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OPPORTUNITIES TO REDUCE TAXPAYER BURDENS FROM HURRICANES AND STORM-RELATED FLOODING

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EXECUTIVE SUMMARY

The value of property at risk from extreme weather events, particularly on coastal lands, is rising. The current annual economic impact from hurricanes and storm-related flooding is $54 billion, $17 billion of which are direct costs to the federal government.[1] The costs of these disasters is anticipated to rise due to the combination of increasing coastal wealth and climate change's intensification of extreme weather events.[2] Since neither coastal wealth concentration nor climate change is anticipated to abate in the near future, prudent policy should dictate that the federal government revisit its coastal resilience efforts and identify opportunities to mitigate the cost and suffering inflicted by natural disasters.

Current federal policy retains perverse incentives which subsidize flood insurance and thus encourage coastal residents to put themselves and their property at greater risk than they otherwise would if they were fully responsible for their own insurance. These subsidies, amounting to $1.5 billion annually, primarily are to the advantage of wealthy Americans that can afford coastal property.[3] Even when updated flood maps (most of which are currently out of date) show heightened risk, government policies prevent any increase in premium and keep the National Flood Insurance Program (NFIP) out of actuarial soundness. The program is currently $20.5 billion in debt, even after approximately $16 billion of its debt was transferred to general taxpayers.[4]

Aside from flood insurance practices that incentivize risky behavior, the federal government is also inefficient in its allocation of existing resources directed to coastal resilience.

1. "Expected Costs of Damage From Hurricane Winds and Storm-Related Flooding," Congressional Budget Office, April 2019, p. 5. https://www.cbo.gov/system/files/2019-04/55019-ExpectedCostsFromWindStorm.pdf.

2. "Potential Increases in Hurricane Damage in the United States: Implications for the Federal Budget," Congressional Budget Office, June 2016, p. 2. https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/51518-hurricane-damage-onecol.pdf.

3. "Expected Costs of Damage from Hurricane Winds and Storm-Related Flooding," p. 24. https://www.cbo.gov/system/files/2019-04/55019-ExpectedCostsFromWindStorm.pdf.

4. Diane Horn, *National Flood Insurance Program Borrowing Authority*, Congressional Research Service, Oct. 2, 2020, p. 3. https://fas.org/sgp/crs/homesec/IN10784.pdf

In 2018 alone, the Bipartisan Budget Act appropriated $28 billion to the Department of Housing and Urban Development for disaster mitigation and resilience activities.[5] The Congressional Budget Office estimates that each dollar of resilience investment avoids $3 of later costs.[6] The Government Accountability Office (GAO), however, has noted that as government resilience efforts are spread across multiple agencies those efforts lack a strategic approach to the allocation of resources.[7] High value resilience efforts are not prioritized, and further a separate GAO analysis that resilience investments may overlook low-cost "natural infrastructure" (mangroves, wetlands and other naturally occurring systems that mitigate flood damage) projects that can have better benefit-cost ratios than conventional resilience infrastructure.[8]

The R Street Institute recommends several policy changes, with the aim of mitigating the costs and harm that result from natural disasters. These recommendations are as follows:

1. End NFIP subsidies and grandfathered rates for new construction in high-hazard areas.
2. Wherever possible, transfer risk to the private insurance markets that are better equipped to mitigate risk.
3. Update flood maps to better identify risk.
4. Consider how urban development exacerbates flood risk by creating impermeable surfaces and reducing groundwater absorption potential.
5. Where reasonable, consider if natural systems can more efficiently mitigate risk than artificial ones.
6. Designate project coordination to a single entity to more efficiently allocate the considerable resources already invested by the federal government in resilience.

INTRODUCTION

The 2020 hurricane season had a record-breaking 30 named storms.[9] Of these, 12 made landfall on U.S. soil, with a whopping five hammering Louisiana.[10] Despite the hurricane season being roughly "73 percent more 'active' than normal," early estimates of storm damage are $37 billion, which comes in below the expected average of $54 billion, and well below 2017's peak of $307 billion or 2005's $238 billion.[11] Storm damage is rarely an exact science, as it is a matter of chance if a storm will hit at just the right location to have a major impact, but the relatively low-cost of the 2020 season despite the jump in activity may indicate that improvements to federal policy on coastal resilience are finally paying off.

The federal government bears a substantial portion of the expense of natural disasters. Most of these expenses are to repair public property, but a significant portion is dedicated to relief for households and businesses. The objectives of public policy in disaster resilience include reducing human suffering and mitigating costs to taxpayers. Appropriate public policy should focus on maximizing disaster resilience, which will require a holistic approach to effectively leverage the many federal programs related to hurricanes and storm-related flooding.

Programs like the National Flood Insurance Program (NFIP)—the government's monopoly on flood insurance—should embrace reforms that minimize the level of risk in the insured pool and eliminate subsidies that incentivize new construction in high-hazard areas. Federal spending on disaster mitigation should carefully consider opportunities for resilience that diminish future damages. Similarly, government should embrace its recent practices of considering how natural systems such as mangroves and wetlands can have comparable benefits to artificial ones, while also having incidental economic benefits. And government should recognize that places that have consolidated disaster mitigation efforts into a single coordinator have had greater efficiency in their spending.

