

An aerial photograph of a mangrove forest. A dark, winding waterway runs through the center of the image, flanked by dense, vibrant green mangrove trees. The trees have a complex, interconnected root system visible from above. The water reflects the surrounding greenery, creating a dark, almost black path through the forest.

10.

Adaptation

ADAPTATION FOR SAFE, RESILIENT COMMUNITIES

Key Takeaways:

- Adaptation is a cost-effective climate solution, and the private sector should play a leading role in assessing climate risk. Collaboration with the scientific community, federal, state, local governments, the private sector, and other stakeholders can maximize resiliency and preparedness for natural disasters.
- Bad policy exacerbates the risks and costs of extreme weather. Poor planning, overly burdensome permitting timelines, socialized risk, and failed coordination misallocates resources and inhibits the ability of communities to adequately prepare and respond to natural disasters.
- Policy reforms should allow for timely construction of more durable infrastructure. Quicker deployment of more resilient buildings, flood control prevention, and forest management practices will reduce the risks and costs of extreme weather events.

For the American people, there is perhaps no greater connection to climate change than when a natural disaster hits their community. Whether it is a heat dome in the Pacific Northwest, wildfires in Colorado, or a hurricane ravaging the Gulf Coast, the personal costs of extreme weather are far too real. Natural disasters take lives, ruin livelihoods, and destroy homes and businesses. From droughts that threaten crops to flooding at military installations, extreme weather affects nearly every aspect of the U.S. economy and government.

Of course, the scientific link between anthropogenic warming and extreme weather is extremely complicated. While there is scientific uncertainty about how climate change affects some extreme weather events, other effects are clearer. For instance, sea levels are rising at accelerating rates, and some regions of the planet are more susceptible to extreme heat. However, there is low confidence to link human-caused emissions to the frequency and intensity of tornadoes.¹

The National Oceanic and Atmospheric Administration (NOAA) summarizes the science of climate change's impact on hurricane activity in the Atlantic and around the world. In summarizing the literature, NOAA calls it "premature to conclude with high confidence" that there is a link between greenhouse gas concentrations and past hurricane activity in the Gulf Coast. However, NOAA projects with medium- to high-confidence that major hurricanes will increase in number and intensity if the planet incurs warming of two degrees Celsius.²

The improvement of detection and attribution science will better inform policymakers about anthropogenic activity's effect on natural disasters. Further, climatologists may be able to better estimate the likelihood of an extreme weather event as a result of human-induced warming. This chapter is not meant to be an exhaustive review of a tie between climate change and extreme weather. For trends, detection, attribution, and projections, see the Intergovernmental Panel on Climate Change's latest assessment report. Rather, climate change should not be an excuse for ineffective policies that increase the vulnerability of communities to extreme weather events.

The reality is: with or without manmade climate change, natural disasters are going to strike in the United States and around the world, and policy reforms should better enable preparation, response, and recovery. The examples of what we know and do not know about anthropogenic warming and extreme weather are meant to communicate four important points:

1. **Scientific knowledge is vital to help communicate our understanding of climate change and extreme weather.** Even with imperfect knowledge, the best available science should be a guide for policymakers. Accurately communicating risk and uncertainty will help allocate resources to their most valuable use to prepare and respond to natural disasters.
2. **Adaptation is a cost-effective climate solution, and the private sector should play a leading role in assessing climate risk.** Adaptation has already been instrumental in reducing climate-related deaths and risks. Collaboration with the scientific community, federal, state, local governments, the private sector, and other stakeholders can maximize resiliency and preparedness for extreme weather.
3. **Bad policy exacerbates the risks and costs of extreme weather.** Poor planning, overly burdensome permitting timelines, socialized risk, and failed coordination misallocates resources and inhibits the ability for communities to adequately prepare and respond to natural disasters.



4. **Adaptation investments are a complement, not a substitute, for global decarbonization.** Adaptation is a more immediate solution to reduce the public health and safety risks of extreme weather. But that does negate the need to reduce emissions globally. As with any approach, policymakers should carefully weigh costs, benefits, and tradeoffs.

