

**Climate Change: An Urgent Call for Action**

Ricardo Huereca

Texas A&M University

URPN-460

Dr. George O. Rogers

Apr 17, 2024

In 2021, a town in Canada recorded a temperature that was unthinkable for its latitude and historical climate data. At around 6pm there was a major town wide evacuation issued after buildings caught on fire and the climate reached a high of 121.3°F, shattering all past records. This event is not one of the only ones, there has been a continuous pattern of isolated incidents that give a clear signal that the Earth's climate system is undergoing profound changes. Such extremes are becoming the new normal, heralding a future where unpredictability becomes the only predictable element. This alarming trend underscores the imperative to address climate change, not as a distant threat, but as a current reality that is reshaping our world and the conditions of human and non-human life on it.

In order to fully understand what climate change is and for the purpose of clarification, climate change will be defined in accordance with the Intergovernmental Panel on Climate Change (IPCC) as “a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer.” This definition encapsulates the broad range of alterations occurring in our planet's climate system, including, but not limited to, temperature increases, altered precipitation patterns, and more frequent and severe weather events. It acknowledges both natural and anthropogenic (human-caused) factors, but given the overwhelming evidence, the focus will primarily be on the human activities that have become the dominant force driving these changes since the mid-20th century.

Climate change encompasses a myriad of effects and interactions within the Earth's atmosphere, hydrosphere, cryosphere, and biosphere. Its multifaceted nature means it not only impacts weather patterns but also has profound consequences for ecosystems, human societies, and economies globally. Thus, understanding climate change is not just about observing

temperature increases; it's about recognizing the interconnectedness of all these systems and the cascading effects changes one can have on another. The reality of climate change is questionable due to its confusion of facts and definition but when truly analyzing the meaning, significance, and full understanding climate change is far from a hoax. It is a profound and escalating threat that poses multifaceted risks to the environmental stability, economic vitality, and social fabric of our nation and the world at large.

The primary issue at the heart of anthropogenic climate change is the unprecedented increase in greenhouse gasses, particularly carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O), which trap heat in the atmosphere. This trapping of heat, known as the greenhouse effect, is a natural and necessary environmental process that keeps our planet warm enough to support life. The process has different periods of increases and decreases. Our planet cycles through them as time progresses. Therefore the development of a warmer environment is normal and would happen without any human intervention. However, human activities, primarily the burning of fossil fuels such as coal, oil, and gas for energy, have dramatically increased the concentration of these gasses beyond natural levels, enhancing the greenhouse effect far more than normal rates would. There is an accelerated rate of warming that doesn't allow for adaptability of the environment against it. Other contributing factors can be scientifically traced towards the human removal of carbon sinks like forests and wetlands along with the increase of chemical fertilizers. These activities are disrupting natural ecosystems and processes that would otherwise be regulating the climate system. This is where we begin to see an increase of strong weather patterns such as hurricanes, droughts, and heatwaves, as well as rising sea levels.

The scientific evidence and research clearly illustrate the extent to which human activities have directly influenced global temperature changes. According to the IPCC's most recent

findings, "The global average surface temperature has increased by approximately 1.0°C above pre-industrial levels." Alongside this temperature rise, the IPCC also reports that sea levels have risen about 3.2 mm per year over the last two decades. Moreover, the rate of sea level rise has accelerated recently due to increased melting of ice sheets in Greenland and Antarctica, as highlighted in the IPCC's Special Report on the Ocean and Cryosphere in a Changing Climate (2019).

These changes pose a substantial threat to our nation and must be addressed with utmost seriousness. One of the most recent and severe examples occurred in Texas. In 2017, Hurricane Harvey struck Houston, unleashing unprecedented devastation."In 2017, Hurricane Harvey struck Houston, unleashing unprecedented devastation. Over four days, the storm dumped approximately 27 trillion gallons of rain across the state, shattering all previous records for a single storm's rainfall." (NOAA) In the months leading up to the hurricane, the waters off the coast of Mexico were reported to be unusually warm, which enabled Harvey to carry a significantly larger amount of moisture, resulting in higher rainfall. The economic losses from Hurricane Harvey are estimated to be about \$125 billion, making it one of the costliest natural disasters in U.S. history, second only to Hurricane Katrina.

Turning to the west coast, the wildfires in California escalated dramatically in 2020. More than 4 million acres were consumed by fire, destroying thousands of homes and displacing numerous people and wildlife. This surge in wildfires can be attributed to the climate changes over the last few years, which have led to prolonged droughts, leaving behind an abundance of dead and stressed vegetation, highly susceptible to ignition. The August Complex fire of 2020, starting in August and becoming the largest single wildfire in California's recorded history,

burned over 1 million acres alone and was declared a "gigafire," a term used for a blaze that burns at least a million acres.

