

Policy Solutions for a Changing Climate



Adaptation Measures to Protect Communities and Taxpayers


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TABLE OF CONTENTS

CLIMATE ADAPTATION POLICY RECOMMENDATIONS

Flood

- Prioritize pre-disaster mitigation efforts, including nature-based mitigation.
- Reform the NFIP to ensure premiums reflect accurate levels of risk and expand the role of private insurance.
- Modernize and improve floodplain mapping.
- Impose limitations on new construction inside FEMA floodplains.

Infrastructure

- Protect infrastructure investments with enhanced minimum design standards.
- Utilize proven financial tools such as insurance and catastrophe bonds to protect infrastructure.
- Codify standards including a federal flood protection standard as a stipulation for infrastructure spending.
- Promote the development of climate-resilient infrastructure based on vulnerability assessments using high-quality information and data.

Housing

- Require enhanced disclosures on real estate transactions.
- Promote federal incentives for green housing and home retrofit resilience projects.
- Provide additional support to provide climate-resilient housing in low-income communities.

Pre-Disaster Mitigation

- Incentivize greater responsibility by tying federal disaster spending to pre-disaster mitigation efforts.
- Promote pre-disaster mitigation such as smarter and safer construction policies and the expanded use of natural barriers such as marshes and dunes.
- Motivate individual mitigation through tax holidays and tax-preferred savings accounts for disaster supplies.

Taxpayer Protection and Risk Transfer

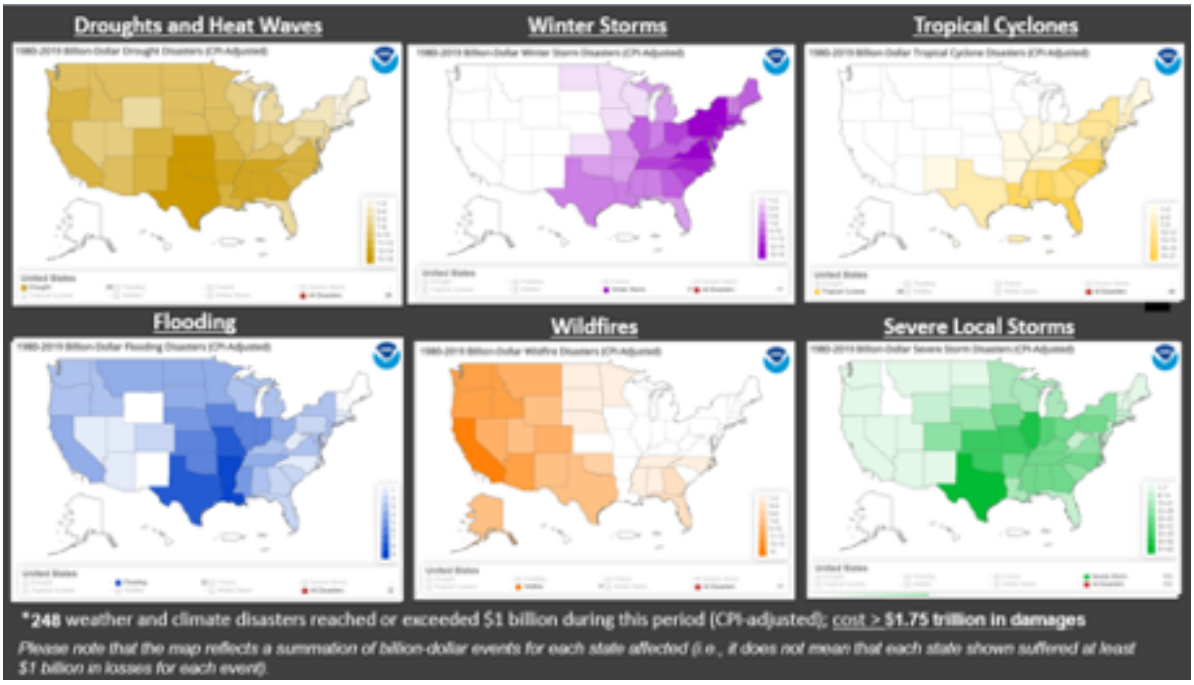
- Enhance opportunities for public-private risk transfer.
- Incentivize investment in pre-disaster mitigation efforts to protect taxpayer dollars and federal facilities.
- Promote increased climate-related protections among private sector businesses.
- Increase the role of the private sector in the National Flood Insurance Program

INTRODUCTION

Our changing climate has dramatically increased the frequency and severity of some natural catastrophes. According to the National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information, the United States has, in the last five years, experienced 65 natural catastrophes with losses exceeding $1 billion, or "billion-dollar events." Those storms resulted in total damage of $535 billion and claimed 3,862 lives. That figure far exceeds the 62 billion-dollar events that occurred in the 2000s, the 53 billion-dollar events during the 1990s, and the 29 billion-dollar events in the 1980s.[1]

In 2019 alone, there were 14 catastrophic events with losses exceeding $1 billion, more than double the annual adjusted average of 6.5 events per year between 1980 and 2018.[2] Last year's catastrophes affected every major region of the country, from severe floods in the Missouri River Basin and hurricanes striking the Eastern Seaboard and Gulf Coast to wildfires in California and Alaska, proving that no community or state is immune from the devastating impacts of natural disasters.

Billion-dollar weather and climate disasters frequency mapping: 1980–2019



Source: National Oceanic and Atmospheric Association

1 https://www.ncdc.noaa.gov/billions/
2 https://www.corelogic.com/insights-download/natural-hazard-risk-summary-and-analysis.aspx

Not every extreme weather event or the incremental damage that results from storms can be directly or scientifically linked to climate change. However, the changing climate does increase the risk of some natural catastrophes, leaving people living in the United States in harm's way. Each year, homes, businesses, and in some cases entire communities are destroyed as a result of these events. Lower-income communities, often communities of color, are disproportionately affected by natural disasters that increase the cost of available housing, limit opportunities for employment, and leave many storm survivors facing economic distress. As the social costs associated with these catastrophes grow, so too do the financial costs. Extreme weather events, including those caused by climate change, leave taxpayers exposed to billions of dollars in losses each year. Further exacerbating the situation are the tremendous resources being diverted to combat the COVID-19 health pandemic.