HOW COMMUNITIES ADAPT TO CLIMATE CHANGE

Climate adaptation takes many forms. More resilient and reliable infrastructure is what may first come to mind. To be sure, constructing stronger levees, building sea walls, and installing door dams are projects that have helped save lives and protect communities. Investments in more efficient water management systems and sustainable agriculture can also help protect against droughts and floods.

Better information that more accurately communicates risk and aids in preparation is another form of climate adaptation. Early detection systems, visualization tools, up-to-date flood maps, computer modeling, satellite, and radar are several tools that scientists employ to track weather and storms. NOAA has 900 automated surface-observing stations that “report data about sky conditions, surface visibility, precipitation, temperature and wind up to 12 times an hour.”³ While there is still a great deal of complexity, uncertainty, and humility involved, technology provides tools for meteorologists and climatologists to be much better at predicting the size and scope of natural disasters to help mitigate the risk and damage.



Other preventative tools are education and warning systems. Accurately forecasting a devastating storm does little good if that risk is not quickly and accurately communicated to the public. Moreover, the information does little good if communities do not respond. Researchers at the University of Oklahoma’s National Institute for Risk and Resilience, Cooperative Institute for Mesoscale Meteorological Studies, and the National Severe Storms Lab are studying the intersection of scientific data and behavior sciences.⁴ They ran experiments in which weather forecasters communicated information about risks through briefings to experts, media, and Facebook posts before, during, and after a (simulated) tornado. They conducted the experiment in both Iowa and South Carolina. In building on databases and interactive platforms of effective means of communication, forecasters are better able to influence community emergency preparedness and responses.⁵

One should also not overlook the effectiveness of relatively low-cost options to reduce the risks of extreme weather. The availability of affordable and reliable air conditioning in the summer and dependable heat in the winter is climate adaptation. This is particularly true in developing countries where access to reliable electricity and clean drinking water are essential to improving their lives. For far too many people, access to dependable power, clean drinking water, and amenities we take for granted simply does not exist.

Writing in the Los Angeles Times, Shashank Bengali’s story of a young man in Mumbai emphasizes the importance of a good like air conditioning:

Raheel Shaikh had worked his way up from a \$90-a-month entry-level job in digital marketing to a position that paid 10 times as much. He remodeled the two-room apartment he shares with his parents, bought a motorbike and was planning his wedding in January. Finally, this summer, the 30-year-old Shaikh splurged on the new must-have item for the upwardly mobile Indian: an air conditioner.

On a warm afternoon in November, Shaikh sat inside his living room and explained how the \$800 Japanese appliance



*quietly exhaling overhead had made it easier for his parents to sleep in the deadening tropical heat of Mumbai, India's commercial capital, and bearable to work on his laptop late into the night. It had also pleased his fiancée to know she would move into an air-conditioned home.*⁶

In the same article, Dr. Nikit Abhyankar, a scientist at Lawrence Berkeley National Laboratory called buying an air conditioner in India “a threshold good — the moment you cross into that middle-class income level, you go and buy one.”⁷ Having the means to afford air conditioning underscores two fundamental points. The first is to acknowledge the challenge at hand of meeting the future energy needs of the developing world and reducing the risks of climate change. More energy use and more use of coolants for air conditioning means higher levels of emissions. The solution is not to keep developing countries de-developed but to reduce the green premium and rapidly deploy cost-effective alternatives. Reducing global poverty and reducing the risks of climate change must work together. The second is that higher levels of wealth and prosperity are beneficial for environmental progress, reducing emissions, and increased resilience.⁸

STRONGER ECONOMIES EQUAL MORE RESILIENT COMMUNITIES

Our Free Economies are Clean Economies report emphasizes that wealth improves health and cleans the environment.⁹ People with more wealth can afford products and technologies that make life easier, healthier, and cleaner. More wealth will give people more of the forms of climate adaptation mentioned above: comfortable settings in your home, technologies to maximize preparedness, and sturdier infrastructure. **Policies rooted in economic freedom will better help households and communities adapt to climate change.**

A striking example of how different economic and political philosophies influence climate adaptation is seen with the paths taken by the Dominican Republic and Haiti. Although there are some geographic differences, the two countries share the same island, Hispaniola. As recently as 60 years ago, the countries' gross domestic product (GDP) per capita were roughly the same.

