preventive interventions
Type 4 – Improving lands	Reinforcement of enabling conditions which foster SLM



Declining ocean stocks

- **The global freshwater LPI declined a staggering 81% between 1970 and 2012**
  - **increased 36% in the temperate zone between 1970 and 2008, but declined by 70% in the tropical zone**
- **The global marine LPI has declined 36% between 1970 and 2012**
  - **The temperate zone marine LPI had increased 53% while declining by 62% in the tropical zone between 1970 and 2008**

WWF *Living Planet Reports*, 2014 and 2012

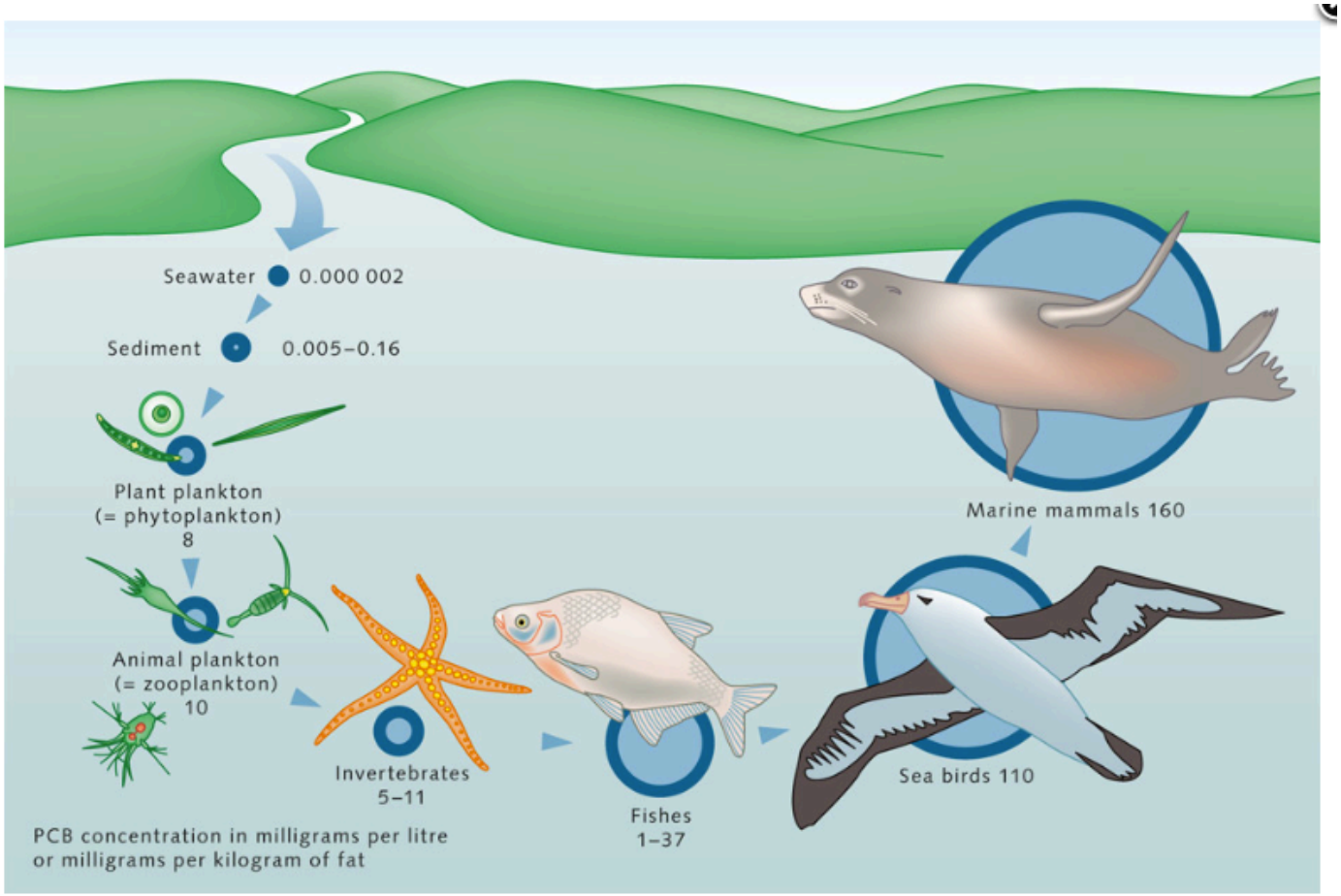
Pollution and ecotoxicity

Health impacts of fossil fuels and energy use

- More than 100,000 coal miners have been killed in mining accidents worldwide since 1900, and another 200,000 have died from pneumoconiosis.
- Energy use accounts for roughly 80% of particulate matter (PM) air pollution world wide, and in 2010 PM pollution resulted in 3.1 million premature deaths.
- Very large numbers of death and injuries resulting from transportation, especially from automobile and motorcycle use;

Smith et al, 2013

Pollution and ecotoxicity



4.7 > Bioaccumulation of toxins in the marine food chain has long been recognized as a problem. The process illustrated here relates to polychlorinated biphenyls (PCBs), a typical environ-mental toxin. © maribus (after Böhlmann, 1991)

Increase in PCB concentration from water to seal is 80,000,000 times

Health impacts of ecotoxicity

- **Of 10 chemicals of major concern for public health identified by WHO, knowledge of their health impacts is limited**
- **Almost 800 chemicals are known or suspected endocrine-disrupting chemicals (EDCs)**
  - **Only a small fraction have been properly tested**
  - **There is evidence of widespread and simultaneous exposure of both humans and wildlife to multiple EDCs (WHO/UNEP, 2012)**

In utero and childhood exposure . . .

- to persistent organic pollutants (POPs) and EDCs, as well as heavy metals
- 2 recent Canadian reviews found
  - some evidence for health impacts of prenatal and childhood exposure,
  - many associations where there is limited or inadequate evidence,
  - mainly because of an inadequate number of studies or methodological problems such as small sample size, a limited range of exposure or poor exposure indices

The Inuit and POPs

