US Water Alliance

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Water Environment Federation
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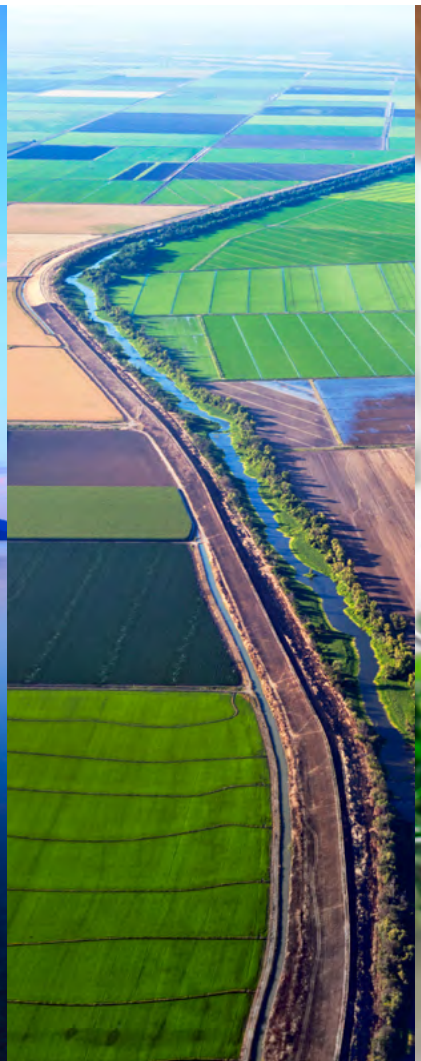
Addressing Nutrient Pollution in Our Nation's Waters:
The Role of a Statewide Utility

Preface

Nutrient pollution is a complex and massive problem for our nation's waters. It is a challenge for many different bodies of water across many different regions, but the responses to nutrient pollution have been siloed and fragmented. To forge large-scale progress on nutrient pollution, we are going to need a new approach that is more strategic and holistic in its structure and execution. This policy brief was developed by the US Water Alliance, the National Association of Clean Water Agencies, and the Water Environment Federation. Our organizations know that a collaborative approach will be the only way to achieve our nutrient reduction objectives. We are proud of this partnership and offer this policy brief with the hopes of advancing innovative solutions to such a critical and complex challenge.

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Introduction

The benefits of freshwater to people and nature are immeasurable, but water quality and quantity issues are among the greatest environmental challenges of this century. Additionally, the American system of water management is fragmented, which constrains water utilities, farmers, manufacturers, environmental leaders, and others from coming together to forge collaborative, cross-sector solutions to protect our nation's waters.

In 2014, the US Water Alliance convened the *Mississippi River Nutrient Dialogues*, which brought together agriculture, wastewater, drinking water, environmental, academic, and business leaders for a blue-sky discussion about how to address the significant water quality challenges that result from excess nutrients. There was consensus that no single group has the capacity nor the resources to tackle the massive problem of excess nutrients. For example, while government agencies can help identify high-level objectives, such as state-based nutrient reduction strategies, without cross-sector leadership, such strategies have little chance of being implemented at the necessary scale. To safeguard critical freshwater assets like the Great Lakes and Mississippi River Basin, we need new, collaborative structures that go beyond the current regulatory context and traditional silos.

One big idea that emerged from the *Mississippi River Nutrient Dialogues* was the idea of establishing a statewide entity that could augment existing governance and funding structures by tapping into the support of broader constituencies and stakeholder groups. Stakeholders in states such as Ohio, Illinois, and Iowa are now exploring how such an entity might be established.

Building on those ideas, this paper introduces the concept of a statewide institution or utility that would offer new financing, governance, and operational functions to advance state nutrient reduction strategies with the support and participation of agriculture, water utilities, environmental and business interests, and the public. Several states are advancing bold nutrient loss reduction strategies, but in many cases, there are substantial issues with financing, technical capacity, cost effectiveness, and public support.

The statewide[1] utility concept has the potential to strengthen existing efforts to improve water quality and create a system that incentivizes, invests in, and seeks returns from innovative technology and human resource development.

As described in further detail in this paper, a statewide utility could be structured and empowered to:

- Draw on a statewide base of funding, reflecting a shared burden/shared benefit model for the residents of a state;
- Be accountable, through the composition of its Board of Directors, to a full range of nutrient reduction stakeholders;
- Pursue the highest value and most cost-effective nutrient reduction investments on a statewide basis; and
- Provide the technical, financial, and operational capacity needed to design, build, and operate large-scale projects (e.g., wetlands installations) that are called for in-state nutrient reduction plans.

Achieving nutrient reduction objectives will bring huge benefits. But to get there, institutional changes and an increase of investments will be required. This paper introduces institutional changes that, if implemented, could create the structure and confidence needed to unlock additional investment. Big policy debates, such as the Farm Bill, are currently underway. Now is the time to be bold in addressing the longstanding challenge of excess nutrient pollution in our nation's waters.

Why Excess Nutrients are a Problem

Nutrient pollution is one of America's most widespread, costly, and challenging environmental problems. In most cases, nutrient pollution is caused by excess nitrogen and phosphorus in the air and water. It's important to note that nitrogen and phosphorus are nutrients that are natural parts of aquatic ecosystems. These nutrients are essential to the growth of algae and aquatic plants, which provide food and habitat for fish, shellfish, and smaller organisms that live in water. However, when too much nitrogen and phosphorus enter the environment—usually from a wide range of human activities—air and water can become polluted. Excess levels of nutrients affect streams, rivers, lakes, bays, and coastal waters in regions across America. They can threaten human health, wildlife and plant populations, recreation opportunities, and livelihoods in communities and watersheds throughout the United States.

