Accelerating Transformational Change in Pittsburgh's Three Rivers

Phase I Report

The Heinz Endowments
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The Water Center
University of Pennsylvania

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There is more consensus than disagreement regarding a long-term vision for the Three Rivers Region "Fishable, swimmable, drinkable, accessible, attractive, just and safe waters"

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BACKGROUND

- The greater Pittsburgh region faces a $2 to 6 billion investment in its water systems over the next 20+ years just for the delivery of two essential capital projects: ALCOSAN's Consent Decree and Pittsburgh Water and Sewer Authority's Capital Investment Program.

- The ALCOSAN and Pittsburgh water system projects have been highly controversial and have, for many years, overshadowed most other water resource discussions among stakeholders throughout the region.

- As the region moves into the implementation stage, it is a perfect time to step back and take stock of the region's abundant water systems and acknowledge some of the other environmental issues confronting the region; their implications on our future water resources; and begin to answer the question of how do we balance and prioritize the implementation of long-term holistic and integrated solutions.

- Other water resource challenges include, but are not limited to:
    - overall waterway health and meeting fishable and swimmable standards of the Clean Water Act;
    - flooding (riverbank overflow, localized and basement);
    - aging municipal infrastructure, septic systems and wells;
    - acid mine drainage;
    - fracking development and frack waste management;
    - lead pipe removal;
    - stream/water corridor and lock repairs and maintenance;
    - recreational use and river access;
    - water affordability;
    - emergency planning and coordinated response to spills and other catastrophic events;
    - climate change and changes in the amount and intensity of precipitation;
    - small system compliance with drinking water quality standard violations;
    - non-CSO stormwater management from existing and new developments and I&I;
    - lack of stormwater utilities, fees and regulations;
    - industrial contaminants (past and present);
    - increasing levels of bromide emissions to surface waters from oil, gas and coal-fired power plant wastewater and road salt;
    - green infrastructure opportunities;
    - contaminated groundwater (PFAS, heavy metals);
    - contaminated sediment; and
    - source water protection from legacy pollutants and emerging contaminants.

- Progress in confronting these challenges has been limited by:
    - the scope and breadth of the ALCOSAN and PWSA projects;
    - the region's rich legacy of strong local governance;
    - limited political leadership in promoting integrated water resource management;
    - the absence of an organized, central entity to lead a regional water resource strategy;
    - the fragmented and siloed nature of the region's water systems;
    - lack of comprehensive watershed-wide long-term monitoring data;
    - weak regulatory and policy oversight; and
    - perceived conflicts between the economic, social and environmental goals for the region.

- The SPC 2019 Forces of Change Environmental Exploratory Scenario Report proposes a five-pronged strategy to address the region's water challenges;
    - Promote Sustainable Regional Water Resource Management and Planning
    - Collaborate on Regional Water Topics
    - Support Efforts to Manage Water Quantity and Storm Water/Flooding
    - Fund Sustainable Infrastructure Systems
    - Develop and Provide Tools for Regional Water Quality Improvement

- While this overall approach is positive and significant, it will need to be significantly strengthened through details, funding and regional cooperation in order to succeed and should be revisited in the presence of more favorable enabling conditions.

A PATH FORWARD

- This report argues that the priority water issues differ by local watershed and political jurisdiction and are experienced in different ways by different segments of the population. Future water resource improvements can best be achieved by:
    - leveraging local energies, especially in underserved communities, into local but scalable solutions, with support from regional expertise and resource networks; and
    - developing integrated strategies that embrace a "One Water" approach for greater effectiveness than the current, more siloed approaches.

- While an effective response will require cooperation and trust across boundaries - geographical, jurisdictional, political, social and cultural - the region does not appear ready to accommodate the emergence of a new or re-organized regional entity with overall regulatory or policy control over water resource issues.
    - That there is a need for such a regionally focused entity to lead creation and implementation of an integrated water strategy is evident. However, this must remain, a long-term objective which guides the short to medium term solutions.

- Therefore, while the region needs to continue to develop a shared vision, long-term regional goals, roles, and responsibilities, it must continue to support and begin to bring together the many individual outcomes-based frameworks that promote a bottom up approach.

- It is recommended that the region build on good practices from the other regional models including those used by Delaware River Basin Commission, Ohio River Sanitation Commission and the Susquehanna River Basin Commission. In addition, there is a significant new reservoir of ideas, models and programs emerging from the Delaware River Watershed Initiative and the Schuylkill Action Network which should be explored for adaptation in the Three Rivers.

- Well organized and carefully nurtured local awareness and water activism - across the region and the political spectrum - will generate significant environmental and political success. This may include:
    - linking up networks and better connecting local initiatives, leveraging successes and lessons learned and amplifying the political importance of this local work;
    - incorporating issues of equity and green infrastructure into the solutions matrices;
    - identifying, developing, and equipping the next generation of regional water leaders among the various grass roots organizations working in the region - in effect - creation of a Water and Watersheds Incubator focused not merely on conveying technical information, but building the political and leadership skills necessary for long-term impact;

  - supporting development of information/data platforms that draw from the many separate and sometimes sporadic data collection efforts. This should be complemented by development of decision-making tools that can identify, in real time, water quality trouble spots so as to better target finite resources; and
  - providing technical and financial assistance and support to the numerous small towns and municipalities within the Three Rivers region that are currently suffering from insufficient capacity to deliver the water services for which they are responsible.

- Key existing organizations should be mobilized to support and become instrumental in moving the water agenda forward including, but certainly not limited to, Three Rivers Wet Weather, Pittsburgh United, the Allegheny Conference, the SPC Water Resource Center, a number of the watershed groups and institutes of knowledge (such as both Carnegie Mellon University and University of Pittsburgh). All should be commended for efforts to date and will be crucial partners in any forward strategy.

- Emerging opportunities must be capitalized upon. As one example, the Water Infrastructure Improvement Act of 2019 amends the Clean Water Act recognizing (1) stormwater source reduction (eg green infrastructure) as an effective and legitimate means of addressing overflows and runoff, and (2) integrated planning across MS4 and CSO regions are an acceptable way to manage overall water quality given limited funding. This provides a new opportunity for more closely aligning ALCOSAN and PWSA committed investments to broader municipal priorities for capital investments, tailoring the combination of solutions to local water issues with increased consideration of sustainability and affordability factors.

- Finally, the regional regulatory agencies (e.g. USEPA, Pa DEP, Allegheny County Health Dept, ORSANCO) need to be significantly more engaged in providing technical and financial assistance and guidance.

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INTRODUCTION

Southwest Pennsylvania is blessed with a wealth of water, with this wealth informing the region's history, industrial legacy, economy, culture, and quality of life.

Water also presents a unique set of challenges for the region: sewer overflows, flooding, industrial and agricultural pollutants, emerging contaminants, aging infrastructure, poorly coordinated land use, and an upstream resource boom. Progress has been made across the watersheds to identify and address some of these issues - the region is on the cusp of unprecedented investment in both gray and green infrastructure in response to a federal consent decree. But this will only partially address the list of evolving and interconnected challenges. Changing climate will strain aging infrastructure, despite investments. Growth in the region and associated land use changes will impact water quality, quantity and affordability. These challenges differently affect populations across urban and rural watersheds, often with inequitable outcomes based on socioeconomic disparities.

An effective response will require cooperation and trust across boundaries - geographical, jurisdictional, political, social and cultural. The region has a rich legacy of local governance much cited as a source of political inertia and a hindrance to action. However, opportunity comes not from obliterating these boundaries in favor of unresponsive technocracy, but in leveraging local energies, especially in underserved communities, into local but scalable solutions with support from regional expertise and resources. This moment provides a unique opportunity to move beyond reactivity to a proactive, long term view of water and land use throughout the three-rivers watersheds.

Only through taking a systematic and integrated approach can the current water system challenges in Southwest Pennsylvania be effectively addressed, with full realization for all of the many benefits the Three Rivers have to offer.

HISTORY

The 'Three Rivers', comprised of the Allegheny, the Monongahela and the Ohio Rivers, have long been considered the arteries of the Pittsburgh Region. From the first riverside human settlements dating back to over 16,000 years ago through to 16th century French and British colonial battles for control of this strategic river outpost considered an enabler of transportation and trade, the value of this natural resource was well understood.

Over the following two centuries, the Three Rivers continued to play an important role in the development of the City of Pittsburgh and surrounding areas. But the late 19th/early 20th centuries witnessed a much more consumptive use of this resource, focused on a primary purpose of ferrying away waste excreted into the rivers by the burgeoning industrial operations lining the riverbanks. Only with the decline of the industrial heyday and the advent of federal laws recognizing the need to protect US airways and waterways in the 1970s was there a reconsideration of the broader value of these river bodies.

One such re-envisaging was around the recreational and sustainable economic development-related opportunities offered by a healthy river-system. There was also increased appreciation for the valuable and often inimitable ecosystem services provided by these bodies of water and their watersheds. Nevertheless, the Three Rivers continued to be used as a back-up system for large precipitation events that overwhelmed combined and sanitary sewer systems. While an increase in recreational water use was experienced, county officials deemed the water unhealthy to recreate in up to 40% of the time over the May to October period each year.[1]

Today, the issue of SSO and CSOs sits high on the Pittsburgh agenda, with the city forced to enter into a consent decree to eliminate discharges into the Three Rivers. This is certainly positive, but the pressures to complete the design of a program that achieves the consent decree's ambitious targets means that it has occurred somewhat in isolation from the many interconnected issues related to the region's water systems.

