National Marine Sanctuaries ™

COASTAL ARMORING

Action Plan Summary

MONTEREY BAY NATIONAL MARINE SANCTUARY

THE ISSUE:

The coastline of the Monterey Bay National Marine Sanctuary (MBNMS) is highly erosive; in an attempt to protect private and public structures from coastal erosion, shoreline protective structures, collectively known as coastal armoring, have been used extensively in certain coastal region of the sanctuary. This trend towards armoring of the coastline has increased significantly during the past few years, and increases in development and continued natural erosion of coastal bluffs will likely cause additional pressure to install structures to protect private and public property from erosion. There can be significant long-term impacts to the MBNMS related to coastal armoring.

OUR GOAL

The sanctuary's goal is to develop and implement a proactive regional approach to addressing coastal erosion that minimizes the negative impacts of coastal armoring on a sanctuary-wide basis.

BACKGROUND INFORMATION

Coastal erosion is a natural process that occurs throughout California, in fact throughout the world, where land meets the sea. Through this process, the energy of ocean waves removes, or erodes, portions of the coast. In fact, 86% of California's coastline is actively eroding, including much of the coastline within the MBNMS. This retreat, or inland movement of the land's edge, is most apparent when heavy winter storms coincide with high tides, often during El Niño episodes, when large sections of bluffs and dunes can erode in just a few hours and storm-driven sand removal can significantly narrow beaches.

In response to coastal erosion, private landowners and government agencies have built shoreline protective structures, or coastal armor, on the coast to protect development from wave action, the main force that causes the breakdown of cliffs and dunes. This practice, commonly known as coastal armoring, includes the construction of seawalls, bulkheads, and revetments. Seawalls are concrete or metal walls constructed in front of a structure to protect it from wave action. Revetments are structures with a sloping surface, commonly made of large boulders, used to protect a structure against erosion. Bulkheads are walls built to hold soil in place on an embankment or cliff. As you visit MBNMS beaches or drive along the coastline, chances are you have seen evidence of coastal armoring. Some of the more common structures include piles of large boulders, called rip-rap revetments, and seawalls.

MBNMS

With an incessantly eroding coastline and increasing coastal development, it is not surprising the amount of coastal armoring has increased in California over the past several decades. A study conducted by the Army Corps of Engineers from 1971 to 1993 concluded the coastline between the Santa Cruz and San Mateo County border and Point Lobos in Monterey County had been armored at a rate of approximately 2,100 feet per year (0.4 miles per year). Currently, 10% of the state's shoreline is covered by hard, protective structures, with over 15 miles of armoring in the sanctuary alone, according to a recent University of California, Santa Cruz study. The cost of trying to slow the rate of coastal erosion with armoring can be significant. California residents are paying more than $75 million per year in tax dollars and private funds to armor the shoreline, which includes initial costs of construction and continual maintenance that is necessary to keep the structures functional.

Beyond the cost of these structures, there are many impacts of armoring affecting both the people using the coast and the ecosystems that depend on sensitive coastal habitats. Environmental impacts of coastal armoring vary significantly depending on the type of structure constructed, the magnitude of the project, and the specific geological, biological, and oceanographic conditions in the vicinity of the structure. Coastal armoring can potentially lead to loss of public beaches, damage or alter local coastal habitats, deprive beaches of sand, lead to accelerated erosion of adjacent beaches, hinder access, and present problems with public safety.

One of the most significant impacts of coastal armoring is the loss of beaches due to passive erosion. Much of California's coastline is eroding, the result of which is a landward retreat of beaches, cliffs and other coastal landforms over time. Yet when a structure, such as riprap or a seawall, is constructed in front of a building to halt erosion, the shoreline is essentially fixed at that location. Adjacent landforms (beaches, cliffs, etc.) will continue to retreat landward, creating an artificial headland out of the armored segment of coast. Likewise, if armor is placed at the base of a cliff that has a beach in front of it, the beach will continue to migrate landward on either side of the armored area, but there will, ultimately over time, be no beach in front of the armor. In this manner, armoring can lead to a loss of beaches, which are one of the most valuable resources of the sanctuary.

Beaches along the Central Coast establish a sand "budget" in which there is both sand supply and sand removal. Natural cliff erosion can contribute significantly to the sand supply. Covering up bluffs, where natural erosion occurs, with armor, prevents a historical source of sand from entering the system and contributing to the region's sand supply. This may cause downcoast beaches to become narrower, which can in turn lead to accelerated bluff erosion due to the decreased width of the beach. In this manner, armoring can accelerate erosion on adjacent, unprotected beaches.

Coastal ecosystems can be drastically altered when riprap or concrete walls are built; natural habitats are lost and replaced by new, hard structures. Thus, coastal armoring can change the abundance and distribution of species. The threatened Snowy Plover, for example, nests and feeds on the beaches of the sanctuary and populations would be highly stressed or lost altogether if these beaches were covered with rip rap boulders. Alternatively, other species may have an increased survival rate or be able to spread beyond their natural range when hard armoring is placed along previously sandy intertidal areas.

