

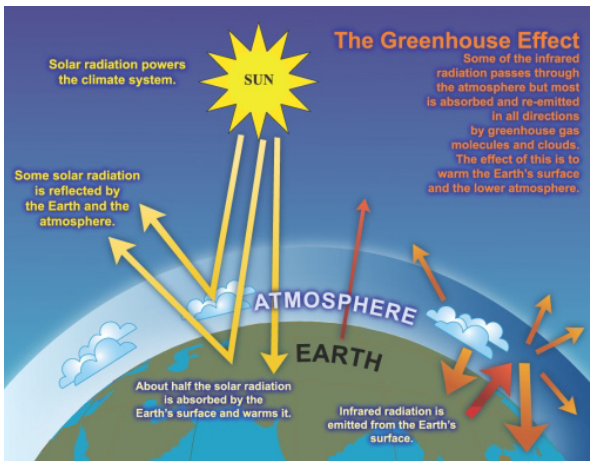
THE GLOBAL CARBON CYCLE



Woods Hole
Research Center

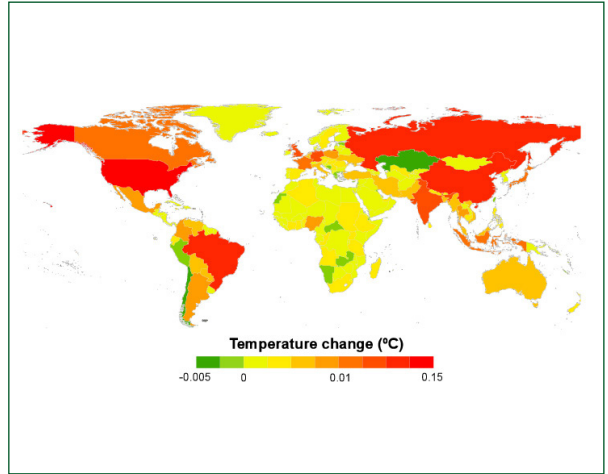
GLOBAL WARMING IS NOT A SCIENTIFIC CONTROVERSY

There is a natural greenhouse effect when carbon dioxide, methane, nitrous oxide and other gases trap heat in the atmosphere and warm the Earth. The concentrations of these gases remained relatively constant from the 700s to the 1700s – the dawn of the Industrial Revolution. Since then, greenhouse gas concentrations have risen 44%, raising the Earth's mean global temperature by 1.4°F.



The Earth is warming, our climate is changing, and climatic disruption is already here. Extreme weather events have become more common from monsoons and flooding in Malaysia and India, record heat and droughts in Australia and New Zealand, to wildfires in Arizona and record winter storms in the northeastern United States.

In the 1990s there were some 200 weather related disasters each year, but during the last decade that number has increased to 350 per year, including the extreme heat wave in Europe in 2003 that killed 35,000; by 2050, such heat waves are expected to be biannual or annual events.



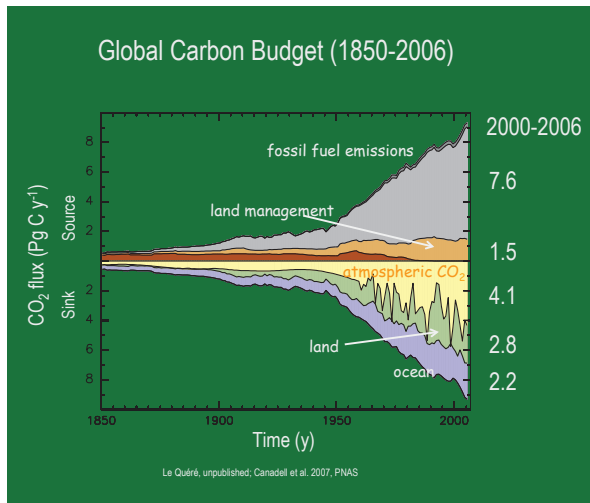
These severe weather events happened with an average global warming of less than 1.4°F, and climatic changes are occurring much more rapidly than scientists predicted.

Global warming is caused by the increase in greenhouse gas emissions, nearly 80% of which is carbon dioxide (CO₂). Since 1850, CO₂ concentrations in the atmosphere have increased 60% and were measured at 400 parts per million (ppm) in May of 2013. The dramatic increase in CO₂ is caused by burning fossil fuels and will continue to rise *until the practice ceases*.

THE GLOBAL CARBON CYCLE

The global carbon cycle describes the exchanges of carbon between the Earth's atmosphere, oceans, land and fossil fuels, all of which are both *sources* of emissions and *sinks* that contain carbon.

Carbon sources and sinks on land result from environmental changes and direct human efforts that include reforestation or deforestation for agriculture, grazing, forestry or other pursuits. Global warming is changing landscapes, but it is unclear how much these changes will affect the global carbon budget.

