

## CLIMATE CHANGE & BIOETHICS

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## CLIMATE CHANGE

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### “cli-mate change”

*noun*

a **change** in global or regional **climate patterns**, in particular, a change apparent from the mid to late 20th century onwards and **attributed largely to the increased levels of atmospheric carbon dioxide** produced by the **use of fossil fuels**.

### Greenhouse Gas Emissions?

- Human activities such as the **burning of fossil fuels** (oil, coal and gas) for energy are the primary cause of the **increased carbon dioxide (CO<sub>2</sub>)** concentrations in the atmosphere.
- CO<sub>2</sub> - and other gases such as Methane (CH<sub>4</sub>), Nitrous Oxide N<sub>2</sub>O and fluorinated hydrocarbons – **trap heat in earth's atmosphere**, producing warming effects as well as other effects such as **ocean acidification**, smog **pollution**, **ozone depletion** and changes in plant growth and nutrition levels.
- Other significant sources of greenhouse gas emissions include forest clearing for agriculture (farming and pasture), and certain industrial processes (steel, cement)

### Intergovernmental Panel on Climate Change (2014)

[International body set up by the World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) in 1988 to assess the science related to climate change]

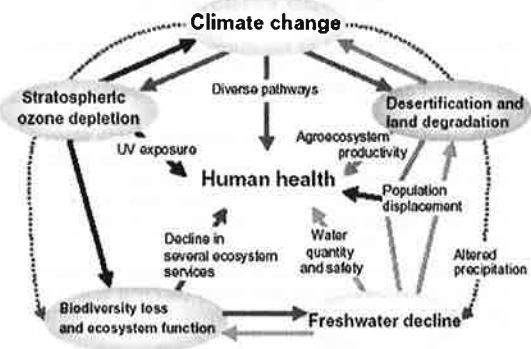
- IPCC(2014): "Human influence on the climate system is clear, and recent **anthropogenic emissions of greenhouse gases** are the highest in history."
- The Arctic is warming at a faster rate than the rest of the planet for the second straight year; since 2000, Arctic air has increased 5 degrees - *Arctic Report Card: 2015 Update* (National Oceanic and Atmospheric Administration)
- Land areas are warming faster than the oceans.

now you see it      now you don't



Mar 2000, Alaska August 11, 1941 and August 31, 2004

NASA CLIMATE



### Global health threats from greenhouse gas emissions:

- increased frequency and severity of extreme weather events,
- habitat and species extinction,
- expanded reach of vector-borne diseases,
- water scarcity,
- agricultural collapse and famine,
- armed conflicts,
- population displacement and humanitarian crises,
- reduced social and economic resiliency

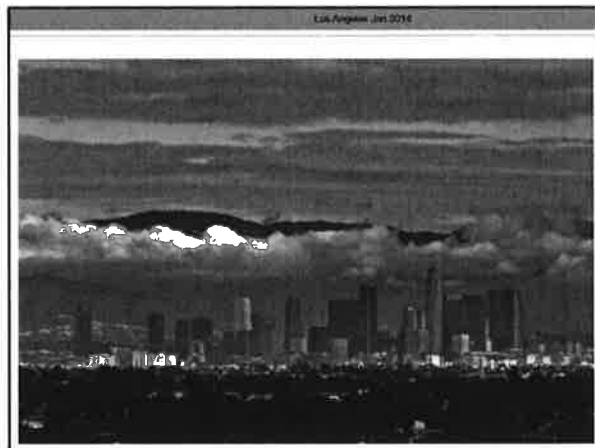


## Air Pollution

Air pollution is produced primarily by humans' reliance on burning fossil fuels for energy. (Natural air pollution can occur from fires, volcanic explosions, etc.) The combustion of fossil fuels produces:

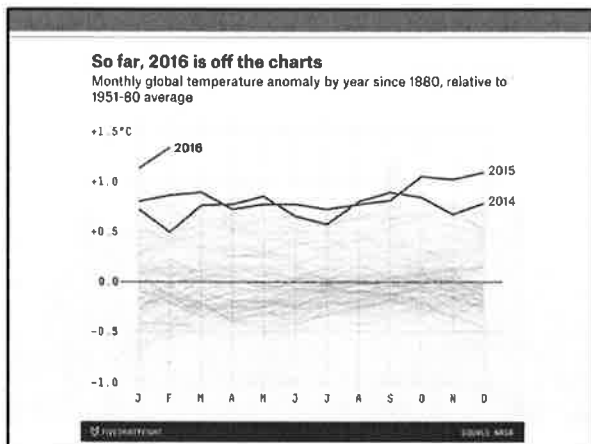
- **Gases - carbon dioxide (CO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>), and**
- **Particulates - tiny particles suspended in air (e.g. smoke), usually produced by the combustion of fossil fuels.**

The result is smog, acid rain, damage to the ozone layer, and ultimately, global warming, with serious implications for the environment and human health.



