



The Liquid Assets Project

YEAR TWO – LESSONS LEARNED

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About the Liquid Assets Project

The Liquid Assets Project is a partnership approach that brings together key experts to design and finance sustainable water investments. Partners include Trout Unlimited, the impact investment firm Encourage Capital, the water law firm Culp & Kelly, LLP and several agricultural and municipal water expert consultants. The Project is partnering with the Water Funder Initiative to refine strategy and generate philanthropic support for the development of these impact-focused investments.

I. THE LIQUID ASSETS PROJECT: YEAR TWO UPDATE

In October 2017, the Liquid Assets Project (LAP) released a Lessons Learned report with support from the Walton Family Foundation (see original report below). The purpose was to share our experiences and key lessons after LAP's inaugural year (2016-2017) conducting extensive due diligence, legal research, policy analysis and building partnerships to develop impact investments that advance water sustainability across the American West. We now offer this document, an update – sharing additional insights and lessons learned after year two of the Liquid Assets Project.

LAP was created to originate and design sustainable water investments that generate environmental, social, and financial returns. The same conditions – specifically, natural and human-made hydrological systems that are on the brink of crisis, and/or system failure – that compelled the LAP to originally form (and are discussed in the 2017 report) exist today and, in many regions, have been exacerbated by the continued effects of drought, climate change, economic growth, and population increases.

We remain focused on two core strategies:

Agricultural and Ranchland Investments. LAP is continuing to develop strategies to help farmers improve water use through a combination of crop switching and irrigation system improvements and to help ranchers convert to sustainable ranching practices. By targeting both water savings and increased profitability, the LAP team seeks to promote projects that enable farmers and ranchers to stay on the land, build agricultural constituencies for water markets, reduce diversions of water from surface streams or connected groundwater systems, improve the volume and timing of in-stream flows and enhance grassland conditions and ecosystem health. Specifically, we are exploring:

- using land purchases, joint ventures and special purpose vehicles to improve profitability of agricultural and ranching operations and generate water that can be marketed to meet other needs and/or provide environmental benefit.

Municipal Investments. LAP is continuing to partner with municipalities across the West to design, test and pilot financially innovative, environmentally sustainable water management solutions. Water has traditionally been artificially divided and managed in distinct programs — source water, drinking water, wastewater, and stormwater. Failure to manage water as the single, connected resource that it is, coupled with the effects of climate change and other stressors, has led to sub-optimal and sometimes disastrous outcomes. Taken together, these challenges point to a need to transform water infrastructure and management, increase flexibility in water use and mitigate system-wide and regional risks. Water utility managers and policy-makers are on the cusp of change, and we are working closely with partners to help rethink how water is managed and what financing options work in specific situations. Specifically, we are exploring:

- designing environmental impact bonds and joint benefits authority financing vehicles and private related investment initiatives to finance municipal water solutions.

II. LESSONS LEARNED: YEAR TWO

After our second year of effort, we offer these additional lessons to funders, investors, practitioners, nonprofits and others interested in developing and scaling creative solutions that promote water sustainability in the American West, and beyond.

Though we identified this in our 2017 report, one overarching lesson stands above all others and warrants highlighting:

1. *Building water sustainability investments is time- and resource-intensive.*

Like others in this space, LAP is trying to introduce the combination of innovative financing mechanisms, ecologically-sustainable solutions and private capital participation into a system of water use and management that has, largely, been unchanged for decades and is not naturally inclined to quickly adopt innovative financing approaches.

