



Financing Climate Resilience, Stormwater Management, and Green Infrastructure in Rhode Island

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EXECUTIVE SUMMARY

Communities in Rhode Island have begun to pursue climate resilience projects in order to mitigate the serious economic, public health, and infrastructure impacts of climate change. This report describes a variety of financing mechanisms that are available to communities to fund projects that relate to climate resilience, stormwater management, and green infrastructure. Over forty members of a broader network of climate resilience, stormwater management, and green infrastructure professionals were interviewed during the development of this report. They were asked about the challenges and benefits of traditional financing mechanisms, as well as their views about the best way to organize decision-making (e.g., local, regional, state). Of all the financing tools that are available to towns and municipalities, we found that our interview participants were most knowledgeable about grants, bonding, and stormwater utility fees. We also learned that the most preferred locus of decision-making among our interview participants was at the state and regional level, while fewer participants preferred a local approach.

Introduction

It is now widely acknowledged that “Climate change is one of the most pressing issues of our time and its effects are increasingly impacting Rhode Island,” coming in the form of sea level rise, warming air temperatures, warming water, storm frequency and intensity, changing biodiversity, and flooding (Raimondo 2018, p. 11). These impacts have a dramatic impact on Rhode Island’s marine environment, which forms the basis of the state’s economic competitiveness. The resources that are contained within marine environments are increasingly threatened by the flooding and stormwater pollution that is caused by more frequent and severe storms. At the municipal level, all of Rhode Island’s 39 towns and municipalities may anticipate lower bond ratings and higher all around costs if no action is taken to make their communities more resilient. Environmental justice considerations create even more challenges for the urban areas where historically underserved communities of color are on the frontlines of climate change.

The intense precipitation and more frequent flooding that is associated with climate change presents special problems for Rhode Island as it seeks to become more resilient to the impacts of climate change. Rhode Island’s nineteen wastewater treatment facilities that together treat 120 million gallons of wastewater everyday have been identified by the *Resilient Rhody* report as presenting some of the greatest vulnerabilities to climate change (Raimondo 2018, p 21). As flooding becomes more intense, wastewater treatment systems are overwhelmed causing combined sewage overflows, flooded wastewater pumping stations, and threats to onsite water treatments systems (OWTS). Water quality also becomes impaired where pervious drainage areas are eliminated, which allows stormwater contamination to spill over into marine areas, including beaches, shellfishing areas, and other marine habitat environments.

Despite widespread agreement that action is needed to address resiliency in Rhode Island, there remain challenges as to how to finance climate resilience, stormwater management, and green infrastructure projects by the state and its municipalities. Further, municipalities are now under even greater pressure by bond rating agencies to install infrastructure that adds to the long-term viability and resilience of communities. And even though a variety of programs have been made available through traditional financing mechanisms like the Rhode Island Infrastructure Bank and through competitive grants delivered through state agencies, municipalities have not yet coalesced around a sustainable model of financing that will accelerate the large-scale installation of infrastructure needed to address contamination that is caused by climate-induced stormwater pollution.

This report describes the dominant mechanisms that are used to finance green infrastructure in Rhode Island, and highlights some of the barriers that prevent stakeholders from utilizing the financing tools that are available to them. To complete this report, we conducted over 40 interviews with stakeholders in Rhode Island who occupy the climate resilience, stormwater management, and green infrastructure network to learn a) which financing mechanisms are the most and least widely known, b) the key costs and challenges of utilizing each financing approach, and c) the key benefits and opportunities associated with each approach.

Economic and Public Health Impacts of Climate and Stormwater Pollution in Rhode Island

If there is no action to address the combination of climate impacts and stormwater pollution in Rhode Island, then significant economic and public health impacts are likely. Beach recreation and coastal tourism play a significant role in the Ocean State's economy. In 2017, alone, state beach tourism contributed \$115,016,556 to the local economy (Rhode Island Department of Environmental Management 2017b). Beach closures due to water quality concerns pose major disruptions and economic losses to this sector of Rhode Island's economy. The Narragansett Bay Estuary Program identifies stormwater contamination as a leading factor causing high bacteria counts that require the closing of beaches (Narragansett Bay Estuary Program 2017). Commercial shellfishing is yet another culturally important activity and economically significant driver of Rhode Island's blue economy. Quahogs are the most economically important fishery resource harvested from Narragansett Bay. According to the Rhode Island Department of Environmental Management (RIDEM), over 20 million quahogs with an off-the-boat value exceeding \$5 million are harvested from the bay on an average annual basis (Rhode Island Department of Environmental Management 2021). Aquaculture in Rhode Island consists of over 70 Aquaculture farms, with 275 acres under cultivation and almost 7.8 million farmed oysters sold each year (Rhode Island Department of Environmental Management n.d.). In Rhode Island, it is standard procedure after rainfall of three inches in a 24-hour period to close conditional shellfish areas because of stormwater-related sanitary sewer overflow contamination.

Climate impacts are also inextricably linked with public health impacts that affect all populations. As climate change causes more regions to experience prolonged heat waves, urban areas have been experiencing an urban heat island effect, whereby urban areas are 4-4.5 degrees warmer than surrounding areas due to the absorption of heat into the built environment, which cause increased hospitalizations and mortalities (Keith and Meerow 2022). Further, public health impacts are negatively impacted by the effects of extreme precipitation that is caused by climate change, such as standing water and mold contamination that causes the outbreak of waterborne diseases (Centers for Disease Control and Prevention 2020).

Infrastructure Impacts

The impacts of climate change in Rhode Island are increasingly putting communities, coastlines, and infrastructure at risk. While noting that some improvement has recently been made to improve the state's infrastructure, the American Society of Civil Engineers provides Rhode Island with an overall report card of C- after grading its infrastructure in 2020. Of the types of infrastructure that are impacted by climate change, Rhode Island's wastewater infrastructure receives a C grade due, in part, to threats that are posed by widespread flooding, and drinking water infrastructure receives a C+ when taking into consideration the threats posed to water supply by increasingly severe weather events. Climate change will force public, non-profit, and quasi-public entities all across the state to plan for infrastructure impacts on drinking water systems, wastewater treatment facilities, dams, stormwater infrastructure, and ports. This section will discuss in greater detail the stormwater infrastructure and wastewater treatment facility impacts.