This devastating situation underscores the need for more effective government policies that prioritize climate adaptation and pre-disaster mitigation, share risk management with the private sector, and accurately account for risk. Ensuring cost-effective and resilient infrastructure, mitigating the impact of climate risk on housing, and promoting proper disaster preparedness are critical components of any effective government response. Current federal government policy focuses too heavily on responding to crises after they strike. Government intervention should focus more on preventative climate adaptation measures that are effective, efficient, and protect taxpayer dollars, property, and lives today and in the future.

Policy Recommendations:

- Prioritize pre-disaster mitigation efforts, including nature-based mitigation.
- Reform the NFIP to ensure premiums reflect accurate levels of risk and expand the role of private insurance.
- Modernize and improve floodplain mapping.

Flooding is the most expensive type of natural disaster in the U.S. because of the damage it causes to property and the exceptional disruption and strain it puts on economic activity and government operations. Inland flood events alone have cost approximately $146.5 billion in taxpayer funds since 1980.[3]

There is a direct correlation between increased flooding and sea level rise. According to NOAA, global sea levels have risen approximately 8 to 9 inches since 1880, one-third of which has occurred in the last twenty-five years. NOAA cites the combination of glacial melting with the expansion of seawater due to rising temperatures as the primary cause of sea level rise. In 2018, the global mean sea level was more than 3 inches above the 1993 average. NOAA estimates that, by the end of this century, global mean sea levels are likely to rise at least one foot above levels seen in the year 2000, which has the potential to cause devastating flooding across the U.S.[4]

Sea level rise is slated to have a profound impact on coastal communities. Nearly 40 percent of individuals in America (more than 123 million) live on or near the coast.[5] The destruction from coastal storms results from heavy precipitation and flooding caused by storm surges and damage from hurricane-force winds. Rising sea levels means destructive storm surges are more likely to reach inland communities, resulting in widespread damage and "nuisance flooding," or less severe flooding events that cause property and infrastructure damage. According to NOAA, disruptive and expensive nuisance flooding is estimated to be 300 percent to 900 percent more frequent in U.S. coastal communities than it was 50 years ago.[6]

Though hurricane frequency has seen little change since the mid-1970s, the severity of hurricanes has increased since then, with great economic and human cost. There has been a rising trend in the number of hurricanes that reach categories four and five in strength on the Saffir-Simpson scale since the mid-1940s.[7] While the official start of hurricane season is June 1,

3 https://www.climate.gov/news-features/blogs/beyond-data/2010-2019-landmark-decade-us-billion-dollar-weather-and-climate
4 https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level
5 https://oceanservice.noaa.gov/facts/population.html
6 https://oceanservice.noaa.gov/facts/sealevel.html
7 https://www.gfdl.noaa.gov/global-warming-and-hurricanes/

the last five consecutive years have seen named storms – those storms that are uniquely identified and tracked by the federal government – in the month of May. This begs the question of whether the official start of hurricane season should be moved up on the calendar, a notion that is beginning to gain traction in Congress.[8] The number of hurricanes is projected to double again by the end of the century.[9] Even if the frequency of coastal storms such as hurricanes does not increase, rising sea levels are expected to increase their severity and the extent of associated flooding.

Hurricane Harvey, the Category 4 hurricane that struck Texas and Louisiana in 2017, provides a tragic example of how inland communities face increased flood risk. Hurricane Harvey dropped 20 trillion gallons of water on affected areas, equating to nearly 1 million gallons of water for every person in Texas and enough to raise the water level in each of the Great Lakes by one foot. In the aftermath of Harvey, more than 80,000 homes were inundated with 18 or more inches of water, causing mass destruction and billions of dollars in damage.[10] The storm also resulted in more than 100 fatalities.[11] Nationwide, more than 60 percent of U.S. hurricane-related deaths from 1970 to 1999 occurred in inland counties, with more than half of those deaths related to freshwater flooding.[12]

Flood Case Study:
Impacts on the Missouri River Basin

In 2019, the Missouri River Basin experienced record precipitation and flooding. In total, 16 major disaster declarations were made in states and counties from Montana to Missouri due to climate and weather-related events. According to an April 2020 report from NOAA, the U.S. Department of Agriculture, and the University of Nebraska - Lincoln, hundreds of communities were evacuated, and critical infrastructure such as roads, bridges, and levees were destroyed. The season brought more than 50 record river crests and broke 125 precipitation records in communities throughout the basin. It is estimated that 20 million acres of agricultural land went unplanted in 2019, a situation that was exacerbated by heavy snowfall in North and South Dakota that severely damaged crops. As of January 2020, 50% of the corn crop in those states had yet to be harvested, a process usually completed by the Fall. As a result, the impact of Missouri River flooding stretched far beyond the basin.

8 https://murphy.house.gov/news/documentsingle.aspx?DocumentID=1403
9 https://www.nature.com/articles/news.2010.24
10 https://toolkit.climate.gov/topics/coastal-flood-risk/inland-flooding
11 https://www.worldvision.org/disaster-relief-news-stories/2017-hurricane-harvey-facts
12 Moser, S.C., M. A. Davidson, P. Kirshen, P. Mulvaney, J. F. Murley, J. E. Neumann, L. Petes, and D. Reed, 2014: Ch. 25: Coastal Zone Development and Ecosystems. Climate Change Impacts in the United States: The Third National Climate Assessment.

Increasing flood risks are not associated only with hurricane activity. Heavy precipitation has increased the likelihood of inland flooding since 1991. The average annual cost of damage from inland floods is higher than any other severe weather event, averaging $6.9 billion per year.[13] Rivers are increasingly prone to flooding as a result of heavier, more sustained periods of rain and earlier snowmelt. In the Pacific Northwest, for example, snow has begun melting five to 20 days earlier than it did 50 years ago.

As detailed in the Federal Emergency Management Agency (FEMA) chart below, estimates show that the cost of flooding on an average home – a 2,500 square-foot, one-story home with possessions worth $50,000 – could reach over $100,000, depending on interior water depth.[14]

Interior Water Depth (Inches)	Cost to Home	Cost to Personal Property	Combined Loss Potential
1"	$23,635	$3,172	$26,807
2"	$23,720	$3,172	$26,892
3"	$24,370	$4,917	$29,287
4"	$31,345	$7,207	$38,552
5"	$31,425	$13,914	$45,339
6"	$37,260	$14,777	$52,037
7"	$37,691	$17,700	$55,391
8"	$38,122	$20,624	$58,746
9"	$38,553	$23,547	$62,100
10"	$38,983	$26,470	$65,453
11"	$39,414	$29,394	$68,808
12"	$39,845	$32,317	$72,162
24"	$44,325	$43,001	$87,326
36"	$47,905	$46,633	$94,538
48"	$53,355	$50,000	$103,355

Source: Federal Emergency Management Agency

These numbers highlight the urgency to address flood risk, particularly as extreme weather patterns caused by climate change may increase flood events and the associated consequences.

