

Stormwater for Resilience

Stormwater Finance Workshop

December 8, 2020

Virtual Workshop



SCHOOL OF GOVERNMENT
Environmental Finance Center

www.efc.sog.unc.edu

What is resilience?



Enter your answer in the chat box.

What is resilience?



the capacity to recover quickly from difficulties; toughness.



the ability of a substance or object to spring back into shape; elasticity.

Definition of resilience of regulated activities from NARUC

- “Robustness and recovery characteristics of utility infrastructure and operations, which avoid or minimize interruptions of service during an extraordinary and hazardous event.”

“Physical” Resilience

- Based on planning efforts
 - Hardening of Assets
 - Making assets submersible
 - Moving assets out of the flood plain
 - Redundancy of assets
 - Interconnections
 - Emergency plans



Examples?

Financial Resilience

- Rate setting and revenue stability
- Days cash on hand—liquidity
- Emergency fund



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Other examples?

How are you implementing resilience strategies in your community to address stormwater?



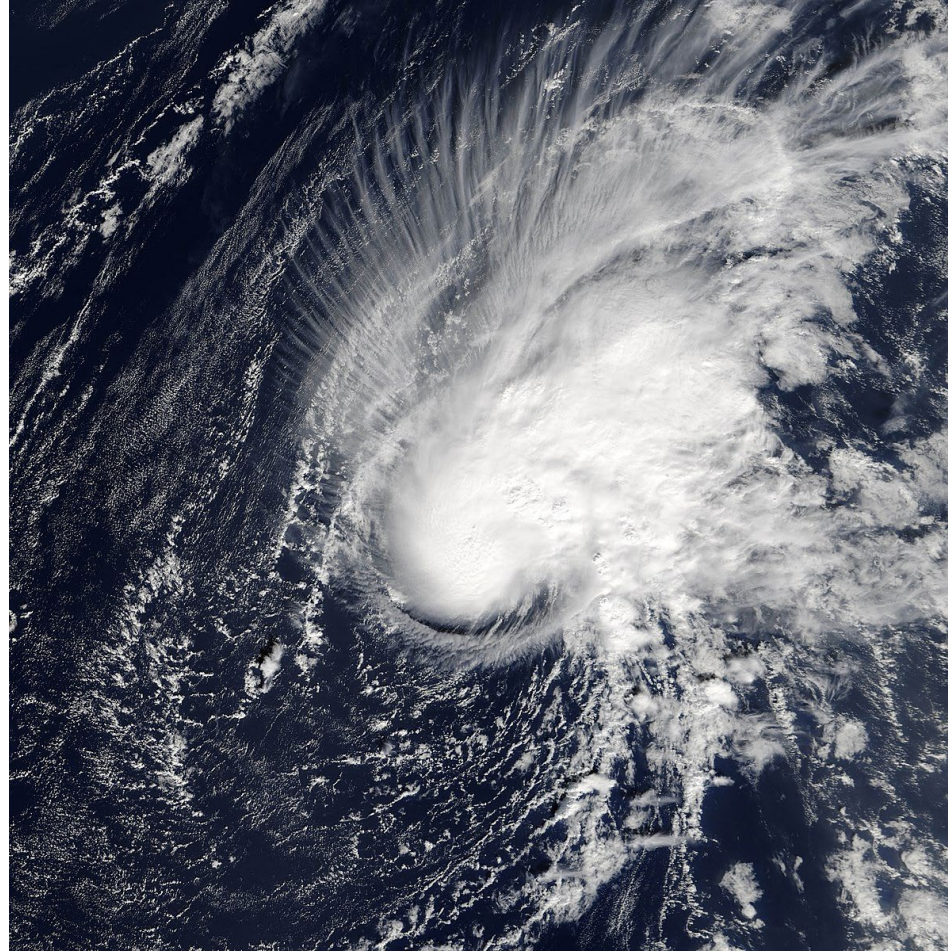
Enter your answers in the chatbox...



So why the need to be resilient?



STORMS!!!!!!!!!!!!



