Coastal communities and infrastructure are vulnerable to storms and flooding – a problem made worse by rising sea levels. Natural infrastructure, such as dunes and wetlands, is an important part of the solution to protect our nation’s coasts. We are improving our ability to identify opportunities to use natural infrastructure and to measure the multiple benefits provided under a range of conditions.

Natural infrastructure can protect coastal communities

Recent storms such as Hurricane Sandy have dramatically impacted major cities. These storms lead to loss of human lives and homes, disrupted businesses, and damaged infrastructure. Efforts to rebuild after such events, as well as to prepare for future ones, increasingly consider natural infrastructure because it can contribute to the resilience of coastal communities.

Natural infrastructure has been used for decades – but new information is helping us realize its full potential

For years, federal agencies and others have used natural infrastructure to ensure multiple benefits for people. For example, restoring a wetland can reduce floods impacts but also filter water, provide recreation opportunities, and protect wildlife habitat. What’s new is our increased ability to identify, measure, and sometimes monetize the long-term benefits and costs of different infrastructure options. There is a growing realization that hybrid approaches — combining layers of natural and built infrastructure — provide many valuable benefits.
Key Considerations

Natural infrastructure can increase cost efficiency: Knowing where natural habitats provide protection now, and where they could offer multiple benefits in the future, can help deliver more cost effective solutions for protecting coastal communities, property, and infrastructure.

Location matters: The value of coastal habitats (dunes, wetlands, coastal forests, reefs) for protection from erosion and flooding varies spatially. Strategic approaches can inform where protecting existing coastal habitat or restoring and/or building natural or hybrid structures can optimize benefits.

Implementation and research can go hand-in-hand: Though much research is still coming online, scientists have developed frameworks to help decision makers assess alternative scenarios for natural infrastructure in terms of cost, protection, and performance — both in the short and long term. Full implementation and integration of these approaches may ultimately require re-examining approaches to permitting, as well as more broadly incorporating ecosystem services assessment into decision making.

Case Study: evaluating options for urban coastal resilience in Howard Beach, NY


For More Information

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Evaluates how natural infrastructure (such as mussel beds and restored marsh) can be successfully used in a dense, urban setting in combination with built infrastructure (such as sea walls and flood gates) to provide efficient and cost-effective protection from sea level rise, storm surge, and coastal flooding. This report explicitly estimates the economic value of the contributions of nature, finding that combining natural and built defenses holds the most benefits.


Presents a national map of risk reduction due to natural habitats for the entire U.S. coastline. By considering the people and property most vulnerable to coastal hazards and storms, this research paper identifies where conservation and natural infrastructure can have the greatest potential to protect coastal communities.


Develops a framework for identifying and evaluating opportunities to integrate natural and built infrastructure, to support coastal risk reduction and resilience. This research report describes how natural infrastructure can reduce risks from coastal storms, and also provide a range of additional ecosystem services that support coastal ecosystems and communities (including benefits related to commercial and recreational fisheries, tourism, clean water, habitat, and support for cultural practices).


Recommends areas for prioritized Federal research to support the integration of natural infrastructure into risk reduction, resilience planning, and decision making. This report is a useful reference for planners and decisions makers that provides an introduction to major categories of natural infrastructure and associated ecosystem services, as well as factors that should be taken into account when considering if, when, and how to incorporate natural infrastructure into a given setting.


Highlights strengths and weaknesses of the coastal protection benefits provided by built infrastructure, natural ecosystems, and hybrid approaches for coastal protection. Includes case studies where hybrid approaches are being implemented to improve coastal resilience as well as some policy challenges that can make implementation of these approaches more difficult.
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