Ultimately, the costs of natural disasters are expected to rise on account of both climate change and the rising value of coastal land. As taxpayers are poised to shoulder significant burdens from disasters, emphasis should be placed on government accountability that allocates resources efficiently to mitigate long-term risk.

5. Nicole Carter et al., *Flood Resilience and Risk Reduction: Federal Assistance and Programs*, Congressional Research Service, Dec. 17, 2019, p. 35. https://crsreports.congress.gov/product/pdf/R/R45017

6. "Expected Costs of Damage From Hurricane Winds and Storm-Related Flooding," p. 25. https://www.cbo.gov/system/files/2019-04/55019-ExpectedCostsFromWindStorm.pdf.

7. J. Alfredo Gomez, "Climate Resilience: A Strategic Investment Approach for High-Priority Projects Could Help Target Federal Resources," United States Government Accountability Office, October 2019. https://www.gao.gov/assets/710/702236.pdf.

8. "Army Corps of Engineers: Consideration of Project Costs and Benefits in Using Natural Costal Infrastructure and Associated Challenges," United States Government Accountability Office, March 2019, p. 14. https://www.gao.gov/assets/700/698019.pdf.

9. Matthew Cappucci, "The record-shattering 2020 Atlantic hurricane season is over, but the scars it left remain," *The Washington Post*, Nov. 30, 2020. https://www.washingtonpost.com/weather/2020/11/30/record-hurricane-season-2020-ends.

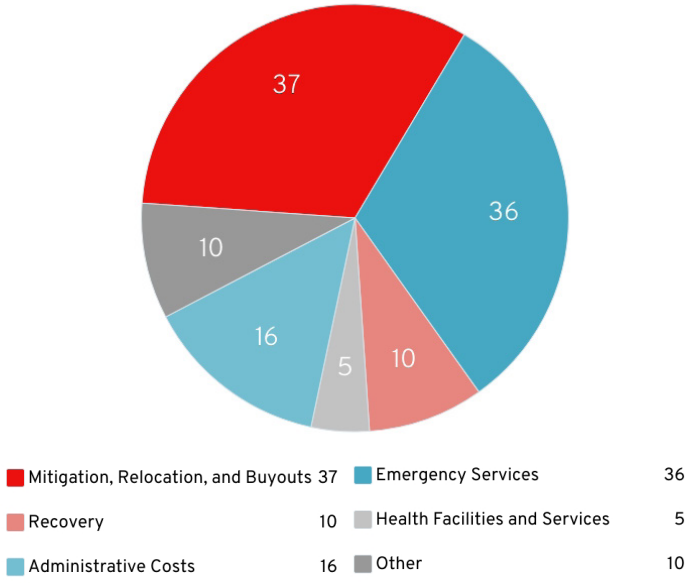
10. Ibid.

11. Ibid.

TAXPAYER INTEREST IN RESILIENCE POLICY

Natural disasters have a significant impact on taxpayers. The total estimated annual economic impact from hurricane winds and storm-related flooding is $54 billion, and estimated annual federal outlays are $17 billion.[12] Of the $54 billion in losses, $12 billion represent losses to the public sector, but federal outlays exceed that value because the government subsidizes communities in the form of reduced flood insurance rates and direct assistance following a natural disaster.[13] From 2005 to 2016, the U.S. government spent approximately $203 billion in response to damage from hurricane winds and storm-related flooding.[14] Chart 1 below shows the way these expenditures were divided, with the largest portion (44 percent) used to repair and replace property, over a third of which was private property.[15]

GRAPH I: FEDERAL SPENDING ON HURRICANE AND STORM-RELATED DAMAGE

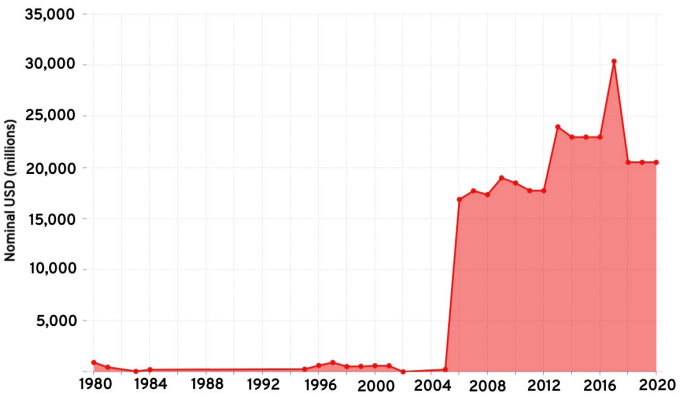


Source: R Street chart created using data from "Expected Costs of Damage from Hurricane Winds and Storm-Related Flooding." https://www.cbo.gov/system/files/2019-04/55019-ExpectedCostsFromWindStorm.pdf.

Absent any adaptation to hurricanes and other storms, it is anticipated that their related costs will rise due to climate change and concentrating coastal wealth. The Congressional Budget Office (CBO) estimates that current environmental conditions result in an annual $28 billion of economic damage from hurricanes (not including other storm damage), but by 2075 that cost will rise to $39 billion (in today's dollars).[16] Increased storm intensity and rising sea levels due to climate change are responsible for 45 percent of the expected damages, while increasing property values account for the remaining 55 percent. Overall, between now and 2075 the CBO estimates that the annual costs to the federal government (and thus taxpayers) from hurricane winds and storm-related flooding will increase by 33 percent, to $24 billion (in today's dollars).

