Leveraging the Integrated Planning Framework for Advancing Climate Resilience and Environmental Justice

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Acknowledgments

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Introduction

Climate change is causing increases in both total precipitation volume and precipitation intensity. A warming climate also causes seawater to expand and ice over land to melt, contributing to sea level rise. These changes in global patterns increase the frequency and severity of storm surges and coastal flooding, causing serious damage to critical public water infrastructure. For both municipal separate stormwater systems (MS4) and combined sewer systems, increased rainfall will produce increased storm runoff, which can exacerbate existing or introduce new pollution problems. Stormwater can overwhelm storm sewer systems, especially in an era of faster, more frequent, and more intense wet weather events. Uncontrolled stormwater runoff can cause urban flooding and threats to the human-built environment.

Lower income communities, particularly communities of color, already face disproportionate impacts of stormwater flooding including sanitary sewer backups in basements flood exposures, disaster damage outcomes from heavy rainfall events, economic impacts, and efforts to build resilience. Those impacts are only expected to worsen with climate change.

EPA's Integrated Planning Framework offers great opportunities for municipalities to incorporate climate change and/or environmental justice concerns into a holistic long-term plan. The stakeholder engagement, alternatives selection, and project prioritization processes that are central to the framework allow local governments to incorporate equity, resiliency, and climate change into a plan designed to address Clean Water Act goals.

INTEGRATED PLANNING FRAMEWORK, CLIMATE CHANGE, AND ENVIRONMENTAL JUSTICE CONSIDERATIONS

Portland, Maine:

Heavier Rains and Water Quality Mandates

Carol Highsmith, *Aerial View of Portland Maine*, Retrieved from https://thenounproject.com

The City of Portland, Maine has a population of about 68,000 and is the economic capital of the state. Portland operates a combined sewer system and since 2014, a separate stormwater system as well. Both these systems transport effluent into Casco Bay, an important natural, cultural, and economic resource for Maine.

Impacts of Climate Change:

As a coastal city, Portland is vulnerable to sea level rise, warming ocean temperatures, and increasing storm activity related to climate change. Greater Portland communities have been experiencing recurrent tidal and storm-related flooding and erosion. Flooding events are intensifying and becoming more common. Flooding is most severe when tidal flooding coincides with intense precipitation events. Portions of the city are already observing tidal inundation during the highest of high tides. Tidal inundation is causing stormwater and combined sewer systems to backup and flood streets, damaging homes and businesses and significantly increasing the amount of discharge into Casco Bay.[1] While the City has been using a variety of stormwater management practices, the infrastructure of the current combine sewer system has proved insufficient to handle recent flood events and the problem will only worsen over time.

Summary of Recent Predictions of Climate Change Effects in Casco Bay[1]

Stressor	Past Statistic	Future Estimate	Potential Impacts
Temperature Increase	Average Annual Temp has warmed by ~3.0 °F since 1895	Average Annual Temp is predicted to increase by ~3.0-5.0 °F by 2050	Increased energy consumption due to air conditioning use; increased irrigation needs
Precipitation Increase	Annual precipitation total increased by ~6 inches or 13% since 1895	Annual precipitation total to increase by 4-5% or ~2-3 inches by 2050	Increased stormwater volumes leading to more frequent flooding of streets and increased CSOs and SSOs
Sea Level Rise	Sea level has been rising at a rate of 0.01-0.04" per year for the last 1,000 years	Recent sea level rise rate at 0.07" per year leading to ~0.5-2.0' by 2050	Increased flood frequency in Back Cove and Portland's downtown
Ocean Temperature Increase	Average surface water temp increased 0.05 °F per year since 1982	Warming rate has accelerated to 0.41 °F per year (faster than 99% of the world's oceans)	Potential for increased HABs, nuisance algae and invasive species; may place greater emphasis on nutrient reductions and may affect tourism

[1] City of Portland Water Resources Division. (December 2020). Integrated Water Resources Management Plan.

Past Efforts to Address Stormwater Issues:

Portland is subject to Clean Water Act regulatory requirements, including a consent decree for combined sewer overflows (CSO) and a wastewater treatment plant permit. In response to the consent decree, Portland developed a Long-Term Control Plan (LTCP) in 2013 to reduce the volume of CSOs through the construction of wet weather storage tanks to reduce overflows, installation of tide gate valves at the end of storm drain systems, and other gray infrastructure improvements. The overall cost to implement the plan was approximately $200 million over the 15-year planning period. Concurrently, the wastewater utility worked with regulators to improve its capacity through permit renewal processes. A separate initiative to expand the stormwater management system (MS4) was also ongoing.

In 2016, Portland established a stormwater utility fee to generate revenue for stormwater management. This stormwater fee is designed to distribute the costs of stormwater management more equitably by charging customers based on impervious surface area. Moreover, Portland instituted a fee credit program that allows customers to reduce or eliminate their stormwater utility fee by implementing approved green infrastructure projects on the property. This stormwater fee played an important part in setting the stage for their Integrated Plan, providing a source of financing and an understanding of green infrastructure to the public.

Addressing Climate Challenges Through Stakeholder Engagement:

In 2018, Portland's Department of Public Works (DPW) began the integrated planning process with the aim of improving the city's water quality while also enhancing the Portland community in other ways. They placed particular emphasis on the stakeholder involvement component of the framework through a series of workshops and public meetings. Six workshops were held with the aim of developing informed recommendations for city officials about management strategies to both improve water quality and provide ancillary benefits to the environment, the economy, and public health. At these events, DPW discussed the city's wastewater and stormwater priorities with advocacy groups, local businesses, fishermen, aquaculture growers, and academic institutions. The workshops were designed to help the city develop a plan that balances the needs and services of residents and local businesses with those used to support transient populations and the summer tourism-based economy. The stakeholders raised concerns such as the adverse effects of warming temperatures in Casco Bay on the viability of lobster, an economically critical native species. The workshops generated recommendations for metrics and a draft implementation strategy that took into consideration stakeholder concerns regarding climate change and environmental justice.

> Bringing in stakeholders into the project prioritization process **"gave a literal and figurative weight to climate change concerns,"** said Nancy Gallinaro, Portland's Director of Water Resources.

The resulting Integrated Plan improved Portland's resiliency by providing an opportunity for community stakeholders to bring their concerns to the table. Climate change impacts, such as flooding risks for waterfront businesses and increasing pollution in Casco Bay, were a top priority. Part of the planning process included an evaluation of where the city's at-risk population, including low-income, non-white, and senior citizens, lives. DPW generated a map to contribute to its analysis, particularly looking at instances of overlap between environmental and demographic indicators. Effects

on burdened communities was also a part of the qualitative screening for scoring projects.

The city detailed a public outreach and engagement approach as part of its integrated plan, to better promote meaningful involvement of all relevant stakeholders during the development and implementation stages. Comprehensive representation during this process was ensured by compiling a list of community organizations, consisting of constituents that are often under-represented in the public planning process. Outreach methods included distributing flyers in languages other than English, choosing public meeting times and locations with the greatest access, and attending community events such as walking tours and races to answer questions about the integrated plan.

Stakeholder input ultimately fed into a multi-objective decision framework that informed the final plan document. Previous efforts to reduce CSOs focused on improving the infrastructure in specific areas affected by flooding. Portland is now seeking the flexibility to develop innovative solutions to reduce CSOs while also addressing issues raised by residences and businesses. Using the Integrated Planning Framework facilitated a more holistic approach to address flooding and water quality challenges. While Portland awaits State approval to incorporate the Integrated Plan into its permits and LTCP, the plan has informed the 2021 and 2022 budgets and the current capital improvement plan.

Some recommended climate resilience projects and policies that may not necessarily have been a part of the LTCP without using the Integrated Planning Framework include:

- Building living shoreline demonstration sites for estuarine restoration;
- Developing a wetland protection ordinance to improve the protection of wetlands in the city from development impacts; and
- Developing a hydraulic model to better understand the hydraulic conditions and assess the effects of flood mitigation projects.

Hampton Roads Sanitation District (HRSD):

Adapting to the Impacts of Sea-Level Rise

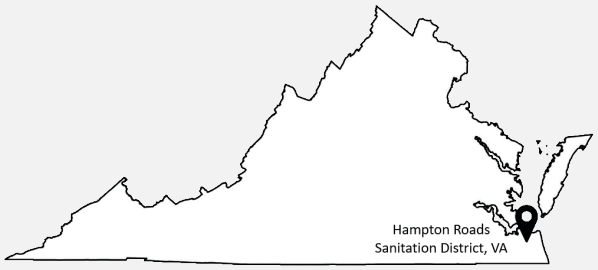
Megan Starr, *Norfolk Virginia*, Retrieved from https://virginiatraveltips.com/

Hampton Roads is a region in Southeastern Virginia with a population of approximately 1.8 million people. Across the region, stormwater runoff flows into the Chesapeake Bay and Atlantic Ocean. The Hampton Roads Sanitation District (HRSD) includes city and county owned local sewer collection systems and pumping stations as well as HRSD owned regional sewer pipelines, pumping stations, and treatment plants. The HRSD system is designed to only handle sewage. Each Hampton Roads locality has a separate system for handling stormwater runoff.

Environmental Justice and Sea Level Rise in the Hampton Roads Region:

Hampton Roads is experiencing the highest rate of sea-level rise along the entire Atlantic seaboard and is one of the largest U.S. population centers at risk, second only to New Orleans. As sea levels rise, shorelines retreat and the magnitude and frequency of near-shore coastal flooding increases. Sea level rise dramatically compounds the effects of storm surge, causing flooding resulting from extreme weather to be more frequent and costly. Some areas are already experiencing permanent inundation, while others have seen more frequent flooding.

As sea levels continue to rise, some previously unaffected areas will be flooded, resulting in major infrastructure impacts. Low-income and person of color communities in Hampton Roads are particularly vulnerable to the impacts of storm surge scenarios. Norfolk, the most populous city in Hampton Roads, is unlike most major American cities in that a significant percentage of its population, 43%, identifies as black, and 19% of the city currently falls within the 5-year floodplain.[2]



Hampton Roads is also affected by the shrinking of the Potomac aquifer. Homes and industries in eastern Virginia remove approximately 155 million gallons of groundwater from the Potomac aquifer daily, contributing to land subsidence and saltwater intrusion. Land subsidence amplifies the region's vulnerability to sea level rise by contributing to steady but dramatic increases in tidal flooding as the land sinks.

Creating Resiliency Through Prioritization:

In 2010, the EPA issued a Wet Weather Consent Decree, requiring HRSD to implement measures to reduce the discharge of pollutants. The vast array of issues facing the Hampton Roads region led HRSD to develop an integrated Plan. HRSD sought to prioritize projects that best address the region's main concern, the shrinking Potomac aquifer, through cost effective solutions that reduce wet weather overflows while maximizing environmental benefits. The Integrated Planning Framework's processes for prioritizing alternatives and iterative

[2] Boyer, Michael and Penn, Erica, "Tidal Turmoil: Environmental Justice and Sea Level Rise in Hampton Roads: Norfolk Case Study" (2013). Virginia Coastal Policy Center. Retrieved from https://law.wm.edu/academics/programs/jd/electives/clinics/practicum_list/vacoastal/documents/march2014reports/tideturmoil2.pdf

decision-making made it an ideal approach.

Using the framework, HRSD prioritized Sustainable Water Initiative for Tomorrow (SWIFT), a plan to reduce the impact of sea-level rise by injecting treated wastewater effluent into the aquifer, suspending aquifer compression and promoting aquifer rebound. SWIFT's goal is to reduce the impact of sea-level rise by 25 percent over the next 50 years.[3] However, a key benefit to the framework's approach is that it does not force users to select between alternatives; instead, users can prioritize in the sequence that makes the most sense to the community.

Along with SWIFT, HRSD's Integrated Plan also prioritizes a Regional Wet Weather Management Plan (RWWMP), which features an adaptive management approach to address the impacts of climate change on Hampton Roads. Highlighted in the Integrated Planning Framework, adaptive management incorporates iterative decision-making to manage uncertainty in addressing environmental challenges. As Jim Pletl, the former Director of the Water Quality Department at HRSD, described in an interview, "Before the framework was written in 2012, people expected to write a plan and stick to it." The Integrated Planning Framework allows for flexibility through iterative decision-making to adapt to changing conditions. An important component within HRSD's Integrated Plan is the Adaptive Regional Plan, which directs the utility to revisit the wet weather projects every five years. If new data shows that different service areas have an increased susceptibility to flooding, plans to address pump station upgrades may change. Revisiting the plan every five years ensures local government level policy decisions are responsive to changing climate conditions.

Innovative Components of the Integrated Plan:

SWIFT:

Under a $225 million WIFA loan issued by the EPA, HRSD will inject millions of gallons of highly treated water into the Potomac aquifer to reduce saltwater intrusion caused by sea-level rise. This system serves 1.7 million people and has created 1,412 jobs for the area. HRSD estimates to be recharging at least 100 million gallons per day of SWIFT Water into the Potomac Aquifer by 2030.

Regional Wet Weather Management Projects:

Regional Wet Weather Management Projects: A Sanitary Sewer Overflow (SSO) storage tank was constructed underground beneath a new skate park. The Integrated Planning Framework emphasizes the use of innovative solutions to reduce overflows. Conventional construction would involve installing the tank above ground. Underground storage combined with new urban development reduces the amount of excess flow to be treated at a WWTP and enhances environmental, social, and economic sustainability.

[3] Hampton Roads Sanitation District. (2017, September 28). Integrated Plan/Regional Wet Weather Management Plan. Retrieved from https://www.hrsd.com/sites/default/files/assets/Documents/pdfs/EPA/IntegratedPlan/HRSD_IP_RWWMP_2017_09_28_DIGITAL_FOR_VIEWING.pdf

The Kickapoo River Watershed:

A Cost-Effective Approach to Climate Adaptation and Mitigation

Carol M. Highsmith, *Dells Mill, a gristmill in Augusta, Wisconsin* Retrieved from https://thenounproject.com/

The Kickapoo River Watershed is situated in the southwestern corner of Wisconsin. The region encompasses approximately 490,000 acres, beginning north of Wilton in Monroe County and flowing south-southwest through Vernon, Richland, and Crawford counties. The watershed is very rural with just over 20,000 residents, most of whom live in small villages.

Intensive Flooding in the Kickapoo River Watershed:

The Kickapoo region's unique topographic features including upland plateaus, steep valley sides, and dendritic stream systems contribute to flooding events occurring every few years. However, severe one-hundred-year flooding events are becoming more frequent. The watershed is dominated by silt loam soils that lie over bedrock. While the moderate permeability and high-water capacity of these soils make the land ideal for farming, they also endanger the water quality of the region. Silt loam soils are easily dislodged and suspended in runoff. This combination of high nutrient pollution from streambank erosion with flooding affects the communities' drinking water.

Runoff also reduces future agricultural production, as water with high phosphorus loads can result in slow crop growth and disease propagation amongst livestock. The Kickapoo River is a tributary of the Wisconsin and Mississippi Rivers, so its nutrient loading and the resulting poor water quality contribute to the eutrophication and deterioration of water quality in these watersheds. Agriculture, as well as other industries that depend on clean,

reliable water such as food processing, tourism, and outdoor recreation, are crucial to the local economy. In terms of per capita income, the watershed is one of Wisconsin's poorest areas. Wages, as well as the growth rate of income, are generally lower in the region than in the rest of the state. Similarly, poverty rates are higher compared to many other regions of the state. Rural areas of the region have experienced slow population growth rates of less than 1% per year over the last several decades.[4] Gays Mills Village, a community of 490 people with a declining population, has seen six major flood stage events since 1950, five of which occurred during or after 2007.[5] In 2009, approximately half of the homes in Gays Mills were slated to be demolished or elevated and the government center was moved to higher ground.[6] After a flood event in 2018, the Village considered relocating government and downtown properties once again.

[4] Wisconsin Department of Natural Resources. (2013, February). Regional and Property Analysis for the development of a master plan for Department of Natural Resources' properties along Trout and Smallmouth Bass streams in the Driftless Area.

[5] LA Crosse Tribune. (2017, August 18). A tale of two Gays Mills: Flooding inspired part of village to move to higher ground. Retrieved from https://lacrossetribune.com/news/local/a-tale-of-two-gays-mills-flooding-inspired-part-of-village-to-move-to-higher/article_8e62f653-bf59-5f64-9fb4-74a905e5fece.html

[6] U.S. Department of Agriculture. (2017, February 21). Apple capital of Wisconsin, Gays Mills, begins move with USDA support. Retrieved from https://www.usda.gov/media/blog/2010/05/13/apple-capital-wisconsin-gays-mills-begins-move-usda-support

Addressing Flooding and Water Quality Issues:

In 2019, Readstown Township, located within the Kickapoo River Watershed, reached out to the EPA Region 5 office requesting information on cheaper alternatives for compliance with the Wastewater Treatment Plant (WWTP) nutrient permit. Readstown explored the cost of various mechanical upgrades to their wastewater treatment plant to comply with nutrient limits but came to understand that they would place a high burden on their ratepayers. Compliance with phosphorous and other nutrient limits commonly puts disproportional pressure on often rural and economically distressed communities. In addition, 'end-of-pipe' treatment upgrades alone may not achieve the required effluent quality improvement outcome and can impose an economic burden on individual rural communities that cannot afford it. Originally, the township requested technical assistance to create a constructed wetland for nutrient treatment and polishing effluent. However, because the WWTP was determined by EPA Region 5 scientists to be in a floodplain, an artificial wetland WWTP would not be a viable option. In response, with similar issues facing the other nine WWTPs, EPA staff worked with communities in the region to develop a watershed-based integrated plan.

The plan consists of two stages with the goals of reducing nonpoint source pollution, mitigating the impacts of flooding, establishing regenerative agriculture, recharging the aquifer/groundwater, and improving water quality. Stage 1 addresses the alternative approach for NPDES wastewater discharge compliance through water quality trading. Water quality trading provides flexibility to meet nutrient requirements offsite by purchasing credits from non-point sources within the watershed. Communities can pay for agricultural best management practices, such as converting corn crops into prairie grass and thereby reducing the nutrient loss in soil erosion, instead of more costly wastewater treatment plan upgrades. Stage 2 expands the project beyond wastewater treatment plants and compliance issues to the watershed level, considering broader land use change and flooding mitigation potential, nutrient and sediment loading potential trade-offs, and the impacts to downstream rivers such as the Wisconsin and Mississippi.

The Kickapoo River Watershed Integrated Management Plan consists of the following goals[7]:

- Water quality trading between the village and nearby agricultural landowners
- Green or natural infrastructure such as land use changes or streambank restoration to reduce non-point source runoff
- Encourage regenerative agriculture and land use change to mitigate flood risks
- Increase soil infiltration and storage for baseflow, carbon sequestration and aquifer recharge.

Agricultural best management practices, such as no-till or conservation tilling for minimal soil disturbance, mulching, composting, rotating livestock, and using cover crops can increase the soil's ability to sequester carbon. The WWTF and community worked together to actively seek a wide variety of cost-effective best management practice that improved water quality faster. The Integrated Planning Framework also provides more ancillary environmental benefits such as carbon sinks, flood retention, and riparian and habitat improvement, which further improves water quality.

[7] U.S. Environmental Protection Agency. (2021, September 14). Kickapoo River Watershed Integrated Management Study.

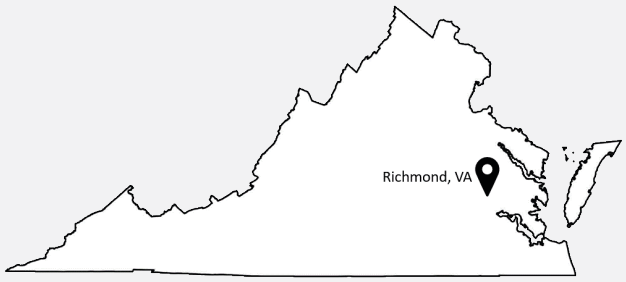
Richmond, Virginia:
Addressing Inequities Through Stakeholder Involvement

Sean Pavone, Richmond Virginia, Retrieved from https://www.dreamstime.com/

Founded in 1737, Richmond is the capital of the Commonwealth of Virginia. As of 2019, Richmond hosts a population of approximately 230,000. Between 2010 and 2017, Richmond's diverse population grew by 11 percent, outpacing surrounding counties' growth rates during the same period.

Inequitable Impacts of Climate Change:

Located at the fall line of the James River, Richmond is experiencing increasingly severe flooding impacts intensified by climate change. Two of the wettest years on record have occurred in the last 4 years (2018 and 2020). Extreme rainfall events that overwhelm drainage systems and lead to severe street flooding, once uncommon, have been occurring more than twice a year in Richmond recently. The most recent IPCC report found that it is likely that heavy precipitation events will intensify and become more frequent in most regions with additional global warming.[8] Changing rainfall patterns are not just limited to Virginia's coastline—more intense and more frequent storms will happen across the state. In a localized study that examined data from locations across Virginia between 1947 and 2016, researchers found that both average annual precipitation and heavy rainfall frequency increased statewide.[9] Richmond's drainage system is inadequately prepared to handle these recurring superstorms and street flooding is becoming more common. These events occur most frequently in the oldest parts of the city and in disadvantaged communities, increasing the vulnerability of individuals living below the poverty level, some 20 percent of Richmond residents.[10] In some neighborhoods of South Richmond, the struggles of managing increased and more intense rainfall are already apparent in frequent flooding that leaves streets and yards waterlogged for days.



With a high concentration of people of color, Richmond's disadvantaged neighborhoods reflect the legacy of racist policies. Contemporary maps for flood risk strongly resemble New Deal-era maps used by the federal government to assess risk for mortgage lending in a practice known as redlining. Data collected by the Office of Sustainability show that areas of the city with higher proportions of people of color also face higher rates of poverty, chronic illness, crime, and other factors that increase overall social vulnerability. These neighborhoods also lack critical infrastructure, tree canopy and green space, modern stormwater infrastructure, and energy efficient buildings, increasing their vulnerability to climate change.

[8] Eyring, V. (2021).Human Influence on the Climate System. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

[9] Allen, M.J., & Allen, T.R. (2019). Precipitation trends across the commonwealth Virginia (1947-2016)" Virginia Journal of Science. Volume 70, Issue 1 & 2.

[10] U.S. Census Bureau (2020). Selected economic characteristics, 2016-2020 American Community Survey 5-year estimates. Retrieved from https://www.census.gov/quickfacts/richmondcityvirginia

Prioritizing Vulnerable Populations Through Integrated Planning:

Richmond's Department of Public Utilities (DPU) utilized the University of Virginia's Institute for Equitable Engagement and Negotiation (IEEN) to facilitate stakeholder engagement. The academic institute helped to improve coordination between stakeholder groups and DPU and created the space for stakeholders to develop potential approaches for prioritizing projects. DPU began developing the RVA Clean Water Plan in 2014, using the Integrated Planning Framework not as a roadmap, but as a checklist. Stakeholder involvement was paramount and incorporated throughout the entire process. Stakeholders included wildlife and animal advocates, boaters, residential, commercial, and business interest groups, and groups representing environmental justice issues. DPU tailored the engagement process to the technical expertise of the stakeholders, breaking them into two groups. For future environmental justice stakeholder roundtables, DPU will pay participants to share their experiences and thoughts on project prioritization. Paying community members to travel to these meetings will ensure residents who cannot afford to take off work will be able to have their voices heard.

DPU carried out a public outreach effort, including several open houses held in local parks to lay a foundation of understanding before engaging in the more technical conversation around watershed integration. Through both online and offline communication strategies, the city's Public Outreach Plan, strived to reach 20% of the city's population in the MS4 area by 2018.[11] Progress towards this goal was tracked by Facebook and Twitter traffic, email campaign engagement, and flier distributions and the goal was ultimately achieved.

An example of integrated planning in action is the expansion of green infrastructure in the Shockoe Bottom neighborhood. Shockoe Bottom was an epicenter of the domestic slave trade in the mid 1800's, second only to New Orleans.[12] This low-lying area near downtown Richmond on the banks of the James River faces an extreme risk of flooding due to its built infrastructure. Richmond's combined sewer system infrastructure was designed to direct overflow from the West, North, and Eastside areas into Shockoe Bottom, draining water into this valley populated with homes and businesses. Economic investment and infrastructure improvement in the area have been inconsistent. While a floodwall protects the neighborhood from floods from the river itself, storage and conveyance are needed to solve the CSO problems. Before the introduction of the Integrated Plan, green infrastructure would typically be built only in the MS4 as developers cannot get credit in the combined area. Due to the involvement of stakeholders during the strategy prioritization process, there is now a considerable effort to take flow out of the combined area with green infrastructure.

Morgan Riley ,View north on 17th Street at the Farmers' Market, in Shockoe Bottom, Richmond, Virginia.

The Integrated Plan was a necessary precursor to Richmond's Green Infrastructure Master Plan within their combined sewer sheds because it demonstrated how green infrastructure can be leveraged to meet Clean Water Act requirements. With the Integrated Plan, the city is given the freedom to say that pollution reduction anywhere is a good idea, using green infrastructure development as a primary strategy to improve the quality of ground and surface water. DPU is in the planning process of constructing green streets and adding parks in another historically African American neighborhood, Fulton Bottom, east of Shockoe. The city is also working with community stakeholders, the Partners Alliance for the Chesapeake Bay, and the National Fish and Wildlife Foundation to finalize a project selection process using its Green Infrastructure Master Plan, which includes neighborhood equity as a criterion.

[11] RVA H20. (2017, September). 2017 RVA Clean Water Plan. Retrieved from https://j3n7e4b9.stackpathcdn.com/wp-content/uploads/2020/02/Final_RVA_Clean_Water_Plan.pdf

[12] Ebony Walding Consulting. (2019, August) Shockoe Bottom Equitable Economic Redevelopment Resource Guide. Retrieved from https://preservationvirginia.org/wp-content/uploads/2019/11/Shockoe-Bottom-Equitable-Economic-Development-Resource-Guide.pdf

Spokane, Washington:

Delivering a Cleaner River for the Community

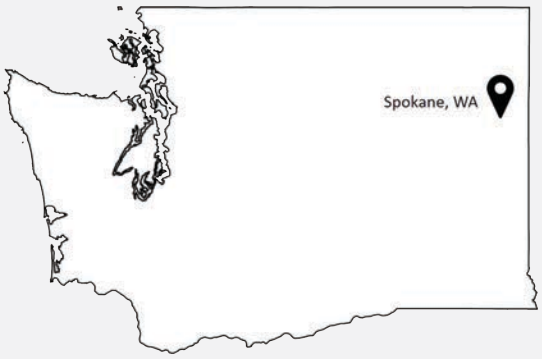
Benedek, photograph of the downtown Spokane, Retrieved from https://www.istockphoto.com/

The City of Spokane, Washington is the second largest city in the state, home to about 220,000 people. The Spokane River runs through the downtown area and flows into Lake Spokane. The city has more than 300 miles of separate storm sewers that discharge stormwater and more than 400 miles of combined stormwater and wastewater sewers.

Unequal Burden of Climate Change and Flooding on Vulnerable Residents:

The Spokane River receives untreated overflows and stormwater runoff during heavy rainstorms and rapid snowmelt. Additionally, discharge of treated effluent from the city's WWTP is directed to the river. For the Spokane Tribe of Indians, the river flows through the heart of their ancestral homeland.[13] Members of the Tribe have historically relied on the river for nourishment, medicinal, and spiritual purposes. Today, the Tribe works to protect and improve the river's water quality and fisheries. Toxins that enter the river bioaccumulate in fish, presenting a public health issue when consumed by people. This problem is more concentrated in some of the low-income and minority populations in Spokane that rely on the river for food.

While Spokane's flooding issues are not overly significant, individual rainfall event intensity is likely to rise, with a 13 percent increase in number of days with over an inch of precipitation expected by 2050.[14] Higher levels of precipitation influenced by climate change are expected to have a greater impact on the lower elevation neighborhoods in Spokane, which tend to house lower-income communities.



These communities face the highest risk of flooding issues while also hosting the city's CSO systems. Some of these low-elevation neighborhoods also have below average tree canopy cover. With climate projections predicting future temperature increases of two to five degrees Fahrenheit by 2050 in the Spokane region , these low-income communities will also face higher risks of exposure to heat-related illnesses. Protecting and expanding tree cover is an important strategy for both minimizing the effects of heat and protecting watershed health. The city's Integrated Plan includes coupling investments in green infrastructure with other public infrastructure projects, which will result in long-term reductions in CSO frequency and volume, stormwater charges, and uncertainties associated with climate change.

[13] Northwest Power and Conservation Council. (n.d.). Spokane River. Retrieved from https://www.nwcouncil.org/reports/columbia-river-history/spokaneriver

[14] U.S. Census Bureau (2020). Selected economic characteristics, 2016-2020 American Community Survey 5-year estimates. Retrieved from https://www.census.gov/quickfacts/spokanecitywashington.

Integrated Planning Prioritizes Environmental Justice and Resiliency:

Before considering an integrated strategy, the city planned to spend $300 million as part of its Long-Term Control Plan (LTCP) to address overflows to the river from its combined sewers. However, that investment would not have addressed other sources of pollution to the river, including stormwater. Reductions in pollutants like PCBs and heavy metals would have been minimal. Spokane's median household income is 70 percent of the statewide median household income and about 78 percent of the U.S. median household income.[15] With this financial consideration, the city decided to develop a plan that would not significantly raise wastewater rates for its customers while still improving the health of the Spokane River. In 2014, Spokane completed its Integrated Clean Water Plan, with a primary focus on improving the water quality of the Spokane River. All clean water planning efforts are integrated into the plan, including those for CSOs, stormwater, and the addition of tertiary treatment at its Wastewater Treatment Plant. Most of the projects in the Plan—including the CSO work and improving its wastewater treatment—have been completed. The city is currently undertaking a project to manage stormwater from its largest stormwater basin, the Cochran Basin, which contributes about half the annual stormwater to the river.

Using an Integrated Planning Framework instead of an LTCP enabled the city to incorporate broader and more inclusive community stakeholder engagement in the planning process. The City's Department of Public Works (DPW) reached out to special interest stakeholders, including environmental advocates, users of the Spokane River, owners of property along the river's shores, and neighborhoods where construction projects would be implemented. The city also kept staff from regulatory agencies and members of the Spokane Tribe engaged and informed. Initial communications with the public focused on the basics—what is a combined sewer, how is stormwater managed throughout the city, what do flows from combined and stormwater sewers bring to the Spokane River, and what is "green" infrastructure. DPW also explained that it was striving to make the changes more affordable and provide greater value to citizens for the dollars spent.

The Plan clearly outlines the inclusion of environmental justice principles with respect to the implementation of stormwater management and CSO reduction projects. Both the selection of projects and siting of facilities are required to provide maximal benefits to the surrounding community. Due to the nature of the locations of CSOs and stormwater outfalls, many of the recommended projects are sited near the shore of the Spokane River, potentially impacting locations of cultural significance to the Spokane Tribe. The Plan explicitly requires the city to coordinate with the Tribe on the siting of projects throughout the planning process. In addition, the city's comprehensive approach to addressing toxins in the Spokane River is of particular importance to the Tribe.

The city recognized the following opportunities for environmental justice and climate resilience in siting the following projects:

- The West Broadway Spokane Urban Runoff Greenway Ecosystem (SURGE) is located in the West Central Neighborhood, which has a low-income population. The SURGE project benefits this neighborhood by providing education, low impact development stormwater facilities, and enhancements of trees and plants in storm gardens.
- Construction of CSO storage tanks are paired with park and trail development, providing new trees, and river views and other streetscape improvements. The reduction of untreated sewage discharge provides a cleaner river for everyone.

[15] U.S. Census Bureau (2020). Selected economic characteristics, 2016-2020 American Community Survey 5-year estimates. Retrieved from https://www.census.gov/quickfacts/spokanecitywashington.

- The city has adopted an adaptive management process for CSO reduction, stormwater reduction, and sizing the Membrane Filtration facility. Adaptive management, which consists of monitoring the plan and adaptive future actions based on observable results, allows the city to account for sources of uncertainty, including climate change.

Spokane also included an alternative evaluation process, a component of the Integrated Planning Framework that considers environmental justice and social equity and uses a multi-objective decision analysis (MODA) process. The MODA process is a useful tool to capture the environmental and social justice impacts of projects because projects that provide higher benefits in metrics such as integrated benefits, environmental outcomes, and lower cost will score higher.

Out of the city's integrated planning efforts for clean water improvements grew its new "Integrated Streets" concept, which addressed both utility and street needs. The Integrated Streets concept involves replacing all the above and below ground infrastructure as needed, prioritizing streets using a matrix that looks at pavement condition, traffic volumes, the need for utility upgrades, connection to the pedestrian generators, and economic development opportunities. Completing all work at once minimizes the disruption caused to the neighborhood. A citizen committee examines how projects are scored according to proximity to schools, economic development opportunities, and overall, how investments can produce the greatest impact. The committee then recommends projects to elected officials for investment. To complete the street projects, the city passed a $5M per year street levy and committed $5M a year match of utility funds. The street levy funds the street projects and the matching utility funds pay for removing stormwater from the system and other integrated benefits as part of the street project.

The following are several statistics on the City's stakeholder involvement process:

- More than 40 presentations to interested stakeholders and citizen groups, reaching nearly 1400 people
- More than 30 meetings with regulators, Spokane Tribe representatives, and elected officials
- City elected officials were updated through twice-monthly public works meetings

The Integrated Planning Framework allowed Spokane to consider their multiple challenges—CSOs, water treatment, and stormwater management—in a holistic manner. The original plan to spend $300 million just to address CSOs was far too expensive and did not comprehensively cover all the water related issues that the community cared about. By using an integrated planning process, Spokane has created an approach that is both affordable and feasible while satisfying its stakeholders' main concerns.

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