Fortunately, momentum is building around understanding the relationship between healthy watersheds, clean and safe rivers and tributaries, flooding and clean and affordable drinking water. Highly engaged Three Rivers region stakeholders increasingly recognize that what happens in the upper river watersheds affects the use of this resource down stream. Agriculture, industrial activities and different types of land use strongly impact waterway health, as do sewer systems that are over-capacity due to population growth, aged and failing infrastructure and climatic changes resulting in increased frequency and intensity of large precipitation events.

The time is right to bring stakeholders together to plot a path forward, and this should start with the development of a collective vision to guide the use and stewardship of this incredibly valuable resource well into the future.

1 According to ALCOSAN, over the past ten years, there have been an average of 11 CSO alerts issued by county officials each year during the May to October months. As each event averages 7 days, this amounts to water's being deemed unsuitable for recreation 40% of the time.

The Task

In 2018, the Heinz Endowment Environment program approached the Water Center at Penn to undertake a planning grant for the purposes of:

1. Providing an initial assessment of Pittsburgh's State of its Waters;
2. Identifying the priorities and drivers of the region's leading water stakeholders;
3. Establishing the threats, opportunities, challenges and weaknesses of Pittsburgh's critical water issues; and
4. Creating a road map for a collaborative multi-stakeholder strategic planning process aimed at improving the quality of and access to water resources for all constituents across Pittsburgh's three rivers.

Recognizing the significant number of high quality reports focused on water issues in Southwestern Pennsylvania published from the 1990s to present, this planning grant sought to build upon this knowledge base, avoiding the temptation to repeat what has already been written. The report instead takes a 50,000 foot view and focuses on providing updates where needed and adding new content related to emerging issues and opportunities. With the addition of rich information gained from stakeholder interviews, this report's key aim is to plot out a potential path forward for holistically addressing the water challenges and opportunities facing the Three Rivers region.

Key steps in the development of this report have included:

- In-depth literature review - See extensive reference list at end of report.
- Stakeholder outreach - Based on an initial stakeholder list provided by the Heinz Endowment, and building opportunistically on a range of meetings organized for Howard Neukrug by Pittsburgh United as part of their Tunnel Vision campaign, a longer list of stakeholders was developed.
    - This list deliberately tried to cover a wide range of stakeholders categories including universities/knowledge centers, watershed associations, environmental groups/NGOs, communities, municipal/borough/county representatives, private sector, recreational river users, land use government departments, utilities, regulators and elected officials (See annex 1).
    - Over 40 individuals representing 34 organizations/groups were interviewed via phone or in person. Conversations explored challenges and opportunities from their diverse perspectives. Insights were gained into why previous stakeholder exercises had not necessarily resulted in resolution of the identified issues.
    - The final list of interviews is far from exhaustive, acknowledging a number of important stakeholder group gaps including insufficient engagement with more economically disadvantaged communities, water recreation users, the private sector and with land use planners. But in the context of a planning grant, the process was considered sufficient to inform the Water Center at Penn thinking that follows.

A SHARED VISION

A shared, long-term vision for water resources in the Three Rivers region is conspicuously absent. The 2012 Water Resource Foundation study similarly noted a lack of a unified vision and systems thinking. The entire 295 page book 'Regional Cooperation for Water Quality Improvements in Southwest Pennsylvania' is surprisingly silent on the importance of shared vision development (2005) and even a number of highly commendable local watershed strategies say little about the vision communities have for broader water resources over the next 20 to 50 years.

While trying to understand why no vision yet existed - discussed at length in the 'Threats' section of the report - this planning grant began by exploring the range of outcomes sought by interviewed stakeholders. In considering what they wanted the water system to be like in the future - 2030, 2050, 2070 - many overlapping themes were elicited, demonstrating much more consensus than disagreement:

Swimmable Fishable Drinkable Healthy Accessible Safe
Attractive Protected One Water Economic Engine
Responsibly and thoughtfully developed

These terms contrasted with individual descriptions of the water system today:

Abundant Threatened Distressed At a threshold Challenging
Compliance driven Severely underfunded Much better than the past

This last point - 'much better than the past' - was considered a key source of the inertia or general lack of urgency around taking action. There was some consensus that while water in the region is seen as a valuable resource by some, the mainstream is still insufficiently aware of how valuable.

The development of a shared vision will be a crucial element of any future strategic planning process, particularly given the highly diverse interests of the Three Rivers region's stakeholders. Undertaking a visioning exercise can present an opportunity to harness energy and commitment around those aspects where there is broad consensus, temporarily shielding the exercise from the divisions and tensions created by starting with shorter term priorities and tactics. Developing a longer term vision may also prove helpful in overcoming the inertia and hopelessness that arise from the realities of short term funding shortages. But the enabling conditions for undertaking a formal, regional visioning exercise must be present for it to be successful. Right now, this report argues that initial efforts might be better placed in supporting and networking existing local initiatives.

GEOGRAPHICAL SCOPE OF THE EXERCISE

The ability to articulate and then deliver effectively and efficiently upon an eventual shared vision for the Three River water system will require coordination, cooperation, and increased trust across geographic, jurisdictional, political, social and cultural boundaries. Gaining a better understanding of differences and unifiers across these boundaries has been an important part of this planning grant. This understanding will be crucial in helping to inform an eventual decision around the geographical extent of future Three Rivers Water resources strategic planning and management exercises.

Not unexpectedly, no consensus was obtained in interviews regarding preferred geographical delineations. Some interviewees clearly feel that only by operating at a watershed level can the goals of 'swimmable, drinkable, fishable' be achieved. Such an approach would therefore delineate the bounds of this exercise as the outer regions of the three watersheds, possibly encompassing the entire area show below in figure 1.

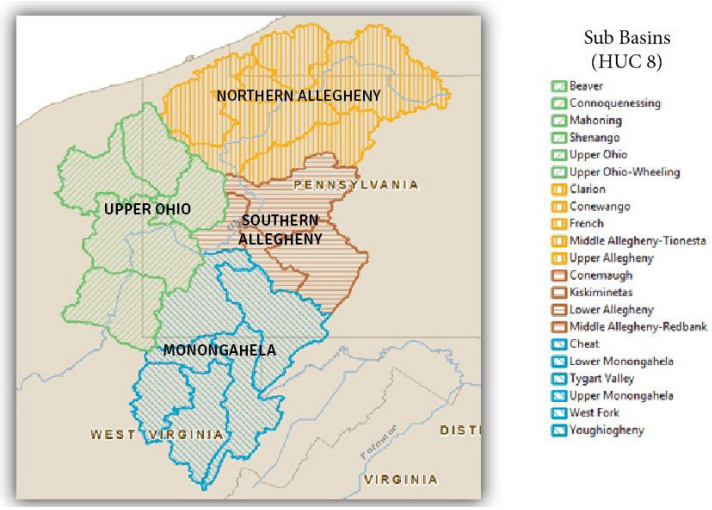

Figure 1: Three Rivers Watersheds. Source: https://www.fondriest.com/news/monongahela-monitoring-program-expands-to-ohio-and-allegheny-rivers.htm

Other stakeholders, while understanding the biophysical reasons for a focus on the three watersheds, feel such a scale to be unmanageable and a likely source of future inertia. As such, these stakeholders recommend working within existing jurisdictional boundaries such as the 10 counties that form part of the Southwestern Pennsylvania Commission (2.5m people), Allegheny County (1.2m people), or the ALCOSAN service area (900,000 people), capitalizing on existing governance structures. Figure 2 below depicts all three of these potential delineations.

Figure 2: SPC (all 10 counties), Pittsburgh Metropolitan Statistical Area (area within blue delineation), Allegheny County (center county) and ALCOSAN service area (colored section within Allegheny county)

Ultimately, in the short term, the more bottom-up lead approach recommended by this paper means that a formal delineation is not yet required. To a certain extent, future leaders and organizations will be self identifying, and the collaboratory model can allow an opportunistic approach to defining the boundaries: Locations will demonstrate their interest in building a shared vision by turning up.

THE THREATS

Development of a forward path must be informed by a solid and shared understanding of the current threats and challenges. As such, interviewed stakeholders were asked to identify the critical Three Rivers water system problems that needed addressing. Surprisingly, many respondents struggled to easily articulate which of the many issues were the greatest threats. The lack of sufficient, timely, comprehensive high quality data to understand the magnitude of each of the challenges was repeatedly mentioned. As such, the following section presents a high level summary of each of the issues raised, avoiding the temptation to provide a ranking.

US Army Corps of Engineers: https://www.lrp.usace.army.mil/Missions/Navigation/Locks-and-Dams/Lock-Dam-6-Allegheny-River/

DIVERSITY AND FRAGMENTATION

The Three Rivers region has a rich legacy of small municipalities and multiple levels of governance.

- Within Southwestern Pennsylvania, the rivers pass through seven counties:
    - The Allegheny River passes through Armstrong and Westmoreland counties on its way to Allegheny county. Meanwhile, the Monongahela River meanders through Greene, Lafayette, Washington and Westmoreland counties before arriving into Allegheny county. Finally, the Ohio River, which starts in Allegheny County proceeds to travel through Beaver before arriving in West Virginia
    - Allegheny County, home to the confluence of the three rivers, itself boasts 130 municipalities as well as 41 different entities involved in water sourcing, treatment and distribution.
    - Allegheny County is governed by an elected executive and county council, and also hosts a conservation district with a mandate to conserve, promote and improve the county's natural resources.
    - Under the Pennsylvania Municipal Authorities Act the Allegheny County Sanitary Authority (ALCOSAN) was also established to treat sewage and wastewaters for 83 Allegheny communities including the City of Pittsburgh.
    - All above-mentioned counties through which the Three Rivers pass are within the remit of the 10-county Southwest Pennsylvania Commission (SPC). The rivers themselves also fall under the mandate of the Ohio River Valley Water Sanitation Commission (ORSANCO).

