In the past, the US has displayed ambivalence about international efforts to combat climate change. For example, U.S. Administrations have entered, rejected, and now re-entered the Paris Climate Accords. Given political polarization in the US, how steady will American leadership be? How might the negative effects of policy responses to climate change, including losses in industries based on fossil fuels, be tempered? How is climate change, and responses to climate change, affecting the balance of power across the world and reshaping international relations? How might climate change impact U.S. economic and military dominance? Can new or prospective technologies reduce global warming and slow, halt, or reverse environmental damage?

Climate Change: Can the U.S. Lead the International Fight?

Lt Col James "Jim" R. Hughes

Introduction

President Biden made a deliberate shift in U.S. foreign policy on climate change by taking action to rejoin the Paris Agreement on his first day as President on January 20th 2021.[1] The U.S. has also pushed forward with legislation seeking to address climate change in the form of the Inflation Reduction Act, which was signed into law by President Biden on August 16th.[2] Elizabeth Kolbert gave a perspective on this act regarding addressing climate change on the New Yorker Radio Hour (from WNYC Studios). She observes that this is a noteworthy moment as this legislation is described as "the most significant piece of legislation the Senate has ever passed on climate change", but this is put into perspective by the fact that it is really the first legislation that addresses climate change.[3]

Climate change is a frequent topic in news coverage and arguably is gaining more attention in recent years. In fact, a Pew Research poll conducted in the spring of 2020 found that 65% of Americans stated that the "Federal government is doing too little to reduce effects of climate change."[4] Also, 60% "view climate change as a major threat to the well-being of the United States."[5] The Pew polls also found that while there is little regional difference regarding views on climate change, there are significant partisan differences. For example, regarding impacts on the community, 83% of Democrats (or leaning Democrat) agree that climate change is affecting their community, while only 37% of Republicans (or leaning Republican) agree concerning local impacts.[6] This raises the question of what the true risks are compared to public perception. But from a policy standpoint, public perception can drive political action.

What climate change policies are in the best interest of the U.S.?

What policies are the best for addressing climate change globally?

Are these questions complementary, opposing, or a mix?

Can the U.S. benefit from addressing climate change?

These are just a few of the questions to consider when making climate policy recommendations.

Why is Climate Change a Global Concern?

To provide some context on whether the U.S. has an interest in addressing climate change, we will look at some highlights from the systematic review provided by the latest

International Panel on Climate Change (IPCC) reports. This paper will not provide a deep dive into the legitimacy of the IPCC, but arguably this community effort is the best launching point to evaluate the impacts, risks, and recommendations regarding climate change. In fact, referring to an earlier report in 2018, Michael Mann (a climate scientist from Penn State) responded to criticism that the IPCC was alarmist by stating that "…it is the opposite. Once again, with their latest report, they have been overly conservative (i.e. erring on the side of understating/underestimating the problem.)."[7] It should not be surprising that a consensus report like the IPCC may err on the side of being conservative, since they have to reach a consensus which should discourage extreme or anomalous views. Keep this consensus model in mind as we review some highlights from the report, to provide a motivation for why climate change may be worth addressing through U.S. policy.

First let's look at the IPCC's assessment of changes to the Earth system in their report on "The Physical Science Basis" from the Sixth Assessment Report in August 2021.[8] Then we will look at some highlights from the February 2022 report on "Impacts, Adaptation and Vulnerabilities."[9] The following overarching statement frames the discussion well, in terms of the basic cause and effect of climate change as assessed in 2022.

> *It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.*[10]

As a reminder this is a consensus report, which tends to filter out extreme views. In that context this is a strong statement of the current gravity of the situation. The following figure sheds light on the significant changes in temperature since the industrial age.