Because the vast majority of natural disasters in the U.S. stem from floods, hurricanes, and other severe storms, policymakers at all levels of government must work collectively to be better prepared. Pre-disaster mitigation represents a far more cost-effective approach than post-disaster recovery and rebuilding efforts. FEMA should exercise its authority to prioritize mitigation investments before disasters strike, not after the fact. Consideration should be given to nature-based mitigation efforts, including the restoration of wetlands, dunes, and other coastal barriers, all of which make communities more resilient to increased flood risk.

13 https://toolkit.climate.gov/topics/coastal-flood-risk/inland-flooding
14 https://www.fema.gov/media-library-data/1566226341350-89d7abe16b19822b4eaeeb934448738f/C3.FloodLossPotential_Word_508.pdf

The National Flood Insurance Program (NFIP), created by Congress in 1968 and administered by FEMA, is a central part of the federal disaster response apparatus. The purpose of the NFIP is to offer affordable insurance coverage to property owners, renters, and businesses, including more than 5 million homeowners nationwide. The NFIP is also intended to encourage communities to adopt and enforce floodplain management regulations.

The growing strength of floods and hurricanes is increasingly straining the financial health of the NFIP. In recent years, the program has been hit with major losses from a series of powerful storms, including Hurricane Katrina ($16.3 billion), Hurricane Harvey ($8.9 billion), Superstorm Sandy ($8.8 billion), Hurricane Irene ($1.3 billion), and Hurricane Irma ($1 billion).[15] Unfortunately, the situation has resulted in the NFIP paying out claims at an unsustainable rate, borrowing approximately $40 billion from U.S. taxpayers to date.[16]

Coastal properties take a disproportionate toll on the NFIP because premiums do not reflect risk and are not adjusted in response to flood events. NFIP provides coverage for properties regardless of how many times a home or business has been destroyed. While the number of these repetitive loss properties is small – 160,000 properties out of more than 5 million insured have experienced repetitive losses as of 2015[17] – their financial impact is disproportionately large. In Massachusetts, for example, a mere 150 properties in the well-off coastal town of Scituate have accounted for more than 40 percent of the $60 million in flood insurance payouts to the town since 1978. Overall, repetitive loss properties have made up 38 percent of NFIP's claim costs since 1978 – a total of about $4.6 billion – despite making up only 1 percent of properties insured.

FEMA and Congress must work to reform the program. In 2019, FEMA announced Risk Rating 2.0, a re-designed risk rating system that incorporates modern technology and industry best practices in an effort to "deliver rates that are fairer, easier to understand, and better reflect a property's unique flood risk."[18] The new rates stemming from Risk Rating 2.0, originally scheduled to go into effect in October 2020, have been deferred until October 2021.[19] Despite positive steps, additional reforms are necessary, such as support for enhanced and accurate floodplain mapping including projections for future conditions. The inaccuracy of floodplain mapping is a widely recognized problem. Floodplain mapping should be updated with greater engineering confidence and property-level elevation information gathered through Light Detection and Ranging (LIDAR) surveys, a technique used to develop accurate high-resolution maps. Reliable mapping is necessary to better understand levels of

15 https://www.iii.org/fact-statistic/facts-statistics-flood-insurance
16 https://www.insurancejournal.com/blogs/right-street/2018/07/09/494466.htm
17 https://crsresources.org/files/500/rlaa-guide-2017.pdf
18 https://www.fema.gov/nfiptransformation
19 https://www.fema.gov/news-release/2019/11/07/fema-defers-implementation-risk-rating-20

risk, which is essential for meaningful reform of federal flood policies. Additionally, policymakers should adjust NFIP premiums to reflect accurate levels of risk with means-tested assistance for those who cannot afford actuarial rates; and expand the role of private insurance to close the protection gap and help ensure rates reflect the true risks for disaster-prone communities.

INFRASTRUCTURE

Policy Recommendations:

- Protect infrastructure investments with enhanced minimum design standards.
- Utilize proven financial tools such as insurance and catastrophe bonds to protect infrastructure.
- Codify standards including a federal flood protection standard as a stipulation for infrastructure spending.
- Promote the development of climate-resilient infrastructure based on vulnerability assessments using high-quality information and data.

One of the primary purposes of infrastructure, in addition to ensuring the habitability of municipalities and delivery of goods and services, is to serve as a line of defense against severe weather. For example, levees and seawalls are intended to protect communities from floodwaters, elaborate stormwater systems provide for the rerouting of excess water, and roads serve as a buffer for wildfires.

Globally, infrastructure investment is desperately needed. A 2017 report by the Organisation for Economic Co-operation and Development (OECD) estimated that $6.3 trillion of investment in infrastructure will be required annually through the year 2030 in order to meet global devel-opment needs.[20] The financial resources required for meaningful infrastructure improvement increase as natural catastrophes spike in frequency and severity. U.S. infrastructure is not immune from this global trend. American infrastructure, including roads, bridges, and stormwater systems, was designed without regard for a changing climate and is simply not equipped to withstand natural catastrophic risks. It is estimated that more than $4.5 trillion in funding is necessary to improve U.S. infrastructure.[21]

Higher temperatures and increased precipitation can create significant problems for roads and bridges, resulting in asphalt degradation, stress on bridge joints, and increased costs of construction and maintenance. According to the Federal Highway Administration, 70 percent of the nation's roads are in regions that on average receive five or more inches of snowfall each year, requiring $2.3 billion per year in maintenance, with millions more spent annually on road repair.[22]

20 OECD (2017), Investing in Climate, Investing in Growth, OECD Publishing, Paris, https://doi.org/10.1787/9789264273528-en.
21 https://www.cbpp.org/research/state-budget-and-tax/its-time-for-states-to-invest-in-infrastructure
22 https://ops.fhwa.dot.gov/publications/fhwahop13030/chap3.htm

A 2019 study by the University of New Hampshire examined the impact climate change will have on roads. The study recommended a 7% to 32% increase in asphalt thickness to protect U.S. roadways against rising temperatures expected in the next several decades.[23] While such a solution imposes immediate costs, researchers conducting the study estimate that thicker roads would result in savings of 40 to 50 percent of what the government would otherwise spend on road repair in the long-run. Given the long lifespan of roadways, policymakers should incorporate mitigation strategies to avoid the future costs that will come from climate change.