The fragmented governance that results from the above picture is much cited as a source of political inertia and a hindrance to meaningful regional action. It supports the 2017 Blue Ribbon Panel contention that Southwest Pennsylvania is arguably the most fragmented region in the U.S. in terms of water management. Previous, high quality studies and panels commissioned for the purposes of charting a way forward have most often arrived at recommendations for regionalization. The below table 1 summarizes three high profile efforts between 1990 and 2015.

Table 1

Report	Key Recommendations
Allegheny County Stormwater Management Study-Phase 1 (Coopers and Lybrand, 1990)	1. Stormwater Management District most viable 2. Watershed approach 3. Annual user fee for property owners 4. Lays out roles and responsibilities for district
Regional Water Management Task Force - Recommendations (University of Pittsburgh Institute of Politics: Environmental Policy Committee, 2007)	1. Creation of a Three Rivers Water Planning district as a regional planning and local government service entity 2. Document makes specific recommendations for governance, powers and functions, model ordinances, best practices, integrated water management plans, revenue, staffing, and the like
Sewer Regionalization Evaluation: Review Panel Findings and recommendations (Allegheny Conf. on Community Development/Alcosan, 2013)	1. Municipalities should pursue integrated municipal stormwater and wastewater planning and include source reduction approaches in their feasibility plans 2. Municipalities should explore the practicality of voluntary consolidation of their collection systems with watershed-based systems or with ALCOSAN 3. Municipalities should determine the potential for developing regional stormwater collection services on watershed or other logical bases 4. County Executive and the Mayor of the City of Pittsburgh should convene a stakeholder process for recommending the appropriate size and mix of ALCOSAN board membership 5. County Executive should immediately establish the position of Wastewater Planning Coordinator 6. Expeditious process to determine how intermunicipal conveyance lines, other trunk lines and upstream wet weather facilities will be conveyed to ALCOSAN 7. ALCOSAN and the municipalities should develop a standard agreement to incentivize flow reduction from municipal conveyance sources.
2015 Update (3RWW, Congress of Neighboring Communities ("Connect" - UPitt))	1. Implement a municipal outreach process to all 83 ALCOSAN service-area municipalities in regionalization and source reduction efforts 2. Assist in the due diligence process of ALCOSAN and its service-area municipalities to aid the negotiations that will result in ALCOSAN taking ownership and operations responsibility for the intermunicipal conveyance pipes, other trunk lines, and upstream wet weather facilities beginning in 2016 3. Convene of a regional source reduction policy process whereby municipalities cooperatively create a source reduction plan to maximize returns for the region 4. Consider meaningful ways to assist the region in reaching consensus on source reduction, green infrastructure, and flow control elements.

But to date, many of the above recommendation have struggled to move into the implementation phase. Stakeholders have repeatedly and consistently cited the primary reasons for this as being the lack of clear leadership in this crowded space, as well as a lack of a formal legal mandate and associated funding to allow regional organizations such as SPC to move this forward.

Additionally, the region, like many regions across the US, also demonstrates wide political, socio-economic and cultural diversity. This translates into different values and different needs. And the diversity is not static. Political shift to the right occurring in Southwest Pennsylvania between 2012 and 2016 have been accompanied by increasing polarization of perspectives, including vastly different degrees of receptiveness to using regulatory approaches for addressing water issues (see figure 3 below). Rural communities may also be concerned that the large financial needs for delivering on the consent decree and PWSA CIP commitments will leave little in the way of financial resources to address water issues outside of Pittsburgh.

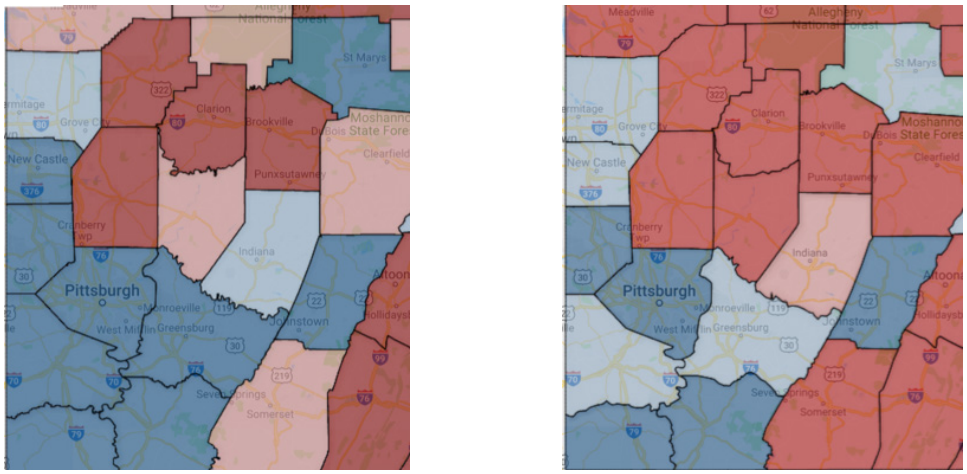

Figure 3: Voter registration 2012 (left) versus as at Oct 2016 (right). Source: https://www.mcall.com/news/local/elections/mc-map-pa-voter-registration-20160315-htmlstory.html

GOVERNANCE CHALLENGES

Confounding efforts further are some noteworthy governance challenges facing water resource management in the Three Rivers Region.

In 2017, the state legislature placed the Pittsburgh Water and Sewer Authority (PWSA) under the regulatory oversight of the state Public Utilities Commission(PUC) in response to the public exposure of the highly precarious state of the utility.

- A Blue Ribbon Panel convened to advise the Mayor on how to possibly restructure PWSA concluded that "PWSA's leadership in the past has been weak, ineffective and conflicted. Furthermore, based on political considerations, elected officials and PWSA's Board and senior leaders have made numerous decisions not in the best interest of PWSA".

- The panel acknowledged a real improvement in PWSA operations since being placed under PUC oversight but indicated that experts still classified the organization as "fragile". There was still a need for further governance and operational changes to ensure additional improvements to its health and effectiveness.

- The panel recommended against privatization of the utility, but also against transferring ownership to the City of Pittsburgh, recommending it remain a municipal authority.
    - It strongly advocated removing politics from selection of PWSA's future board.

- The years-long state of crisis at PWSA has meant that its leadership has not had the luxury of focusing on long term strategic issues such as source water protection. Given the number of current and future upstream impacts to its surface water sources, this should be an intermediate-term priority.

The issue of utility privatization remains highly contentious with strong opposition among Pittsburgh's environmental and community organizations. At the root of the issue is the fear of water service price hikes and less scrutiny over drinking water quality should a private entity take over water resource management. The concern is not without substance, with a 2015 Food and Water Watch report indicating that in Pennsylvania, private water systems charged 84% more than public systems, equivalent to an extra $323 a year.

Another issues raised by a number of stakeholders is the sense that Pennsylvania and Allegheny County's political leaders are promoting concepts of sustainability, livability, transformation and renaissance, but in reality are not really willing to expend the political capital necessary to get behind a plan that requires them to rethink their support for extractive and other industrial developments.

COMBINED SEWER OVERFLOW/SANITARY SEWER OVERFLOW (CSO/SSO)

The state and capacity of Allegheny county's sewer infrastructure and its fragmented governance, as well as the equity of it fee structure have dominated Allegheny county water-focused conversations in recent years.

Sewer Infrastructure and Fragmented Governance

Many different actors play a role in wastewater management. In Allegheny County, there are an estimated 35 wastewater management agencies and 46 publicly owned wastewater treatment facilities (Allegheny County, 2008). ALCOSAN is the largest sewer network serving about 70% of the county throughout 93 municipalities, including the City of Pittsburgh. It is comprised of 4,100 miles of underground conveyance pipes which transport waste waters to its treatment center, prior to release back into the rivers (ALCOSAN, 2012).

Municipalities additionally play a key role in wastewater management, responsible for CSO or SSO infrastructure within their jurisdictions. Where both CSO and SSO exist, wastewaters travel from these satellite systems into the trunk sewers owned by ALCOSAN. Eventually wastewaters make their way into the interceptor system that transports it to the treatment plant. Based on geography, some municipal wastewaters first pass through neighboring municipal sewage systems before entering the ALCOSAN trunk system. Finally having arrived at ALCOSAN's 59 acre treatment plant, wastewater is treated to the secondary level and is then released into the Ohio River.

But not all wastewater undergoes treatment. ALCOSAN's sewer system also includes 317 overflow structures. Their purpose is to allow for release of untreated wastewater into waterways whenever the system's capacity is overwhelmed, which can occur with as little at 1.5 inches of rain. 84% of the overflow structures come from combined sewers.

- According to the 2017 RAND report, more than 9 billion gallons (Bgal.) of sewer overflow are released into waterways each year in and around Pittsburgh, in violation of the U.S. Clean Water Act (33 U.S.C. 1251), in addition to state and county public health laws. In 2017 alone, Pittsburgh sewers overflowed 65 times, resulting each time in raw sewage being pumped into the river system (Pittsburgh Magazine, 2018). Insufficient sewer capacity also results in basement backups and neighborhood flooding, raising serious public health and safety, as well as economic and environmental justice issues.