While there is some progress in addressing excess nutrients entering our waterways, progress is not happening at the scope and scale sufficient to protect our nation's waters. In 2009, the State EPA Nitrogen Innovations Task Group observed that continuing the status quo "will ensure increasingly degraded ecosystems, lost aquatic habitat and species diversity, abandonment of water quality standards in vulnerable watersheds, increased drinking water risks, and the greater future costs associated with lost economic opportunity, vanishing recreational resources, and increased treatment, recovery, and restoration."[2]

Excess nutrients can cause water quality problems both near and far from the location where they enter rivers, lakes, bays, or other water bodies. High phosphorus and nitrogen levels can feed harmful algal blooms—a condition where algae grow out of control and can produce toxins and elevated bacteria levels, which can sicken people and animals if they are exposed to the water or consume contaminated fish and shellfish. High nitrogen levels in drinking water can also interfere with the ability of red blood cells to carry oxygen.

One of the most well-known long-distance effects of nutrient pollution is in the Gulf of Mexico, where excess nutrients from the Mississippi River Basin cause algal blooms as far as 2,300 miles downstream. The algae then decompose, consuming large amounts of oxygen and creating a hypoxic "dead zone" in which aquatic organisms cannot survive. In 2017, this dead zone in the Gulf of Mexico covered 8,776 square miles, an area the size of New Jersey.[3] Hypoxic dead zones also occur in Lake Erie, Green Bay, Chesapeake Bay, and other areas.

Excess nutrients increase the costs for water agencies to provide high-quality drinking water and treat wastewater. It also adversely affects livelihoods by limiting recreational opportunities and negatively affects animal and plant life too. The US tourism industry loses nearly $1 billion and the commercial fishing industry loses tens of millions of dollars each year due to excess nutrients.[4]

What Are the Sources of the Nutrients?

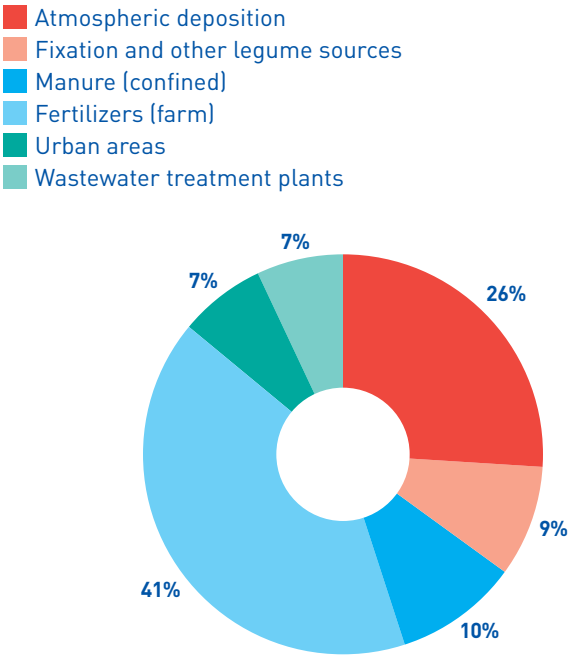
While a range of human activities contributes to excess nutrients in the water, the primary contributors are agricultural runoff from row crops and livestock, urban stormwater, and wastewater. *Figure 1* shows estimates of the sources of nitrogen and phosphorus transported from the Mississippi River Basin to the Gulf of Mexico.[5] The pie charts show that agricultural runoff carrying fertilizer is the single biggest contributor to excess nitrogen and phosphorus in the Mississippi Basin. This represents not only an unwanted input to the aquatic environment, but the loss of an expensive resource—fertilizer—for farmers.

Most communities working to solve the problem of excess nutrients focus on both "point" source and "nonpoint" sources. Point sources usually refer to industrial and municipal wastewater treatment plants. Nonpoint sources refer to stormwater[6] and agricultural runoff.

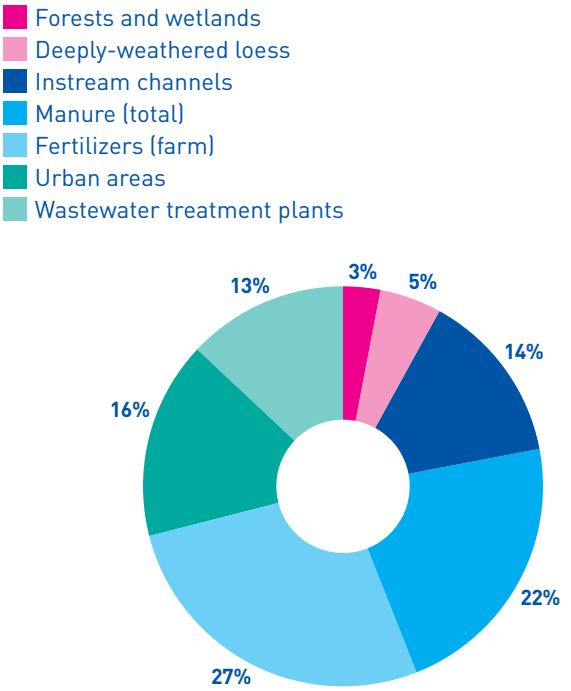
Figure 1

USGS estimates of sources of total nitrogen and total phosphorus transported from the Mississippi River Basin to the Gulf of Mexico.