2018 North Carolina



NEWS

‘Epic’ rainfall from Hurricane Florence causing catastrophic flooding

By Eileen AJ Connelly

September 15, 2018 | 5:54pm | Updated

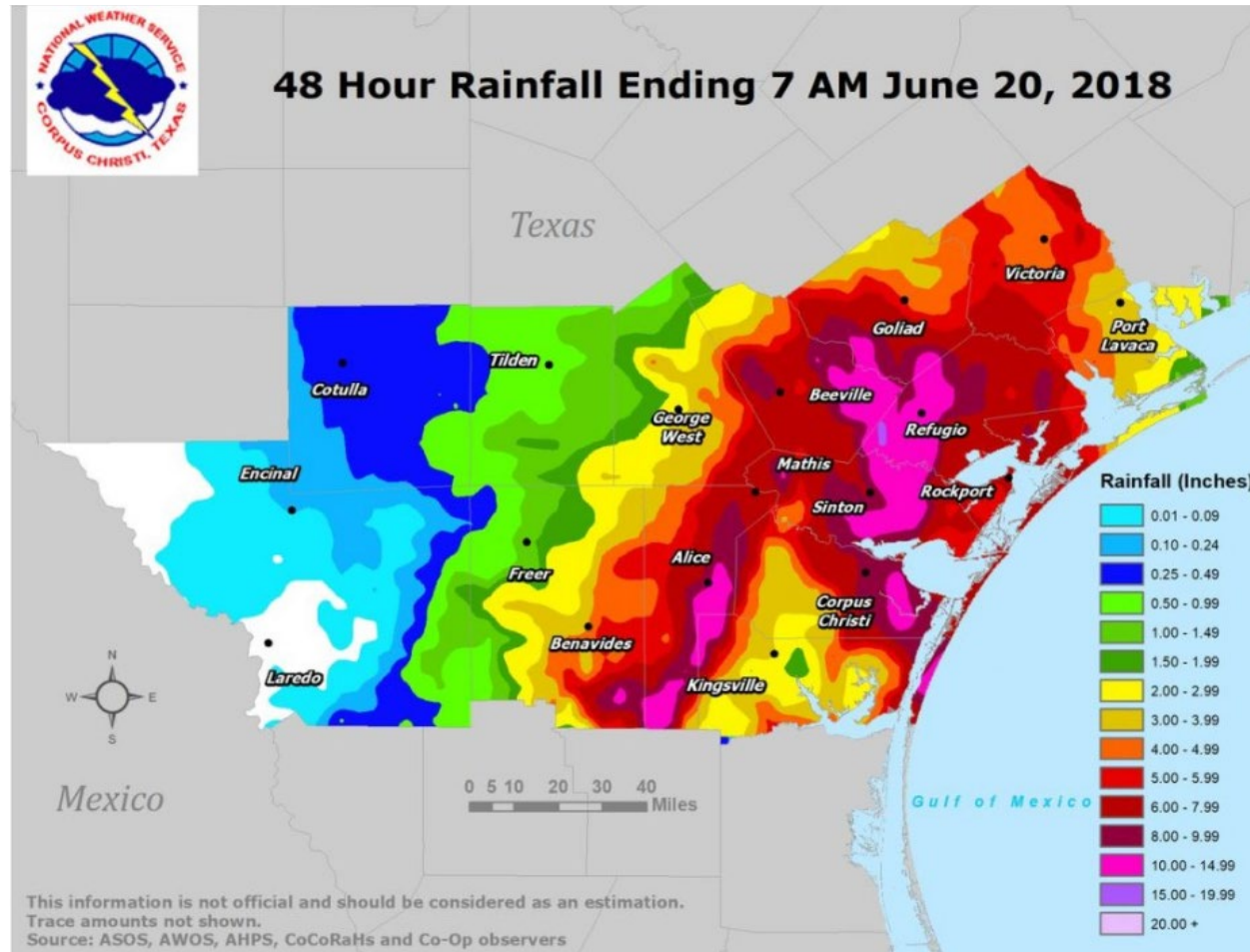


2018 Boston



**East Coast blizzard unleashes epic flooding
ahead of dangerous cold**

2018 Texas



Oregon, 2019

Why resilience?



Mar 7, 2019 | When Disaster Struck, This Tiny Oregon Town Was Out On Its Own

“...it will take millions of dollars to repair the sewer and water systems for this town [Elkton] of 200 people. And the local utility company, [Douglas Electric Cooperative](#), is looking at about \$6 million in damages. [Nine days after the storm, about 4,600 of its customers didn't have electricity.](#) . . .”



statesman journal

PART OF THE USA TODAY NETWORK

Jun 14, 2019 | Pacific Power will consider shutting off power in Oregon to avoid wildfires in 'extreme weather'

Also, the costs of not being prepared...

Austin, Texas...Fall 2018

- <https://www.kvue.com/article/news/local/austin-boil-water-2018-report/269-409da868-0d92-4a9b-b8b7-5b1c9e167cb4>



How is stormwater integral to resilience?