Additionally, the nation's apparatus of stormwater management systems, levees, and dams is aging and proving to be easily overwhelmed by modern natural catastrophes. On May 19, 2020, two dams in Michigan failed from an inundation of rainwater, resulting in severe flooding and the forced evacuation of 10,000 individuals. The guidelines in place as a result of the COVID-19 pandemic posed immediate difficulties not just in the recovery efforts but also in providing temporary shelter for storm victims.[24] The situation in Michigan is likely to repeat itself as dams and levees fail to compete with changes in the climate, increasing the likelihood that damage from natural catastrophes is exacerbated across the nation. The average age of the roughly 91,000 dams across the United States is 56 years. Approximately 15,500 of those dams are considered "high-hazard potential," according to the most recent Infrastructure Report Card from the American Society of Civil Engineers (ASCE), released in 2017. The nation's dams received a collective D rating from the ASCE, the same grade given to Ameri-can levees, while stormwater systems fared modestly better with a grade of D+.[25]

As we look to invest in climate-resilient and cost-effective infrastructure, greater emphasis should be placed on natural infrastructure approaches that can absorb floodwaters and buffer and protect communities, while avoiding the risk of catastrophic failure. Natural infrastructure – including healthy floodplains, wetlands, mangroves, and dunes – provides effective solutions to guarding against flooding and erosion. NOAA estimates that U.S. coastal wetlands alone provide $23.2 billion in storm protection each year. During Hurricane Sandy, for example, wetlands reduced damages by more than 22 percent in more than half of the areas directly affected by the storm.[26] In addition to protecting communities, these natural features provide important wildlife habitat and will assist in creating outdoor recreation opportunities and restoring tourism activity, which will be increasingly important in the wake of COVID-19.

23 https://journals.sagepub.com/doi/full/10.1177/0361198119844249
24 https://www.nytimes.com/2020/05/19/us/michigan-dam-breach.html?smid=fb-nytimes&smtyp=cur
25 https://www.infrastructurereportcard.org/americas-grades/
26 https://coast.noaa.gov/states/fast-facts/natural-infrastructure.html

Source: Office for Coastal Management, National Oceanic and Atmospheric Administration

Additionally, stronger minimum design standards should be required for any future infrastructure federal investments so that expenditures are protected. Federal funds – whether provided through disaster assistance, Community Development Block Grants, or other programs – should be directed to outcome-driven projects that strengthen communities and reduce risk over the long run. Those taxpayer dollars should only be allocated to projects that promote resilience – on building smarter and safer – and not on construction that cannot withstand disasters. The lack of a robust federal flood protection standard, for instance, leaves America's public infrastructure exposed to more frequent and severe flooding. New flood standards should require government-funded agencies involved in floodplain construction to follow certain mitigation strategies to ensure that funds are used for projects that can withstand disasters. The inclusion of a flood protection standard for federally funded infrastructure projects would be an important step in protecting communities, property, and taxpayer investments.

Rather than simply relying on taxpayer funds to rebuild, government agencies should also consider insuring infrastructure. Insurance sends proper signals about risk and encourages the development of safer and more resilient infrastructure. New York's Metropolitan Transportation Authority, for example, maintains its own insurance company, which covers the first $25 million of property damage caused by a disaster, as well as up to $1 billion in losses from reinsurers.

Finally, taxpayer investments in climate-resilient infrastructure should be based on scientific data and analysis. Federal agencies should commit to additional research on climate change and the associated impacts on the nation's infrastructure.

HOUSING

Policy Recommendations:

- Require enhanced disclosures on real estate transactions.
- Promote federal incentives for green housing and home retrofit resilience projects.
- Provide additional support to provide climate-resilient housing in low-income communities.

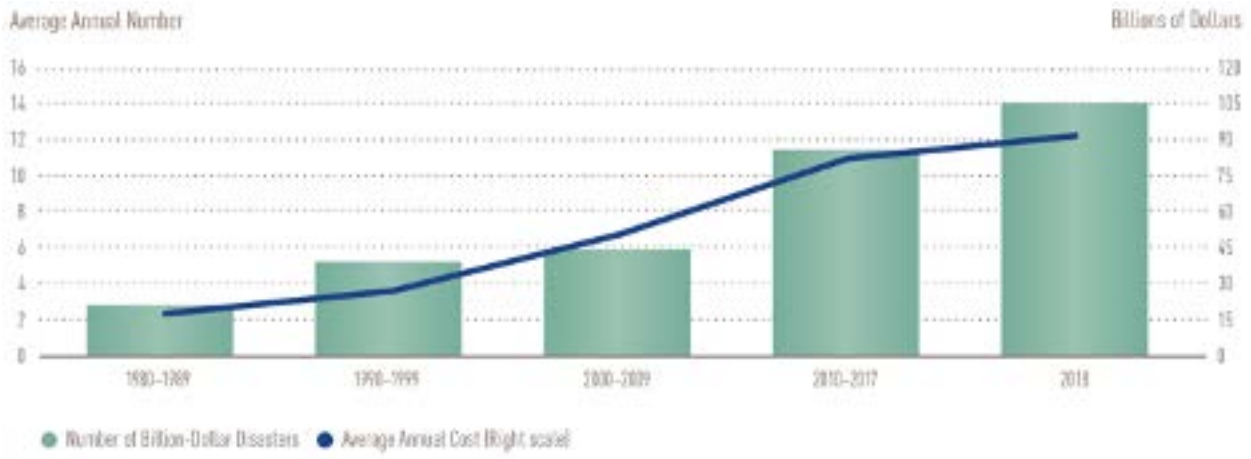
Before the COVID-19 pandemic, the nation was grappling with a housing shortage. According to the National Housing Forecast published by the National Association of REALTORS, housing inventory in 2020 is expected to remain constrained, particularly in the affordable housing market.[27] The full impact of the global pandemic remains to be seen, but in all likelihood the ability of low- to moderate-income persons to secure permanent housing will remain difficult.

A 2019 study by the Joint Center for Housing Studies at Harvard University found that nearly one-third of American homeowners spend more than 30 percent of their income on housing while 15 percent of households spend more than half of their income on housing. The figures for renters are worse: nearly half of all renters spend more than 30 percent of their income on housing while nearly 25 percent spend more than half of their income on rent.[28] For extremely low-income individuals including those considered to be at risk of homelessness, the housing supply shortage is more pronounced. As of 2019, there was a national shortage of 7 million affordable rental homes for extremely low-income renters.[29]

Both the costs of homeownership and the availability of affordable rental housing are exacerbated by the threat of natural disasters and climate change. These events, which are becoming both more common and more destructive, take a serious financial toll on property owners and renters.