Policies have since changed that. The Dominican Republic ranks in the “Moderately Free” category of the 2022 Index of Economic Freedom and had a gross domestic product per capita of \$7,268 (in 2020).¹⁰ Haiti ranks in the “Mostly Unfree” category and is teetering on slipping into “Repressed.”¹¹ Out of 177 countries ranked, Haiti is 145 and has a GDP per capita of \$1,272 (in 2020).¹² Regrettably, Haitians have lost more lives to natural disasters and suffer economically and environmentally. In 2016 Madison Park of CNN reported: “In 2004, Hurricane Jeanne made landfall at the eastern tip of the Dominican Republic. The flooding from Jeanne killed an estimated 3,000 people in Haiti, according to a report from the National Hurricane Center. Meanwhile, only 19 deaths were reported in the Dominican Republic.”¹³ Park also reports that an earthquake in 2010 impacted the entire island but no one outside of Haiti died.¹⁴

“Policies rooted in economic freedom will better help households and communities adapt to climate change.”

Haiti lacks the resources to build more resilient infrastructure, to prepare for natural disasters, or to respond to them. Poor environmental policies, including rapid and widespread deforestation, exacerbated Haiti's environmental challenges and made its people more susceptible to flooding and soil erosion.¹⁵ Haiti ranks 170 out of 180 countries on Yale's Environmental Performance Index.¹⁶ To be clear, the legacy of environmental mismanagement dates back to the French colonization of Haiti where deforestation cleared the way for plantations.¹⁷ Even so, the lack of economic freedom has undoubtedly contributed to Haiti's continuing economic plight, poor environmental record, and inability to adapt to climate change. Financial commitments to rebuild may help on the margin, but true progress will come through systemic reform.

ADAPTATION POLICY IN THE U.S.



In the United States, policy reform should allow for timely construction of more durable infrastructure. Quicker deployment of more resilient buildings, flood control prevention, and forest management will reduce the risks and costs of extreme weather events. The longer it takes to conduct an environmental review and permit for a project, the longer an area is susceptible to the next natural or manmade disaster. Take Offutt Air Force Base, south of Omaha, Nebraska, for example. An NBC News and InsideClimate News report covered the flooding at the Air Force Base in March 2019. Reporter David Hasemyer wrote that the base knew flooding was a risk when water came close to the base's runway eight years earlier.¹⁸ Hasemyer observed, "Crucially, construction was never approved to begin reinforcing an earthwork levee system to protect the vital base from the Missouri River the next time it raged over its banks. Winkler said approval for the levee construction was complicated by myriad requirements from the Army Corps of Engineers that took six years to navigate."¹⁹ Identifying vulnerabilities and ways to reduce those vulnerabilities is the first step in reducing the risk of extreme weather. Carrying out plans with expediency (and with proper environmental and public safety vetting) is just as critical.

The Infrastructure Investment and Jobs Act dedicates \$47 billion for climate resiliency projects to improve preparedness for fires, floods, droughts, and hurricanes.²⁰ \$2.6 billion will go to NOAA, of which \$492 million will provide resources "to map and forecast inland and coastal flooding, including 'next-generation water modeling activities'"²¹ "NOAA [will] also get \$50 million to predict, model and forecast wildfires."²² The bill includes nearly \$6 billion for forest restoration, management, and wildfire prevention, and contains measures for watershed and coastal restoration, \$11.6 billion to the Army Corps of Engineers for flood control and river dredging, and money for the environmental remediation of abandoned mines. While the bill contains and codifies some regulatory reforms to make it easier to build and to protect forests, policymakers should do more to remove barriers for climate adaptation investments.