Developing new tools and financial models and creating vehicles and markets where none exist takes a significant amount of time, energy, and resources. These efforts are not solely a matter of investment due diligence (sourcing, structuring, and closing deals), but also, require a broad suite of stage-setting activities, including education and outreach, building trust, creating new partnerships and working within traditional systems and decision-making processes that move slowly and may be resistant to new approaches. These activities demand constant attention, diligence and time to:

- identify geographies that are ripe for investment **and** where investment can deliver meaningful environmental benefits;
 - develop trust and relationships with key players, whether complex municipal entities or agricultural producers;
 - tailor solutions to specific problems facing a landowner, company, municipalities or other public agency;
 - change deeply held beliefs and practices around water use and management.
2. *Both private impact and philanthropic capital are necessary to promote system change.* We believe that mobilizing private impact capital holds significant promise for solving many of the water management challenges facing the American West. However, after significant effort to develop impact investments, we also recognize, given their innovative nature, complexity, risk profile, and time horizon to develop deals, that risk-tolerant, patient philanthropic capital is essential. Philanthropic support (including grants, Program Related Investments, Mission Investments and Impact Investments) allows the Liquid Assets Project, and others like us, the necessary

time to build partnerships, change thinking and design initial, groundbreaking deals that will “prime the pump” for private investment and philanthropic investment capital, and ultimately, create solutions that begin to have impact at scale. Sole reliance on private impact capital, in the very near term, provides too narrow of a platform on which to build – yet, private impact capital, once mobilized, can achieve a scale of investment that philanthropy alone cannot. Engaging the full spectrum of philanthropic resources *and* private impact capital provides the broadest platform, and maximum flexibility, from which to develop a mix of creative approaches to solving our water management challenges and promoting water sustainability.

3. ***Geographic-focused or theme-specific funds hold promise.*** Each region throughout the West faces different water challenges. LAP has learned that tailoring investments to the specific issues of a place is critical for success. With this lens, LAP sees opportunity in pursuing project-specific investments that are either geographically focused (i.e., a particular irrigation region in the Colorado River Basin) and/or theme focused (i.e., crop switching, green infrastructure). This approach allows investments to be designed around specific, on-the-ground challenges and has the added advantage of pushing a few discrete projects across the finish line and beginning to create a network of projects that demonstrate how these creative approaches can work.
4. ***Field-building activities are prerequisite for success.*** Beyond the financial, technical and legal due diligence, a much broader set of foundation-building activities are required in order to advance creative solutions and innovative financing, particularly in the municipal sector. Technical assistance, education, meeting coordination and facilitation, partnership-building and outreach are needed to create the conditions that will allow these strategies to move forward and ultimately attract impact investors. We see an expanded need for the nonprofit sector, which has the expertise, on-the-ground presence and local relationships, to play a vital role in working with municipalities to advance understanding of the role that innovative finance strategies can play.
5. ***Building and supporting progressive-minded municipal leaders is critical.*** Most water utility staff face significant day-to-day demands on their time and energy. Without support from above (decision-makers, elected officials), innovation on the scale we are proposing will be difficult to achieve, in spite of the best intentions. We need to identify, support and elevate a network of progressive-minded leaders and build an ecosystem of players that begins to reach a critical mass. Several NGO-led initiatives have begun to independently build this network, including the WaterNow Alliance, the US Water Alliance, World Resources Institute, and sustainability/green infrastructure initiatives of organizations and associations such as the National League of Cities, AWWA, WEF, and ICMA. In addition, academic institutions at Harvard, Yale, Stanford, Duke and elsewhere are helping train a new generation of progressive municipal leaders.

Connecting and harnessing this momentum will help move and expand sustainable water projects forward faster.

6. ***There is no “one-size-fits-all” solution for municipalities.*** No single tool will work across the entire municipal sector. Going forward, rather than going to the municipalities with a single strategy, we need to start with their unique situation, and build out the solution, the financing, and the approach to address their specific problems. For example, after working with one large municipality for several months and realizing that the major problem was that green infrastructure was seen as the “more expensive” approach to addressing stormwater management, we developed a new approach. We are pioneering the Joint Benefits Authority (JBA) approach to help overcome a water utility's understandable bias against funding 100% of a green infrastructure project that provides multiple benefits to a community, but not 100% attributable to their water user fees. The JBA unites multiple municipal departments behind one green infrastructure (GI) project and allows for each department to pay for the specific co-benefits that the GI project will deliver to their specific department.

