Researchers Test Beach-Nourishment Protocol

An interdisciplinary team of VIMS researchers is wrapping up a multi-year study in Virginia Beach designed to help government agencies more effectively monitor the environmental impacts of beach nourishment.

Beach nourishment involves mining sand from offshore or land-based deposits and transporting it to beach areas to make them wider and more stable.

Geologists Woody Hobbs, Scott Hardaway, and Jesse McNinch have joined forces in the project with biologist Bob Diaz and computer modeler Jerome Maa. Their goal is to test the Mineral Management Service’s (MMS) protocol for monitoring the effects of sand mining on the living and physical resources of U.S. shorelines. The MMS is the federal agency charged with issuing permits for sand-mining from federally managed offshore areas.

Beach nourishment is a sometimes-controversial practice with costs and benefits to both the economy and the environment. The Army Corps of Engineers (ACOE) spends about $80 million a year to maintain the nation’s coastline against erosion and rising sea level, with local governments chipping in another $40 million. In addition to supporting a healthy tourism economy that generates billions of dollars annually, healthy beaches can play a major role in protecting the shore from storms and erosion. Critics contend that some beach-nourishment projects actually hasten coastal erosion, and that the practice is ultimately unsustainable.

Virginia Beach, the Commonwealth’s most popular seaside destination, has spent about $110 million on its 30-year beach-stabilization project, and earns about $40 million in taxes from the $500 million in tourist revenue that the beach generates each year.

The current study builds on VIMS’ long history of collaboration with MMS, ACOE, and other coastal-management agencies. “We’ve had a series of one-to-two year projects going back over a decade years with MMS, looking at various aspects of beach nourishment in Virginia Beach,” says project leader Hobbs.

The initial studies defined the available reserves of sand offshore of Virginia Beach. A more recent study focused on the potential environmental impacts of offshore mining. VIMS scientists assessed the possible biological impacts to bottom-dwelling organisms and fish, and the possible physical impacts to the offshore dredge zone, the surf zone, and the nourished beach. Study results included computer models that MMS and ACOE use to evaluate and implement beach-nourishment projects.

The VIMS’ studies were instrumental in guiding MMS officials during their review of Virginia Beach’s (successful) request for permits to exploit the sand resources off its shoreline. In fact, the MMS was so satisfied with VIMS’ efforts that the agency encouraged other institutes to use the studies as a template when submitting proposals for shoreline-impact studies in other states along the Atlantic seaboard.

“Ultimately, though,” says Hobbs, “MMS realized that their studies were about the potential impacts, and that follow-through to see what really happened would be of great benefit. So they set about to create a protocol for monitoring offshore sand-mining areas.”

“Monitoring would allow us to assess the accuracy of the predictions that were used in the design and consideration of the dredging process,” notes Hobbs. “That would help improve the predictive models so that subsequent nourishment projects will last longer and have fewer detrimental environmental effects.”

The current VIMS study is designed to review and enhance a trial protocol that was developed by a consultant using information obtained during a December 2000 meeting of scientists, engineers, and resource managers at VIMS.

The VIMS study is multifaceted. McNinch is studying how subsurface geology in the surf zone helps controls beach erosion. Hardaway is investigating the best ways to monitor a nourished beach to ensure that it lasts as long as possible. Diaz is exploring how best to conduct long-term studies of impacts to bottom-dwelling organisms in the dredge zone. Maa is testing a low-cost radar system for monitoring wave height shoreward of the dredge area (see sidebar).

The team expects to deliver its final report to the MMS in early 2006.