



 COLUMBIA CLIMATE SCHOOL  
CENTER FOR SUSTAINABLE URBAN DEVELOPMENT



# *Improving Coastal Resiliency Projects with The U.S. Army Corps of Engineers:*

*Protecting coastal communities through investment in green  
infrastructure and communities*

## Executive Summary

Flood risk facing coastal communities continues to escalate with the current hurricane season expected to bring [record-breaking storm activity](#). Yet current Federal coastal resiliency planning faces serious challenges that require urgent attention. This brief, prepared by advocates and researchers in climate-vulnerable coastal communities across the United States, calls upon the U.S. Army Corps of Engineers (USACE) to adopt critical policy reforms to avoid further widespread flood loss and damage. It also asks Congress to direct and fund additional reforms in the legislation that authorizes the USACE work, the Water Resources Development Act (WRDA) for 2024 and beyond. Based on experiences with the USACE resilience projects on the East Coast and Gulf Region as well as academic and USACE analysis, this brief asserts that USACE needs to adjust its practice in:

- modeling flood risk accurately under changing climatic conditions,
- utilizing a wider scope of flooding hazards to analyze flood risk,
- engaging and centering communities better in planning,
- employing natural and nature-based solutions and nonstructural approaches
- utilizing a benefit-cost analysis beyond a narrow set of variables
- addressing environmental justice concerns and carrying out [Justice40](#)

To address these concerns and improve how these projects are carried out, we recommend the USACE should:

- Include compound flooding analysis in study scopes and develop standardized implementation guidance for [Section 8106 for WRDA 2024](#), include the analysis of environmental risks from structural measures, and utilize the best available models in collaboration with agencies and other stakeholders.
- Carry out meaningful public engagement that centers disadvantaged communities, allow adequate windows for public comment, and utilize community expertise.
- Require analysis of ecosystem services, utilize natural and nature-based solutions (NNBFs) in hybrid project alternatives through a phased approach to manage risk, rather than as add-ons to structural solutions, and center the Engineering with Nature program in project planning
- Implement a more equitable benefit-cost analysis through consideration of social, environmental, and economic factors.

Congress should:

- Strengthen WRDA in 2024 and beyond by allocating greater funding to ensure that the USACE is able to staff and conduct compound flooding analysis, establish environmental justice coordinating committees, and analyze ecosystem impacts.
- Update legislation (Public Law 84-71) to explicitly allow for consideration of coastal storm-induced compound flooding effects.

## **I. Introduction and Purpose**

From sea level rise and increased rainfall intensity to higher and more intense storm surges, climate change impacts present new and escalating risks for coastal communities. Navigating these challenges requires rethinking past approaches to resiliency in the context of continued floodplain development and aging infrastructure. Under the Water Resources Development Act (WRDA), the USACE is authorized to address coastal protection through studies and projects along coastal areas of the United States. These projects vary in scope and size, with some totaling millions while others billions. Estimates suggest a total cost of at least \$143 billion for “Coastal Storm Risk Management” (CSRM) projects identified<sup>1</sup> along the East Coast and Gulf Region over the next few decades; this figure is likely to be higher. It is critical that these resources are carefully allocated and well-spent to lead to maximum protection of communities.

Local and regional community-based advocacy organizations and academic researchers have come together after years of work with the USACE on CSRM studies affecting their communities across projects in Miami, Galveston/Houston, Charleston, Norfolk, and the New York/New Jersey Harbor to discuss shared experiences and challenges. During these discussions, clear patterns of concerns emerged from across the country. This brief seeks to examine these key concerns around the approach that the USACE is taking to meet its mandate and provides recommendations to improve

collaboration and partnership, including with affected communities.

To date, the USACE water resources projects and their associated planning processes have suffered from:

*1) failure to conduct compound flooding analysis and use the most up-to-date data and modeling*

*2) low levels and poor quality of community engagement*

*3) the use of an outdated benefits/cost analysis that fails to consider important factors including critical equity and justice considerations*

*4) underutilization of natural and nature-based features, and*

*5) underutilization of nonstructural approaches.*

The overarching goal of this policy brief is to foster a nuanced, broader, discussion on how to better support the USACE in coastal protection and develop evidence-based policy recommendations for critical improvements.

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<sup>1</sup> The projects identified are organized into a table in the appendix.