III. LIQUID ASSETS PROJECT: LESSONS LEARNED, YEAR 1 (2016-2017)

In order to help develop the field of impact investing in water, particularly in the western US, the Liquid Assets Project offers the following lessons learned from our first year in operation:

1. There is strong interest in innovative financing for sustainable water solutions.

The LAP team continues to be encouraged by the strong positive response to this project from many different sectors. There is substantial enthusiasm about and interest in developing sustainable water investments from the government, investment, agricultural, municipal, and NGO sectors. This continued broad interest has helped us forge ahead through the challenges of designing something new.

2. Water has become a hot topic in impact investing circles. In the past, water topics were often ignored or under-investigated in discussions about impact investing. But there has been a noticeable uptick in interest from investors regarding sustainable water investment. For example, at a March 2017 Credit Suisse meeting on conservation investments, two of three opening plenary panelists mentioned water investments as the most exciting thing they are seeing in the investment space. In addition, the CREO Syndicate and the ImPact Group have recently released an impact investing primer on water for family offices and foundations. This increased interest is partly the result of expanded attention to water sustainability issues due to the drought/flood cycle in California and water quality crisis in Flint. With this increasing investor interest will come

increasing pressure to develop pipelines of investments with clear environmental and social benefits, but may also increase the risk that investors support investments without clear positive impacts.

3. *The limiting factor is finding investment opportunities, not finding investors.* The LAP team has met with numerous individuals in the investment community who are eager to support water investments that have environmental and financial returns. Based on our experience and discussions with others developing water investments, there are indications that good projects may be quickly “over-subscribed.” For example, DC Water had dozens of investors wishing to invest in its recent environmental impact bond for green stormwater infrastructure, but it picked only two for the investment. Further, in conducting research for several recent reports on conservation impact investment, Encourage Capital staff were told that investors have raised roughly \$500 million for water-related investments that has not yet been deployed, perhaps pointing to a shortage of investable projects in the space. This reinforces the need for the Liquid Assets Project and others to focus on developing strong impact-focused water investments to meet increasing investor demand.

4. *The devil is in the details.* Water sustainability is a complex area where the environmental and social value of a project is very site-dependent. For example, when an energy efficiency investment results in a saved kilowatt of power, there is a clear environmental benefit, but when a water efficiency project saves a gallon of water, the environmental benefit depends on where the gallon is saved and what happens to the saved water. For this reason, the Liquid Assets Project prioritizes the development of investments with a team that understands the local environmental and social context for a project, the regional water trading landscape, and the financial value of the transaction. This team approach is core to our mission and will be integral to success of any water impact investment.

5. *Sustainable water investments are built, not found.* Through this project, LAP staff have conducted a broad search for sustainable water investment opportunities across the West. While we have come across a number of new and innovative ideas, no shovel-ready opportunities have dropped in our laps. This result is unsurprising – this is a new field, and each investment needs to be designed from scratch and evaluated carefully to ensure there are both financial and environmental returns. The LAP team expects that once pilot investments are developed, municipal and agricultural players will wish to replicate these projects, and this will make developing follow-on investments less challenging. As a result, the Liquid Assets Project’s focus remains on the identification and development of initial pilots that have the potential to be replicated, given the investment community’s interest in investing in multiple similar projects.

6. Building investment opportunities is time- and resource-intensive. The process applied by the LAP team to identify investment opportunities involves several layers: identifying specific regions or locales where such investments may be needed; general scoping of potential investment opportunities and environmental and social benefits; refinement of the investment approach based on local economics, legal constraints or other factors; and then identifying and spending time with farmers, ranchers, irrigation districts and cities to discuss and design investment opportunities. While the full process takes time, the last step is particularly time-consuming and complex. The potential agricultural investments involve real people, with real land and water, in some cases land and water that has been in a family for generations. These discussions are sometimes sensitive and slow moving. On the municipal side, discussions usually involve several staff, working up from those most familiar with infrastructure needs through a decision-maker hierarchy that is often quite risk adverse. In either case, if there is agreement to explore a potential particular investment, further time and resources are required for economic modeling, due diligence, resolving legal and technical issues and other matters.