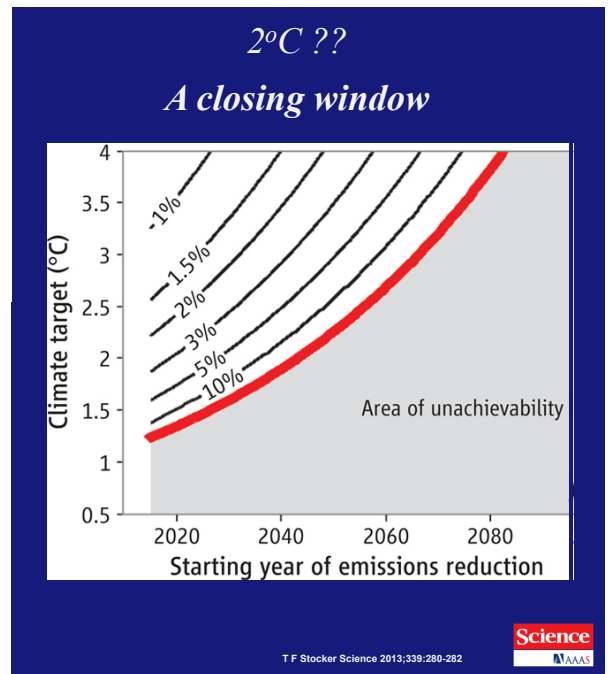


Net global carbon emissions and capture since 1850 including the role of land management both in emissions from deforestation and capture of carbon.

The current climate compromise between what is needed to sustain life and what is possible is 2°C (3.6°F). The Earth has already warmed by 1.4°F, and because of a lag in the ocean carbon sink, we are already committed to another 1.4°F. Thus, we are locked into 2.8°F of warming, even if CO₂ emissions were stopped today.

Warming trajectories are even more dramatic in the permafrost of the high latitudes, which are warming at a rate twice that of the rest of the globe.

Scientists agree that the window of opportunity to change the current climate trajectory is closing, and the longer we wait to alter our course the more herculean the efforts required will be.



Based on our current trajectory, we will exceed 2°C or 3.6°F of warming.

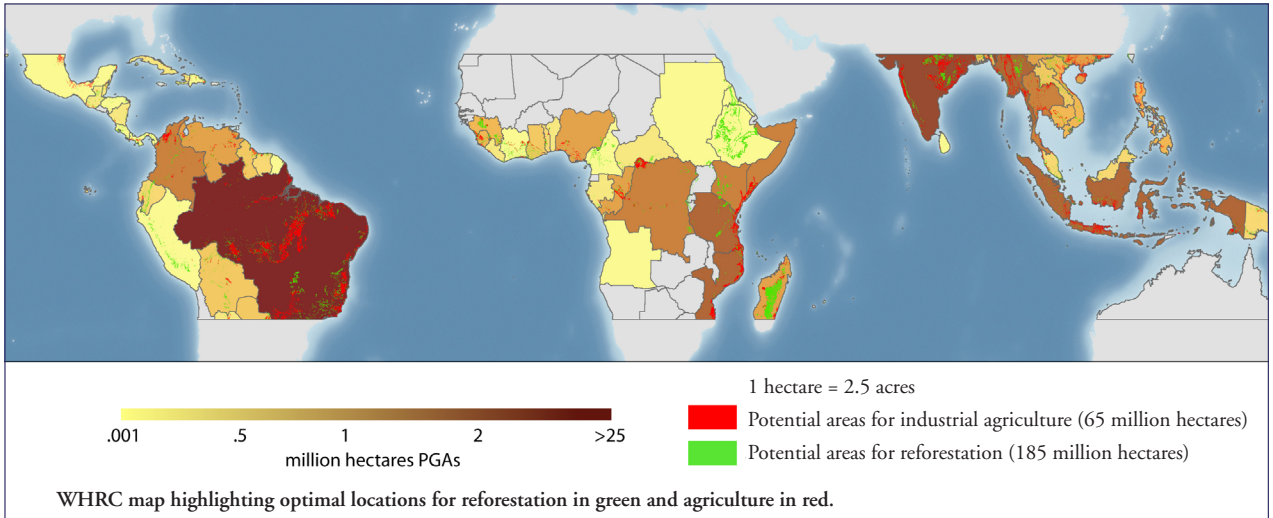
THERE IS HOPE

There is only one way to arrest global warming: stabilize CO₂ concentrations by reducing emissions and increasing the storage of carbon on land and in oceans. It has been estimated that it will take 40 years to develop and implement the technology that will replace fossil fuels as the primary energy source for our planet. In the meantime, if we manage our forest capital we can cut CO₂ emissions by 50% every year for the next 50 years – but no longer. **Forest management is the bridge to a fossil fuel free future.**

We can stabilize CO₂ concentrations by reducing emissions through sequestering carbon in forests.

We can cut CO₂ emissions every year by:

- 1 billion tons through ceasing deforestation, which now accounts for a loss of about 10 million hectares of forest per year
- 1- 3 billion tons through allowing young forests to mature
- 1 billion tons through reforesting an area half the size of the US



Woods Hole Research Center (WHRC) has created maps of the tropics highlighting optimal locations for protection, conservation and reforestation. Of the 1.2 million square miles of degraded lands in the tropics identified by WHRC, seven hundred thousand square miles are prime opportunities for reforestation.

Please contribute to WHRC and help us build a global map of reforestation opportunities to reduce global carbon emissions by 50%.

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