- **"As the Inuit diet is comprised of large amounts of tissues from marine mammals, fish and terrestrial wild game, the Inuits are more exposed to food chain contaminants than human populations living in temperate regions."**
- **"…their infants are exposed through transplacental and breast milk transmission from the Inuit mother."**

Dewailly, 2006

Species extinction/ loss of biodiversity

Health impacts of loss of biodiversity

- **Many of the ecosystem goods and services on which we depend are created through the actions of other species**
  - **Birds and bees pollinate many of our plants**
  - **Many species are natural pest control agents**
  - **Microbial species fix nitrogen, decompose waste, etc**

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.**

The Millennium Ecosystem Assessment, 2005

- **"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

Managing decline - some key concepts

- A long, slow emergency
- A 'soft landing'
- How do we manage decline
  - With minimal health impacts
  - With minimal health equity impacts
  - Without violence
  - To avoid collapse

3. Health care in the Anthropocene

Implications for health care systems

Adaptation

- **Changing environmental conditions may impact the operation of the system.**
- **Health problems related to global ecological changes will present new or considerably increased challenges for the system to deal with.**

Mitigation

- **The health system is itself a significant contributor to global ecological change and must reduce its impact.**
- **The health system needs to advocate for and support social and economic changes across society that will lead to a healthier and more sustainable future**

3 a) Adaptation

1. **Understand and plan for**

- **what environmental changes can be expected locally**
  - **e.g storms, floods, landslides, 'heat events'**
- **what the implications are for the operation of the health system and its components**
  - **e.g. damaged health care infrastructure, loss of power, no access to staff or supplies etc.**

Adaptation - 2

2. **Understand and plan for**

- **Changing patterns of disease and injury that will need to be managed e.g.**
  - **heat events, severe weather events**
  - **heat stress in outdoor workers**
  - **insect-borne diseases**
  - **Eco-refugees**

3 b) Mitigation

In most high-income countries the HCS is around 12 percent of GDP (11% in Canada, 17% in the USA), and thus a significant user of resources and producer of wastes, as well as a major employer.