27 https://www.realtor.com/research/2020-national-housing-forecast/
28 https://www.jchs.harvard.edu/blog/headlines-from-the-2019-state-of-the-nations-housing-report/
29 https://www.americanprogress.org/issues/green/reports/2019/08/01/473067/a-perfect-storm-2/

Highly Damaging Natural Disasters Have Become Much More Frequent and Costly



Source: Joint Centers for Housing Studies, Harvard University

The aforementioned 2019 report from Harvard University showed that costs to homeowners for disaster-related improvements have doubled from $7 billion per year in late 1990s to $14 billion per year in the 2010s. Harvard researchers declare that "finding the resources to adapt and strengthen the current housing stock, to mitigate future damage, as well as to fix the damage done by these increasingly likely storms is an urgent housing challenge for the nation."[30]

The loss of housing stock by natural catastrophes increases the cost of available housing in affected areas, disproportionately impacting the nation's supply of low-income housing. That is in part because affordable housing units are less likely to be rebuilt in the wake of a serious natural catastrophe.[31] Low-income housing is also often located in flood zones, where the land is cheaper, and are often built with substandard materials that cannot withstand extreme weather.

Homelessness and a Hurricane

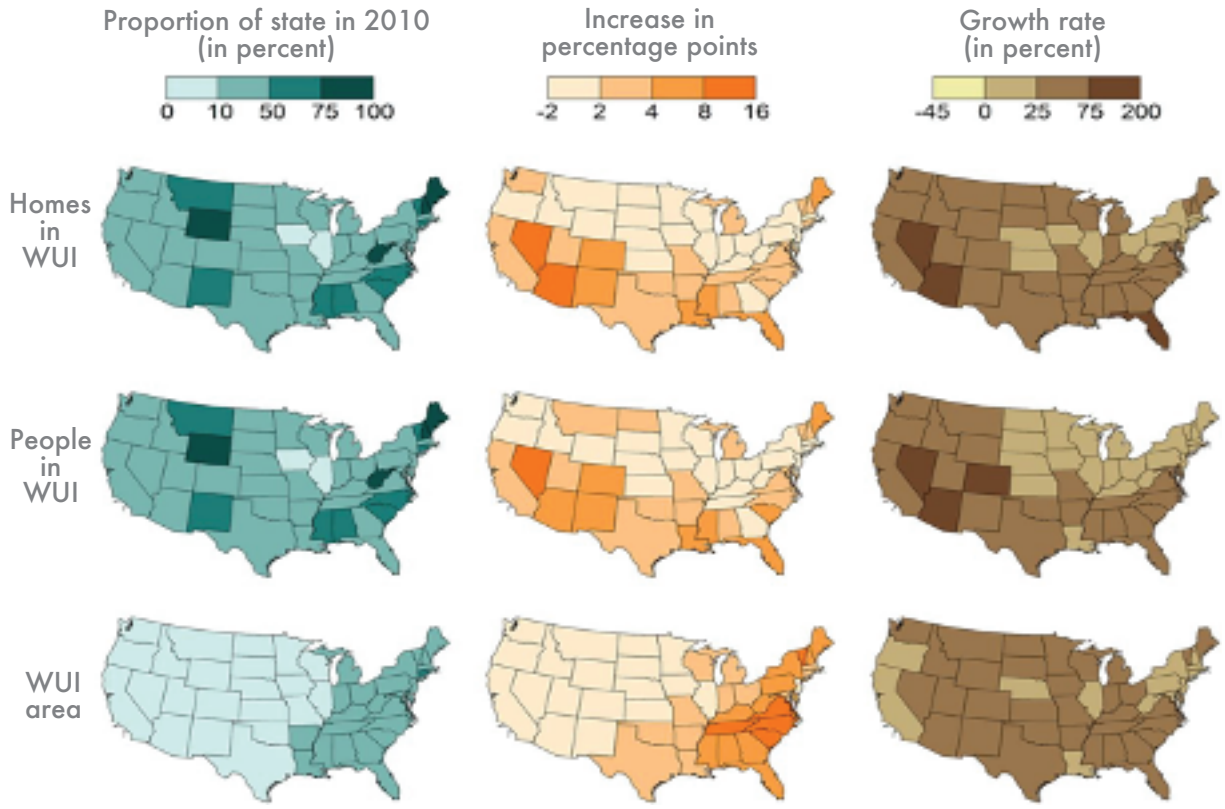
Hurricane Harvey pummeled the Texas and Louisiana coastlines in August of 2017, resulting in approximately $125 billion in damage. Harvey damaged nearly 200,000 homes across Texas, 2,000 of which were federally subsidized. Hardest hit was the greater-Houston area. According to a report issued by the Way Home Continuum of Care, a Houston-based regional planning group, homelessness in the Houston area grew by 15 percent from 2017 to 2018.

30 https://www.jchs.harvard.edu/blog/headlines-from-the-2019-state-of-the-nations-housing-report/
31 https://s3.amazonaws.com/media.hudson.org/files/publications/AffordableRentHousing2017.pdf

While flooding is often top of mind, homeowners must also consider other natural disasters augmented by climate change, including wildfires. With warmer, drier conditions during fire season, the effects of wildfires on both properties and human life have increased. According to Verisk's 2019 Wildfire Risk Analysis, nearly 4.5 million homes in the US are at high or extreme risk of wildfires, more than 2 million of which are in California alone.[32]

Wildfire risk is also increasing throughout the country as newer homes are being built near wildlands. The "wildland-urban interface" (WUI) – the transition areas between unoccupied land and human development – is growing in size and putting communities at greater risk for wildfire. From 1990 to 2010, the WUI grew rapidly, increasing from 30.8 to 43.4 million homes (41 percent growth) and expanding in area from 143,568,227 acres to 190,271,144 acres in area, or 33 percent.[33]

WUI Growth: 1990–2010



Source: United States Forest Service

32 https://www.verisk.com/insurance/visualize/verisk-2019-wildfire-risk-analysis-highlights-evolving-peril/
33 https://www.nrs.fs.fed.us/news/release/wui-increase

Regardless of the specific peril, the reality is that many homeowners are unprepared for the risks associated with climate change. Significant steps should be taken at the federal level to protect homeowners and renters from natural catastrophes. More specifically, and as disaster risk increases, it is even more important that this risk is properly communicated to homeown-ers and tenants. Policymakers should require enhanced disclosures on real estate transactions so that homebuyers and renters better understand the catastrophic risks associated with properties.