## II. Compound Flooding Analysis, Up-to-date Data and Modelling

### Engage in Compound Flooding Analysis

Multi-hazard and compound flood risk modeling in the context of uncertain climatic conditions is challenging but necessary. The USACE studies rely on models and study scopes that are too narrow and do not fully account for all potential current and future flood risks that communities face, or the possibilities of compounding and cascading risks. Currently, the primary concern from Congressional authorizations for CSRMs studies has been storm surge, a single hazard. As a result, studies have intentionally ignored heavy downpours, wind damage, groundwater inundation, sea level rise, and other flooding sources that are clear compounding threats that have already caused severe damage and loss of life. Yet structural interventions based on single-hazard models are not likely to function well when confronted in practice with multiple flood drivers. Multiple forms of flooding also compound each other's effects and potentially exacerbate other problems including saltwater intrusion, altered sediment flows, reduced water quality, induced flooding, and ecosystem damage.

Requiring an approach that addresses compound flooding and its diverse effects would address these concerns moving forward. This is even acknowledged in the 2021 South Atlantic Coastal Study (SACS): a critical recommendation from that report is for the Corps to “improve understanding and application of compound flooding effects on

existing and future coastal storm risk.”<sup>2</sup> To this end, Congress has directed USACE’s Engineering, Research and Development Center to collaborate with academia to conduct research into compound flooding. The Corps has also partnered with federal agencies and NGOs to establish a cohesive framework around compound flooding.<sup>3</sup> A second SACS recommendation is to revise Public Law 84-71 (the 1955 CSRMs study authority) to explicitly allow for consideration of coastal storm-induced compound flooding effects.<sup>4</sup> However, updating Public Law 84-71 requires an act of Congress; further, the Corps has not indicated if or when the study authority will be modified per the SACS recommendation. **Congress should follow the SACS recommendation to update the 1955 Public Law 84-71 to explicitly allow for consideration of coastal storm-induced compound flooding effects. In addition, the Corps should move forward on using compound flooding frameworks.**

### Implement Water Resources and Development Act Section 8106

Fortunately, Section 8106 of the Water Resources and Development Act of 2022 (WRDA), enables non-federal sponsors of coastal flood risk reduction studies to formally request that the USACE expand the scope of their studies to include nine different flood risks.<sup>5</sup> A January 8, 2024 letter from New York

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<sup>2</sup> 2021 South Atlantic Coastal Study Main Report, at 7-4.

<sup>3</sup> *Id.*, at 4-14.

<sup>4</sup> *Id.*, Table ES-2, at ES-12.

<sup>5</sup> These are: 1) a riverine discharge of any magnitude or frequency; 2) inundation, wave attack, and erosion coinciding with a hurricane or coastal storm; 3) flooding associated with tidally influenced portions of rivers, bays, and estuaries that are hydrologically connected to the coastal water body; 4) a rainfall

and New Jersey formally requested the expansion of the scope of the New York-New Jersey Harbor and Tributary Study (HATS), under WRDA 2022 Section 8106. Unfortunately, the USACE’s New York District staff has expressed concern that they have not been provided with sufficient guidance, time, and resources to carry out their newly broadened mandate for the HATS. Further, [recent implementation guidance](#) relating to Section 8106 is extremely general, with little actual guidance as to how individual USACE districts should evaluate the individual and collective risks associated with the nine specific categories of flooding this provision covers.



**Proposed USACE Seawall in Miami**  
*Source: Curtis Rogers Design Studio*

The [cost](#) of providing accurate analyses under Section 8106 of WRDA 2022 poses challenges, with such analysis potentially resulting in a doubling of expense and the timeline necessary for study completion. And for storm surge projects that finalized their feasibility study

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event of any magnitude or frequency; 5) a tide of any magnitude or frequency; 6) seasonal variation in water levels; 7) groundwater emergence; 8) sea level rise; subsidence; or 9) any other driver of flood risk affecting the area within the geographic scope of the study.

before Section 8106 was passed, such as the \$57 billion project proposed for the Galveston/Houston region, the \$2.6 billion Norfolk project, and the \$1.3 billion Charleston project, Section 8106 does not apply.