7. Foundation funding is critical for success. Because the transaction costs of building innovative new sustainable water investments are high, foundation funding (through grants and Program Related Investments) remains a very important component for underwriting the development costs of the initial phase of origination and development. For the most part, this is a new approach for foundations. The LAP team has worked with foundations to provide information about the need and value of providing philanthropic support for an enterprise that will eventually return a profit along with environmental impact. We have received important support and leadership from the Water Funder Initiative, which has been instrumental in educating the funding community about the potential impact and leverage of jump-starting impact investing in water.

8. Developing investments is different than typical NGO work. While the LAP team is looking for investments that have environmental benefits and that could drive policy change, in the end the Liquid Assets Project is also about ensuring sufficient financial return for private investors. This focus requires more sensitivity to competition and confidentiality than typical NGO collaborative efforts. The LAP team has worked to establish a structure that reflects the need for confidentiality while maximizing the networking needed to identify investments in the close knit agricultural and municipal water communities.

9. Private investment in sustainable water infrastructure is a non-partisan goal. The gap between infrastructure needs and public funding for water infrastructure continues to expand. Because of this, both the Obama and the Trump administrations have recognized the value of enabling private investment to advance sustainable water infrastructure. The Liquid Assets Project has worked with both administrations to explore how federal funding and policies can help advance sustainable private investments.

10. Investing in sustainable agricultural and ranching practices is challenging in regions where land valuation is driven by non-agricultural factors. In many regions, amenity-driven second home purchasers, suburban development interests and foreign land speculators are skewing the value of agricultural and ranch lands. In areas where land values are driven by non-agricultural factors, it is difficult to invest in agricultural properties and anticipate a reasonable risk-adjusted return from only agricultural and water revenue streams. The LAP team has had to refine our search criteria to find locations where land values are less driven by these factors but still show promise for environmental benefits from improved agricultural practices. We are also exploring alternative financing structures to address the land valuation issue.

11. Local partners will be increasingly important for success in municipal investments. Because municipal infrastructure design and investment decisions take many years to develop, having strong local partners who can advance sustainable infrastructure solutions is very important for success. The LAP team has designed materials for local partners to enable them to promote sustainable infrastructure solutions and understand how the Liquid Assets Project can help when it is time to explore financing. We expect this will help seed a longer-term pipeline for investments.

12. Being on the cutting edge means frequent changes. As the Liquid Assets Project pursues investments across the West, it has become clear that what we are attempting is both new and innovative, and also deeply needed. While similar work has been done in the energy and other environmental spaces, we are clearly on the cutting edge of change. This means there are really no models to follow and our strategies are necessarily experimental. We have evolved our ambitions and strategies to respond to lessons we have learned to date. And we will need to continue to remain nimble to respond to opportunities and have the flexibility to change and evolve approaches based on what we learn. We are encouraged to see several other parties also seeking to develop water-focused impact investments, because increased impact-focused deal flow is needed. Comparing lessons learned will help to strengthen all of these efforts.

IV. THE LIQUID ASSETS PROJECT - 2017 LESSONS LEARNED REPORT

A. INTRODUCTION

Throughout the West, the combined impacts of drought, climate change, economic growth and population increases are pushing both natural and human-made hydrological systems to their limits. Taken together, these challenges point to an increasing need to transform the region's water infrastructure and management, increasing flexibility in water use and managing for system-wide risk. There are opportunities to modernize agricultural irrigation (the primary use of the West's water) to produce food and fiber with less water. Likewise, there are opportunities to transform urban water systems to maximize the efficient use and reuse of water supplies, and to integrate municipal water use with the natural functioning of a region's rivers, streams, and groundwater aquifers.

Traditionally, construction of water infrastructure for agricultural and municipal uses has been funded primarily through public investments – either grants or low interest loans. However, public funding is not keeping pace with the increasing need for water infrastructure investment, and the public funding is increasingly constrained. Private investment is urgently needed to meet the water challenges on the horizon. Developing opportunities for private investors who seek both environmental and financial returns can increase investment in sustainable water solutions. Demonstrating water solutions in partnership with impact investors can demonstrate the financial value of sustainable water solutions, thereby attracting broader financial returns-focused private water financing. And by testing both the technical viability and the ecological and social value of these solutions, impact investments can increase comfort with innovative, environmentally sustainable approaches and thus help unlock public funding for these sustainable solutions.

