

Coastal Flood Resilience Project

WHITE PAPER

Recommended Measures to Address Coastal Storm Flooding and Sea Level Rise Risks in Water Resources Development Legislation 6.7.2022

The [Coastal Flood Resilience Project](#) is a coalition of organizations working for stronger programs to prepare for coastal storm flooding and rising sea level in the United States. This White Paper offers national policymakers in Congress and Biden administration recommendations for addressing the risks posed by more severe storms and rising seas in water resources development legislation.

Introduction

A changing climate is resulting in more severe storm surge flooding of coastal communities and, in the decades ahead, storm flooding will ride on top of higher sea levels and reach farther inland than ever before. Temporary storm flooding will be followed in many places by permanent inundation due to steadily rising sea levels. Rising sea levels already cause “sunny day” or nuisance flooding in coastal areas and will gradually inundate parts of hundreds of communities and threaten critical infrastructure and coastal ecosystems.

Coastal storm flooding and rising sea level will demand dramatically expanded response measures from a range of federal agencies as well as state and local governments. The [Coastal Flood Resilience Project](#) (CFRP) is a coalition of organizations working for stronger programs to prepare the United States for the more severe coastal storms and rising sea level. The CFRP has described diverse federal government policy and program changes that are needed to meet this threat in a [Policy Agenda](#) and several supporting white papers.

Preparing for more severe storms and rising seas will require a “whole of government” effort. The Water Resources Development Act of 2022 can be a constructive means of implementing key federal program improvements. **This White Paper recommends that Congress include ten measures in the Water Resources Development Act of 2022 to respond to threats posed by more severe storm flooding and rising sea level (see Appendix 1 for list of recommendations).**

Problem Statement: Coastal Inundation Due to Storms and Rising Seas

The Atlantic, Gulf of Mexico, and Pacific coasts are home to over [100 million Americans](#). The population living right along the coast (i.e., at elevations of 33 feet and lower) is expected to [double by 2060](#) to about 44 million. Coastal communities have long faced significant risks from coastal storm surge flooding but climate change heightens these storm risks and adds the new threat of permanent inundation by steadily rising sea level.

More Severe Coastal Storms: Coastal storms are a major risk to life and property and major storms can deliver [storms surges of over fifteen feet](#). A warming climate is causing an [increase in the number of the strongest storms](#). These storms bring more extensive coastal flooding, higher storm surges, and increased rainfall. Research indicates that intense storms are [slowing down and thus](#) raining on a given place for longer, generating more rainfall and flooding. Even as storms move more slowly, they [intensify more rapidly](#), making their landfall harder to predict and more likely to result in major damage and loss of life. Some storms deliver intense precipitation to inland areas that then [comes downstream to worsen coastal flooding](#).

Steadily Rising Sea Level: The National Oceanic and Atmospheric Administration (NOAA) recently issued [new estimates](#) of future sea level rise concluding that the rate of sea level rise along the American coasts is accelerating and is likely to rise as much over the next 30 years (i.e., about 1.3 feet by 2050 in the “Intermediate” scenario) as it has over the last 100 years. Sea level rise averaging as high as 1.7 feet around the coastline is possible over this period and could reach as high as 2.2 feet in some places (e.g., in the Western Gulf of Mexico).

By the year 2100, NOAA projects sea level rise along the American coasts to average about 4 feet (in the “Intermediate” scenario) while an average increase of over 7.2 feet is possible. Sea level rise in some regions could be higher. By 2150, NOAA forecasts average sea level rise of over 7 feet in the “Intermediate” scenario with the possibility of average increases as high as 12.8 feet with increases in the Western Gulf of Mexico of 14.7 feet.

NOAA explains in its new report that the rate of increase of sea level rise depends on increases in global air temperature driven by the release of greenhouse gases. Additionally, the rapid deterioration of ice sheets in Antarctica and Greenland could result in higher projected increases occurring sooner than previously expected. These changes in ice sheets are difficult to model but are thought to pose the greatest risk in the decades after 2050. Finally, sea level will continue to rise for centuries after 2150.

Impacts of More Severe Storms and Rising Seas on Communities: More severe storms and rising seas will bring economic, environmental, and social disruption to coastal communities on an unprecedented scale.

In the short term, coastal communities can expect more [“sunny day flooding”](#) during high tides and larger surges and greater flooding during storms. In the longer-term, all or parts of

[hundreds of coastal communities](#) will face far more extensive flooding than they currently experience. As sea levels rise, sunny day flooding will increase and gradually lead to permanent inundation. The combination of more severe storms and rising seas is projected to result in losses of coastal property running into [trillions of dollars](#). These loss estimates, however, are based on the existing population along the coast and are likely to rise as new development occurs in risky coastal places in response to population increases.