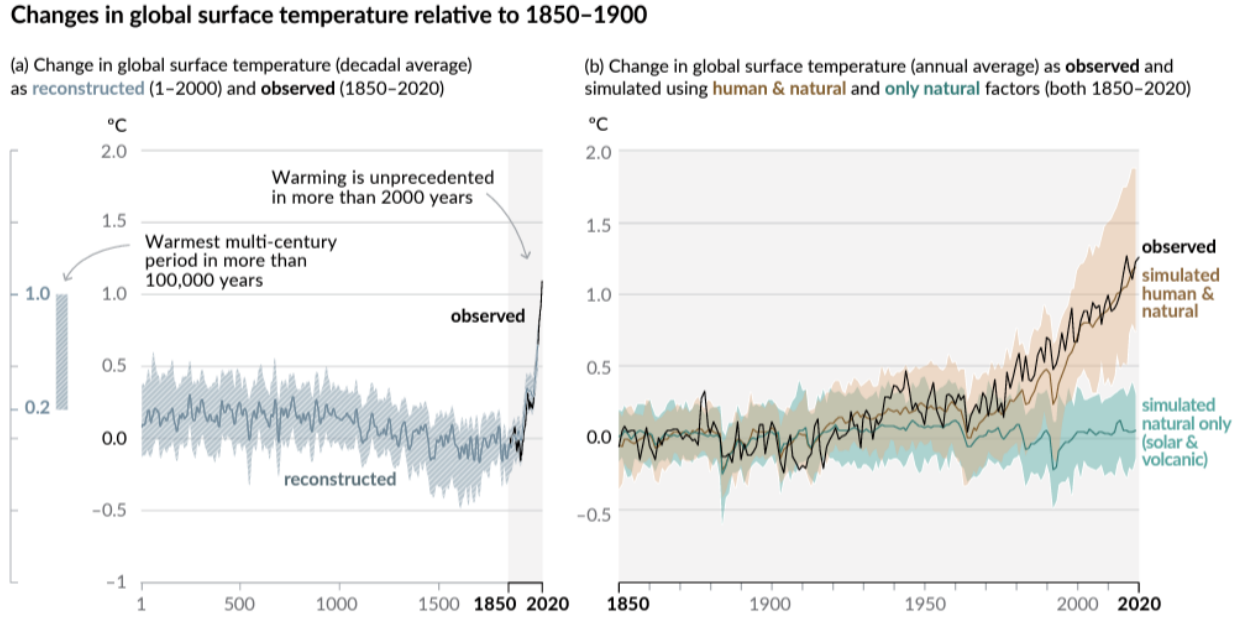

Figure 1: "Panel (a): Changes in global surface temperature reconstructed from paleoclimate archives (solid grey line, 1–2000) and from direct observations. (solid black line, 1850–2020)" "Panel (b): Changes in global surface temperature over the past 170 years (black line)"[11]

While Panel (a) shows the rapid increase in average global temperatures, Panel (b) emphasizes the human cause of this climate change by comparing a simulation with human and natural inputs (tan color) with a simulation that removed the human input (teal color).[12] Also note that the simulation is compared against actual observations (black line), to show the credibility of this approach. In other words, changes in the Sun's output or CO2 emissions from volcanoes cannot explain the rapid change in climate that we have observed. This panel is focused on policy approaches to dealing with climate change, so establishing that climate change is clearly a human-caused problem is an important first step before developing policy approaches. What human activities have caused this change, so we know what policy approaches could change this trend?