But to date, investment opportunities for private impact-focused investors have been few and far between. This is in part because many impact investors have not had the tools or relationships to understand agricultural and municipal water use dynamics, the state, federal and local regulatory constraints, or the economic and ecological forces at play in specific locales.

The Liquid Assets Project (LAP) was established to help address these challenges. The Project's goal is to originate and design sustainable water investments that can attract private investors to the West who care about environmental and social returns as well as financial profit. The Project emerged from the October 2015 report *Liquid Assets: Investing*

for Impact in the Colorado River Basin, by Encourage Capital and Squire Patton Boggs. This report looked across the landscape of Western water issues, outlined what solutions are needed to bring water use into sustainable balance, and identified income streams in some of those solutions. The report then built investment blueprints for those income streams that have the potential to generate environmental, social and financial returns.

In 2016, the Liquid Assets Project was formed following the publication of the *Liquid Assets* report to advance two types of investments outlined in the report. First, the LAP is advancing *agricultural and ranchland investments*, using land purchases or joint ventures to improve profitability of agricultural and ranching operations and generate water that can be marketed to meet other needs and/or provide environmental benefit. Second, the Project is advancing innovative *municipal investments*, designing green bonds, environmental impact bonds and joint benefits authority financing vehicles to finance environmentally-sustainable municipal water solutions.

For each of these investment approaches, the Liquid Assets Project team is working to originate, structure and diligence an initial pipeline of investments, and in order to raise impact capital to finance the investments. Through building two pipelines of investments, the Liquid Assets Project is working to jump-start investment across the American West in innovative water management solutions with sustainability at their core.

Building on a philosophy that the most impactful investments are designed with a combination of investment and local water and environmental expertise, the Liquid Assets Project is a partnership approach that brings together key experts to design impactful investments. Partners include Trout Unlimited, the impact investment firm Encourage Capital, the water law firm Culp & Kelly and several agricultural and municipal water expert consultants. The Project is partnering with the Water Funder Initiative to refine strategy and generate philanthropic support for the development of these impact-focused investments.

This report outlines the work that the Liquid Assets Project is endeavoring to advance, and provides lessons learned from the Project's initial year of operations. The LAP team's goal with this report is to share our learnings to help others advance investments in sustainable water solutions.

B. AGRICULTURAL AND RANCHLAND INVESTMENTS

The Challenge:

Irrigated agriculture accounts for a substantial portion of water use in the western United States, producing food and fiber for domestic consumption and export. It also provides

the foundation for many rural communities, and its viability is a critical component of the West's landscape and cultural heritage. In many cases, these irrigation water rights have senior priority under the state prior appropriation system. Irrigated agriculture faces many challenges, including volatile commodity prices; aging irrigation infrastructure in need of repair; an aging farmer and rancher population; and in some areas, efforts by municipal water providers or others to buy farms and dry them up by moving water to meet urban needs.

Many agricultural producers recognize these challenges and are seeking to improve water use efficiency, explore temporary water leasing (as opposed to permanent land dry up), switch to higher value and lower water use crops, or modify grazing and irrigation practices to improve productivity and grassland health. However, the capital to support such transitions is often lacking.

Sustainable Solutions:

The Liquid Assets Project promotes approaches that save water, improve agricultural productivity, and avoid disruptive “buy and dry” transfers. These approaches include:

- ***Crop switching:*** Switching to the production of less water-intensive (and in many cases higher-value) crops;
- ***New techniques:*** Using deficit irrigation and rotational grazing techniques;
- ***Soil management changes:*** Making management changes that improve the soil's health and ability to retain moisture, including cover crops and conservation tillage; and
- ***New technologies:*** Introducing efficient technologies, such as land leveling and drip irrigation.

These more sustainable approaches can potentially reduce the consumptive use of agricultural water and generate water savings that can be transferred to other uses for compensation—all while promoting increased viability and sustainability of agricultural operations.