- The issues:
 - Impervious Surfaces
 - Developments in Floodplains
 - Climate Impacts
 - Flooding
 - Storm surge
 - Sea Level Rise

How is stormwater integral to resilience?



Over half of the US
population lives within
50 miles of the coast

Typically low-lying
areas

Number is growing →
increased development,
increased impervious



29% of population lives in a coastal
county



More people at risk, coupled with
increased risk due to increased
development

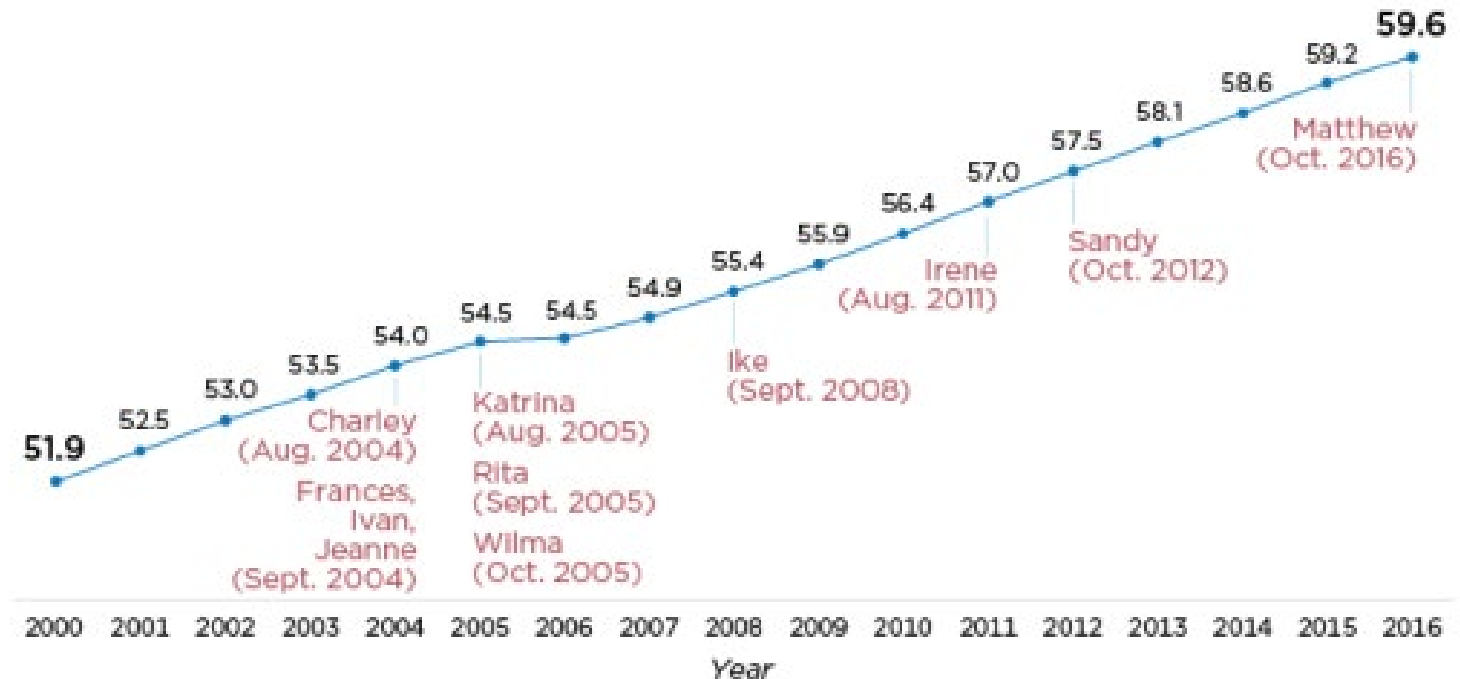
Humans are bad at understanding risk

How is
stormwater
integral to
resilience?

Figure 1.

Atlantic and Gulf of Mexico Coastline County Population: 2000-2016
(In millions)

Names and dates of hurricanes that caused \$10 billion or more in losses



Sources: National Climatic Data Center <www.ncdc.noaa.gov/billions>;
U.S. Census Bureau, V.2016 Population Estimates, and 2000 to 2010 Intercensal Estimates.

How is
stormwater
integral to
resilience?



What does this REALLY mean?

- Property damage/loss
 - \$\$\$
- Displaced Community members
- Emergency Aid
- Loss of water/sewer/electricity
- Potential for environmental hazards
- Lost economic activity

How is stormwater integral to resilience?

- Sure, if the flooding is a disaster then FEMA/CDBG-DR funds will typically come in.
- But, it could be years...
- <https://abc11.com/where-is-the-money-hurricane-matthew-victims-still-waiting-for-relief/3544128/>

Proactive vs. Reactive

- The way we've always done it
- Being proactive is costly and nuisance
floods/natural disasters don't occur at predictable intervals
- HUMANS ARE BAD AT ASSESSING RISK

How is stormwater integral to resilience?



Annapolis

“On days with otherwise pleasant weather, Baltimore and Annapolis flooded a dozen times each in 2018, setting records in both cities for what meteorologists call “nuisance” flooding. And that is expected to become even more frequent in the coming decades.

In reporting the data Wednesday, the National Oceanic and Atmospheric Administration warned that such flooding could occur as often as every other day in Central Maryland, more than almost anywhere else in the country, by 2050.”

[Source](#)

Norfolk, VA

Challenge

Over the last century, the Chesterfield Heights neighborhood of Norfolk, Virginia has experienced more than **14 inches of sea level rise**. The community, a registrant in the National Registry of Historic Places, has relied largely on stormwater drains to manage any excessive precipitation. However, higher sea levels have rendered the stormwater drainage system ineffective, resulting in regular flooding during storm events. Some homes face flooding problems during normal high tide cycles.

<https://www.wavy.com/news/two-norfolk-neighborhoods-picked-for-112m-coastal-improvement-project/>



Norfolk, VA

Solution

They determined the volume of peak storm water flow they needed to remove to minimize flooding impacts and allow the existing compromised stormwater system to handle the runoff. They found that a distributed approach that included **downspout disconnects, on-ground interlocking cistern systems, rain gardens, bioswales, and permeable pavers with under-street cisterns** would be most effective at addressing stormwater flooding. In addition, they concluded that installing a **living shoreline** along the riverfront would help protect the shoreline from erosion while maintaining its natural feel.



Norfolk, VA

Costs

Location: Norfolk, VA

Population: 246,000

Strategies: Bioswales, Rain Gardens,
Floodwater Detention, Green Streets, Coastal
Restoration

Cost: \$115 million

Benefits: Flooding reduced by 90%

To pay for it, they received \$120 million from
the HUD-run National Disaster Resilience
Competition



Charlotte Floodplain Buyouts



Since 1999, Storm Water Services has purchased over 400 flood-prone houses, apartment buildings and businesses that were in floodplains throughout Charlotte-Mecklenburg. Over 700 families and businesses have moved to less vulnerable locations outside of local floodplains. 185 acres of public open space has been "undeveloped" to allow the floodplain to function during heavy rain and provide a long-term community asset. Storm Water Services also estimates **these buyouts have avoided \$25 million in losses and will ultimately avoid over \$300 million in future losses.**

Charlotte Floodplain Buyouts



Some of the final uses of the buyout properties include:

- Greenway trails/paths
- Community gardens
- Reforested natural areas
- Stream and floodplain restoration
- Storm water wetlands and retention
- Informal recreational areas

So why does it matter? Why stormwater?



- A dedicated source of municipal funds
- If structured well, it can incentivize incorporation of green infrastructure
- Being reactive is costly, slow, and dangerous
- Stormwater projects can be coupled with other community development projects that people “like”
- Stormwater is stormwater. Addressing concerns related to water quality still mean *slowing down the water* and uptake

Checking out some examples of adaptation

- <https://www.arcgis.com/apps/MapJournal/index.html?appid=c7c7bc614f1441349aba0346c14f0fec#>



