

Committee: Special Commission on Climate Change

Topic: The Question of the Impact of Global Warming

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Summary

Global warming, the long-term heating of Earth's climate system observed since the pre-industrial period due to human activities, is having wide-ranging impacts on our planet's physical, biological, and human systems. The primary driver of global warming is the emission of greenhouse gases, particularly carbon dioxide from burning fossil fuels. As global temperatures continue to rise, the impacts are becoming increasingly severe and widespread.

Key impacts of global warming include:

- Rising sea levels due to melting ice sheets and thermal expansion of oceans
- More frequent and intense extreme weather events like heatwaves, droughts, and storms
- Shifting precipitation patterns and disruptions to water resources
- Loss of biodiversity and ecosystem changes as species struggle to adapt
- Threats to food security as agricultural productivity is affected
- Health risks from heat stress, disease spread, and air pollution
- Economic damages from climate-related disasters and adaptation costs

The scale and severity of these impacts are projected to increase significantly if global warming exceeds 1.5°C above pre-industrial levels. Urgent and ambitious action to reduce greenhouse gas emissions is required to limit warming and its impacts. Simultaneously, adaptation measures are needed to build resilience to unavoidable changes.

Definition of Key Terms

- **Global Warming:** The long-term heating of Earth's climate system observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere.
- **Greenhouse Gases:** Gases that trap heat in the atmosphere, including carbon dioxide, methane, nitrous oxide, and water vapor.
- **Climate Change:** Long-term shifts in temperatures and weather patterns, driven largely by human activities like burning fossil fuels.
- **Climate System:** The highly complex system consisting of five major components: the atmosphere, the hydrosphere, the cryosphere, the lithosphere, and the biosphere.
- **Adaptation:** The process of adjustment to actual or expected climate and its effects in order to moderate harm or exploit beneficial opportunities.
- **Mitigation:** Human intervention to reduce emissions or enhance the sinks of greenhouse gases.

Background Information

The Earth's climate has changed throughout history. However, the current warming trend is of particular significance because it is unequivocally the result of human activity since the mid-20th century and is proceeding at an unprecedented rate over decades to millennia.

The primary driver of current climate change is the human emission of greenhouse gases from fossil fuel combustion, deforestation, and other activities. These emissions have caused the global average temperature to rise by approximately 1.1°C since pre-industrial times. This may seem small, but it represents a significant amount of heat energy added to Earth's climate system.

As early as the late 19th century, scientists began to suspect that human activities could change the climate. By the 1960s, warming trends were becoming apparent. The 1980s and 1990s saw growing evidence and concern about human-induced climate change. In 1988, the

Intergovernmental Panel on Climate Change (IPCC) was established to assess the scientific basis of climate change, its impacts and future risks, and potential adaptation and mitigation options.

Since then, our scientific understanding of climate change has advanced tremendously. There is now unequivocal evidence that human activities are causing global warming. The impacts are already being felt around the world and are projected to become increasingly severe without urgent action to reduce greenhouse gas emissions.

Major Countries and Organizations Involved

1. **United Nations Framework Convention on Climate Change (UNFCCC):** An international environmental treaty adopted in 1992 to address climate change. Its secretariat organizes annual global climate summits called COPs (Conference of the Parties).
2. **Intergovernmental Panel on Climate Change (IPCC):** The United Nations body for assessing the science related to climate change. It provides policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and potential adaptation and mitigation options.
3. **United States:** Historically the largest emitter of greenhouse gases, though now second to China. Withdrew from the Paris Agreement under the Trump administration but rejoined under Biden.
4. **China:** Currently the world's largest emitter of greenhouse gases. Has pledged to reach carbon neutrality by 2060.
5. **European Union:** Has been a leader in climate policy, setting ambitious emissions reduction targets and implementing an emissions trading system.
6. **India:** The third-largest emitter of greenhouse gases. Has set renewable energy targets but faces challenges in its development goals.
7. **Small Island Developing States:** Particularly vulnerable to the impacts of climate change, especially sea level rise. Have been vocal advocates for ambitious climate action.

