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For additional information:
Sharon Haensly, Squaxin Island Legal Department, 360/490-4830 or SHaensly@Squaxin.us
Jeff Dickison, Squaxin Island Natural Resources Department, 360/ 791-8114 or JDickison@Squaxin.us

Sharon Haensly has practiced law since 1988. She has a Bachelors of Science degree in Natural Resources from Cornell University (1981), and a law degree from the University of Oregon (1988). Before representing the Squaxin Island Tribe, Sharon was an attorney for the US Environmental Protection Agency, Swinomish Indian Tribal Community, and several Seattle law firms that represent Indian tribes.

Jeff Dickison is a Fish Biologist with a Master of Science degree from the University of Washington. He has worked for the Squaxin Island Tribe for 30 years protecting the Tribe's treaty rights to fish, shellfish, and habitat to support healthy populations in perpetuity.

PATHWAYS FOR LOCALIZED WATER INFRASTRUCTURE

by Melissa L. Kelly, Staff Director, Center for Land, Environment, and Natural Resources, University of California, Irvine School of Law (Irvine, CA)
&
Caroline Koch, Water Policy Director, WaterNow Alliance (San Francisco, CA)

Introduction

The urgent need to radically increase investment in local water infrastructure across the United States is well documented. Drinking water, stormwater, and wastewater systems are in crisis in communities nationwide. Addressing drought, urban flooding, and water quality impairments — all of which are intensified by climate change — are critical priorities. Notwithstanding the recent historic expansion in federal and state support for these priorities, the size and scale of the need dwarfs the available loan and grant programs. The often-unacknowledged reality is that the overwhelming majority of water infrastructure spending, approximately 96%, occurs at the local level. The challenge for water resource managers and their political leadership is how to address these water needs sustainably, create resilience to climate change, and protect water quality, all while securing local water supplies and services for everyone equitably.

LWI Defined

This article focuses on the considerable and largely overlooked opportunities presented by **l**ocalized **w**ater **i**nfrastructure (LWI) — i.e., onsite decentralized installations and technologies widely distributed across communities. These are often described as distributed systems that extend beyond centralized water infrastructure and are located at or near the point of use. These installations and technologies, some time-honored and others trailblazing, could be the most impactful water infrastructure of the future.

Multiple Benefits

At scale, LWI performs the same functions as conventional water infrastructure. LWI provides reliable drinking water supply, effectively treats wastewater, and captures and manages stormwater. Indeed, onsite decentralized strategies often perform these functions more equitably and affordably. LWI also provides multiple co-benefits for communities such as permanent, green jobs, improved public health, and more green space. Getting to scale is already feasible technically, financially, and legally. Yet, realizing LWI's full potential remains untapped for a variety of reasons.

Solutions & Scaling

This article makes nine recommendations and identifies roughly two dozen achievable, practical action items to overcome the financing, institutional, legal, and policy barriers to largescale adoption of LWI. These recommendations and action items set a foundation for expanding access to and understanding of LWI in an effort to catalyze and accelerate the shift towards sustainable, climate resilient, affordable, and equitable water solutions. LWI solutions for drinking water utilities, pathways to scale, and real-world case studies are explored below. These themes are also discussed in greater detail in the *Tap into Resilience: Pathways for Localized Water Infrastructure* report published by the University of California, Irvine School of Law Center for Land, Environment, and Natural Resources (CLEANR) and WaterNow Alliance in September 2021 (www.law.uci.edu/centers/cleanr/news-pdfs/tap-into-resilience-report.pdf).

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Essential Functions

Limited Flexibility

LWI Categories

Localized Water Infrastructure

In urban settings, water infrastructure needs to perform three basic functions:

1) Provide clean, safe, and reliable drinking water supplies for homes, businesses, institutions, and industry
2) Move wastewater away from these properties, treat it to meet water quality requirements, and safely reclaim or discharge it without contaminating rivers, lakes, streams, oceans, and estuaries
3) Manage stormwater to limit flooding and related damage and, again, ensure that it is safely reclaimed or discharged without harm to public health, water bodies, and ecosystems

Centralized water infrastructure owned and operated by utilities can perform these functions well in many cases and has been the conventional approach for the past 150 years for most communities. Yet, centralized systems comprised of vast networks of pipes, pumps, reservoirs, tunnels, and treatment facilities "require more than a decade to plan, build, [and pay for]" leaving communities with "little flexibility as conditions change." They are thus limited in their capacity to meet 21st century water management needs.

In particular, centralized systems do not have flexibility to adapt to changing conditions due to the "lack of inter-connectedness" between drinking water, wastewater, and stormwater systems and their "limited and specialized" functionality. (*Optimizing the Structure and Scale of Urban Water Infrastructure: Integrating Distributed Systems*, The Johnson Foundation At Wingspread (2014)). Many conventional facilities are designed for a singular purpose, which ultimately results in "wasted opportunities for more efficient and ecological urban water management." (Leigh, Nancey Green & Lee, Heonyeong, Sustainable and Resilient Urban Water Systems, 10 SUSTAINABILITY 2 (2019), supra note 7 at 6.). Further, because centralized systems are designed for "a useful life of up to 100 years," they are highly inflexible with limited reconfiguration possibilities. In addition, the high costs of centralized systems contribute to water inequity and affordability challenges due to the rate increases necessary to pay for improvements to these centralized systems.

In light of these limitations and in response to the growing strain on our local water systems, communities are looking for ways to supplement and extend the life of conventional, centralized infrastructure that are more integrated, affordable, equitable, and adaptive in order to build resilience and sustainability and provide multiple community co-benefits. Local governments across the country have begun to explore LWI to expand their options in this regard.

LWI is a "conceptual category" rather than a specific technology or legal term.

Generally, LWI can be grouped into four broad categories:

1) Water use efficiency
2) Reuse and other alternative non-potable water sources
3) Green infrastructure (GI)
4) Privately-owned lateral line replacements

The distributed, decentralized nature of these categories of water management solutions unifies them under the LWI umbrella.

Drinking water utilities can leverage LWI from each of these categories to meet water supply and quality needs. Water use efficiency solutions such as: indoor, high-efficiency appliances and fixtures; turf replacement and water-wise landscapes; smart irrigation controllers; and customer-side leak detection devices make it possible for utilities to treat conservation as a source of supply. Advanced onsite reuse systems, greywater systems, and rainwater harvesting provide alternative sources of water supplies by offsetting potable water use. Source watershed green infrastructure strategies — such as conservation easements, revegetation, riparian buffers, and wetlands restoration and creation — can be used to protect drinking water quality.

Figure 1: LWI Rain Barrel

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LWI offers a diverse array of water management strategies that can meet drinking water, wastewater, and stormwater needs. Many of these strategies are well known to the water sector (e.g., water efficient appliances, turf replacement, and green roofs), while others represent more emerging technologies that are just gaining traction (e.g., customer-side leak detection devices). In either instance, cities and utilities that have deployed LWI even on modest scales have realized the water management benefits they provide, making the case for accelerating and expanding LWI investments in communities nationwide on par with conventional systems.