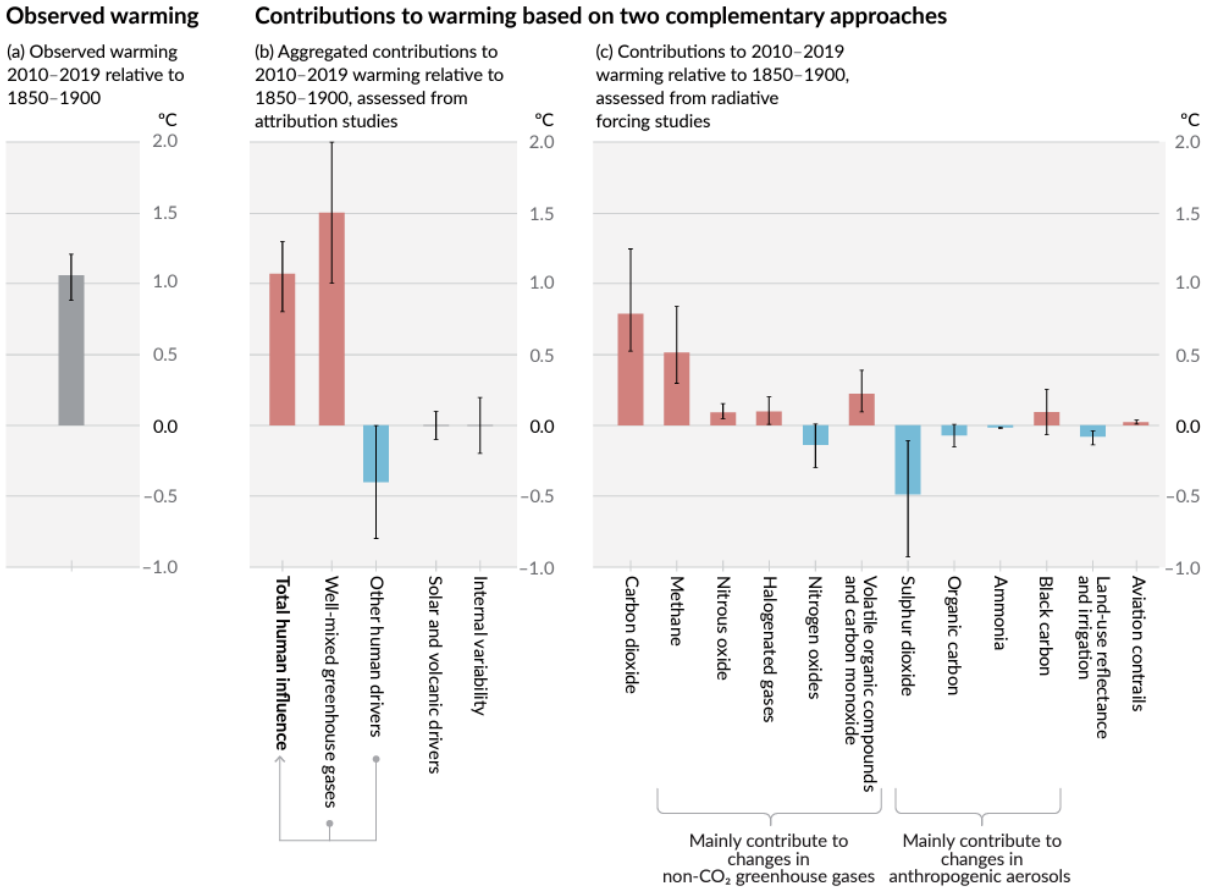

Figure 2: "Panel (a): Observed global warming…" "Panel (b): Evidence from attribution studies, which synthesize information from climate models and observations." "Panel (c): Evidence from the assessment of radiative forcing and climate sensitivity."[13]

Figure 2 from the IPCC report highlights the impact of greenhouse gas emissions such as carbon dioxide (CO2) and methane. It also shows that some human actions work against warming such as sulfur dioxide, which can reflect incoming solar radiation.[14] Of note, even though sulfur dioxide mitigates warming, it can harm human health when inhaled, damage vegetation, and help produce acid rain.[15] The Environmental Protection Agency (EPA) provides additional insight on the sources of greenhouse gas emissions in the U.S., with 27% from transportation, 25% from electric power generation, 24% from industry, 13% from commercial

and residential sources, and 11% from agriculture.[16] This breakdown starts to raise questions about how we can reduce these greenhouse gas emissions. A couple areas that come to mind are related to the largest two categories. Switching transportation sources to electric vehicles could reduce emissions as long as the electricity generation also switches to sources other than fossil fuels, to include solar, nuclear, wind, hydroelectric, and geothermal. In fact, this is increasingly the case since "Renewable energy is the fastest-growing energy source in the United States, increasing 42 percent from 2010 to 2020 (up 90 percent from 2000 to 2020)."[17] The commercial and residential sector also raises some options for reduction through more efficient heating, better insulation, etc., since the EPA states that one of the main sources of emissions in this sector is from heating.[18]

Next, we turn to the 2022 IPCC report to shed light on the impacts from climate change. The following statement from the report summarizes the scope of the impact.