Stormwater Infrastructure Impacts

A large portion of Rhode Island's stormwater infrastructure was built at least 75 years ago when storms were less intense. Decades of deferred maintenance paired with the intensification of storms has reduced this decades-old system's ability to adequately control stormwater. According to the State of Rhode Island's *Resilient Rhody* report, "Submerged outfalls, undersized culverts, and unmapped flood plains are documented problems that occur across Rhode Island's cities and towns. Capacity in existing local stormwater systems will likely be exceeded as storm patterns change, threatening additional damage to property and water quality" (Raimondo 2018, p. 24).

The State of Rhode Island has already taken several measures to combat the aforementioned challenges. For example, the Rhode Island Department of Transportation (RIDOT) has "embarked on a 10-year strategic program to improve stormwater management consistent with a federal consent decree" (Raimondo 2018, p. 24). Additionally, the RIDEM and Coastal Resources Management Council (CRMC) only permit projects following Low Impact Development (LID) practices. According to the EPA, LID strategies are planning and design strategies that "work with nature to manage stormwater as close to its source as possible" (Environmental Protection Agency 2022a, para 1). Using site-planning, source control, and small-scale practices throughout the site, LID strategies can maintain or mimic pre-development hydrology (Raimondo 2018, p. 24).

Wastewater Treatment Facility Impacts

Wastewater collection and treatment facilities use water's natural tendency to flow downhill when designing underground sewage transportation lines. As a result, most Rhode Island wastewater systems have been developed in floodplains (Kuffner 2007). Though flood protections have been designed into these systems, they are not adequately protected against the threats of more intense flooding brought on by climate change.

Potential impacts of climate change on wastewater treatment infrastructure are vast. The increased potential for flooding causes "sanitary sewer overflows (SSOs) where improperly treated wastewater flows directly into the state's ponds, rivers, and bays" and combined sewer overflows (CSOs) where combined stormwater and sanitary wastewater are left untreated as they overflow into surface waters, putting communities at risk of exposure to waterborne disease (Rhode Island Department of Environmental Management 2017a, 2-12). Increased precipitation that is caused by climate change represents another key impact that causes more frequent and intense spikes in wastewater flow rates. These spikes, known as inflow and infiltration (I&I) "can be detrimental to wastewater collection and treatment systems and even small quantities of I&I can negatively influence the treatment process" (Rhode Island Department of Environmental Management 2017a, 2-14). Small quantities of I&I can throw off the balance of microbiological treatment processes hindering the treatment process, while large quantities have the potential to exceed collection system capacities and cause backups and sewer overflows. Third, wave and storm surges are a physical risk to wastewater infrastructure with the ability to damage or disable equipment, expose sensitive equipment to damage, and erode loose soils that could weaken building foundations (Rhode Island Department of Environmental Management 2017a, 2-15). Finally, rising sea-levels can cause the "complete and permanent submersion in salt or brackish waters" of coastal areas and low-lying wastewater treatment infrastructure (Rhode Island Department of Environmental Management 2017a, 2-15).

In summary, challenges have always existed with regard to our national stormwater and wastewater infrastructure, but now those challenges are accelerating due to climate change. Government bodies at all levels are now seeking to address those challenges by identifying the most optimal financing tools and this report summarizes the opportunities and challenges of the tools that are available to them.

Climate Resilience Financing Mechanisms Available to the State of Rhode Island and Municipalities

This section of our report describes in detail the traditional financing mechanisms that are available to municipalities, as well as emerging models for funding green infrastructure, stormwater management, and climate resilience projects. We interviewed over 40 stakeholders who are part of the climate resilience, stormwater management, and green infrastructure network in Rhode Island to learn about the costs and benefits of these financing approaches. Each section begins with a description of the funding approach, as well as summaries of responses from the participants we interviewed.

Commonly Used and Widely Known Financing Mechanisms in Rhode Island

Grants, Bonding, and Tax Increment Financing are all either commonly used or widely known tools for financing resilience, stormwater management, and green infrastructure projects in Rhode Island. When we began our interviews and asked participants which financing tool came “first to mind,” the majority of them responded, “Grants.” All but one of our survey participants had knowledge of “bonding” as a financing mechanism, while 55 percent of our participants had knowledge of Tax Increment Financing as a financing option.

Grants

Grants are one of the most popular funding sources for climate resilience projects in Rhode Island and when asked to share the financing mechanisms they were most familiar with, the majority of our study participants described grants as being the predominant funding source.

Most Familiar Funding Mechanism

Grants (21)
Stormwater Utility (11)
Rhode Island Infrastructure Bank (6)
Bonds (4)
RIDOT (2)

Bridge Loans (1)
 Capital Budget (1)
 Incentives (1)
 Revolving Loan Fund (1)
 Stormwater Project Accelerator (1)

Grants that are made available to municipalities tend to come from state or federal grant programs, including the Clean Water Act Section 319 grants, the EPA’s Healthy Communities Grant, and the Southern New England Program (SNEP) Watershed Grant. The Healthy Communities Grant identifies and funds important environmental resilience projects, reduces environmental and human health risks, and increases community capacity to combat environmental and human health problems (Environmental Protection Agency 2022b). SNEP Watershed Grants are financed by the EPA in partnership with Restore America’s Estuaries, while other prominent federal grant programs include the Federal Emergency Management Agency’s (FEMA) Flood Mitigation Assistance Program and the USDA Rural Development Water and Waste Disposal Direct Loan/Grant and Loan Guarantee Programs.

State grant programs are another critical source of grant funding for Rhode Island municipalities. One prominent program is delivered by the Rhode Island Infrastructure Bank (RIIB) through the Municipal Resilience Program (MRP), a program that is in partnership with the Nature Conservancy and addresses climate resilience through Community Resilience Building (CRB) workshops. Cities and towns completing CRB workshops are designated as “Resilient Rhody Municipalities,” and they become eligible to apply for a pool of specially dedicated action grants to complete resilience projects (Rhode Island Infrastructure Bank, n.d.).

When we asked our participants to describe the challenges and benefits of a predominately grant-funded approach to financing climate resilience projects we received a variety of different responses, which are summarized in the associated table.