Pathways for Financing Localized Water Infrastructure

Barriers

Notwithstanding the feasibility, affordability, and multiple benefits of localized water infrastructure, LWI uptake has been slow and somewhat fitful. This is due partly to water managers' caution about plunging headlong into new technologies and strategies. But it is also due in large part to structural legal and policy barriers and constraints. Equally important, the pace of adoption has been slowed by perceptions that may not be entirely accurate. Both actual and perceived barriers can create challenges that unnecessarily limit flexibility and opportunity to move toward innovation and the greater community benefits LWI offers.

FINANCING CHALLENGES

Fiscal Tools

For much of the 20th Century, the federal government played a major role in the development of local water infrastructure, particularly in the 1950s to 1970s. However, that support declined dramatically in the 1980s in line with a shift in Congressional policy to transition to full state and local responsibility for water investments. Today, with their revenues largely limited to rates and fees, cities, towns, and special districts responsible for local water resources spend far more on annual operations than long-term investment in infrastructure, at a ratio of roughly 3:1.

Most, although certainly not all, water resource management entities across the US are adept at accessing capital markets to finance their requisite treatment facilities, pipes, tanks, pumps, and other conventional water infrastructure. Fully realizing the benefits of LWI will require that they invest similarly in decentralized and onsite options involving private, as well as public, non-utility-controlled sites. Such investment represents one of the major financing opportunities — and challenges — for scaling deployment of LWI options.

Many, if not most, local and regional public water resource entities have the authority required to raise and invest capital in LWI, but are often held back by various barriers, perceived and otherwise, including most prominently:

Perceived Barriers
- Accounting limitations
- State gift prohibitions
- Limits on tax-exempt governmental bonds
- State and local laws limiting use of bond proceeds

Actual Barriers
- Lack of dedicated or sufficient revenue streams
- Federal and state loan program priorities
- Federal tax disincentives/lack of incentives

Solutions to these challenges are discussed below.

Financing Recommendations

EXPANDING PUBLIC FINANCING OPPORTUNITIES

Finance Opportunities

The first step in getting past LWI financing barriers is to expand our collective vision and definition of infrastructure. Once we appreciate that onsite reuse systems, permeable pavements, rain gardens, and high-tech leak detection devices all function as water infrastructure, the generational equity case for using debt rather than annual operating cash to pay for these investments makes itself. Moreover, many of the barriers to such investments are now due more to perception than legal barriers.

Four of the most important opportunities to expand financing for LWI and begin to close the water infrastructure funding gap include:

1) Accessing Municipal Bonds for LWI
2) Establishing Dedicated Revenue Streams for LWI
3) Prioritizing LWI Projects for federal & state grants and loans
4) Leveraging State & Federal Tax Codes

Accessing Municipal Bonds

Municipal bonds have long been the debt-financing vehicle of choice for cities and public water agencies. In order for local governments to invest in LWI at large scale, they will need to access capital

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Bonds and Accounting

markets through municipal bonds, among other financing approaches addressed in latter sections of this article. Municipal bonds can be issued either as revenue bonds or general obligation bonds, which can also be marketed as green bonds or as innovative, outcomes-based, environmental impact bonds.

To use municipal bonds to finance LWI, however, local governments must first navigate accounting, legal, and tax constraints. Accounting rules on debt are, in fact, sufficiently flexible to enable utilities and municipalities to capitalize investments in localized infrastructure of all kinds. A small but important set of water utilities are finding that they can invest municipal bond proceeds in LWI and comply with the Governmental Accounting Standards Board (GASB) Concepts Statement No. 4's requirement that the agency "control" the asset to be financed by entering into property liens or contracts with property owners. GASB has also promulgated an alternative to Statement No. 4. More than ten years ago, GASB issued Statement No. 62 codifying "Regulated Operations" accounting, providing that local governments may capitalize spending "business-type activities," such as consumer incentives to implement LWI, as long as they effectively commit to repaying their investors. In addition, local governments must also have the requisite legal authority to issue debt to finance LWI. As with accounting guidelines, many of these legal requirements are sufficiently flexible to allow for, and are not complete bars to, bond financing LWI. Within existing flexibilities of the federal tax code, local governments are likely able to access tax-exempt governmental bonds to finance LWI, keeping these offerings attractive to investors.

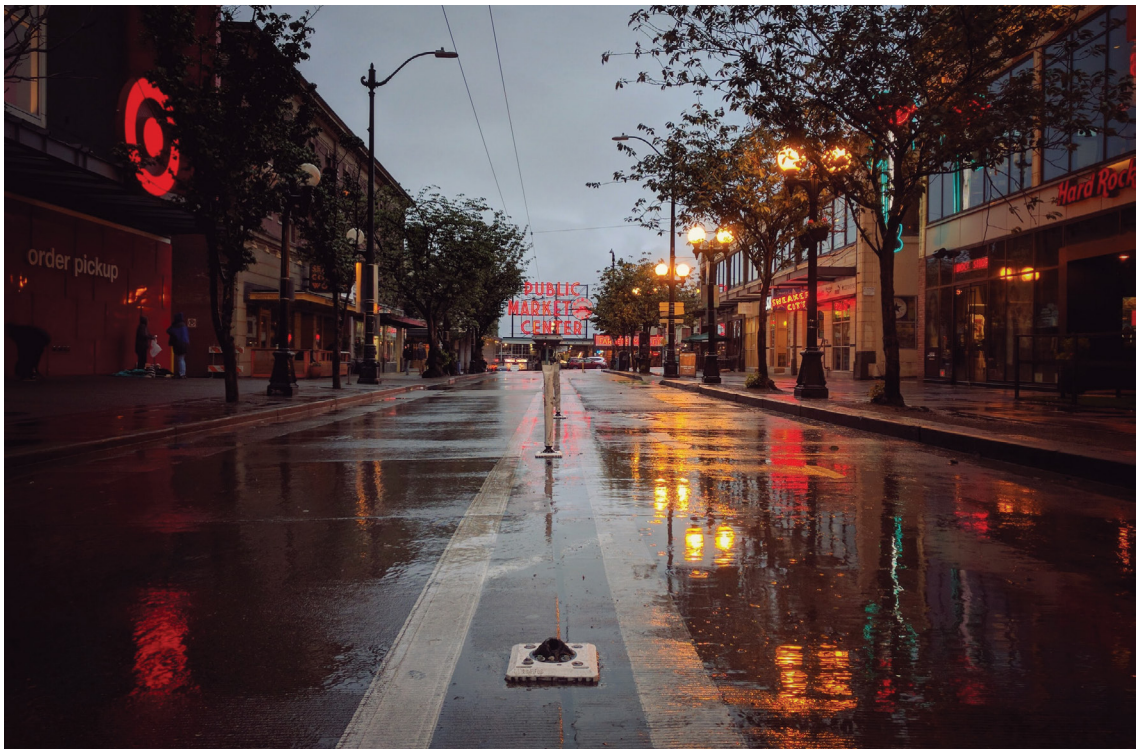

Figure 2: Seattle Stormwater

GI Projects

Accessing Municipal Bonds: Seattle Public Utilities & King County

Challenge: Urban Stormwater Runoff
Localized Water Strategy: RainWise Program, which provides residential customers rebates that cover up to 100% of the costs to install rain barrels and rain gardens to capture stormwater runoff and reduce the risk of combined sewer overflows.
Financing Mechanism: Seattle Public Utilities and King County finance the RainWise program with municipal bond proceeds using the GASB No. 62 regulated operations accounting approach.
Results: As of 2021, the RainWise program has financed GI projects on private property that manage 26.5 million gallons of stormwater per year. In total, Seattle's GI projects on public and private property manage 465 million gallons of stormwater per year, bringing the city closer to meeting its goal of managing 700 million gallons of runoff per year with GI by 2025.
Learn More: www.kingcounty.gov/services/environment/wastewater/cso/rainwise.aspx