One simple metric to assess federal spending on disasters is the Disaster Relief Fund (DRF), which is administered by the Federal Emergency Management Agency (FEMA). While the DRF only accounts for an estimated 35 percent of all federal disaster spending, it offers insight into the trends of federal disaster spending.17 Appropriations from select years show big swings dominating the fund, with an average annual appropriation of $12.5 billion, but a much lower median appropriation of $6.7 billion.18 The graph below shows that except for Hurricane Katrina, recent years have put upward pressure on appropriations.

GRAPH 2: TOTAL DISASTER RELIEF FUND APPROPRIATIONS



Source: R Street chart using data from William Painter, *The Disaster Relief Fund: Overview and Issues*, Congressional Research Service, Nov. 13, 2020. https://fas.org/sgp/crs/homesec/R45484.pdf.

In addition to storm damage costs, taxpayers will also face additional costs due to programs that are intended to relocate vulnerable, coastal communities. Between 2005 and 2016, the federal government spent approximately $37 bil-

12. "Expected Costs of Damage From Hurricane Winds and Storm-Related Flooding," Congressional Budget Office, April 2019, p. 8. https://www.cbo.gov/system/files/2019-04/55019-ExpectedCostsFromWindStorm.pdf.

13. Ibid, p. 5.

14. Ibid., p. 20.

15. Ibid.

16. "Potential Increases in Hurricane Damage in the United States: Implications for the Federal Budget," Congressional Budget Office, June 2016, p. 2. https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/51518-hurricane-damage-onecol.pdf.

17. "Expected Costs of Damage from Hurricane Winds and Storm-Related Flooding," p. 11. https://www.cbo.gov/system/files/2019-04/55019-ExpectedCostsFromWindStorm.pdf.

18. William Painter, *The Disaster Relief Fund: Overview and Issues*, Congressional Research Service, Nov. 13, 2020, p. 20. https://fas.org/sgp/crs/homesec/R45484.pdf.

lion on disaster mitigation, relocation and buyouts.[19] As sea level rise exacerbates coastal erosion and storm surge, federal liabilities to support community relocation—sometimes described as "managed retreat"—will likely rise as well. Simply, a business-as-usual approach to coastal resilience will result in higher costs to taxpayers, and greater overall economic harm to vulnerable coastal communities.

There is a strong case for improved coastal resilience policy at the federal level. While public attention with recent natural disasters is frequently focused on climate change, it should be noted that climate change is not the primary rationale for updated resilience policy. As the CBO noted in its estimate of rising storm damage, most of the increased costs from storms come from the increasing value of coastal property, which is an expected occurrence in a healthy economy with rising wages and living standards. While there is considerable debate as to the extent of how federal policy should address climate change, resilience considerations should not fall within that scope—the need for mitigating the costs to taxpayers from extreme weather events is well established.

There is also a growing demand for resilience policy, in both the government and the private sector. For example, the 2019 Department of Homeland Security's National Mitigation Investment highlights the opportunities for improved coordination among federal agencies in reducing damages, as well as the benefits of having risk managed by the private sector.[20] In the private sector, insurers—and especially reinsurers—recognize that insufficient resilience coupled with growing risk poses a threat to business models that rely on accurately measuring premiums to compensate for the level of risk in the insurance pool.

The nature of return on mitigation investment is somewhat complex, though. It is frequently noted that resilience investments can have returns far exceeding initial investment, often cited as $6 of return for every $1 of investment.[21] This approach may be a simplification, though, as the return on investment is most pronounced with a serious disaster, and if no disaster occurs then there is no return. Taking it as a given that increased federal spending on resilience ad infinitum yields linear returns is not true, so appropriate balance of risk and reward is necessary. Good federal policy on resilience should identify both risk and opportunity.

THE MISALIGNMENT OF RISK

Risk can be thought of as the probability of an event, multiplied by the cost of its occurrence. While the calculus is simple enough, the enactment of policy that reduces risk is not; traditionally, the federal government has not been very effective at measuring and reducing risk. One of the best examples of poor risk management by the federal government is the National Flood Insurance Program (NFIP). The program acts as a government monopoly on national flood insurance and is effectively the largest disaster related subsidy to the private sector at $1.5 billion annually; however, the size of the NFIP is less important than its incentives.[22]

Because the NFIP allows customers to acquire flood insurance at a rate below what the market would deem is appropriate for their risk, it acts as an incentive for residents to move into and develop areas that are high risk. In addition, the NFIP allows policy holders in high-hazard zones with structures built before the community joined the NFIP to obtain a subsidized policy. These subsidized policies make up approximately one fifth of all NFIP policies.[23] Further, many policy holders have a rate that is "grandfathered," meaning that even as risk in a particular area has increased, the policy holder's premium has not risen with it. Though grandfathering is not defined by the NFIP as a subsidy, it fits the classical economic definition, acting as a wealth transfer via the government to reduce market rates of a commodity, and the CBO's $1.5 billion subsidy estimate includes grandfathering.

