The American Shore & Beach Preservation Association
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ASBPA Position Statement – May 2007

Innovative Erosion Control Devices

ASBPA's Science and Technology Committee has reviewed recent practice and certain states' policies regarding erosion control structures and Innovative Erosion Control Devices and proposes the following position statement to:

- Distinguish between "innovative" and "experimental" devices.
- Establish guidelines for measuring and monitoring performance.
- Encourage testing of experimental erosion control devices primarily by independent federal research programs and or university laboratories.
- Screen out experimental devices early (before field tests) that have little chance of working and or surviving in the coastal environment.
- Include appropriate caveats on field tests which explain the experimental nature of the work to avoid unrealistic expectations of the public.
- Encourage consideration of the limited use of conventional erosion control structures (e.g. groins and breakwaters) with beach nourishment to better manage hot-spot erosion and extend the life of beach nourishment programs/projects.

Almost every year, a number of experimental erosion control devices are proposed by inventors that are often unusual and purport to counter erosion in some unique way. These devices have taken many different forms including artificial seaweed, uniquely shaped submerged structures and devices placed in or on the beach as well as nets to catch sand.

The industry has named the general class of these devices as "innovative". The designation of innovative is considered a misnomer because many of these devices have not accomplished their fundamental goal of reducing beach erosion and or have failed structurally in the marine environment. Truly innovative devices are considered to be those which are shown to work and/or save money; until proven, therefore, we suggest that such structures be classified as experimental and should be considered experimental until proven.

Often the public and sometimes a municipality or county views a choice of the latest unproven experimental device as potentially equal or better than conventional solutions such as nourishment, groins or breakwaters. In many of these cases the experimental nature of the device is not fully appreciated nor is the lower probability of success associated with such untested devices recognized.

In some cases the inventor claims that his device will accrete sand without any downdrift effect, a claim that is impossible to realize on an open coast. This can and has

led to actions that preclude or seriously delay effective action to solve critical erosion problems. It is important therefore that the public and local governments be provided the guidance and the background needed to make decisions that are more informed.

Shoreline retreat along sandy shorelines results from the net loss of sand from a segment of beach. When the beach retreats the storm protection provided to upland structures and infrastructure is diminished as is the recreational beach area. Successful solutions to erosion necessarily must involve replacement of lost sand in adequate quantities to accommodate the range of natural changes that occur seasonally on a beach.

Sand cannot be created by erosion control structures (conventional or experimental) but merely retained or sequestered. The only way to address a long-term sand deficit along an eroding coast is by addition of sand from an offshore or upland source, or a renewable littoral source. Examples of external sources include: offshore deposits beyond the active littoral zone and upland deposits containing beach quality sand.

Renewable littoral sources are considered to be those deposits where sand will continue to accumulate even if some of the deposit is removed for use elsewhere, such as an ebb-tidal delta or sand that accumulated updrift from a jetty. Beaches can erode due to sea level rise, major storms or when sand is trapped by coastal features. Sand moved by waves along the coast can be trapped in inlets or held in place by jetties, groins, breakwaters, offshore shoals, or natural headlands.

Downdrift of these features one often finds eroded beaches that have lost sand as a result of the reduction in the supply of sand from the updrift beach. Where the sand deficit has occurred over a number years, the beach can become critically eroded and in need of a large quantity of sand via a process called beach restoration or beach nourishment. To reduce rates of future erosion and required periodic nourishment of these areas, sand bypassing of trapped sand (release or transfer of sand to downcoast areas) and backpassing (transfer of sand back to upcoast areas) can be used.

Coastal structures can be categorized as armoring (seawalls and revetments) or erosion control; this paper addresses erosion control structures only. Erosion control structures, including experimental devices, work as a groin (perpendicular to the beach) intercepting and reducing the flow of sand or a breakwater (parallel to the beach) intercepting and reducing wave energy, which in turn slows the movement of sand in the protected area. Both groins and breakwaters, therefore, slow down sand movement (littoral drift) to counter localized erosion. Sand is retained by these structures and not created. There are updrift and downdrift effects consequent to retaining sand at a specific location along the beach.