Total Nitrogen



Total Phosphorus



Source: EPA, Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, 2015 Report to Congress.

Point sources. Since 1972, over $1.4 trillion in public funds have been invested to improve municipal wastewater treatment facilities to address nutrient pollution. Between 1972 and 2008, the municipal wastewater sector improved its nutrient removal from 40 percent of incoming nutrients to 60 percent.[7]

Since the remaining nutrients still cause water quality degradation, point sources are often targeted to increase removal of nutrients from their effluent. As many wastewater treatment facilities have significantly controlled their nutrient runoffs, they now face diminishing returns. In many cases, additional nutrient removal would be very costly and inefficient, and even a large investment would not result in a meaningful reduction in overall nutrient loadings.[8]

Nonpoint sources. In the case of agricultural nonpoint sources, a primary approach to reducing nutrient runoff has been the implementation of "Best Management Practices" on a farm-by-farm basis. While many of these practices can be a cost-effective way to reduce nutrients and improve water quality, others are expensive and can create competitive disadvantages for individuals. Farmers are often price-takers, meaning they must accept prevailing prices in a market and, therefore, cannot pass along any increases in the cost of production.

Nutrient flows of farm practices are unpredictable (due to differences in soil properties, hydrology, cropping patterns, weather, etc.), so farmers are often hesitant to change practices or make investments that lack foreseeable returns. Some best practices are outside of farmers' expertise or require off-field property that they do not own.[9] Alternatively, some best practices are known to deliver highly reliable and quantifiable reductions in nutrient loading. This includes optimized application of fertilizer, using the "4R" nutrient stewardship concept—the right source, at the right rate, at the right time, and in the right place.

Since the mid-1980s, the federal government has spent only $5 billion to incentivize farmers to implement nutrient pollution reduction strategies. That is less than one percent of the investment in point source treatment with the same objective.[10]

Business-as-Usual is Not Working

Over the years, several sectors have undertaken substantial efforts—including agriculture, regulators, environmental interests, and municipal and industrial point-source National Pollutant Discharge Elimination System (NPDES) permit holders—to reduce nutrient pollution.[11] These efforts have produced reductions in excess nutrients in some watersheds across the country such as the lower Ohio River and the lower Susquehanna River.[12] Despite progress, reality is still falling short of our goals. For example, over half the states have nutrient reduction strategies,[13] but the progress towards those goals is slow, and not keeping pace with the scope of the challenge.[14]

Key shortcomings of existing institutional arrangements that limit their ability to achieve the level of nutrient reductions required to meet local, state, and federal water quality objectives include the following:

- **No entity "owns" the problem.** While numerous entities have a role in the system, there is no one responsible party that has the mission, authority, and resources to effectively implement a solution.[15]

- **Multiple programs exist, each with constrained scope.** Existing programs have clearly defined and focused target audiences and typically operate on a constrained scope and scale (e.g., the individual farm level), limiting the reach of programs across the full array of nutrient sources and limiting their ability to operate on a watershed scale. For example, existing funding mechanisms lack the flexibility to: 1) target the most cost-effective reductions anywhere in a state or watershed and; 2) combine sources of funding to invest in large, watershed-scale nutrient reduction projects. An example is the Environmental Quality Incentives Program, which does not allow geographic targeting because that is seen as potentially favoring farmers in one region over another.

- **Insufficient scale compared to the magnitude of the problem.** Despite some successes, today there is widespread recognition that the current approach has not worked at the geographic scale (e.g., watershed or regional) needed to adequately reduce nutrient pollution. In 2016, EPA observed that "the National Aquatic Resource Surveys conducted by the EPA and state and tribal partners continue to show that nutrient pollution affects an alarming proportion of the Nation's waters. … The 2009-2010 survey of rivers and streams found that 46 percent have high levels of phosphorus and 41 percent have high levels of nitrogen."[16]

- **Insufficient resources.** The amount of resources currently devoted to solving the excess nutrient problem falls far short of the amount needed to meet nutrient reduction objectives. In addition, the resources that are available are generally not predictable or available on a consistent, long-term basis. And while additional resources will help, if they are provided within the current institutional and policy framework, they will face the same challenges identified here and their effectiveness will be limited. For example, in the State of Iowa, cost estimates for reaching the state's 45 percent nutrient reduction goal in 2035 range from $200 million to $1.3 billion annually. Recent funding has been far less.[17]

- **Limited technical capacity.** Some practices identified in state nutrient loss reduction strategies for farmers, such as edge-of-field bioreactors and off-field wetland treatment systems, require engineering design and technical operation and maintenance capabilities far outside the core business of growing crops and operating farms. Likewise, small and medium wastewater treatment plant operators may also struggle with the technical requirements of installing and operating advanced nutrient reduction technologies. To successfully scale up the use of these technologies, commensurate levels of technical assistance will be necessary.

- **Existing legal tools often lead to expensive methods of reducing nutrients.** Given the tools available in the Clean Water Act, an important focus of the current federal approach is downward pressure on the amount of nutrients wastewater utilities can discharge. These regulations come with high price tags for utilities, which means increased rates for ratepayers and, at times, community resistance. Moreover, the stricter limits may make only a very marginal improvement in overall water quality.

- **Lack of public awareness or support.** There has been an insufficient level of public awareness and/or support for the new funding required to address the massive scale of the nutrient issue. Without public support, there is often a lack of political will from elected officials. (See text box on opposite page on funding Iowa's nutrient reduction strategy.)

