



Beach Nourishment as Storm Protection: Its Impact on Sediment Budgets and Ecosystems

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Over the last decade, major storms have impacted US sandy shorelines stretching from Texas to Maine. Increasingly, the primary tool being used along the oceanfront at the local, state, and federal level to “repair” storm-damaged beaches and to adapt to rising sea level is the addition of sand to the coastal system in the form of engineered beaches and dunes (commonly referred to as beach nourishment or beach replenishment). At the Program for the Study of Developed Shorelines, we have built a comprehensive database of all beach dredge and fill projects in the USA. The database tracks a history of beach projects that date back to 1923 with continual updates as new projects are implemented today. The projects in the database represent the movement of over 950 million cubic meters of sand covering over 3700 km of shoreline at a cost of over \$9 billion USD. Following Hurricanes Sandy, Irma, and Harvey, the US Congress has allocated another \$20 billion for coastal protection, much of which will be used to hold beaches in place in front of coastal infrastructure.

This massive program of shoreline stabilization is being carried out with little long-term vision or planning, and no consideration for the cumulative environmental impacts of the mining and placement of so much sand. Impacts to shorebirds, turtles, and nearshore fisheries have been clearly documented, but are largely ignored. It is no exaggeration to say that a significant portion of the US East and Gulf Coasts are now completely artificial constructs, with engineering replacing natural processes. Along the coast of New Jersey, the rate at which sand is moved from nearshore borrow areas onto the beach now surpasses natural rates of longshore sediment transport and cross-shore profile movement. Researchers who ignore beach nourishment when examining long-term sediment budgets or calculating shoreline change rates are missing important data.

Recently, along many shorelines, beach nourishment has become unsustainable as sand sources diminish (e.g. much of Florida). In addition, the cost of moving the sand has increased dramatically as communities scramble to build beaches and dunes. The prospect of protecting all US shorelines from storms utilizing beach nourishment is not sustainable into the future, but there has been no widespread recognition of this reality.

A 1994 National Academies report found that the USA has no national plan or vision to guide the billions we spend on coastal protection and sea level rise adaptation. The spending, and the projects, are reactive (following storms) rather than proactive. Beach nourishment may play a role in long-term coastal storm protection, but we must establish clear goals and national priorities, and it cannot last forever.