While ALCOSAN is a holder of a NPDES permit, the levels of overflow resulted in a 2008 EPA order for ALCOSAN to enter into a consent decree. A plan was to be developed to guarantee that by 2026, all SSOs would be eliminated and CSOs reduced significantly. Over the subsequent years much time was invested into development of the Wet Weather plan. The Plan eventually arrived at the conclusion that the most cost effective approach for addressing CSO and SSOs was three-pronged, consisting of mainly traditional grey infrastructure, specifically:

- Expansion of the treatment capacity at the Wood's Run wastewater treatment plant,
- Construction of new regional deep conveyance tunnels, and
- The establishment of several remote storage facilities.

Costed at $3.5b (2010 dollars), a phased approach was presented with the first $2billion (2010 dollars) phase to be completed by 2026 and the second phase being undertaken using an adaptive management approach reflecting the environmental, regulatory and economic conditions at that point in time. The draft Wet Weather Plan was submitted to EPA in 2013.

EPA responded in 2014, indicating they found the plan to be insufficient. Since the, and in an environment of significant advocacy campaigning in favor of natural rather than grey solutions, an updated Wet Weather Plan has been developed. It is now said to include more language around adaptive management and more references to green infrastructure. At May 2019, it was awaiting final executive approval from Washington DC.

Stormwater Fee Structure Equity

The current stormwater fee structure is considered by many as inequitable. In many places, fees remain tied to water usage with no consideration of impervious surfaces and the role they play on stormwater runoff. Such an approach provides little incentive for individual property owners to reduce the volume of stormwater runoff from their properties. It also means that, in the case of Pittsburgh, the approximately 40,000 properties not currently connected to the sewage system make no contribution to the costs of sewer maintenance or upgrades despite contributing stormwater runoff from their properties.

Fortunately progress is being made to address the inequities and lack of incentives for adoption of best management practices.

- In 2018, the PA senate local government committee authorized boroughs, townships of the first class, cities of the third class and incorporated towns to adopt local stormwater management fees. This follows earlier legislation in 2014 and 2016 permitting municipalities to establish municipal authorities for implementing stormwater management programs (PA Environment Digest Blog, 2018).
- PWSA is expected to introduce a separate stormwater fee in 2020, based on impervious surface. Importantly, the fee is also expected to be applied to 40,000 non-connected properties mentioned above. Fees collected will be earmarked for GI investment, mimicking the approach already being taken in at least four other Allegheny municipalities.
- The new, more equitable fee structure will also be accompanied by a reduction in sewage bills for most customers.

FLOOD MANAGEMENT

While much of the official attention and future water investment is on drinking water and elimination of sanitary and combined sewer overflows into the Three Rivers, the issue of flooding was more often cited as a serious concern of the stakeholders interviewed as part of this planning grant.

Life along rivers means flooding, and the region has faced significant catastrophic main-channel flooding in 1883, 1907, 1936, and 1964, among other years. Large flood control infrastructure spending in response to the 1936 event has mitigated some subsequent events. However, more regular localized flooding is a constant issue for the region.

Physical Characteristics of Region

Regional topography, geology and hydrologic soil types make the area prone to flooding. More than 75% of soils in Allegheny county are considered to have moderate to high runoff potential while more than 50% of land in Allegheny county is classified as having steep to severe and precipitous slopes, rendering it unsuitable for most urban development (Allegheny County, 2018).

This threat is exacerbated by historic land use decisions and infrastructure design. The people of the region have been conditioned to expect closed roads and flooded basements as a result of any significant rainfall.

This is an issue likely to get worse, as changing precipitation patterns result in greater frequency and intensity of large rainfall events. In 2018, Pittsburgh experienced its wettest year since recordings began in 1890.

Land Use

In addition, ongoing development continues to increase the volume of storm runoff. While stormwater management is now an integral part of the planning and design process, and available land for development is limited by topography, it is clear current standards for new construction remain insufficient to address this issue. Land use management decisions are a primary driver of these issues and a key part of solution, yet often not part of water-related discussions.

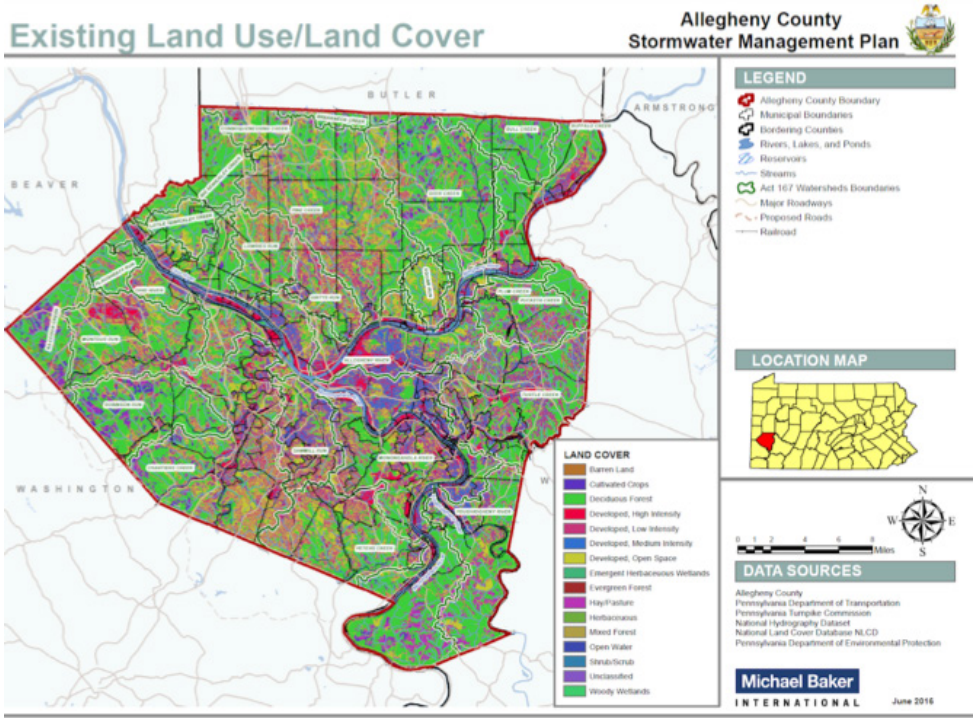

Figure 4: Allegheny County Land Use Cover. Source: Allegheny County Stormwater Management Plan 2018

Flooding and Environmental Justice

Historic land use and ongoing development patterns also introduce an equity issue to the question of flooding. In a very general sense older, poorer communities less able to withstand repeated flooding events tend to be downstream - nearer historic industrial developments in the floodplains. Much of the classic suburban sprawl and residential development over the past 70 years has flowed up out of the narrow valleys close to the main channels, into upper reaches of the watersheds of the smaller tributaries with the resulting stormwater flows funneled back downslope. The Boroughs of Mill Vale and Etna along the north shore of the Allegheny are prime examples of this phenomena.

Since flooding is such a key topic to a broad section of stakeholders, and is inextricably linked to issues of stormwater management, water quality, CSO's, etc., it is a valuable way to introduce the broader topics to stakeholders. To our knowledge, no comprehensive assessment of the annual economic cost of flood damage to the region has been undertaken, although the Pennsylvania Emergency Management agency's 2009 statewide study looking at potential damage estimates for major flooding events presents a picture of significant costs - over $7b for Allegheny County alone for a 10-year storm (Allegheny County, 2018).

AFFORDABLE, SAFE DRINKING WATER

The issue of system fragmentation has been discussed above, and clearly manifests in the treatment and provision of drinking water. In Allegheny county, the majority of its drinking water for its 620,000 customers is sourced from the three Pittsburgh rivers, with only around 10% extracted from groundwater sources.

There are many disparate actors involved in the sourcing, treatment and distribution of this water -: Latest figures indicate 22 municipal authorities, 18 municipalities and one investor-owned operation (see figure 5). Of these, 20 are considered primary water suppliers, operating both source of supply and treatment (Allegheny County Comprehensive Plan, 2008).

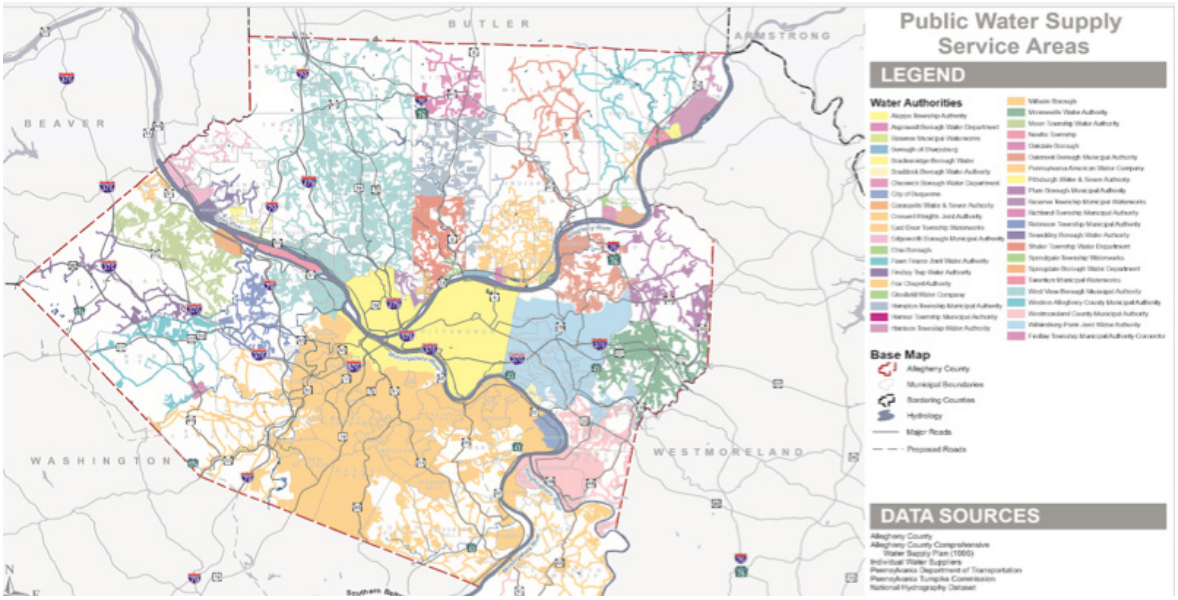

Figure 5: Public Water Supply Service Areas. Source: Allegheny County Comprehensive Plan 2008, Map 4J1 http://alleghenyplaces.com/maps/ec/PublicWaterSupplyServiceAreas.pdf

Four water suppliers supply the lion's share of the county's drinking water and cover the greater Pittsburgh area - Pittsburgh Water and Sewer Authority (300,000 customers), Pennsylvania American Water (unable to obtain), Wilkinsburg Penn Joint Water Authority (40,000 customers) and West View Water Authority (200,000 people).

