Coastal Resilience in the Northern Gulf of Mexico: Moving Beyond the Hype

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Guest Expert

The Hype… and the Challenge

Coastal resilience is a phrase that has saturated community planning and decision-making. It does not have a single definition, however, coastal resilience is generally thought of as the ability of a community or individual to recover quickly from a disturbance or disaster. Federal, state, and local organizations and agencies are thinking and talking about coastal resilience more than ever before. Being resilient has become a badge of honor and an ever-present metric for new projects or efforts. Capital improvement projects, vulnerability assessments, and strategic planning all now are being undertaken with coastal resilience as a central or critical component.

Millions of dollars are being invested in the pursuit of coastal resilience; yet, for all its omnipresence, what it means to be resilient and how to work towards resilience is not well understood. This is in part because there is no one single way to be resilient or to pursue resilience. Coastal resilience for each person, community, and state is unique. The challenges, external and internal, will never be the same in any two situations, and therefore, strategies for becoming more resilient must be uniquely designed for the community in order to be successful.

Given the push for coastal resilience but the lack of clarity of how to achieve this goal, for some planners and other coastal decision-makers pursuing coastal resilience can be a source of frustration. It can be difficult to know what goals or activities to pursue, to determine a pathway for achieving those goals, or to identify what actions can be helpful.

However, increasing resilience along the coast has the potential to save billions of dollars in damages, prevent loss of life, enhance coastal ecosystems, and strengthen economic security. Additionally, planning for coastal resilience gives us an opportunity to examine our communities as they currently are, including issues around socioeconomics, and reimagine and invest to achieve the communities that we want.

Coastal resilience deserves the hype and fortunately there are lots of things states, counties, cities, and individuals can do to pursue coastal resilience. There are also lots of opportunities to learn from others who have forged ahead already.

Quick Note On Sea-Level Rise

Addressing the risks from flooding is a fundamental part of coastal resilience which means that sea-level rise and coastal resilience are hand in hand.

We know that seas are rising, recently have started rising faster, and will continue to rise. A critical take away regarding sea-level rise is that it **exacerbates existing hazards**. For example, **high tide** has always served as a boundary between buildable land and the ocean. Most construction avoids the space that falls between high and low tides, leaving it for coastal ecosystems like marshes and beaches. However, sea-level rise has caused high tide to creep up, placing infrastructure and public and private property into the ocean's domain. Similar changes can be seen with other hazards, such as erosion occurring in new places, storm surge being deeper and flooding more inland areas, and rainwater not draining effectively. These all lead to new challenges when it comes to addressing future flooding.

Addressing sea-level rise is particularly critical in the northern Gulf of Mexico where we are seeing some of the highest acceleration, or increase in the rate, of sea-level rise. As the area is already projected to experience 25-30% greater amounts of sea-level rise than the global average, we do not have the luxury of not preparing for the coming changes.

Credit: City of Foley, AL

Preserved area in Foley, AL

Using Green Infrastructure to Reduce Flood Risk

Green infrastructure is another term that has become very common. Green infrastructure refers to any use of natural systems such as wetlands, restored floodplains, or rain gardens to act in tandem with gray infrastructure such as culverts or hardened stormwater outfalls. Leaders in Foley, Alabama, a small but rapidly growing city of around 20,000 people, have had to think strategically about its land use as it quickly is moving from an agricultural area to a more suburban community. Green infrastructure played a part. Foley does not have a lot of direct exposure to the coastline; its flood pressures come from development reducing water storage capacity, increases in intense rainfall events, and higher sea levels reducing the ability of its storm system to drain efficiently. This is like many communities in coastal counties that are near the Gulf but not located directly on the shoreline.

A key strategy for Foley has been to identify areas where its stormwater system is already unable to keep up and then use green infrastructure to enhance stormwater storage capacity upstream from the trouble spots. A common approach by Foley is to restore floodplains around streams that convey stormwater. These restored floodplains add a greater area in which the water can be temporarily stored during rain events and a wide array of natural plants that absorb and filter the water before it slowly moves downstream. This decreases the water's quantity and speed in the streams.

Foley has already done this once near its town center, and the downstream area which previously flooded frequently has not flooded since the restoration was completed. Further, the restored floodplain is so robust and contains so many rare and beautiful plants and wildlife, the city is developing a way for residents to view the area and learn more about green infrastructure. This highlights one of the many benefits of using green infrastructure: unlike traditional methods, the infrastructure itself can become an amenity for the community.

The Big Picture – Piecing Many Small Projects Together

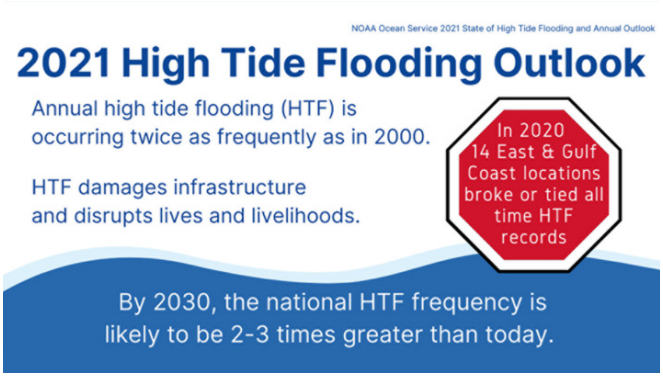
Coastal communities often do not have large sums of money at their disposal for tackling resilience. This means that they must get creative with smaller amounts of funds, take small, but critical, steps forward, and be ready to leverage large pots of money when they become available. In Dauphin Island, Alabama, the town has been working to increase its resilience since 2005. Hurricane Katrina had many devastating impacts, one of which was a dramatic decrease in the housing stock

