Models for Mainstreaming Adaptation

For the first ISC Resource Guide on Adaptation & Resilience, staff prepared case studies documenting the experience of practitioners from various disciplines in Seattle and New Orleans in implementing strategies that bolster climate resilience within the context of water supply planning, public works, land use planning and redevelopment. The full case studies are available on ISC’s Sustainable Communities Leadership Academy website. This synopsis captures in brief the lessons learned as previously documented.

Seattle Public Utilities – Water Supply Planning

Few people might suspect that Seattle’s water supply is at risk. The city has long been known as a place of abundant water. For more than a century, it has met all its water supply needs with snow melt and rainfall from two mountain watersheds a short drive away. Despite this long history of ample water, Seattle Public Utilities (SPU), the city’s publicly-owned water utility, turned its attention to the potential water supply risks from climate change more than a decade ago.

*Hydrological Modeling.* Since 2002, SPU has collaborated with the University of Washington’s Climate Impacts Group on regional hydrological modeling—initial modeling suggested that under a moderate risk scenario, Seattle was projected to lose 13% of its water by 2050. SPU used the assessment as a basis for assembling a portfolio of adaptation strategies that could offset expected losses and make the city’s water supply more resilient to climate change.

*Looking for Effective Adaptation Options.* Since climate impacts were not forecasted to be severe before 2050, SPU looked most closely at “no regrets” operational options that could be implemented by the utility itself in the near term and without significant cost to its rate payers, such as drawing down water levels in a reservoir below typical operating levels.

Seattle Public Utilities – Flood Risk Management

Seattle experienced two of the most damaging storms in its history in 2006 and 2007. The first storm, in December 2006, produced intense rainfall over a single hour. The city’s natural and artificial drainage systems could not accommodate all the runoff that resulted, and water rapidly flooded streets and buildings.

Another record-breaking storm struck in December 2007, this time dumping nearly five inches of rain on Seattle in a 24-hour period. Again, severe flooding occurred throughout the city, with some properties having as much as four feet of stormwater in basements and on ground floors.

Both incidents represented 100-year storm events (i.e. the rainfall released during each storm exceeded the amount the city would expect for a storm of its duration once every hundred years).
Assessing the Increased Risk of Flooding. SPU hired consultants to examine historic rain data collected at 17 rain gauges across the City and analyze whether the frequency of extreme precipitation events had increased. The analysis showed a “weak increasing trend...in the number of days on which 25-year or greater precipitation events are recorded by at least one gauge.” The conclusion was that every 3.2 years, SPU could expect a storm to produce a volume of rainfall exceeding 100-year or greater precipitation events somewhere in the city.

Improving Data Collection. SPU’s assessment of historic rain gauge data left no doubt that the utility should expand and improve the information it had available for analyzing localized precipitation trends. The utility added 11 new rain gauges to its network, locating them in places where robust information about rainfall patterns was not yet available. It also improved procedures for gauge maintenance to increase the reliability of the record.

SPU also launched a new program to create better “eyes and ears” out on city streets when major storms strike. A new group of “storm observers”—utility planners and engineers who had no explicit emergency management responsibilities—were trained to go to specific sites during high intensity storms and prepare written notes and take photographs documenting what occurred.

Tuning Up Pre-Emergency Planning and Emergency Response. After the 2006 and 2007 storms, drainage managers at SPU decided the utility needed a more regularly-updated list of the locations in the city that were most vulnerable to flooding. Staff from across the utility—planners, engineers and field crews—now convene after every storm season to revise this so-called dynamic hot spot list, and continue improving their understanding of the types of storms that are of the greatest concern at each site (e.g. some spots flood during short, intense rain events; others during steadier, longer storms).