Examples of Innovative Resilience Finance Options



RESILIENCE

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Debt



State revolving fund loans



Municipal bonds



Revenue bonds



Green bonds



Stormwater Debt in NC: Need and willingness



Capstone survey



March 2019 webinar

Capstone survey

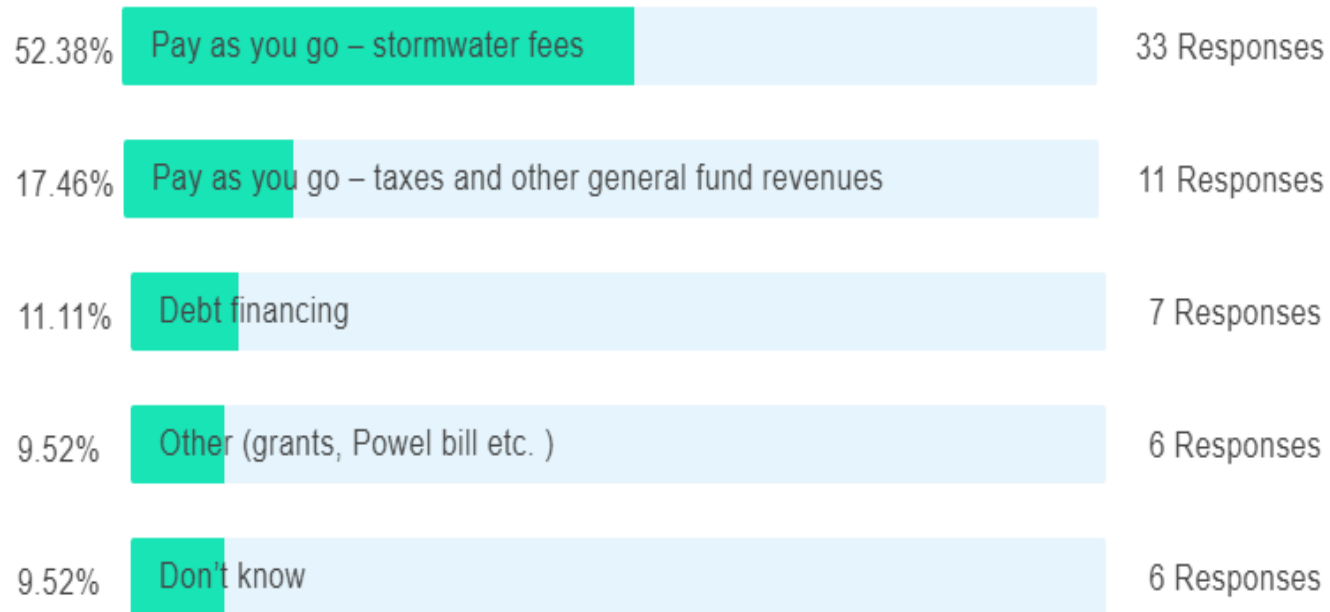
- “The current fee does not fully cover operational costs or address the CIP need.”
- “We have several stormwater projects that need to be done but we are not sure where the funding will come from.”
- “We have one large project that we can't fund.”



Webinar survey

4 of 9. From where will the majority of your funding for capital improvements come over the next five years? 63 of 119 Attendees responded

Multiple choice with single answer

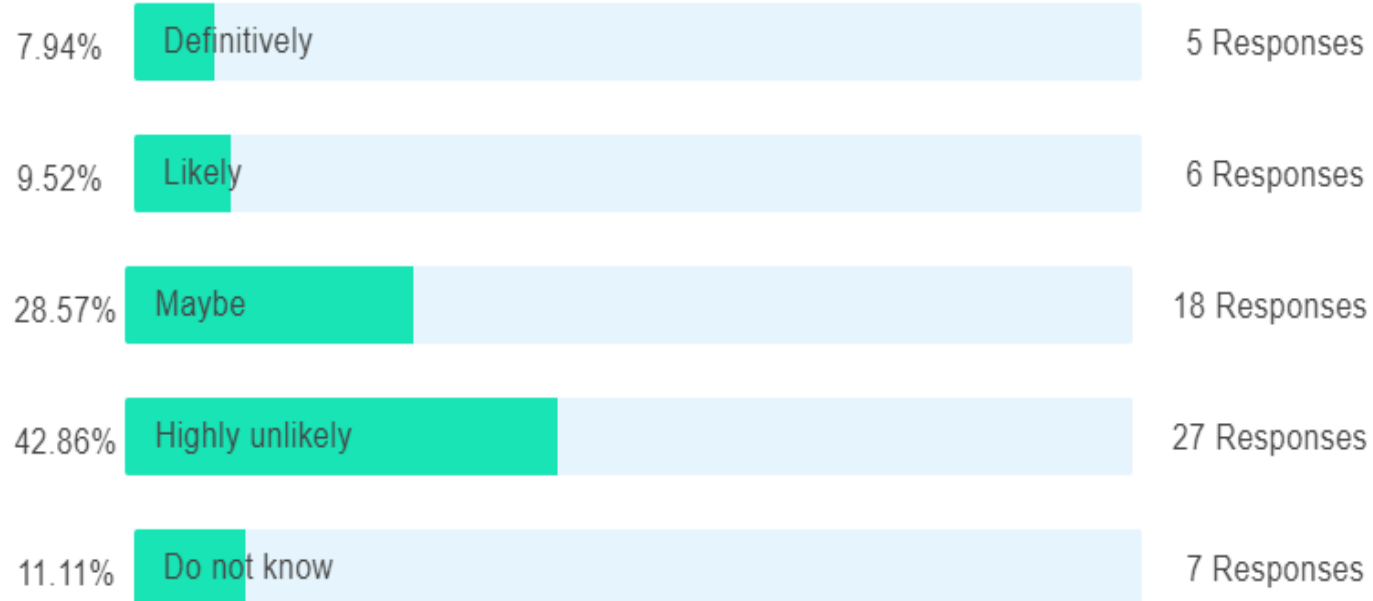


Webinar survey

6 of 9. How likely do you think it is that your program will borrow money for a stormwater project in next 5 years?