In some cases, erosion control structures can be used to extend the life of beach nourishments, control hot spot erosion areas, and prevent losses of sand at the terminal end of littoral systems. Indeed, as sand deposits used for nourishment become scarcer, it is important to consider the surgical use of structures to conserve sand. For example, where a high erosion (hot spot) area transitions to an accretion area (cold spot) along a beach, erosion control structures can help balance sand movement to levels that approach stability in both areas. Terminal groins at coastal inlets can also be used effectively to reduce losses from the end of a beach nourishment; sand that would be otherwise lost to the ebb or flood tidal deltas of the adjacent inlet.

In the United States the use of conventional erosion control structures has been severely restricted for the last thirty years as sand nourishment became the primary tool for erosion control. State governments have resisted permitting erosion control structures during recent years primarily because of wide scale and often indiscriminate use of erosion control structures in the past without beach restoration, a practice that has left a number of beach areas starved of sand.

Restrictions on the use of erosion control structures have directly or indirectly promoted the use of experimental devices to solve erosion. In some cases grants have been offered to develop innovative designs and have largely been limited to experimental concepts.

Because of the resistance to permitting groins and breakwaters, the practice of designing these structures to enhance the performance of beach nourishment has lagged other advances in coastal science. Consequently, the successful use of conventional erosion control structures as part of a larger erosion control program that includes nourishment would be innovative and potentially provide important benefits in the form of sand conservation and cost savings.

Funding programs for demonstration projects of innovative structures should therefore allow for proposals that include the limited use of conventional erosion control structures in conjunction with beach nourishment. To address the uncertainties of performance and downdrift effects of conventional erosion control structures, temporary or adjustable conventional erosion control structures can be used. Temporary structures such as T-Head groins can be built for example from sand filled geotextile units.

Proposals to build experimental erosion control devices should be held to the same standards as conventional structures and also be required to demonstrate proof of concept. The testing of experimental devices should primarily be performed by federal research programs or university laboratories. Field tests should follow laboratory testing that shows positive results and structural stability.

If conventional groins or breakwaters would not be approved for a specific location because of downdrift impacts resulting from sand retention, then experimental erosion control devices should similarly not be approved for that site because if successful, they would have the same impacts. There should be no preferential permitting for non-conventional erosion control devices simply because government agencies are not sure if they will work (retain sand). The proof of concept should include:

1. Development of a rigorous requirement for testing, including some physical basis for the possibility of success, adequate monitoring, and an agreement by the proponents that they will abide by the results.
2. Development of a science-based metric or set of metrics (criteria) with which to judge success.
3. Creation of a long-term monitoring plan that will provide essential information and cumulative documentation on the project’s success while at the same time contribute to the field at large.
4. Quantification of the downdrift effects of the proposed structures.
5. Evaluation of cost effectiveness.

In many areas of the country, sand resources are not only limited but becoming scarcer. Conservation of existing sand resources is vital to the survival of our beaches and coastal infrastructure. The combination of sand bypassing and a surgical use of conventional erosion control structures can prolong the life of beach nourishments and conserve sand.

Public policy that limits or prohibits conventional structures and directly or indirectly encourages experimental erosion control devices should be modified to enable and encourage more effective sand conservation. By acknowledging the sand retention capability of conventional structures and designing to avoid or manage downdrift impacts, truly innovative solutions to coastal erosion will emerge.

About the ASBPA: *Founded in 1926, the American Shore and Beach Preservation Association (ASBPA) represents the scientific, technical and political interests along the coast in an effort to shape national research and policy concerning shore and beach management and restoration. The group strives to engage a factual debate on coastal issues and economics that will foster sound, far-sighted and economical development and preservation of our beaches; thereby aiding in placing their benefits within the reach of the largest possible number of people in accordance with the ideals of a democratic nation. For more information on the ASBPA, go to www.asbpa.org.*