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Fees and Revenue

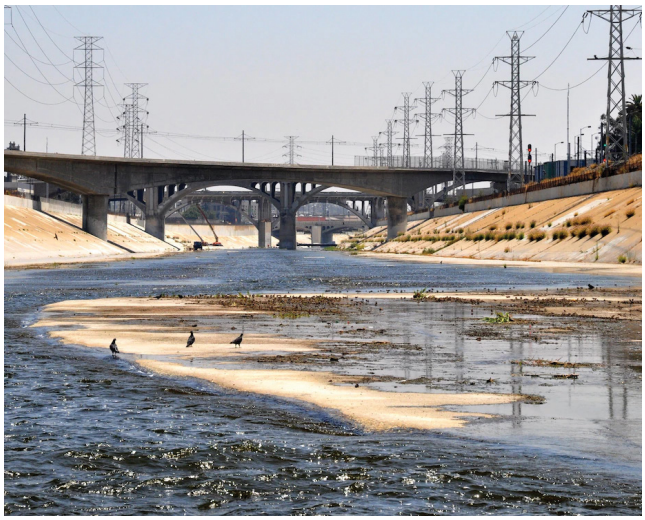
Establishing & Leveraging Dedicated Revenue Streams

Financing LWI on a large scale may require additional vehicles and sources of capital — i.e., dedicated taxes, fees, or charges. Accessing municipal bonds may depend on a dedicated revenue stream to secure the debt. Two options for dedicated revenues are stormwater fees and special fees.

Stormwater fees can be structured in a number of ways, including:

- Tiers of stormwater rates based on the diameter of a property's potable water pipe and assumptions about usage
- Based on a property's "usage," i.e., gallons of stormwater that a property generates per inch of rainfall either "parcel-based" or "impervious area-based"
- Based on assessed property value, i.e., property taxes

Special fees can include "conservation fees," which collect funds to pay for water conservation programs or "watershed protection" fees, which help fund land acquisition efforts to protect water quality.



Figures 3 & 4: LA Stormwater Infrastructure

Parcel Tax

SIPs

Establishing a Dedicated Revenue Stream: Los Angeles County Parcel Tax

Challenge: Addressing Contaminated Urban Stormwater Runoff

Localized Water Strategy: Clean Water Program that funds projects throughout the Los Angeles region to capture, clean, and reuse stormwater.

Financing Mechanism: Los Angeles County enacted a parcel tax via a ballot measure in 2018 that will generate approximately $300 million per year for stormwater capture projects (see Patsch & Zhang, *TWR #198*). Securing the two-thirds majority to pass was a major hurdle, which the County overcame by partnering with an environmental non-governmental organization (NGO). This group was instrumental in garnering support for the measure and attributes its success to three key elements: 1) leadership at the County in the form of project champions on the Board of Supervisor and at the staff level; 2) local environmental and social justice groups aligned in their support of the measure; and 3) ongoing dialogue over the course of a year and a half among stakeholders through both formal and informal processes. These efforts resulted in all parties (NGOs, municipalities, organized labor, and businesses) reaching a compromise on the measure.

Results: Through this program, as of October 2022, nine Stormwater Investment Plans (SIPs) have been approved, funding over 100 infrastructure projects. Each SIP's individual projects vary according to the type of capture infrastructure involved and the extent of additional community and nature benefits. Some projects create new parks and spreading grounds, others expand or significantly rehabilitate existing ones. Project purposes vary from infiltrating water directly to groundwater, capturing and reusing water from underground tanks, or creating low flow water diversions to wastewater facilities. Many projects also include recreational opportunities and the placement of native plants and trees to provide habitat, cool communities, improve air quality, reduce flooding, and sequester carbon.

Learn More: https://safecleanwaterla.org/program-overview/

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Federal Funds

SRF's

GI Reserves

Other Funds

Eligibility Criteria

Customer Incentives

Tax Reform Needed

Prioritizing LWI for Federal & State Grants and Loans

Many federal programs provide financial support for LWI. By far the most significant of these programs are the Clean Water Act and Safe Drinking Water Act State Revolving Funds (SRFs), and the more recently enacted Water Infrastructure Finance and Innovation Act, known as WIFIA. The SRFs are administered by the states and are, as their name indicates, revolving funds that provide upfront cash to local entities to build water infrastructure. While some SRF funds are grants, the vast majority are loans. This is how water infrastructure programs have been sustained over decades. WIFIA program eligibilities are coextensive with the SRFs. WIFIA loans are issued by EPA for projects of $20 million or more for large communities and $5 million or more for small communities.

The SRFs have provided low-cost loans to utilities building water infrastructure for more than 30 years, amounting to more than $194.1 billion in project investments. The WIFIA program was created in 2014 and has overseen 49 loans totaling $34 billion in credit assistance to help finance nearly $20 billion for water infrastructure projects. Historically, these federal loans have been used to pay for conventional, grey infrastructure. However, there is no legal barrier to using these funds for green and nature-based solutions. The American Recovery Act of 2009 established a "Green Project Reserve," that specifically requires all Clean Water SRF programs to use at least 10% of their federal capitalization grant for projects that address GI, water and energy efficiency, or other environmentally innovative activities. Notably, the Green Reserve is a floor, not a ceiling. Water use efficiency and distributed green infrastructure (GI) projects implemented via consumer incentive programs are already eligible for SRF loans — though these funds are not accessed to finance LWI as often as they can and should be. Further, most states do not yet clearly explain that localized options are eligible for SRF loans.

In addition to these main federal and state loan programs, there are smaller grant and loan programs that make funding available for water infrastructure improvements, including the Land and Water Conservation Fund, Sewer Overflow and Stormwater Reuse Municipal Grants Program, and Water and Waste Disposal Loan and Grant Program. While such programs can be used to fund LWI, the eligibility criteria and application processes for many of these programs do not specifically prioritize LWI, and it is not clear whether utilities widely view these programs as potential sources of LWI financing. Updating these criteria and application processes is an important step to increased investments in LWI. For example, in 2022, the Bureau of Reclamation revised the eligibility criteria for the WaterSMART program to expressly state that indoor and outdoor water use efficiency measures on private property are eligible for WaterSMART grants.