Grants	Description
Benefit (24)	Networking and education (6) More capital (5) Good for specific projects (4) Leverage (2) Co-benefits (1) Federal prevailing wage (1) Forces planning (1) Greater administrative control (1) No fundraising (1) Small firms can compete (1) Workforce development (1)
Challenge (35)	Grant requirements (7) Capacity (6)

Uncertainty (4)
Match requirements (4)
Politics (3)
Short timelines (3)
Not sustainable (2)
Opportunity costs (2)
DPW opposition (1)
Grant management (1)
Reimbursement (1)
Slower (1)

When our participants described the benefits of a grant-funded approach, their responses converged on the networking and education elements of completing a grant project and receiving funding from others who are part of the community of practice, as well as having more capital that can be invested in climate resilience projects. One municipal-level participant described the network and education benefits of “exposing [projects] to a new set of technical experts and partners around the country that are doing similar work.” Still another municipal employee highlighted the benefits of having more immediate capital to finance projects that are part of the EPA’s CWA’s Total Maximum Daily Load (TMDL) program:

At some point, if we didn't have this grant money, to be quite honest with you, we'd be really handcuffed as to how many of these TMDLs we can do at a given time because again, \$75,000 a year [budgeted by the town] is not going to get us what we need to get the design done, the study done, and the construction done...I mean it's going to take us probably 20 or 30 years to get through all the TMDLs. It is going to be probably the most expensive public works project the town has ever done in over a 20 or 30 year period.

Participants described meeting “grant requirements” and the capacity to submit grant applications and implement grants that are awarded to the organization as the primary challenges of a grant-funded approach. These participants were concerned that municipalities are already understaffed and that the management of grant money that has been part of recent federal stimulus packages has overwhelmed municipal employees. One of our research participants explained the challenge in the following way:

[W]ith now stormwater, it's no difference that the similarity is the capacity and the resources constraint that the municipality has. And I think when you get into something very technical, like energy or stormwater, not all municipalities have sort of that expertise on hand. ... I think sometimes it becomes a barrier knowing who to go to that does have that expertise and can provide that guidance. And then the time - I mean, we have some municipalities that are so small, like, for example, [redacted], they have great ideas and are doing great work, but there's only so much

they can do with, like one full time planner, for example. So, yeah, I think that's the biggest challenge I've witnessed in various roles that municipalities face.

In summary, our participants felt that grants were a crucial way of educating others and funding local resilience projects because it gave them more capital to tackle large resilience-related projects, while also being able to leverage grant funding to acquire additional money from other sources (like bonds), though some of our respondents also recognized the specific challenges that related to meeting grant requirements, having the capacity to apply for and execute grants, meeting grant match requirements, and also navigating the political challenges of requesting local capital to meet these requirements.

Bonding

Bonds are commonly used by states and municipalities to finance roads, long-term capital projects, and the construction of climate resilience infrastructure and stormwater management practices. According to the Securities and Exchange Commission, when lenders purchase a municipal bond, they “are in effect lending money to the bond issuer in exchange for a promise of regular interest payments, usually semi-annually, and the return of the original investment” (n.d., para. 1). States and municipalities choose bonds because project costs and the financing that is available from traditional lending institutions will not cover the full cost of projects. By allowing many individual investors to lend money through the purchase of bonds, governments can acquire all of the financing needed for large infrastructure projects or unexpected expenses. Investors also prefer bonds because they are tradeable, can be resold for a profit, are considered to be safe due to their low volatility in comparison to other investments, and provide investors legal protection under law.

Green bonds are a popular way of bond-financing in Rhode Island. According to the International Capital Market Association (ICMA), “Green Bonds are any type of bond instrument where the proceeds or an equivalent amount will be exclusively applied to finance or re-finance, in part of or in full, new and/or existing eligible Green Projects” (2021, p. 3). Although others have noted that green bonds are not typically used to improve resilience (Hill and Martinez-Diaz 2020), the State of Rhode Island and its municipalities have financed resilience projects by passing statewide referenda to unlock green bond money. In March 2021, for instance, voters were asked to approve the Beach, Clean Water, and Green Bond and overwhelmingly did so with 78 percent support. These bonds were sold to finance combined sewage overflow abatement projects, wastewater treatment upgrades, and a variety of other large infrastructure projects. Rhode Island municipalities, on the other hand, typically finance capital projects through their legislative bodies and through the participation of numerous department heads in an intensive capital planning process. It is not uncommon for Rhode Island municipalities to also add ballot questions during elections that allow voters to decide whether to authorize bonding for the green infrastructure, stormwater management, and climate resiliency initiatives that are contained in a long-term capital plan.

All of our participants except for one were familiar with bonding as a way of financing climate resilience, green infrastructure, and stormwater projects and the challenges and benefits of bonding are summarized in the associated table. The most frequent benefit described by participants was the access bonding gave to instant capital for funding large projects, or for leveraging capital to meet grant matching requirements. These participants described the

instrumental role that bonds played in meeting grant match requirements after having been awarded a grant.

Our interviewees described the key challenges of bonding as being the execution of ballot campaigns. Municipalities wanting to use bonding as an approach are typically required to pass ballot referenda by a majority of eligible voters in order to access the capital. Once the referenda has been passed, lawmakers in municipalities then have discretion as to how the bond funding can be applied to specific projects. Some communities in Rhode Island do not have the same access to bond financing as communities that are less indebted. Our participants described Rhode Island's municipal debt limit statute as one of the factors that precludes communities from bonding. Further, some communities cannot afford the high debt service payments that are associated with bonding, which can be exacerbated for those communities having to pay higher interest rates as a result of having lower bond ratings. These could include the frontline environmental justice communities that are disproportionately impacted by the combination of climate change and the burden of higher taxation. Another factor that affects the efficacy of bonding as a viable approach is the size of the community. One town official described the challenge in the following way:

Well, the drawbacks, you know, as far as bonding, we're pretty much bonded out at the moment. You know, there's definitely a finite level that we had to take out ...and being a small town of a small tax base, we're at the cap... [In] a couple of years, some of that old debt will fall off and we'll be in a better place, but certainly bonding has its limits, especially in a smaller town, smaller tax base.

Overall, our participants thought that the combination of having access to major sources of revenue and the ability to combine that revenue with grants represented the principal benefits of bonding as a financing approach. It was also an approach that drew broad support from the public and represented a financing mechanism that was viewed as "transparent," "equitable," and "legitimate" after allowing the public an opportunity to weigh-in via the referenda process. This process, however, was also recognized as one of the chief challenges of bonding in that a ballot campaign was viewed as a burdensome process for communities that are already perceived to lack local capacity to address resiliency and stormwater management challenges. Further, interest payments on debt service and bond ratings, municipal debt limits, and the additional challenges and expenses of administering bonds through a bond counsel were described as challenges that were associated with this approach.