The updated hot spot list becomes a foundation for more strategic hazard mitigation and response planning. Sometimes, expensive retrofits of drainage infrastructure are needed, and little can be done in the short-term. In many cases, though, a simple increase in pre-storm maintenance, or a low-cost structural fix, such as building a redundant inlet, can significantly ameliorate the problem. Utility staff have also created a set of customized emergency procedures for each location. Each year, drainage managers brief SPU’s director about the hot spot list and the work being done at each location, elevating the attention to flooding at the highest levels in the organization.

Regional Communications. In the fall before each storm season, SPU jointly launches a multi-media educational campaign with many other nearby jurisdictions. A “Take Winter By Storm” website disseminates coordinated messages about the specific steps property owners can take to protect themselves and increase the resilience of their properties. Public service announcements featuring elected officials, and tips delivered by weather reporters during television weather forecasts also help educate residents about what they should do before and during storms.

Remapping Flood Prone Areas. In addition to raising the awareness of all Seattle residents about how to prepare for flooding, SPU wanted to bring more intensive public education to those neighborhoods where the risk of flooding is highest. To target its public outreach efforts in this way, SPU first needed updated maps of flood prone areas that took account of more recent data on precipitation and stormwater flows.
**Integrating Climate Impacts into Capital Project Planning.** “How climate change will affect flooding is not specifically known enough yet for us to make significant changes to our design standards for drainage projects,” says Gary Schimek, SPU’s Separate Systems Manager. In the meantime, though, SPU has made a push to increase consideration of flooding on a project-by-project basis. “We are trying to anticipate how new infrastructure will be affected when flooding does occur,” explains Schimek. “And we are looking at whether we can build individual projects for bigger storm events without substantially increasing our cost.”

**New Orleans Recovery and Redevelopment**
Addressing the scale of damage in New Orleans after Katrina has been no small challenge, but today the city has a state-of-the-art comprehensive master plan that will shape growth and development for the next 20 years. The plan promotes compact, mixed-use, energy efficient, neighborhood-oriented development, improved transportation, and many other strategies to support its three pillars of livability, opportunity and sustainability. Most importantly, the plan squarely addresses the main adaptation challenge for the city: its vulnerability to climate change and sea level rise, and the need for better protection from storms and flooding.

The plan recommends preparing for climate change by adopting standards and techniques to increase resilience, and by engaging the community in dialogue about risk and mitigation options. It also adopts a strategy referred to as “multiple lines of defense”—an integrated approach to flood control that calls for restoration of Louisiana’s coastal wetlands and other natural barriers, and structural strategies, such as levees. In a departure from the past, however, the plan also advocates learning to live with water, transforming it to an asset and integrating it in the urban landscape through canals and green infrastructure.

**Community Based Adaptation and Mitigation in the Lower 9th Ward.** In the wake of the storm, when the city’s planning process and resources remained at best unclear, many individual neighborhoods proceeded to develop their own recovery plans with the encouragement of the mayor. The Holy Cross district in the devastated Lower 9th Ward was one of those neighborhoods. Less than a year after the storm, the Holy Cross Neighborhood Association (HCNA), in partnership with Tulane University and other neighborhood organizations produced a sustainable restoration plan for the entire Lower 9th Ward. The resident-led effort represented the type of new civic engagement that is creating neighborhoods that are on the forefront of sustainability. The plan addressed four areas: urban design and the built environment, the economy, the environment and quality of life.

**Architectural Innovations to Create Safe Affordable Housing.** Developers and nonprofit organizations are building sustainable and affordable architectural model homes throughout the city. The houses incorporate high design elements (which have gotten a somewhat mixed response from area residents), as well as features that will make them safe, affordable and sustainable for low-income residents. The homes are modern, colorful and compact, using existing narrow lots. Taking a practical approach, the houses were elevated and built with accessible roofs for easy escape and rescue in the case of extreme flooding. One is a floating house—the first in the U.S.
For More Information

ISC’s 2010 Case Study on Tucson & Seattle Water Utility Planning:

ISC’s 2010 Case Study on Seattle’s Flood Risk Management:

ISC’s 2010 Case Study on New Orleans Redevelopment: