

Flood Resilience in the Fight against Climate Change

Around 41 million people, more than one in eight Americans, live in the nation's riverine and coastal floodplains, where critical energy, petrochemical refining, transportation, agriculture, and trade infrastructure is concentrated.¹ The nation's coastal and inland waterways -- as gateways for agricultural, energy, and other exports -- produce \$4.6 trillion in annual economic output. America's floodplains are vital to our country's economy, identity, and well-being.

Our coasts are exposed to some of the most damaging effects of climate change as rising sea levels encroach and more intense storms damage and even destroy businesses, homes, and families. Communities along our rivers are already experiencing more intense, damaging flooding. Confronting those challenges will require significant investment and shrewd policy. Flooding of riverine and coastal floodplains impacts virtually all corners of the U.S. and should be a pressing concern as legislators at the federal, state and local level consider solutions to climate change and the ways America must prepare for its impacts.

The Challenge

Floods are already the most common of natural disasters in the U.S. Due to increased intensity and duration of precipitation, scientists and engineers estimate that nation's floodplains will increase, on average, by 45 percent by the end of this century. As sea levels rise, the nation's 95,471 miles of shoreline will change. Science estimates that levels could rise as much as 2.3 feet by 2050 and 6.6 feet by 2100 if carbon emissions go unchecked. Depending on the rate of ice disintegration in Antarctica and Greenland, it could be worse.



Not only are our developed coasts and river corridors especially vulnerable to damages from these hazards, their habitats are also in jeopardy. This is especially true where built transportation and storm damage reduction infrastructure limits habitat migration and where natural recovery processes have been disrupted. Habitat loss significantly impacts commercial and recreational fisheries and tourism; it also increases exposure of coastal and river communities to flood hazards.

Currently, the high risk exposures together with lack of preparation, plays out in costs. Adjusted for inflation, the five costliest hurricanes experienced by the U.S. have occurred since 2005, 4 of them since 2012. In 2017 alone, Hurricanes Harvey, Maria, and Irma cost an estimated \$268 billion. That pattern is likely only to get worse. The unprecedented flooding in the Midwestern states experienced in Spring 2019 may soon become the new normal.

The Solution

We must begin to manage ahead of the floods by shifting federal, state and local policy from reactive to proactive and incorporating natural infrastructure into comprehensive strategies for managing water and coping better when flooding occurs.

Doing so is common sense and will be economically beneficial to local communities, tax payers, and the federal purse. Based on history, it is estimated that \$1 spent before a flood disaster saves \$7 in property loss, business interruption, and death. Investing upfront will help mitigate the burden of catastrophic costs while better protecting entire communities and families from disaster fallout.

We must initiate solutions now. We can start by implementing community improvements such as resilient infrastructure, new zoning, and hazard informed-building codes to bring about both rapid and gradual changes needed to successfully cope with the realities that people face.

The Infrastructure Opportunity

Natural infrastructure solutions lessen flood damages in three ways. First, they diminish factors that increase flooding. Solutions such as restoration of healthy soils slow water runoff. Second, they provide physical barriers to lessen flood hazards—think of dunes on a beach. Third, they create buffers that reduce vulnerability of built infrastructure to flooding. Floodplains, wetlands and forests can be particularly effective. Plus, natural infrastructure can be a community asset providing water quality and storage, recreational space, habitat, and tourism benefits year round—not just when there is a storm.

Natural infrastructure can provide additional layers of protection that complement traditionally engineered structures, increasing security for businesses and families. Rather than allow coastal areas to fall prey to climate change, we should initiate proactive solutions that will allow coastal communities to flourish and safely weather any storms that may reach their shores in the future.

The Role for Congress

Communities rely greatly on federal funding to prepare for storms and mitigate risks as well as to offer support after disaster strikes. While disaster relief spending has become an annual debate in Congress, we can better protect vulnerable populations by taking active measures ahead of time, potentially lowering the costs of future weather events.

To adequately protect and bolster coastal and riparian communities, Congress should consider taking actions such as:

- Fund and engage communities in proactive, hazard-informed planning that builds consensus on acceptable risks, teaches communities how to cope with water, and secures rapid implementation
- Support data acquisition and modeling such as ocean, coastal and stream gauges to provide better information for better planning and management
- Invest in approaches that value and use natural infrastructure to complement traditional approaches to reduce flood hazard and vulnerability and maximize ecosystem and damage reduction benefits and sustainability
- Improve coordination and alignment of federal and state goals and actions for coastal regions to advance implementation of comprehensive plans that include natural infrastructure to meet the urgency of the need
- Increase pre-disaster funding for critical agencies such as FEMA and HUD

ⁱ Wing et al. 2018, Estimates of present and future flood risk in the conterminous United States. Environmental Research Letters 13:3 <https://iopscience.iop.org/article/10.1088/1748-9326/aaac65>