A similar situation of fragmentation is found, albeit to a lesser degree, in surrounding counties.

Key issues related to drinking water raised in stakeholder interviews included that of affordability, quality and reliability, the issue of lead and the sense that there is increasing source water vulnerability. Highlight points for each are presented here below.

Water Affordability

The issue of affordability was raised independently by interviewees in fewer conversations than expected. This was surprising given that PAAW is among the top 5 most expensive water suppliers in the US according to the 2017 Food and Water Watch water affordability report (2017). Additionally, it is awaiting a decision on 17% rate hike requested in 2017, while in February 2019, PWSA received approval for a 14% rate raise, slightly down from the 16% filed.

When stakeholders were directly asked about affordability, a common response was that while rates were rising, water bills were still significantly lower than cable or internet services.

While acknowledging this cost differential to be true, an important limitation of this phase 1 planning grant is revealed though through this question, namely that there were insufficient interviews undertaken directly with economically disadvantaged communities. Additionally, another future useful line of inquiry will be regarding the adequacy or otherwise of the water shut off moratoriums and bill discount programs of both PWSA and PAAW, and the apparent lack of similar safety nets by the majority of other county water utilities.

- To be noted, a Pittsburgh United 'Our Water ' campaign tackling a number of issues including affordability, considers the current affordability programs to be insufficient and calls for more aggressive actions including permanent protections to vulnerable populations and looking for more equitable rate structures.

Drinking Water Quality and Reliability

All drinking water suppliers are obligated to publish annual water quality reports. These reports contain information on a range of parameters in both the treatment centers as well as distribution channels. Such parameters include levels of lead and copper; turbidity; sodium; regulated substances including nitrates, nitrites, fluoride, total trihalomethanes, haloacetic acids and chromium; chlorine; and total organic carbon removal.

2017 drinking water quality reports from the four largest water providers indicate no violations of established acceptable low-high ranges for all tested parameters with the exception of a turbidity event experienced by PAAW resulting in a boil notice affecting over 100,000 customers. PWSA also issued a boil notice to another 100,000 residents in relation to possible giardia contamination due to low chlorine levels at its Highland Park Reservoir and Distribution Center.
In general, setting aside the issue of lead which is discussed separately below, drinking water quality for customers of these four suppliers appears to be generally satisfactory based on what is being tested for.

An important caveat raised by several stakeholders is the likely presence of a range of new or emerging contaminants that are not yet part of mandated testing regimes and as such are not being reported on. Examples include PCBs, PFoS, plastics and pharmaceutical and personal care products (PPCP) and endocrine disrupting compounds. See our additional comments on this in the context of source water protection below.

Several stakeholders raised doubts about the quality of drinking water at the many smaller water suppliers scattered across the region. Though not substantiated, there was a question around the capacity of these much smaller utilities to be able to keep up with complex mandatory treatment regimes and water testing using accepted standards.

To be clear, there was no suggestion of intentional deceit, but rather a question around whether these often very small utilities had the requisite water specialists and the capital to invest in purchasing and/or upgrading of testing and treatment equipment that would allow for proper detection of unacceptable levels of different parameters.

Lead in Water

Lead contamination was raised as a major concern by many in discussions around drinking water. A 2018 analysis undertaken by NDRC using EPA data indicates that Pittsburgh has been experiencing lead contamination issues since 2016.

PWSA's 2017 Annual Drinking Water Quality Report indicated that 12.7% of 112 pre-selected sites tested for lead exceeded the EPA action level of 15 ppb. EPA requires that 90% of tests be under this level. By mid 2018, PSWA were back in compliance with lead testing showing that more than 90% of tests undertaken were under 10 parts per billion.

A February 2019 settlement overseen by the PUC requires $50m in grants and loans from Pennvest be used by PWSA in 2019 to:

- Replace thousands of full lead services lines comprising both public and private portions at zero cost to residents
- Use public health factors including blood lead levels in children, to determine priority lead service line replacements
- Provide low-income customers served by lead or unknown service line materials with free water filters and replacement cartridges
- Create a 'Community Lead Response Advisory Committee' with a mandate to direct PWSA on remediation efforts (WaterOnline, 2019)

An addition limitation imposed on PWSA is regarding partial lead service line replacements which have been seen to spike lead levels.

- This issue was is the center of a February 2019 criminal filings against the PWSA by the PA Attorney General, despite the utility having earlier admitted civil liability and accepting the $2.4m fine from the PADEP.

There is less known regarding water-related lead exposure outside of Pittsburgh. Some stakeholders questioned the capacity of the 40+ other water suppliers throughout the county to be able to properly detect, report and then remedy.

There is also a sense that there is insufficient understanding of non-water sources of lead exposure, particularly via paint, dust, toys or soils. The recently established Lead Safe Coalition is promoting the collection of more evidence to better target finite financial resources to where there may be multiple exposures.

The issue of lead disproportionately impacts people on low incomes and people of color and is seen by many as an environmental justice issue.

Increasing Sense of Source Water Vulnerability

Several interviewed stakeholders raised the issue of an increasing sense of source water vulnerability, primarily due to increased resource extraction activity. While at this stage the claims are somewhat anecdotal with limited concrete supporting evidence, the increasing water demands coming from the extractive industry are certainly real. This combined with the arguably lower capacity of the often smaller water treatment operators responsible for treating extractive industry wastewater does leave open the possibility for a diminishing of drinking water quality.
There is also a sense that certain water authorities are under the impression that they have an unlimited capacity to provide potable water when in reality, they are already tapping into their emergency sources. As an example, one Water Authority was said to be meeting water demand by regularly using reservoir resources that are considered an emergency supply.

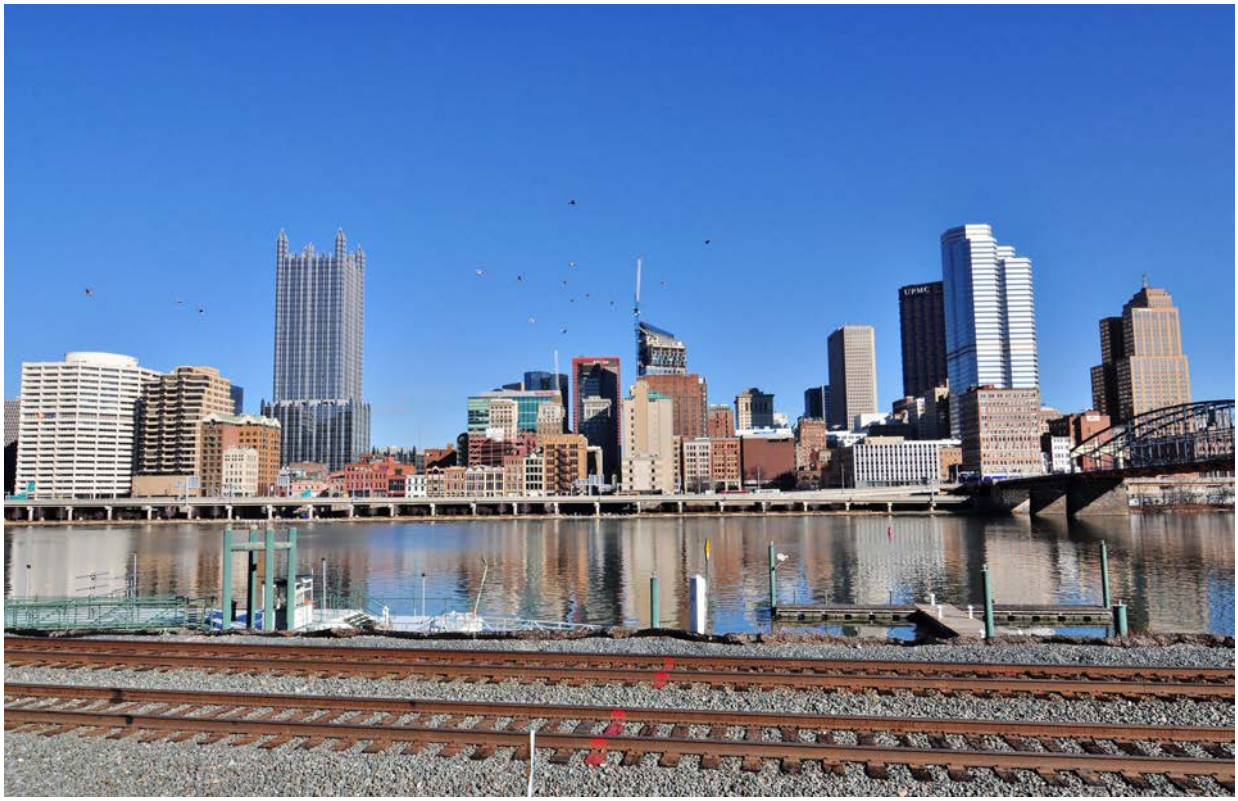

Photo Credit: pedrik (Flickr)

RIVER HEALTH

It is undeniable that the ecosystem health of the Three Rivers has improved over the past 50 years. The management of large point sources responsible for much of the pollution prior to the implementation of the Clean Water Act has been a qualified success. In addition, the evolution of the region's economy has taken some pressure off the resource, and natural systems are resilient and regenerative to a point. However, cumulative impacts from permitted industrial and municipal discharges continue to have a deleterious effect, and the other ongoing and emerging threats are arguably more insidious.