**WRDA 2024 should provide the USACE with funding to carry out Section 8106 as well as increase oversight and expedite the research and partnerships that the Corps is building to complete a compound flooding analysis framework, as recommended in SACS.**



**Proposed USACE Floodwall in Manhattan,**  
*NY Source: Army Corps of Engineers*

**Utilize the Best Modeling**

Given the importance of these studies, it is also critical to draw on the best data and science available for modeling multiple and compound flooding for all the USACE projects. [Concerns exist](#) around the USACE’s failure to adequately and accurately assess [present and future levels of sea level rise](#) as well as the interaction of this sea level rise with other coastal processes. These problems have been raised by scientists. For example, NOAA is concerned that even the USACE “intermediate” sea level rise projections being used on the NY/NJ HATS Study are [“significant underestimations”](#) of potential

future conditions. CSRSM projects are designed to protect against the so-called “100-year storm.” However, in determining the return period<sup>6</sup> the Army Corps uses its 2013 Intermediate Sea Level Rise scenario, which matches with NOAA’s 2017 Intermediate-Low scenario.

The [latest research indicates](#) that the Intermediate to Intermediate-High NOAA scenarios are more probable, and NOAA recommends these be used for planning. Failing to use recommended climate projections can result in a higher return period than what is likely to occur and will therefore result in a project not built for the most likely future conditions. This will also reduce the benefit-cost ratio used to determine whether the project should be pursued and ultimately result in projects that cannot protect communities against the more likely Intermediate to Intermediate-High conditions.

In some cases, the use of the lower estimates in the USACE intermediate projection causes conflicts. In Hampton Roads/Southeast Virginia, the 17 localities in the Hampton Roads Planning District voted unanimously in 2018 to use the NOAA Intermediate High projections in their planning. In updated engineering guidance for bridges, the Virginia Department of Transportation is using the same projections. These actions are in conflict with the Norfolk CSRSM project which uses the USACE intermediate projection, resulting in a one-foot lower estimated sea level at the end of the Norfolk project’s useful life in 2070.

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<sup>6</sup> A return period in modeling extreme weather events can be [defined](#) as the “average time until the next occurrence of a defined event”

Local researchers in Charleston also have raised concerns about [local beach erosion rates and models used by the USACE](#). Scientists have also warned the USACE about the failure to consider how sea level rise [impacts the structural components](#) of these projects and sedimentation (river avulsion) in major watersheds such as the Mississippi Delta.

**We recommend that USACE projects use the best, current, and most protective data and science in their modeling and studies, such as NOAA projections.**



**Proposed USACE Floodwall in Brooklyn, NY**  
*Source: Army Corps of Engineers*

### III. Public Engagement

#### **Improve Public Engagement**

Done properly, public engagement enables communities and experts to participate in, and improve flood risk reduction studies, project design, and decision-making. Unfortunately, public engagement on some of the most substantial projects for coastal communities across the country has been poorly conducted and under-resourced. Public engagement has

long been important to planning, as recognized in the establishment of the National Environmental Policy (NEPA) Act, but has not been centered in the process. The USACE is further restricted in its ability to engage because of its “3x3x3” process which aims to achieve study authorization within 3 years and spend no more than \$3 million while passing 3 concurrent levels of federal review. This ultimately provides too short of a time for deliberation on multi-billion dollar projects that reshape community resiliency well into the future. Many of these projects eventually are prolonged further by having the additional hurdle of filing for exemption from this policy.

Community leaders in each of the geographic regions in which the authors of this report are working have expressed frustration with their inability to get the USACE to create a truly collaborative process in their region. Engagement plans are [not funded](#), staffed, or structured to create meaningful consideration of community concerns that utilize local expertise and address realities. Further, public engagement is not obligatory throughout the entire project timeline. Public participation is conducted, most often in a perfunctory way, through the National Environmental Protection Act (NEPA) and ends with the local sponsor’s approval of the feasibility study. After this approval, communities lose the ability to engage the USACE on concerns during the critical phase of project construction.

### **Make More Forward Steps on Environmental Justice**

Disadvantaged communities who face higher risks due to historic marginalization and higher exposure to environmental hazards should be particularly centered in the engagement process;

in practice, they often face challenges in meaningfully participating given the poor quality of engagement by the USACE. Fortunately, this does not have to be the case. Recent efforts by the USACE on the Miami Back Bay study involved accounting for environmental justice in the main focus areas of the Tentatively Selected Plan. The Corps also employed charrettes, public meetings, and additional stakeholder engagement to get higher quality community collaboration and buy-in that was central to the newly developed plan.

The recent move by the USACE to [set up Environmental Justice coordinators in district offices and plan for EJ at the district level](#) is another welcome step in the right direction. At the prompting of local sponsors and environmental justice organizations, the USACE New York District is in the process of establishing an Environmental Justice Coordinating Committee (EJCC) whose purpose will be to establish the sort of meaningful engagement needed to put affected communities “at the front and center” of HATS planning.