Health care is a major polluter

"In 2013, the (US) health care sector was also responsible for significant fractions of national air pollution emissions and impacts, including acid rain (12%), greenhouse gas emissions (10%), smog formation (10%) criteria air pollutants (9%), stratospheric ozone depletion (1%), and carcinogenic and non-carcinogenic air toxics (1–2%)."

Eckelman and Sherman, 2016

HCS needs to reduce its carbon/ecological footprint

- HVAC
- Waste disposal
  - Incineration
  - Methane from organics etc.
- Food
  - 100 mile diet?
  - Low meat diets are also healthier
- Transport
  - Telehealth

Health care transport

"5 per cent of all the UK's emissions from road transport are attributable to NHS-related journeys. Staff, patients and visitors travelled almost 25 billion passenger kilometres for NHS-related purposes in 2001, of which 83 per cent were by car or van"

new economics foundation/ NHS Confederation, 2007

The benefits of Telehealth

Based on the nearly 27,000 Telehealth consults undertaken since its inception in 2007 until the end of July 2016, Island Health estimates it has saved 10.6 million kms of patient travel, 1.2 million litres of gasoline, and 2.9 million kgs (2,900 metric tonnes) of carbon dioxide emissions

Henderson, 2016

Telehealth -2

Toronto,

- **A mere 840 telemedicine consultations over six months led to estimated reductions of**
  - **757,234 km of travel,**
  - **185 tonnes of CO_2 Eq GHG emissions**
  - **360 kg of other air pollutant emissions**

(Masino et al. 2010)

Portugal

- **"21,000 telemedicine consultations performed over a seven-year period in Alentejo […] may have led to a 95% reduction in distances travelled – or 2.3 million km of travelling by patients"**

(Oliveira et al. 2013).

Telehealth – 3: Other benefits

- Traffic volumes are reduced
- Injuries and deaths resulting from motor vehicle crashes are reduced
- Valuable health human resources are at less risk

Canadian Coalition for Green Health Care

- Provides a virtual platform for the sharing of ideas and resources;
- Lends support to those seeking to build a stronger, healthier and more sustainable health service delivery system;
- Strives to improve access to best practice information, innovative goods and services that offer a clear environmental advantage to users within the sector, and
- Provides a venue for stakeholders to work together to reduce health care's environmental impact.

http://www.greenhealthcare.ca/

Other useful 'green health care' resources

- ***Healthcare Without Harm*** **- more than 500 members in 53 countries and has regional offices in Asia, Europe Latin America and North America**

  https://noharm-global.org/

- **UK - The NHS Sustainable Development Unit**

  http://www.sduhealth.org.uk/

4. Healthier alternatives

The public health response

- Oppose harmful policies and practices
- Encourage and support beneficial policies and practices

Health co-benefits in the areas of e.g.

- Energy systems
- Food systems – the meat issue
- Healthy and sustainable communities
  - Transport systems
  - Urban planning and design

Health co-benefits

4 a) Energy systems and health

Energy has health benefits

- 2.8 billion people lack access to clean fuels for cooking,
- 1.6 billion people lack access to electricity

"For these people . . . adequate access to clean energy is a more pressing health need than is energy conservation."