River Stressors

The health of a river is dependent on the health of its tributaries and watersheds. In addition, stakeholders are more likely to be invested in the health of their local tributaries. Each significant tributary of the three rivers faces a unique mix of stressors affecting its health. Unfortunately the lack of comprehensive monitoring data for many streams and rivers in the region makes it very difficult to make conclusive assessments of the magnitude and associated trends of many of the issues raised by stakeholders throughout this process. Limited state resources, and the short-term nature of typical project-based funding, result in a discontinuous patchwork of data of varying breadth and quality.

Nevertheless, known stressors include:

- Discharges from historic (AMD) or ongoing mining activities (exacerbated by recent historically-high water tables)
- Ongoing and new permitted industrial discharges, as well as accidental releases and non-compliance with existing permits
    - While all NPDES permits issued by PA DEP are based on TMDL acceptable limits for receiving waterways, it is also true that not all permits are followed, illicit discharges continue and there is always the possibility of unplanned discharges of important magnitudes such as the Freedom Industries discharge that occured in Elk River, West Virginia in 2014. A 2018 PennEnvironment report drawing from EPA compliance data indicated that 40% of all major industrial facilities across the US exceeded their permits at least once, with Eastman Chemical Resins, on the Monongahela just upstream of Pittsburgh considered the second worst offender (Lancianese, 2018). Pennsylvania had the second highest number of permit exceedances in the country.
- The impacts of both conventional and non-conventional oil and gas extraction on groundwater and surface water
- Urbanization and poorly considered land-use and development patterns, and attendant effects on runoff quality and quantity
- Ongoing impacts from legacy pollutants in sediment (e.g. PCB's and other persistent organics, metals)
- Emerging contaminants such as PFOS, pharmaceutical compounds, personal care products, and the broad range of chemical compounds present in the chain of commerce but

not routinely analyzed in surface water. These can be particularly pernicious from an ecological standpoint since many are formulated to have particular biological effects, yet their long term environmental effects are often unknown, particularly in synergy.

Each of these stressors in isolation poses a challenge in its own right, but the typical tributary of the Three Rivers faces most or all of these. This is compounded by changes in flow regimes due changing precipitation patterns.

One particular river stressor that has benefitted from some recent, concentrated research attention is that of increased bromide levels in source water. While bromide in rivers was not historically considered a direct concern for human or ecosystem health and therefore remained largely unregulated, during conventional drinking water treatment processes, bromide does increase the formation of disinfection byproducts (DBPs) such as trihalomethanes. Recognition of this has resulted in the US EPA adding bromides to the Safe Drinking Water Act's Fourth Unregulated Contaminant Monitoring Rule (2019).

Apart from naturally occurring bromide in source waters, the majority of anthropogenic discharge comes from:

- Coal-Fired power plants Wet Flu Gas Desulfurization (FDG) wastewater discharges. Bromide is added to control mercury discharges which are subject to EPA controls under the Mercury and Air Toxic Standards (MATS).

- Oil and gas wastewaters. The source of high bromide concentrations is a result of their origin from highly evaporated paleoseawater. Currently, treatment plants accepting such wastewaters most often do not remove bromide.

Two recent studies undertaken by Good and Van Briesen from Carnegie Mellon University deepen our understanding of the current and future impact of bromide loading within the Three Rivers region, and ask questions of whether the current regulatory approach will be sufficient in managing current and future risks to human and ecosystem health. Taking into account more stringent future MATS controls which will likely result in increased industry use of bromide at FDG plants, their 2016 study estimated future bromide levels in the Allegheny River. The results indicate:

> "For the Allegheny River, the current bromide is associated approximately 49% with oil- and gas-produced water discharges and 33% with coal-fired power plants operating wet FGD, with 18% derived from natural sources during mean flow conditions in August. Median wet FGD bromide loads could increase 3-fold from 610 to 1900 kg/day if all plants implement bromide addition for mercury control. Median bromide concentrations in the lower Allegheny River in August would rise to 410, 200, and 180 µg/L under low-, mean-, and high-flow conditions, respectively, for the bromide-addition scenario" (Good and VanBriesen, 2016, p9078).

Focusing on the same water body, their 2017 published study explored whether the current regulatory approach to establishing a geographic buffer to evaluate the effects of wet FGD discharges on surface water sources is appropriate. Their research revealed that multiple power plants operating wet FGD currently contribute approximately one-third of the total bromide concentration at a drinking water treatment plant located a significant distance downstream and outside of the buffer. This is significant given that in the area under study, 22 public drinking water systems serve a population of 2.5 million people downstream of at least one wet FGD discharge.

A concluding thought of Good and Van Briesen was that installing new treatment processes at water treatment plants for bromide removal remains impractical and cost-ineffective and as such, greatest attention and resources should be placed on preventing discharge from entering into source waters in the first place (2016, 2017).

Impact on Recreational Use

The perceived health of the rivers and tributaries are a key factor in recreational use of these resources. People are naturally drawn to water, but the strength of a community's connection (or not) to the river is a function of its access to the water and how they view its health. Important strides in both areas in the recent past have brought people back to the water, although progress is uneven, arguably inequitable, and much work remains to be done.

The fact that the waterways are much healthier than before has encouraged increased use, despite the fact that Allegheny County health officials county officials deemed the main stem water unhealthy to recreate in up to 40% of the time over the May to October period each year. Success stories include the Three Rivers Heritage trail, a 24 mile multi-use riverfront trail system, which supports a connection to the water for a broad range of users.

Other water recreational activities are also rebounding. Pittsburgh was one a major rowing center in the 1800s but the sport saw a major decline as the river became increasingly used as a sewer for the riverside industry. Only after the decline of industrial activities was rowing revived with the Three Rivers Rowing Association re-created in 1984. Today, alongside rowing, there is growing use of the waterways for activities in kayaking, fishing, swimming, triathlons, and festival-like events including Three Rivers Regatta which includes both river and riverside events. Further up into the watersheds, outdoor recreation such as fishing, canoeing and whitewater rafting continue to be both popular local activities and a boost to tourism.

Not to be overlooked is the issue of equitable access. Often, distressed communities closest to the water are hemmed in by infrastructure and brownfields sites and do not have safe access to the water. Alternatively, the waterways in similar upstream communities are often disproportionately affected by urban runoff and flooding. Any long term planning process concerned with equitable water access must set out to address these barriers.

THE OPPORTUNITIES

The wide range of issues presented above could appear insurmountable. Previous, very ably-lead efforts to tackle some of the Three Rivers region's wicked problems have struggled to move from the recommendations phase to implementation. Nevertheless, there are many reasons for hope and optimism.

1. The timing is ideal for a new collective effort. The unprecedented investment commitments of both ALCOSAN and PWSA - potentially up to $6 billion - present an enormous opportunity: there is raised awareness around the fragility of the current system, with the message reaching broadly across the region.

2. The ALCOSAN Consent Decree, while focused primarily on reducing Sanitary and Combined Sewer Overflows, now features new language around adaptive management. This means that while progress will begin on the construction of the first tunnel, the 7 years between now and when it is expected to be completed allows for stakeholders to experiment further with green infrastructure and other initiatives and in doing so, demonstrate the ability of these natural solutions to reduce the predicted volumes of wastewater that the tunnel is being designed to handle. If this can be done, the adaptive management clauses of the consent decree allow for tunnel design modifications.

    a. Green infrastructure development is a major part of the adaptive management strategy. Use of GI is being widely embraced by both community/watershed groups as well as utilities such as PWSA and as it gets further rolled out, many proponents expect it to be able to demonstrate tangible results in terms of reducing stormwater runoff.

3. The new Water Infrastructure Improvement Act addendum to the Clean Water Act, signed by the President on Jan 14, 2019, provides new opportunities for more closely aligning ALCOSAN and PWSA committed investments to broader municipal priorities for capital investments, tailoring the combination of solutions to local water issues and considering sustainability and affordability factors. It codifies integrated planning and green infrastructure, optimizing municipalities' abilities to develop flexible, affordable, and adaptable programs addressing critical water quality impacts.

4. Timing may not be right for another strong watershed-wide regionalization push, but near term opportunity lies in leveraging local voices and local energies into meaningful local solutions, with the support of regional expertise and resource.

    a. There are numerous local efforts to build upon and with which to encourage more cross-dissemination of experiences including motivated groups working on Negley Run, 4 Mile Run, Borough of Etna, Nine Mile Run, Mountain Watershed Association, Saw Mill Run and a number of other grassroots organizations throughout the region. Within these local laboratories are the next generation of water leaders who, in the absence of political will among large institutions, must be nurtured and equipped to lead in 10, 20 or 30 years when generational changes are likely to change the political calculus.