Bonding	Description
Benefit (32)	Instant capital (13) Leverage (5) Broad public support (4) Can happen through Stormwater Utility (3) Low Rates (3) Public Participation Legitimizes (2) Equity (1) Transparency (1)
Challenge (57)	Ballot Campaign Execution (13) Debt Service (7) Not Sustainable (6) Municipal Debt Limit (4) Bond Counsel (3) Bond Ratings (3) Issue Competition (3) Can't be used for maintenance (3) Politics (3) Stringent Requirements (3) Capacity (2) Inefficient Administration (2) Labor Intensive (2) Delayed Payment (1) Timelines (1) Underpay Contractors (1)

Tax Increment Financing

Tax increment financing (TIF) was first widely used in California in the 1950s as a means of raising matching funds for federal grants and quickly became a widely used tool by which local governments finance economic development in the United States (Dye and Merriman 2006; Briffault 2010). This practice typically requires municipalities to identify a particular area within the municipality that is “underdeveloped” or “blighted” and where development would be stagnant without the incentives provided through public investment. Once a TIF district is formally established, contributions to the taxing authorities within the district are frozen for an extended period of time, usually 15 years, while future increases in property taxes are diverted from the general funds and earmarked to pay for capital improvement projects, developer incentives, and the service of debt incurred by redevelopment authorities.

Although TIF is widely used throughout the United States, some researchers argue that their impact from an economic development standpoint has proven to be negligible (Youngman 2011; Hicks, et al. 2016). Dye & Merriman (2006) suggest that TIF may negatively affect economic development as

their studies found that “property value in TIF-adopting municipalities grew at the same rate as or even less rapidly than in non-adopting municipalities” (p.4). With perceptions growing that TIF districts were being mismanaged California began phasing them out in 2012 (Governor’s Office of Planning and Research, 2020). Critics further argue that TIF encourages corruption and crony capitalism because public officials have power to choose the recipients of these subsidies (O’Toole, 2011). It has also been argued that TIF districts encourage fiscally irresponsible governance because governments can use it to exceed local debt limits.

The Municipal Tax Increment Financing Act is Rhode Island’s enabling legislation governing the local establishment of TIF districts ([RIGL § 45-33.2](#)). In recent years, the cities of East Providence and Pawtucket have created redevelopment districts that use tax increment financing. East Providence’s Waterfront Commission was established in 2003 to stimulate environmentally friendly, mixed-use development along the waterfront. Since its inception, this agency has provided oversight for projects that include housing, medical offices, warehouses, an assisted living facility, recreation, and a stormwater mitigation project that diverts silt runoff. Developers can apply for TIF through the commission with application fees ranging from \$4,000 to \$7,500 depending on the amount requested (City of East Providence Waterfront Commission n.d.). The City of Pawtucket’s \$400 million Tidewater Landing project offers TIF through the Pawtucket Redevelopment Agency in collaboration with CommerceRI, Rhode Island’s quasi-public economic development corporation. This development project included a stadium for a USL professional soccer team, office buildings, housing, sports facilities, and recreational spaces (Tidewater Landing n.d.).

When we asked our participants about their familiarity with TIF financing, we found that over one-half of our participants were aware of it as a potential funding source for climate resilience, green infrastructure, and stormwater management upgrades. The associated table summarizes the responses given to us by the study participants. Those who were knowledgeable about TIF financing usually had backgrounds working in planning departments at the municipal level. For those of our participants who were aware of TIF financing as a funding source, no overwhelming consensus emerged about specific benefits that were attached to the funding approach. When participants described the benefits of it, they spoke about not having to raise taxes to support these projects. Still others saw TIF financing as a strategy for attracting quality developers and negotiating with developers over density. Other challenges that emerged under a TIF regime included the difficulty of educating the public about the financing approach, the logistical difficulty of the approach, and the higher bond rates that are paid back under a TIF financing scenario. One of our participants describes the multi-faceted challenges of TIF this way:

You have a lot of people oftentimes who don't know what it is and hear “tax” as the first word and have a Pavlovian response against it to say, “wait a minute, you're going to...?” So you need a great advocacy campaign to lead in about and you need a really good, disciplined political body to say what the money is going to be used for.

In summary, TIF financing was an ideal option for improving areas in need of redevelopment and attracting quality developers. When areas needing redevelopment are identified, then TIF financing can be used to install comprehensive infrastructure improvements where stormwater and climate resilience infrastructure represents a small piece of the overall infrastructure package. Even when

some areas are recognized as eligible for TIF financing, however, the financing tool may not be the most ideal way to finance the projects. For instance, convincing local residents of its merits requires a burdensome and disciplined public outreach effort from a variety of actors, requires support from outside consultants who are familiar with successful TIF district adoptions, and costs more due to higher bond rates.

Tax Increment Financing	Description
Benefit (13)	No tax increases (2) Comprehensive infrastructure improvements (2) Attracts quality developers (2) Potential for major environmental improvement (1) Ease of administration for contractor (1) Grant match (1) No voter approval (1) Potential with other instruments (1) Predictable revenue (1) Trade density for improvements (1)
Challenge (23)	Public education (5) Bond rates higher (2) Logistically difficult (2) Only benefits developers (2) Stakeholder involvement (2) Messaging Discipline (2) Difficult to direct geographically (1) Distrust of government (1) Enabling legislation required (1) Gentrification (1) Hard to reimburse staff time (1) Inaccurate revenue projections (1) Local advocates needed (1) Public opposition (1)

Less Widely Used Financing Mechanisms

Enabling legislation exists for municipalities to finance climate resilience, stormwater management projects, and green infrastructure approaches, but for a variety of reasons those strategies are not yet used. Many of these financing mechanisms are already widely known; for instance, the “Stormwater Utility Fee” was known by all but two of our survey participants. Public-Private Partnerships, on the other hand, were widely known, though participants struggled to identify specific examples of successful Public-Private Partnerships that had formed to address climate resilience, stormwater management, and/or green infrastructure projects in Rhode Island.

Stormwater Utility Fees

Fees and charges imposed by governments are thought to be an effective means of financing green infrastructure, stormwater management, and climate resilience while also incentivizing environmentally friendly behavior by actors within a given citizenry (Fiorino, 2004). The rationale behind a fee is that when someone incurs tangible monetary costs for an environmental impact, that person is more likely to engage in behavior that minimizes those costs. Fee systems that are commonly designed to deal with stormwater mitigation are stormwater utility fees, which are tied directly to resource consumption, which in stormwater management districts is commonly the conversion of pervious areas into impervious ones. Utility fees are widely known as an area of opportunity for funding green infrastructure on a greater and more targeted scale. Stormwater utility fees are charges that are usually assessed to property owners based on that property’s impact to the locality’s stormwater system. Property owners can receive “credits” for installing “best management practices” and green infrastructure to offset the property owner’s environmental impact. Revenues generated from the stormwater utility fees can be used as a dedicated funding source to finance stormwater mitigation infrastructure and to finance maintenance of it.