POLICY RECOMMENDATIONS FOR SAFER, MORE RESILIENT COMMUNITIES

To enable investments for safer, more resilient communities, Congress and the administration should:

- **Enact Full Expensing for Buildings and Structures.** Full expensing allows a business to deduct expenses immediately rather than over a long depreciation schedule. For a residential building the depreciation schedule is 27.5 years and for a nonresidential building the depreciation schedule is 39 years. As the Tax Foundation notes, "This is problematic; due to inflation and the time value of money, a dollar in the future is worth less than a dollar today. Thus, delaying deductions for the cost of business investments means that the real value of the deductions is less than the original cost."²³ Immediate expensing for long-lived assets would not only provide a boost to the economy, but it would encourage the development of more efficient, environmentally friendly, and climate resilient buildings.²⁴
- **Modernize the National Environmental Policy Act.** At nearly every level of government, delays can obstruct the development of more resilient infrastructure. The primary tool to block projects at the federal level is the National Environmental Policy Act (NEPA). President Nixon signed NEPA into law more than 50 years ago. Since then many federal, state, and local environmental laws have been enacted, creating a confusing web of unclear, overlapping, and complex requirements. Permitting reform would enable the private sector, the federal government, and state and local governments to construct more durable infrastructure on shorter timelines. Both the "Undoing NEPA's Substantial Harm by Advancing Concepts that Kickstart the Liberation of the Economy Act" (UNSHACKLE Act) and the "Building United States Infrastructure through Limited Delays and Efficient Reviews Act of 2021" (BUILDER Act) are legislative fixes that would expedite permitting timelines, increase accountability, and curb excessive litigation.²⁵ (For more information, see NEPA chapter).
- **Reform the National Flood Insurance Program.** A fundamental problem that increases the public's vulnerability to extreme weather is the misperception of risk as well as policies that distort and socialize that risk. The National Flood Insurance Program (NFIP) is a prime example where the federal government has long-used out-of-date flood maps and subsidized insurance premiums for homeowners living in high-risk areas (often wealthy families).²⁶ The distortion of risk has resulted in overbuilding in areas susceptible to flooding. When flooding does occur, taxpayers are on the hook to massively bail out the program.²⁷



In October 2021, the Federal Emergency Management Agency (FEMA) launched its new Risk Rating 2.0 to have insurance premiums more accurately reflect the risk of living in certain areas. Productively, the new rating system uses methodology that builds off “years of investment in flood hazard information by incorporating private sector data sets, catastrophe models and evolving actuarial science.”²⁸ The reality is many households in coastal communities covered by NFIP will see premium increases. As QuoteWizard data analyst Nick VinZant bluntly said, “It doesn’t matter if you don’t believe in climate change--your insurance company does.”²⁹ VinZant’s point is spot on. The more the federal government and public can rely on private risk assessors to communicate the risks of climate change and have prices accurately reflect that risk, people will be safer, and developers will think more carefully about where they build. At the very least, homeowners and builders will more fully bear the cost of their decisions. Risk Rating 2.0 is a much-needed step in the right direction but deeper reforms are needed, including transferring NFIP to the private sector as much as possible.³⁰