> *Human-induced climate change, including more frequent and intense extreme events, has caused widespread adverse impacts and related losses and damages to nature and people, beyond natural climate variability. Some development and adaptation efforts have reduced vulnerability. Across sectors and regions the most vulnerable people and systems are observed to be disproportionately affected. The rise in weather and climate extremes has led to some irreversible impacts as natural and human systems are pushed beyond their ability to adapt. (high confidence)*[19]

There are a lot of details on impacts, adaptations, and vulnerabilities to digest in the full report, but you can see the motivation for international collaboration and government action to address these changes. The IPCC report highlights that there are "irreversible impacts", which reinforces the need to also look at adaptations to deal with climate change.[20] This opens a lot of discussion regarding policy since there are multiple avenues to address climate change. Finally, the report's observation that "the most vulnerable people and systems are observed to be disproportionately affected"[21] raises questions about international stability and possible sources of conflict that could affect U.S. security and/or disaster relief operations.

> Based on the source of greenhouse gas emissions in the U.S., what policy choices make the most sense to reduce these emissions?
>
> What role can technology play in the U.S. for addressing sources of greenhouse gas emissions? Could this benefit the U.S.?
>
> Are there roles for technology to address climate change beyond reduction in greenhouse gas emissions? What are some examples?
>
> How could impacts to vulnerable populations affect U.S. security or U.S. defense policy?

Past International Efforts to Address Climate Change

As noted earlier, the U.S. played a role in formulating the Paris Agreement[22], which was adopted by 196 Parties in 2015 with the goal to "limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels."[23] The Paris Agreement moves towards this goal through mandatory nationally determined contributions (NDCs) that

take aim at reducing greenhouse gas emissions and adapting to climate change; the agreement also encourages non-mandatory long-term goals.[24] As of 8 October 2022, 53 Parties have submitted long-term strategies.[25] For example, in November 2021 the U.S. set a long-term goal of reducing greenhouse gas emissions to net-zero by 2050 through transforming industry, investing in clean energy, switching to electric power for transportation, etc.[26] Finally, the agreement fosters collaboration on finance, technology, and capacity-building, encouraging developed nations to help developing countries.[27]

President Trump decided to leave the Paris Agreement with an announcement in June 2017, but this did not take effect until November 2020, marking the U.S. as the first nation to withdraw from the agreement.[28] The decision to withdraw was part of President Trump's campaign pitch, with a justification to withdraw based on an initiative to revive the economy with fossil fuel energy production; he also pointed to the disparity between the U.S. taking action while India and China do not.[29] As the largest economy in the world, this withdraw raised questions of trust in addressing this global issue.[30] A negotiator from Belize, Carlos Fuller noted this as "…a big blow to the Paris agreement," and that "We actually worked very hard to ensure that every country in the world could accede to this new agreement…" and "…by losing one, we feel that basically we have failed."[31] It is easy to see how the action of the U.S. could have substantially undermined the goals of the agreement. Despite the pledge to withdraw, negotiators from the Trump administration continued to participate in climate talks but promoted fossil fuels.[32]

Finally, despite the policy shiftat the federal level, the U.S. did not truly make a full reversal regarding climate change, with states and private industry taking action, including America's Pledge led by California Governor, Jerry Brown and Michael Bloomberg, the former mayor of New York.[33] It is also noteworthy that BNP Paribas Asset Management, which controls Chevron's majority vote directed that the oil company fall in line with the Paris Agreement for lobbying on climate.[34] These other state and private sector actions suggest that despite changes in leadership and political direction in the federal government, there may be reason to have long term confidence in the U.S. contributing to the global fight against climate change.

President Biden reversed gears on the international front by rejoining the Paris Agreement in 2021, with Secretary of State Antony Blinken noting this agreement as "an unprecedented framework for global action."[35] Secretary Blinken also emphasized that the U.S. helped to build and establish the agreement in the first place. The goals are twofold: decrease the amount of climate change and build resilience to these changes.[36] He expanded the scope of U.S. international efforts beyond these treaties with the following statement:

> *Climate change and science diplomacy can never again be "add-ons" in our foreign policy discussions. Addressing the real threats from climate change and listening to our scientists is at the center of our domestic and foreign policy priorities. It is vital in our discussions of national security, migration, international health efforts, and in our economic diplomacy and trade talks.*[37]

Furthermore, this opened the door for the U.S. to partake in the COP26 (UN Climate Change Conference of the Parties) in Glasgow.[38;39] The U.S. was able to play a role in securing

the Glasgow Climate Pact in November 2021.[40] The COP26 President, Alok Sharma, highlighted that "We can now say with credibility that we have kept 1.5 degrees alive. But, its pulse is weak and it will only survive if we keep our promises and translate commitments into rapid action."[41]

How would the Glasgow Climate Pact have turned out without the U.S. returning to the Paris Agreement?