Enabling legislation for the creation of local stormwater utility districts has existed since passage of the Rhode Island Stormwater Management and Utility District Act of 2002 ([RIGL § 45-61](#)). In Rhode Island, the towns of Bristol, Narragansett, and Middletown have studied the feasibility of adopting and implementing stormwater utility districts but none have yet been created. Regionally, the municipalities of Central Falls, Cranston, East Providence, North Providence, Providence, Pawtucket, and Warwick came together to study the feasibility of a regional stormwater utility district, but after being completed in 2014 the study has not yet resulted in the creation of a regional stormwater utility district. While many stakeholders agree that a stormwater utility fee system allows municipalities in Rhode Island to effectively manage stormwater, and enabling legislation exists that would allow stormwater management districts to be created, little progress has been made in managing stormwater through these entities.

Almost all of our participants were aware of stormwater utility fees as a financing mechanism even though they are not currently used in any of Rhode Island’s 39 municipalities. When asked to describe the benefits of this approach, our participants described the sustainability of the revenue stream as the most frequently cited benefit of stormwater utilities. The reason why a sustainable funding source is so critically important for stormwater and climate resilience is that a revenue stream must always be available for funding the maintenance of these infrastructure projects. Without maintenance, the infrastructure will not work over a period of time. Another key benefit of the stormwater utility is the ability to allow residential and commercial property owners to receive “credit” for stormwater mitigation on their properties. In their view, a stormwater utility district

would allow a collection of disaggregated properties to more quickly come into compliance and provide a public good that causes better water drainage, less stormwater contamination, and, thus, less flooding. Equity was another frequently cited benefit of the stormwater utility approach. Participants gave this response because a stormwater utility district, much like a sewer fee that is levied by a sewer district, imposes a fee even on properties managed by religious or non-profit educational institutions, whereas these properties are commonly insulated from property tax obligations due to their tax-exempt status.

Our study participants also identified a number of different challenges that are associated with this approach, chief among them “politics” and “opposition to fees.” A consultant that we interviewed from the private sector described the challenge in this way:

You've got to overcome the political hurdles, which is enormous because... it's slandered with ...the rain tax ...and makes it automatically sound ridiculous, but it's very easy to brand it that way. You know, and people want to hear it branded that way and it's like, "Oh, this is so stupid. Like, why this rain tax? Like, I can't believe they're taxing us on the rain."

When our participants described opposition to fees associated with the stormwater utility model, some were careful to point out that the creation of a stormwater utility does not actually create a new fee. Rather, it creates a dedicated enterprise fund that removes stormwater responsibilities from the collection of other line items that compete in a general budget. Thus, in an ideal world, the creation of a stormwater utility district would create no net loss or increase in either taxes or revenue, respectively. Yet, explaining that to lawmakers and the public, according to our participants, is difficult due to the limited knowledge that communities have about stormwater pollution and how a stormwater utility district would operate.

Stormwater Utility Fees	Description
Benefit (67)	Sustainable revenue stream (29) Incentives (11) Equity (8) Dedicates revenue (6) Immediate solution (4) Spending flexibility (3) Adds capacity (2) Planning benefits (2) Co-benefits (1) Leverage (1)
Challenge (105)	Politics (27) Opposition to fees (27)

Local administrative capacity (12)
Public understanding (11)
Public pushback (6)
Efficacy (5)
Home rule (5)
Community engagement (3)
Issue attention (2)
Budgeting control (1)
Discourages development (1)
Already general funds (1)
Government distrust (1)
Grants available (1)
Large projects hard to fund (1)
PUC jurisdiction (1)

Public-Private Partnerships (P-3)

When we asked our participants about their knowledge of public-private partnerships, most of them understood that these relationships existed as a financing mechanism for infrastructure, but many used a broad definition of the concept when referring to it and very few were able to describe the costs and benefits of a public-private partnership approach. The EPA (2015) defines a Public-Private Partnership (P3) as “a performance-based contract between the public sector (any level of government) and the private sector (usually a consortium of private companies working together) to arrange financing, delivery, and typically long-term operations and maintenance (O&M) of public infrastructure” (p. 12). The key departure from typical procurement processes is that the P3 allows firms to become responsible for all aspects of a project, whereas projects are commonly awarded based on design, development, finance, and operations and maintenance (EPA 2015). Their benefits include cost reduction, spreading risk, stable funding, leveraging public funds while minimizing debt capacity, better asset management, and the creation of local jobs (NOAA 2021; EPA 2015). Some jurisdictions in the Chesapeake Bay watershed have formed Community Based Public Private Partnership (CBP3s) to integrate more green infrastructure into the region. These models allow communities to partner with private entities so that procurement of capital projects can be bundled together as a package, rather than individually.

Our interview participants who were knowledgeable about P3's usually gave the example of work that is being done in Maryland's Prince George's County, a community that is part of the Chesapeake Bay watershed. Prince George's County assesses a stormwater utility fee, which it uses to finance a variety of stormwater management projects and community programs. In 2015, Prince George's County partnered with Rhode Island-based Corvias to execute a \$100 million plan over three years, which includes a community outreach program, a green infrastructure installation program, and a compliance program (Daniels 2020). Other communities with stormwater authorities like Chester, PA have also partnered with Corvias to design, build, and maintain its \$50 million stormwater infrastructure investment, with “all cost savings...reinvested back into the partnership for the City to retrofit additional acres much faster than they could have previously” (Corvias n.d., para. 4).

Those who had a deeper understanding of the concept also spoke of the benefit of “shifting risk” from the public sector to the private sector. Others described the mutual benefit that occurs when a public-private partnership is formed between government and the private sector. The challenges described by our participants were related to regulatory enforcement of Municipal Separate Storm Sewer permits (MS4) by RIDEM. Under the MS4 program, municipalities are issued a permit for the operation of their stormwater systems and are required to implement stormwater management programs that are designed to improve water quality. Our participants argued that stricter enforcement of the MS4 program in Rhode Island could incentivize municipalities to partner with the private sector through performance-based contracts in order to achieve regulatory compliance under the permitting program, but without that stricter enforcement P3’s have not formed to achieve the savings associated with them. One of our participants from the non-profit sector described the challenge in the following way:

I've heard about [P3's] in presentations about Maryland and other places, and it's all a lovely idea... [W]hat's missing here is the regulatory urgency and requirement to take action and, lacking that...I have never heard a presentation like, "oh, I can see how that would work here"...there's nothing forcing the communities to do this work, and without that, I just don't know how the [P3's] work.

