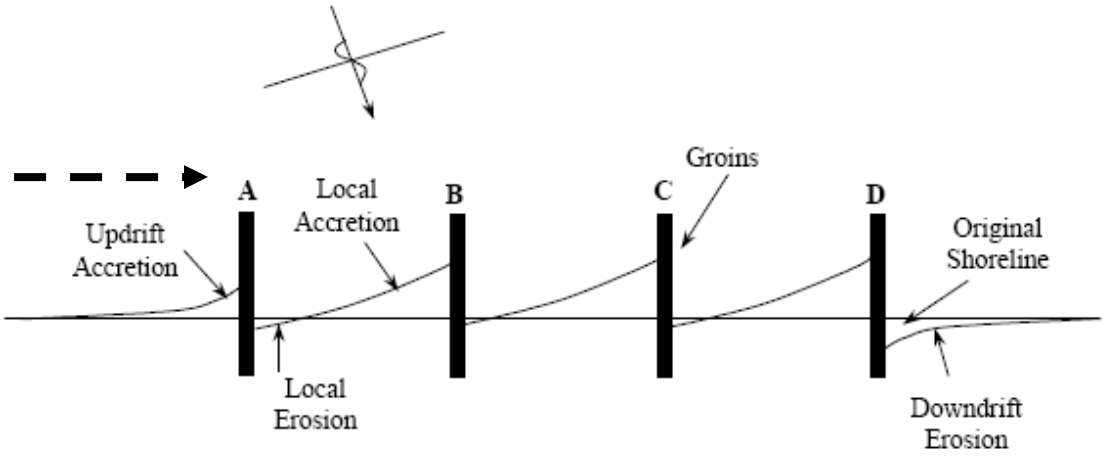
Western Carolina University
Program for the Study of
Developed Shorelines

The Impacts of Groins

There is a long history of groins on shorelines all over the world, and it is well documented that the cumulative, long-term costs of these structures, which are built perpendicular to the shoreline, are much greater than any benefits.

When a groin (A below) works as intended, sand that was going along the beach in the so-called downdrift direction (dashed arrow) is trapped on the updrift side of the groin, causing a sand deficit and increasing erosion rates downdrift of the groin. In response, a second groin (B) is typically constructed downdrift of the original groin to alleviate the erosion problem caused by the first groin. Over time, a third groin (C) will be built to alleviate the problems caused by the second groin. The end result is a shoreline armored by multiple groins, or a groinfield. Groin impacts can occur as far as a mile or more from the groin.



Placing groins in beach nourishment projects is of dubious value as well. For one thing, when big storms occur, groins direct strong currents that carry large amounts of sand seaward, in an offshore direction parallel to the groins. After Hurricane Hugo, for example, sidescan sonar studies showed gullies excavated on the continental shelf adjacent to each of the groins on Pawleys Island in South Carolina. Because much sand loss is offshore during storms, groins will have little impact on holding sand in place (and may even accelerate loss).

Furthermore, groins emplaced on a nourished beach and covered by sand won't have any impact on holding the beach in place until the ends of the groins are exposed. But once they are exposed, sand trapping will begin and sand that would have moved down the coast is prevented from doing so.

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Barrier islands are the world's most dynamic natural environments, and areas within a mile or so of inlets are the most dynamic portions of barrier islands. Groins intended to "protect" property near inlets on Ocean Isle Beach, North Topsail Beach and Figure Eight Island fly in the face of so much knowledge of barrier island processes and the impacts hard structures have upon these processes.

Construction of a groin at the end of an island will always impact on the next island, and it is imperative that such impacts are clearly identified, assessed and acknowledged. Although exact changes can not be predicted, "terminal" groins interrupt the natural sand bypass system through the ebb and flood tide deltas, causing changes that may have a substantial negative impact on adjacent Islands. It may take several years, even a decade, before these impacts appear.

The fact that "terminal" groins are even being discussed illustrates the inability of local communities, property owners and special interests to acknowledge the inherently dynamic nature of these locations, a refusal to work **with** the changing end of an island and a futile assumption that barrier island shorelines can be engineered and maintained in a static configuration.