5. Greater consideration is being given to equity issues. In stakeholder interviews, it was raised in conversations around lead in drinking water, water affordability, basement CSO backups, stormwater fees (or absence of), flood induced landslides and access to waterways and associated recreational opportunities. Water-related equity considerations are being increasingly embedded into stakeholder organization's programing.

    a. A number of water and equity focused initiatives are already underway or soon to be launched. Any future steps emerging out of this planning phase should make efforts to link to these initiatives. A sample of such activities include:

        i. UrbanKind - With a mission of advancing policies, practices, and programs that are kind to urban people and environments, this Pittsburgh-based organization is establishing a collective of black environmental professionals working at the intersection of health, environment, and climate change. The aimis to grow and ground the Pittsburgh region's environmental efforts in a way that is life-informed, culturally-fluent, and comprehensive, with a focus on Black neighborhoods and living contexts.

        ii. Mayors Innovation Project - This learning network of American mayors committed to shared prosperity, environmental sustainability, and efficient democratic government plans to begin some equity focused work in Pittsburgh in 2019.

        iii. US Water Alliance - In 2019, the US Water Alliance is expanding membership of its Water Equity Taskforce Network of cities, to include Pittsburgh. Led by PWSA, Pittsburgh will work together with seven other cities to develop more equitable water policies and practices. The project aims to increase understanding of the challenges, opportunities, and promising interventions to promote equitable water management in each participating site and at the national level.

    b. Additionally, it is important that any stakeholder water resources visioning process be truly inclusive so as to continue to capture all of the issues and all of the solutions that impact on equitable outcomes for all people of the region. Avoiding the etractive nature of some consultation processes and ensuring that local, trusted organizations are given a voice and also act as a conduit for the voices of economically or socially disadvantaged communities will be extremely important.

6. In early 2019, the SPC Water Resource Center's released a new report proposing a five-pronged strategy to address the region's water challenges:

    a. Promote Sustainable Regional Water Resource Management and Planning

    b. Collaborate on Regional Water Topics

    c. Support Efforts to Manage Water Quantity and Storm Water/Flooding

    d. Fund Sustainable Infrastructure Systems

    e. Develop and Provide Tools for Regional Water Quality Improvement

While there will need to be significantly more details, funding and regional cooperation in order to succeed, it is positive and significant that SPC envisages a role for itself in regional water issues. This strategy should be revisited in the presence of more favorable enabling conditions.

7. There also appears to be some forward movement on the ALCOSAN sewer regionalization work started back in 2011 by Three Rivers Wet Weather. While the original 2013 recommendations were for ALCOSAN to assume responsibility and ownership of a significant parts of the system, a slightly scaled back reality nevertheless sees them taking over the multi municipal trunk sewers. This translates into ALCOSAN owning approximately 300 miles of sewers compared to the current 90 miles. While there have been some challenges in executing agreements with some municipalities, it is expected that the trunk main transfer to ALCOSAN will start to take place in 2019.

8. Finally, there is increasingly an enabling environment for the establishment of stormwater authorities and introduction of stormwater fees, which if designed correctly, incentivize good practices to reduce stormwater runoff, thereby reducing pressures on existing stormwater infrastructure. As discussed above, these fee structures are also considered to be more equitable.

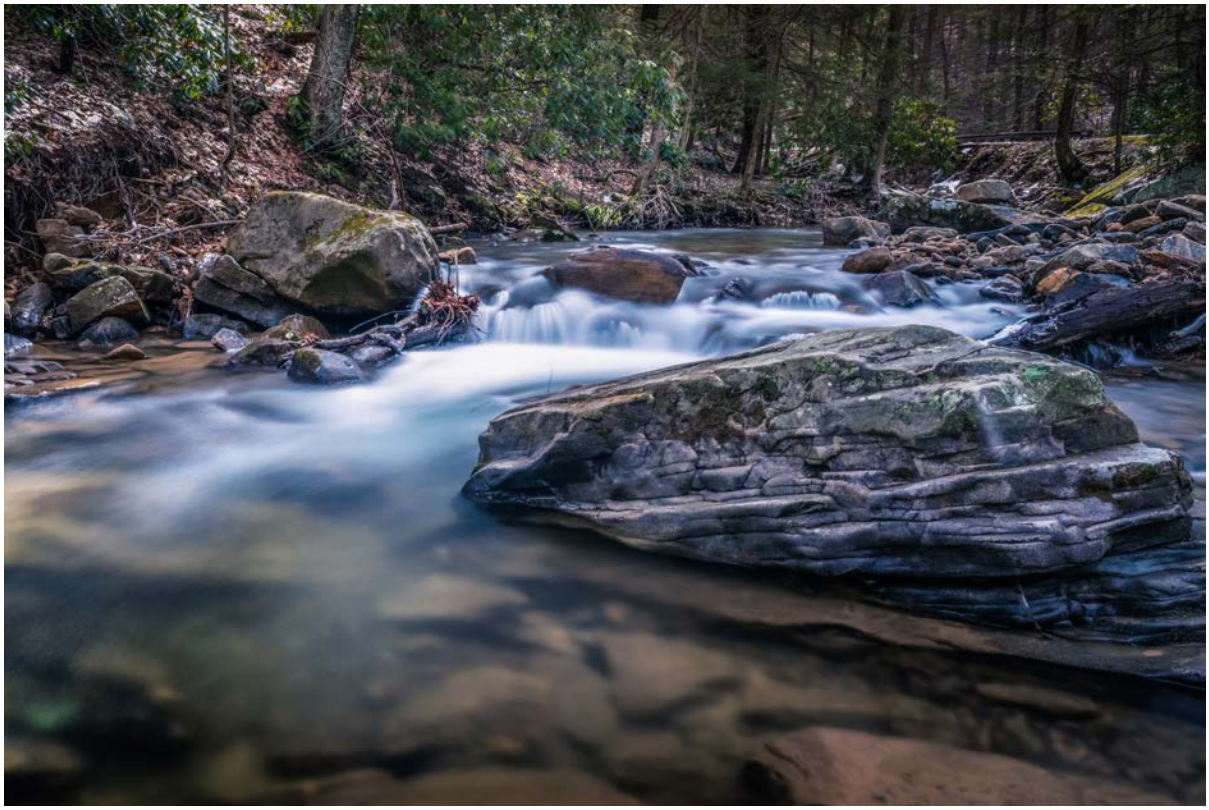

Image Source: John Brighenti (Flickr)

A WAY FORWARD

Based on extensive stakeholder engagement undertaken as part of this Heinz Endowment funded planning grant, The Water Center at Penn believes this moment provides a unique opportunity to move beyond reactivity to beginning to build the foundations for a proactive, long term view of water and land use throughout the three-river watersheds. While specific priorities differ by local watershed and political jurisdiction, and issues are experienced in different ways by different segments of the population, there is a good deal of commonality across the region in how stakeholders view water issues.

Development of a long term vision, regional goals, roles and responsibilities will require cooperation and trust across boundaries - geographical, jurisdictional, political, social and cultural. Yet the region is not yet ready to summon the political will to allow the emergence of a new or re-organized regional entity with overall regulatory or policy control over water resource issues to lead such a process. As such, for now this should remain a long-term objective which guides the short to medium term solutions.

Instead, in the short to medium term, the timing appears ideal to support the generation of the necessary political will for action by expanding the tent from the smaller group of highly sophisticated stakeholders deeply engaged in the current challenges, to engage the larger community- from the urban core to rural stakeholders. At the same time, any strategy should build upon the many successful local initiatives already under way, supporting the many individual outcomes-based frameworks that promote a bottom up approach. Properly nurtured, these initiatives can be leveraged and expanded across region.

We recommend that over the next few years, the region embark upon or scale up existing efforts in the following interconnected areas:

1. Creation of a "Three Rivers Watershed Action Network".

In the first instance, what is needed is a carefully managed, technology-enabled, ongoing process to identify the most engaged and innovative groups and individuals working across the larger watershed: urban, suburban, and rural, in order to establish:

- The shared vision for their water and their watersheds in 30 years
- Which local organizations and organizational models can be adapted across the region, with development of strategies around obtaining more funding to support their efforts?
- Who are the next generation of water leaders from across the social and political spectrum in the region?
- What water fairness and equity looks like to people across the region, and how can we get there?
- What are their top priorities for specific efforts in protecting, managing and expanding equitable access to their water given limited resource?

Responses should inform development of a network of water resource focused organizations/ associations/entities, building upon the decentralized base that already exists. Such a network would create synergies, build momentum and ensure more efficient use of resources.

- One potential model is the Schuylkill Action Network, whose mission is to improve water resources in the Schuylkill River watershed by working in partnership with local watershed organizations and land conservation organizations, businesses, academics, water suppliers, recreational communities, local governments, and regional, state, and federal agencies to transcend regulatory and jurisdictional boundaries in the strategic implementation of protection measures.

- Other models to draw upon include the Delaware River Basin Commission, ORSANCO and the Susquehanna River Basin Commission. In addition, there is a significant new reservoir of ideas, models and programs emerging from the Delaware River Watershed Initiative which should be explored for adaptation in the Three Rivers.

A Three-Rivers network should include existing advocacy groups to expand public education around source water issues. The network should also seek to find opportunities to increasingly involve land management stakeholders in water conversations so as to increase the understanding of the role land management plays in water quality outcomes.