Federal dollars from the Bipartisan Infrastructure Law and the Inflation Reduction Act will reinvigorate investments in water infrastructure. These renewed federal investments should reflect 21st century needs and solutions. To this end, federal and state grant and loan programs should prioritize LWI as key strategies for building increased resilience at the local level.

Leverage State and Federal Tax Codes

The ability of water utilities to employ financial incentives to motivate their customers to participate in LWI programs is key to their success, particularly at a large scale. State and federal tax codes are central to these efforts. Tax incentives can be powerful catalysts for action. Removing tax barriers is essential to avoid disincentivizing participation in otherwise strong programs.

On the federal side, the Internal Revenue Service's (IRS) definition of "gross income" has been a major challenge for many years for water resource agencies attempting to provide consumer rebates. Rebates can greatly aid the deployment of a wide variety of cost effective, climate resilient, and environmentally sustainable LWI. The IRS and US Department of Treasury maintain that consumer rebates issued by public water utilities qualify as "income" for federal tax purposes — notwithstanding the fact that such rebates advance clear public interests. This has led utilities to conclude that they are required to issue 1099 tax forms to customers participating in rebate programs covering water use efficiency measures, GI installations, septic system upgrades, and more. It is widely believed among rebate program managers that taxing local water rebates as "income" operates as a major disincentive for private property owner participation in LWI programs. Indeed, in some areas, concern about federal taxation on rebates may be aggravating public health and safety challenges as homeowners refuse to participate in programs to swap out septic systems for upgraded, onsite treatment technology.

The IRS takes the position that only Congress can make the requisite IRS Code changes and, since 2014, efforts to address this issue administratively have not been successful. Federal legislation to address this issue and exempt a full range of financial incentives for decentralized and distributed water infrastructure from federal income taxation has been introduced, but has not yet been enacted as of December 2022.

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State Exemptions

For the same reasons, exemption from state income taxes for water rebates are also critical. California's tax code, for example, exempts rebates for water efficient toilets, clothes washers, and certain plumbing for recycled water from both personal and corporate taxes. California also recently reinstated a personal income tax exemption for turf replacements. However, California's current exemption does not cover all types of efficiency rebates, such as those for other outdoor water conservation measures or stormwater management. The taxability of these rebates is a barrier to full-scale implementation of these crucial programs. Efforts to remove this barrier at the California legislature have not yet been successful. As this California example demonstrates, there has been some progress on clearing state income tax barriers, but work on this front remains to be done.

On the other hand, states such as Georgia, Maryland, and Texas, are beginning to show some willingness to use their tax codes to affirmatively support deployment of water infrastructure. These initiatives are particularly significant because they can provide vital support without draining local utility resources.

Financing Action Items

Recommendations

We have identified eight ways that utilities, federal, state, and local governments, along with NGOs, universities, and other partners can begin to overcome barriers and carry out the above recommendations for investing in LWI on par with conventional infrastructure approaches.

Local Water Resource Managers & Utilities

- Establish standards and/or targets for LWI in internal, capital investment plans, and other long-range planning; institutionalize the concept that these strategies can be debt-financed alongside, and in the same way as, conventional water infrastructure.

State & Local Governments

- Exempt public investments in LWI from restrictions on the use of bond proceeds on private property, and/or recognize investments in LWI as authorized debt-financed investments.

Federal & State Government

- Update tax codes to exempt consumer incentives designed to implement LWI from income tax.
- Create tax incentives for residents and businesses to invest in LWI.

Federal Government

- Create or update SRF eligibilities, and/or guidance and criteria to: (a) prioritize funding for LWI; and (b) expand SRF financial assistance mechanisms that can lower costs and accelerate the pace of LWI funding on a national scale.
- Update the IRS code to exempt LWI from the cap on "private activities" for purposes of tax-free governmental bonds.

NGOs & Universities

- Create and maintain a database of state-level statutory and regulatory public finance rules that may operate as, or may be perceived to be, barriers to capitalizing LWI investments. WaterNow has built an initial version of this database: https://tapin.waternow.org/finance-database/.
- Conduct a literature review of EPA and other resources related to the use of SRF funds to finance LWI, and create a summary report that compiles and synthesizes the relevant information and provides case study examples of SRF-funded strategies.

If implemented, these actions would help create multiple pathways for financing LWI in a way that realizes their full capability in providing drinking water, wastewater, and stormwater services.

INSTITUTIONAL CHALLENGES: OVERCOMING "SILOING"

Centralized vs Decentralized

Expanding the vision of water infrastructure — from centralized systems of pipes, tanks, and tunnels to include decentralized onsite strategies and technologies spread over a community — faces institutional as well as financial challenges. Predominant among these is the compartmentalized way in which water resources have traditionally been managed and regulated. Drinking water, wastewater, and stormwater are often under the jurisdictional purview of separate local entities and rarely fully integrated. It is even more rare for land use and water resource management to be integrated. This "siloing" favors centralized water infrastructure initially designed to serve limited purposes.

Reflecting these limited purposes, each utility's roles, responsibilities, and capacities have historically been aligned to implement these centralized approaches. Further, due to the large fixed costs of centralized water infrastructure, agencies favor maintenance and upgrades to existing, centralized systems over introducing new LWI. In addition, certain types of LWI may be seen as incongruent with

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utility business models. For example, in the western US, some water providers have resisted investing in distributed water use efficiency and onsite reuse at large scale because, while such measures could provide important supply and climate resilience benefits, they also result in substantial revenue losses if rates are based primarily on sales volume. Shifting to a business model that decouples revenues from volumetric sales can be a slow and challenging process.

Underpinning these structural challenges is the need for new or updated guidance and data-driven decision-support tools to assist policymakers and water managers shift from conventional systems to LWI. Pivoting to large-scale adoption of LWI is feasible, but will require an intentional approach to institutional issues that can operate as barriers.

Barriers

Institutional Barriers to LWI Adoption include:

- Lack of appropriate decision support tools and guidance
- Compartmentalized water management, i.e., water agency silos
- Lack of collaboration with other city departments and community groups
- Difficulty accessing water management potential of private property
- Outdated business models
- Limited scope of water utility role and capacity

Institutional Recommendations

LWI Strategies

BUILDING INSTITUTIONAL CAPACITY FOR ADOPTION OF LOCALIZED WATER INFRASTRUCTURE

Addressing the institutional challenges to LWI entails long-term transformation of deep-rooted municipal and utility *modus operandi*. We have identified three sets of strategies with meaningful potential to open pathways to greater acceptance and adoption of LWI in the near term. These approaches are designed to pave the way for broader expansion of what investment-worthy infrastructure means.

Strategic Pathways to LWI include:

- Creation of alternative water service business models
- Development of new decision-support tools
- Creation of new pathways for collaboration

Revenue Stability

Create Alternative Water Utility Business Models

A particular institutional challenge arises for public water providers in connection with increased efforts to deploy reuse and other water saving technologies. While it is widely acknowledged that "conservation is the cheapest source of water," for many municipal water suppliers declining water sales equates to declining revenues. Maintaining revenue stability is a major driver because over 80% of water utility costs are fixed costs. Moreover, like other forms of water infrastructure, localized reuse and efficiency measures require investment. For these reasons, utilities can be deterred from investing in these strategies even though, over the long-term, reduced water demand can generate substantial financial savings for ratepayers and generate other co-benefits as described above.