## nature climate change (journal)

- **“Future temperature in southwest Asia projected to exceed a threshold for human adaptability” (26 Oct 2015)**
- **“Millions projected to be at risk from sea-level rise in the continental United States” (16 March 2016)**



**DATA**

Carbon Dioxide  
<http://climate.nasa.gov/vital-signs/carbon-dioxide/>

Global Temperature  
 • <http://climate.nasa.gov/vital-signs/global-temperature/>

Sea Level  
 • <http://climate.nasa.gov/vital-signs/sea-level/>

**The Impacts of Climate Change on Human Health in the US: A Scientific Assessment (2016)**

- With climate change, **the frequency, severity, duration, and location** of weather and climate phenomena—like **rising temperatures, heavy rains and droughts**, and some other kinds of severe weather—are changing.
- While often assessed individually, exposure to multiple climate change threats can occur **simultaneously**, resulting in **compounding or cascading health impacts**.

[2016. U.S. Global Change Research Program, Washington, DC, 312 pp. <http://dx.doi.org/10.7930/JOR49NQX>]

### Temperature-Related Death and Illness

- Increasing **concentrations of greenhouse gases** lead to an increase of both average and extreme temperatures. This is expected to lead to an **increase in deaths and illness from heat** and a potential **decrease in deaths from cold**.
- Temperature extremes can also **worsen chronic conditions** such as cardiovascular disease, respiratory disease, cerebrovascular disease, and diabetes-related conditions.
- Prolonged exposure to high temperatures is associated with **increased hospital admissions** for **cardiovascular, kidney, and respiratory disorders**.

### Air Quality Impacts

#### Ozone Health Impacts

Unless offset by additional emissions reductions, these climate-driven increases in ozone will cause premature deaths, hospital visits, lost school days, and acute respiratory symptoms [**Likely, High Confidence**].

#### Increased Health Impacts from Wildfires

- Increased number and severity of naturally occurring wildfires in US, increasing emissions of particulates, increase the risk of premature death and adverse chronic and acute cardiovascular and respiratory health outcomes [**Likely, High Confidence**].

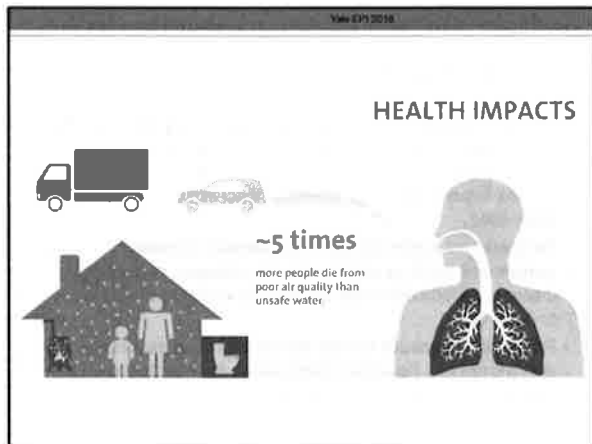
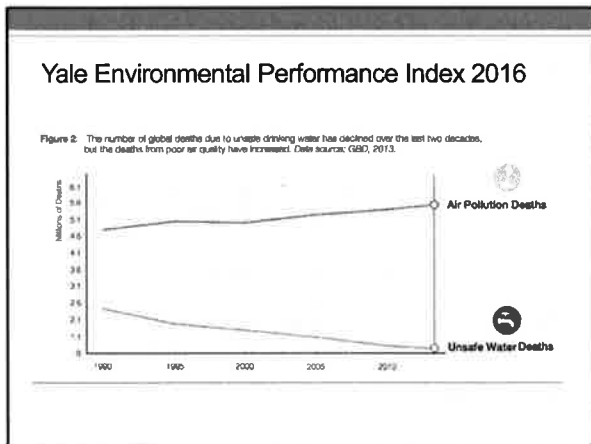
### Air Quality Impacts (continued)