The CBO estimates that 85 percent of policy holders in Zone V, the highest-risk zone for NFIP coverage, are subsidized.[24] In Zone V, 56 percent of policy holders have grandfathered policies, 16 percent have discounted rates, and 13 percent have both grandfathered and discounted rates.[25] For coastal counties, the gap between expected premiums and revenue raised was $1.5 billion, with an average subsidy of $410 per policy holder in coastal areas.[26]

The incentives of the NFIP in allocating risk to high-hazard areas are growing. New construction in areas that are deemed as high hazard under the NFIP are still eligible for coverage under the program. Old homes that are eligible for subsidized NFIP rates remain at these preferred rates even after undergoing renovation, eroding incentives for renova-

19. "Expected Costs of Damage From Hurricane Winds and Storm-Related Flooding," p. 20. https://www.cbo.gov/system/files/2019-04/55019-ExpectedCostsFromWind-Storm.pdf.

20. Mitigation Framework Leadership Group, "National Mitigation Investment Strategy," Dept. of Homeland Security, August 2019. https://www.fema.gov/sites/default/files/2020-10/fema_national-mitigation-investment-strategy.pdf.

21. Porter et al., *National Hazard Mitigation Saves*, National Institute of Building Sciences, December 2019, p. 10. https://cdn.ymaws.com/www.nibs.org/resource/resmgr/reports/mitigation_saves_2019/mitigationsaves2019report.pdf.

22. "Expected Costs of Damage from Hurricane Winds and Storm-Related Flooding," p. 24. https://www.cbo.gov/system/files/2019-04/55019-ExpectedCostsFromWind-Storm.pdf.

23. "The National Flood Insurance Program: Financial Soundness and Affordability," Congressional Budget Office, September 2017, p. 36. https://www.cbo.gov/system/files/115th-congress-2017-2018/reports/53028-nfipreport2.pdf.

24. Ibid., p. 16.

25. Ibid.

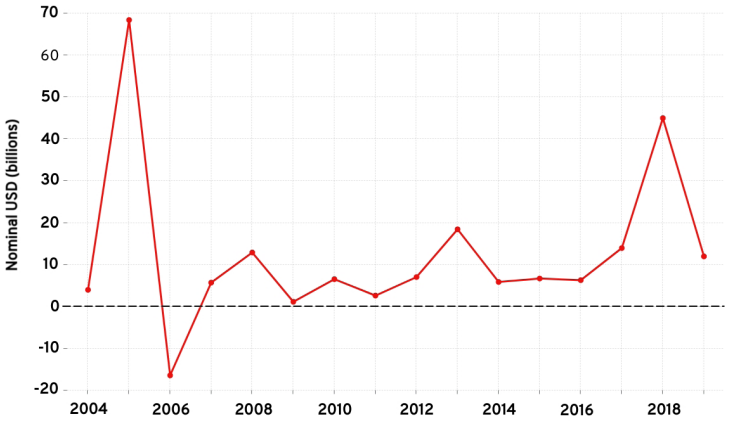
26. Ibid., p. 13-15.

tions to improve the resilience of the structure.[27] New structures are also frequently eligible for grandfathered rates, raising incentives to increase property value and reducing incentives for resilience.

Additionally, the federal government's role in identifying the probable occurrence of damaging events—a key component for measuring risk—is woefully behind. Previous R Street Institute research found that flood insurance claims in low-risk areas are rising, and this is likely due to outdated flood maps as well as low-quality maps when updates occur.[28] FEMA is required to update all its flood maps at least once every five years, but in 2017 it was found that only 42.4 percent of the milage mapped was up to date.[29] Even worse, data as far back as 2011 showed that FEMA had never even broken the 50 percent mark, with a 2015 peak attainment of 49.3 percent.[30] Even when maps are updated, there is a concern about their accuracy. One study estimates that 13 percent of Chicago properties are in a 100-year flood zone, more than 40 times higher than FEMA's estimated 0.3 percent.[31]

To make matters even worse, the unsustainability of the NFIP has not diminished its failure to be reformed. In 2012, the Biggert-Waters Flood Insurance Reform Act was passed with the intent of raising subsidized and grandfathered policies to an unsubsidized rate, with an annual rate increase capped at 20 percent per year.[32] However, two years later the Homeowner Flood Insurance Affordability Act of 2014 rescinded the changes, and capped premium increases at 18 percent.[33] In 2017, the NFIP's debt was bailed out, with $16 billion of its debt erased, meaning the burden of repayment was transferred from policy holders to general taxpayers.[34] Now, the NFIP is more than $20.5 billion in debt, burdened by one of the busiest hurricane seasons on record.[35] Graph 3 below shows the changes in the cumulative NFIP debt over time.

GRAPH 3: NFIP DEBT OVER TIME



Source: R Street chart using data from CRS report. Diane Horn, *National Flood Insurance Program Borrowing Authority*, Congressional Research Service, Oct. 2, 2020, p. 3. https://fas.org/sgp/crs/homesec/IN10784.pdf.