Federal and State Efforts

Federal Initiatives

Point sources. The federal Clean Water Act and state laws regulate point source discharges to water. Point source dischargers are required to obtain a National Pollutant Discharge Elimination System (NPDES) permit from the state (or sometimes the EPA). NPDES permits set enforceable limits on the quantity and/or concentration of nutrients and other pollutants that can be discharged into surface waters. The limits are designed to ensure local bodies of water meet water quality standards. The Clean Water Act's popular State Revolving Fund program provides low-interest loans for wastewater treatment infrastructure, including wastewater treatment plant upgrades needed for nutrient removal. The US Department of Agriculture's (USDA) Rural Development Water and Environmental Programs provide long-term, low-interest loans and grants for the construction of water and waste facilities in rural communities.

Nonpoint sources. The USDA and the EPA support nutrient pollution reduction efforts by incentivizing voluntary action by nonpoint sources. Several USDA programs target nutrient pollution, including the Regional Conservation Partnership Program (RCPP), the Conservation Innovation Grants (CIG) program, the Conservation Stewardship Program (CSP), the Environmental Quality Incentives Program (EQIP), and the Conservation Technical Assistance (CTA) program. These programs provide a mix of funding with some going directly to individual farmers (EQIP and CSP) with others also providing funding at the state or community level (RCPP, CIG, and CTA). The EPA also supports state efforts to reduce nutrient pollution with its $160 million per year grant program under Section 319 of the Clean Water Act.

Recognizing the need to accelerate progress, the EPA released its nutrient policy in 2011.[18] This policy reaffirms the agency's commitment to partnering with states and collaborating with all stakeholders. It calls for prioritizing watersheds on a statewide basis for nitrogen and phosphorus reductions, ensuring effectiveness of point sources permits, integrating innovative approaches into agricultural practices, identifying government tools to assure reductions of nutrients from stormwater and septic systems, and verifying that nutrient reduction practices are effective.

The largest federal initiative to address nutrient pollution in a specific watershed is the Gulf Hypoxia Task Force, which is supported by EPA. Its 2008 Action Plan was developed in coordination with—and adopted by—12 states and calls for reductions in nutrient loads by 20 percent by 2025 and by 45 percent by 2035. Within this framework, each state has developed its own nutrient reduction strategy.[19] A parallel effort, the Mississippi River Basin Healthy Watersheds Initiative, is administered by USDA's Natural Resources Conservation Service and provides funding from Farm Bill conservation programs to support nutrient reduction efforts in 13 states. USDA is a member of EPA's Gulf Hypoxia Task Force. Funding and coordination of USDA and EPA programs is generally addressed through state-level nutrient loss reduction strategies. Federal and state agencies are involved in several other nutrient reduction initiatives, including initiatives in Chesapeake Bay,[20] the Great Lakes,[21] and many others.[22]

State Initiatives

Numerous states have developed nutrient reduction strategies, some tied to regional initiatives such as those in the Mississippi River and Chesapeake Bay watersheds, and some purely state-based. In the case of the Mississippi River/Gulf of Mexico Hypoxia Task Force, the state nutrient reduction strategies from the 12 participating states can be found on the EPA's website.[23] The status of funding to implement the strategies varies by state.

Funding Nutrient Reduction Strategies in Iowa

In 2012, after over two years of intensive work, the State of Iowa released its Nutrient Reduction Strategy. The strategy was developed in response to the 2008 Gulf Hypoxia Action Plan, which called for the 12 states along the Mississippi River to create strategies to reduce nutrient loading to the Gulf of Mexico. The Iowa strategy follows the recommended framework provided by EPA in 2011. Cost estimates for reaching the 45 percent reduction goal in 2035 range from $200 million to $1.3 billion annually.[24]

In 2010, Iowa voters approved a constitutional amendment creating the Iowa Natural Resources and Outdoor Trust Fund to aid water quality, trails, and other projects. Capitalizing the trust funds requires legislative action to increase the sales tax, which has not yet occurred. In the 2017 legislative session, both the House and Senate passed their own versions of water quality funding plans, but could not agree on a plan before the end of the session. If passed, the House bill would have provided about $50 million per year for water quality, while the Senate bill would have provided about $26 million per year.[25] In 2016, Iowa's governor proposed the following principles to guide discussions for addressing water quality infrastructure in Iowa: "long-term, dedicated, reliable, and growing funding."[26]

A Promising Option for Addressing the Gap—A Statewide Utility

The excess nutrient problem is massive and the status quo isn't working. Something is needed to fill the gap in existing governance and fund structures by tapping into the support for clean water by broader constituencies and stakeholder groups. A statewide utility could address these challenges by supplementing the existing finance, governance, and operational framework within a state to advance nutrient reduction strategies with the support of agriculture, water utilities, environmental and business interests, and the community at large.

The statewide utility could bring more cohesion and flexibility, and could take advantage of a larger scope to invest in priority projects that provide the highest return on investment to the state. It could invest in projects that are effective, but not feasible for individual actors, such as off-field/in-stream projects near agricultural land. It could benefit from economies of scale in procurement and increased experience from executing multiple projects. It could raise funds, implement projects, and be accountable for achieving results at a scale large enough to address the gap between current nutrient reduction performance and reduction objectives.

