

Beach Nourishment

Introduction

Beach nourishment is the engineered process of pumping or dumping sand on a beach to replace eroded sand, or to protect against future erosion. Beach nourishment can also be used to widen a naturally narrow beach.¹ Its drawbacks discussed below notwithstanding, nourishment is most suitable on beaches that provide natural protective services and culturally or economically important coastal access. Beach nourishment might also be apt for beaches that are the most susceptible to erosion due to rising sea levels or increased storm impacts.

Tradeoffs

One advantage of nourishment is that it can maintain the width of an eroding beach. Nourishment can also replace sediment supply loss, such as from sand mining or from dammed rivers.² Nourishment is also environmentally preferable to armoring a beach with seawalls, especially in the short term.³ Beach nourishment might also increase public access to beaches by maintaining or expanding the beaches themselves. Proponents of beach nourishment argue that it is less expensive than competing strategies, such as retreat.⁴ Regardless, it is still very expensive, perhaps even more so than other options, depending on what backs the beach.⁵

However, beach nourishment is known to have deleterious impacts on environmental conditions.⁶ For instance, nourishment can cause increased turbidity and sediment suspension in surrounding waters. Murky, turbid water can threaten the affected marine species and habitats. Nourishment can also cause environmental impacts to the areas from which the sand is sourced, especially if dredging is involved.⁷ In California, beach nourishment can cause sediment to unnaturally accumulate in the submarine canyons offshore of the coastline.⁸ Beyond direct environmental concerns, beach nourishment has had the effect of encouraging development in certain especially hazardous areas.⁹ Another drawback of beach nourishment projects is that they can be politically unpopular and can prompt public opposition.¹⁰

Further, beach nourishment alone will not safeguard beaches, especially those impacted by reduced sediment supply from dammed rivers upstream. Similarly, sand mines can reduce sediment supply, prompting more beach nourishment in affected areas than would otherwise be required.¹¹ Detractors also argue that nourishment is a misnomer because the name does not reflect the potential damage these projects can do to the coast.¹²

1 Gary Griggs et al., *Living with the Changing California Coast* 72 (Gary Griggs et al. eds., 2005).

2 *Id.* at 301 (“Another major historical loss of sand in southern Monterey Bay was due to the sand mining in the Marina and Sand City areas.”).

3 Charles Lester, *An Overview of California's Coastal Hazards Policy*, in *LIVING WITH THE CHANGING CALIFORNIA COAST* 138, 161 (Gary Griggs et al. eds., 2005) (recommending investigating beach replenishment strategies as a way of avoiding shoreline armoring); see also Jared Whitlock, *Coastal Commission Approves Scaled Back Sand Project*, THE COAST NEWS GROUP, Nov. 19, 2013, <http://www.thecoastnews.com/2013/11/19/coastal-commission-approves-scaled-back-sand-project/> (“To manage sea level rise, Solana Beach Mayor Mike Nichols said that beach nourishments are preferred over seawalls.”).

4 *San Diegans v. City of San Diego*, D046603, 2006 Cal. App. Unpub. LEXIS 4521, at *66 (Ct. App. May 25, 2006) (“Delaware published a study showing ‘retreat is 3 to 5 times more expensive than beach nourishment over a fifty year period’”).

5 See, e.g., Bianca Kaplanek, *Federal Funding for 50-year Sand Project Approved*, THE COAST NEWS GROUP, Dec. 15, 2016, <http://www.thecoastnews.com/2016/12/15/federal-funding-for-50-year-sand-project-approved/> (estimating the costs of a fifty-year beach nourishment project “to be \$100.1 million in Encinitas and \$64.7 million in Solana Beach, with average annual costs of \$2.1 million and \$1.6 million, respectively.”).

6 For instance, biologists have found that beach nourishment leads to long-lasting declines in invertebrate abundances due to beach replenishment. See Tyler Wooldridge et al., *Effects of Beach Replenishment on Intertidal Invertebrates: A 15-month, Eight Beach Study*, 175 ESTUARINE, COASTAL & SHELF SCIENCE 24 (2016).

7 See NAT'L RESEARCH COUNCIL, BEACH NOURISHMENT AND PROTECTION 97–99 (1995).

8 For example, Monterey Bay has a submarine canyon. ECOSYSTEMS OF CALIFORNIA 393 (Harold Mooney & Erika Zavaleta eds., 2016) (explaining that littoral cell sand losses can include “loss to submarine canyons”).

9 Scott B. Armstrong et al., *Indications of a Positive Feedback Between Coastal Development and Beach Nourishment*, 4 EARTH'S FUTURE 626 (2016).

10 See, e.g., Deirdra Funcheon, *Divers Protest Beach Renourishment Project in Broward*, BROWARD PALM BEACH NEW TIMES, Feb. 5, 2016, <http://www.browardpalmbeach.com/news/divers-protest-beach-renourishment-project-in-broward-7557047>.