The methods employed in building new and modernizing existing homes and businesses also merit reconsideration. With regards to new construction, while climate-resilient building can increase construction costs it can also save crucial taxpayer dollars in the long run. Adapting construction practices to better meet the demands of a changing climate can better protect both public and private facilities and the individuals that rely on those facilities for shelter and employment. Similarly, projects that increase the resilience of existing structures through retrofits or elevations, as well as programs that help finance energy efficiency installations in residential, commercial, and industrial settings, are cost-effective over time and have climate mitigating benefits. Federal funds should incentivize mitigation while recognizing that lower-income communities may lack sufficient resources to navigate the federal assistance process.

Overall, more significant attention must be paid to the needs of lower-income communities when it comes to disaster mitigation and smarter and safer building. Lower-income communities and communities of color are at the greatest risk from disasters, which widen already existing inequalities. Disasters often negatively impact financial health, including bankruptcy, mortgage delinquency, and foreclosures.[34] These financial impacts not only make life more difficult for those already struggling, but can have broader impacts on their communities' long-term economic well-being. Absent consideration of these social inequities, such as access to safe, affordable housing, the ability to build resilient communities will be greatly hindered.

34 Caroline Ratcliffe, et. al., *Insult to Injury: Natural Disasters and Residents' Financial Health*, Urban Institute (2019) *available at* https://www.urban.org/research/publication/insult-injury-natural-disasters-and-residents-financial-health

PRE-DISASTER MITIGATION

Policy Recommendations:

- Incentivize greater responsibility by tying federal disaster spending to pre-disaster mitigation efforts.
- Promote pre-disaster mitigation such as smarter and safer construction policies and the expanded use of natural barriers such as marshes and dunes.
- Motivate individual mitigation through tax holidays and tax-preferred savings accounts for disaster supplies.

As the frequency and severity of disasters increases, individuals, communities, and state and local governments must do everything possible to ensure they can weather the next storm. The nation's natural disaster policy framework primarily emphasizes and funds responses to disasters after they strike as opposed to implementing pre-disaster protective measures to reduce devastation, though recent changes made in the Disaster Recovery Reform Act of 2018 begin to address this imbalance. Federal disaster policies remain largely stuck in the 20th century and must be further reformed to reflect the reality of a changing climate, reduce risk before a disaster strikes, and avoid needlessly exposing individuals to greater loss of life and property damage.

According to a December 2019 report from the National Institute of Building Sciences (NIBS), federal mitigation grants save $6 in taxpayer spending for every $1 spent, meaning that the $27.4 billion in federal mitigation grant spending over the last 23 years has reduced the amount of federal spending needed for post-disaster responses, providing $157.9 billion in benefits to American communities and taxpayers. Researchers found that similar savings can be achieved through other pre-disaster mitigation efforts: the retrofitting of buildings, investment in mitigation infrastructure, and application of enhanced building codes all save $4 for every $1 spent in the aggregate. Further, the report estimates that pre-disaster mitigation could ultimately prevent 600 deaths, 1 million non-fatal injuries, and 4,000 cases of post-traumatic stress disorder.[35]

Despite this clear evidence of the merits of pre-disaster mitigation funding, such funding continues to be dwarfed by post-disaster recovery spending. In fiscal year 2019, Congress appropriated $250 million for FEMA's Pre-Disaster Mitigation Grant Program.[36] By comparison, Congress appropriated $12.25 billion in Fiscal Year 2019 funding for the FEMA Disaster Relief Fund alone, all of which is utilized for responding to and recovering from natural catastrophes.[37]

35 https://cdn.ymaws.com/www.nibs.org/resource/resmgr/reports/mitigation_saves_2019/mitigationsaves2019report.pdf
36 https://www.fema.gov/media-library-data/1566838030892-2ce88be44262b32999aecba3e383aa05/PDMFactSheetFY19Aug2019.pdf
37 https://www.fema.gov/media-library-data/1552772002358-9cee7fa336c399f38ffce5d42baa0e36/March2019DisasterReliefFundReport.pdf

The federal government's history and policy of funding post-disaster relief has led to states routinely seeking federal assistance after a natural catastrophe rather than adopting policies to enable people living in the United States to guard against future catastrophic risks. First and foremost, the federal government must ensure that flood maps are updated regularly to reflect the latest accepted science. Accurate flood maps are foundational to wise and strategic floodplain management decisions at all levels of government. It is also imperative that FEMA leverage its various hazard mitigation programs to drive wise investments in both nonstructural projects that can decrease risk at the property level (e.g. home elevations, buyouts, retrofits, etc.) and community-wide nature-based mitigation projects. FEMA should be deliberate not to use hazard mitigation dollars – including through the new Building Resilience Infrastructure and Communities, or BRIC, program – to fund large infrastructure projects that could incentivize additional risky development in the floodplain. Individual incentives like sales tax holidays for disaster supplies – a program that has been used successfully in states like Florida – can also be part of such an effort. Disaster Savings Accounts, which allow homeowners to set up tax-preferred accounts to prepare for hurricanes and other storms, are another option.

The federal government also has a responsibility to incentivize mitigation at the state, local, and individual level. For example, rather than simply funding post-disaster aid that does not reduce the impact of future events, the federal government must make new disaster spending contingent on concrete commitments and results, such as implementation of building standards that promote resilience and smarter and safer planning.

In order to do that effectively, states must better track and disclose the funding they allot to mitigation efforts, a seemingly obvious protocol that is currently performed by only a handful of states.[38] Further, both states and local communities that access disaster funds should be required to submit, implement, and enforce meaningful mitigation plans that take into account future climate conditions, and mitigation approaches designed to accommodate those conditions so that rebuilding is stronger and safer after a disaster. In turn, the government's share of disaster funding should be preconditioned on these steps taken by a community to protect itself.

38 https://www.pewtrusts.org/en/research-and-analysis/reports/2018/06/19/what-we-dont-know-about-state-spending-on-natural-disasters-could-cost-us

FEMA isn't the only federal agency that receives funding to administer mitigation programs. Other federal agencies that receive funding for mitigation programs should take specific action to ensure that the funds are spent wisely to decrease future risk. The Small Business Administration, Department of Housing and Urban Development, Department of Agriculture, and the Department of Commerce should review the use of mitigation dollars to ensure taxpayer funds are being deployed to maximize efficacy and community protection. One approach that should be given more attention across the federal government is investment in and protection of natural habitats that offer effective storm protection. Ecosystems like swamps, dunes, and marshlands can act as an effective barrier against hurricanes and floods, absorbing the brunt of a storm surge before it reaches homes and businesses.