Beyond the unsustainable, compounding debt of the NFIP, it also seems to be failing in its core mission as a program to insure policy holders that would not otherwise be able to attain private insurance. The NFIP, in theory, should ensure that even low-income households have access to flood insurance, but a 2013 report found that "counties with higher home values and income levels tended to have larger percentages of remaining subsidized policies compared to those with full-risk rates."[36] Simply put, most of the subsidized policies are expected to be for high-income households. Further, the Biggert-Waters Act eliminated subsidies for 438,000 policies, 345,000 of which were second homes.[37] While there is an argument to be made that low-income and vulnerable communities should be protected from flood risk, it seems that the NFIP has instead been acting as a wealth transfer from taxpayers to high-income households and subsidizing beach homes.

Even if policymakers are unconcerned with the budgetary impacts of the NFIP and related programs, there is still a governance efficiency question to be addressed. With over $16 billion of NFIP debt already transitioned to general treasury burdens, and the implicit subsidy of $1.5 billion per year from the program, there is an outstanding question of whether such funds could be used more efficiently to address climate-related issues. For example, the Advanced Research Projects Agency–Energy (ARPA-E) is a program designed to fund high-potential applied research innovation that could reduce greenhouse gas emissions, but the program has been politically challenged over debates on its appropriate fund-

27. R. J. Lehmann, "Do No Harm: Managing Retreat by Ending New Subsidies," *R Street Policy Study* No. 195, February 2020, p. 8-9. https://www.rstreet.org/wp-content/uploads/2020/02/195.pdf

28. Ibid., p. 4.

29. Office of the Inspector-General, "FEMA Needs to Improve Management of Its Flood Mapping Programs," U.S. Department of Homeland Security, Sept. 27, 2017, p. 4. https://www.oig.dhs.gov/sites/default/files/assets/2017/OIG-17-110-Sep17.pdf

30. Ibid.

31. Christopher Flavelle et al., "New Data Reveals Hidden Flood Risk Across America," *The New York Times*, June 29, 2020. https://www.nytimes.com/interactive/2020/06/29/climate/hidden-flood-risk-maps.html

32. H.R. 4348, Biggert-Waters Flood Insurance Reform and Modernization Act of 2012, 112th Congress, p. 918. https://www.congress.gov/112/plaws/publ141/PLAW-112publ141.pdf

33. H.R. 3370, Homeowner Flood Insurance Affordability Act of 2014, 113th Congress, p. 128. https://www.congress.gov/113/plaws/publ89/PLAW-113publ89.pdf

34. Diane Horn, *National Flood Insurance Program Borrowing Authority*, Congressional Research Service, Oct. 2, 2020, p. 3. https://fas.org/sgp/crs/homesec/IN10784.pdf.

35. Ibid.

36. Alicia Cackley et al., "Flood Insurance: More Information Needed on Subsidized Properties," United States Government Accountability Office, July 2013, p. 12. https://www.gao.gov/assets/660/655734.pdf.

37. Ibid.

ing level, which was $425 million in fiscal year 2020.[38] A bipartisan bill aimed to increase that funding to $1 billion by 2029.[39] Reforming the NFIP to eliminate its subsidies could offer a revenue-neutral opportunity to not only reduce risk, but fund high-potential innovation efforts.

How to Mitigate Risk to Costal Communities

As a matter of policy, the NFIP shows the stark contrast between how government approaches risk and how a private entity would. Under optimal conditions, an individual facing a risk will purchase insurance to protect themselves from extreme consequence in exchange for marginal short-term costs. An insurer would then determine the level of risk faced by the client, as well as the total level of risk in the insured pool, and thus arrive at a conclusion of how much each policy holder must be charged to cover expected claims.

A private insurer is also expected to take steps to minimize the risk they cover. With that in mind, they would give discounts to homes that are built to a higher standard that minimizes damage. They would also have a keen interest in keeping their informational awareness on the level of risk as up to date as possible, so that claims do not rise faster than premiums. And for properties that seek to be built in high-hazard areas, insurers would either charge much higher premiums or refuse coverage outright. If a private insurer erred in its operations, it would go out of business, while its more effective competitors would succeed.

The NFIP in effect does the opposite of what a private insurer would be expected to. It does not charge rates that are actuarially sound. Rather, it subsidizes them. It does not keep the information necessary for estimating risk up to date. Nor does it refuse coverage to high-risk clients. And worst of all, when the NFIP fails to sufficiently mitigate risk, it does not go out of business, but instead is bailed out by taxpayers.

The lack of accountability for the NFIP is perhaps one of the biggest challenges it faces. For a conventional insurer, getting the risk pool wrong would be devastating to the success of the business. Charging premiums that are too high would result in lost customers to a competitor. Charging premiums that are too low means the insurer will not have enough money to pay out claims. Charging low-risk policy holders too much incentivizes them to leave and increases the risk in the remaining policies and charging too little to high-risk policy holders swells the risk.

To improve the NFIP, reforms should seek to have it function more as a private insurer would, minimizing risk and ensuring that premiums are high enough to cover claims. While such proposals have thus far proven unpopular—out of fears that it would be a double whammy to coastal communities that are already hit hard by storms—in truth, such policies are key for reducing human suffering from storm damage. As the NFIP acts as a subsidy, it incentivizes individuals to put themselves and their assets at more risk than they otherwise would. In 2020, the R Street Institute suggested two major reforms that could alleviate the burdens of the NFIP and mitigate harm from disasters:

1. The NFIP should not cover new construction in 100-year floodplains.

It makes little sense for the NFIP to openly offer coverage for new construction in the highest risk areas. If a private investor seeks to build property that they know is at high risk, the consequences of such action should be borne by that entity—not taxpayers.