Public-Private Partnerships	Description
Benefit (8)	<ul style="list-style-type: none"> Mutual benefit (3) Shifting risk (2) Attracts development (1) Economies of scale (1) Long-term maintenance (1)
Challenge (12)	<ul style="list-style-type: none"> Lack of regulatory enforcement (3) Scaling (2) Being transparent (1) Bidding (1) Determining priorities (1) Educating landowners (1) Pay-for-success legislation needed (1) Political (1) Tying stormwater to performance (1)

Potential Financing Tools that are not Commonly Used or Do Not Yet Exist

A variety of potential financing tools are available to Rhode Island municipalities that are not commonly used for climate resilience, stormwater management, and green infrastructure projects. Other financing tools in this section may have potential, but do not yet have state-level enabling legislation in place to allow their application. The financing tools making up this section include property tax incentives, special tax assessments, development impact charges, and PACE and C-PACE financing.

Property Tax Incentives

Taxation is one of the most conventional financing mechanisms that municipalities can utilize to fund green infrastructure projects. The greatest source of revenue for Rhode Island municipalities comes in the form of property taxes. Even those municipalities relying on grant revenues for financing green infrastructure projects are commonly asked for matching grant funds, which can be drawn from general revenues or fund balances (revenue carryovers). Other times, municipalities use taxation to service the debt for the municipal bonding that is used to finance large infrastructure and other capital projects. Another way that property taxes can be used to incentivize commercial or residential stormwater management practices is to provide property owners with a tax exemption for installing best practices on their properties. Though Rhode Island municipalities have not adopted exemptions as a tool for financing infrastructure projects, some communities have created property tax exemptions for rooftop solar arrays, for construction improvements made to properties in blighted communities, and improvements that are made to residential properties that are under the regulatory authority of historic district commissions. Though property tax exemptions for climate resilience, green infrastructure, and residential stormwater mitigation are not yet widely available in Rhode Island, our approach here was to propose them to incentivize small-scale best management practices on either residential or commercial properties.

After proposing this concept, our interview participants were asked the key benefits of an exemption-based approach and they overwhelmingly cited the financial incentives that property owners would have to install small-scale best management practices on their properties. Though our interviewees focused on the financial incentives of such an approach, they also revealed some challenges of implementing resilience-based tax exemptions. In order of frequency, these included the loss of revenue, the burden of educating the public, the administrative burden of rewarding the tax exemption, fraud, and concerns about the limited impact of such an approach. One municipal employee, particularly concerned about the loss of revenue, summarized how other interview participants felt about an exemption-based approach:

I think there was a [state] bill this session...that would give tax exemptions to anyone who does improvements on their property for climate resilience. And I saw that circulate among our tax assessors...what kind of impact would this have on our taxable income? [We were more concerned] for the city's financial health and less so [about wanting] people to invest in climate resilience. So I can't see that being a super popular one.

Though it was not raised in our interviews, it should be noted that communities wishing to adopt a tax incentive-based approach would likely need to pursue state-level enabling legislation in order to enact a local property tax exemption ordinance.

Tax Exemptions	Description
Benefit (13)	Financial incentives (8) Efficacious (1) Flood mitigation (1) Incrementalism (1) Limited opposition (1) Tax stabilization opportunities (1)
Challenge (25)	Revenue loss (8) Education (4) Limited impact (3) Administrative burden (3) Fraud (2) Insignificant revenue (2) Benefits wealthy property owners (1) Educating lawmakers (1) Limited tax stabilization applications (1)

Special Tax Assessments

Special tax assessments are a form of “government financing that assesses residents in proportion to the ‘special benefits’ they receive from various public goods and services” (Kogan and McCubbins 2009, p. 5). These assessments can be levied through both *ad valorem* and non *ad valorem* taxation. In Rhode Island several communities have used special tax assessments to finance the installation and extension of wastewater infrastructure, though a special tax assessment imposed as part of a stormwater management, climate resilience, or green infrastructure project has not yet been used as a financing strategy. Although examples of this financing mechanism do not yet exist, state enabling legislation exists ([RIGL § 45-63](#)) that allows the Town of Middletown to finance stormwater improvements via an assessment that is imposed on property owners.

Of all of the financing mechanisms that we presented to our participants, the special tax assessment was the least known out of all of them with only 25 percent of our participants being familiar with this approach. Those who were aware of the approach liked that property owners benefiting from the improvement are required to pay for it rather than spreading the cost across the larger community. Yet, when asked about the approach, participants described a financing mechanism that raised far more challenges, which included having to deal with public opposition, imposing a new tax burden on residents who may have difficulty affording it, and drawing special assessment district boundaries that satisfied residents. Many of these challenges were raised by a study

participant who had experience with special tax assessment districts in Warwick. According to this participant:

...the municipality has a sewer authority that has that special, enabling legislation to assess those fees. And again, there's a public health and safety issue there, because without that, you're in Warwick discharging raw sewage, untreated sewage. It was impacting, you know, health as well as water quality. So there was a clean nexus there. And even then, it can be challenging...[B]ecause it was a low income area, DEM and the sewer authority at the time was reticent to force people to tie in. So they were still discharging untreated sewage into the Cove and Warwick. It was outrageous. So we tried to get some grant money to help low income folks tie in. And then even when we did that, there was a state rep who said, "Well, this neighborhood is so low income they don't want to tie in because now they're going to be assessed an annual sewer fee where now they don't pay anything, they're just illegally discharged into the cove."

For large infrastructure projects that benefit a specific cross-section of communities, special tax assessments may represent a viable “benefiter pays” model for addressing climate resilience issues in Rhode Island.

Special Tax Assessments	Description
Benefit (4)	Benefiter pays (2) Captures cost upfront (1) Long-run benefits (1)
Challenge (12)	Public opposition (4) Equity (3) Drawing boundaries (2) Applies only to public infrastructure (2) Administrative burden (1)

Development Impact Charges

Development charges are fees imposed on developers to offset the costs associated with a new development. These charges can be applied when existing development intensifies or when redevelopment occurs. Development charges are typically used in other parts of the country to finance parks, stormwater, transportation, and wastewater systems.