Achieving state and regional nutrient reduction objectives will require significant new financial resources, which will necessitate strong public support to gain approval. A statewide utility has the potential to invest new resources in a flexible, accountable, equitable, and cost-effective manner, and the potential to earn the public and legislative support needed to acquire the funds. A concerted effort will be necessary to inform the public about the need, the options for addressing the need, and why the utility proposal makes sense. Building consensus on fair and reasonable revenue sources and rate design will require an equally concerted effort.

Operational Approach and Key Functions of the Utility

A utility typically operates like a business that creates and maintains the infrastructure for a public service and generates its own revenues. The proposed statewide utility could be publicly or privately owned; in either case, it could be operated much like a private business. Publicly owned utilities include cooperative utilities, owned by their customers, and municipal utilities, owned by a municipality or other unit(s) of government and governed by a Board of Directors or elected officials. Private utilities, also called investor-owned utilities, operate for profit and are generally regulated by a public regulatory body.

A utility could be designed to operate anywhere along a continuum of operational models. At one end of the continuum, the utility could operate as a "management company" that issues requests for proposals (RFPs) and manages awarded contracts, focusing on managing what is essentially a nutrient reduction investment portfolio. At the other end of the continuum, the utility could be a "fully operational utility" and as such it could design, own, and operate nutrient reduction systems on a statewide basis.

Achieving nutrient reduction goals will require a large financial investment and prioritization controlling costs and economic efficiency. In response, the utility Board could establish its investment priorities based on the specific potential and cost effectiveness of an initiative to contribute to meeting nutrient reduction targets.

The utility's key functions could be to:

1. Establish the means to evaluate the nutrient loss reduction potential of investments
2. Solicit and provide for effective public input into its operational priorities
3. Identify and communicate nutrient loss reduction priorities to the marketplace
4. Establish investment project selection criteria, considering public input
5. Solicit requests through RFPs for nutrient loss reduction projects targeted to the annual priority list
6. Invest in the most cost-effective reduction initiatives that meet its investment acceptance criteria
7. Stimulate targeted research and development (see additional discussion on opposite page)
8. Enter into, manage, monitor, and assure conformance with nutrient reduction contracts
9. Provide the basis for a system that supports Clean Water Act compliance such as "verified nutrient reductions"

Annual Priority List

To generate nutrient reduction loss investment opportunities, the utility, on an annual basis, could announce its reduction priorities—for example, the type, amount, locations of interest, and source contexts of interest. The utility could also specifically express interest in certain types of projects in a particular location, such as a wetlands installation at the mouth of a major agricultural drain. The utility could then utilize an RFP process to solicit project proposals that could address these priorities, as well as be open to receiving unsolicited proposals consistent with its expressed priorities. It is anticipated that this process holds substantial potential to:

- Create private sector engagement in response to RFPs;
- Encourage innovation as respondents improve the cost effectiveness of their nutrient reduction initiatives; and
- Promote collaborative efforts among watershed stakeholders seeking funding to both improve local water quality and contribute to the statewide reduction objectives.

Types of Projects to Invest In

The utility could be charged with investing strategically, using scientific evidence and monitoring, to spur innovation and maximize return on investment across a geographic region. Investments could take many forms as long as a tangible and definitive causal relationship to nutrient loss reduction is established. While not exhaustive, some of the types of projects could include:

1. A large-scale, **wetlands-based treatment** facility proposed, owned, and operated by a private company[27]
2. A series of **bioreactor** installations placed in priority areas across a watershed proposed, owned, and operated by a local nonprofit organization
3. **Riparian buffers** installed by an individual farmer or collective of farmers
4. **Nutrient reductions** at wastewater utilities through enhanced onsite wastewater treatment
5. **Habitat preservation** or enhancement projects with direct links to nutrient loss reduction, that can also provide substantial additional ecosystem service benefits

Project selection criteria could focus on protecting local water quality and requiring a minimum level of nutrient control before receiving funding. For example:

- Individual, **regulated point sources** might need to demonstrate engagement and nutrient management intentions consistent with an overall local watershed strategy; and
- **Nonpoint sources** might need to have deployed agreed upon "water quality best management practices" (e.g., practices that 1) reduce nutrient runoff and 2) produce a positive return on investment).

Core Capabilities

A utility could have the capacity to implement the following key functions in a coherent and cost-effective way across its service area. This concept contrasts with the status quo, where an efficient, integrated approach to such functions is not feasible across multiple agencies, watersheds, and program requirements.

- **Research and development.** The utility could receive proposals from researchers for projects in support of innovative nutrient reduction loss initiatives or cooperate with research already underway at the regional and/or national levels. A range of projects could be funded—from pure research to field-based demonstration projects. In effect, the utility could act as an investor seeking opportunities to spur innovation and to obtain the rights to innovative technologies.

- **Monitoring.** The utility will be highly dependent on its ability to analyze not only individual investment performance but the overall progress towards local and statewide objectives. Monitoring and evaluation activity would be critical for the utility. For example, the utility could supplement and enhance existing monitoring efforts through its investment portfolio. Consistent with its mission, its investment focus could be on better understanding technical performance (reductions delivered per dollar invested) and overall water quality improvements. The results of monitoring could inform any necessary refinements to criteria for selecting projects.

- **Providing needed technical capacity.** Nutrient loss reduction strategies show a heavy dependence on technically challenging edge-of-field and off-field practices, such as bioreactors. If nutrient strategies are implemented at a larger scale, it is not clear that the current, business-as-usual approach can provide the needed technical capacity. The utility could have technical in-house expertise, or available through contractors, to properly review proposals and ensure implemented projects continue working properly.[28]

- **Verifying and accounting for performance.** The utility could maintain a record of project commitments and results. This monitoring and verification framework would allow for statewide flexibility to pursue the most cost-effective nutrient reductions consistent with the overall targets, while fully protecting local water quality. In addition, a rigorous verification system would be needed if the utility were to allow individual NPDES permit holders to demonstrate compliance through information accrued and verified by the utility.