Smith et al, 2013

Energy is also a global health problem

"the direct effects of energy systems alone exceed the global health impact of most other risk factors except malnutrition, rivaling the global impacts of tobacco, alcohol, and high blood pressure. The vast part of the direct impact comes from the poor management of fuel combustion. Clearly, energy is a global health issue"

Smith et al, 2013

- **Energy systems directly cause "perhaps as many as five million premature deaths annually and more than 5% of all ill health (measured as lost healthy life years)."**

Smith et al, 2012

The economic costs of health impacts

- **The health costs of coal-fired electricity in the US alone range from $62 billion to $523 billion annually, which at the upper range is several times the cost of producing electricity.**

Smith et al, 2013

All energy systems have health impacts

Illustrative examples of health impacts for various energy systems				
Energy source	Extraction	Processing & transport	Use	Disposal
Coal	**Mining illness & accidents, water and pollution**	**Transport accidents, air pollution**	**Air pollution**	**Fly ash**
Oil	**Oil spills, air & water pollution, occupational injuries**	**Oil spills, fires, air pollution**	**Air pollution, MVCs**	**Soil and water pollution**
Gas	**Air & water pollution, occupational injuries**	**Leaks, other accidents**	**Air pollution, leaks and fires**	
Nuclear	**Mining illness & accidents, water and air pollution**		**Leaks, fires**	**Long-lived radioactive wastes**
Solar – both passive solar & photovoltaic (PV)	**Extraction of rare earths for some PV**	**Occup. illness & accidents from manufacturing, distribution and installation**		
Wind		**Ditto**	**Vibration noise**	
Conservation		**Ditto**		

Comparative risk of energy systems per TWh (Germany)

	Years of life lost	Restricted activity days
• Coal	138	4,751
• Lignite	167	4,976
• Oil	359	12,248
• Gas	42	1,446
• Nuclear	25	314
• Solar PV	58	1,997
• Wind	2.7	90

Krewitt, Hurley, Trukenmüller and Friedrich, 1998

Comparative risks

- **"risks from the use of solid and liquid fossil fuels are at the upper end [of public health risk], while electricity generation from nuclear and wind are options with a relatively low risk per unit of electricity generation . . . The coal fuel chain clearly shows the highest occupational risks".**

Krewitt, Hurley, Trukenmüller and Friedrich, 1998

Comparative risks - 2

- **"Overall the health impact of solar power is likely to be far less than that of any of the fossil fuels"**
- **"Overall, the population health impacts [of wind power] appear to be far lower than for equivalent energy generation by fossil fuel combustion"**
- **"[energy] conservation is an efficient, economical, healthful, and environmentally friendly approach to energy use."**

Smith et al (2013)

Major opportunities for energy efficiency and conservation

The following have both climate change and health benefits

- **Economy-wide carbon-intensity reduction**
- **Use of more efficient vehicles**
- **Reduced use of vehicles**
- **Efficient buildings, and**
- **Efficient base load coal plants**

Haines et al, 2007

Health benefits of energy conservation & efficiency

Energy end-use efficiency

- **"…is generally the largest, least expensive, most benign, most quickly deployable, least visible, least understood, and most neglected way to provide energy services."**

  Lovins, 2005

- **Health benefits include**
  - **Reduced air pollution**
  - **Increased physical activity**
  - **Job creation**
  - **Reduced GHG emissions**

- **conservation and renewable energy systems are usually more labour intensive and more local, thus generating local employment and strengthening the local economy; this can be particularly important in lower income communities**

CPHA Report

- **"employment created from low-impact renewable electricity would be comparable to or greater than that created by an equivalent capacity of fossil-fuel based generation."**

The Pembina Institute

http://www.pembina.org/re/benefits

Conclusion:

We need a comprehensive health impact assessment of energy systems nationally and in every province and territory

4 b) The meat issue

- 75% of the world's agricultural land is used for raising animals
- World average meat consumption per person doubled between 1961 and 2011, from 110 to 230 Kcalories per day (Kcal/p/d)
- In 2011, people in African countries derived only 88 calories per day from meat, while those in the high income regions derived in excess of 400 calories per day from meat

FAO Stats, 2014

Meat - 2

- An animal-based diet is a much less efficient way of providing food than a plant-based diet
  - requires more inputs in terms of energy, water and other resources
- Thus a less efficient conversion of plant calories to calories consumed by humans