63 of 119 Attendees responded

Multiple choice with single answer



Clean Water State Revolving Fund Green Project Reserve

American Recovery and Reinvestment Act of 2009 – has a requirement that all CWSRF programs use a portion of their federal funding for green projects that include green infrastructure, water and energy efficiency, and other environmentally innovative projects.

- <https://www.youtube.com/watch?v=Okz1MGYY96U>

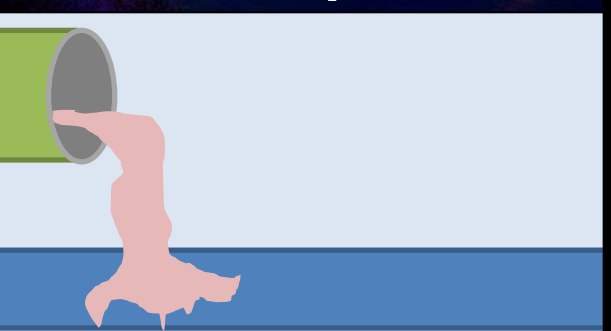
D.C.



Atlanta

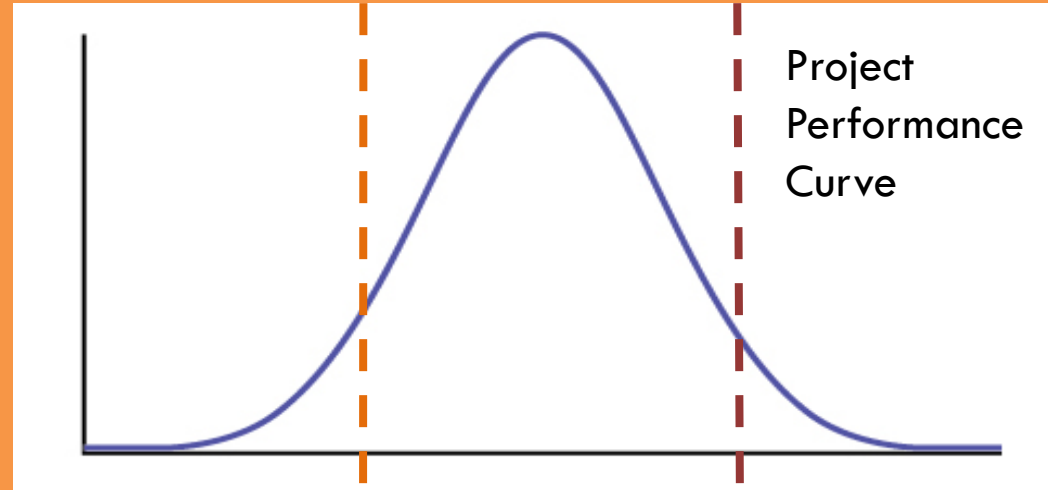


Hampton



Environmental Impact Bonds (EIBs)

- ✓ Access **private** capital for green stormwater infrastructure (GSI) projects
- ✓ Measure and **quantify** the outcomes of GSI
- ✓ Allow local governments to **share risk** with private investors