#### Worsened Allergy and Asthma Conditions

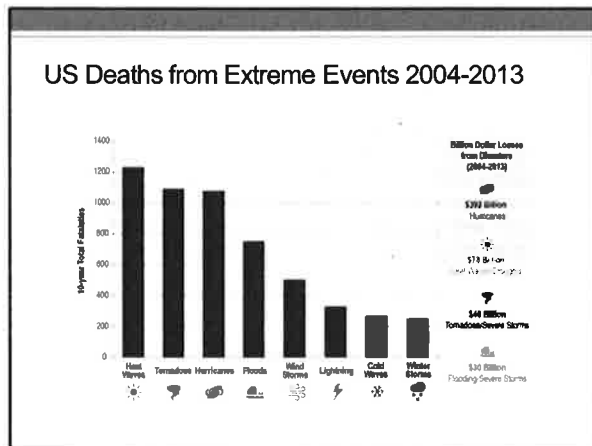
Rising temperatures, altered precipitation patterns, and increasing concentrations of atmospheric carbon dioxide, will contribute to increasing levels of some airborne allergens and associated increases in asthma episodes and other allergic illnesses [**High Confidence**].

### Water Pollution

- **Direct Sources:** Discharge from factories, refineries, waste treatment plants, etc.
  - **Indirect Sources:** Contaminants that enter the water supply from soils/groundwater systems, e.g., from human agriculture (fertilizers, pesticides, etc.), atmospheric contaminants (emissions from automobiles, factories), incineration
  - **Effects:** poisonous drinking water, poisonous food animals (due to bio-accumulated toxins), river and lake ecosystems that cannot support biodiversity, deforestation from acid rain
- > Note: endocrine disrupting chemicals and estrogenic compounds make wastewater reuse challenging



- ### Other Climate Change Induced Health Risks
- Shifts in vector-borne disease patterns
  - Increased exposure to toxic chemicals
  - Extreme weather events disrupt food safety, health delivery infrastructure



### Climate First-Responders

According to WHO, 25% of premature deaths are linked to environmental hazards (35% in some regions such as sub-Saharan Africa).

Climate change can be expected to increase the need for primary care and occupational/environmental health specialties:

- Malnutrition
- Respiratory illnesses
- Diarrheal diseases
- Mental health issues

### THE FORGOTTEN HISTORY OF BIOETHICS

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### Human Impacts on Environment

- Air Pollution
- Water Pollution
- Land Pollution
- Population Pressure

### Van Rensselaer Potter

*Bioethics, The Science of Survival (1970)*

Potter envisioned a new discipline combining scientific knowledge and humanistic values as a "bridge" from the current situation in which we are ignorant of, and indifferent to, the consequences of anthropogenic impacts to one in which we achieve mutual sustainability for both human and non-human life.

### Technology, Toxics and Consumption

- *Physicians for Social Responsibility (PSR)* - 1961 studies of human health hazards from atmospheric nuclear testing: Strontium 90 in cows milk and children's teeth as a result of nuclear fallout.
- *Recombinant DNA Moratorium* (1974) – science as part of the commons
- *Rachel Carson – Silent Spring* (1962) – public awareness about bio-accumulative chemicals and industry-science relationships and launched the modern environmental movement

### Technology, Toxics and Consumption

- *Paul R. Erlich The Population Bomb* (1968) – best selling environmental book of the 60s. Thesis: human population had exceeded the capacity of the earth to feed its inhabitants, future grim: mass starvation, disease, worldwide collapse, unless severe restrictions placed on reproduction.
- Led to *Zero Population Growth* movement in 70s, and gentler *sustainability* rhetoric in 80s and 90s.
- Although Erlich overstated imminence, concerns about excessive consumption and resource allocation under scarcity remain a central feature of normative ethics.

## ETHICS

## QUESTIONS

### What is Just 1<sup>st</sup> iteration

There are a number of ways in which the idea of distributive justice could be cashed out:

1. Are the benefits of industrialization and the burdens of climate change shared equitably? First, are the burdens distributed according to some pattern in which the ethical relationship between responsibility (for emissions) and consequences (climate shift), if any, obtains?

