Potential Impacts of Climate Change on the U.S.: The Need for Action

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Human-induced climate change: One of the most important issues facing humanity.

The scientific evidence clearly indicates that our climate is changing, and that human activities have been identified as the primary cause.
National Academies of Science from G8 + 5 other countries

“The need for urgent action to address climate change is now indisputable.”
Many Changes Signal a Warming World

And......

- Atmospheric water vapor increasing
- Glaciers retreating
- Arctic sea ice extent decreasing
- Extreme temperatures increasing
- Increasing incidences of heavy precipitation events

Warming is Unequivocally

Rising atmospheric temperature
Rising sea level
Reduction in NH snow cover

IPCC WG1 (2007)
Conditions today are unusual in the context of the last 2,000 years ...
Why does the Earth warm?

1. Natural causes

THE GREENHOUSE EFFECT...

- ...is 100% natural.
  - Heat is trapped in the atmosphere.

- ...sustains life on Earth.
  - Keeps average temperatures at 55°F, instead of –20°F.
Why does the Earth warm?
2. Human causes

THE ENHANCED GREENHOUSE EFFECT
(or GLOBAL WARMING)

➢ ... is primarily human-induced
   ▪ We’re increasing heat-trapping gases in the atmosphere.

➢ ... is like wrapping an extra blanket around the Earth.
Atmospheric Carbon Dioxide
Measured at Mauna Loa, Hawaii

Carbon dioxide concentration (ppmv)


Annual Cycle

Jan Apr Jul Oct Jan
Are Humans Responsible?

Observations

Natural and human effects

Year

Temperature anomaly (°C)
What can we expect in the future?
Projected Temp Changes for the MW

Temperature change above 1961-1990 average
Increases in very high temperatures will have wide-ranging effects.

Number of Days Over 100ºF

Recent Past, 1961-1979

Higher Emissions Scenario, 2080-2099

Lower Emissions Scenario, 2080-2099
Projected Change in Precipitation: 2081-2099

Midwest:
Increasing winter and spring precipitation, with drier summers

More frequent and intense periods of heavy rainfall

Relative to 1960-1990
Migrating Illinois Climate

Based on summer average temperature and precipitation
Agriculture will face challenges from increased heat, pests, water stress, diseases, and weather extremes.
Projected Shifts in Forest Types

The maps show current and projected forest types. Major changes are projected for many regions. For example, in the Northeast, maple-beech-birch forest type, which is currently dominant in the region, is projected to be completely displaced by other forest types in a warmer future.
Projections for heat waves similar to Chicago in 1995

- Will become routine by end of century
- High emissions: 2-3 per year
- Low emissions: <0.5 per year
Extreme Heat — Dangerous Air Pollution

Ground level ozone increases at temperatures over 90°F
Extreme Heat – Asthma
Pollen Allergens

Warmer temps + higher CO₂ levels → more pollen allergen production
Infrastructure and Economy
Shifts in Energy Demand

Decreased demand for gas and oil for winter heating

Much more increased demand for electricity for summer cooling

Increased challenges to supply - increased risk of blackouts
1 meter will be hard to avoid, possibly within this century, just from thermal expansion and small glacier melt.

USA: Florida

Weiss and Overpeck
The University of Arizona
We must meet the Challenge

• The worst impacts can be avoided

• Avoid the unmanageable

• Manage the unavoidable
The benefits of strong, early action on climate change outweigh the costs.
Sources of U.S. Greenhouse Emissions

~87 percent of U.S. emissions come from energy production and use.
What Can We Do?

- Encourage policymakers to act.
  - We need to clean up our own mess—reducing the emissions from burning of coal, oil and gas.

- Conserve energy
  - Cut electric bills by $2 billion, and reduce our emissions by the equivalent of 5 million cars.

- Replace light bulbs
  - If every U.S. home replaced ALL its most commonly used lights with a compact fluorescent, it would be enough to stop the increase in U.S. emissions of heat-trapping gases.
Thank You