1936

PAY TO THE ORDER OF DC Water DATE _____

\$ 3.3 M DOLLARS

FOR Underperformance Investors

⑆000000186⑆ 000000529⑆ 1000

1936

PAY TO THE ORDER OF Investors DATE _____

\$ 3.3 M DOLLARS

FOR Over performance DC Water

⑆000000186⑆ 000000529⑆ 1000



Environmental Impact Bond

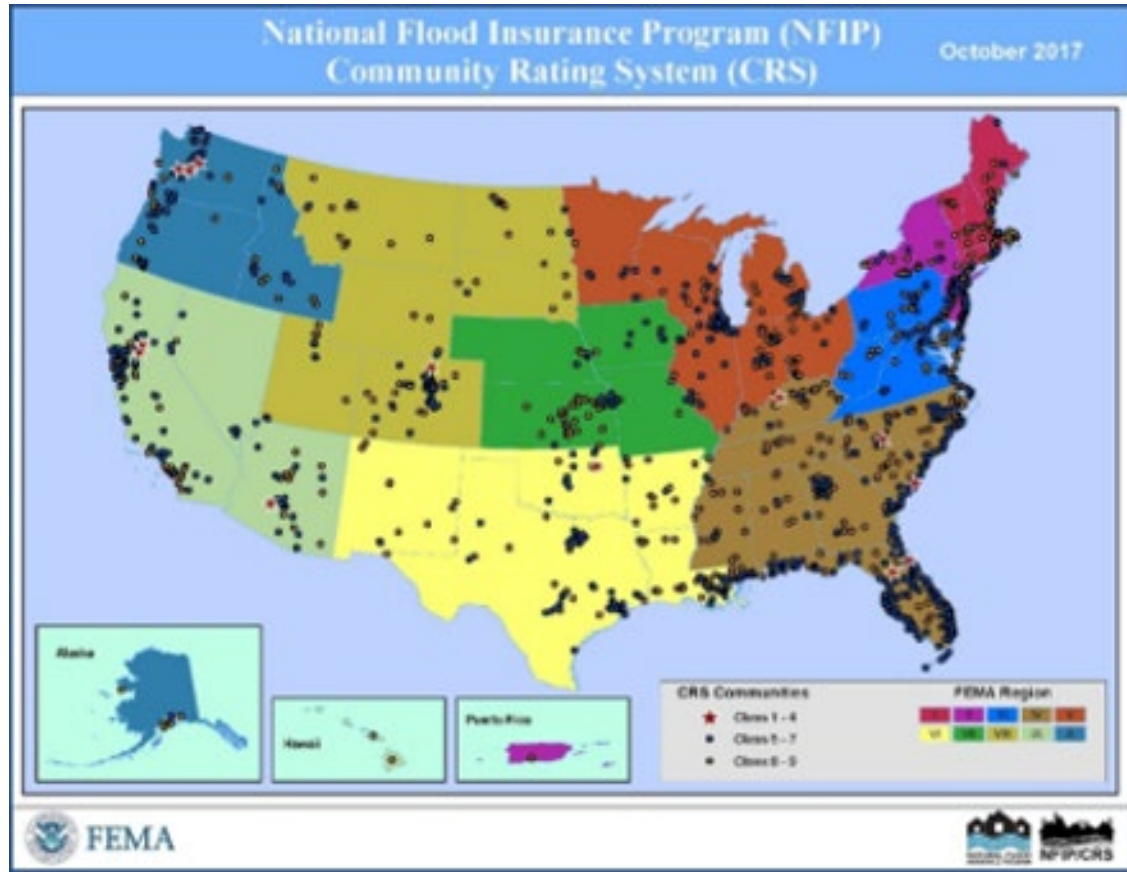
❖ Performance Tier, Outcome Ranges and Contingent Payment

- Depending on the effectiveness of GI, a contingent payment may be due at the mandatory tender date:

Performance Tier	Outcome Ranges	Contingent Payment
1	Runoff Reduction > 41.3%	DC Water will make an Outcome Payment to Investors of \$3.3 million.
2	18.6% <= Runoff Reduction <= 41.3%	No contingent payment due.
3	Runoff Reduction < 18.6%	Investors will make Risk Share Payment to DC Water of \$3.3 million.

- The Outcome Ranges reflect the expectation that a successful project will result in Performance Tier 2 with no contingent payment due by either party.
- If green infrastructure outperforms expectations and the stormwater runoff reduction is greater than 41.3%, then DC Water will make an additional Outcome Payment to the investors for sharing its risk in the Project.

National Flood Insurance Program (NFIP) Community Rating System Mitigation



- Offers discounts on flood insurance to communities who implement flooding mitigation plans
- Participating communities implement a combo of 19 possible activities that reduce flood risk and are given a class rating
- The class rating determines the premium reduction

Massachusetts – Municipal Preparedness Vulnerability (MVP)

- Two step process: Step One Planning Grant
- Funding for cities and towns to begin the process of planning for climate change resiliency and implementing priority projects.
- Funding can be used to complete vulnerability assessments and develop action-oriented resiliency plans.
- Certified as MVP community and are eligible for MVP Action grant funding and other opportunities



MVP – Action Grants

- Eligible communities must have MVP designation
- Requires 25% match from local government
- Examples of types of projects:
 - projects to develop, amend, and implement local ordinances, bylaws, standards, plans, and other management measures to reduce risk and damages
 - Projects that incorporate clean energy generation and that are paired with resilience enabling technology to maintain electrical and/or heating and cooling services at critical facilities