- **Repeal the Foreign Dredge Act.** More than a century old, the Act prohibits any foreign-built or foreign-chartered ships from dredging in the U.S. Consequently, some world class dredgers that could deepen and widen America’s ports at a fraction of the cost and time cannot bid on contracts. The Dutch and Belgians own these dredgers and present minimal risk to American national security. In addition to making America’s ports more competitive and removing inefficiencies created by congestion and light loading, dredging is an effective tool to replace sediment and protect against coastal erosion.³¹ Senator Mike Lee (R-UT) has introduced four bills, any or all of which would be a marked improvement from the current law that harms taxpayers, the economy, and the environment.³²
- **Eliminate steel and aluminum tariffs.** Artificially high costs threaten the construction of more resilient infrastructure. In addition to finding workers and fixing supply chain issues, contractors have expressed concern over how tariffs will adversely affect future investment. In a September 2021 survey conducted by the U.S. Chamber of Commerce, “45% of contractors say steel and aluminum tariffs will have a high to very-high degree of impact on their business in the next three years [...]”³³ Congress and the administration should scale back tariffs and tariff rate quotas that have little, if any, economic or national security rationale.³⁴
- **Better coordinate federal activities on adaptation.** Several federal agencies provide resources for prevention of, response to, and recovery from natural disasters. Along with more funds committed through the infrastructure bill and appropriations bills, better coordination is necessary to protect communities and be good stewards of taxpayer dollars. In releasing the National Climate Adaptation and Resilience Strategy Act of 2022, a bipartisan group of Senators and House Members correctly noted, “Federal agencies provide essential resources and services for local climate adaptation efforts, but often operate independently of one another. The siloed nature of federal resilience operations creates inefficiencies and unnecessary burdens for non-federal partners attempting to access these resources and services.”³⁵ The legislation aims to reduce those burdens and redundancies by creating an adaptation and resiliency implementation plan and creating a chief resilience officer and resiliency interagency working groups. Several states, such as Florida and Louisiana, have state resiliency officers that should work collaboratively with federal agencies. Identifying duplicative spending and regulatory inefficiencies should be the first step in maximizing the federal government’s resiliency spending.
- **Limit emergency use spending to emergencies.** According to policies established by George H.W. Bush’s Office of Management and Budget in 1991, emergency spending should be necessary (essential or vital, not merely useful or benefi-



cial); sudden (coming into being quickly, not building up over time); urgent (requiring immediate action); unforeseen; and not permanent.³⁶ Any emergency funding to respond to natural disasters should adhere to these criteria. Another fiscally responsible measure is the Budgeting for Disasters Act. The Act would ensure Congress dedicates funding to true emergencies, provides a strong consensus for such spending, and keeps funding in check with existing budget caps. Specifically, the legislation would:

- Eliminate the requirements to adjust annual discretionary spending limits to accommodate additional appropriations for disaster relief and wildfire suppression;
- Increase the number of votes that is required to waive the Senate point of order against emergency spending designations, which exempt spending from discretionary spending limits; and
- Require the Government Accountability Office to report on spending for emergencies and disaster relief.

- **Commit international development funds to economic growth, economic freedom, and adaptation.** Vijaya Ramachandran of the Breakthrough Institute and Arthur Baker of the University of Chicago’s Development Innovation Lab argue in *Foreign Policy* that: “The shift of focus from poverty to climate is unjust, ineffective, and disastrous for the world’s poor. It’s unjust because rich countries are forcing the World Bank and IMF to deprioritize poverty reduction despite this mission being vital to protect developing countries from the climate shocks caused by rich countries’ emissions.”³⁷ The authors go on to say:

Adaptation requires investments in better housing, transportation, education, infrastructure, water management, agricultural technology, and other sectors. And it requires reducing poverty—so that more people have the resources to cope with weather-related extremes. Until now, these kinds of investments have been the bread and butter of the World Bank and other development institutions. By shifting development funding to emissions reduction, they are taking money from the poor and making them less resilient than they would otherwise be.”³⁸

Ramachandran and Baker are right. The United States must take a leadership role to commit international assistance to promoting economic well-being, sustained growth through policies rooted in economic freedom, and investments in adaptation. Leadership on climate mitigation (reducing emissions) will come from driving down the cost and deploying low-carbon and emissions-free technologies where it is in the economic self-interest of developing countries to pursue those technologies.

- **Maintain steady support for resiliency research and development.** The private sector will be the leader in resiliency innovation as there is an economic incentive to make buildings safer and crops more weather resistant. However, government research facilities and academic institutions play an important role in studying basic physics, chemistry, novel materials, biosciences, and more. Research in these sciences can lead to groundbreaking discoveries and consequently innovative new technologies that help communities adapt to climate change. Congress should continue supporting basic science research and continue to support research to help policymakers and the public better understand climate vulnerabilities and how to prepare and respond to them.³⁹



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