

Keys to Planning, Designing, and Permitting Resilient Coastal Restoration Projects

Matthew Starr and Jeffrey Tabar

A new set of challenges are affecting the ability to plan, design, and permit successful projects in the coastal environment. In no particular order, climate change, sea level rise, funding, extreme storms, regulatory policy, political pressures, and coastal zone management issues all introduce unique challenges to implementing a successful coastal restoration project.

It's estimated that about 40 percent of the world's population lives within 60 miles of a coastline. This coastal population—and the coastal infrastructure it relies on for economic viability—is highly vulnerable in the face of global climate change. This vulnerability will be exacerbated by projected increases in the frequency of intense tropical storms.

More-intense storms could result in more-frequent barrier island overwash, storm damage to coastal infrastructure, shoreline retreat, loss of coastal wetlands, saltwater intrusion into aquifers, and increased coastal flooding. This article provides an overview of these challenges, discusses their importance in today's political climate, and provides examples of projects that carefully and successfully maneuvered through these elements. Restoration examples from Florida and other east and gulf coast locations will be provided.

Stantec was involved in the largest post-Hurricane Sandy restoration project (\$40 million), which demonstrated how various phases of a project—from planning, design, and permitting, through construction—were completed. Considering the very active 2017

hurricane season, the projected RESTORE funding for Florida can't come at a more important time for the maintenance, preservation, and restoration of its coastline.

Defining Coastal Resilience

According to Webster's Dictionary, the definition of resilience is "the capability of a strained body to recover its size and shape after deformation caused especially by compressive stress." This definition is broad at best, but can be used to begin the discussion on coastal resilience.

Resiliency can mean many different things depending on the subject:

- ◆ Preparedness
- ◆ Survivability
- ◆ Hazard mitigation
- ◆ Sustainability
- ◆ Best practices
- ◆ Disaster recovery
- ◆ Adaptive management

A strategy that may be successful in one region of a country may not be appropriate elsewhere. Each community must assess its own hazard risk and community vulnerability. This is accomplished by collecting data and gathering information as it relates to coastal impacts. This data will help identify solutions that may help provide protection from hurricanes, storm surge, wave impacts, and sea level rise.

With solutions determined early in the process, restoration and mitigation efforts can be implemented in time to provide the necessary protection. The proactive approach will ultimately provide a level of protection that's better than current scenarios. The effectiveness of these actions may not be seen immediately, but when the next super storm approaches the United States, or another part of the world, the risk reduction strategies implemented now will have overwhelmingly positive effects on the local community.

Planning

Having a well-defined plan is key to the success of a coastal resiliency program. This begins with collecting data and conducting research on local issues. By defining what data is needed to



assess community risk, the collection process can begin. This process will allow data gaps to be determined, and new data can then be identified to build an inventory to be used throughout the design, permitting, and implementation phases. Due to everchanging advances in technology, the database systems that are developed must be able to be updated and adapted throughout the process—and into the future.

An excellent example of this planning was the creation of the Southeast Florida Regional Compact Climate Change, which was formed in 2009 by a group of four counties in south Florida:

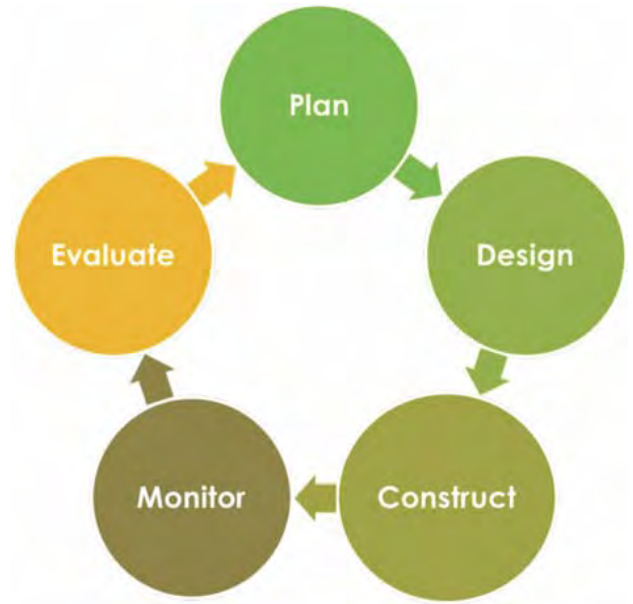
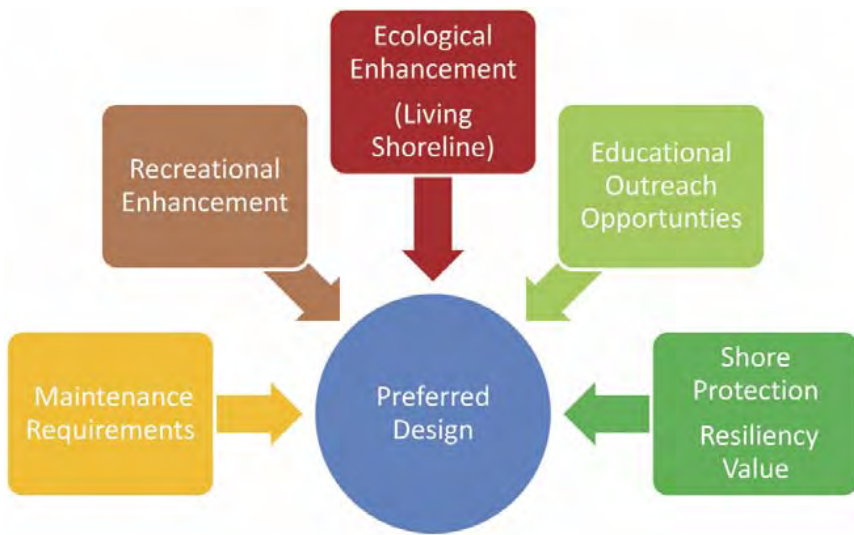
- ◆ Palm Beach
- ◆ Broward
- ◆ Miami-Dade
- ◆ Monroe



The counties recognized and understood the need for proactive planning and action to be taken to protect their communities from the effects of global warming and sea level rise.

Continued on page 6





Continued from page 4

Designing

With the planning and data collection phases complete, the alternatives analysis of the design can be developed. Designs should incorporate both recent and historic data, and be science-based.

The design should incorporate current land use patterns, but also plan for future population growth. High hazard areas should integrate sustainability with long-term environmental and economic benefits. As with any project, the design must balance risk reduction, provide protection, and meet stakeholder objectives.

The reality is that these solutions to provide coastal resiliency are often so large and expensive that they must be approached in a “phased” way to provide short-term results for communities, while being part of an overall larger project. While each project is unique, some solutions will inevitably cause impacts to existing environmental resources, which may require mitigation. This is the where the balance between protection versus environment must be examined and vetted among multiple stakeholders, as mitigation projects can provide enhanced benefits beyond the existing conditions.

By monitoring the performance of the design, and the implementation that follows, success criteria can be determined. An important aspect of any project is reviewing and understanding what was completed satisfactorily and what features can be improved upon for the future. These “lessons learned” are vital to the successful development of a coastal resiliency program.

Summary

Coastal resiliency can have many different interpretations and applications, depending on the location and goals of all stakeholders involved. Communities should consider taking a long-term and phased approach to accomplish these goals:

- ◆ Guide growth and development away from high-risk locations
- ◆ Make sound science and engineering decisions
- ◆ Understand that there is value to restoring ecosystems that goes beyond financial benefits

These impacts are just now gaining media attention and are new to many industries and stakeholders. As with the southeast compact, cities and organizations should support and encourage forward-looking leadership, while understanding that resiliency takes time. With a well-defined plan of action and a proactive approach to resiliency, coastal risk can be reduced and planned for accordingly.

Matthew Starr, P.G., is an associate, southeast coastal team leader, and Jeffrey Tabar, P.E., D.CE, is principal coastal engineer with Stantec Consulting Services in Naples. ◊