Timeline of Events

- **1824:** Joseph Fourier describes the Earth's natural "greenhouse effect"
- **1896:** Svante Arrhenius calculates that doubling atmospheric CO₂ would raise global temperatures
- **1938:** Guy Callendar argues that CO₂ greenhouse global warming is underway
- **1958:** Charles David Keeling begins measuring atmospheric CO₂ at Mauna Loa, Hawaii
- **1988:** Intergovernmental Panel on Climate Change (IPCC) is established
- **1992:** UN Framework Convention on Climate Change (UNFCCC) is adopted
- **1997:** Kyoto Protocol is adopted
- **2006:** An Inconvenient Truth documentary is released
- **2007:** IPCC and Al Gore are awarded the Nobel Peace Prize
- **2015:** Paris Agreement is adopted at COP21
- **2018:** IPCC Special Report on Global Warming of 1.5°C is released
- **2021:** IPCC Sixth Assessment Report states climate change is "unequivocally" caused by humans

Relevant UN Treaties and Events

- **1992:** United Nations Framework Convention on Climate Change (UNFCCC)
- **1997:** Kyoto Protocol
- **2015:** Paris Agreement
- **2021:** Glasgow Climate Pact (COP26)
- **Annual:** Conference of the Parties (COP) to the UNFCCC

- **IPCC:** Assessment Reports (released every 5-7 years)
- **2019:** UN Climate Action Summit

Previous Attempts to solve the Issue

International efforts to address climate change have been ongoing for decades, with varying degrees of success:

- **Kyoto Protocol (1997):** Set binding emissions reduction targets for developed countries. While an important first step, it did not include major emitters like the US and China.
- **Copenhagen Accord (2009):** Attempted to establish a new global climate agreement but failed to reach consensus. Resulted in voluntary pledges instead.
- **Paris Agreement (2015):** A landmark accord that aims to limit global temperature rise to well below 2°C above pre-industrial levels, and preferably to 1.5°C. All countries set their own emissions reduction targets (NDCs).

While these agreements have raised global awareness and spurred some action, greenhouse gas emissions have continued to rise. The current pledges under the Paris Agreement are insufficient to meet its temperature goals.

Possible Solutions

1. Accelerate the transition to renewable energy sources and phase out fossil fuels.
2. Implement carbon pricing mechanisms (e.g., carbon taxes or cap-and-trade systems) to incentivize emissions reductions.
3. Increase investment in research and development of clean energy technologies and negative emissions technologies.
4. Enhance energy efficiency across all sectors (buildings, transportation, industry).
5. Protect and restore natural carbon sinks like forests and wetlands.
6. Reform agricultural practices to reduce emissions and increase resilience.
7. Strengthen climate education and public awareness campaigns.
8. Increase climate finance to support developing countries in mitigation and adaptation efforts.

9. Implement nature-based solutions that address climate change while providing co-benefits for biodiversity and human well-being.
10. Strengthen international cooperation and accountability mechanisms for climate action.

Bibliography

1. Intergovernmental Panel on Climate Change. (2021). Climate Change 2021: The Physical Science Basis.
 2. United Nations. (2015). Paris Agreement.
 3. NASA. (2022). Climate Change: How Do We Know?
 4. National Geographic. (2022). Effects of global warming.
 5. World Meteorological Organization. (2021). State of the Global Climate 2020.
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Useful Links for Further Research:

- IPCC Reports: <https://www.ipcc.ch/reports/>
- UNFCCC Website: <https://unfccc.int/>
- NASA Climate Change Website: <https://climate.nasa.gov/>
- World Resources Institute Climate Data: <https://www.wri.org/data>
- Climate Action Tracker: <https://climateactiontracker.org/>