

Whither the Shoreline?

What does one do when the sea begins lapping at your door, nibbling at the sand dune that once seemed reassuringly indestructible? A typical response has been to call an engineer, who would then build a seawall to hold back the waves and a jetty to keep the beach sand in place.

A group of shoreline geologists is now suggesting that, in many such cases, perhaps nothing should be done other than to move the building back from the beach. Much of the U.S. shoreline that has been retreating during the past century will continue to do so, these geologists say. The engineers' traditional solution of stabilizing the beach has too often proved ineffective, counterproductive, or simply uneconomic, they claim. In a strongly worded statement forwarded to President Reagan, the group calls for a drastic reorientation of shoreline protection policy. "Our crisis approach to coastal management must come to an end. . . . Most of our shoreline stabilization has been and is being carried out without consideration or understanding of fundamental principles of shoreline processes. . . . In most cases, current efforts at stabilization should cease. . . . Past, present and future coastal programs must be evaluated by using a combined scientific-economic yardstick."

This call to arms was drawn up by a committee of nine shoreline geologists* from the eastern seaboard and the Gulf Coast convened by Orrin Pilkey of Duke University and James Howard of Skidaway Institute of Oceanography. The group mailed copies of the statement "to every

meters each century, the geologists claim. Although changes in both land and water levels combine to produce such relative changes in sea level, sea level will probably continue to rise if predictions of a carbon dioxide greenhouse warming are correct and more polar ice melts, they point out. Seawalls thrown in the path of a rising sea can halt shoreline erosion and protect property behind them, but the beaches will eventually be washed away, they warn.

Coastal engineers are not so quick to place the burden of blame for shoreline retreat on a sea level rise. The future behavior of sea level is uncertain in any case, they say, and other shoreline processes, which are not yet fully understood, must also be considered. Craig Everts of the Army Corps of Engineers' Coastal Engineering Research Center at Fort Belvoir, Virginia, believes that observed long-term changes in the size and direction of waves hitting the coast could be having a greater effect on the shoreline than any rise in sea level. Although the shoreline may have retreated landward during thousands of years, as geologists claim, some beaches have not migrated landward during the past century as predicted by geological theory, he says. Instead of retreating, he notes, the barrier island running from Cape Henry, Virginia, to Cape Hatteras, North Carolina, has remained stationary since 1850 but has narrowed from both the seaward and the landward sides.

Man's fiddling with the shoreline has probably produced as many coastal erosion problems as rising sea level, according to Robert Dean, an engineer at the University of Delaware. Man-made structures, not sea level rise, created many of the examples of severe coastal erosion cited in the geologists' statement, he says. At Cape May, New Jersey, the culprit is a jetty that has cut off the natural supply of sand to beaches down the coast. In Florida, Dean says, human intervention has caused about half the critical erosion problems.

Coastal geologists and engineers cannot always agree on the relative importance of the likely causes of shoreline erosion, but at least one state, New Jersey, has adopted a shore protection master plan that attempts to blend the geologist's point of view with the purely engineering approach. The plan requires that the real costs of a never-ending battle with the sea be made clear before economic and political decisions are made.

The planning for Sea Bright, just south of Sandy Hook, is a current example of the planning process. The shoreline had been retreating there at 2 to 6 meters per year for 80 years. Seawalls erected in the 1950's to protect private property slowed the retreat, but now there is little beach left at this one-time beach resort. The master plan calls for the inclusion of the entire stretch of beach from Sea Bright to Monmouth in a single plan so that the preservation of one beach will not destroy another. The immediate cost of \$3.7 million for repairing the present structures has been separated from the additional costs of creating and maintaining indefinitely a new beach. An initial local share of costs of \$1 million has been set, in part on the basis of a cost-benefit analysis. No state or federal money will be available until Sea Bright decides that it can afford that kind of protection.—RICHARD A. KERR



Eroding beach in Georgia

Robert Frey

shoreline geologist we could think of" plus about half the members of the Society of Economic Paleontologists and Mineralogists' coastal research group, about 150 researchers in all. Ninety-four have signed it, including a majority of the coastal researchers associated with universities, Pilkey says.

A fundamental cause for pessimism about traditional approaches to shoreline protection, the geologists say, is rising sea level. Both geologists and engineers recognize that sea level along the U.S. East and Gulf coasts has been rising at an average rate of about 30 centimeters per century, as calculated from tide gauge records by Stacey Hicks of the National Ocean Survey in Rockville, Maryland. At that rate, sea level rise could cause the shoreline to retreat up the gently sloping coastal plain by as much as 150

*"Saving the American Beach: Position Paper by Concerned Coastal Geologists," prepared by Orrin Pilkey, Duke University; James Howard, Skidaway Institute of Oceanography; Benno Brenninkmeyer, Boston College; Robert Frey, University of Georgia; Albert Hine, University of South Florida; John Kraft, University of Delaware; Robert Morton, Bureau of Economic Geology, Austin, Texas; Dag Nummedal, Louisiana State University; and Harold Wanless, University of Miami.