2. New structures should not be eligible for grandfathered rates.[40]

Grandfathered rates, while not fiscally wise at any time, are intended to be applied to homes that have not lapsed in coverage and maintained standing in the program. There is no compelling reason for why a new structure should be eligible for a grandfathered rate, and perversely the practice weakens the incentive for new structures to be built for resilience.

Further, the most successful example of risk mitigation for coastal property has been the Coastal Barrier Resources System (CBRS).[41] The CBRS was created in 1982 and is comprised of 3.5 million acres of coastal land. While the land is not protected and private development is permitted, the CBRS explicitly prohibits federal subsidies for any development. One study estimated that the CBRS saved the federal government $9.5 billion between 1989 and 2013, as all the costs and risks of development are borne by the private sector.[42]

Ultimately a key requirement for FEMA and its management of the NFIP, regardless of any reform, will be to attain up-to-date flood maps. Without knowledge of the present level of risk, it is impossible to know just how far off from actuarial soundness the program is. One report noted that it

38. "Department of Energy FY2021 Congressional Budget Request (Volume 2)," Department of Energy, 2020, p. 321. https://www.energy.gov/sites/prod/files/2020/03/f72/doe-fy2021-budget-volume-2.pdf.

39. H.R.5685, Securing American Leadership in Science and Technology Act of 2020, 116th Congress. https://www.congress.gov/bill/116th-congress/house-bill/5685.

40. Lehmann, pp. 8-9. https://www.rstreet.org/wp-content/uploads/2020/02/195.pdf.

41. Ibid., p. 8.

42. Andrew S. Coburn and John C. Whitehead, "An Analysis of Federal Expenditures Related to the Coastal Barrier Resources Act (CBRA) of 1982," *Journal of Coastal Research* 35:6 (March 15, 2019), pp. 1358-61. https://www.jcronline.org/doi/abs/10.2112/JCOASTRES-D-18-00114.1.

may be worthwhile to allow private insurers to provide flood maps, as they have the most expertise in evaluating risk.[43] The report also noted that there are plenty of private insurers interested in entering the flood insurance market, which would indicate that the NFIP is not remedying any market failure. It is also worth noting that the CBO estimates that 80 percent of annual economic losses from flooding come from uninsured households, so having a more robust and competitive flood insurance market could mitigate the economic impacts of storm-related flooding.[44]

Reforms to the NFIP to make it act more like a private insurer—or better yet transfer its management to the private sector altogether—would also eliminate incentives for additional property value and population to accrue in high-hazard areas. This should be a major pillar of any resilience policy moving forward, as alternative resilience efforts may yield limited benefits if the NFIP continues to stimulate risky behavior. In recent years, the NFIP has sought private reinsurance to cover the program, and hopefully this will bring it some much needed fiscal discipline.[45]

And, for policymakers that are concerned about the impacts of NFIP reform to low-income households, they should consider if federal aid in the form of targeted relief would better serve vulnerable communities. In addition to the federal government's $1.5 billion in annual subsidies to the NFIP, it also spends $4 billion on individual assistance to households, much of which is to uninsured households. Therefore, a reform that ends subsidies for wealthy policy holders and makes it easier for low-income households to acquire insurance could have substantial benefits to the federal budget.[46]

OTHER CONTRIBUTIONS TO COSTAL RESILIENCE

Federal expenditures for public losses from hurricanes and storm-related flooding cover disaster clean up, property damage, repairs to dams and levees, and emergency services. Some of the spending is also on disaster mitigation, and a CBO analysis of 58 major storms from the 2005 to 2016 period found that approximately 18 percent of federal spending went to mitigation services—but it should be noted that this included relocations and buyouts.[47] FEMA's Hazard Mitigation Grant Program, a major incentive for long-term risk mitigation, comprised only 2 percent of total federal disaster spending.[48] In addition, the CBO acknowledged that current levels of federal spending on pre-disaster mitigation are insufficient for mitigating risk, and that their own analysis of FEMA's Pre-Disaster Mitigation Program prevented future losses by $3 for every $1 of funding.[49]

There are several opportunities for federal policy and investment to mitigate risk, which could reduce federal spending from future natural disasters.

Improve Natural and Artificial Coastal Resilience to Mitigate Risk

While there is already a major push for governments to better consider sea level rise and other climate impacts in their planning for long-term infrastructure, less attention has been given to the impact on risk from coastal infrastructure and development generally. One key consideration should be how increased development can inadvertently create flood risk where previously there was none. For example, urban planning that involves too much concrete can increase flood risk because artificial materials are impermeable to water and reduce the water absorption capabilities of land.