Rhode Island – Municipal Resilience Program (MRP)

- First stage is funds to identify priority projects and strategies to improve the municipality's resilience to all natural and climate-related hazards using a flexible, tested approach called Community Resilience Building (CRB).
- Upon successful completion of the CRB process, municipalities will be designated as a “Resilient Rhody Municipality” which enables municipalities to apply for dedicated action grants to implement identified projects



MRP – Action Grants

- Eligibility limited to Resilient Rhody Municipalities
- Requires 25% match from municipality
- Types of projects include:
 - dam repair and removal
 - road elevation
 - hardening or elevation of pump stations
 - culvert repair
 - green stormwater infrastructure
 - urban tree planting; and
 - coastal erosion control

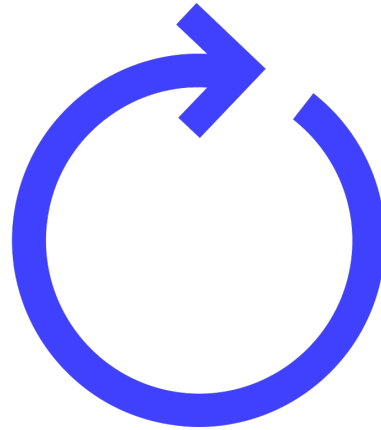


SC Resiliency Revolving Fund

Proposed state fund would help facilitate flood buyouts in SC

BY CHLOE JOHNSON CJOHNSON@POSTANDCOURIER.COM

DEC 22, 2018





Resiliency Revolving Fund

- “Goldfinch, who represents a vast swath of the coast from Charleston County to Horry County, said he has watched constituents pass on federally funded buyout programs because they often require a 25 percent match to be paid locally. That money often must come from either the homeowner or local government. ” – Post & Courier, 2018



Resiliency Revolving Fund

Eligible projects include buyouts of properties experiencing repetitive flood loss, buyouts of properties experiencing repetitive flood loss with land designated for floodplain restoration, and floodplain restoration on bought-out lands (for buyouts funded by other funding sources). The act prioritizes buyouts of multiple or clusters of properties, rather than buyouts of individual, scattered properties, and caps the funding of individual home buyouts at \$500,000 per home. The act also prioritizes the use of the fund to support voluntary buyouts and relocations for low- to moderate-income households.¹





Resiliency Revolving Fund

The act requires the state to provide a portion of each loan as a grant that local governments do not have to repay. Specifically, the state can choose to make between 5-25 percent of each loan available as a grant. The flexible grant amount is intended to be used as a financial incentive to encourage local governments to incorporate one or more "beneficial flood mitigation practices" into their proposed projects.² As envisioned, local governments will be eligible for more grant money if they incorporate more beneficial flood mitigation practices. State agencies, local governments, and land trusts can apply to the Resilience Revolving Fund.

SC Resiliency Revolving Fund

- “One drawback is that using the revolving fund for local match money means communities still would depend on a federal disaster declaration before they could apply for FEMA money for a buyout program.”-David Salveson

So, its still a reactive program...



Resilience Authorities – Maryland SB 457

- WHEREAS, The impacts from climate change are happening now in communities across the State of Maryland; and
- WHEREAS, These impacts include rising temperatures, major rain and storm events, sea level rise, and changes in precipitation patterns; and
- WHEREAS, Those things that Maryland communities depend upon and value – natural resources and ecosystems, energy, transportation, agriculture, cultural and historic resources, human health, and economic growth – are experiencing, and will continue to experience, the effects of climate changes; and
- WHEREAS, Communities in coastal states account for nearly half of the nation's population and economic activity, and that cumulative damage to property in those areas could reach \$3.5 trillion by 2060; and
- WHEREAS, Local governments will bear much of the responsibility and cost required to mitigate the impacts of climate change through infrastructure investment; and
- WHEREAS, Resilience financing authorities can work in partnership with local governments to accelerate infrastructure financing, reduce the cost of implementation, and mitigate and manage the risks of climate change;



Resilience Authorities – Maryland SB 457

- **“RESILIENCE AUTHORITY”** means an authority incorporated by one or more local governments in accordance with this title whose purpose is to undertake or support resilience infrastructure projects.
- **“RESILIENCE INFRASTRUCTURE”** means infrastructure that mitigates the effects of climate change and includes flood barriers, green spaces, building elevation, and stormwater infrastructure.



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