

COASTAL ARMORING AND RISING SEAS PUT A SQUEEZE ON TURTLES

By SCOTT EASTMAN and GARY APPELSON

Global concern is growing about the current and future impacts of sea-level rise that will likely affect coastal property owners, beach-based economies, and sea turtle nesting beaches. Coastal erosion is bad for all those factions, yet effective long-term solutions to confront the rising tide of beach erosion are few and far between.

One stopgap strategy to protect homes and coastal infrastructure from beach erosion is through coastal armoring by constructing seawalls to deflect wave energy and hold back the surf. Vertical seawalls made of rocks, concrete, metal, or wood that parallel the shoreline can provide short-term protection for beachfront property, but they do nothing to protect the beach and dunes. They also pose a major threat to sea turtles by exacerbating erosion of nesting habitat and, ultimately, reducing the area of available nesting habitat from both the seaward and terrestrial sides of the beach. Moreover, seawalls interfere with natural shoreline processes (i.e., nearshore sand transport and onshore sand deposition). Without sand placement on the seaward side of seawalls, nesting habitat will continue to decrease as the beach berm lowers and erodes.

Seawalls are usually built on beaches with significant coastal erosion, so they interact with waves and surf during high tides and storm events such as nor'easters and tropical cyclones. Wave energy typically is dispersed as waves run up a sloping beach, but when waves hit a seawall, their energy is deflected back onto the beach

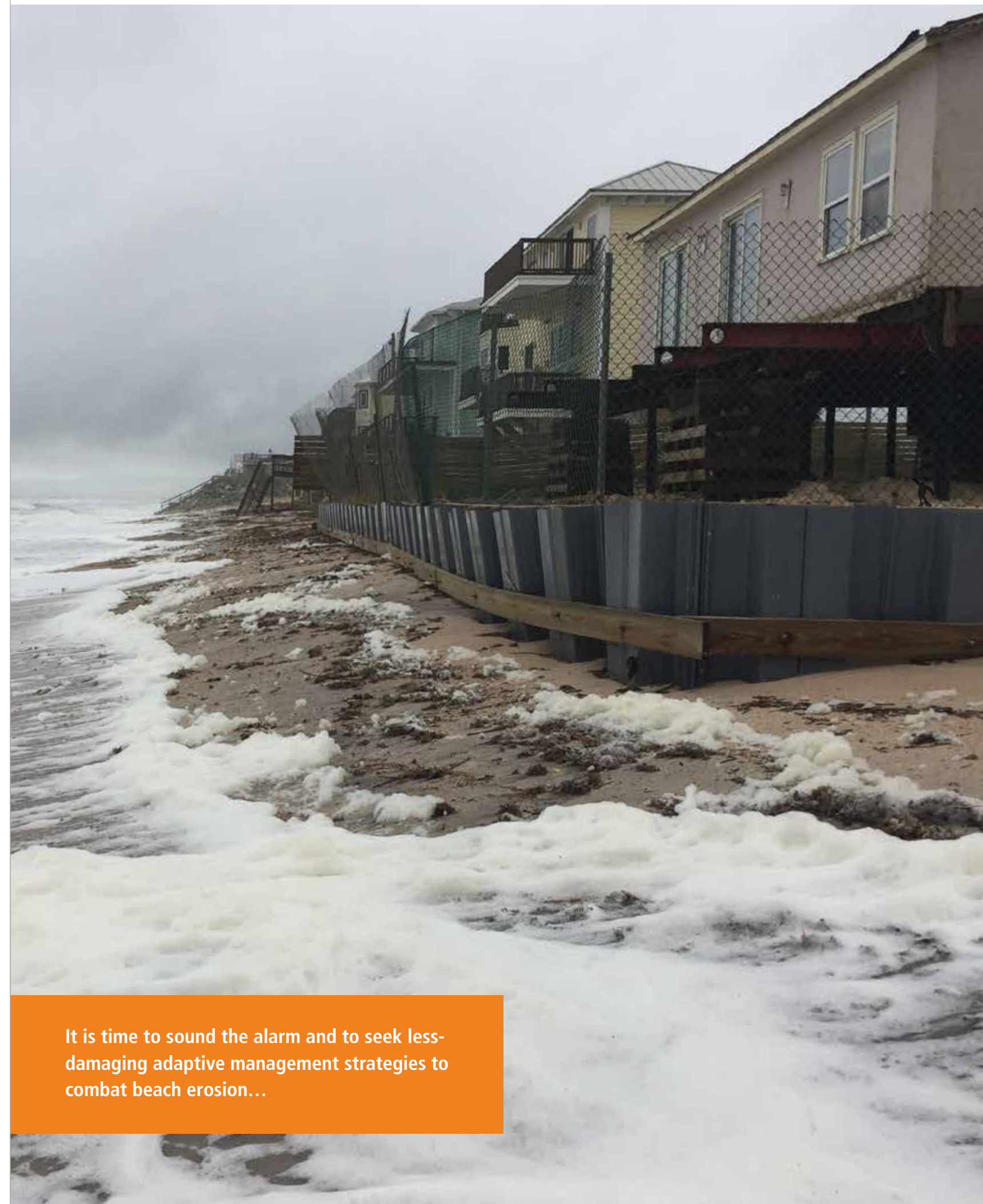
immediately in front of and to either side of the wall, resulting in increased beach erosion. Worse yet, as the beach erodes in front of a seawall, it is more frequently inundated; the resulting saturated sand is even more susceptible to erosion than dry sand because it does not allow water to percolate down, which results in waves carrying more sand back from the beach as they recede. Seawalls also “lock up” the sand behind them, thereby preventing it from nourishing and rebuilding beaches and reducing the beaches’ ability to recover naturally after storms. Because seawalls can increase sand loss on neighboring properties as well, they create a domino effect that encourages the construction of more seawalls, which has in many places resulted in long stretches of armored beach.