- **Collaboration.** The utility could meet nutrient reduction objectives while providing support to local watershed water quality improvements where objectives align.

Illinois Stakeholders Consider a Statewide Water Resource Utility

The US Water Alliance recently supported a group of nutrient management stakeholders in Illinois considering the concept of a statewide "water resource utility" to deal with excess nutrients in the state's waters. Recognizing that substantial new funding would be required to meet the nutrient reduction objectives, there was a strong belief that support for this funding would not emerge in the absence of a new way of doing business. Following a substantial consultative process, the group identified the following key characteristics of the new business model needed to address excess nutrient pollution:

- A clear sense of commitment among all nutrient sources for taking reduction action
- A recognition that the need for nutrient reduction is a statewide obligation and the costs of these actions should therefore be spread equitably across the state
- An ability to engage the private sector to drive innovation and efficiency in achieving reductions
- Access to funds that can flexibly target the highest value reductions
- Collaboration among stakeholders, providing a clear basis for collective, equitable decision making regarding program priorities and investments
- A structure that is independent, accountable, and transparent, so it can earn the confidence of Illinois citizens by demonstrating that funds are used intentionally and efficiently
- Highly adaptive, based on performance monitoring—adjust investments over time as the confidence to meet milestones increases

Source: US Water Alliance, 2017, *"Illinois Water Resource Utility: Discussion White Paper."*

Options for Creating the Utility

Mechanisms for creating a statewide utility will vary greatly depending on each state's history, laws, political climate, public opinions, fiscal condition, community engagement, presence of a "champion" to advocate for the concept, and many other factors.

At least three states have explicitly looked at the idea of a statewide stormwater utility: Vermont (2013), New Hampshire (2010), and Maine (2005).[29] Of potential interest, the Vermont study included the following observation: "there are certain practices that appear to be incorporated into utilities nationwide and are generally considered to be successful. Some of these best management practices include: public education programs; the use of a service fee as opposed to a tax; defining the service area to include all beneficiaries of the utility; and implementing supplementary pollution reduction measures."

In many states, new legislation would be needed to enable the formation of a statewide utility. As with any policy action, especially one involving taxes or fees, a carefully crafted strategy is critical. Listening to and educating the public, addressing concerns, and building support for the proposal will all be key components to a successful strategy.

There is also a potential role for federal legislation in facilitating the utility concept. For example, the Farm Bill could be a vehicle to incentivize states to create utilities to 1) address nutrient pollution, 2) fund a pilot project, 3) establish a new, targeted revolving fund for nutrient reduction projects, or 4) to create a national watershed health improvement fee.[30] In 1965, Congress passed the Water Resources Planning Act which authorized the creation of River Basin Commissions. Groups of states petitioned the President to create these commissions by executive order, and six River Basin Commissions were eventually created. However, these multi-state commissions were limited to planning and coordination functions, with no implementation authority. The commissions were terminated by executive order in 1981.[31] It is conceivable that new watershed/river basin commissions with greater authority could be authorized by Congress or established by formal interstate compact[32] (which also requires an act of Congress) or by a less formal agreement among states.

Utility Governance

The success of the utility will depend on the sustained commitment of diverse water quality interests in the state, including wastewater treatment facilities, drinking water utilities, the agricultural sector, industry, environmental/community interest groups, municipalities, and regulators. The cooperation and trust of other stakeholders, including ratepayers and consumers, will also be important.

In this context, governance of the utility will be critical. It must be seen as legitimate, accountable, equitable, representative, transparent, and collaborative. To support full public transparency through pubic reporting, the Board could establish and track performance measures related to its investments and the contribution made to reducing nutrient levels in the state's waters. All Board processes and decisions would need to be transparent and well-documented, and membership would need to be balanced. Some of the key considerations in establishing the Board of Directors include:

- Board membership (e.g., number, representation, appointment process, terms, etc.)
- Powers and duties
- Decision/voting rules
- Transparency procedures
- Accountability and oversight requirements

Innovative Funding Model—Partnering with Agencies with Shared Interests

The "From Forest to Faucets" Partnership described below serves as a funding model that could be adapted for protecting water quality in *agricultural* watersheds. In this case, Denver Water partnered with the US Forest Service to protect water quality in a *forested* watershed that supplies drinking water for the city.

Denver Water—Innovative Funding with the "From Forest to Faucets" Partnership

As the water provider to 1.4 million people in the Denver metropolitan area, Denver Water directly depends on healthy forests and watersheds. After a series of wildfires required expenditures exceeding $27 million for restoration and repairs to Denver Water's collection system, the "From Forest to Faucets" Partnership was established between Denver Water and the US Forest Service.[33] The two entities have a shared interest in improving forest and watershed conditions to protect water supplies and water quality, as well as to continue providing other public benefits, such as wildlife habitat and recreation opportunities. Forest treatment and watershed protection activities can help minimize sedimentation impacts on reservoirs and other water infrastructure by reducing soil erosion as well as the risk of wildfires. Denver Water provided $16.5 million for this effort, and its contribution is being matched by the Forest Service and by two additional agencies with a shared interest in the project: the Colorado State Forest Service and the Natural Resources Conservation Service.