GHG emissions by diet type, UK, 2014

Age-and-sex-adjusted mean GHG emissions (in kilograms of carbon dioxide equivalents per day - kgCO2e/day) for a standard 2,000 kcal diet in the UK

Diet	kgCO2e/day
High meat-eaters (>=100 g/d)	7.19
Medium meat-eaters (50-99 g/d)	5.63
Low meat-eaters (<50 g/d)	4.67
Fish-eaters	3.91
Vegetarians	3.81
Vegans	2.89

Scarborough et al, 2014

Environmental costs per consumed calorie

- "dairy, poultry, pork, and eggs are mutually comparable (to within a factor of 2)
- beef production requires 28, 11, 5, and 6 times more land, irrigation water, GHG [greenhouse gases], and Nr [reactive nitrogen], respectively, than the average of the other livestock categories"

Eshel, Shepon, Makov and Milo, 2014

Health benefits of a low-meat diet

- a shift to a low meat or vegetarian diet would have a number of direct health benefits

McEvoy, Temple and Woodside, 2012

- a diet in the UK that complied with the WHO dietary recommendations would result in a 17% reduction in greenhouse gas emissions, while adding 8 months to average life expectancy

Milner et al 2015

4 c) Healthy and sustainable communities – towards a 'One Planet' region

There are many health co-benefits of sustainable communities

- **Energy systems**
- **Food systems**
- **Transportation systems**
- **Compact mixed use development**

These have been discussed and documented for decades

Active transport/ Public transport/ NO transport

- Increased physical activity
- Reduced air pollution
- Fewer crash injuries/deaths

Don't forget telecommuting

- Average 1 day/week = 20% reduction
- More social connections
- More family/community time

Compact mixed use development

- Walk, bike
- Social interaction and cohesion
- Eyes on the street
- Access to nature and other amenities

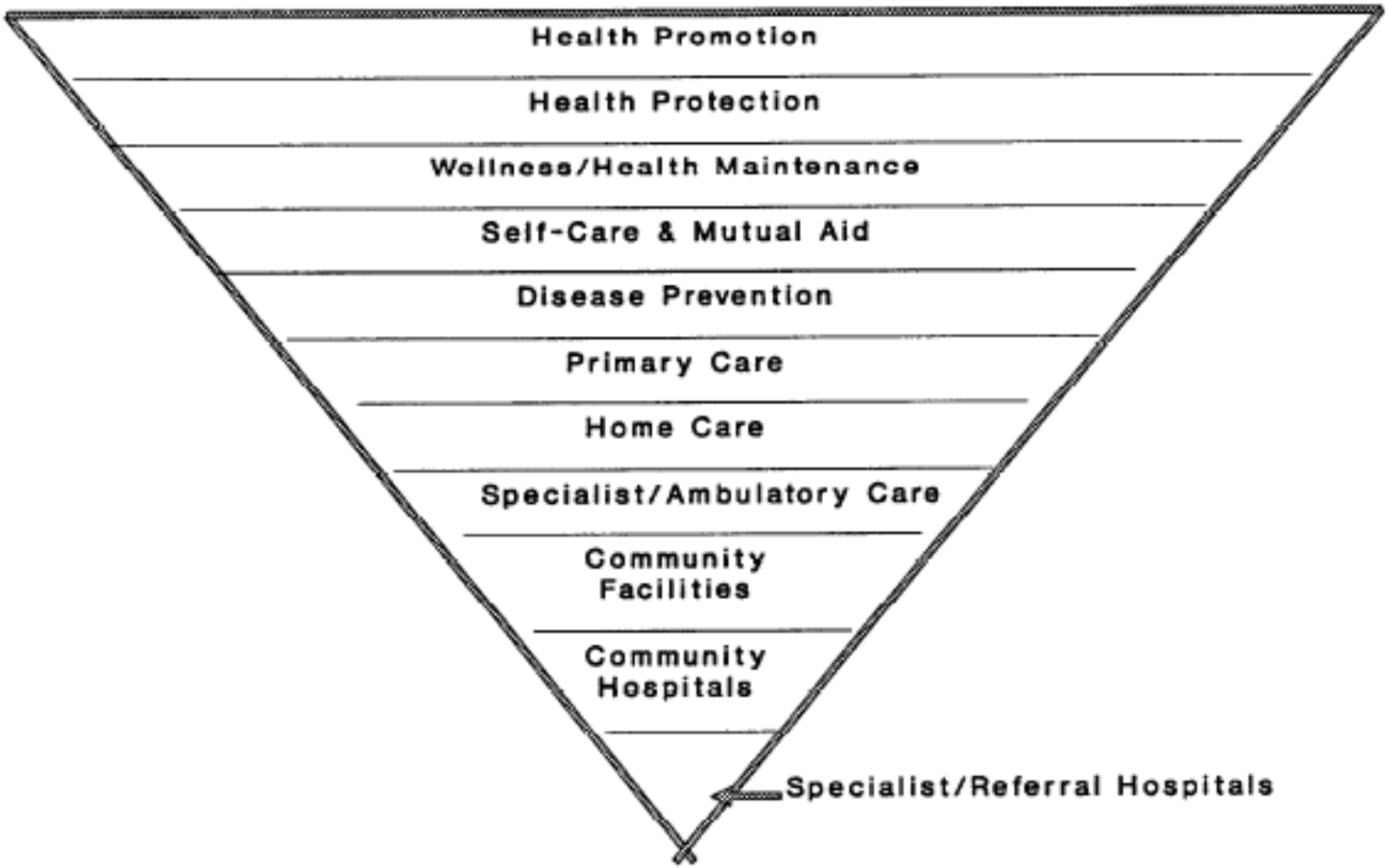
5. A health care system for a One Planet Region