This is in fact required under the terms of the [Interim Environmental Justice Implementation Guidance to the US Army Corps of Engineers](#) issued by the Department of the Army in March 2022. While the USACE expressed a goal of setting up EJ coordinators and EJ plans at the district level by early 2023, it is unclear whether the USACE has met its targets in other offices.

**We recommend that the USACE improve community engagement and ensure that there are environmental justice coordinators in each district that work down to the neighborhood level so that projects live up to**

the promise of the interim guidance and Justice40<sup>7</sup>.

## IV. Benefit-Cost Analysis and Justice Concerns

### Value Environmental and Social Variables

The USACE has employed a narrow benefit-cost analysis (BCA) in the selection and design of preferred project plans. Even the USACE is questioning this BCA as it is biased towards [economic variables](#) that are more easily quantifiable and exclude the proper weight of variables such as natural and nature-based features (NNBFs), ecosystem services, equity, and environmental justice concerns.

In evaluating plan alternatives, the USACE emphasizes economic variables, most notably the potential avoided property damage from flooding. In evaluating benefits, the USACE also [prioritizes](#) benefits to the national economic development account (NED), favoring alternatives designed for the greatest national economic benefit, without an understanding of how “benefits” are distributed across communities. The focus on economic variables further minimizes environmental and social variables that should be equally as relevant in decision-making. This results in an incomplete and therefore flawed analysis.

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<sup>7</sup> Section 223 of the 2021 Executive Order 14008 established the Justice40 Initiative, which directs 40% of the overall benefits of certain Federal investments to flow to disadvantaged communities; USACE projects are considered covered programs.

### Protect Marginalized Communities

The benefit-cost analysis currently prioritizes the protection of higher-value property and does not account for the reduction of risk to human life. This results in an analysis that is biased towards protecting wealthier communities and expensive structures, rather than people or the environment and often leaves disadvantaged and historically redlined communities without protection. To illustrate, the current benefits-cost analysis views the benefits of protecting a \$1,000,000 home housing one person as greater than the protection of three \$200,000 homes housing a total of twelve people, ultimately leaving more people at risk.

This illustration helps show how the analysis further ignores how these benefits are distributed, resulting in environmental justice communities being left unprotected from disastrous storms. Such communities include the Rosemont community in [Charleston](#), parts of the [South Bronx](#) as well as the Campostella and Berkley Communities in [Norfolk](#) and the Channelview neighborhood in [Galveston](#). This analysis also justified the creation of more pollution burdens for [already overburdened communities along the Houston Ship Channel](#) in Galveston during the ten-year construction period.

This is contrary to the [2021 Policy Directive: Comprehensive Documentation of Benefits in Decision Document](#) which requires equal consideration of economic, social, and environmental categories as well as the federal Justice40 Initiative which covers the USACE. Other agencies such as the Department of Housing and Urban Development have taken steps to employ a more equitable, accurate BCA, which has yielded a higher BCA ratio. Analysis

using this alternative BCA determined protections of some structures that the USACE excluded were in fact cost-effective in [Norfolk](#).

Use of a BCA that does not include equity considerations will continue to exclude disadvantaged communities nationwide, despite the disproportionate levels of current and future flood risk these communities face. As the USACE continues its expanded role in developing coastal resilience nationwide, an equitable and accurate cost-benefit analysis must be employed to ensure that all communities are protected. Fortunately, the [February 15th draft of Agency Specific Procedures \(ASPs\)](#) for the Corps' implementation of the Principles, Requirements, and Guidelines for water resources investments (the “Proposed Rule”) seeks to reevaluate the BCA and decision-making process to give equal weight to economic, social and environmental variables. However, implementation of these changes remains uncertain as a framework for doing so on the USACE projects does not yet exist. Hence, **we recommend creating a more holistic and equitable BCA framework.**



*A rendering of the “Ike Dike” gates in Galveston, TX*

*Source: Texas A&M University at Galveston*

## V. Inclusion of Natural and Nature-Based Features in Resilience Projects

### Leverage Engineering With Nature Expertise

The potential advantages of natural and nature-based features (NNBFs) in providing cost-effective, and sustainable approaches to flood resilience have been clear to the USACE for decades, leading to the establishment of their [Engineering with Nature \(EWN\)](#) team in 2010. However, natural and nature-based flood management techniques remain severely underutilized in most of the USACE flood risk reduction studies. This stems from challenges in quantifying NNBF value and performance metrics as well as the mandate to focus those studies solely on wind-driven storm surge – rather than planning for other risks, like rain-driven storms, underinvestment in drainage and sewage infrastructure, and sea-level rise<sup>8</sup> – for which NNBFs can be effective.