Would the U.S. have more influence in the international community if it showed a steady commitment to combating climate change across changes in administrations?

Current State of Affairs: The Inflation Reduction Act

For an example of how policy can affect climate change, let's look at the Inflation Reduction Act from 2022. The bill includes over $300 billion for investment in energy and addressing climate change, which includes $60 billion to support manufacturing of wind turbines and solar panels to enhance renewable energy capabilities.[42] Elizabeth Kolbert points out that this legislation mostly uses incentives to address climate change. These incentives are in the form of tax credits for consumer goods such as heat pumps and electric vehicles.[43] Democrats claim there will be a 40% reduction in greenhouse gas emissions by (2030 from 2005 levels) because of this bill.[44]

Dr. Steven Novella summarizes the approach in the Inflation Reduction Act as using the "carrot not the stick."[45] He states that the goal is to transition to an economy that no longer relies on fossil fuels. Novella argues that this 'carrot' approach is more feasible politically: although increasing the cost of fossil fuels could decrease the demand for the fuel it would increase the profitability for the fossil fuel industry. Instead, if you reduce the cost of fossil fuels while providing cheaper alternatives (green energy) there is less business incentive to extract fossil fuels. Novell emphasizes that we should focus on the "win-win" approaches. This bill incentivizes car companies to switch to electric vehicles and consumers to buy these vehicles.[46] Both approaches could accelerate the transition to electric vehicles—the demand is already high.[47] Novella notes that the compromise with Senator Manchin to allow more fossil fuel extraction on federal land was worth it since it is politically popular to reduce oil profits for Russia and that the good outweighs the bad. This bill could help normalize this approach to addressing climate change. He suggests that the US could be at a tipping point where these technologies/approaches become sufficiently popular that it is hard to take them away, drawing a parallel to Obamacare which, once its benefits were established, was hard for another administration to remove.[48] This highlights the importance of U.S. policy at key junctures. Novella argues that focusing on the positive is more feasible.[49] Later in the paper we will look at some alternative policy approaches to consider which are more of the 'stick' approach.

Elizabeth Kolbert points out that if all vehicles were converted to electric vehicles and if this electricity was from sources that do not emit carbon, this could make a significant impact on climate change.[50] This could have a global effect because the U.S. has been one of the biggest emitters of carbon, responsible for one quarter of the CO2.[51] But even as U.S. emissions decline, other countries have rising emissions.[52] She observes that the problem of emissions and climate change doesn't get "solved." Rather, "You simply make it worse or less worse."[53]

Do you think the Inflation Reduction Act will change global perception of the U.S. resolve to fight climate change?

Will this type of legislation become more popular over time? Will it become less partisan?

What do you think about Elizabeth Kolbert's statement on the political challenge facing climate change remedies? Is this a policy fight worth taking on?

How Can Policy Decisions Affect Climate Change?

One policy approach that can be considered for the U.S. is putting a price on carbon, through either a cap-and-trade scheme or a carbon tax, which are both designed to put a burden on those emitting greenhouse gasses.[54] This is analogous to using a stick instead of a carrot (through incentives like subsidies, federal investment, tax credits). The Citizen's Climate Lobby notes that more than 45 countries put a price on carbon and that the U.S. is one of the two developed nations that do not use this policy approach.[55] This fact highlights that the U.S. may be lagging behind the rest of the world in regard to addressing climate change, which may affect its global influence. Or some nations may look at the U.S. and use it as an example for why they also do not need to take these approaches.

A potential benefit of implementing carbon pricing is that it requires entities emitting carbon to shoulder costs which are otherwise externalized to the public (such as impacts from sea level rise, flooding, health care, etc.).[56] Although the U.S. does not have a carbon pricing policy at the federal level, California has a cap-and-trade scheme that was implemented in 2012, and the following states also have some type of emissions trading schemes in place or planned: Oregon (2021), Washington (2023), Massachusetts (2018).[57] The action taken at the state level suggests again that the U.S. is not a monolith when it comes to addressing climate change and efforts may continue regardless of which political party is in the White House or which party controls Congress.

What are the benefits and drawbacks of using a carbon pricing system?

