Understanding the October 2015 Charleston Floods

Executive Summary

Due to its low-lying coastal location, the Charleston, South Carolina region is susceptible to a range of hazards, including flooding due to the isolated and combined effects of relative sea level rise, inundating precipitation and storm surge associated with tropical storms. In the decades following the landfall of Hurricane Hugo (1989), improvements have been made in emergency management and land use planning. However, without adequate consideration for future planning needs and assertive intervention, the Charleston region’s ability to absorb and recover from catastrophic events will be diminished. Effective long-term regional preparedness and resilience planning requires a concerted and coordinated effort among governmental entities, private industries, and owner/operators of critical infrastructure.

The Charleston Resilience Network (CRN) strives to foster a unified regional strategy and provide a forum to share information, educate stakeholders, and enhance long-term planning decisions that result in the implementation of effective pre-hazard mitigation strategies and post-hazard recovery efforts. On February 23, 2016, the CRN hosted a symposium in partnership with the National Academy of Sciences (NAS) Resilient America Roundtable to examine the Charleston region’s resilience through the lens of the major rainfall and flooding event that occurred in October 2015. At the Symposium, a diverse range of stakeholders assembled to share information and lessons learned across key sectors, as well as discuss practices, partnerships, and opportunities to enhance resilience to similar future events. Key topic areas discussed were: Public Safety and Health; Business and Economic Impacts; Critical Infrastructure / Lifelines; and, Moving Forward. Technical presentations included a meteorological overview of the October rainfall event, presentation of models depicting future flooding potential for the area and enhanced mapping and analytical capabilities that will support planning.

The October 2015 flooding event, while not a hurricane, brought extensive flooding with historic rainfall amounts across a large portion of South Carolina. On Thursday, October 1, the National Weather Service (NWS) in Charleston began forecasting rainfall amounts in excess of 10 inches for much of southeastern South Carolina. By Friday, October 2, it became clear that this event would not only be record breaking, but could be historic, potentially producing damaging and even life-threatening flooding. In addition, high tides due to the recent perigean spring tide, or “King Tide”, and persistent onshore winds exacerbated flooding along the coast, particularly in downtown Charleston and outer low-lying areas. Storm total amounts of 15 to 25 inches or rain were common across the tri-county area of Charleston, Dorchester, and Berkeley Counties with isolated maximum amounts in excess of 25 inches recorded in Charleston and Berkeley Counties.

According to the 3rd National Climate Assessment, global sea level is projected to rise between 0.8 to 6.6 feet by 2100, with a probable range between 1 to 4 feet. These projections are based upon extrapolation of existing trends, ocean warming and thermal expansion and polar ice melt. The tidal gauge at the U.S. Custom House in Charleston has been measuring sea level since the 1920s, indicating that sea level in Charleston Harbor has risen approximately one (1) foot over the past 100 years. Higher
frequency, low impact coastal flooding from astronomical high tides is occurring more often, causing societal disruption, challenging the region’s infrastructure such as the storm water system, and parts of the region’s transportation network. Recent reports by the National Oceanic and Atmospheric Administration (NOAA) list Charleston in the top 10 cities experiencing nuisance flooding, with the expectation that the number of “blue sky” flooding events will reach at least 30 days per year by 2020.

The theme throughout the symposium was resiliency realized through collaboration. The Charleston region has benefitted from the work of many institutions and organizations on resiliency issues in the past; it needs to continue to take advantage of the multitude of resources available. This coordinated effort should utilize the latest science, especially climate and flooding data, and information such as state-of-the-art design standards to inform decision-making. All data and information should be refined within the scope of the region’s needs and to the correct spatial scales to be integrated and applied at the municipal (i.e. parcel) level. Planners and decision-makers in the Charleston region need to continue thinking further into the future and intervening assertively, particularly where flooding from predicted tides, storms and sea level rise is inevitable.

Several key points framed the Symposium’s discussion:

- Partnerships and relationships are critically important to successful planning, response and recovery efforts.
- Public and private sector leaders and managers must:
  a. Leverage resources, information, tools, technologies, and people from all sectors of the area and in conjunction with State and Federal partners to optimize future decision making.
  b. Build an environment where stakeholders and planners learn from the available research, others’ experience, and related training.
  c. Develop effective messaging strategies, including the communication of technical information, risk analysis and efforts needed to prevent, mitigate, and respond.
  d. Create situational awareness within every community by directly addressing the multiple audiences involved, understanding of the pathways to reach those audiences, and the most effective communication methods to reach them.
  e. Deliver the resilience message proactively, consistently, and continuously to the community so that the public better understands vulnerabilities and how to prepare and respond.
  f. Instill that responsibility for the future success of the area starts with stakeholders taking ownership to be a part of the resiliency planning and implementation.

The Charleston Resilience Network works to foster a unified strategy and provide a forum to share information, educate stakeholders and enhance long-term planning decisions that result in the implementation of effective pre-hazard mitigation strategies and post-hazard recovery efforts. As an initial step, S.C. Sea Grant Consortium, on behalf of the CRN, received a Regional Coastal Resilience Grant from the National Oceanic and Atmospheric Administration (NOAA) to help community leaders plan for and adapt to the area’s increasing flood challenges through the development of more robust and localized flooding models that can be used to plan infrastructure improvements in the Charleston, S.C. region. CRN invites everyone, public and private sector stakeholder organizations to read the full report and join this conversation at www.charlestonresilience.net