Despite their underutilization, NNBFs have demonstrated success in EWN [“proving ground” projects](#) in Galveston, Buffalo, Philadelphia, and elsewhere. Today, over [200 operational individual](#) projects demonstrate the success of EWN practices and NNBFs and support further application by the USACE. Fortunately, the Corps has proposed a novel nature-based solution (NBS) pilot study program for the Miami-Dade Back Bay Study CSRM, to investigate locally-appropriate demonstration

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<sup>8</sup> Natural and Nature-Based Features utilized by the USACE are Freshwater wetlands, Maritime forest/shrubs, vegetated dunes/beaches, salt marshes, oyster reefs, barrier island restoration, submerged aquatic vegetation and green stormwater management (which is defined as a non-federal responsibility)

projects. These should inform the quantitative evaluation of CSRMs benefits provided by different types of NBS. The pilot program is intended to fill data gaps and support Miami-Dade County in its efforts to manage coastal storm risk using a “multiple lines of defense” strategy, examine the effectiveness of CSRMs solutions, and leverage environmental co-benefits. This is a positive step forward for the Corps, and we recommend this model be imported to other districts.

### **Recognize and Utilize Value of Natural and Nature Based Features**

We continue to see the protective value that NNBFs can provide for coastal communities, including the following examples of effectiveness provided in the [National Wildlife Federation’s Protective Value of Nature](#) report:

- Of all 88 tropical storms and hurricanes that impacted the United States between 1995 and 2016, affected counties with greater areas of wetland coverage experienced [significantly less property damage](#) than those with little or no wetlands.
- During Hurricane Sandy in 2012, coastal wetlands prevented an [estimated \\$650 million](#) in direct flood damages.
- The benefit-cost ratio of wetland restoration for flood risk reduction is estimated to be 8:1, [compared with only 0.99:1](#) for local levees in high-risk areas.
- In San Francisco Bay, a project that included restoration of both native oysters and eelgrass was found to reduce wave energy by [30% compared with](#)

[unrestored areas](#), in addition to increasing habitat, food resources, and biodiversity.

- Field observation research in the Chesapeake Bay found that areas planted with *Spartina alterniflora* demonstrate significant wave attenuation capacity during storms including a reduction in wave height by [70% during a 100-year storm](#).

In addition to risk reduction benefits, NNBFs have been found to often be more cost-effective than traditional gray infrastructure such as shoreline seawalls and in-water sea gates, which are the USACE’s default choice in dealing with storm surge. As annual appropriations continue to rise for the USACE with more projects under the USACE authority, operations, and maintenance have also grown to [roughly 60%](#) of the operating budget, in part due to the reliance on structural solutions that require more upkeep.

NNBFs also can be far more effective in dealing with rain-driven storms and sea-level rise, as well as providing advantages in relation to construction and maintenance and faster implementation, while also potentially providing advantages in dealing with storm surge as well. Gray infrastructure will degrade after decades while NNBFs can become self-perpetuating ecosystems. Finally, NNBFs, as they work with and enhance natural systems, avoid the sort of [damage](#) to water quality and ecosystem health that large, concretized storm surge barriers inflict on such systems. Concerns around avoiding these kinds of damages have been raised for projects in Charleston, Norfolk, Galveston, and Miami.

While NNBFs build ecosystem resilience as well as coastal resilience and are popular with the communities they protect, they have not been widely adopted as central components of CSRM flood risk reduction studies. This stems from the fact that these studies focus on storm surge rather than other flood risks and due to the difficulty of quantifying the benefits associated with natural and nature-based approaches. To remedy this latter issue, EWN began a five-year global research effort to develop the [International Guidelines on Natural and Nature-Based Features on Flood Risk Management](#) in which EWN quantifies NNBFs risk reduction, and co-benefits. This will also offer guidance for how the USACE's benefit-cost analysis formulas can be applied to give NNBFs their deserved role in flood risk reduction planning.