Some emerging range management strategies also suggest significant potential for private investment in livestock production that can improve grassland conditions and increase net livestock yields. For example, intensive rotational livestock grazing actively manages livestock to graze on a confined plot of land for a short period and then move elsewhere, allowing grasses to recover while opening up soils and leaving animal manure behind to build soil nutrients. These practices have been shown to substantially improve grassland conditions, soil moisture, and other values while generating greater livestock yields.

Financing Approaches:

Many farmers and ranchers don't have the available capital to finance these improvements, especially if they grow low-value crops with aging irrigation infrastructure. Because of this, there appears to be significant potential for the deployment of private capital to finance the improvements outlined above. The Liquid Assets Project is exploring three investment structures to support this approach:

- The **direct purchase** from willing sellers and upgrade of farm or ranchland operations by investors who then capture the upside of both enhanced farm and water revenues, as well as the appreciation of the farmland assets;
- A **joint venture** in which farmers/ranchers and investors work together to achieve improved outcomes through the farmer's labor and the investors' capital, and then share the resulting revenues; and
- Investment in **market interventions** (e.g., processing facilities) to increase access to higher value agricultural markets and drive crop-switching.

The Liquid Assets Project is also exploring ways to structure these types of investments to facilitate the entry of young farmers as partners in the investment, allowing them to finance their acquisition of farmland in areas with many older farmers and where the costs of an outright farm purchase by a young farmer are effectively out of reach.

Investments would be repaid by a combination of enhanced agricultural or livestock revenues, potentially supported by purchase or long-term supply contracts for specialized crops or sustainable beef that are not widely produced in the region. Where legally possible, these returns would be enhanced by monetizing water savings via the sale or lease of conserved water to downstream users. In the case of direct-purchase financing approaches, the appreciation of underlying land assets would also be used to finance the investments.

While using private funds to finance water savings improvements at farms and ranches is in itself not new, the approaches being pursued by the Liquid Assets Project are innovative in that they prioritize changes that will improve the economic productivity of the farm/ranch while saving water, thus avoiding harmful "buy and dry" approaches that are not only politically unpopular but also socially and environmentally disruptive. By demonstrating the ability to maintain agricultural productivity while saving water, the LAP team hopes that these investments will be integral to changing regional politics and driving policy change across the West.

The Liquid Assets Project's goal is to develop a pipeline of sustainable agricultural and ranchland investments, with the first closed by March 2018 and a total of eight investments closed by 2021. The LAP team anticipates development of an Agricultural and

Ranchland Investment Fund, with the first half of the fund raised by December 2018 and the full fund raised by December 2019.

C. MUNICIPAL FINANCE INVESTMENTS

The Challenge:

Throughout the Western US, most cities and towns depend either on highly variable river flows or hard to replenish groundwater to meet their water needs. Aging water infrastructure is used for varying combinations of pumping, diverting, storing and treating these water supplies. In the face of population growth and climate uncertainty, these water supplies are increasingly over-tapped and unreliable – from both a quality and quantity perspective. Longer drought cycles are producing acute supply challenges, and also reducing opportunities to refill reservoirs and recharge groundwater. More frequent extreme storm events increase the need to reduce flooding risks and prevent water quality issues, but also present opportunities to use that stormwater to recharge depleted groundwater supplies. In many Western cities, these climate-induced water uncertainties impact low-income populations the most, with flooding, poor water quality and unreliable water supplies occurring more often in poorer communities that lack the resources to respond to these challenges.

Most of the West's water development has been focused on the construction of so-called "gray" infrastructure projects to meet water supply and water treatment needs. This gray infrastructure includes dams and diversions, groundwater wells, canals and pipelines to import water from remote locations, hardscaped stormwater management, and industrial-scale wastewater treatment plants. While these types of infrastructure have served their water development purposes, in some places they have also led to groundwater overdraft, depleted natural stream systems, and disrupted hydrological cycles. The impervious concrete lining city streets and urban streams has exacerbated flooding. And poorly-planned, deteriorating, or outdated infrastructure has also impaired water quality in both groundwater and surface streams.