Alternative Models

However, water utilities are not locked into a one-size-fits-all business model. Increasingly, they are developing alternative business models designed to maintain fiscal health without relying on volumetrically-driven water sales. There are a number of ways to accomplish this and make water use efficiency a core part of the utility business model. Strategies include budget-based rate structures and "shifting away from the single-purpose service provider model and becoming multi-purpose utilities that provide a variety of services at different scales" (The Johnson Foundation at Wingspread, *supra* note 15, at 18). The energy sector shifted in a similar way — as small-scale systems became more prevalent, power utilities began providing more distribution and grid management services.

Strategies

Recommendations for Alternative Business Models include:

- Providing services to operate and/or maintain LWI systems
- With respect to drinking water utilities, decoupling rates from revenues by implementing one or a combination of conservation-oriented rate structures
- With respect to internal agency structures, updating institutional hierarchies and traditional roles to reflect 21st century needs by:
  - Evaluating where staff capacities are most impactful in meeting utility and community goals
  - Realigning departments and roles to match utility priorities
  - Refreshing the utility's stated mission to correspond with community values
- Providing LWI job training programs that can:
  - Create new local jobs, including for vulnerable youth
  - Garner greater confidence in LWI

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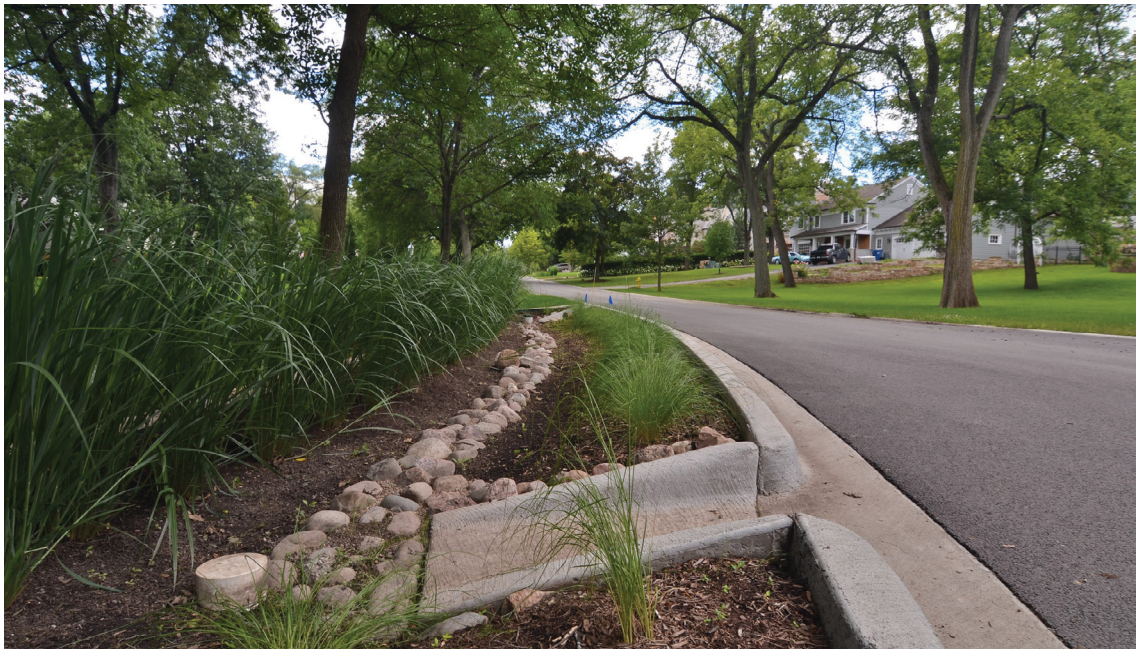
- Reduce the costs associated with acquiring skilled personnel to implement, operate, and monitor LWI systems

Water utilities are already demonstrating how development and implementation of alternative business models has allowed them to encourage water conservation and efficiency and better weather drought, while still maintaining revenue stability. As more water utilities demonstrate the long-term benefits of alternative business models that do not rely on selling water as a commodity, we expect that there will be greater opportunities to increase adoption of LWI.



Figures 5: Moulton Nigel

Alternative Rate Structure

Creating Alternative Business Models for Utilities: Moulton Niguel Water District

Challenge: Recurring Drought & Limited Local Supply
Local Water Strategy: Conservation
Alternative Business Model / Water Budget-Based Rate Structure: In 2011, the Moulton Niguel Water District (MNWD) began transitioning to a water budget-based rate structure, where customers receive a customized, monthly water budget designed to meet their indoor and outdoor needs. Customers who consume water efficiently and stay within their budget enjoy the benefit of low water rates, while over-budget water use is billed at increasingly higher unit costs. In addition to this updated rate structure, MNWD updated its organizational structure to integrate traditionally siloed departments and foster integrated management of key internal functions. For example, MNWD developed a department manager role to oversee utility finance, conservation programs, and rates. This involved evaluating utility needs, staff capacities, and community values and learning from those outside of the water sector. MNWD also employed a proactive approach to outreach and engagement with its customer base. The revenue generated from the higher rates customers pay for using water inefficiently is invested in conservation and efficiency programs for the community, allowing customers to see how that revenue is used.
Results: With a budget-based rate structure, MNWD has decoupled rates from revenue. MNWD collects two distinct charges from customers: a service charge to cover the majority of the District's fixed costs and a volumetric charge to cover the cost of water. Separating these revenue streams has allowed the District to achieve greater water use efficiency and revenue stability. Unlike many other water agencies, MNWD did not see a loss in revenue during the 2012 to 2016 drought. Further, the conservation and efficiency achieved with this rate structure has reduced overwatering and resulted in a decrease in dry weather runoff, which in turn reduces the amount of polluted urban runoff reaching surface waters. Linking finance with conservation efforts, as well as rate structures, has been an important opportunity for meaningful integrated water management at MNWD.
Learn more: www.mnwd.com/

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New Tools

Develop New Decision-Support Tools

Expanding water infrastructure options requires that municipal and utility leaders have credible and reliable tools, protocols, and guidance on which to base their decisions about implementation and investment. In the absence of such tools, managers and political decisionmakers fall back on conventional, analytical approaches designed for a substantially more limited set of strategic and financial options.

One recommendation for addressing this is for NGOs, universities, and key federal agencies — such as the EPA and Bureau of Reclamation — to develop tools to assist local decisionmakers in their evaluation of various LWI.