### **Avoid Bias Towards Concrete Structural Solutions**

In sum, despite the vast body of research and successful work, EWN is notably not included in discussions on CSRM studies, nor is their work used to ensure community protection, ecosystem health, and potentially provide more cost-effective solutions on the USACE's more expensive projects. Insufficient consideration of NNBFs is further reinforced by the CSRM mandate to only look towards the specific risk of storm surge while these NNBF solutions are particularly effective in delivering additional co-benefits through managing multiple risks from other flooding hazards such as those specified in WRDA Section 8106. WRDA further does not aim to prioritize NNBFs, deferring decision-making to the USACE, which, as we have seen, uses the BCA that is biased towards gray infrastructure.

Numerous examples exist of this bias. For example, despite EWN viewing the [Galveston "proving ground"](#) project as a success, the selected alternative under the \$57 billion Galveston/Houston Coastal Texas Study largely relies on traditional engineered approaches and declines considering a natural, nature-based, or nonstructural alternative. This bias towards surge barriers is also highlighted in the case of the Campostella and Berkley Communities of Norfolk. These communities received NNBFs because of the skewed BCA which led the USACE to see structural solutions as too costly for these low-income communities. Inadvertently, this shows that NNBFs can indeed be less costly than gray infrastructure. This instance further exemplifies the cost-effectiveness of the NNBF use, despite poor evaluation of their risk management ability.

Overall, even with proving grounds, successful operational projects, community interest, and EWN leadership, NNBFs have not been viewed as solutions. Instead, they tend to be seen as add-ons to structural solutions like seawalls rather than an effective approach to mitigating multiple risks. We view the Miami-Dade Back Bay Study NBS pilot program as a positive step by the Corps in rethinking this approach to NNBFs and support this move forward.

**We strongly urge the Corps to implement similar pilots around the country where data gaps on the protective impacts of localized NNBFs exist and where they can hasten calculating CSRM benefits – while also drawing on the vast body of research and successful work that EWN, local universities, and other stakeholders could provide.** We recommend a stronger role and coordination with EWN and outreach to local stakeholders first to confirm whether such data gaps even exist around NNBFs.



**Swan Island Restoration Project by USACE**

*Source: NOAA*

## **VI. Inclusion of Non-Structural Measures in Resilience Projects**

Non-structural measures<sup>9</sup> are an additional approach the USACE employs in reducing community risk to flood hazards. These include better floodplain policy, flood impact reduction, flood preparedness, and relocation, which help manage flood risk without the additional burdens presented by focusing on structural solutions. Policies such as zoning changes, buyouts, relocation, stormwater management, and redesign have the potential to reduce the need for gray infrastructure as well as help build multiple lines of defense against flooding.

Miami-Dade's CSRM [recent update report](#) moved to prioritize both non-structural and nature-based solutions. The report focuses on floodproofing and elevation of residences. This

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<sup>9</sup> Nonstructural measures include, among others: buyouts, floodproofing, stormwater management, relocation, early warning systems, retreat, elevating structures, wetland migration, resilience standards, emergency response systems, channel modification, sedimentation management, and redesign of utilities.

work should continue with a comprehensive focus on long-term policy solutions that require coordination and leadership from local sponsors.

## **VII. Final Recommendations**

Congress and the USACE should adopt the following recommendations on policy and spending priorities to meet community needs and develop long-term flood resilience:

### **1) Strengthen and Fund Multiple and Compound Flood Analysis**

The multiple types of flooding laid out by Section 8106 of WRDA 2022 will pose higher risks as extreme weather events become more common with climate change. Limiting review to a single flood risk will result in projects that do not adequately protect communities and can result in an ineffective use of federal funds. Including compound flooding in the risk scope will enable a complete and accurate understanding of the risks faced by communities, therefore enabling the best possible decision-making and use of federal funds.

- Congress should update Public Law 84-71 to explicitly allow for consideration of coastal storm-induced compound flooding effects.
- Congress should allocate adequate funding and resources for the USACE to implement Section 8106, starting in WRDA 2024.

- Congress should direct the Corps to develop standardized guidance on the implementation of Section 8106 that leverages local communities and researchers such as the [Megalopolitan Coastal Transformation Hub](#).
  - Congress should pass amendments to strengthen Section 8106, such as Section 330 of the Transportation and Infrastructure Committee's June 26th, 2024 version of WRDA 2024 that ensures that plans are revised after Section 8106 requests, therefore ensuring that compound flooding analysis is central to the project
  - Congress should ensure that the USACE utilizes the resources within other Federal agencies, communities, outside experts, and academics in identifying and employing the best available modeling and projections for climate change such as the [Guidance for Integrating Climate Change Information in Greater Atlantic Region Habitat Conservation Division Consultation Processes](#), from NOAA that provides the best understanding of current and future risk.
  - The USACE should use the NOAA intermediate high curve for sea level rise projections as there is deep uncertainty in climate modeling and estimates continue to project worsening conditions.
- 2) **The USACE should implement more equitable cost-benefit analysis in all studies**

To best weigh decisions on how to protect our communities, the USACE needs to employ a more equitable cost-benefit analysis. [The February 15 Proposed Agency Specific Procedures](#) to implement the Principles, Requirements, and Guidelines is a positive step in this direction in considering economic, environmental, and social equality but must be finalized and appropriately implemented.

