

Climate Change

Over the past decade, climate change has become a wildly polarized issue in America. Political conservatives ostensibly believe that the science is wrong, that the problem is not an American issue, or even that climate change is a hoax altogether. This rhetoric is not only absurd, it is dangerous to Americans and the world as a whole. The U.S. is the second largest emitter of CO₂, the primary cause of climate change, and yet the current administration is actively revoking measures to reduce emissions (Greshko et al. 2018). Contrary to the beliefs of many U.S. policymakers, climate change *is* real, it is already impacting the U.S., and we are running out of time to act.

The discovery of global climate change did not come from a single experiment or research paper. Bits of the current scientific understanding of climate change trace back over 100 years to 1824, when Joseph Fourier calculated that the Earth would be much colder without an atmosphere, and to 1859 when John Tyndall suggested that some atmospheric gases block infrared radiation (Burgess 1837, Tyndall 1859). Over the next 150 years, thousands of researchers slowly built the science of the Earth's climate and with it the realization that humans are drastically changing the atmosphere. For much of this time there was no debate. There was certainly the normal skepticism attributed to every new scientific discovery, but there was not the fury and blanket disbelief seen today. The science was new, and a clear picture didn't emerge until much later. An appropriate date to start the modern history of the climate change debate is in 1970, the year of the first Earth Day. While the focus was not the climate, the first Earth Day marked the global acknowledgement that humans were degrading the planet. By 1977, the opinion in the scientific community tended toward a global warming of the atmosphere, and that this warming would be the biggest risk of the coming century (Weart 2017). Criticism against the rising environmental movement came with the election of Reagan as president in 1981, when for the first time political conservatives were connected with skepticism about global warming (Weart 2017). This skepticism was followed immediately by the discovery of a rapid increase in

atmospheric CO₂ since the 19th century, which further muddled the issue (Maries). In 1983 global warming started to become a consistent debate in mainstream politics. Finally, by 1995 the scientists of the International Panel on Climate Change (IPCC) detected evidence that humans are causing the climate to change (Weart 2017).

As the science of climate change continues to grow, politicians, corporations, and wealthy conservatives are continuing their campaign of misleading the public. Between the year 2000 and the current iteration of the debate, the tune shifted drastically from a mostly scientific debate to a purely political one. Evidence from a 2007 report shows that ExxonMobile and the oil-tycoon Koch brothers spent millions of dollars to spotlight any claim against global warming (Union of Concerned Scientists 2007). This rhetoric continues today with the election of President Trump, who denies climate change entirely, and with the head of the EPA, who is actively trying to cut programs that limit US CO₂ emissions (Greshko et al. 2018). The New York Times explains that, “Most Republicans still do not regard climate change as a hoax...but the entire climate change debate has now been caught up in the broader polarization of American politics, and it’s become yet another of the long list of litmus test issues that determine whether or not you’re a good Republican” (Davenport and Lipton 2017). The authors suggest that politics and loyalty to a party are keeping policymakers from making the informed decision on climate change. With the divide between liberals and conservatives continuing to increase, it is unlikely these politicians will change their outward opinions or decisions anytime soon.

Neil deGrasse Tyson once said that, “The good thing about science is that it’s true whether or not you believe in it”, which is fitting because the science is clear, the climate is warming (Tyson 2014). The International Panel on Climate Change (IPCC) is a scientific body created by the United Nations for the task of, “...providing the world with an objective, scientific view of climate change and its political and economic impacts” (Weart 2017). More than 1000 researchers from around the world contribute to the reports published by the IPCC, and the IPCC is considered by most governments, the global authority

on climate change. Every subsequent report since the first in 1990 has language indicating the increasing certainty that the climate is warming and that humans are largely the cause. The first report states that, “We are certain of the following: emissions resulting from human activities are substantially increasing the atmospheric concentrations of the greenhouse gases carbon dioxide...” and that, “...we calculate with confidence that Carbon dioxide has been responsible for over half the enhanced greenhouse effect in the past...” (Houghton et al. 1990). The language used is intentional, the report does not say that global warming is caused by humans, only that it is likely that humans increased CO₂, and that CO₂ has caused a warming in the past. The 2014 report by contrast, after two and a half decades of advances in technology and increased research states that, “Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history... and are extremely likely to have been the dominant cause of the observed warming since the mid-20th century” (Pachauri and Meyer 2014). It is the nature of science that research cannot be proven completely true. Scientists can continually provide evidence that a theory is true, but there is always room for improvement and there *must* always be a chance a theory can be proven wrong. The use of the words ‘extremely likely’ in the 2014 report is as close as any reputable scientific research will get to stating that the findings are true beyond the shadow of a doubt. The science has never been more clear, anthropogenic release of carbon dioxide since the industrial revolution has created an enhanced greenhouse effect which has caused a warming of the planet. Any denial of this fact, especially by the acting president of a country already feeling the effects of global warming, is extremely dangerous.