Policy Recommendations:

- Enhance opportunities for public-private risk transfer.
- Incentivize investment in pre-disaster mitigation efforts to protect taxpayer dollars and federal facilities.
- Promote increased climate-related protections among private sector businesses.
- Increase the role of the private sector in the National Flood Insurance Program.

The federal government faces increasing fiscal exposure from the risks associated with climate change, as the potential for catastrophic loss grows with increased vulnerability of insured property and crops, damage to thousands of federal facilities, and reliance on federal disaster assistance. The effects of climate change, marked by costly hurricanes, heat waves, and deadly wildfires, have tremendous impacts on disaster spending in the United States. Federal spending on disaster relief has grown to almost $8 billion per year from roughly $1 billion per year in the 1970s and 1980s. Even after adjusting for inflation, taxpayer spending on federal disaster relief is ten times higher than it was three decades ago.[39] Once a rarity, "billion-dollar disasters" – those causing at least $1 billion in damages – have multiplied in recent years.[40]

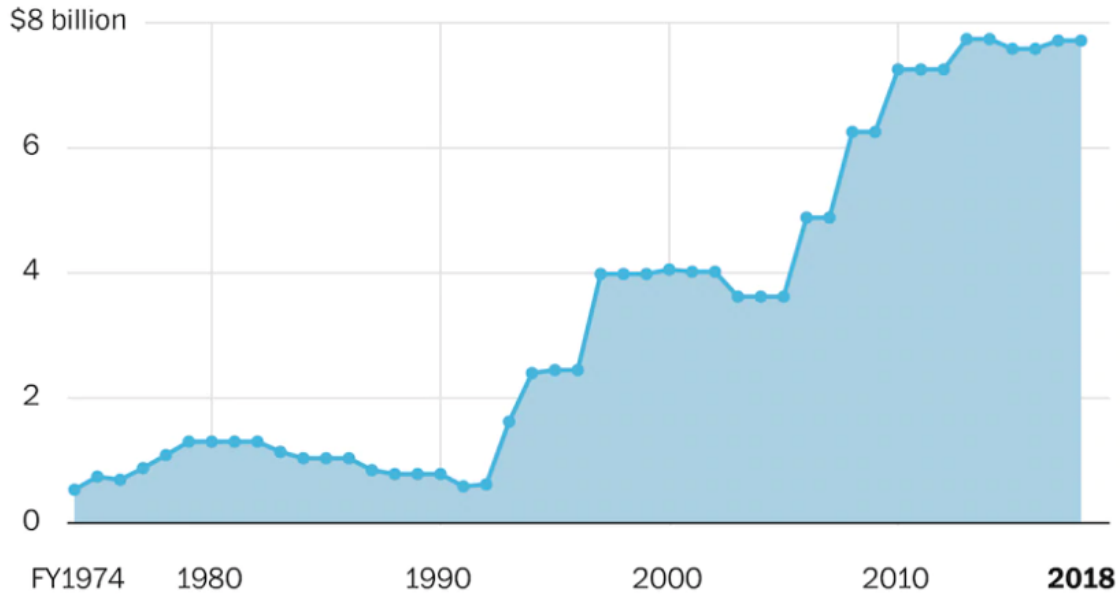
The burden of responding to disasters has increasingly fallen on the federal government. In June 2019, Congress passed and President Trump signed into law a supplemental disaster appropriations bill that provided more than $19 billion in funding for natural catastrophe recovery activities including repair of agricultural land and infrastructure such as dams or roadways.[41] For Fiscal Years 2012-2018, the federal government spent nearly $200 billion on regular and emergency disaster relief funding.[42]

Significant federal disaster spending stems in part from the Robert T. Stafford Disaster Relief and Emergency Assistance Act, or Stafford Act. The Stafford Act makes it easier for states to appeal to the federal government for disaster assistance. In cases where a federal disaster declaration is made, the federal government assumes liability for at least 75 percent of the costs.[43] The number of disaster declarations has steadily escalated since the Stafford Act was passed in 1988, growing from just 16 in 1988 to a record high of 242 in 2011 and a total of 178 in the first five months of 2020.[44]

39 https://www.washingtonpost.com/us-policy/2019/04/22/taxpayer-spending-us-disaster-fund-explodes-amid-climate-change-population-trends/
40 https://www.ncdc.noaa.gov/billions/
41 https://www.congress.gov/116/plaws/publ20/PLAW-116publ20.pdf
42 https://www.americanactionforum.org/insight/federal-disaster-relief-and-the-federal-budget/#_ftn3
43 https://www.govinfo.gov/content/pkg/USCODE-2009-title42/html/USCODE-2009-title42-chap68.htm
44 https://www.fema.gov/disasters/year

Federal Disaster Relief Fund appropriations, 10-year rolling median

Adjusted for inflation
Medians are for the decade ending in each fiscal year



Source: The Washington Post; Congressional Research Service; Labor Dept.

The changing climate is likely to increase levels of taxpayer spending. Between 2005 and 2015, FEMA spent almost $70 billion on public assistance due to natural disasters caused by climate change. $53.31 billion of that was spent on state, tribal, and local governments, in some respects demonstrating the level of preparedness among state and local governments.[45] This year shows little signs of improvement. Researchers at NOAA's Climate Prediction Center forecast up to 19 named storms for this year's Atlantic hurricane season, of which 6 to 10 could become hurricanes.[46] The economic costs are only expected to increase with predic-tions of a busier, "above-normal" hurricane season ahead.

With the federal government taking on almost all of the responsibility for financing recovery efforts, there is little incentive for disaster-prone states to take action to reduce risk. As a result, many of these states rely more heavily on federal assistance to recover from disasters after they strike instead of preparing for them in advance. Increasing federal spending after disasters, furthermore, does not enhance safety and incentivizes state and local governments to underinvest in mitigation.