11 But see Paul Rogers, *Controversial Beachfront Sand Mining Operation Along Monterey Bay to Close*, THE MERCURY NEWS, June 27, 2017, <http://www.mercurynews.com/2017/06/27/controversial-beachfront-sand-mining-operation-along-monterey-bay-to-close/>.

12 *Beach Fill*, BEACHAPEDIA, http://www.beachapedia.org/Beach_Fill (last visited Aug. 25, 2017) (“Many coastal experts believe the term ‘beach nourishment’ is a misleading term and that these projects should be called ‘beach dredge and fill projects’ to reveal their true impact on the beach.”).

Finally, beach nourishment is sometimes disfavored because it benefits a few landowners at the expense of the public at large. Specifically, public funds are typically used to finance nourishment projects under the guise that they will increase beach access or at least maintain existing public beaches. But nourishment projects typically act to protect the few wealthy landowners whose homes are imperiled by eroding beaches and rising seas instead, with limited protective benefits for public property.

Legal Considerations

Beach nourishment projects require several permits and are subject to several state and federal laws. Projects are typically subject to California Environmental Quality Act, National Environmental Policy Act, and other environmental impact analyses.¹³ After the applicable environmental review processes are complete, permits must be granted by the U.S. Army Corps of Engineers and the California Coastal Commission, among other agencies.¹⁴ Depending on the project, more permits may be required.¹⁵

Beach nourishment projects might face legal opposition for a variety of reasons. In New Jersey, homeowners filed lawsuits challenging nourishment projects that obstructed their views of the ocean.¹⁶ In Florida, beachfront property owners sued to stop a beach nourishment on the grounds that it unlawfully infringed upon their rights to the beach.¹⁷ In California, lawsuits over nourishment have even challenged the routes that trucks carrying sand to nourish the beach were to take.¹⁸ Another lawsuit challenged a Malibu beach nourishment project on environmental grounds.¹⁹

Examples

Beach nourishment is a common strategy that has been employed throughout California and the United States. In California, the Encinitas and Solana Beach storm damage reduction project includes beach nourishment in its plan.²⁰ There are several previous examples of beach nourishment along California's coastline as well, including Crescent City, Bolinas Bay, Ocean Beach in San Francisco, Seabright Beach in Santa Cruz Harbor, Twin Lakes Beach in Capitola, and Morro Bay.²¹

Researchers

Jesse Reiblich, Early Career Law & Policy Fellow: jesselr@stanford.edu
Eric Hartge, Research Development Manager: ehartge@stanford.edu
Cole Sito, Legal Intern

¹³ CAL. PUB. RES. CODE §§ 21000–21189; 40 C.F.R. §§ 1500–1508.28.

¹⁴ For a thorough review of the permitting process, see EVEREST INTERNATIONAL CONSULTANTS prepared for CALIFORNIA STATE COASTAL CONSERVANCY, CALIFORNIA COASTAL SEDIMENT MASTER PLAN: BEACH RESTORATION REGULATORY GUIDE (Dec. 2006), available at http://www.dbw.ca.gov/CSMW/PDF/BBRG_Final.pdf.

¹⁵ Incidental take permits from the National Marine Fishery Service for projects in or near critical habitat, or from California's State Lands Commission, for example. See, e.g., 16 U.S.C. § 1539(a)(1)(B).

¹⁶ Tara Nurin, *Beach Replenishment: War on the Jersey Shore*, NJ SPOTLIGHT, Aug. 31, 2012, <http://www.njspotlight.com/stories/12/0831/0007/>.

¹⁷ *Stop the Beach Renourishment v. FL Dep't. of Env'tl. Prot.*, 560 U.S. 702 (2010); see also Andrew Rice, *A Stake in the Sand*, THE NEW YORK TIMES, Mar. 19, 2010, <http://www.nytimes.com/2010/03/21/realestate/keymagazine/21KeyBeachfront-1.html?mcubz=1>.

¹⁸ Emily Sawicki, *Broad Beach Residents Sued Over Beach Restoration Project*, THE MALIBU TIMES, Apr. 7, 2016, http://www.malibutimes.com/news/article_f4da9d1c-fc24-11e5-a769-3300ec937d2f.html.

¹⁹ Gary Baum, *Malibu's \$20 Million Sand War*, THE HOLLYWOOD REPORTER, Nov. 27, 2012, <http://www.hollywoodreporter.com/news/malibus-20-million-sand-war-394381>.

²⁰ See U.S. ARMY CORPS OF ENG'RS LOS ANGELES DISTRICT, ENCINITAS-SOLANA BEACH COASTAL STORM DAMAGE REDUCTION PROJECT, available at <http://www.spl.usace.army.mil/Missions/Civil-Works/Projects-Studies/Solana-Encinitas-Shoreline-Study/>.

²¹ Lisa M. Krieger, *Lines in Sand Don't Last*, SAN JOSE MERCURY NEWS, Nov. 4, 2003, at F1, F6.



This research was completed in collaboration with Stanford Law School and the Natural Capital Project with support by the Stanford Woods Institute for the Environment through the Realizing Environmental Innovation Program.