Population and Climate Change: The Dynamic Duo

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South Sound Climate Action Convention
Lacey, Washington

April 14, 2018
Population and Population Growth and Climate Change are linked in many ways.

Yet, population is rarely mentioned in discussing climate change.

Population is the elephant in the room.

World wide and at least since 1750, the start of the industrial revolution,

the increase in annual greenhouse gas emissions closely matches the growth in population.
World population growth, 1750-2100

Until fossil fuels – coal, oil, and gas – were used in any significant amounts producing greenhouse gas emissions, population worldwide grew very little – less than one billion persons over human history.

With fossil fuel use, the world’s population is 7.5 billion today and increasing.
World Population over the last 12,000 years and UN projection until 2100

Conversely, the extraordinary growth of population has contributed greatly to our greenhouse gas emissions.

The more people, the more greenhouse gas emissions and the greater impact on climate change even as we emit more greenhouse gases per person.

\[ E = \text{emissions} \quad P = \text{population} \]

\[ E = P \times \frac{E}{P}, \text{ where} \]

\[ \frac{E}{P} \text{ represents the amount of emissions per person.} \]
Impact of Climate Change on Population in the Future

What is our concern?

The United Nations projections of population growth (2017) expects population to keep growing under “normal” conditions – its medium variant,

assuming gradual decrease in fertility rates and gradual decreases in mortality rates.
Under those conditions, population will continue to grow beyond 2100 and reach over 11 billion people.

An increase of 3.5 billion people over the 7.5 billion people in the world today.

With the impact of climate change, can that happen?

The impact of climate change on mortality is not considered in these population projections.
The Impact of Climate Change on Mortality

Some estimates of increased mortality (deaths) in the world if greenhouse gas emissions continue on their current trajectory.

- Landrigan, et. al, 2017, *Lancet Commission on Pollution and Health*: Diseases caused by pollution (mostly from the production of carbon dioxide) were responsible for an estimated **nine million premature deaths** in 2015.
• Shindell, et. al, 2018, Quantified, Localized Health Benefits of Accelerated Carbon Dioxide Reductions: If serious action were taken on climate change, thus reducing carbon dioxide emissions and other sources of air pollution, **110 million to 200 million** fewer premature deaths would occur worldwide.

• Fagan, 2008, *The Great Warming: Climate Change and the Rise and Fall of Civilizations*: suggests that with climate change, **droughts, heat waves, and famine** will significantly raise the death rate in the world.
The Impact of Climate Change on Migration

Increased significant migration both within countries and between countries will occur because of climate change.

  - without significant action on climate change, over **143 million people** (2.8 percent of the population) will migrate in developing countries
  - because of lower water availability, poorer crop productivity (drought), rising sea level, and storm surges.
  - This will get worse after 2050.
The Syrian refugee crisis has impacted many countries with **4.2 million persons migrating from Syria** in **2010-2015**.
Slowing Population Growth by Reducing Fertility to Address Climate Change

Several studies have shown that decreasing the rate of population growth by reducing fertility could lead to substantial reductions in global carbon dioxide emissions, particularly in the long run.

- O’Neil, et. al, 2012, *Demographic Change and Carbon Dioxide Emissions*: a significant reduction in fertility (blue line on next figure) alone could lead to a reduction in carbon dioxide emissions after 2040.
Figure 1: CO$_2$ emissions from fossil fuel use according to rate of population growth
Projections of CO$_2$ emissions for 2000–2100 for (A) the world and (B) India and the USA based on the Intergovernmental Panel on Climate Change B2 scenario. The shape of each curve over time is driven by assumptions specific to the B2 scenario that affect changes in energy demand and the mix of fuel types in the energy system. Long-term population projections from the UN$^{39}$ were used to calculate emissions based on high, medium, and low population growth projections. CO$_2$=carbon dioxide. GtC=gigatonnes of carbon.
Reducing Fertility to Address Climate Change (Cont.)

- Wynes, et al., 2017, *The Climate Mitigation Gap: Education and Government Recommendations Miss the Most Effective Individual Actions*: Having one fewer child is **significantly** the most effective action to reduce carbon emissions.
Having one fewer child will save 58.6 tonnes of CO2-equivalent per year

Tonnes of CO2-equivalent per year for one person undertaking each action:

- Upgrade light bulbs: 0.10
- Recycle: 0.21
- Hang-dry clothes: 0.21
- Wash clothes in cold water: 0.25
- Replace typical car with hybrid: 0.52
- Eat a plant-based diet: 0.82
- Switch electric car to car free: 1.15
- Avoid one roundtrip transatlantic flight: 1.60
- Buy green energy: 1.47
- Live car free: 2.4

Guardian graphic | Source: Wynes & Nicholas, Environmental Research Letters

The graphic shows how much CO2 can be saved through a range of different actions.
Reducing Fertility to Address Climate Change (Cont.)