Climate change is an American problem as much as it is a global problem. It is easy to disregard the effects of global warming when they occur elsewhere in the world, and according to research by Yale University, 50% of Americans do just that (Marlon et al.). Most of the more heavily reported impacts of climate change-melting glaciers, calving ice sheets, endangered polar bears, acidic oceans, dying coral reefs, and rising ocean levels-do not affect the everyday lives of Americans. But for every

distant impact there is an analog in the US. The 2011-2014 drought in California was the longest and most severe in 1200 years (Griffin and Anchukaitis 2014). The 2017 Atlantic hurricane season produced Irma, one of the two most powerful storms on record, and Harvey, which flooded Houston with a record amount of rainfall (Sneed 2018). And while researchers are hesitant to say that the strength of the entire season can be attributed to climate change, a study from Rice University suggests that the amount of rainfall attributed to Harvey was 1.5 to 5 times more likely to occur in 2017 than it was in the early 1900's, as a result of global warming (Oldenborgh et al. 2017). In economic terms, 2017 saw more billion-dollar natural disasters than any year on record, with a cumulative cost from the 16 events of \$309.4 Billion. While many individuals fail to see these events as effects of global warming, the government, during the previous administration, recognized the danger. The Third National Climate Assessment states that, "...impacts related to climate change are already evident in many regions and sectors and are expected to become increasingly disruptive across the nation throughout this century and beyond" (Melillo et al. 2014). The threat of climate change is already here and will only get worse in the coming years.

Climate models predict that extreme events will increase before the end of the century; we are running out of time to act. Researchers at the University of Hawaii have put forth a timeline of climate change based on climate normals. Climate normals are characteristics of the climate such as precipitation and temperature, averaged over a 30 year time period (NOAA). A set of climate normals for a given 30-year period is considered to be the 'climate' of that time period. The researchers from the University of Hawaii have combined periods and have calculated normals for the time span of 1860 to 2005 to be used as the defining 'climate' in their research. The researchers predict two scenarios where, "projected mean climate of a given location moves to a state continuously outside the bounds of historical variability" (Mora et al. 2013). Both timelines predict that we will reach the state in which

averages of precipitation, temperature and other characteristics of climate will move beyond any that humans have ever experienced. The first timeline was calculated supposing an “emissions stabilization scenario” and predicts that we will reach this new climate by 2069 (Mora et al. 2013). The second timeline considers a scenario in which we do not act to reduce our emissions. The researchers predict that if no changes to our emissions are made, we will reach a climate unknown to humans as early as 2047 (Mora et al. 2013). The timeline is particularly unsettling considering the current US has pulled out of the Paris Agreement, and by all indications has no intent to reduce emissions.

With climate change already impacting the US environmentally and economically, and with time running short, it is important to consider *why* politicians are against efforts to mitigate climate change. Climate deniers in the U.S. Government frequently point towards the economy as the reason for their backlash against climate change. Heedless of the irony of denying climate change on one hand and stating that the economy is more important than the climate on the other, politicians often cite the number of jobs that will be lost if the country moves away from fossil fuels. The problem with this argument is that it simply isn't true. Numbers from the Department of Energy show that in 2016 Solar Energy alone accounted for 373,807 jobs, more than twice the number of jobs in the coal sector (Popovich 2017). More importantly than the number is the fact that coal jobs have been in a steady decline since 2012, while solar jobs have continued to rise (Popovich 2017). Other arguments, some as fanciful as the idea that more CO₂ is a good thing, have been thoroughly debunked by the scientific community and yet most conservative politicians remain dedicated to maintaining the status quo.

Much of the history of climate change is riddled with scientific debate. From the 1950's to the 1970's the debate was focused on whether the climate was warming and what was causing it. From the 1970's to the late 1990's the debate shifted towards the question of how to solve the problem, with a few mainstream denials. It wasn't until the early 2000's that the issue became highly political, and not until the administration of President Trump that the government actively started to deny and revoke

protections from climate change. The U.S. was once a world leader in both science and technology but has fallen into a state that it is acceptable to deny basic science. Regardless of the opinions of policymakers, climate change is a real issue that is already impacting the habitat and the economy of the U.S. The impacts will become more severe, and before the end of the century the Earth is likely to reach a climate unknown to modern humans. The changing climate is the most important issue facing the world as a whole, and the U.S. needs to once again become a world leader by reducing emissions and mitigating change.

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