Tools Could Be Designed to Accomplish the Following:

- Account for the full range of advantages and disadvantages of localized water strategies (i.e., consider benefits and interpret water savings as avoided costs rather than reduced revenues)
- Use a time horizon that accounts for cost efficiency of a localized water strategy over its lifetime
- Account for climate variability projections
- Evaluate impacts of land use decisions on water resources
- Forecast demand to accurately reflect downward trend in water use and integrate factors such as efficiency, change in economic activity, and denser development

Creating Partnerships

Create New Pathways for Collaboration

A number of the institutional barriers to acceptance and adoption of LWI as legitimate infrastructure strategies reflect the evolving nature of how utilities function in municipal and community ecosystems. With notable exceptions, water utilities are prone to view themselves as technical service providers and typically perform their critical functions largely in isolation from other governmental departments and community organizations. This siloing means that pathways for collaboration with other agencies or departments rarely develop organically. Similarly, it does not always come naturally for utilities to be deeply engaged with the community organizations, institutions, and other partners generally vital to broad deployment of decentralized solutions.

Greater collaboration and communication between public entities, different disciplines, and the community would enable the sharing of resources and technical expertise needed to facilitate both the assessment and implementation of LWI. This includes identifying and coordinating with key intra-city and community-based agencies, as well as NGOs and universities to effectively implement LWI programs.

Leveraging Skills

Because it is implemented on non-utility property, LWI can also benefit significantly from coordination among traditionally siloed agencies. For example, a recent report from the Pacific Institute, highlights how San Mateo, California, and Fort Collins, Colorado, have taken a coordinated approach to co-fund water customer incentive programs to install multiple-benefit LWI. These coordinated efforts opened the door to additional funding and made the programs more accessible to customers — effectively leveraging each utility's unique capacities and expertise.

Addressing Equity

Greater engagement and collaboration with non-traditional community partners can also help address local equity issues related to water resource management. Increasingly, municipalities and utilities are taking steps to incorporate equity considerations into their decisions. They are recognizing the need for a deliberate approach to address systemic racism when tackling equity-related challenges related to flooding, water quality, inadequate infrastructure, and climate impacts. Effectively addressing these challenges requires empowering disadvantaged and vulnerable communities that are disproportionately affected by giving voice to their concerns and needs. In their report "*Building Blocks of Trust: Building Lasting, Authentic and Equitable Relationships between Community Organizations and Water Utilities*" the River Network and WaterNow developed eight best practices for building trusting partnerships between water managers and community groups. The River Network also recently released its Equitable Water Infrastructure Toolkit, intended to help "stakeholders, advocates, and leaders" familiarize themselves with "water infrastructure funding and financing mechanisms" and "[u]nderstand the role and impact of local, state, and federal entities, and community organizations in addressing affordability and sustainability."

Actions

Municipalities and utilities can collaborate with NGOs focused on promoting racial equity to incorporate a meaningful equity lens into their localized water strategies.

Promoting Meaningful Equity may include:

- Measuring and describing community disparities
- Providing local planners, public officials, community organizations, and foundations with the tools they need to engage marginalized populations and advocate for equity objectives

Pathways

Engagement

- Transforming equity goals into targeted discussions on particular disparities that will be tackled
- Conducting a visible and inclusive public planning process designed to foster equitable participation in the decision-making process as well as the resulting localized programs
- Developing specific measurable equity-based objectives and achievable action items
- Eliminating barriers to participation. For example, bridging language and cultural barriers, expanding distributed GI, water use efficiency, conservation, or onsite reuse incentive programs to multi-family homes, and removing exclusions from participating in rebate or other incentive programs for customers with late or overdue payments.

Utilities have incorporated equity considerations into a variety of LWI programs such as water use efficiency strategies (e.g., high-efficiency indoor appliances and fixtures) and green infrastructure. As just one example among a growing number of communities, Tucson Water provides limited-income individuals and families with free high-efficiency toilets and offers grants (up to $400) and loans (up to $2,000) for rainwater harvesting systems.

New decision-making tools, alternative water utility business models, and new pathways for collaboration will help remove institutional barriers to greater adoption of LWI. There are some valuable decision-support tools already available, and some utilities have begun to update their business models.

Recommendations

Institutional Action Items

We have identified 10 action items for utilities, state and local governments, the federal government, NGOs, and universities that can be used to overcome identified institutional barriers to LWI and carry out the recommendations for operationalizing utility adoption of LWI.

Utilities & Local Governments

- Establish alternative business models designed to maintain fiscal health without relying exclusively on volumetrically-driven water sales (e.g., budget-based rate structures, repeal of volume discounts, flat fee combined with a variable, tiered rate, and/or fixed variable rates).
- Update institutional hierarchies and traditional roles to reflect 21st century needs. Shift utility goals from the single-purpose service provider model and move to a multi-purpose model that provides a variety of services at different scales informed by community values, staff capacities, department alignment, and utility priorities.
- Provide LWI job training programs that can: create new local jobs (including for vulnerable youth); garner greater confidence in LWI; and reduce the costs associated with acquiring skilled personnel to implement, operate, and monitor LWI systems.

Utilities Working with Technology, University & NGO Partners

- Identify and coordinate with key intra-city and independent community agencies, as well as NGOs and university partners
- Invest in tools and technologies that harness real-time data to inform improved rate modeling and decision-making
- Create a "data dictionary" for public water data that includes definitions, standards, and data collection protocols to "promote interoperability, efficiency, and user-flexibility"

State Governments

- Adopt and/or update urban water use planning requirements to include guidelines on how to conduct demand forecasting to reflect the reality that water demand is trending downward

NGOs, Universities, & the Federal Government

- Develop tools for local utilities to use to better evaluate the efficacy and benefits of localized water strategies, including head-to-head comparisons with conventional approaches
- Develop matrices to match localized water strategies with the different applications (residential, commercial, etc.), the various challenges the strategies can address, data needs, and financing tools
- Generate, collect, and analyze data on: (a) how LWI meets water supply, stormwater, and wastewater management needs; (b) environmental, economic, and social benefits of LWI; (c) how LWI meets public health and safety standards; (d) how capital costs, performance, and resiliency characteristics of LWI compare to centralized systems; and (e) the job creation potential of various LWI projects.

If implemented, these actions would help institutionalize LWI strategies for providing drinking water, wastewater, and stormwater services.

Pathways

Codes & Ordinances

Incorporate LWI

Leverage Points

Greywater Reuse

Examples

LEGAL & POLICY CHALLENGES

In addition to financing and institutional barriers, certain types of legal and regulatory requirements can hinder, or effectively preclude, larger-scale implementation and deployment of LWI. While these challenges can occur at all levels of government, state and local rules, regulations, and policies represent the majority of the laws and policies that govern whether, how, and where LWI can be implemented. Federal rules primarily concern the funding issues addressed above.

Municipal codes and ordinances can limit LWI because they were not drafted with localized solutions in mind. They often expressly or implicitly prohibit deploying LWI to meet water supply, wastewater, and stormwater management needs. For example, local rules such as parking lot requirements may specify use of conventional curbing or specific types of plants, which can restrict the use of bioswales, bioretention areas, or installation of drought tolerant plants. Similarly, well-intentioned state and local public health regulations can directly prohibit LWI. These regulations can restrict laundry-to-landscape greywater reuse for single-family homes as well as complex, campus-wide, advanced onsite reuse systems that treat black water. Additional examples of these regulations include: prohibitions on rainwater harvesting and the use of reclaimed stormwater; restrictions on soils used for infiltration; and requirements for vector control such as mosquito abatement rules that do not reflect the nuances of LWI.