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THE SANCTUARY'S ACTION PLAN

The sanctuary's "Coastal Armoring Action Plan" was developed jointly with a variety of stakeholders and partners and includes, but is not limited to, the following components:

- Compiling and analyzing existing information on coastal erosion and armoring and how it may impact sanctuary resources
- Producing a comprehensive database and GIS maps for use as planning and permit review tools that will assist in making wiser decisions regarding coastal armoring
- Identifying specific planning sub-regions within the sanctuary, based on biological sensitivity, levels of development, and physical considerations, and developing specific planning guidelines for each sub-region
- Developing a system for improving coordination among agencies and jurisdictions involved in the permitting of coastal protection structures
- Exploring options to manage coastal erosion beyond traditional armoring techniques as part of this regional-scale plan
- Developing a long-term monitoring program that compares the ecological impacts of different types of coastal armoring structures by studying various types of habitats
- Becoming more active in reviewing and commenting on local land use decisions involving coastal erosion and armoring
- Providing targeted education and outreach to decision makers and the general public about the issues of coastal erosion and armoring and the sanctuary's regional guidelines and policies.
- Improving the maintenance and restoration of existing coastal armoring sites to minimize environmental damage
- Expanding the multi-agency, coastal armoring enforcement program through improved tracking, inspection and responses to illegal structure
- Reducing the need for emergency armoring permits by predicting erosion and initiating work before sites become emergencies

For a complete listing of the sanctuary's "Coastal Armoring Action Plan" please visit http://sanctuaries.nos.noaa.gov/jointplan/m_reptoad.html and scroll down the page.

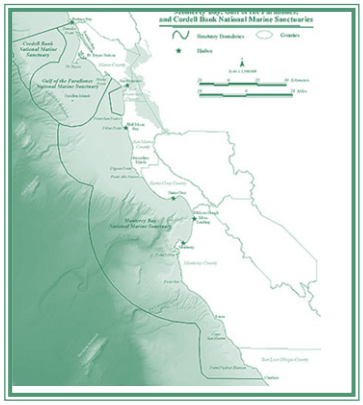
Increases in development and continued, natural erosion of coastal bluffs will cause additional pressure to install structures to protect private and public property from erosion.

As with any activity that alters natural processes, there can be significant long-tern impacts related to coastal armoring.

The Joint Management Plan Review (JMPR)

"Coastal Armoring" is one of the action plans in the MBNMS Draft Management Plan. The MBNMS Draft Management Plan includes twenty-eight plans that, once finalized, will guide sanctuary management for the next five years. The plan is a revision of the original management plan, adopted with sanctuary designation in 1992, and is focused on how to best understand and protect the sanctuary's resources.

The National Marine Sanctuary Program (NMSP) is updating the management plans for the Cordell Bank, Gulf of the Farallones, and Monterey Bay National Marine Sanctuaries a process known as the Joint Management Plan Review (JMPR).



GLOSSARY

Coastal Erosion: The gradual wearing away of rock or soil along the coast, such as that found in coastal cliffs and dunes, by physical breakdown and transportation of material, generally caused by water or wind.

How You Can Get Involved in the MBNMS Management Plan Process

The MBNMS welcomes your ideas about important resource management issues in the sanctuary. A Draft Management Plan and Draft Environmental Impact Statement are scheduled for release to the public in 2006. Following their release, hearings will be held in several locations throughout the region to gather public comment. Written comments will be accepted as well. To find out about public hearings, or how to submit written comments, please visit our website at http://www.sanctuaries.nos.noaa.gov/jointplan.

Resources

California Coastal Commission http://www.coastal.ca.gov
California Coastal Sediment Management Workgroup http://dbw.ca.gov/csmw/csmwhome.htm
Coastal Clash http://www.kqed.org/w/coastalclash/home.html
Marine Sanctuaries Conservation Series MSD-05-3. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Marine Sanctuaries Division, 2005. The Impacts of Coastal Protection Structures in California's Monterey Bay National Marine Sanctuary
http://www.sanctuaries.noaa.gov/science/conservation.coast_study.html
Monterey Bay National Marine Sanctuary
http://montereybay.noaa.gov/resourcepro/resmanissues/coastal.html
Sanctuary Integrated Monitoring Network (SIMoN)
http://www.mbnms-simon.org/sections/beaches/overview.php?sec=b
United States Geological Survey – Western Region Coastal and Marine Geology http://walrus.wr.usgs.gov

THE MONTEREY BAY NATIONAL MARINE SANCTUARY

Stretching from Marin to Cambria, the Monterey Bay National Marine Sanctuary encompasses 276 miles of shoreline and 5,322 square miles (4,625 nautical miles) of ocean, extending an average distance of 30 miles from shore. At its deepest point, the sanctuary reaches down 10,663 feet (more than two miles). The sanctuary was established for the purposes of resource protection, research, education, and public use. Its natural resources include one of our nation's largest kelp forests and one of North America's largest underwater canyons. It is home to one of the most diverse marine ecosystems in the world, including 33 marine mammal species, 94 seabird species, 345 fish species, and numerous invertebrates and plants. This remarkably productive marine environment is fringed by spectacular coastal scenery, including sandy beaches, rocky cliffs, rolling hills, and steep mountains.

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