

Where coasts and rivers meet: Living on the edge requires us all to work together

By

Shannon E. Cunniff

Environmental Defense Fund, 1875 Connecticut Avenue, Suite 600, Washington, DC 20009; scunniff@edf.org

*“The coast is an edgy place. Living on the coast presents certain stark realities and a wild, rare beauty. Continent confronts ocean. Weather intensifies. It’s a place of tide and tantrum; of flirtations among fresh- and saltwaters, forests and shores; of tense negotiations with an ocean that gives much but demands more.” — Carl Safina, *The View from Lazy Point: A Natural Year in an Unnatural World**

Wherever an ocean’s salty water meets the fresh water of rivers, something seemingly magical happens. Dynamic river and tidal currents mix nutrient-rich sediment-laden water fueling highly productive ecosystems. The bounty provided by these deltaic and estuarine environments has attracted human settlement for millennia.

Where coasts and rivers meet, the fishing is rich and the harbors are protected from coastal storms but provide ready access to ocean trading routes. So it is no surprise that some of the largest and oldest cities of the world developed adjacent to estuaries. Now, critical energy, petrochemical refining, transportation, and trade infrastructure is concentrated along our coasts and coastal rivers.

The productive waters where coasts and rivers meet support nesting and feeding habitats and are likewise important for recreation and tourism. Millions of people visit each year to boat, fish, swim, watch birds and other wildlife, and consume fresh fish and shellfish. Estuaries also help to maintain healthy ocean environments by trapping fine sediments and filtering out pollutants from rivers and streams before they flow into the ocean, providing cleaner water for marine life and sand for beaches.

Erosion, environmental degradation, and sea level rise are increasingly threatening coastal communities and their quality of life. Climate change means more extreme weather; hurricanes, floods, and droughts are already affecting



Figure 1. Interstate 40 flooding during Hurricane Florence (photo courtesy NCDOT).

our coastline and will continue to do so. The nation’s 95,471 miles of shoreline will be changing. Reducing risks, improving water quality, and enhancing other ecosystem functions and services are taking on increased significance as purposes for shore restoration.

The nation’s coastline is densely populated, with approximately 25 million people living in an area vulnerable to coastal flooding^{1,2}. The people and industries of the U.S. coastal counties produce 42% of the nation’s economic output. Dense development in the coastal zone will continue to drive the nation’s economy and property damage and business inter-

1) EPA Climate Impacts to Coastal Areas. https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-coastal-areas_.html#ref2 citing FEMA (2008). Coastal AE Zone and VE Zone Demographics Study and Primary Frontal Dune Study to Support the NFIP. Washington, DC: Federal Emergency Management Agency Technical Report, 98p.

2) Moser, S.C., M.A. Davidson, P. Kirshen, P. Mulvaney, J.F. Murley, J.E. Neumann, L. Petes, and D. Reed, 2014: Ch. 25: “Coastal Zone Development and Ecosystems. Climate Change Impacts in the United States: The Third National Climate Assessment.” J.M. Melillo, Terese (T.C.) Richmond, and G.W. Yohe, Eds., U.S. Global Change Research Program, 579-618.

ruption will drive up the costs of damages from coastal disasters. Currently, the high flood and wind risk exposures together with lack of preparation, plays out in costs. Adjusted for inflation, the five costliest hurricanes experienced by the U.S. have occurred since 2005, four of them since 2012. That pattern is likely to only get worse.

These recent hurricanes illustrate the particular vulnerability of communities established where coasts and rivers meet and the emerging challenges they are facing. Hurricane Sandy clearly illustrated the variety of coastal flooding threats — large erosive waves, storm surge, and back bay flooding due to riparian flows, urban runoff colliding with high coastal waters. In New Jersey some of the worst flooding and damages came not from ocean waves, but from back bays.

More recently in North and South Carolina, Hurricane Florence demonstrated the one-two punch of some hurricanes and especially the effects of storms with an extended duration. The coast first experienced the hurricane’s winds, high seas, and rainfall which resulted in flooding and damaged property along the bar-



Figure 2. Hurricane Florence flooding in downtown Wilmington, NC (photo courtesy EPA).

rier islands. Within the following week, the storm's prolonged intense rainfall over inland portions of the state resulted in swelled rivers and floodwaters flowing over the coastal plain's already saturated soils. The result: cutoff communities due to extended roadway flooding; damaged infrastructure, businesses, and homes; displaced residents; as well as flooded hog lagoons and septic systems and sewage infrastructure failures releasing waste into the river systems.

The record-breaking rains of Hurricane Harvey also swamped communities resulting in a terrible human and infrastructure toll. The region's oil refineries, petro-chemical plants, Superfund sites, and waste treatment plants were also

affected³. Hundreds of airborne and waterborne chemical releases occurred and many of those toxins have made their way to the Houston-Galveston Bay. The full extent and likely duration of damage is currently unknown and under investigation.

These examples also illustrate the ever increasing need to consider the interactions of physical, biological, and social processes when evaluating coastal flood risk problems and making risk-informed

3) <http://blogs.edf.org/texascleanairmatters/2018/03/06/hurricane-harvey-wreaked-havoc-on-peoples-health-texas-should-be-better-prepared-next-time/> and <https://www.houston-chronicle.com/news/houston-texas/houston/article/In-Houston-and-beyond-Harvey-s-spills-leave-a-12771237.php>.

Editorial

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The final two papers in this issue include a Coastal Forum from Shannon Cunniff, which is our first introduction to the 2019 ASBPA Coastal Conference next October in Myrtle Beach, SC. Her paper, "Where coasts and rivers meet: Living on the edge requires us all to work together," expands on the conference theme to discuss many of the opportunities and challenges of development along coastal rivers and estuaries and the clear inter-

connections of the human and natural systems that co-exist on our coasts. In the other, we take a field trip with the Sea Grant coastal specialists to view coastal processes of the Outer Banks of North Carolina — there is some overlap with the area studied by Sciaudone and Velasquez Montoya, which is clearly a very dynamic coastal system.

Several of the papers in this issue are about coastal change and dynamics.

decisions. Such systems thinking will help understand interactions, reduce unanticipated outcomes, and increase the potential for maximizing synergies that produce sustainable solutions, promote innovative partnerships and enhance the potential of leveraging of resources from diverse stakeholders.

ASBPA is dedicated to preserving, protecting and enhancing the nation's coast — its beaches and other shores — and to addressing current and emerging issues relevant to coastal managers and practitioners. *Shore & Beach*, as well as our Coastal Summit and National Coastal Conference, strive to reflect current and emerging challenges as well as innovative solutions for preserving and restoring our nation's diverse coastal environments.

This year's ASBPA National Coastal Conference's theme, "Where Coasts & Rivers Meet," is no exception. This year a Floodplain Management track will explore a range of flood risk management issues. It will help broaden our thinking about the dynamic and integrated nature of coastal and estuarine systems. It will serve to highlight the common issues coastal floodplains have with riparian floodplains. It will advance systems thinking necessary for successfully solving the continuing and emerging issues our coasts face.

By recognizing the interconnected nature of our coastal and riparian systems — the physical, economic, and social systems — we can make progress toward creating and implementing better approaches to realize communities that are vibrant and increasingly resilient to higher sea levels and storm surges, inland flooding, erosion, and myriad other climate-related changes.

Depending on where you live and whose view you take, you either have a century or more to enjoy your local beaches, or you have only a few decades to enjoy them. In either case, please enjoy them now, jot down your observations to develop into a paper or for your own amusement, and share your thoughts at future ASBPA events or in articles for this journal.