Many low income and disadvantaged communities are among those [in harm's way](#). These communities are [disproportionately affected](#) by climate change including sea level rise and extreme coastal weather events, and often lack the resources to respond to these risks.

Recommendations for New Water Resources Development Authorities

Congress should consider how the Water Resources Act of 2022 could support new policy and program authorities for effective responses to more severe storms and rising sea levels. Some elements of the nation's water resource development program are already addressing coastal flood risks. Congress should strengthen these existing authorities and provide new authority in several key areas.

Recommendation #1: Address Sea Level Rise Risks to Coastal Flood Project Plans

Today, authority for coastal flood studies and projects is focused on addressing the impacts of storm flooding. The Corps may consider how sea level rise can make such occasional, temporary storm flooding worse in the future, but is not required to assess the impacts of permanent inundation, increasing every year, due to rising seas. **The Congress should include in the Water Resources Act of 2022 a new requirement, *not just the option*, for studies of coastal flood response strategies to specifically assess and address the potential for both more severe storms in the future and the impacts of projected increases in sea level.**

The need for this new authority is illustrated in a "Frequently Asked Question" for the [Florida Keys Coastal Storm Risk Management Study](#), in which the Corps responded to a question on sea level rise as follows:

"Shouldn't we spend this money on projects that also address sea-level rise?"

U.S. Army Corps of Engineers only has the authority to address risk caused by coastal storm events in this study, not the more broad effects of sea-level rise that may occur on a more frequent basis, such as "sunny day flooding" and "king tides." However, sea-level rise is included in evaluation of the impacts expected from future coastal storms."

Adding sea level rise to the coastal flood planning process is both overdue and essential to effective planning. Why should the Congress add sea level rise risk to coastal flood planning?

- **Apply Sound Science:** The last decade has produced highly quality science on both global sea level rise projection and localized projections all along the U.S. coast that make accurate accounting for sea level rise possible.
- **Save Money:** Sea level rise brings permanent inundation while storm flooding is temporary. Response measures that make sense when the problem is defined as occasional, temporary flooding make less sense when the problem is permanent and growing inundation. For example, elevating buildings is a reasonable way to reduce conventional storm flood damages but standing water around homes due to rising seas poses challenges like access for emergency vehicles and provision of utilities. Implementing flood control measures that do not account for rising seas means that some measures will be ineffective or at best interim. Responding to coastal flooding and rising seas will be very expensive and the government should not pay twice to solve a problem.
- **Minimize Social Disruption:** Avoiding ineffective or interim measures not only saves money, but it also reduces the extent of social disruption that more severe storms and rising seas will inevitably bring to the coast, especially to disadvantaged communities. There are cases where interim measures may make sense, but these measures should be considered in the context of a more permanent solution (e.g., relocation to higher ground).

Recommendation #2: Recognize and Support Relocation Options

When sea level rise is considered as a risk to the coast along with storm surge flooding, response measures such as home buyouts and relocation are likely to be more cost effective in the long run than building protection structures to hold the current shoreline in place or elevating structures above rising waters. **The Congress should include in the Water Resources Development Act of 2022 clear authority to support relocation as a key strategy to build coastal resilience.**

Relocation of coastal assets has for many years been dismissed as impractical, unpopular, or unnecessary. Today, relocation is increasingly recognized as a coastal flood and sea level rise response strategy that needs to be considered along with other options and likely the inevitable outcome for many coastal areas.

Earlier this year, the Intergovernmental Panel on Climate Change (IPCC) published [*Climate Change 2022: Impacts Assessment and Vulnerability*](#), and concluded:

“Only avoidance and relocation can remove coastal risks for the coming decades, while other measures only delay impacts for a time, have increasing residual risk or perpetuate risk and create ongoing legacy effects and virtually certain property and ecosystem losses (high confidence).”

In the United States, the widely respected Coastal States Organization stated in recent [testimony](#) *“Determining when and how to restore and when and where to retreat is at the heart of coastal resilience.”* (italics in original testimony)

The Corps has experience in designing, permitting, and building coastal protection structures but has not generally recognized the importance of considering relocation strategies. But, writing in the preface to the [North Atlantic Coast Comprehensive Study](#) developed in the wake of Hurricane Sandy, the Corps noted:

“Given current and projected sea level and climate change trends, some of our built environment will become unsustainable for the human systems presently located there. Coastal communities face tough choices as they adapt local land use patterns while striving to preserve community values and economic vitality. In some cases, this may mean that, just as ecosystems migrate and change functions, human systems may have to relocate in a responsible manner to sustain their economic viability and social resilience.”

In addition, the [Coastal Flood Resilience Project](#), recently released a [white paper](#) addressing the benefits of a relocations strategy and outlining measures the federal government should take to support relocation of coastal communities.

In drafting coastal relocation authority for the Water Resources Development Act of 2020, the Congress should consider making any needed adjustments in current law. For example, In the case of a project that involves significant acquisition of land and property, and relocation of infrastructure and ecosystems, the provisions of the 33 USC 2213(b)(1) might be read to require the non-Federal party to provide the land. The bill could clarify that a requirement for provision of land is limited to land used for structural measures and not land or other assets intended to be acquired by the project to support relocation.

Other topics related to relocation that Congress should consider include:

- how responsibility for managing and funding buyouts and relocated relocation costs should be apportioned among federal agencies in addition to the Corps (e.g., FEMA and HUD);
- the importance of coordinating relocation strategies with the coastal flood resilience strategies of the state and neighboring jurisdictions;
- the benefits of coordinating relocation strategies with plans for relocation of critical infrastructure in sea level rise risk areas and with the landward migration of coastal ecosystems such as beaches and wetlands; and
- how to assure that relocation strategies treat low income and disadvantaged communities, that often suffer the greatest harms and have the fewest resources, fairly.

Recommendation #3: Conduct National Oversight of Very Expensive Coastal Projects

The Corps has recently completed coastal flood studies proposing to spend hundreds of millions of dollars each but it also authorizes several very expensive projects that are estimated to cost over \$1B in Federal funds and hundreds of millions in local contributions (e.g., Florida Keys and Upper Barataria Basin). In the case of the [Texas coastal project](#), the bill authorizes federal appropriations of almost \$18 billion. Further costs are likely in all these cases.

Given the significant and long-term implications of major coastal projects, **Congress should include in the Water Resources Development Act a requirement for written approval by the governor or governors of affected states and should adopt a policy of providing for Congressional level review (i.e., a Congressional hearing) for very large federal investments of over \$1 billion in coastal flood projects.**

Although these projects have had local input, the scale of proposed and likely additional spending for the above \$1 billion projects argues for a national level review to gain confidence that these projects are well designed, to understand likely follow-on spending, and to hear from diverse local and national stakeholders. A standing policy of oversight of these high-cost projects would result in project proposals prepared with the expectation of Congressional scrutiny and would allow for consideration of major investments in the larger context of other needs and the limits on the country's capacity to support coastal resilience projects.

A statutory requirement for written approval of governors of states affected by a proposed coastal project would assure that a project is consistent with state coastal goals and plans and statewide priorities for federal investments in addition to those of local sponsors.

Recommendation #4: Improve Cost/Benefit Analysis

The current procedures for cost/benefit analysis for water resources projects result in undercounting of both benefits and costs and a bias toward investment in wealthy areas where the value of homes and other property generate high benefits relative to costs. **The Congress should include in the Water Resources Act of 2022 a direction to the Assistant Secretary of the Army for Civil Works to work with the Director of the Office of Management and Budget to identify fundamental reforms to cost/benefit analysis and decision criteria for coastal water resource projects and report to Congress within one year.**

The Congress should identify key potential reform measures including:

- comprehensive assessment of diverse project benefits of projects, as described in Coastal States Organization [testimony](#); p 5.);
- risk assessments that consider current and projected future flood, storm, and sea level rise risk over the projected useful project life;
- project assessment time horizons that apply to the projected useful life of the project rather than a fixed period such as 50 years or a minimal "design life" of a facility;

- assessment of risks and costs related to operation and maintenance and replacement of proposed measures or features, or of alternative measures or features, needed over time (e.g., costs of elevation and costs of relocation after access to elevated structures is no longer safe); and
- development of methods to establish benefits based on the number of people benefitting rather than the value of the assets protected.

Improvements in cost/benefit analysis will have significant consequences for decisions concerning project design and selection of projects for funding. For example, addition of long-term maintenance costs (now considered a local sponsor responsibility) to cost/benefit assessments will add to the long-term costs of projects requiring maintenance (e.g., such as seawalls in the ocean). In addition, assessing benefits of a project based on alternative or more diverse considerations (e.g., the number of people benefitting from a project, rather than the value of the property protected), will make federal investments in coastal resilience more widely available and increase investments in low-income and disadvantaged communities.

Recommendation #5: Reduce or Eliminate Non-federal Share of Project Costs for Low-income and Disadvantaged Communities and Increase Share for Wealthy Communities

Sea level rise is occurring along most of the U.S. coastline, including low income and disadvantaged communities. Today, the local sponsor cost-share requirements for federal water resources projects apply regardless of the ability of a benefitting community to pay the cost share. In practice, this means that water resources assistance is not available to many low-income communities with limited resources. These communities also are often burdened with a history of discrimination and may have [received less disaster assistance than wealthy areas](#). They are also likely to have a high percentage of primary residences rather than high value [second homes or investment properties](#). Some very poor communities are unable to afford even a reduced local share.

A related problem is that a fixed cost share percentage allows communities with significant financial resources to pay a share of project costs that is well below their financial capacity. Because total federal financial assistance is limited, these communities that could pay a greater share of costs use federal funds that are then not available to communities with more limited funds. These resource-constrained communities also are often not able to develop project proposals. The net effect is that disadvantaged communities are less likely to get federal assistance than other communities.

The Congress should include in the Water Resources Development Act of 2022 new authority for reduced costs-sharing by low-income and disadvantaged communities and higher cost-shares for wealthier communities based on affordability criteria to be developed by the Corps, including authority to eliminate cost-share requirements for disadvantaged communities and to assist them in developing applications for grant assistance.

The Congress should also require a report from the Corps to Congress within one year of enactment of the bill describing affordability criteria and periodic reports on projects for low income and disadvantaged communities.

Recommendation #6: Reduce Local Cost-share for Nonstructural and Nature-Based Projects

Coastal project designs that rely on nature, such as coastal wetlands, or include natural elements, such as [“living shorelines,”](#) are an improvement over conventional shoreline armoring with seawalls or bulkheads. In addition, [nonstructural measures](#), including relocation and elevation of buildings, can help improve resilience to both coastal flooding and rising sea level and can be less expensive than conventional structural protection projects (e.g., such as seawalls).

The non-federal share of all coastal projects is currently 35 percent. **The Congress should include in the Water Resources Development Act of 2022 new authority for a lower non-federal share (e.g., 20 percent) for projects that apply nonstructural or nature-based solutions, including projects that provide for relocation of homes and related community infrastructure.**

This new, lower local cost-share authority would provide a clear policy and price signal to local project sponsors concerning the long-term value of nonstructural and nature-based solutions. Although this policy would require a larger federal share of a project’s cost, nonstructural and nature-based solutions are commonly less expensive than structural projects and greater use of projects with these features is likely to reduce the overall costs of the coastal flood and sea level rise resilience projects.

Recommendations #7: Require Individual Rather than General Permits for Coastal Armoring

A common response of many property owners to more severe storms and rising seas is to protect their property by armoring the coast with a bulkhead or related structure. Some [14 percent of the coast is already armored](#) and, if the current rate of armoring continues, that percentage is expected to double by 2100. These projects protect property, but come at a cost as they [“can reduce ecosystem connectivity”](#) and obstruct landward migration of ecosystems.

In addition to its role in planning, financing, and constructing major coastal flood resilience projects, the Army Corps of Engineers, in conjunction with the Environmental Protection Agency, implements the wetlands protection program under section 404 of the Clean Water Act. As part of this program, the Corps issues permits for discharges of dredge and fill material into waters of the United States, including wetlands. Section 404 permits may be issued for an individual project but many projects are covered by a “general permit” applicable to a type of project. Under [Nationwide Permit 13](#), the Corps provides for expedited approval of shoreline armoring, bulkhead, and seawall projects that are determined by the Corps to have “minimal adverse environmental effects” except that bulkheads over 1,000 feet in length are not eligible for a general permit and must get an individual permit.

In its review of nationwide permits in 2021, the Corps considered changes proposed to Nationwide Permit 13, noting that commentors pointed to [“deleterious effects on shoreline ecosystems”](#) caused by general permits for these coastal armoring projects. A related concern is that, although installing a “living shoreline” as an alternative to armoring can proceed under a separate general permit, these living shoreline projects face [“tighter restrictions”](#) than do armoring projects. Despite these concerns, the Corps did not revise the general permit.