The absence of policies, rules, and regulations that recognize LWI as available water management measures can operate as barriers to implementation as well. For example, absence of language about LWI in codes and ordinances may result in water managers not even entertaining the possibility of using such strategies. In other words, if a city's stormwater code makes no mention of bioswales, rain gardens, or other onsite GI solutions as ways developers can meet the city's post-construction stormwater standards, developers will likely use only conventional stormwater management options.

Granular scale state and local policies are crucial to LWI deployment. These policies govern on-the-ground adoption of LWI and present the main legal and policy implementation barriers when it comes to large-scale LWI uptake. As described above, there are generally two sets of legal and policy challenges to LWI implementation at state and local levels:

- Laws and policies that expressly and/or implicitly create barriers to LWI implementation
- Absence of state and local law and policies that either mandate or incentivize LWI

Recommendations

UPDATE STATE AND LOCAL LAW AND POLICY TO SUPPORT WIDESPREAD ADOPTION OF LWI

State and local laws and policies present key leverage points for decisionmakers and advocates working to establish flexible pathways for water entities to advance adoption of LWI at large-scale.

There are two important ways to apply these leverage points:

- Adopt new laws and policies to support LWI
- Update existing laws and policies to clear barriers to LWI

Adopt New Laws and Policies to Support LWI

Adoption of new state and local laws and policies that either require and/or incentivize LWI would help facilitate greater LWI implementation. These new laws and policies would provide local decisionmakers with guidance as to when LWI can appropriately meet water management needs, including whether LWI options meet state and local regulatory requirements.

The growth of greywater reuse in several western states demonstrates the relationship between state-established legal foundations or mandates and the local pathways for greater adoption of LWI. For example, California adopted guidelines for installation of residential greywater systems as part of the state plumbing code, providing the basis for many utilities and local governments to invest in public education, and incentive programs to advance adoption of these systems locally. So far, it appears to be working; public interest in greywater has grown, increasing installation of such systems. In 2019, Utah's Division of Water Resources adopted water conservation goals for municipal and industrial water use for nine regions around the state. These goals are likely to play a key role in spurring wider investment in and adoption of LWI by local water agencies working to meet them. In 2015, Colorado adopted Regulation 86 which outlines requirements, prohibitions, and standards for greywater use for non-drinking purposes that local jurisdictions can adopt to create their own locally administered greywater programs.

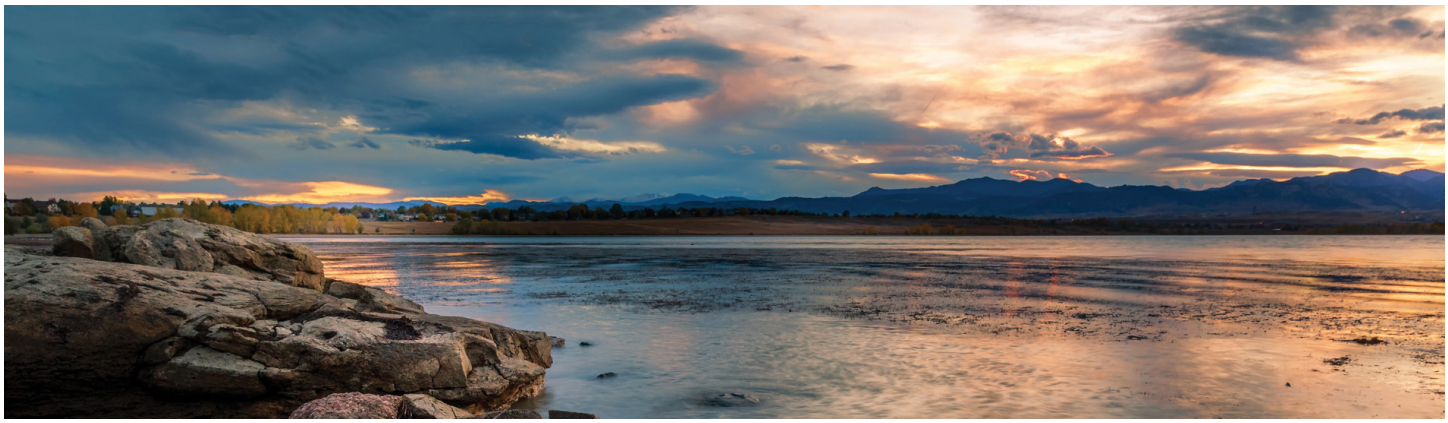
Western Resource Advocates (WRA) has built a database of several notable state water policies and programs from around the country related to urban water conservation, water reuse, and land use and water integration. Many of the policies and programs identified in WRA's database serve as robust examples for how states can establish policies to accelerate adoption of LWI (https://westernresourceadvocates.org/).

Pathways

Re-Prioritizing

Net Zero

There are several ways local governments can adopt new regulations to prescribe or incentivize LWI implementation. They can establish rules related to new development or redevelopment as a cost-effective approach. This can range from prioritizing GI for onsite, stormwater management in post-construction stormwater ordinances (as is done in Seattle, Washington, and Eugene, Oregon); to establishing conservation-oriented tap fees designed to promote water-wise growth in the arid West (as is done in Westminster and Castle Rock, Colorado); to adopting an ordinance requiring new development to reuse available greywater, rainwater, and foundation drainage for toilet and urinal flushing and irrigation (as is done in San Francisco, California). Local "net zero" water policies, which allow for new development so long as there is no net increase in water consumption, are another tool cities have used to advance LWI.



Figures 6: Westminster, Colorado

Tap Fees

Adopting New Laws and Policies to Support LWI: City of Westminster, Colorado

Challenge: Drought, Climate Change, Population Growth, Limited Access to New Supply
Localized Water Strategy: Conservation & Efficiency
Policy: To incentivize water conservation and efficiency strategies that "ensure water availability at city-wide buildout," the City of Westminster, Colorado (City), has set conservation-oriented "tap fees." In other words, to connect to the City's water system, new developments are charged based on the development's planned landscaped area and projected annual landscape water demand. Connection charges are lower for developments that use water-wise plants and reclaimed water. The City also charges a two-factor connection fee for commercial, industrial, and institutional new and re-development. One element of the fee is based on meter size; the other is based on the type of business or activity and projected annual water use. This allows the City to recommend water efficiency measures that could result in reduced connection fees when the City reviews new developments' design plans.
Results: Westminster's conservation and efficiency programs, including its long-standing conservation-oriented tap fees, have saved the City both water resource and infrastructure costs. A 2013 study showed that the City had experienced a 21% reduction in average per capita water demand. This kept residential and business water rates 99% lower than they would have been without conservation. New customers in Westminster also avoided an 80% increase in water and sewer tap fees.
Learn More: www.cityofwestminster.us/

Pathways

Change Laws

Integrated Planning

LWI & Permits

Stormwater Capture

Recommendations

Update Existing Laws and Policies to Clear Barriers to LWI

Updating local building, land use, and zoning laws offer key opportunities to accelerate adoption of LWI strategies. Changes can range from simply authorizing use of LWI where existing rules may be unclear, to specifically requiring incorporation of various types of LWI as available management practices to meet state and local regulatory requirements for efficiency and conservation. Local governments can also accelerate adoption of LWI by revising water supply planning regulations and policies to integrate water savings from water use efficiency, conservation, and reuse and identify these strategies as a means to improve efficiencies.

