Climate Change Impacts on Stormwater Infrastructure

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MA Water Resources Commission
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MA State Auditor’s Report 2017

- $1.58 billion on SW in next 20 years
- Need to incentivize green infrastructure
- Communities were not focused on vulnerabilities to climate change
- Communities reported a low rate of adoption of innovative technologies that reduce cost and increase efficiency
Coastal Pollutant Remediation (CPR) Grant Program

- Coastal Habitat and Water Quality
- Assessment, Design and Construction of SW BMPs
- Role of climate change for coastal BMPs?

https://www.mass.gov/service-details/coastal-pollutant-remediation-cpr-grant-program
Assessment of Climate Change Impacts on Stormwater BMPs and Recommended BMP Design Considerations in Coastal Communities

Climate Change Impacts

Precipitation and Drought

1958-2012
Heavy downpours % increase
Karl et al. 2009

September 2016
NE drought conditions
US Drought Monitor

Hurricanes

Annual number of hurricanes
Emanuel 2005
Climate Change Impacts

Sea Level Rise

Boston Mean Sea Level (meters) 1900-2013

Groundwater Elevation

Current

Future

Masterson et al. 2014
Field Assessments

- 26 BMPs evaluated in spring 2015

- Both green and grey infrastructure
BMP Vulnerabilities to Climate Change

- Rising sea level and submerged outfalls
- Rising groundwater and shrinking separation distances
- Physical impact of storm surge inundation
- Increased flooding and drought
- Chronic wind, sand and salt exposure

Clogged inlet  Invasives species  Submerged outfall  Flooded rain garden
Design Recommendations

- Using a 50-year planning horizon
- Proper siting of practices
- Selecting appropriate practices and materials
- Ensuring redundancy and flexibility in design
- Choosing “green” over “grey”
- The importance of maintenance
Using a 50-year planning horizon

100 Year Storm Flood Risk Projections

LiDAR Elevations (Feet)
- < 8.2: flooded in the present
- < 8.2 – 9.3: flooded by 2030
- < 9.3 – 12.8: flooded by 2070
- > 12.8 Dry

Projections based on model results from Bosma et al. 2015
Proper siting of practices

Sites 8 & 9, Cohasset
Selecting appropriate materials
Selecting appropriate practices

Underground infiltration chambers

Image Source: Cultech

Site 32, Bourne
Choosing “green” over “grey”
Ensuring redundancy and flexibility in design
The even greater importance of maintenance
Conclusions

Common sense, practical guidelines
The future is now
Guidance in sw management
Tools for Implementation

BMP Selection

- **BSWC Stormwater Best Management Practices: Guidance Documents (urban focus)**
- **EPA and MassBays Green Infrastructure Handbook:**

Landscaping Tips

- [http://www.mass.gov/eea/agencies/czm/program-areas/stormsmart-coasts/coastal-landscaping/tips.html](http://www.mass.gov/eea/agencies/czm/program-areas/stormsmart-coasts/coastal-landscaping/tips.html)
- [http://ag.umass.edu/landscape/factsheets](http://ag.umass.edu/landscape/factsheets)

BMP Coastal Siting

- **CZM Sea Level Rise Viewer:**
- **NOAA’s Digital Coast:**
  - [https://coast.noaa.gov/digitalcoast/topics/coastal-storms.html](https://coast.noaa.gov/digitalcoast/topics/coastal-storms.html)
References