As Western communities and populations have grown, the use of gray infrastructure to tap surface water and groundwater supplies in many areas now approaches or exceeds what is sustainably available for human use. Many rivers and streams may even run dry for part (or even all) of the year. This threatens water rights and environmental values alike. In many groundwater-dependent areas, groundwater pumping substantially outstrips the rate of natural groundwater recharge, creating significant water deficits in local groundwater basins. This not only reduces municipal water supplies, but sinking land as

groundwater basins contract harms surface buildings and infrastructure, and depleted groundwater also reduces or even dries out the streams and lakes that are interconnected with those groundwater supplies.

As the region's infrastructure ages and populations expand, massive new investments in infrastructure will be needed. It is critical to consider the implications of how new water infrastructure is designed. The infrastructure choices made today will have long-term consequences for the resilience of Western communities and the watersheds on which those communities depend. If all new infrastructure follows yesterday's "gray" models, current ecological challenges and municipal supply vulnerabilities may be exacerbated. New dams and diversions may further disrupt stream systems and interfere with downstream water rights holders and sensitive environmental uses; new or expanded wellfields can worsen existing groundwater overdraft problems; and armored stream channels and stormwater systems can actually worsen flooding, increase pollution, and prevent groundwater recharge.

Sustainable Solutions:

Recently, there has been a growing interest in replacing or combining traditional "gray" infrastructure with more innovative "green" (also called "nature-based") infrastructure approaches that can increase the ecological benefits associated with municipal water infrastructure projects while also increasing the resiliency of the water project to changing environmental conditions. There is a growing recognition that municipal water users and environmental values do not necessarily need to be in competition with each other for limited water resources. In fact, when properly designed, green municipal water infrastructure can benefit both people and the environment – where ecosystem values function to increase the resiliency of municipal water supplies, and where municipal water infrastructure functions as part of an ecosystem.

To advance sustainable municipal water solutions, the Liquid Assets Project is targeting the financing of three types of green water infrastructure, described below. As part of a broader system of municipal water infrastructure, these nature-based components can create community and environmental benefits that both reduce pressure on external water supplies and work to integrate municipal water use into local watersheds. Separately or in combination, these infrastructure solutions can help to significantly change the relationship of a community to its watershed and the surrounding ecosystem, providing cost-effective water quality and quantity benefits, increasing hydrological connectivity, enhancing recreational and environmental values, and increasing the resilience of a community to uncertain weather and water supply changes.

- ***Green Stormwater Capture and Recharge Systems:*** Streets, parking lots, roofs and other hardscaped areas in communities can cause flooding during rain events.

The resulting stormwater can become polluted from contaminants, sediment and trash on the streets, harming local streams. In some cities, the stormwater is routed into the sewer system, resulting in overflows of untreated sewage during large rain events. By turning some of the paved areas in a city into natural areas, stormwater can be captured or slowed down. These systems can reduce pollution flowing into rivers and streams by using the natural treatment benefits of soils, and can be important in helping communities manage localized flooding caused by more frequent extreme weather events. Designed properly, these systems can also recharge groundwater and manage the timing and volume of stormwater flows to benefit local water supplies and control erosion. In addition, the increase of green space in communities can reduce air pollution and heat island effects, calm traffic flows and improve habitat values and quality of life.

- ***Effluent Recharge Projects:*** In many communities, treated wastewater is disposed of through evaporation ponds, spray disposal, surface irrigation or deep injection, removing that water permanently from the local water supply balance. If treated properly, effluent can instead be strategically recharged into groundwater aquifers to reduce existing groundwater deficits or offset new groundwater pumping. Treated effluent can also be used to mitigate the loss of stream flows by recharging water into adjacent floodplain aquifers, allowing that water to migrate to the stream to enhance base flows. This can help to improve water quality in streams by taking advantage of the natural treatment provided by infiltration through soils. These approaches to recharging properly treated effluent can help to sustain local water supplies even as communities grow by essentially reinserting and integrating communities into the local hydrological cycle.
- ***Wetland-Based Tertiary Wastewater Treatment Systems:*** Constructed wetlands can provide a cost-effective way for a community to treat its wastewater, and can provide secondary natural habitat and groundwater recharge benefits as well. Wetland-based tertiary treatment systems can help to significantly improve the quality of water coming from wastewater treatment plants, allowing water to be put to other beneficial uses or to be recharged/discharged for environmental benefit. These facilities can also help to replace wetland habitat that has been lost to land and water development, creating important wildlife and bird habitat, and creating community recreational and environmental amenities.