Land use planning policies can also be updated to integrate water planning and LWI. For example, Severance, Colorado's most recent Comprehensive Plan (Plan) includes a stand-alone water element and incorporates water conservation considerations throughout the Plan. This approach is designed to "bring about continued discussion surrounding water conservation for every planning document or decision that is proposed in the Town." To operationalize the policies in its Comprehensive Plan, Severance will rely in part on LWI implemented via rebates for: high efficiency toilets; adoption of water efficient landscape regulations; and irrigation design criteria designed to drive outdoor conservation measures. Other local governments could take a similar approach to integrated land use and water supply planning. This integrated approach also applies to local resiliency or sustainability planning that is already underway in many communities.

In addition, federal Clean Water Act (CWA) permit programs present opportunities to encourage local actors to employ onsite strategies as options for meeting permit requirements. For example, the California State Water Resources Control Board has amended the statewide industrial stormwater general permit to incentivize localized stormwater capture and use rather than limiting compliance options to centralized treatment. To this end, the permit authorizes onsite and/or offsite stormwater capture as compliance options provided the discharger meets the specific stormwater capture requirements outlined in the permit.

Under these permit terms, urban industrial development, in particular, presents opportunities for stormwater capture and greywater strategies due to the demand for non-potable water at industrial sites. Some industrial stormwater permittees have already demonstrated how implementation of such strategies can support CWA compliance. For example, several cement manufacturing facilities in southern California are retaining and reusing stormwater on site in their industrial operations. Another example is a grain elevator and export facility in Washington State that is infiltrating all stormwater runoff from its permeable surfaces onsite. Similar amendments to other state's industrial stormwater permits would incentivize more permittees to invest in stormwater capture strategies to meet their permit requirements.

Establishing new state and local guidelines, regulations, and policies or promoting LWI in existing laws and policies would just begin to scratch the surface of the many ways that cities, towns, utilities, and their states can create the policy pathways to accelerate adoption of these strategies. These modest changes would, however, have an outsized impact on increasing adoption.

Legal & Policy Action Items

We have identified nine action items for utilities, state and local governments, and NGOs and universities to take to begin to overcome identified legal and policy barriers and to foster large-scale adoption of LWI.

Utilities & Other Local Governmental Entities

- Develop internal/external teams to review municipal codes to identify unintentional barriers to LWI adoption as well as gaps in policies and ordinances needed to support larger scale deployment.
- Revise building codes and other relevant local ordinances and polices to require use of LWI in new development including, but not limited to: water use efficiency measures; onsite reuse systems; and GI.
- Establish criteria and monitoring guidelines in health and safety codes for onsite reuse of stormwater, graywater (relatively clean wastewater from baths, sinks, washing machines & etc.), and blackwater (wastewater from toilets).
- Revise ordinances or incentive programs to ensure private property owners maintain onsite facilities, and establish dedicated utility staff to ensure proper operation and maintenance of privately-owned LWI through oversight and inspection.
- Incorporate LWI objectives into comprehensive master plans and sustainability plans.

State & Local Government

- Update water supply planning regulations and policies to ensure that water savings from water use efficiency, conservation, and water reuse is treated as a source of supply.

Pathways

State Governments

- Eliminate state-level prohibitions to LWI technologies and strategies such as rain cisterns, onsite reuse and graywater systems; and/or establish state-level guidance for deploying such systems safely while protecting public health.
- Leverage regulatory requirements (e.g., municipal stormwater permits and wastewater treatment plant permits) by identifying LWI as authorized best management practices, as well as encouraging the use of LWI. For example, setting different deadlines for permittees that deploy LWI to meet permit terms and allowing for stormwater credit-trading systems.

NGOs & Universities

- Create a repository of local ordinances, policies, and programs that facilitate LWI such as building, plumbing, and land use codes, climate action or sustainability plans, and water supply and comprehensive plans.

Conclusion

LWI is Possible

LWI implementation at scale is both possible and highly beneficial. Public utilities have access to mechanisms to finance large-scale localized water infrastructure investments just as they do for conventional infrastructure.

The tools to counteract institutional inertia — that keeps the bulk of water utilities' resources and decision-making flowing exclusively towards conventional approaches — are already available or are readily achievable with the support from water sector partners, NGOs, and academia.

Finally, a growing number of federal, state, and local policies that authorize, incentivize, and prioritize LWI provide solid models for other communities as they work to shift towards these sustainable, resilient water resource management options.

For Additional Information:

Melissa Kelly, University of California, Irvine School of Law, 818/ 795-3685 or mkelly@law.uci.edu

Melissa Kelly is the Center for Land, Environment, and Natural Resources (CLEANR) Staff Director and Attorney at the University of California, Irvine School of Law. Before joining CLEANR, Melissa worked as a staff attorney at environmental nonprofit Los Angeles Waterkeeper.

Caroline Koch, WaterNow Alliance Water Policy Director, is an experienced environmental attorney and leads the organization's work in identifying and addressing policy and legal barriers to implementation of sustainable water management practices through toolkit development, on-the-ground technical assistance, legislative and administrative advocacy, and policy white papers.

NFHP - Part 2

NATIONAL FISH HABITAT PARTNERSHIP – PART 2

PROTECTING, RESTORING, & ENHANCING US FISH HABITATS

by Ryan Roberts, Association of Fish and Wildlife Agencies (Washington, DC),
Gary Whelan, Michigan Dept. of Natural Resources (Lansing, MI),
& Christopher Estes, Chalk Board Enterprises, LLC (Anchorage, AK)

Introduction

Part 1 of this article was featured in *The Water Report #225* and provided a brief overview of the National Fish Habitat Partnership (NFHP) (https://fishhabitat.org). This article offers additional details on the conservation work of NFHP, accomplishments to date — including protecting intact, rehabilitating impaired, and improving degraded fish habitat — and the overall enabling legislation, America's Conservation Enhancement Act PL 116-188, Title II.

NFHP Assessments

NFHP is currently the most comprehensive and diverse, nationwide, and partner-led network implementing science-based conservation actions for fisheries in the United States. To date, NFHP has completed two one-of-a-kind National Fish Habitat Assessments at actionable spatial scales (e.g., river reaches and individual estuaries). Many additional, smaller scale assessments have been performed by the 20 Fish Habitat Partnerships (FHPs), which are focused on specific landscapes/regions, fish species, or habitat types. In accordance with PL 116-188, Title II reporting requirements, NFHP is slated to complete the next national assessment by the end of calendar year 2025. The science assessments are supported and used by a broad range of partners including: state, federal,