Relationship to Existing Institutions and Programs

The utility could act to supplement, enhance, and amplify, rather than supplant, existing institutional and programmatic water quality efforts. Such existing efforts include those undertaken by the state, the EPA, Department of Agriculture, Natural Resources Conservation Service (NRCS), and State Water and Soil Conservation Districts. It could also seek to fully integrate into, collaborate with, and leverage any existing implementation framework established in the state.

Relationship to Watershed Initiatives

A variety of formalized, watershed-level initiatives exist in numerous states. Some of the efforts have well-developed planning efforts that draw on sophisticated technical analysis and modeling efforts, with implementation backed by a highly collaborative, consensus-based agreements among watershed participants. These existing efforts can view the statewide utility as creating an opportunity to acquire additional resources for meeting their nutrient reduction objectives. The utility could invite existing and newly formed watershed groups to apply for utility investment funds. Watershed groups, as part of the application process, would demonstrate effective utilization of existing state and federal resources. Alternatively, the watershed group could seek the utility's assistance in identifying private sector, or other, partners to supplement existing resources and expertise. The utility could also work with existing watershed groups during its annual prioritization process to ensure local watershed interests are considered and addressed.

Relationship to State and Federal Financial, Technical Assistance, and Regulatory Resources

The utility would operate in a highly collaborative manner with existing state and federal programs and institutions—state environmental/natural resource agencies, state departments of agriculture, US EPA, NRCS, State Soil and Water Conservation Districts. Some of the important areas for collaboration would be setting of its annual investment priorities, and ensuring well-coordinated nutrient reduction engagements at the local level.

Ensuring Clean Water Act Compliance

A key responsibility of the statewide utility will be to address excess nutrients in compliance with the Clean Water Act, but using more cost-effective methods. One model for connecting actual reductions to compliance could be based on "verified nutrient reductions." Over time, the utility's investment portfolio would represent an accrual of nutrient reductions that have been verified and acquired at the lowest possible cost for the citizens of the state. While the utility would have responsibility for verified nutrient reductions, the utility would not be a permit holder to avoid creating liability for the Board of Directors.

A portion of the verified nutrient reduction accruals could be set aside and made available to eligible point sources for meeting Clean Water Act compliance. The amount of and criteria for accessing the nutrient accruals would be determined by the utility Board consistent with:

1. Meeting the state's efforts to meet its nutrient reduction goals
2. Meeting this goal at the lowest possible cost to the citizens of the state
3. Fully protecting local water quality

Within this framework, point source NPDES permit holders would have two options for deriving benefits from the statewide utility. First, permit holders could apply to the statewide utility for funding to invest in *local* nutrient treatment capacity (on site at the treatment plant). The application would be evaluated along with all other proposals based on the cost effectiveness of the proposed reductions. Second, if a wastewater utility has an NPDES permit limit driven by distant water quality (e.g., Gulf Hypoxia), while *local* water quality is considered acceptable, the wastewater utility could receive a waiver from meeting its limit at the point of discharge and receive "nutrient reduction accruals" from the statewide utility for compliance purposes. Any wastewater utility facing a permit limit that drives high-cost reductions would have the option to draw on lower-cost, environmentally-equivalent reductions undertaken elsewhere in the state.[34]

Another challenge to aligning the concept of the utility as described in this paper with Clean Water Act compliance is the need to determine how to reconcile the Act's Total Maximum Daily Load (TMDL) process with the utility's statewide prioritization process. TMDLs are done on a watershed or sub-watershed basis and would not necessarily coincide with a statewide geographic scope. TMDLs are a complex process beyond what will be covered in the scope of this paper. A great deal of thought has gone into TMDLs in recent years[35] and it seems clear that innovative thinking will be needed to ensure that a statewide utility could have a path to demonstrate compliance.

Potential Sources of Revenue

Several states used a public process to establish nutrient reduction objectives, but the price tag for achieving these objectives vastly outstrips the current available resources. Public and political support will be necessary to close that funding gap. Exploring sources of revenue to fund the utility's operations will require a separate analysis and will vary state-by-state, but some potential sources of revenue could include:

1. Assessments of landowners and/or residents within the state
2. State sales tax established through popular vote
3. New and/or partial redirection of existing taxes, (e.g., taxes on fertilizers, pesticides, irrigation water)
4. Government sources, which might include state and federal grants (e.g., the EPA's §319 funds), cost share funds (e.g., USDA conservation funds and Regional Conservation Partnership Program resources), or green payments (e.g., the USDA's Conservation Reserve Program)
5. Interest income, such as on a portion of the capital raised by the utility and used as a source of loans to fund nutrient reduction projects, with repayment of loans with interest
6. Private contributions

Building Blocks—Permitting Innovations to Ensure Clean Water Act Compliance

City of Boise, Idaho

The City of Boise is in the process of upgrading its wastewater treatment plant to remove 93 percent of the phosphorus from its discharge. Yet it was facing a federal requirement to remove 98 percent of the phosphorus. It became clear that removing the last 5 percent would be extraordinarily expensive. The city worked with stakeholders to find an innovative solution that would provide a better environmental result at the same cost. In the end, the city purchased 49 acres of land to build a series of wetlands and sedimentation basins downstream of agricultural land. The Dixie Drain Project is now being used to remove far more phosphorus from the river than could have been done at the city's plant. EPA approved NPDES permit provisions to enable this solution.

