

## Climate Change Resilience of Water Infrastructures

### Overview:

Current models in design of our water management systems and their corresponding infrastructure have commonly failed from the perspective of cost-effectiveness and inability to adapt to future changes. With increasing climate change impacts coupled with existing unsustainable factors and risks inherent to conventional urban water management, cities and their communities will experience difficulties in efficiently managing water resources. Climate change will affect water resources through increasing temperatures, sea-level rise, a shift in the precipitation patterns, changes in snow cover, and the increase in the frequency and intensity of flooding and droughts, which might cause a shortage in urban water supplies and damage to infrastructures. In order to meet these challenges, there needs to be a paradigm shift. This paradigm shift could be based on several key concepts of urban water management including: resilience of urban water systems to global change pressures; interventions over the entire urban water cycle; reconsideration of the way water is used (and reused); greater application of decentralized and natural-based solutions for water security and flood resilience.

### Questions for Discussion:

- How do we look at water infrastructure vulnerabilities?
- What are the social factors that contribute to vulnerability?
- How do we increase efficiency of water management operations, in general?
- What is “green infrastructure”? How can it be used to build resilience?
- How do we balance a combination of green and gray stormwater infrastructure needed to deal with future conditions (looking and multiple flood driver conditions that might be exacerbated, including storm surge, extreme rainfall, sea level rise, increasing groundwater tables)?
- How do we transition current legacy infrastructure systems towards more resilient systems?
- How innovations will advance water sustainability and resilience?
- What are the most common barriers to implementing climate-resilient and sustainable practices at a community scale and how to overcome them?

### Suggestions:

- Capture water at the source. Utilize decentralized best management practices.
- Planting trees and native plants and nurturing them to reduce heat island effects and reduce water use.
- Update land use planning and land development codes to promote adaptation and resiliency - stormwater requirements - etc (accounting for future conditions such as reduced storage capacity, increased extreme rainfall events, etc).
- Require or incentivize increased energy efficiency in new buildings (see Boston and Orlando examples) — Water Management Systems - operational efficiency.
- Use the incentive program in Orlando that reduces tax burden as a model.
- Reduce parking ratios and mandate permeable pavement
- Green infrastructure should be a focus of effective municipal investment. It has sometimes been treated in a superficial way.
- Land acquisition and conservation have the potential to increase mitigation capacity in a number of different ways (stormwater management, flood abatement, heat abatement, etc.) —increasing the need for storage.

- Provide guidance for the application of green infrastructure and living shoreline approaches by governmental and private entities.
- Native planting for coastal residents.
- Ensure surrounding land use doesn't impact those conservation lands.
- Small efforts can make a difference if long-term. Plant trees that absorb carbon rather than palm trees, support changing septic systems to sew
- Embrace cascading water management options (from the household/neighborhood to basin scale). Increase inter-basin connections, when/where possible, to help move water around, as needed during extreme events.
- Consider an integrated urban water management plan (if possible) that considers all water services simultaneously to determine optimal infrastructure solutions.

**Focus on things that can be easily implemented by local officials/governments.**