Longer-term, a consensus platform for a path forward can be established. This platform is not merely a report or a series of management recommendations, but a framework for encouraging and enabling meaningful ongoing grassroots action, which in turn can influence the larger scale politics. Creation of the platform should involve a technology-enabled engagement to reach the broadest cross-section of the population, in the most detail, and serve as a platform for bridging the fragmented entities working in land and water management.

2. Development of a"Three Rivers Watershed Leadership Incubator"

This would involve Identifying and supporting water resource-focused future leaders from across the region, and across the existing social and political divides. These are the individuals and organizations who will be most influential in 2030-2050, and in a position to leverage current education efforts focused on the general population. The leadership incubator will serve as a safe networking space to build a critical mass of forward-looking leaders that will be needed to eventually achieve a long term Three Rivers Watershed integrated management strategy

In addition to providing networking opportunities, additional capacity development efforts could include:

- More detailed discussion of many of the myriad of challenges across the watershed

- Review of the current regulatory, NGO, and political frameworks governing current activity, and key actors across the watershed

- Development of strategies for engaging local stakeholders, encouraging cooperation across divides, and building political will for progress in the watershed

- Identification of current and future funding sources, how to obtain and leverage funding, and how to provide the best return on funders' investments

- Opportunities for further education and involvement in these issues

Future leaders should be provided with ongoing mentoring support over the next few years and be encouraged to work together as a group on key ongoing strategies.

3. Development assistance for a robust watershed-wide water data collection, monitoring, and communication framework

The lack of comprehensive, longitudinal data across the watershed of consistent high quality has been repeatedly raised by a number of key stakeholders as a limiting factor in assessing and advocating for the health of the watershed. There is value in supporting development of information/data platforms that draw from the many separate and sometimes sporadic data collection efforts. This should be complemented by development of decision making tools that can identify in real time water quality related trouble spots so as to better target finite resources.

Any efforts in this area must be focused on supporting the efforts of knowledge partners like The University of Pittsburgh, Carnegie Mellon University, Duquesne University, and other important local institutions that are already working on a way forward in this area. The focus of this particular area should be around supporting coordination across entities as well as seeking inputs from other institutions in Philadelphia and elsewhere currently engaged in a similar effort in the Delaware River Basin. Indicative activities may include:

- Establishment of common minimum standards for data quality, analyses, sampling frequency, etc.,

- Obtaining consistency with efforts underway in other watersheds in the commonwealth, and in adjoining states,

- Identification of the most effective strategies for taking advantage of ongoing regulatory sampling programs in the region.

- Identification of funding needs and strategies for ongoing efforts, and

- Development of communication and data sharing platforms to encourage cooperation and ensure critical mass and maximum utility for academics, practitioners and policy makers.

The goal of this effort would be to leverage external expertise and support to allow a robust long-term effort to reside entirely within the region

4. Targeted technical assistance in integrated water management for struggling small communities

The provision of basic services is under strain in many small and distressed communities in the region. No such services are more critical to public health, economic development, social justice, and healthy watersheds than the provision of drinking water, community access to waterways, and basic sanitation. There is diminishing community capacity to manage these issues. Officials and managers are often part-time and/or working on a volunteer basis. While there is no shortage of information and technical guidance from the state and federal governments, the information is not uniformly reaching its targets: stretched officials and operators with not enough hours in the day who operate in a constant state of crisis.

As such, an important complementary element should be the provision of technical assistance and support to the numerous small towns and municipalities within the three rivers region that are currently suffering from insufficient human, technical and financial capacity to deliver the water services for which they are responsible. Focused initially o 4-6 small utilities, indicative activities might include:

- Undertaking a needs assessment: administrative, contractual, technical, planning, funding
- Developing a long-term community-specific plan for each system
- Pairing key employees with mentors at larger/more sophisticated utilities and service providers
- Connecting communities with targeted state and federal technical and funding support to implement these plans.

Learning from working with these initial 4-6 utilities, good practice case studies will be developed that might prove useful to other small utilities not directly reached by these efforts.

ONE WATER

All of the above four interconnected areas of effort should be guided by the One Water Approach (figure 6). One Water promotes a holistic approach to integrate planning for water supply, wastewater and stormwater systems. It is a collaborative effort that considers multiple water projects all with the same goals of protecting human health, improving water quality and managing stormwater as a resource. A "One Water" approach considers the connections between various water systems, and by thinking of them as a whole creates an outcome that is a more sustainable and resilient system.

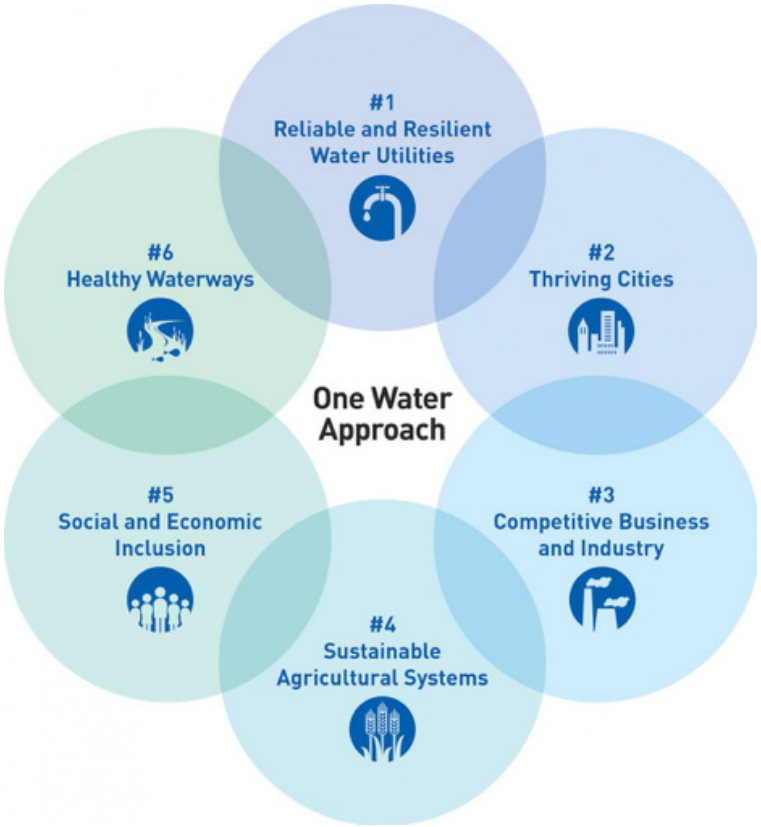

Figure 6: One Water Approach. Source: US Water Alliance

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ANNEX 1 - STAKEHOLDERS CONSULTED

Undertaken via phone or face to face individual or group conversations between November 2018 - Feb 2019

Stakeholder Category	Name	Title	Organizational Affiliation
Environmental/ Community Focused Groups	Lisa Werder Brown	Director of Environmental Initiatives and Projects	Saw Mill Run Association
	Bev Braverman	Executive Director	Mountain Watershed Association
	Eric Harder	Youghiogheny Water-keeper	Youghiogheny Water-keeper
	Brenda Smith	Executive Director	Nine Mile Run
	Jennifer Kennedy, Aly Shaw	Exec Director; Campaign-er	Pittsburgh United
	Doug Shields	Western Pennsylvania Outreach Liaison	Food and Water Watch
	Sarah Winner	Interim Executive Director	Three Rivers Waterkeeper
	Rebecca Zeyzus	Executive Director	Allegheny Watershed Alliance
	Michelle Naccarati-Chap-kis	Executive Director	Women for a Healthy Environment
	Ilyssa Manspeizer	Executive Director	Landforce
	Heather Sage	Director of Community Projects	Parks Conservancy
	Madeline Weiss	Environmental Justice Community Organizer	Clean Water Action
	Mark Wolinsky and Beth Sutton	Director and Deputy Director	3Rivers Wet Weather
	Myron Arnowitt	Executive Director	Clean Water Action
	Jason Beery	Senior Researcher and Policy Analyst	UrbanKind
Academia	Emily Elliot and Dan Bain	Director and Associate Di-rector, Pittsburgh Collabo-ratory for Water Research, Education, and Outreach	University of Pittsburgh
	Jeanne Van Briesen	Director, Center for Water Quality in Urban Envi-ronmental Systems (Water QUEST)	CMU
	Jordan Fischbach	Co-Director, Water and Climate Resilience Center	RAND
	John Stolz	Director	Center for Environmental Research and Education, Duquesne University

Public Sector/Regulators/ Elected officials	Deb Gross	Councilwoman	City of Pittsburgh Council
	Karina Ricks	Director	Pittsburgh Department of Mobility and Infrastructure
	Mike Moskorisin	PDW/WM Program Manager	Allegheny County Health Dept.
	Mary Ellen Ramage	Borough Manager	Borough of Etna
	Brian Wolovich	Elected Official	Borough of Millvale
	Richard Harrison	Executive Director	ORSANCO
	Jim Pillsbury	Engineer; Landscape Architect	Westmoreland County Conservation District
	Lew Villotti	Director, Planning and Development	SPC
	Kathy Libertz	Water Lead	EPA Region III
	Tracy Royston	County Official	County Controller's Office
Private Sector	Brian Jensen	Director	Allegheny Conference
	Ian Lipsky	Senior Hydrologist	E Design Dynamics
Utilities	Bob Weimar	Executive Director	PWSA
	James Stitt	Green Infrastructure Manager	PWSA
	Jan Oliver, Tim Prevost, Julie Spiker	Director, Regional Conveyance; Manager, Wet Weather Program; Civil Engineer	ALCOSAN
Recreational Users	Matt Grau and DJ Civiletti	Head Coach, Junior Rowing and Executive Assistant	Three Rivers Rowing Association