Zero-based health planning

- What if the health care system we know disappeared overnight?
  - Knowing what we know today
  - Faced with the same population and needs as we have today
- What we build?
  - Not what we have!

Hancock, Trevor (1991) Zero-based health planning and hospitals without beds: two thought experiments for health planners *Health Care Management Forum* 4(3):35-36

"Bottom-down" health system

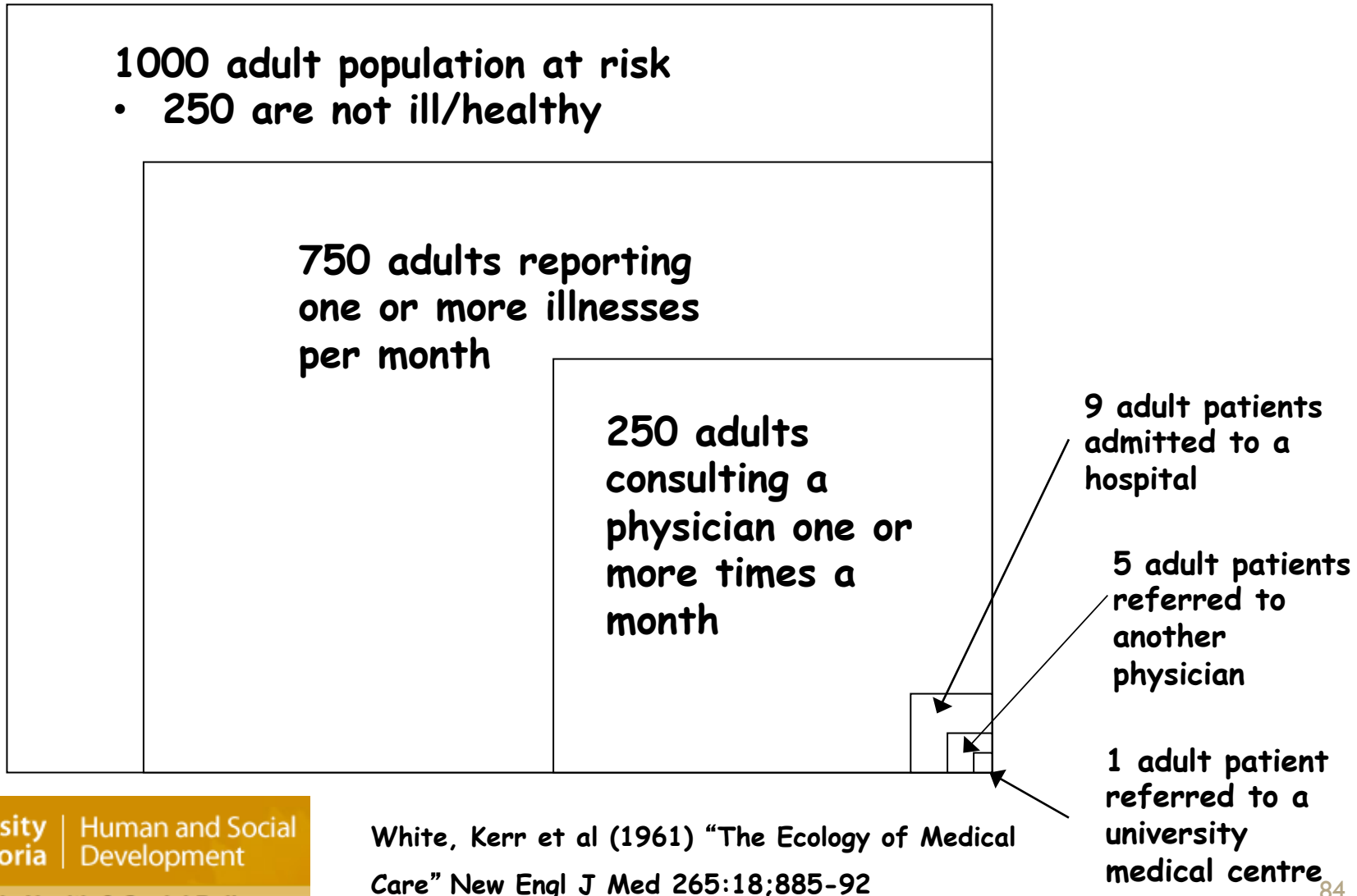


Hancock, T (1993) "Bottom-Down Health Systems" In Healthier Communities Action Kit, Vol. 2. For The Healthcare Forum, San Francisco

The ecology of medical care

- Kerr White's 1961 model shows us the health and health system use of the US population in a month
- 35 - 40 years later, little has changed (Green et al)
  - And a partial analysis for BC was consistent with this

