

APRIL 1, 2019

Flooding and Climate Change

By Dr. Mark Hafen, Master Instructor & Program Director, Urban and Regional Planning

Back in May 2017, I read an opinion piece in the *Tampa Bay Times*. The piece concerned me for a couple of reasons. First and foremost, it made ZERO mention of how sea level rise is going to make the already-problematic flooding in South Tampa worse. Tampa Bay is rising, as are the rivers that flow into it, and no amount of refitting of our stormwater infrastructure is going to help in the long-term, if all we're trying to do is move urban runoff to the Bay and the rivers.

Second, I was struck by the surprise expressed by one city official that, before Tampa became the city that we see today, there once were natural features surrounding the Bay in South Tampa. This is a common observation among many people I talk to. They look around at our built environment and seem to have no sense that it was placed atop natural features, with little thought given to the future consequences. Most people assume that what they see has always been there, and then wonder why it doesn't seem to be adapting very well to our changing weather and climate.

Tampa Bay was once surrounded by mangroves, marshes, and tidal creeks. Indeed, if you walk along W. Bay Street in Tampa, where it intersects with iconic Bayshore Boulevard, you'll see a historical marker commemorating the Spanishtown Creek community, one of the first European settlements in the area. That's Spanishtown CREEK. There was a CREEK. If you want to see where that feature once was located, you need only look at where the standing water lies after heavy rains in the blocks to the north. Those low-lying areas are likely the remnants of the creek bed, long since paved over.

We have placed impervious surfaces over much of the immediate watershed surrounding the Bay, which has also altered the flow of the rivers—the Hillsborough, Alafia, and Little Manatee—into the estuary. We have attempted to channel the excess runoff into stormwater pipes leading to the rivers and to the Bay. This runoff flows there much more quickly (sometimes overwhelming the stormwater pipes) than it would have, had it been allowed to infiltrate the soil and percolate to groundwater, or to enter as slow base flow into the wetlands, creeks, and rivers.

Sometimes, during high tide and a heavy thunderstorm, you'll see stormwater spouting up out of the manhole covers along Bayshore Boulevard like little fountains. The water has nowhere to go, and that road often floods, especially during tropical storms and hurricanes (Fig. 1).

As sea level rises, the saline water of the Bay not only makes its way farther into stormwater outfall pipes, but also intrudes into the rock and soils beneath our built environment. Thus, the fresh water that does infiltrate into our lawns and green spaces encounters that denser saltwater and, again, has nowhere to go. During our summer rainy season, the surface soils quickly saturate and remain that way. So subsequent rains send more runoff into our streets and into the stormwater system.

City and County agencies are working diligently on adaptation measures for these problems. Citizens recently agreed to an additional fee on their property taxes in order to provide funding for much-needed maintenance and replacement of stormwater infrastructure. Evidence of those projects can be seen all around the city, especially in South Tampa, where flooding is such a problem. In addition, the stormwater outfall pipes around the bay are being cleaned of sediments, barnacles, and oysters that clog them and slow water flow. Pumps have been installed along Bayshore Boulevard to move further upstream some of the excess water during heavy flows, to lessen the volume and provide a time delay.

Certainly we need these adaptation measures right now; replacing and improving stormwater drainage is an absolute necessity. But our flooding situation is going to get worse. We must take sea level rise into account, as well as the effects of "compound events," combinations of intense rainfall, high tides, storm surge, and other contributors to flooding that are exacerbated by rising seas. And we need long-term, resilient strategies that address this.



Figure 1: Bayshore Boulevard. Tampa during Tropical Storm Debby in 2012 (author's photo).



Figure 2: Students working in a riparian wetland along the Hillsborough River in 2012 (author's photo).

The water needs somewhere else to go besides into the Bay. Natural infrastructure, like living shorelines, wetlands (Fig. 2), bioswales, rain gardens, green roofs, and other nature-based strategies will help keep some of the water out of the sewer system, as well as make our community more resilient to climate change impacts.

This semester, students in my Land Use Planning class are working on nature-based adaptation policy recommendations, which they will present to Manatee County at the end of the semester. This is part of a project being led by the Tampa Bay Regional Planning Council to assist the County in becoming more flood resilient. In addition, students in my Planning in Coastal Communities course are working on flood hazard mitigation strategies as part of a larger project for Tampa/Hillsborough County, led by the USF School of Architecture and Community Design.

Exciting work for our students, which will make a difference in how the Bay area adapts and becomes more resilient to the impacts of climate change and sea level rise – especially to flooding.