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Research Brief: Coastal Morphology-Change Models

Issue Many federal projects that have altered the coast, such as jetties and river damming, are more than 100 years old. Over that period of time, the coastal response to these projects can extend to a regional scale, and such projects will likely be maintained indefinitely. The causes of adverse sediment redistribution might well reside outside the direct physical or administrative limits of a project, and its solution by RSM may also arise from beyond a project's traditional boundaries. The Corps must develop the broad knowledge base, analytical tools, and predictive numerical models required to address sediment management on a regional scale. Through this technology, Corps field offices and partners can assess quantitatively the consequences of regional coastal sediment management alternatives for domains extending over multiple and interacting projects.

Objective Develop, validate, and implement the comprehensive regional coastal morphology-change numerical model, *Cascade*, together with a toolbox for conducting associated analysis and data preparation. *Cascade* will be founded on new concepts that are an outcome of investigating large-scale coastal behavior and conducting mission-support studies for navigation channel and shore-protection projects. Feasible domains cover temporal and spatial scales exceeding more than a century and hundreds of kilometers. The name, *Cascade*, connotes the explicit interaction of different scales of sediment transport and geomorphologic trends from large to small.

Research/Design Development of *Cascade* was initiated through prior research and experiences extending back to the early 1990s in consideration of large-scale coastal behavior. The RSM Project Delivery Team is developing a fully-capable model, validating it under a wide range of conditions, and making it operational for transfer to the field. *Cascade* computes regional longshore sand transport rates and natural bypassing at multiple coastal inlets and river mouths, while representing both regional and local trends in morphology and transport rates. Processes under research include overwash, wind-blown sand and dune development, representation of river discharges of sediment, and barrier island breaching (conducted together with the Coastal Inlets Research Program). Technology transfer will begin with beta testing of a simplified version of the model by Districts, so that the fastest possible feedback and benefits can be obtained.

Application *Cascade* and its associated toolbox will support coastal regional sediment management by providing reliable quantitative predictive capability to evaluate traditional (local) and non-traditional (regional) alternatives. The model domain will be capable of encompassing multiple projects with a wide variety of cumulative interactions, engineering actions, sediment forcings, boundary conditions, and geomorphic types.

Products Links and information will be posted here. View online at <http://rsm.usace.army.mil>.

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