The USACE should:

- finalize the rulemaking for the Agency Specific Procedures and develop guidance on how this analysis can be implemented and applied to future and existing studies.
- give equal weight to ecosystem services, NNBFs, and social variables in decision-making
- employ the approach to equity in BCA outlined in [Circular A-4](#), which provides guidance to agencies by the Office of Budget Management on how to improve regulatory BCA
- consider how benefits are distributed amongst communities, not simply total net benefits.
- consider the [marginal utility of income](#) when evaluating flood damage to best reflect more expensive structures in wealthier areas.
- adopt a definition of disadvantaged communities and use existing tools such as the [Climate and Economic Justice Screening Tool](#) or locally utilized mapping tool.

**3) USACE should leverage the expertise of EWN to make greater use of NNBFs**

The USACE should better account for NNBFs' ability to deliver multiple benefits in reducing risk from compound flooding, NNBFs' cost and time effectiveness, and the ability of NNBFs to improve ecosystem health.

The USACE should:

- expand and center EWN in project processes so that there is a formal role in designing and selecting the preferred alternative.
- better quantify and account for the ability of NNBFs to reduce risk from compound flooding and provide co-benefits.
- expand the use of NNBFs in project design and planning, as outlined in Section 116 of WRDA 2020.
- require analysis of the impact of ecosystem services and ecosystem value and an assessment of ecosystem services gained or lost as a result of a project alternative.
- undertake a phased adoption of projects that enables the early application of NNBF given that they can be cost-effective and take time to mature.
- where feasible, include in the alternatives analysis for CSRM studies an analysis of an alternative that relies

predominantly on nature-based and non-structural approaches as well as a hybrid approach of gray and green infrastructure.

- use technologies to design gray/green hybrid infrastructure that minimizes gray infrastructure needed while creating multiple lines of defense against flooding.
- implement regional NNBF pilot studies to assess performance in local conditions to support their use where data gaps exist.

**4) The USACE should better utilize non-structural approaches and integrate with local planning**

The USACE should more seriously consider non-structural approaches including equitable buyouts, home elevation, structure hardening, and managed retreat, among other options.

The USACE should:

- prioritize non-structural alternatives over structural measures, where feasible.
- develop working groups of community members and local planners to identify how non-structural measures can be used to reduce flood risk.
- integrate non-structural approaches such as floodproofing, home elevation, stormwater management, and rezoning into existing long-term policy planning under leadership from local authorities.

- work with local authorities to communicate flood risk to residents, and ensure equitable buyout programs and housing for residents displaced during home elevations. The Temporary Relocation Assistance Pilot Program from Section 8154 of WRDA 2022 should be utilized to ensure this.

**5) The USACE should set guidelines to conduct meaningful community engagement with respect to environmental justice**

The USACE should advance the “proactive approach” as promised in the 2022 Environmental Justice Interim Guidance and commit to a collaborative public engagement process that centers disadvantaged communities.

The USACE should:

- provide public analyses and timelines for project elements that enable adequate windows for public comment.
- undertake responsive engagement that solicits local knowledge to address community concerns and feedback, responding to all public comments.
- center disadvantaged communities that face disproportionate risks to the effects of climate change and flooding and actively seek their input and voice.
- ensure that there are environmental justice coordinators in each district so that projects are carried out with respect to equity considerations.

- USACE should make transparent the contact information for all district-level and regional EJ coordinators and update their EJ report card to include district-level information, including the number of coordinators and environmental justice communities they interact with, as well as any community organizations involved in decision-making.