The ecology of medical care

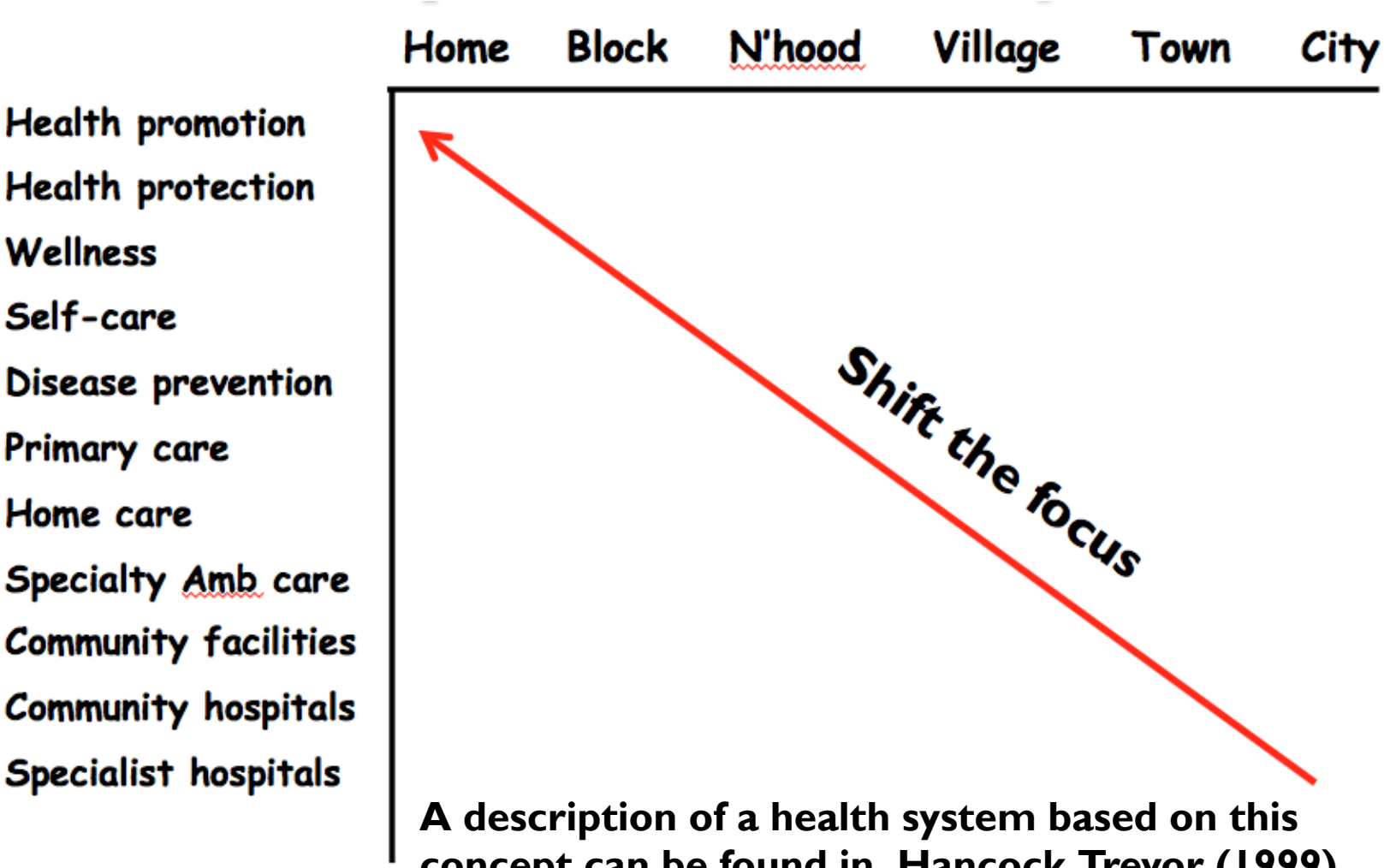


White, Kerr et al (1961) "The Ecology of Medical Care" New Engl J Med 265:18;885-92

The ecology of medical care revisited – 35 years later, nothing much had changed!

Category (in 1 month) *(Italics = 1996)*	1961 (White et al)	1996 (Green et al, 2001)
Population	1000 (Adult population only)	*1000 all ages (includes children)*
Report one or more illnesses or injuries/ *symptoms*	750	*800*
Consult a physician one or more times/*visit a physician's office*	250	*217 (113 primary care, 104 specialist)*
Visit other provider *- complementary or alternative care provider* *- hospital outpatient clinic* *- home health care* *- emergency department*		 *65* *21* *14* *13*
Admitted to a hospital/*hospitalised*	9	*8*
Referred to a university medical centre/ *hospitalised in an academic medical centre*	1	*0.7*

A bottom-up health care system



A description of a health system based on this concept can be found in Hancock, Trevor (1999) Health Care Reform and Reform for Health: Creating a Health System for Communities in the 21st Century *Futures* 31(5): 417-436

What would our bottom-up system look like?

- Keeping healthy
- Self-care
- Home and community care
- Primary care
- Institutional care