Enabling legislation in Rhode Island exists for the assessment of development charges. The Rhode Island Development Impact Fee Act ([RIGL § 45-22.4](#)) allows charges to be assessed, imposed, levied, and collected for all new development. State law requires that fees are calculated based on the development’s “share of the cost of infrastructure improvements made necessary by the development.” For instance, the Town of Smithfield passed an ordinance requiring that impact fees be assessed on residential developments for recreation, libraries, schools, road improvements, and open space. The development of single family attached residential dwelling units under this town’s plan, for example, required a fee to be paid of \$6,573.33, while condominiums and multihousehold units were respectively \$5,596.39 and \$5,394.48 per unit.

Fifty-five percent of our interview participants had knowledge of Development Impact Charges as a way of financing infrastructure projects in response to new development. The benefits and challenges of the Development Impact Charge are summarized in the associated table. For the interview participants with knowledge of this financing tool, they described the benefits of having developers pay upfront their fair share for infrastructure projects. Our interview participants also listed a broad range of challenges associated with the development impact charge. The most frequently cited challenge was that fewer new developments meant fewer opportunities to assess a development impact charge. Other challenges included demonstrating fairness to developers, the administrative burden of imposing the charge, and the risk of losing development. Although not widely cited as a challenge by other participants, one member of the environmental community raised the issue of the Rhode Island housing shortage as a drawback of Development Impact Charges as a funding source. According to this participant,

I think developers would oppose it, and... we've got a housing crisis in the state and we need new housing. I think you're pushing the wrong button. You want to push a button that is related to the problem itself and doesn't ...bring in a layer of new problems like [the] housing shortage. We don't want that to be part of the conversation.

Implicit in a lot of the responses was the difficulty of relying upon the Development Impact Charge as a funding source. This was described by one local planner as only receiving “small pockets of money” from new developments and that generating enough revenue to complete a large project could take “a decade’s worth of funding.”

Development Impact Charges	Description
Benefit (7)	Developer Pays Fair Share (3) Upfront Funding Source (3) Community Investment by Developer (1)
Challenge (23)	Fewer New Developments (6) Demonstrating Fairness to Developer (4) Administrative Burden (3) Risk Losing Development (2) Higher Purchasing Costs (1) Current Housing Shortage (1)

Justifying the Fee (1)
Must be Codified in Ordinances (1)
Lack of Political Will (1)
Minimal Funding Source (1)
Stormwater is Low Priority (1)
Stormwater Projects Already Mandated by
Regulators on New Developments (1)

C-PACE Financing

The US Department of Energy developed an energy efficiency program called Property Assessed Clean Energy (PACE). The PACE program allows residential and commercial property owners to partner with municipalities to voluntarily borrow capital for the installation of energy efficiency improvements and/or infrastructure and to pay off the loan over a 15-20 year period through a system identical to the payment of quarterly property tax payments. This model can be replicated to finance commercial and residential green infrastructure improvements. Rhode Island currently has enabling legislation that allows municipalities to designate themselves as “PACE Communities” by passing a city or town resolution ([RIGL § 39-26.5](#)). While this model of financing has had success in the commercial sector, its challenges in the residential sector are widely noted. Some consumer protection concerns have been raised due to aggressive marketing tactics used by third party sellers, and government lenders instructed banking institutions not to create or refinance mortgages on properties that are encumbered by a PACE lien.

Rhode Island’s version of the Commercial Property Assessed Clean Energy (C-PACE) program is sponsored by the Rhode Island Infrastructure Bank, though our interview participants with knowledge of the program noted a variety of challenges associated with using the program. The most widely cited challenge described was that the incentives of the program were not powerful enough to generate enough interest from commercial property owners. One of our participants described the challenge of the program this way:

I think the biggest question is going to be what's going to drive a private property owner to do the beyond the bare minimum? You either have to passionately believe in it or you see some fiscal incentive for yourself. You know, if I get energy efficient and my energy consumption in my rental properties goes down, I benefit. Yeah, if I make my stormwater cleaner before it gets to the municipal stormwater system, I don't care. I mean, it doesn't benefit me fiscally, I may care environmentally, but it's harder to trace that line to say how much...

Other challenges raised included the incapacity for some municipalities to provide the billing for the program and conveying to commercial property owners that the program is available for making stormwater improvements.

C-PACE	Description
Challenge (10)	Lack of Incentive (6) Raising Awareness (1) Branding (1) Free Money Available Elsewhere (1) Municipal Incapacity (1)

Perceptions of Local Decision-Making Among Stakeholders in the Climate Resilience, Stormwater Management, and Green Infrastructure Network in Rhode Island

How and where decisions are made can be just as instrumental as the financing tools that are available for integrating more climate resilience, stormwater BMPs, and green infrastructure projects into communities. That is why we asked our interview participants about the challenges and opportunities that are associated with local decision-making in Rhode Island, which are summarized in the associated table. When asked about their reaction to local level decision-making, our respondents overwhelmingly identified local knowledge and control over climate resilience projects as one of the key benefits of home rule in Rhode Island. By this, some participants meant that municipal employees and decision-makers can tailor climate solutions to local problems more effectively than state policymakers. A quote by a municipal planner effectively summarizes the views of other municipal employees in the state:

I think each community gets to tailor their program... not every town has the set up in the people to do... it the same. So if it came down as a mandate: "You must do it this way," I could see a lot of... problems there because towns of different sizes are different, either political makeup or administratively. You know how things are. You know ...how they divvy up the work. It's different in every community, obviously. Whereas this way it's, "here's what you got to get done. Here's some tools to get it done. It's up to you to kind of figure out how to do it..." But I think it's good to have the flexibility so that we can go inside the council and say, "Look, we think we can get this done this way," whereas [another town] might be doing it completely different with a different funding mechanism, but that's something that they're comfortable with for whatever reason.

Another participant shared a story about how state agencies prioritize certain projects over others that may have been prioritized by decision-makers at the local level. This participant felt that when it came time to select projects, the state uses different criteria for selecting projects than what would have otherwise been used at the municipal level. Others liked the fact that local governments

can experiment, that municipal officials can generate local support for localized projects, that municipalities can be more responsive to local constituencies, and that municipalities are able to go above the minimum regulatory standards that are imposed by the state.

Our participants also described some of the challenges of dealing with climate resilience projects locally. Their responses included the challenge of having local capacity to address climate and stormwater impacts, as well as having the capacity to properly maintain infrastructure projects. Participants also raised the challenge of coordinating efforts among municipalities to address cross-border pollution issues. A participant with a background as a community planner described it this way:

And in stormwater, you know, watersheds cross municipal boundaries. So it doesn't make a whole lot of sense to have it just on a localized basis. So to try to work on a collaborative basis with more than one community and so the watersheds cover more than one community certainly makes sense if you can do it. So I think that's where addressing stormwater on the watershed basis versus a municipal basis, if possible, makes sense. You have culverts that are on town lines, you have water that's feeding into your stormwater systems from other communities and surcharging them. I think that it certainly doesn't make sense to do it on a city by city basis. Water doesn't stay in one town. And I think that a lot of funding agencies, especially federal and state grants, strongly encourage collaboration.

In addition to the problem of cross-border pollution, other stakeholders described how municipalities have not seized opportunities to capitalize on the long-term cost savings of pooling resources with other communities for sharing and to generate the funding that is necessary to maintain infrastructure that positively impacts the region. Still others felt that there would be more predictability if climate resilience and stormwater management was dealt with regionally. Their view was that developers and other investors would appreciate having fewer regulatory systems in place so that complying with codes related to climate resilience and stormwater management would be made easier.

Localism Benefits	Localism Challenges
<ul style="list-style-type: none"> • Local knowledge and control (13) • Responsiveness (3) • Able to exceed minimum state standards (2) • Local support (2) • Can partner with the state (2) • Policy innovation (1) 	<ul style="list-style-type: none"> • Incapacity (9) • Cross-border pollution (7) • Maintenance (6) • Foregone cost savings (6) • Funding (5) • Scale (4) • Siloes (2) • Less predictability (2) • Gaining stakeholder support (1) • Different reporting systems (1)

Structure Preference Among Stakeholders in the Climate Resilience, Stormwater Management, and Green Infrastructure Network in Rhode Island

We were also interested to know how our participants would respond if they had an opportunity to change anything about the status quo, including how to organize jurisdictionally to address climate impacts. When given this opportunity, the frequency of their responses favored a municipal or a regional response to addressing climate and stormwater impacts, as described in the associated table. What is most interesting about responses of a jurisdictional nature is the frequency of 25 responses not favoring a municipal design for addressing climate resiliency (13 Regional, 11 Statewide, and 1 Hybrid), whereas the frequency of responses related to a municipal approach totaled only 13. When regional and statewide approaches are added together, the vast majority of participants that we interviewed were not particularly interested in having a design that favored the status quo with power structured at the most local level of government.

We gathered some additional insights from our participants about other changes that might be made to the status quo, with five specific references to maintenance raised as a specific concern. Our participants were particularly concerned that maintenance planning is not factored into the design and installation of climate resilience and stormwater management projects. Their responses supported the idea of continuously maintaining this infrastructure, enforcing maintenance on private properties, and/or hiring someone in a Department of Public Works who is specifically responsible for infrastructure maintenance.

Enforcement was another concern that was raised, especially as it pertained to enforcement of regulations by the RIDEM, while another participant favored an approach placing individual responsibility on property owners and/or those with legal responsibility for certain public rights of way to ensure that stormwater runoff is treated and stays on that property. Some participants favored an approach that was geared toward more vigorous stakeholder engagement, whether that be better stakeholder and community engagement, more local demonstration projects, more integration of the private sector, or even more statewide or regional coordinators who are responsible for educating the public and/or providing technical assistance to communities on these projects. Those conceptualizing policy change as being related to finance mechanisms preferred tools that captured externalities up-front (usually at the development stage for new developments) instead of after-the-fact, while others spoke of specific programs that should be continued or expanded (e.g., Municipal Resilience Program). Other responses included tackling procurement reform so that installation of infrastructure projects was not based on the lowest bidder.

Concept	Specific Change
Jurisdiction (38)	Municipal (13) Regional (13) Statewide (11) Hybrid (1)

Maintenance (5)	Continuous maintenance (2) Enforce maintenance on private sites (2) Deputy DPW Director of Stormwater (1)
Enforcement (4)	Stricter state enforcement (3) Individual responsibility (1)
Engagement (4)	Better stakeholder and community engagement (1) Neighborhood-level demonstration projects (1) Better private sector stakeholder integration (1) Place-based resilience coordinator (1)
Finance (3)	Capture externalities up-front (1) Expand Municipal Resilience Program (1) Tie funding source to impact (1)
Procurement (2)	Procurement/bidding reform (2)
Resource (2)	Integrated water management (2)

Conclusion

One key takeaway is that among all the different financing mechanisms that are available to policymakers in Rhode Island, each one contains at least some element of public education as being a challenge. Being that a more robust system of stakeholder engagement was identified by our participants as a key change that would be made to the status quo as it relates to the resilience package, it might make sense to consider incorporating some of the benefits and challenges of the resilience financing mechanisms into revamped stakeholder engagement efforts.

It was also clear that one of the most effective approaches to sustainably financing installation and maintenance of infrastructure projects was viewed by most of our participants as the stormwater utility fee, though it was also viewed as the most politically challenging approach. Therefore, one strategy for incrementally steering communities toward a stormwater utility concept may be to pursue less intrusive financing tools that allow a sizeable portion of communities to be rewarded for coming into compliance with stormwater utility goals prior to the adoption of one. One strategy for doing so may be to use the concept of the property tax exemption to facilitate the adoption of best stormwater management practices, climate resilience practices, or green infrastructure practices so that property owners who are creating a public good on their properties are rewarded for doing the “right thing.”

We also found it interesting to note that nearly two-thirds of our participants preferred moving toward a more regional or statewide approach to climate resilience, stormwater management, and green infrastructure. If a regional or statewide approach represents the most optimal way of confronting the challenges that Rhode Island communities are sure to encounter in the future, then

communities may want to consider opportunities for building regional capacity to work with other communities on watershed-level problems. These communities may want to consider identifying shared boundaries where pollutants or flooding nuisances are generated and develop shared solutions that can be adopted by residential or commercial property owners. Creating a “resilience district” around a resilience or stormwater-related problem that is shared by two municipalities may provide opportunities for them to collaborate on a larger scale. As communities are exploring these options, they may want to consider the experience of counties in Maryland that have adopted the “Resilience Authority” concept, which provides regional bodies the authority to bond, develop stormwater utility districts, and to compete for grants. The lessons that can be learned from the Maryland experience may provide keys to unlocking the potential of collaborative resilience in Rhode Island communities.

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