A study by the U.S. Geological Survey found that "common consequences of urban development are increased peak discharge and frequency of floods."[50] The same study found that the increase in flood peak discharge because of urban development was between 100 and 600 percent for two-year floods, and between 10 and 250 percent for 100-year floods.[51] Understanding how urban development can increase flood risk, potentially reducing the value and utility of property that otherwise had high utility, should not be ignored. As a caveat, though, imposing undue conditionality on development could cause more harm than good, as federal investment—particularly in infrastructure—undoubtedly has at least some measure of utility, and new federal requirements that delay investment can generate additional costs.

To minimize increased flood risk from urban development, "natural infrastructure" has been an increasingly important tool for coastal resilience. Since the late 2000s, decisionmakers have been incorporating concepts of how natural systems

43. Diane Katz, "The National Flood Insurance Program: Drowning in Debt and Due for Phase-out," The Heritage Foundation, June 22, 2017. https://www.heritage.org/government-regulation/report/the-national-flood-insurance-program-drowning-debt-and-due-phase-out.

44. "Expected Costs of Damage From Hurricane Winds and Storm-Related Flooding," p. 9. https://www.cbo.gov/system/files/2019-04/55019-ExpectedCostsFromWindStorm.pdf.

45. "Public Notice of FEMA's Intended Procurement of Reinsurance January 2021 – Amended," Federal Emergency Management Agency, Sept. 16, 2020. https://www.fema.gov/fact-sheet/public-notice-femas-intended-procurement-reinsurance-january-2021.

46. "Expected Costs of Damage From Hurricane Winds and Storm-Related Flooding," p. 5. https://www.cbo.gov/system/files/2019-04/55019-ExpectedCostsFromWindStorm.pdf.

47. Ibid., p. 20.

48. Ibid., p. 12.

49. Ibid., p. 25.

50. C. P. Konrad, "Effects of Urban Development on Floods," U.S. Geological Survey, November 2003, p. 3. https://pubs.usgs.gov/fs/fs07603/pdf/fs07603.pdf.

51. Ibid.

such as mangroves and coastal wetlands can reduce the economic impacts of storm damage.[52]

Non-governmental organizations have examined how natural systems fare during extreme weather events and have found that their presence can yield benefits comparable to artificial ones. A 2019 study found that in Florida, the presence of mangroves prevented $1.5 billion of flood damage from Hurricane Irma in 2017.[53] Further, the study found that should the mangroves be lost annual flood damage in at least one county would increase by 25.5 percent.[54] Similarly, a study on Hurricane Sandy found that the presence of wetlands reduced the damage of the storm by 10 percent, and areas further inland from salt marshes had an average of 16 percent lower property damages.[55]

While the government lacks a standardized system for specifying investment in natural infrastructure, it is taking steps to capture its potential benefits. In 2016, the U.S. Army Corps of Engineers' (USACE) was required by statute to consider natural infrastructure alternatives when appropriate.[56] A 2019 report from the Government Accountability Office (GAO) found that the USACE has pursued eight natural infrastructure projects where benefit-cost analyses showed natural systems to yield greater net benefits than artificial ones.[57] Part of the reason that natural systems can be greater in economic benefit is due to the presence of incidental benefits, such as the increased recreational value of larger beaches, which made up nearly half of the benefits for the USACE's Encinitas-Solana Beach Project.[58] As a note, the USACE's benefit-cost decisions explicitly excluded environmental and health benefits from natural systems (such as water quality), because such benefits are not monetizable, but policymakers may still consider these benefits salient.

There are, however, opportunities for artificial infrastructure development to reduce flood risk. The USACE is the primary government entity in facilitating flood-related improvements; it maintains and improves dams and levees, and engineers coastland to reduce flood risk by widening beaches. In 2019, the USACE was awarded a supplemental appropriation of $3.3 billion for resilience efforts, with $1 billion specifically for the Flood Control and Coastal Emergencies account.[59]

In addition to funding to the USACE, improvements to dams, levees and other public assets are funded by the Department of Housing and Urban Development (HUD). Most of the disaster-related funding for the HUD comes in the form of Community Development Block Grants (CDBG), and specifically Disaster Recovery CDBGs (CDBG-DR) which are offered as supplemental appropriations in response to a disaster. From 2015 to 2019 the HUD awarded $39.9 billion in supplemental appropriations for natural disasters.[60] Allocating more funds specifically for disaster mitigation may alleviate future CDBG-DR requirements.

In 2018, the Bipartisan Budget Act appropriated $28 billion to the HUD specifically for disaster mitigation and resilience activities.[61] Of that, $12 billion was required to be spent on areas that were presidentially declared disasters from 2014 to 2017.[62] Clearly, the federal government does have an appetite for increased spending on resilience.

Spend Better, Not More

More spending, though, is not necessarily a guarantee of desirable outcomes. A 2019 GAO report determined that despite government investments in enhancing climate resilience, there was no discernable, strategic approach in investment strategy.[63] Because government resilience efforts are spread across multiple agencies, there was no prioritization or coordination of enhancements. The GAO recommended that to maximize the value of federal spending, resilience projects should be coordinated by a single governmental agency. Its recommendation was also based on the successful test case of Louisiana's consolidation of all coastal planning efforts into a single Coastal Protection and Restoration Authority (CPRA). The Louisiana CPRA utilized quantitative modeling to identify $50 billion of high-priority projects between 2005 and 2017, enabling better allocation of resources.[64]

52. Eva Lipiec, *Nature-Based Infrastructure: NOAA's Role*, Congressional Research Service, Jan. 2, 2020, p. i. https://www.everycrsreport.com/files/20200102_R46145_6027ea5c62df4c4a03a2570fcaac97a6906d49ec.pdf.