45 https://www.americanprogress.org/issues/green/reports/2016/09/22/144386/the-costs-of-climate-inaction/
46 https://www.noaa.gov/media-release/busy-atlantic-hurricane-season-predicted-for-2020

Federal, state, and local disaster assistance accounts, despite billions in funding in recent years, can be easily and quickly depleted given the broad spectrum of events that qualify for recovery dollars. For example, the same budgets that help in pre-disaster mitigation and natural catastrophe recovery efforts are being used to fight both the COVID-19 health pandemic and the response to civil unrest in cities across the nation. Given this unprecedented level of spending, significant action should be taken to protect taxpayers from the costs of ballooning disaster spending and balance sheet risk.

Aside from the financial assistance offered to state and local governments each year, there is tremendous direct exposure on the federal government's own balance sheet. The Department of Defense (DoD), for example, owns and operates domestic and international infrastructure valued at $1 trillion. In its 2015 National Security Implications of Climate-Related Risks and a Changing Climate report, DoD indicated that "[a] changing climate increases the risk of instability and conflict overseas, and has implications for DoD on operations, personnel, installations, and the stability, development, and human security of other nations" and that "[m]easures will also likely be required to protect military installations, both in the United States and abroad…".[47] Beyond DoD assets, the U.S. government owns 650 million acres of land that are vulnerable to climate change. Potential losses will prove to harm taxpayers more as climate resilience efforts for infrastructure become more costly over time.[48]

Federal, state, and local policymakers must find ways to make every dollar go farther and should consider enhanced public-private partnerships and risk-transfer opportunities. The private sector, particularly the insurance industry, has both the willingness and capacity to take on additional risk associated with natural disasters. Organizations across the globe have called for stronger alliances to shift certain financial burdens associated with climate change and natural disasters from the balance sheets of government to willing private sector participants. The Munich Climate Insurance Initiative, for example, has called on the G20 nations to develop a plan to allow for "cost-effective transfer of catastrophe risks to insurance and capital markets through public-private partnerships, in particular with the domestic insurance industry."[49]

Insurance markets should be opened and permitted to more ably compete with federal insurance programs like the NFIP in an effort to ensure that more American households with the financial means can purchase natural catastrophe insurance. On flood insurance

47 https://archive.defense.gov/pubs/150724-congressional-report-on-national-implications-of-climate-change.pdf?source=govdelivery
48 https://www.gao.gov/assets/710/703452.pdf
49 http://www.climate-insurance.org/fileadmin/user_upload/20170316_MCII_G20_Position_2017.pdf

specifically, FEMA must take additional steps to allow for innovation and private sector participation. The Consumer Federation of America estimates that approximately 80 percent of households impacted by Hurricane Harvey did not have flood insurance policies.[50] Further, studies have shown that households with insurance recover faster than those without coverage.[51] All insurance policies, including those offered by the federal government through the NFIP, should incentivize pre-disaster mitigation. More broadly, greater emphasis must also be placed on public-private risk-sharing programs.

The threat of climate change should also be mitigated by private sector businesses to help guard against insolvency and possible taxpayer bailouts. When PG&E, the California-based gas and power utility, filed for Chapter 11 bankruptcy protection in January 2019, the company pointed to billions of dollars in losses from wildfire claims as a driver of financial insolvency. The Wall Street Journal and other publications cited the case as the first, but probably not the last, climate-change bankruptcy.[52]

To ease the financial risk of climate change to taxpayers, private companies can begin to implement weather-risk transfer contracts in sectors and locations vulnerable to climate risk. These tools mitigate the costs of weather sensitivities in industries like electric and gas utilities, renewable power, agriculture, and other sectors. The costs of climate change include reduced revenue from decreased production capacity (e.g. supply chain interruptions), negative health and safety impacts on workforce, damage to property and assets in "high-risk" locations, increased operating and capital costs, and increased insurance premiums and potential for reduced availability of insurance in "high-risk" locations.[53]

50 https://consumerfed.org/press_release/consumers-get-fair-claims-payments-wake-hurricane-harvey/
51 Kousky, C. (2019). "The Role of Natural Disaster Insurance in Recovery and Risk Reduction," Annual Review of Resource Economics 11(3): 399-418.
52 https://www.wsj.com/articles/pg-e-wildfires-and-the-first-climate-change-bankruptcy-11547820006
53 https://mklstatic01.azureedge.net/~/media/nephila/climate/risk-transfer-for-climate-resilience.pdf?rev=73370dcb8b94446fae44196d1d1c0398

CONCLUSION

Natural disasters and extreme weather events not only threaten human safety but also place enormous strains on our infrastructure, property, and government budgets. The federal government continues to spend billions of dollars each year in post-disaster recovery all while individuals and families continue to experience immense personal losses after storms wreak havoc across the nation.

There is a better way. Climate and disaster preparedness in the United States must take shape in a way that advances sound, fair, and efficient policies. To mitigate the risks of climate change, policymakers must recognize that increasingly severe disasters will have tremendous environmental and economic impacts on people in communities across the nation. The federal government must not continue to subsidize inadequate disaster spending and promulgate ineffective, outdated disaster preparedness and recovery policies. Rather, policymakers must begin to seriously prioritize pre-disaster mitigation, more meaningful disclosures and information-sharing, and facilitation of risk transfer opportunities that protect both communities and taxpayer dollars. While the threat of climate change looms large and leaves no community unscathed, smarter and safer policies will go a long way in alleviating the heavy burden facing our nation today.

ABOUT SMARTERSAFER

SmarterSafer is a national coalition made up of a diverse chorus of voices united in favor of environmentally responsible, fiscally sound approaches to climate adaptation policy. To learn more about SmarterSafer, visit our website or follow us on Twitter.

MEMBERS

Environmental Organizations

American Rivers
Center for Climate and Energy Solutions (C2ES)
ConservAmerica
Defenders of Wildlife
National Wildlife Federation
Natural Resources Defense Council
Surfrider Foundation

Consumer and Taxpayer Advocates

Coalition to Reduce Spending
National Taxpayers Union
R Street Institute
Taxpayers for Common Sense
Taxpayers Protection Alliance

Insurer Interests

Association of Bermuda Insurers and Reinsurers
The Chubb Corporation
Liberty Mutual Group
National Association of Mutual Insurance Companies (NAMIC)
National Flood Determination Association
Reinsurance Association of America
SwissRe
USAA

Mitigation Interests

Natural Hazard Mitigation Association

Housing

Habitat for Humanity
National Housing Conference
National Leased Housing Association

ALLIED ORGANIZATIONS

Allianz of America
American Consumer Institute
American Property Casualty Insurance Association
Center for Clean Air Policy
Friends of the Earth
Institute for Liberty
Zurich