

Future Flood Mitigation in Charlotte-Mecklenburg

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Floods are one of the costliest natural disasters in terms of lives lost, property damaged, and people affected. 85% of the Presidential Disaster Declarations over the last 50 years in the United States have been for flood events. However, even though the national government dedicates substantial funds to extreme weather events, 90% of that funding is spent on response and recover, *after* an event, rather than on prevention and mitigation measures. This case study looks at Charlotte-Mecklenburg's largely successful story of local flood mitigation.

Contextually, flood management in the United States is led by the national government, primarily through the Federal Emergency Management Agency (FEMA). After a long and contentious history of local versus national management, today, flood insurance is available through FEMA's National Flood Insurance Program (NFIP), and the US Army Corps of Engineers (USACE) is responsible for building and maintaining some of the largest flood mitigation infrastructure in the country. FEMA produces flood hazard maps for most of the United States, which are the basis for setting flood insurance premiums as well as minimum regulation standards in the floodplains. Participation in the NFIP is voluntary, but communities who participate must also adopt a minimum set of regulations. However, because the influence of insurance costs is so powerful, that is the debate that dominates local governments, diverting the focus from flood mitigation strategies.

Charlotte-Mecklenburg are participating members of the NFIP, but in 1999, they began the process of creating their own flood risk maps for regulation purposes. There were several factors in the years leading up to this decision that allowed them to do so, including a local funding source, consolidation of their storm water services, two back to back flood events, and effective stakeholder engagement.

Consolidation. Between 1993 and 1994, the City of Charlotte, and then the County of Mecklenburg, joined forces to consolidate all storm water services across the county under one agency, Charlotte-Mecklenburg Storm Water Services (CMSWS). This not only streamlined the processes and services, but allowed them to plan for entire watersheds, instead of having different cities and the county managing parts of various watersheds. This geographical consolidation meant that CMSWS was in charge of the area where most of their streams were originating, making them the source, and the solution, to downstream flooding.

Local funding. Also around this time, they implemented a storm water utility fee, which had taken upwards of two years of stakeholder engagement to get approved. This fee, levied on residential and non-residential properties as a function of the impervious cover on a property, became a sustainable local funding source for storm water management. Because national funds are limited and largely restricted to post-disaster recovery, this local revenue became a key factor in the region's subsequent success.

Triggers. The proximity of Tropical Storm Jerry in 1995 and Hurricane Danny in 1997 became a trigger for the public demanding major change. Typically, collective memory of the trauma, damages, and losses of a flood fade away within a few years. However, these two storms kept the public memory and appetite for major change alive. Further, neither of these disasters was declared a Presidential Disaster, and the \$20 million and \$60

million in losses, respectively, became the burden of local governments. With the public demanding change and the local governments struggling to find recovery funding, CMSWS realized the need for better data and planning for future floods.

Stakeholder engagement. In 1999, CMSWS began a planning process with a variety of stakeholders including a Citizens Review Committee, developers, and engineers. Together, they prioritized the creation of new local flood maps because the FEMA maps for this area were grossly outdated, from the 1970s. While the new maps showed increased risk and a need for stricter regulations that would have cost the developer community, engineers pushed back, invoking their code of ethics behind the need to build to higher safety standards. This type of pluralistic planning has allowed the changes in flood mitigation planning in Charlotte-Mecklenburg to be more sustainable.

Mapping. The new maps created by CMSWS, known locally as community maps, are a significant improvement on FEMA flood hazard maps. First, they are future conditions risk maps that use a hypothetical full buildout of the county to determine where flooding will be in the future, in contrast with FEMA using existing conditions, which are often outdated by the time the map is released. Further, they use newer and more accurate Lidar technology for modeling topography, compared to FEMA's more manual methods of measuring elevation. Community maps also use a higher rainfall estimate than FEMA maps and allow a lower level of surcharge. Finally, community maps cover undeveloped areas as well, as opposed to only mapping already developed areas, in order to identify areas that need to be protected from future development.

These new maps and improved data have allowed CMSWS to do a lot more than improve development and building regulations in broadened and deepened floodplains. These maps have also been followed with a Risk Reduction and Risk Assessment Plan that helps CMSWS prioritize properties that are already in harm's way, based on more accurate risk data, and introduce programs to mitigate their risk, either through buyouts, or through retrofitting structures to make them more flood resilient. These maps also help the community and stakeholders remain informed, thanks to the easy user interface of the interactive maps available online.

Lessons and Recommendations. Among the many takeaways and recommendations based on this case study, the most significant is that local governments can have a lot of power in flood mitigation planning. While components of flood management should remain under the national government, more partnerships with local governments are needed in order to leverage local knowledge and produce better data and flood risk maps. National agencies must provide local governments with funds, incentives, and technical capacity to create their own maps, while maintaining federal oversight to ensure the data conforms to standards and is shareable across regions.

Local communities need to form management agencies around appropriate geographies, such as watersheds or river basins, for most effective flood management. They also need to engage multiple stakeholders with various interests in order to create lasting change. Information must be communicated and verified, if not co-created, with local residents. Natural disasters will also benefit from more holistic planning efforts, and mitigation must prioritize socially and economically vulnerable populations. Finally, local funding sources and in-house technical expertise, where possible, will allow more efficiency and flexibility in local planning.