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ATM APPLIED TECHNOLOGY & MANAGEMENT

Undercurrents

An ATM Coastal Newsletter

Biological Monitoring in Adverse Conditions

The forces of nature are constantly reshaping shorelines. The buffeting actions of large waves and storm surges can wash away huge swaths of a beach.

Restoring a beach by dredging sand from the sea bottom and spraying it on shore repairs such damage and offers numerous benefits, including improved shoreline protection from future storms. Unfortunately this intervention, in the natural world, sometimes comes with an environmental cost to sensitive near-shore ocean habitats. Therefore, beach restoration or renourishment requires environmental monitoring, and if necessary, a plan to mitigate any negative environmental impacts.

In an area like Ambersand Beach, a narrow barrier island in Florida's Indian River County (IRC), fine sands and sediments are easily stirred up by the vigorous surf and can remain suspended in seawater for long periods. Resulting high turbidity, unfortunately, is harmful to many species that make their homes in the worm rock offshore.

In 2003, IRC completed a beach restoration project at Ambersand, but in 2004 the forces of Hurricanes Frances and Jeanne washed away much of the restored portions of the beach. Before the IRC could embark on another beach renourishment project to repair the damage, it was critical to assess the condition of the nearshore reef habitat. Biological monitoring is also required during and after the restoration.

Part of the Ambersand barrier island is privately owned, and part of the impetus for beach restoration is to protect homes from future storms. Currently, no homes are in immediate danger, but further erosion could provide a threat.

Another portion of the barrier island, the Archie Carr National Wildlife Refuge, is critical habitat for endangered species. It is one of Florida's coastal crown jewels, hosting one of the largest concentrations of nesting loggerhead turtles and the greatest number of nesting green sea turtles in the continental United States.

"It's one of the most significant sea turtle nesting areas in the world," says **Jonathan Gorham**, Coastal Resource Manager for **IRC**. "We knew we needed to make extraordinary efforts to retain the health of the nesting areas."

Varying visibility and reef conditions of Indian River County

Officials were not only concerned about increased ocean turbidity, but also sand settling from the beach that covered portions of the near-shore reefs. Monitoring the impact of beach nourishment for this project required a painstaking, systematic methodology of underwater video surveillance and measurements of sediment accumulation at many points along the reef, where persistently poor visibility became a project hurdle.

"The problem was that the standard methods for this type of work were developed for areas with calmer seas and higher visibility, as in Broward and Palm Beach Counties," Gorham says.

The monitoring process is performed by divers who systematically traverse the near-shore area while recording video of the hardbottom communities on the reef. The divers orient themselves using GPS-mapped transect lines.

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8 KEYS TO BIOLOGICAL MONITORING SUCCESS

1. Have a Roadmap. Environmental resources are the key issue for project approval. The regulatory process is a maze of state and federal agencies and regulations that can be very confusing and frustrating. It is important to plan out the process and understand how the various pieces fit together. A little bit of initial planning will go a long way in developing a successful program.

2. Foster Good Relationships. The key to success of any monitoring effort is the development of a good working relationship with regulatory agency staff. Understanding their needs and motivations will help develop alternatives that will work for all parties.

3. Document Efforts. Even if monitoring efforts are unsuccessful, it is important to record what efforts were attempted and the specific problems encountered. While it is preferable to complete all monitoring as required by project permits, there are times when conditions (waves, visibility, storms, etc.) do not allow for it. Regardless, it is important to demonstrate a good faith effort to complete the required tasks.

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This method allows scientists to monitor the same stretches of reef habitat over months and years. In this way, the impact of cross-shore transport of sand on the hardbottom communities at specific locations is periodically recorded and observed.

"High turbidity makes it difficult to identify the numerous species of hardbottom communities, including algae, sponges, mollusks, and other species," says **Cheryl Miller,** President and Principal Scientist with **Coastal Eco-Group, Inc. (CEG)**, the Ft. Lauderdale firm contracted to consult on the Ambersand biological monitoring methods. "When the visibility is poor, you can't identify species or measure the size classes of common reef organisms," she says. **Continental Shelf Associates** was contracted to perform the biological monitoring.

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Visibility off Ambersand varies from day-to-day, even hour-to-hour. For weeks on end, the visibility may be so poor that monitoring is impossible. On many days, there may only be a couple of hours when conditions are suitable for video recording and in-situ assessments. Even on the best days, the established monitoring methodology may still create murky video that does not yield enough detail to assess the conditions of the habitat.

ATM and its contractors (Continental Shelf and CEG) worked with personnel from the Florida Department of Environmental Protection (DEP) to devise another methodology that would be more effective at Ambersand. In ideal conditions, when using video monitoring methods, recording is typically done from a distance of 40 centimeters from the reef. After testing several recording techniques, ATM found that recording at half the distance yielded sufficient photo clarity to identify reef organisms and adequate spatial coverage to assess changes in reef communities to evaluate project impacts.

"The DEP has strict rules regarding biological monitoring, so ATM kept them abreast of the challenges faced and our suggested solutions," says Peter Seidle, Coastal Engineer with ATM. "We met at least a half dozen times with DEP officials to work out an acceptable protocol for the monitoring."

"This work required quite a bit more coordination and management than is typical for a biological monitoring project," Gorham says. "ATM has done a very good job supervising the contractors, who are doing the work, and communicating the challenges to the regulatory agencies."

One of the goals of the monitoring program is to provide data to determine if any environmental mitigation steps will be necessary to offset the impact of beach renourishment. In 2003, the IRC constructed five acres of artificial reef by laying limestone boulders offshore to offset the anticipated disturbance of reef habitat. Before proceeding with the next beach replenishment, county officials will determine if additional artificial reef habitat needs to be created.

In critical near-shore habitat, officials must have accurate data to make such determinations. Ambersand shows that, in some places, performing biological monitoring requires resourcefulness to cope with adverse field conditions and determination to find a way to gather vital data when standard practices are inadequate.

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8 KEYS TO BIOLOGICAL MONITORING SUCCESS (Continued)

4. Communication is Key. Keeping all parties informed of monitoring efforts and results on a timely basis helps address problems before they become major issues.

5. Be Proactive. Project permits require that efforts be conducted in accordance with a strict timeline and reports must be submitted within a fixed schedule. Given all of the various tasks involved, it is often a challenge to meet these deadlines. Dedicating the proper resources and staff to meet the schedule is critical to successful implementation. If, for whatever reason, it becomes apparent that these deadlines will not be met, it is essential to communicate the concern to the proper regulatory staff as soon as possible. In most cases, interim submissions or extensions may be adopted to meet the requirements of all parties.

6. Focus on the Facts. Don't try to extrapolate or make unsubstantiated claims based on monitoring efforts. A scientific, fact-based use of monitoring results is the best approach to countering claims regarding project impacts.

7. Know the Cost. Don't agree to any monitoring effort or study without an understanding of the costs. A monitoring protocol may seem acceptable until the true costs of implementation are realized. Having a good handle on budget requirements will help the applicant accept and plan for monitoring efforts. In addition, if the costs of monitoring become prohibitively high, having accurate information to support this concern is key to successful negotiation of a resolution.

8. Be Realistic. Biological monitoring is an essential and unavoidable aspect of all engineering projects in the coastal zone. Successful programs require considerable effort, energy and time to implement.