**Society’s Challenge**

Globally, materials and energy are being consumed at accelerating rates. The rates of plant and animal extinctions are also on an accelerating path. On a finite Earth with a growing population, continued growth in consumption will destroy the conditions and ecosystems that humans depend on. Greenhouse gases (GHGs) and the Global Greenhouse Gas Reference Network (GGGRN) tell us an important part of this story.

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**Methods**

- **NOAA Earth System Research Laboratory and the Anthropocene epoch**
  - Read “Half-Earth: Our Planet’s Fight for Life” by Edward O. Wilson
  - Watched six TED talks about the Anthropocene
  - Read NOAA ESRL scientific journal articles and research posters
  - Reviewed the GGGRN website and 2013-2017 Research Plan

**Semi-structured interviews** (six scientists, one administrator, and one educator)

- Transcribed 4 hours and 40 minutes of audio into over 18,000 words
- Highlighted quotes that answered my questions, brought up new questions, told important stories, or were representative of the interviewee’s answer as a whole

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**Science Under Threat → Society Under Threat**

Scientists answer the question: Are there threats to the Network’s ability to gather and spread accurate data about the state of Earth’s atmosphere?

<table>
<thead>
<tr>
<th>Orders from Powerful Groups</th>
<th>Public Misunderstanding</th>
<th>Politicization of Climate Change</th>
<th>Global Relations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fear of significantly decreased funding from US government</td>
<td>Perception that science should focus on short-term needs</td>
<td>Active campaigns to decrease people’s confidence in science</td>
<td>Political changes can undermine cooperative air sampling agreements</td>
</tr>
<tr>
<td>Need to justify monitoring the same gases in the same locations each year</td>
<td>Need of US government funding climate research</td>
<td>Off of the climate change prediction we’re in</td>
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</tr>
<tr>
<td>Need to significantly decrease funding from US government</td>
<td>Of how scientists gain now knowledge</td>
<td>Off of how governmental greenhouse gas science has been shaped</td>
<td></td>
</tr>
</tbody>
</table>

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**Engaging Climate “Solution” Controversies**

**Societal Need**

- Understand how the GHGs we produce are affecting humans, plants, and animals
- Quantify global GHG emissions and removals
- Quantify North American emissions by humans and removals/ emissions by ecosystems
- Quantify regional GHG emissions and removals

**Science Question**

- How are GHGs affecting Earth warming and climate change?
- How are global GHG changes changing over time?
- How are GHGs over North America changing over time?
- Develop methods to objectively quantify emissions that change over time

**Network Priority**

- Create a long-term record of GHGs and climate forcing
- Track spatial differences in GHG levels with time
- Track emissions, removals, and climate response in more detail
- Track emissions of individual cities and oil and gas fields

**Significant Outcome**

- Future scientists will know how the Earth system works
- Improved understanding of ecosystem response to human influence and climate change
- Strengthening understanding of ecosystem response to human influence and climate change
- Assist emissions reduction policies locally, nationally, and internationally

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**Hope for Regenerating the Planet**

- Drastically reduce global GHG emissions
- Preserve Earth’s rich biodiversity of plants and animals
- Employ tried and true carbon sequestration techniques to capture and hold carbon in soil
- Reduce population growth (Increasing education for women globally has been shown to help)
- Support local sustainability efforts that target causes of a problem rather than a symptom
- Avoid “silver bullet” regeneration efforts that cannot be tested and may make things worse
- Prioritize a habitable world for future generations over short-term profits for few

Future generations depend on us.

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**National Oceanic and Atmospheric Administration (NOAA)**

Earth System Research Laboratory (ESRL) in Boulder, Colorado

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