State of Wisconsin

The state is championing Adaptive Management, a voluntary option enabling point source facilities to comply with phosphorus limits. Under the program, a point source utility funds phosphorus management measures at other point or nonpoint sources in the watershed. In contrast to water quality trading which focuses on a *discharge* limit, Wisconsin's Adaptive Management program focuses on compliance with phosphorus criteria *in the receiving water*.

NEW Water, the wastewater utility for the Green Bay area, was facing potential permit limits that would have required spending $220 million but would only reduce the phosphorus in the Bay by three percent. The state is allowing point sources to pursue Adaptive Management, which allows the facility to work with the community to reduce phosphorus at less cost. The utility and stakeholders are engaged in a four-year effort to test a variety of nonpoint source reduction techniques. They will conduct monitoring throughout the project to scientifically demonstrate the effect of the project.

State of Illinois

The Illinois Legislature recently passed a bill providing more flexibility for wastewater utilities to trade for water quality credits such as the verified nutrient reductions described above. This may help the wastewater utility reduce its net costs and help to fund cost-effective nutrient reduction projects outside of the wastewater treatment plant.

Conclusion

This paper proposes the concept of a statewide utility to address nutrient pollution. This utility would be an entity that supplements the existing finance, governance, and operational units within each state to advance cohesive nutrient reduction strategies with the support of agriculture, water, environmental, and business interests. The utility could take advantage of its statewide scope to invest in an integrated list of priority projects that would provide the highest return on investment to the state. It would be able to invest in projects that are effective, but not feasible for any individual actor, such as some edge-of-field and off-field/instream projects near agricultural land. It would benefit from economies of scale both in procurement and by gaining experience in implementing multiple projects over time. It could raise funds, implement projects, and be accountable for achieving results at a large enough scale to solve the problem.

Addressing nutrient pollution in watersheds across the country is a critical need facing our nation, but to get there, it will require institutional changes and a sizable increase of investments. To date, public and political support for such changes has been insufficient. An approach that engages and motivates the full spectrum of nutrient sources and water stakeholders will be required. It is time for state policymakers and stakeholders to engage in a collaborative, focused dialogue to explore the concept of a statewide utility. While politics, stakeholders, champions, fiscal environment, and other conditions may vary in each state, what is consistent is that we absolutely need a new approach to effectively address the catastrophic problem of excess nutrient pollution in our waters.

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Endnotes

1 While this paper focuses on the idea of a *statewide* utility, in any given state, geography, politics, or other factors might suggest that other scales be considered, such as the watershed or river basin scale.

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5 EPA, Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, 2015 Report to Congress, P.18.

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7 National Association of Clean Water Agencies (NACWA), 2011. Controlling Nutrient Loadings to U.S. Waterways: An Urban Perspective. P.11.

8 *Ibid*, P.16ff.

9 For example, wetland treatment cells and sedimentation basins.

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14 See the "Federal and State Efforts" section of this paper (P.8) for a summary of the nutrient reduction objectives.

15 For example, federal and state agencies; municipalities; water utilities; soil and water conservation/drainage districts; watershed initiatives; the agricultural sector; etc.

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18 EPA, 2011. Working in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions. https://www.epa.gov/sites/production/files/documents/memo_nitrogen_framework.pdf

19 See: https://www.epa.gov/ms-htf/hypoxia-task-force-nutrient-reduction-strategies

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25 "Branstad: Sales tax hike for water quality appears dead," Des Moines Register, April 24, 2017.

26 "House Republicans hope new water quality bill is more collaborative,'" Des Moines Register, March 1, 2017.

27 For example, see the text box below describing the Boise, Idaho, Dixie Drain phosphorus offset project.

28 The utility could also leverage technical information from the water-sector technical literature such as the Water Environment Federation's (WEF) *The Nutrient Roadmap* (2015); and the *WEF Manual of Practice No. 34, Nutrient Removal* (2011); and other research literature from the Water Environment & Reuse Foundation's (WE&RF) Nutrients Challenge (http://www.werf.org/i/ka/Nutrients/a/ka/Nutrients.aspx) and research papers from the WEF Nutrients Conference and WEFTEC®.

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30 NACWA Nutrient Summit, March 23, 2017, Discussion Synthesis.

31 Executive Order 12319, September 9, 1981.

32 The Ohio River Valley Water Sanitation Commission (ORSANCO) was established in 1948 and still operates as an interstate compact commission. Its members include IL, IN, KY, NY, OH, PA, VA, WV and the federal government. ORSANCO's programs include water quality monitoring and assessment, spill response and detection, setting Ohio River discharge pollution control standards, applied research, and public information and education.

33 http://www.denverwater.org/SupplyPlanning/WaterSupply/PartnershipUSFS/

34 Importantly, this is not a nutrient trading approach—the wastewater utility will not *purchase* the accruals from the statewide utility or transact business with another individual source of nutrients. The statewide utility will make the accruals available to individual NPDES permit holders based on allocation criteria it develops. These criteria, in part, will need to ensure the "environmental equivalence" of reductions undertaken in different locations, and ensure *local* water quality is fully protected.

35 For more information see EPA's "Impaired Waters and TMDLs" webpage, https://www.epa.gov/tmdl/impaired-waters-and-nutrients, and, WE&RF, 2016, Nutrient Management Volume III: Development of Nutrient Permitting Frameworks. https://www.werf.org/c/KnowledgeAreas/NutrientRemoval/ProductsToolsnonWERF/NUTR1R06z_Product_Page.aspx

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