53. Siddharth Narayan et al., "Valuing the Flood Risk Reduction Benefits of Florida's Mangroves," The Nature Conservancy, Oct. 29, 2019, p. 11. https://www.nature.org/content/dam/tnc/nature/en/documents/Mangrove_Report_digital_FINAL.pdf .

54. Ibid.

55. Michael W. Beck, "Financing Natural Infrastructure for Coastal Flood Damage Reduction," Lloyd's Tercentenary Research Foundation, 2017, p. 24. https://conservationgateway.org//ConservationPractices/Marine/crr/library/Documents/FinancingNaturalInfrastructureReport.pdf.

56. "Army Corps of Engineers: Consideration of Project Costs and Benefits in Using Natural Costal Infrastructure and Associated Challenges," United States Government Accountability Office, March 2019, p. 14. https://www.gao.gov/assets/700/698019.pdf.

57. Ibid.

58. Ibid., p. 19.

59. Nicole Carter et al., *Flood Resilience and Risk Reduction: Federal Assistance and Programs*, Congressional Research Service, Dec. 17, 2019, p. 19. https://crsreports.congress.gov/product/pdf/R/R45017.

60. Ibid., p. 35.

61. Ibid.

62. Ibid.

63. J. Alfredo Gomez, "Climate Resilience: A Strategic Investment Approach for High-Priority Projects Could Help Target Federal Resources," United States Government Accountability Office, October 2019. https://www.gao.gov/assets/710/702236.pdf.

64. Ibid., p. 27.

Duplicative government entities pursuing resilience projects leads to inefficiencies, as multiple separate agencies may invest in projects that protect the same areas. This can also lead to a double counting of estimated benefits, if projects are pursued simultaneously without estimating the interactive effects of the two projects together. The GAO's recommendations highlight that when resilience investments are not coordinated, efforts become inefficient, and this can result in government waste.

Related legislation to create a safety board reviewing natural disasters has been introduced, but not passed, as Reps. Katie Porter (D-CA-45) and Garret Graves (R-LA-6) and Sens. Brian Schatz (D-HI) and Bill Cassidy (R-LA) have sponsored the "Disaster Learning and Life Saving Act of 2020."[65] The bill as introduced would create a "National Disaster Safety Board" that would review natural disasters and identify ways to mitigate future risk. Such a board may not fully satisfy the recommendations of the GAO, but would at least allow for a measure of prioritization for resilience projects.

Importantly, though, it should be noted that the creation of new government entities is a less attractive proposition than reallocating existing disparate government efforts into a single agency such as FEMA or the USACE. So long as multiple government agencies have their own authorities and appropriations to engage in resilience policy, there will continue to be inefficiencies, so policies that allow for improved coordination are key to maximizing benefits and minimizing costs.

Ultimately, policymakers should bear in mind that the United States already spends considerable sums of money on both disaster recovery and resilience efforts, and it should aim to capture the full potential of that spending. The R Street Institute echoes the recommendation of the GAO that publicly funded resilience projects should be prioritized and coordinated to ensure the utility of resilience investments are maximized. Furthermore, there may be untapped opportunities for existing resilience spending to be modulated as public-private partnerships or other forms of investment that can reduce costs by introducing competition wherever possible. Particularly as the fiscal condition of the United States becomes increasingly constrained by mounting debt, federal discretion that can identify projects that mitigate future costs could be a boon to taxpayers while also minimizing human suffering.

CONCLUSION

U.S. taxpayers face a significant and growing cost due to hurricanes and storm-related flooding, which will need to be mitigated with improved resilience policy. Broadly, the federal government should reform the NFIP to better align incentives with risk and identify opportunities for development that improve the physical characteristics of coastal property to better survive extreme weather events. More specifically, R Street's policy recommendations are:

1. End NFIP subsidies and grandfathered rates for new construction in high-hazard areas.
2. Wherever possible, transfer risk to the private insurance markets that are better equipped to mitigate risk.
3. Update flood maps to better identify risk.
4. Consider how urban development exacerbates flood risk by creating impermeable surfaces and reducing groundwater absorption potential.
5. Where reasonable, consider if natural systems can more efficiently mitigate risk than artificial ones.
6. Designate project coordination to a single entity to more efficiently allocate the considerable resources already invested by the federal government in resilience.

Absent reform, existing federal policy perversely incentivizes individuals to put their property and themselves at greater risk. While reform has been difficult because Americans are very sympathetic to the victims of hurricanes and other natural disasters, they should not let their support for immediate relief allow them to lose sight of the long-term opportunities to mitigate the harm to Americans from natural disasters.

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65. S. 4815, Disaster and Life Saving Act of 2020, 116th Congress. https://www.congress.gov/bill/116th-congress/senate-bill/4815; H.R. 8569, Disaster and Life Saving Act of 2020, 116th Congress. https://www.congress.gov/bill/116th-congress/house-bill/8569.