How does this approach compare to the policies from the Inflation Reduction Act? Which approach is more political feasible? Which approach would have more bipartisan support (or would neither)?

A minor example of how policy decisions could affect climate change, is presented by the Mohonk Preserve, "New York's largest nonprofit nature preserve", which is a short drive from West Point and is a well-known rock-climbing destination.[58] It can serve as an example of how non-government organizations are trying to address climate change and we can consider how federal policy may influence their goals or ability to achieve those goals. A recent letter from the president of the preserve, Kevin Case, highlights the preserve's focus on addressing climate change.[59] He states that the need to address climate change has come into focus over the last two years, with examples of erosion to carriage roads and impacts to hemlock trees.[60] To be fair, it may be hard to directly link climate change to the erosion of carriage roads from heavy rains, which could happen without climate change. On the other hand, the threat to hemlocks is twofold: it could reduce habitats where the hemlock can grow and also prompt the expansion of

the invasive hemlock wooly adelgid (HWA), which can kill hemlock trees -- with warmer winters more of the HWA survive.[61] Regardless of the scientific evidence, much of the motivation to address climate change could be due to a shift is public perception of this problem and an interest from members and supporters in places like the preserve to be proactive on this front. What is Mohonk planning to do about it? The following are their focus areas:

1. *Protecting habitats that are naturally resilient to climate change.*
2. *Minimizing greenhouse gas emissions.*
3. *Establishing renewable energy production.* [62]

Item #1 on protecting habitats is fundamental to the mission of a nature preserve regardless of whether they are trying to deal with climate change, but Kevin Case points out that the Mohonk land ranks high for resilience to climate change and can provide habitat for species that are shifting where they live due to climate change.[63] Items #2 and #3 are related to approaches that are incentivized by the Inflation Reduction Act. For example, Mohonk Preserve wants to shift to electric vehicles, expand their EV charging capabilities and install a solar array.[64] These are the types of investments that the Inflation Reduction Act is trying to promote. Perhaps this policy will make it more affordable for non-profit organizations and private enterprises to make investments in technology that reduces dependence on fossil fuels. Even though tax credits for consumer goods may not benefit non-profits directly, it could help stimulate investment in these technologies, leading to improvements in technology, lower productions costs, and more efficient operations overall over time. Although fossil fuels are still used for electricity production, an increase in the number of electric vehicles could position the U.S. to benefit from the shift of energy production to lower carbon-emitting sources. In 2021 60.8% of electricity generation in the U.S. came from fossil fuels, while 20.1% came from renewables.[65] The percentage from renewables can be expected to continue increasing (with influence from recent Federal policy). On another note, 18.9% of electricity generation in 2021 relied on nuclear power production[66], which is another potential growth area to reduce greenhouse gas emissions. The Mohonk Preserve example demonstrates the kinds of changes that organizations are willing to make (perhaps without any policy incentives so long as there are sufficient push-pull factors, including dynamic leadership and public support).

This example does present some interesting questions to consider:

What motivates a non-profit to address climate change?

Are motivations for a non-profit different than for a corporation or private individuals?

What are the relative roles of government policy initiatives and public sentiment in driving these changes?

Role of Climate Change on International Balance of Power

Elizabeth Kolbert from the *New Yorker* discusses the possibility that democracies might not be the best poised to deal with climate change. She notes that the U.S. lacks sufficient support for addressing climate change and that the fossil fuel industry may play a role in the resistance to take political action. While she posits that perhaps a dictator could be better positioned to address climate change, she also recognizes that European democracies have done

much more than the U.S. in taking action. Yet Kolbert also feels that democracies in general have "not risen to the challenge."[67]

Also, despite the fact that U.S. is moving forward to address climate change, it is important to recognize the international complexities that may intersect with effort and hobble it. Kolbert points out that in response to the Speaker of the House's recent visit to Taiwan, China announced that it would no longer cooperate with the U.S. on climate change.[68] Certainly this is concerning from a global perspective. Regardless of other political issues, cooperation with China could play a significant role in controlling future carbon emissions.