**6) Congressional Funding, Oversight and Transparency**

Congress should increase oversight and ensure that the USACE is authorized and funded to carry out WRDA projects effectively, justly, and innovatively. Despite broad concern from communities across these issues, the USACE is often unable to do better without a Congressional mandate, or without additional funding. Congress should:

- direct the USACE to better centralize project data to ensure transparency with the public and Congress, ideally in the form of a dashboard with all projects and their respective reports and timelines listed.
- appropriate resources for staffing and funding public engagement to meet the goals of increased engagement as outlined in Section 110 of WRDA 2020.
- direct the USACE to establish standing Environmental Justice committees at the district and project level that operate throughout project timelines and with communities down to the neighborhood level to assess environmental justice

considerations, beyond NEPA's basic requirements. These challenges are broadly recognized by communities, the USACE, and by [members of Congress](#).

As climate change impacts grow, along with the escalating costs of inadequate protective action in communities across the country, we should not delay. It is critical to update our defenses and enact these critical reforms now.

## Signatures

*Bayou City Waterkeeper*

*Miami Waterkeeper*

*Resilient Coastal Communities Project of the  
Columbia Climate School*

*Texas Surge Forward Coalition*

*Turtle Island Restoration Network*

*Wetlands Watch*

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## Appendix

Below is a list of ongoing CSRM projects, in various stages of planning. This list is not exhaustive as there is not a central repository of data and most figures are only estimates as per USACE reports. These costs often increase as studies are delayed or are provided exemption from the 3x3x3 planning rule.

Project	Cost estimate	Notes
Galveston/ Houston Coastal Texas Study	\$57,billion (Sep. 2023)	Study was narrowed storm surge after originally beginning with a wider scope
<a href="#">New York/ New Jersey Harbor and Tributaries Study</a>	\$52 billion (Jan 2022)	Adoption of WRDA Sect 8106 did not alter plan selection with wider study scope
<a href="#">Charleston Peninsula CSRM</a>	\$1.3 billion ( <a href="#">Aug. 2023</a> )	
<a href="#">Miami-Dade Back Bay CSRM</a>	\$2.7 billion (May 2024)	<a href="#">Public comment on draft feasibility study closed in May 2024</a>
<a href="#">Norfolk CSRM</a>	\$2.6 billion (September 2023)	
<a href="#">Virginia Peninsula CSRM &amp; Virginia Beach CSRM</a>	N/A	
<a href="#">Delaware Bays</a>	N/A	Paused needing more funding

		(\$2 million spent on study to date)
<a href="#">Rahway River Basin, NJ Coastal Storm Risk Management</a>	\$71,929,000 (April 2024)	
<a href="#">New Jersey Back Bays CSRM</a>	\$16.07 billion (August 2021)	
<a href="#">Baltimore CSRM</a>	\$138,000,000 (July 2022)	Feasibility Study underway
<a href="#">Fire Island to Montauk Point Reformulation, NY (P.L. 113-2)</a>	\$1,759,459,000 (February 2024)	
<a href="#">Raritan Bay and Sandy Hook Bay Highlands, NJ</a>	\$161,635,000 (August 2020)	
<a href="#">Fairfield and New Haven Counties, CT</a>	\$151,279,000 (October 2020)	
<a href="#">San Juan Metropolitan Area, Puerto Rico, Coastal Storm Risk Management - 2021</a>	\$237,800,000 (February 2024)	
<a href="#">Collier County CSRM</a>	\$2,224,000,000 (July, 2020)	Feasibility study rejected - new one being conducted
<a href="#">Florida Keys, Monroe County, Florida Coastal Storm Risk Management</a>	\$2,772,359,000 (September 2021)	
<a href="#">Okaloosa County, Florida, Coastal Storm Risk Management</a>	\$19,800,000 (September 2021)	
<a href="#">Folly Beach, South Carolina Coastal Storm Risk Management</a>	\$241,735,000 (October 2021)	
<a href="#">Pinellas County, Florida, Treasure Island and Long Key Segments, Coastal Storm Risk Management</a>	\$248,600,000 (September 2021)	Average of estimate, \$211 - \$285 million
<a href="#">Upper Barataria Basin, Louisiana, Hurricane and Storm Damage Risk</a>	\$1.5 billion (January 2020)	
<a href="#">Rio Guanajibo Flood Risk Management, Mayaguez, Hormigueros, and San German, Puerto Rico</a>	\$170,730,000 (May 2022)	
<a href="#">South Central Coast, Louisiana Hurricane and Storm Damage Risk Reduction</a>	\$1.3 billion (May 2022)	

<a href="#">Rhode Island Coastline</a> , Rhode Island, Coastal Storm Risk Management	\$254,326,000 (January 2021)	
<a href="#">Boston CSRM</a>	N/A	