... Global trade complicates the analysis; for example, China surpasses the United States as the world's leading greenhouse gas emitter but expends a large amount of its energy in the production of consumer goods for the West.



### What is Just 2<sup>nd</sup> iteration

2. Instead, we might ask, are the **beneficiaries** of industrialization **bearing the costs** of mitigation proportionally?

... The carbon footprint of the world's **poorest 1 billion people** is approximately **3%** of the world's total, but they will be the ones most affected by anthropogenic climate changes (Global Health Commission, 2009).

### What is Just 3<sup>rd</sup> iteration

3. More to the point ethically, we might focus on **repairing maldistributions**, that is, trying to ensure that the health impacts of climate change are not distributed in such a way that the risks and burdens are increased for vulnerable individuals (e.g., the elderly, women, the medically marginalized) or vulnerable nations/communities.

### Gender, Health & Climate Change

- Women-as-a-group and men-as-a-group are differently situated with re to power, status, and wealth in many if not most cultures and societies. This translates into differential health risks – and health outcomes – for women and girls (and infants).
- Globally, natural disasters such as droughts, floods and storms kill more women than men, and tend to kill women at a younger ages, especially where where the socioeconomic status of women is particularly low [WHO].
- The majority of European studies have shown that women are more at risk, in both relative and absolute terms, of dying in heatwaves.

### Gender, Health & Climate Change

- Women and girls are more vulnerable to the indirect and longer-term effects of climate-related hazards such as droughts and food insecurity.
- In developing countries, women and girls (and their offspring) disproportionately suffer health consequences of nutritional deficiencies due to household food hierarchies, and the unmet nutritional demands of childbearing and breastfeeding.
- Women and girls must travel further to collect water, increasing the risk of violence.
- In both developed and developing countries, there is evidence that drought can disproportionately increase suicide rates among male farmers.

## Gender, Health & Climate Change

- Burning of biomass in unventilated homes releases high levels of black carbon, causing approximately 2 million deaths a year, mainly of women and children in the poorest communities in the world.
- *World Disaster Report*: "women and girls are at higher risk of sexual violence, sexual exploitation and abuse, trafficking, and domestic violence in disasters" (IFRC, 2007). After a natural disaster, they may become separated from family, friends and other potential support and protective systems, and may avoid using shelters, to avoid sexual abuse or trafficking.

## CONCLUSION:

### BIOETHICS & CLIMATE CHANGE

## American Medical Association Policy H-135.938 on Global Climate Change and Human Health

AMA endorses the findings of the Intergovernmental Panel on Climate Change (IPCC): climate changes will affect public health, with disproportionate impact on vulnerable populations, especially children, the elderly, and the poor. AMA calls for:

- Physicians to educate patients on environmentally sustainable practices, and for
- Physicians to serve as role models for promoting sustainability, as well as
- Physicians to participate in policy efforts to reduce contributions by humans to climate change.

## Practical Agenda for Bioethics

1. Researchers and scholars must explicitly acknowledge the environmental, health, and equity implications of climate change and greenhouse gas emissions in their analyses.
2. Bioethics consultants and ethics committee members must advise hospital administrators and clinicians about the environmental and equity implications with respect to health-care policies and practices.
3. Clinician-champions must take the lead in working with administrators to reduce energy consumption and waste in clinical workspaces (e.g., telemedicine, green purchasing).
4. Clinical Educators must develop opportunities for clinicians to acquire the necessary knowledge base to educate patients re health benefits of low carbon living.

### Practical Agenda (cont)

5. Medical Schools must include an environmental health education standard in undergraduate medical curricula. Similarly, Nursing and allied health education need to consider curriculum and practice initiatives.
6. Clinical pastoral ethics can offer both theological perspectives and leadership in developing faith-based initiatives that are appropriate for particular congregations.
7. Students can collectively support the development educational and practical initiatives in their schools (e.g., fossil-fuel divestment).
8. Business and community organizations can work together to support community education and specific local projects.

### What Can Individuals Do

1. Consume Less Meat and Dairy – Even 1 meatless day per week would produce significant reductions in forest destruction.
2. Buy less "stuff" – examples: "Tiny Houses" phenomenon or the bestseller about the joy of "Decluttering"

### WHY?

Even with fairly minimal reductions in energy consumption and waste reduction per institution and per individual, the aggregate impact on landfills and carbon emissions would be a genuine contribution to climate mitigation and human health and survival.