along the coast. For Dauphin Island, this translated directly to lost revenue due to a decrease in tourism. Vacationers that rent beautiful homes on the picturesque sand beaches of the West End of Dauphin Island are a critical source of revenue. But the housing stock on the West End was reduced to 10% of what it was pre-Katrina. Additionally, the island was physically cut in half – fortunately, not in an area that was habited – but it made starkly clear the vulnerabilities of the island and the realization that a next big hurricane could mean a cut in the island in a much worse location.

However, Dauphin Island is more than just its vulnerabilities. The east end of the barrier island on which the Town of Dauphin Island rests is home to a maritime forest, natural safe harbors, and in some places stark elevation gains. These features represent capacity and opportunities for increasing the town's resilience. Shortly after Hurricane Katrina, the town undertook two separate, but related, planning efforts using small grants. The Comprehensive Plan and the Strategic Plan were compiled by engaging with residents and other stakeholders to understand and then clearly communicate the vision of what they wanted Dauphin Island to be and how to get there. This included identifying specific areas where more studies and information were needed, opportunities for economic diversification to reduce the reliance on the vulnerable West End, and areas where coastal habitats such as dunes and marshes could be restored to strengthen the island's flood protection.

Once the plans were made, the town partnered with different organizations and leveraged available funding opportunities to implement them. This has led to a large-scale restoration study to understand how best to expand the natural resources of the island. The study provided clear guidance on which restoration activities would be the most successful at protecting Dauphin Island from hurricanes both now and into the future based on sea-level rise. Dauphin Island leveraged this study to successfully compete for funding to implement these restorations efforts. Further, the town has begun to invest in rejuvenating a historic working waterfront. This provides more economic opportunity for the island, while maintaining the small-town charm that makes it unique and true to its roots as a fishing village. Finally, it has also begun additional studies and explorations on how best to protect some of the most critical infrastructure for the island including the causeway, the only road to the island.

By using small grants and continuing to take small steps forward one at a time, Dauphin Island is now much more resilient than it was, and as it continues implementing these plans and responding to the new information gained from those studies, it will only continue to become more resilient. This does not happen by accident though – it takes dedicated professionals, leaders, and communities working together to participate in and support the process. It also is not always easy; stakeholders have different ideas of how a community should look and function. However, proactively having these conversations through careful planning efforts allows for compromise and consensus building to occur which generates more productive outcomes.



Credit: PLACE:SLR

Lessons Learned, Best Practices, and Resources

Dauphin Island and Foley are a just two illustrative examples from the northern Gulf Coast. There are many other communities who have been making productive strides in our region. We at the Program for Local Adaptation to Climate Effects (PLACE) have created short case study videos (~5 min long) telling how Ocean Springs, Mississippi is working to increase the resilience of its small businesses, and how Magnolia Springs, Alabama is using green infrastructure to address pollution and flood challenges. We also have stories of how Biloxi, Mississippi is collecting the data needed to improve flood response and planning and how Fairhope, Alabama is doing the same thing for its gullies and stream systems. All those stories and more are found at http://bit.ly/Future-Flooding.

There are some best practices across these communities and others that I have worked with:

- Planning and assessments – These communities invested small amounts of money to understand not only what their vulnerabilities were but to identify

key actions that would directly reduce their vulnerability. This allowed them to successfully pursue additional funds and strategically expend time, energy, and money.

- Continual movement – Successful communities do not treat resilience as if it is an endpoint destination or can be achieved in a single action, they understand that resilience is about the process.
- Community involvement – Increasing the resilience of a community takes a long time and requires change, both of which are generally hard to come by. Involving the community and taking the time to get its input and come to consensus on how best to move forward provides longer lived support and understanding for different efforts. Studies have shown that communities that are engaged and aware are more likely to successfully undertake actions to increase resilience.
- Dedicated champions – Often at the core of these efforts are a few people who have worked hard over the years to help communicate the big picture and the benefits of each step along with way.
- Resilience is not separate – The most successful communities do not pursue resilience as a separate action but instead find ways to integrate a resilience mindset into their day-to-day activities.

There are lots of other things to be learned, and I encourage community leaders to participate in the Gulf of Mexico Climate and Resilience Community of Practice to find a network of other Gulf cities, towns, and counties learning together. Additionally, the Program for Local Adaptation to Climate Effects: Sea-Level Rise is a network focused on coastal flood resilience in Alabama, Mississippi, and northwest Florida intended to support communities on these topics.

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In Sum.

A Summation of the Facts and Figures of Interest in this Edition

★ *Increase in sea-level rise in the northern Gulf of Mexico above the global average:*	25-30%
★ *Inches of rain in Tuscaloosa, AL for a 25-yr 24-hour storm:*	7.19
★ *Inches of rain in Gulfport, MS for a 25-yr 24-hour storm:*	11
★ *Percent of live oaks left standing in Dade County, FL following Hurricane Andrew:*	78%
★ *Percent of other native trees:*	66%