

MARINE NOTES

SPOTLIGHT ON ENVIRONMENT

Vanishing Lands

Ask around the Bay and the same stories come up again and again. About the cornfield that is no longer there. About the house that used to stand just there, beyond the bank, where water now makes a flat sheet from here to the horizon.

My own memory contains such visions: the tree stumps, visible only at low tide, at my grandmother's house. The toilet, also visible only at low tide, still attached to the plumbing of a phantom house on an island that is now mostly marsh. Or mostly gone.

Now Stephen Leatherman and the Laboratory for Coastal Research at the University of Maryland, College Park, have produced a video which tells quite eloquently the story of the land which is no longer there: *Vanishing Lands*.

The Sinking Shore

The examples used by Leatherman are dramatic. The video opens on Maryland's Eastern Shore, on Holland Island, once home to three hundred people, sixty houses, four stores, and a post office. Leatherman reports this as he wades around in what now remains of Holland Island, a small marshy tract awash in Bay water. He conjures up a landscape that once supported fields and orchards, until a general exodus began in 1914. By 1922, Leatherman says, virtually everyone had gone.

Leatherman, a geographer at the University of Maryland and director of the Laboratory for Coastal Research,



has tracked the disappearance of lands around the Bay by means of several methods, including the use of old documents, including deeds, bills of sale and charts from the Colonial period. One of those charts, dating from 1668, shows Holland Island measuring some 217 acres. By the time of its abandonment in the early twentieth century, almost 100 of those acres had vanished into the Chesapeake. Such records demonstrate that land loss has been underway for centuries in the Bay region, but according to Leatherman, the trend has accelerated since 1850.

Part of a Natural Process . . .

This inundation of land began with the end of the last ice age, some 18,000 years ago. This process, part of the earth's natural warming, began to slow about 5,000 years ago, and by about 3,000 years ago

the Bay had reached the shape we would recognize today. The Bay itself is the result of an interglacial period, the long slow planetary summer, a cosmic season.

. . . Only Faster

During the last century, records suggest that this planetary rhythm has accelerated, with sea level rising about six inches worldwide during the past one hundred years or so, as global temperatures rose about one degree Fahrenheit. During the same time period, many glaciers

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Lands, *continued*

have also visibly retreated, a sign of global warming.

On the Chesapeake Bay, however, the effect appears even more startling: waters appear to have risen twice the worldwide average, or as much as one foot. According to Leatherman, this is because land in the Bay region is sinking, at the same time that sea level is rising. This subsidence results both from long-term geologic changes and from human activities, such as withdrawing groundwater for agricultural and other uses.

Leatherman points out that people often believe that one foot of sea level rise means one foot of land loss. But in many areas where the coastal plain slopes upward at a rate of only one foot per mile, one foot of sea level rise could mean the movement of water one mile inland.

This change in the *rate* of sea level rise has significant effects on both natural and human systems. According to Leatherman, even Blackwater Wildlife Refuge, one of the Chesapeake's most extensive marshes, has been losing ground to the Bay, unable to keep pace with rising waters. Though a slow rate of sea level rise created the marsh to begin with, a faster rate appears to be killing it, by submerging marsh plants more quickly than they can adapt.

This inability of the marsh to keep pace is worsened by human attempts to stabilize the landscape. Because of manmade structures, cultivated land and other "permanent" changes in the land, marshes cannot migrate landward over time, as they would likely do in a natural state.

The Bay and Beyond

Leatherman speaks with considerable feeling about the coming of sea level rise. "We need to act based on the information we have already," he says. "And the fact is, we already have big problems with erosion in the Chesapeake region. The oceans and the people are on a collision course," says Leatherman.



Drawing water out of the land, for agriculture, for example, can accelerate subsidence, causing the land to drop lower.

The Chesapeake is not, of course, the only area at risk. Some places have it worse. The Mississippi delta region has experienced a relative sea level rise of some three feet over the last century. And according to Leatherman, a one meter sea level rise in the Nile delta region would displace some 6 million people.

On the ocean coasts, storm surges and wave action can have dramatic impacts. Maryland's Atlantic coast provides one striking example, where the major ocean inlet, at Ocean City, was created by a hurricane during the 1930s. Aerial photographs show quite clearly how neighboring Assateague Island has migrated inland since the construction of a jetty to hold open the Ocean City inlet. Ocean City itself, despite stone structures, has lost much of its sandy beach over time, and between 1987 and 1991 the U.S. Army Corps of Engineers took on the

challenge of replenishing the sand. Though engineers designed the new dunes to withstand the force of a "hundred-year storm," soon after the work was completed, a much smaller storm, described as a thirty-year storm, destroyed 90 percent of the Ocean City dune, according to Leatherman.

The cost of beach replenishment has been high in the U.S.—more than \$8 billion since the 1970s. And while some look to the Netherlands as a model for holding back the sea through elaborate engineering solutions, Leatherman points out that the situation faced by the Dutch differs greatly from the challenge faced by the U.S. For one thing, the Netherlands' coastline measures less than 300 miles, compared with thousands of miles of shoreline in the Chesapeake Bay alone, and tens of thousands of miles in the continental U.S.

With about half of America's population now residing near a coastline, a ribbon of sometimes dense coastal development has become especially vulnerable to both storms and persistent erosion. According to Lynne T. Edgerton, an environmental attorney quoted in *Vanishing Lands*, we need new policies to guide growth away from the shoreline. "Removing existing incentives would prove an important first step," she says. These would include the careful placement of sewer lines, roads and utility lines, and steering development away from the coast.

Leatherman and his colleagues at the University of Maryland's Coastal Resource Laboratory in the Department of Geography are helping to predict how the coastline is likely to change over time. These predictions could help advise developers and others about what to expect in the future.

Such predictions could prove essential. Once development occurs, Leatherman notes, the motivation is great to spend considerable sums of money to protect it from rising waters.

— JACK GREER
*Coastal and Environmental
Policy Program*

The video, *Vanishing Lands*, presented by the University of Maryland's Laboratory for Coastal Research, was produced by Hillman & Carr, with support from the W. Alton Jones Foundation, the Chesapeake Bay Estuary Program, the U.S. Fish and Wildlife Foundation, the William Bingham Foundation, the Chesapeake Division of the Naval Facilities Engineering Command, and the MARPAT Foundation.

Coastal & Environmental Policy

Call for Papers The Environmental Management of Explored Coastal Seas '93

International Council for the Exploration of the Sea (ICES) is seeking papers for the 1993 International Conference on the Environmental Management of Explored Coastal Seas. The conference will be held in Copenhagen, Denmark, from 15-19 June 1993. The theme of the conference is "The Environmental Management of Explored Coastal Seas". The conference will focus on the environmental impacts of coastal fisheries and the need for integrated management of coastal resources. The conference will be held in Copenhagen, Denmark, from 15-19 June 1993. The theme of the conference is "The Environmental Management of Explored Coastal Seas". The conference will focus on the environmental impacts of coastal fisheries and the need for integrated management of coastal resources.