The accelerating rate of sea level rise is likely to drive a continued acceleration of shoreline armoring projects. The cumulative harm resulting from permissive general permits for armoring projects eventually covering thirty percent or more of the coast will result in significant cumulative harm. **The Congress should include in the Water Resources Development Act of 2022 a direction to the Assistant Secretary of the Army for Civil Works to revoke Nationwide Permit 13 and rely instead on individual permits to approve coastal armoring projects.**

Recommendation #8: Authorize Removal of Structures Abandoned to Rising Seas

There are many structures along the coast where rising sea level and storm surges have resulted in abandonment or condemnation of the structures. The number of these structures will increase steadily in the decades ahead as sea levels continue to rise. These structures pose a risk to public safety and navigation and the eventual destruction of structures and related utilities (e.g., septic systems) poses a pollution risk to coastal waters. Local governments are sometimes able to pay the costs of removing risky structures but the likely increase in the number of structures needing removal will make action by local governments increasingly unlikely.

Today, there is no national registry of abandoned structures at risk of being lost to storms and rising seas, no national assessment of their risks to navigation or public safety, and no national program to provide for the removal and safe disposal of these structures on a priority basis. **The Congress should include in the Water Resources Act of 2022 new authority for creation of an inventory of abandoned or condemned coastal structures needing removal and authority to fund projects for the removal of such structures on a priority basis and ecological restoration of these locations.**

Recommendation #9: Authorize Support for Creation of Ecosystem Migration Pathways

As sea levels rise, existing coastal ecosystems – wetlands and beaches - will migrate landward where they are not blocked by geographic features or development. Some important work is already underway to support landward migration of coastal ecosystems. For example, there are many places along the coast where viable saltwater wetlands have been degraded or destroyed by built structures (e.g., bridges, roads, and dams) that restrict tidal flow. The Environmental Protection Agency (EPA) [identified](#) 1,764 restrictions degrading over 70,000 acres of saltwater wetlands in just 10 states.

In addition to built structures, landforms also present obstacles to landward migration of wetlands and beaches. For example, the grade of land behind an existing wetland might be too steep to allow for ecosystem migration. State and local governments, working with nonprofit organizations and other federal agencies can identify areas where physical alteration of existing geography would open a migration pathway. In support of this effort, the Army Corps of engineers can provide the engineering and earth moving capacity to help implement a migration pathway project.

Congress should include in the Water Resources Development Act of 2022 new authority for federal agencies to work with state and local governments and relevant stakeholders to map potential ecosystem migration pathways and, where necessary, authorize projects to support the creation of successful pathways.

Recommendation #10: Authorize Interagency Cooperation and National Report on Coastal Flood Resilience

The national response to the challenges posed by coastal storm flooding and rising sea level will require leadership from the federal government and a “whole of government” approach. Federal agencies with important roles in strengthening coastal flood resilience include the National Oceanic and Atmospheric Administration, the Federal Emergency Management Agency, the Army Corps of Engineers, the Environmental Protection Agency, and the Department of Housing and Urban Development.

Today, existing interagency coordination groups on “coastal resilience” and sea level rise science are not working under statutory authority and might be eliminated by a future administration. **The Congress should include in the Water Resources Development Act of 2022 new statutory authorizations for these existing interagency groups and provide general direction with respect to duties and responsibilities.**

Congress should also call for a comprehensive, interagency assessment of existing coastal flood and sea level rise resilience programs and policies, supported by a federal advisory committee by, and a report from these parties to the President and Congress within two years. The report should specifically address critical topics including expanding coastal relocation program options, addressing social justice, and preserving or increasing ecosystem services.

The [Coastal Flood Resilience Project](#) is a coalition of organizations working for stronger programs to prepare for coastal storm flooding and rising sea level in the United States. The views expressed in this *White Paper* are those of the contributors listed below and do not represent the views or endorsements of their organizations.

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Appendix 1

Recommended Measures to Address Coastal Storm Flooding and Sea Level Rise Risks in Water Resources Development Legislation

- 1. Address Sea Level Rise Risks to Coastal Flood Project Plans**
- 2. Recognize and Support Relocation Options**
- 3. Conduct National Oversight of Very Expensive Coastal Projects**
- 4. Improve Cost/Benefit Analysis**
- 5. Reduce or Eliminate Non-federal Share of Project Costs for Low-income and Disadvantaged Communities and Increase Share for Wealthier Communities**
- 6. Reduce Local Cost-share for Nonstructural and Nature-Based Projects**
- 7. Require Individual Rather than General Permits for Coastal Armoring**
- 8. Authorize Removal of Structures Abandoned to Rising Seas**
- 9. Authorize Support for Creation of Ecosystem Migration Pathways**
- 10. Authorize Interagency Cooperation and National Report on Coastal Flood Resilience**