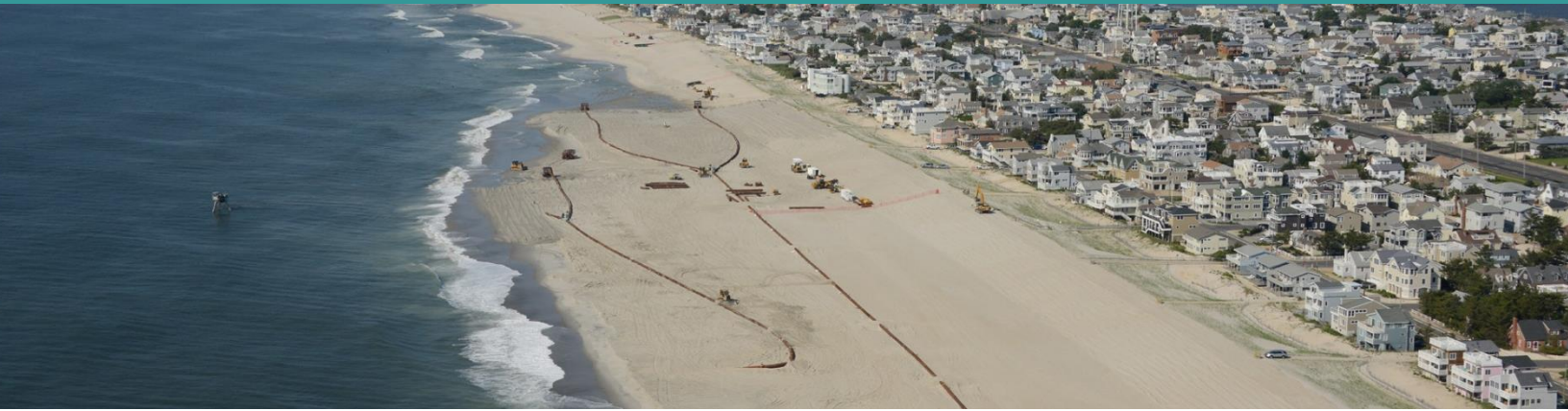


Beach Nourishment

A DOI Nature-Based Solutions Roadmap Fact Sheet



Beach nourishment is the addition of sediment directly onto or adjacent to an eroding beach¹. Sediment can be transported overland from inland sources or dredged from nearby areas offshore. Beach nourishment is increasingly necessary to maintain beaches as natural sediment deposition is disrupted by anthropogenic activities like urban development, damming rivers, and dredging channels². The impacts of climate change, especially sea level rise and increased storm severity, require more frequent beach nourishment and therefore larger volumes of sediment for use in nourishment projects³.

TECHNICAL APPROACH

Implementing a beach nourishment project involves moving large amounts of sediment onto or near the beach. There are several sediment source options⁴:

- **Offshore sources:** A hopper or pipeline dredge sucks up sediment from the bottom of the ocean and pumps it onto the beach via a pipeline⁵.
- **Inlet sources:** A smaller dredge is used to pump sand from a nearby inlet, sound, or waterway onto the beach. Inlet sediment sources are more frequently replenished (by river deposition) than offshore sources⁶.
- **Upland sources:** Sand from inland mines is transported to the beach on trucks. This requires overland access to the beach⁷.
- **Sand from previously planned dredging projects:** Sediment dredged for other purposes (e.g., to deepen shipping channels) is used on nearby beaches⁸.

BENEFITS

Climate Threat Reduction

- Storm protection
- Reduced flooding
- Sea level rise adaptation and resilience

Social and Economic

- Tourism
- Reduced or avoided costs
- Increase property values
- Cultural values
- Mental health and well-being
- Jobs
- Reduced erosion

Ecological

- Supports wildlife
- Increased biodiversity

SITE SUITABILITY FACTORS

- ✓ Gentle slope with minor upland erosion
- ✓ Existing beach with some sand present
- ✓ Beach receives significant recreational use
- ✓ Proximity to planned channel dredging projects
- ✓ Infrastructure at risk of flooding behind beach
- ✗ Presence of submerged aquatic vegetation or mangroves
- ✗ Special geomorphic features such as sand spits
- ✗ Sand migration will inhibit boat navigation
- ✗ Bank height greater than 9 meters
- ✗ Directly in front of a seawall

EXAMPLE PROJECT

The Ocean Beach Beach Nourishment Project, conducted by the US Army Corps of Engineers along with the National Park Service and City of San Francisco, placed 440,000 cubic yards of sediment dredged from the San Francisco Main Ship Channel onto Ocean Beach. This maintains recreational opportunities at Golden Gate National Recreation Area and protects a highway and wastewater infrastructure threatened by erosion.



Sand being placed on Ocean Beach. Photo credit: U.S. Army Corps of Engineers

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KEY RESOURCES

Title and Link	Site Suitability	Design and Construction	Monitoring Guidance	Example Projects
Beach Nourishment: Theory and Practice (World Scientific)	✓	–	–	✓
Beach Nourishment and Protection (National Resource Council)	✓	✓	✓	–

LEARN MORE

Visit the DOI Nature-Based Solutions Roadmap for more information on beach nourishment, other nature-based solutions, and principles and considerations broadly relevant for nature-based solutions projects. The beach nourishment summary includes additional details on each section included in this fact sheet, plus information on operations and maintenance, common barriers, and more resources and example projects.

Explore the Roadmap



Full Roadmap Document



Beach Nourishment Section

www.nicholasinstitute.duke.edu/roadmap