In August 2020, a powerful derecho—a widespread, long-lived windstorm—swept across the Midwest, particularly impacting Iowa. Originating in eastern Nebraska, the storm traversed Iowa and parts of Wisconsin and Illinois, bringing with it extremely strong winds that reached speeds of up to 140 mph in certain areas. The event caused extensive damage to homes, businesses, and millions of acres of crops, and left thousands without power. While derechos are not entirely new phenomena, the intensity and scale of this event were highly unusual. Research suggests that climate change, by altering jet stream patterns and increasing the frequency of extreme weather conditions, could make such destructive windstorms increasingly common. The volatile atmosphere, partly fueled by higher temperatures, creates conditions conducive to the development of severe storms like derechos.

Climate change affects more than just human-built infrastructure; it also significantly impacts biodiversity and natural ecosystems, leading to species loss and habitat degradation. As temperatures rise and precipitation patterns shift, many species struggle to adapt quickly enough, resulting in decreased biodiversity. This loss not only diminishes ecosystem resilience but also undermines their ability to provide essential services such as pollination, water purification, and carbon sequestration. The degradation of these natural systems poses serious challenges to efforts aimed at achieving environmental sustainability and maintaining the balance required for the planet's health. Additionally, the changes exacerbate food and water insecurity, directly affecting agricultural productivity and water supplies. For example, alterations in rainfall patterns and an increased frequency of droughts disrupt food production, drive up food prices, and lead to food scarcity.

Analyzing recent events that have caused massive destruction, some of which is irreversible, it becomes evident that failing to recognize climate change as a massive threat to our country would be irresponsible. Climate change is among the greatest threats our nation faces, and its impacts will continue to escalate unless we implement significant changes. Although some effects are now irreversible, there are several strategies we can adopt to minimize further damage. It is imperative that we act decisively to address this urgent challenge.

One of the most notable recent actions taken by the United States to combat climate change was rejoining the Paris Agreement in 2021. President Joe Biden promptly reentered the agreement after taking office, reversing the decision made by former President Donald Trump. The Paris Agreement is a global pact that aims to limit global warming to well below 2 degrees Celsius above pre-industrial levels. By rejoining, the United States has committed to reducing its carbon emissions by 50 percent from 2005 levels by 2030, signifying a renewed commitment to global cooperation in combating climate change.

Another significant legislative action is the Inflation Reduction Act of 2022, which represents the largest investment in combating climate change in U.S. history. This law allocates \$369 billion towards climate and energy measures, supporting advancements in technologies such as solar and wind power, electric vehicle infrastructure, and energy-efficient buildings. It also addresses methane reduction and carbon capture technologies, areas that have seen limited advancement in recent years (U.S. Congress, 2022).

On a community level, U.S. residents are increasingly adopting sustainable practices. There has been a noticeable shift towards walking or biking for short distances instead of driving, which has traditionally been the norm. This choice for sustainable transportation is complemented by widespread recycling efforts and waste reduction. Additionally, more residents

are choosing to install solar panels on their homes, opting for renewable energy over grid electricity, which is often generated from fossil fuels.

These collective efforts, from international agreements to individual lifestyle changes, highlight a growing awareness and proactive approach to mitigating climate change. It is through these varied but interconnected actions that we can hope to address the formidable challenges posed by global warming and ensure a sustainable future for subsequent generations.

Addressing climate change demands a comprehensive approach that involves the concerted efforts of international organizations, national governments, local communities, and individuals. It necessitates transformative changes in how we generate energy, manage resources, and lead our daily lives. By working together with determination, we can lessen the impacts of climate change and secure a sustainable future for forthcoming generations. Actions such as nurturing green spaces not only enhance our appreciation for these areas but also reinforce our resolve to preserve them. Practices like recycling, reducing waste, conserving water and energy, and choosing sustainable options are all essential steps that collectively contribute to making a significant difference for both this generation and those to come. Active participation and the initiative to educate others represent just the beginning of a journey towards a sustainable planet. This journey starts today, with the choices we make and the actions we undertake. Each decision and action paves the way toward sustainability, emphasizing the role each person plays in the broader context of environmental stewardship.

## References

- Intergovernmental Panel on Climate Change (IPCC). (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.
- IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.
- NOAA (National Oceanic and Atmospheric Administration). (2017). Hurricane Harvey's Rainfall and Economic Impact. Retrieved from NOAA website.
- Environmental Protection Agency. (2022). Summary of Inflation Reduction Act provisions related to renewable energy.
- OpenAI. (2023). Grammar and text assistance provided by ChatGPT. Retrieved from OpenAI