FINANCING APPROACHES

Increasing the reliability and resilience of western municipal water supplies will require near-term, multi-billion-dollar investments to modernize and expand municipal water infrastructure. Private investment is needed to supplement public funds in financing this

infrastructure. This need for private investment creates an opportunity for investors who seek social, environmental and financial returns to influence municipal infrastructure design in favor of more resilient green infrastructure over more traditional gray approaches.

Municipalities across the country are considering innovative financing options to meet infrastructure funding gaps. As an innovative conservation practice, green infrastructure is a good candidate for various types of partnerships between public water institutions and private investors. Private financing can help enable funding for innovative projects, reduce the cost of green approaches, manage performance risk and/or enable private procurement. Depending on the needs of the municipality, one or more financing options may be more useful. The Liquid Assets Project is using the following three types of financing structures, or combinations of these structures, to address current challenges in financing green infrastructure.

- An **“Environmental Impact Bond” (EIB)**/pay for performance approach that could reduce the risk to mid- and large-sized municipalities as they implement more innovative environmental approaches to water infrastructure. This financing could be used to encourage the adoption of environmentally-preferable green infrastructure as an alternative (or complement) to gray infrastructure, generating additional economic and community benefits. Under this approach, private investors would finance the green infrastructure solution, and would receive a range of repayment rates based on the relative performance of the infrastructure tied to agreed-upon environmental performance metrics. An EIB could be designed to incorporate social metrics such as job creation in its structure as well. The first EIB in the country was issued by Washington DC’s water and sewer authority DC Water. It facilitated the construction of a nature-based stormwater capture system to help address D.C.’s combined sewer overflow challenge.
- A **“Joint Benefits Authority”** financing structure for green water infrastructure approaches that deliver co-benefits beyond the infrastructure’s water objectives. This financing approach would blend payment streams for differing project benefits into a single financing vehicle. For example, green stormwater projects can provide flood management, water quality treatment and groundwater recharge – all benefits to a water utility. But the project can also deliver local job opportunities, traffic calming, open space development, heat island reduction, and climate resilience benefits. These “co-benefits” could be of value to the municipality’s departments of transportation, parks, health, labor and others. This joint benefits financing approach not only could significantly lower the costs of the infrastructure to the water utility, but also could help cities shift their infrastructure designs to increasingly integrated approaches that meet multiple

municipal needs and increase overall climate resilience. The Joint Benefits Authority approach can help shift currently desired but undervalued co-benefits from externalities to quantified project objectives, and hopefully can strengthen the political and financial strength of these integrated resilient designs. This could help stretch tight municipal budgets and increase the overall resilience of the city's infrastructure.

- **“Green bond”** financing to upgrade water infrastructure, with the green funding tied to implementation of more environmentally-sustainable approaches. Particularly for small- to mid-size communities, some of which have limited access to credit, this financing structure would allow the municipality to receive financing for green projects which it would otherwise be unable to fund through state revolving funds or other traditional funding mechanisms. Green bond financing could also supplement state revolving funds to upgrade from a default gray infrastructure solution to a more environmentally sustainable green solution. A green bond could also be implemented through a Joint Powers Authority (JPA) financing authority – an entity created by two or more public authorities (such as local municipal or county governments) in order to jointly exercise any power common to all of them. A JPA green bond could allow the local governments to design and build green infrastructure solutions together at a watershed scale that they otherwise would be unable to finance independently or through traditional financing options

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FOR MORE INFORMATION:

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