Rising seas and increasing global temperatures, coupled with armored shorelines and coastal development, have placed a squeeze on sea turtles and their nesting habitats. That effect is especially pronounced in Florida, U.S.A., where almost one-half of the state’s beaches are considered critically eroded and almost 25 percent of the shorelines are already armored by seawalls, rock revetments, or large geotextile sand-filled tubes. Seawalls can deter sea turtles from nesting, resulting in increased non-nesting emergences or false crawls. Sometimes sea turtles can even become trapped behind those structures. Nests that are deposited in front of seawalls are also more prone to inundation, and indeed one of the most significant causes of sea turtle egg mortality in Florida is inundation on eroded beaches.

Predicted increases in human population and shoreline development, combined with increasing sea-level rise, can mean only that sea turtle nesting beach pressures will continue to grow worldwide. It is time to sound the alarm and to seek less-damaging adaptive management strategies to combat beach erosion that will protect beaches and coastal infrastructure while simultaneously ensuring suitable sea turtle nesting habitats for the future. More research is required to understand coastal dynamics and to determine adaptation strategies in changing coastal systems, and stakeholders must work proactively to remove, minimize, or mitigate the impacts of coastal development on sea turtles.

In the Archie Carr National Wildlife Refuge in Florida, which is home to the greatest density of nesting sea turtles in North America, the pressure from property owners to construct seawalls increases following erosive storm events. The local government responds by protecting the nesting habitats: building, restoring, and replanting protective dunes with native vegetation immediately after the storms, thereby decreasing the need for seawalls. A group of leading conservation organizations and other stakeholders in Florida have come together to begin the process of education and change. They have joined forces to create a documentary and webinar series called “Ahead of the Tide.” The series explores the problems associated with sea-level rise and beachfront armoring, and it suggests solutions to better ensure long-term nesting beach protection. Suggestions include strategic sand placement, smarter shoreline development policies to encourage more landward placement of homes and infrastructure, and better management of navigational inlets that disrupt the flow of sand along the beach and greatly exacerbate erosion of downdrift beaches. For more information, visit <http://aheadofthetide.org>. ■

AT RIGHT: Rising seas and coastal armoring visibly impact sea turtle nesting habitat in Vilano Beach, Florida, U.S.A. © SCOTT EASTMAN



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