- Murtagh, et al., 2009, Reproduction and the Carbon Legacies of Individuals: Having fewer children is cumulative over many generations, thus having a long-term impact on climate change.
### Unintended Pregnancies and Abortions, World and United States (Annually, 2010-2014)

<table>
<thead>
<tr>
<th>Area</th>
<th>Unintended Pregnancies</th>
<th>Abortions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent</td>
<td>Rate (per 1000 women 15-44)</td>
<td>Percent of Unintended Pregnancies</td>
</tr>
<tr>
<td>World</td>
<td>44</td>
<td>62</td>
<td>56</td>
</tr>
<tr>
<td>Developed</td>
<td>---</td>
<td>45</td>
<td>59</td>
</tr>
<tr>
<td>Developing</td>
<td>---</td>
<td>65</td>
<td>55</td>
</tr>
<tr>
<td>U.S.</td>
<td>45</td>
<td>45</td>
<td>42</td>
</tr>
</tbody>
</table>
Everywhere a large number of pregnancies are unintended.

Unmet needs for family planning are considerable.

Source: The Lancet Global Health, Guttmacher Institute
The role of family planning programs in addressing climate change

The Bixby Center for Global and Reproductive Health, 2014, “By Slowing Population Growth, Family Planning can help Address Food Insecurity and Climate Change”

• Slowing the growth of human population through strengthened family planning services would powerfully and inexpensively contribute to improvements in food security and the reduction of greenhouse gas emissions.
Bixby (Cont.)

- Family planning programs combined with Education of women and girls,
  Raising the age of marriage for women, and Providing alternative sources of income,

  Empower women.

- Improving access to family planning is a relatively inexpensive intervention for carbon emission abatement compared to other options.
Christ et al., 2017, The Interaction of Human Population, Food Production, and Biodiversity Protection:

The most effective transcultural approach to lowering fertility is comprehensive, well-designed, and well-funded family planning programs, which also promote women’s well-being and empowerment.
## Thurston County Population Growth 2010 to 2017

*Source: U.S. Census Bureau, 2018*

<table>
<thead>
<tr>
<th>Population Growth, Thurston County, 2010 to 2017</th>
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<tbody>
<tr>
<td>Population 2010 (April 1, Census)</td>
<td>252,260</td>
</tr>
<tr>
<td>Population 2017 (July 1, Estimates)</td>
<td>280,588</td>
</tr>
<tr>
<td>Total population growth</td>
<td>28,328</td>
</tr>
<tr>
<td><strong>Components of Growth</strong></td>
<td></td>
</tr>
<tr>
<td>Natural Increase (Births minus Deaths)</td>
<td>7,579</td>
</tr>
<tr>
<td>Net International Migration</td>
<td>4,609</td>
</tr>
<tr>
<td>Net Internal Migration (in the U.S.)</td>
<td>16,184</td>
</tr>
<tr>
<td>Percent growth (2010 to 2017)</td>
<td>11.1</td>
</tr>
<tr>
<td>Average Annual percent growth (2010 to 2017)</td>
<td>1.5</td>
</tr>
</tbody>
</table>
Thurston County is facing many challenges of climate change, including population growth.

Between 2010 and 2017 in Thurston county,

73 percent of the population growth was due to migration from elsewhere, and
57 percent was due to migration from elsewhere in the United States.

How many of these migrants came because of climate change?
Thurston County Population Stressors and Climate Adaptation

The *Thurston Climate Adaptation Plan: Climate Resilience Actions for Thurston County and South Puget Sound*, 2018, Thurston Regional Planning Council

- recognizes that Population Change is a major stressor on climate adaptation in Thurston County.

- seeks to assess the potential climate-change-induced population migration within and to the Thurston Region and to evaluate response strategies.
Population and population change will have considerable impact on climate change and *vice versa* in Thurston County and in the world.

The interaction between population and climate change must constantly be taken into consideration.

Family planning and empowering women – while culturally and politically challenging – are the most effective and least costly approaches to reducing carbon emissions.