In discussing the interconnected, global nature of addressing climate change, Dr. Novella notes that some observers criticize the utility of addressing climate change since large emitters like India and China have yet to take sufficient substantive steps to address this global problem. But the U.S. is still the world's largest economy, and climate reform could give the U.S. moral leadership on the global stage, which gives leverage with our allies.[69] American leadership on the climate also promotes American interests: it makes the U.S. more competitive in the green economy and drives improvements in industrial technology and R&D that could have global effects.[70] Novella summarizes this global influence by noting that U.S. leadership would have "implications far beyond America's shores when it comes to green energy."[71]

U.S. leadership on global warming, although in flux through the past decades, may be more consistent, and also carry more weight internationally, if the perceived threat from climate change is growing around the world. An example is Pakistan where 1,033 people died (as of 29 Aug 2022) due to flooding from extreme monsoon rains.[72] Pakistan's prime minister, recognizing the potential impact from climate change, pointed out that Pakistan is "…on the front line of climate change despite a relatively small carbon footprint…" and that his country "…must focus its rehabilitation toward greater climate change resilience."[73]

It is likely too early to directly link the flooding to climate change, but it is certainly plausible that flooding overall is worse due to climate change. Regardless of the scientific evidence, this example shows that politicians may find it politically advantageous – for both domestic and international audiences -- to underscore climate change in their messaging. It is also a sign of growing attention to climate change that the Prime Minister talks about resiliency. Resiliency is something from which much of the world could benefit regardless of each nation's carbon footprint/output. Climate change is a global problem, and its impacts on a country are not necessarily proportional to its share of the cause (burning fossil fuels, releasing carbon, etc). In other words, nations with little historic carbon emissions might still be greatly affected by climate change. Recognizing the international character of the challenge, CENTCOM commander, GEN Kurilla offered to send a team to Pakistan to evaluate how the DoD can assist USAID with disaster relief.[74] Such support demonstrates that America's values and interests both guide the U.S. to reduce human suffering due to climate change and also help prevent the political instability that may result from it. In short, the global impact of climate change on the United States is growing as we experience "…more frequent and intense extreme events…", as described in the 2022 IPCC report.[75]

There are many policy perspectives to consider but here are a few questions to prompt discussion:

What are the benefits of a nation like Pakistan fully embracing the need to deal with climate change in their political messaging? What countries might be more reticent to fully embrace the fight against climate change?

How is the U.S. impacted by humanitarian disasters like the flooding in Pakistan?

Do you think a future president could fully reverse course on initiatives to combat climate change like those in the Inflation Reduction Act?

What U.S. policy approaches would be most effective over the long term for combatting climate change? In other words, how could you shield against possible policy shifts due to changes in political power?

What U.S. policy approaches might be most effective in influencing other nations to act on climate change?

Conclusion

How will the U.S. move forward? Will America back away from leading on climate change policy with a change in administration in 2024? Certainly, climate change is a global issue by nature so it is natural to look at how the U.S. will influence this global challenge. Science should inform policy decisions on climate change, but it is not solely a scientific decision. Policy recommendations must also consider economic impacts (or opportunities), political will, feasibility of implementation, social psychology, etc. These factors will complicate any policy recommendations. So even though the basic science driving climate change is simple (burning more fossil fuels →increased greenhouse gasses in atmosphere → warming climate), the policy decisions in response to a changing climate can – and is likely to be -- challenging to formulate and implement.

Additional Discussion Questions

Is political leadership from the U.S. pivotal for making global changes to fight climate change or will other nations (or alliances) take more of a leadership role?

Is leadership from the U.S. resilient to changes in presidential administrations, especially changes in political parties? Why or why not?

If U.S. leadership on climate change diminishes in the future, what other global actors are likely to gain influence?

What are the benefits to the U.S. from addressing climate change? What are the negatives? How do these weigh in comparison?

Are all impacts from climate change negative? How could the U.S. capitalize on any benefits?

What is the role of non-federal entities in the U.S. for extending a global leadership role on combatting climate change? Considers states, corporations, NGOs, individual action, etc. Could this build resiliency to changes in political power in the White House?

Could dealing with climate change enhance U.S. influence globally by fostering collaboration? For example, could U.S. assistance in climate-related disasters help build stronger diplomatic ties and enhance the U.S. defense posture?

For Further Reading (or Viewing)

Note: Please watch the **Kurzgesagt video**, which is about 16 minutes long. This is an excellent summary of the climate change situation (as of April 2022) and should also stimulate policy discussions.

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