HARVARD LAW SCHOOL
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Policy Initiative

SMALL-SCALE WATERSHED PLANNING AND IMPLEMENTATION IN AMERICA'S FARMING COMMUNITIES

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SMALL-SCALE WATERSHED PLANNING AND IMPLEMENTATION IN AMERICA'S FARMING COMMUNITIES

Introduction

Nutrient pollution is a leading cause of ground and surface water pollution in the United States. Nitrate contaminated drinking water and toxic and nuisance algae blooms caused by excess nutrients are especially prominent in the Mississippi River basin and Gulf of Mexico. Nutrient pollution threatens public health, local and national economies, and treasured swimming holes and trout streams. Although urban stormwater and private and public wastewater treatment systems contribute to the problem, agricultural runoff is the biggest source of the nutrients that are impairing our water resources.

Many policy conversations addressing agricultural runoff have been high-level and narrowly focused on whether to amend state and federal water and farm programs to regulate all agricultural runoff. Meanwhile, state and local leaders are taking another path forward - a voluntary small-scale watershed planning and implementation approach.[1] Projects on the ground are demonstrating that we have the necessary science, modeling and monitoring tools, and experience to restore nutrient impaired waterbodies using this enhanced voluntary approach.[2]

The meeting aimed to help participants expand watershed project efforts in their states by identifying elements of a coherent policy approach.

On August 31, 2017, the Harvard Environmental Policy Initiative and the Minnesota Water Resources Center co-hosted a focused discussion for state water and agriculture agency, Natural Resource Conservation Service (NRCS), and Soil and Water Conservation District (SWCD) representatives from eight states in the Mississippi River Basin – Ohio, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Kansas and Missouri. To the extent permitted by current funding and programmatic constraints, these key states in the Upper Mississippi are using small-scale watershed planning and

1 Watershed planning occurs at different scales for different purposes. The watershed planning to which this report refers is watershed planning for implementation of conservation practices. The phrase "small-scale watershed planning and implementation" is used throughout this document to reference this type of planning aimed at conservation practice implementation. This terminology is not meant to discount or discourage necessary larger scale planning that helps to focus local implementation efforts. However, the terminology and policy framework discussed in this report are intended to ensure that states move beyond large-scale planning. The goal is to encourage states to develop comprehensive programs providing for the development and implementation of watershed plans that include conservation measures sufficient to address water quality concerns. Slight policy variations are expected as states work to address different imminent public health crises and incorporate watershed implementation efforts that are already underway.

2 The phrase "voluntary approach" can be misleading. The term "voluntary" does not indicate that planning and implementation are carried out by volunteers or left completely to the discretion of agricultural producers or other stakeholders. To the contrary, voluntary programs require carefully crafted policy that provides a framework for on-the-ground efforts and, historically, in the case of voluntary conservation programs for agriculture, require governmental technical and financial assistance. "Voluntary" is used here to contrast the small-scale watershed planning and implementation policy approach with regulatory approaches wherein permitted entities are required to perform tasks under a permit without financial or other assistance.

implementation to address agricultural runoff and tackle nutrient impaired waterbodies. At the forum, participants discussed relevant programs in their states and shared project examples.

The meeting aimed to share the learning and expertise of participants and advance regional discussion of a coherent model policy approach for expanding watershed project efforts. Harvard EPI developed a draft state-level policy framework as a starting point for discussion. The framework focuses on small-scale watershed planning and implementation and incorporates elements from successful state policies and projects. It is intended to support the systematic replication of small-scale watershed projects within agricultural areas in any given state. The comprehensive framework is new, but many of its elements were familiar to participants and will likely be familiar to other stakeholders that have worked on water quality.

The elements of the draft policy framework are:

1. **Establish statewide numeric water quality standards covering all waterbodies.**
2. **Monitor phosphorus and nitrogen at the HUC[3] 10 scale statewide and use measured impairment at the HUC 10 scale to prioritize and develop a timeline for statewide watershed planning and implementation.**
3. **Complete screening-level analyses of HUC 12s within prioritized HUC 10s according to the established timeline. Identify tiers of priority HUC 12 watersheds based on screening-level analysis and establish timelines for HUC 12 plan development and implementation.**
4. **Work with conservation districts (or comparable local entities) and local NRCS offices to complete HUC 12 plan development, implementation, monitoring and adaptive management. Ensure utilization of GIS tools like the Agricultural Conservation Planning Framework (ACPF) and nine key element or equivalent planning processes. (See boxes below for more about ACPF and the nine key element framework.)**
5. **Utilize monitoring from local HUC 12 watershed projects to track social[4], conservation practice implementation and water quality changes, support adaptive management and delist impaired waterbodies.**
6. **Reference prioritized HUC 10 and 12 watersheds on state impaired waters list and reference and track HUC 12 watershed planning and implementation in state nonpoint management plans and Nutrient Reduction Strategy[5] documents.**

Many participants noted that they were already engaged on particular elements in the EPI draft framework, and were attempting to follow similar approaches for addressing nutrient impaired waterbodies in their states. The second part of this report summarizes discussion points and model examples for each

3 In the United States, the United States Geologic Survey has divided the country into hydrologic units. Each hydrologic unit is identified by a code consisting of 2 to 12 digits. In total, the Hydrologic Unit Code (HUC) system is comprised of 6 levels of drainage areas – HUC 2, 4, 6, 8, 10, and 12. Smaller HUC areas are nested within the larger HUC areas. HUC 2s represent the largest and HUC 12s the smallest drainage areas.

4 See the "Social Indicator Planning and Evaluation System for Nonpoint Sources" handbook developed by EPA Region 5 and partners for more information on measuring and tracking social success indicators for watershed projects.

5 The Mississippi River/Gulf of Mexico Watershed Nutrient Task Force, "The Hypoxia Task Force," was established in 1997 to understand and address the causes and effects of algae blooms and the dead zone in the Gulf of Mexico. Members of the task force include State and federal agencies with responsibility over activities in the Mississippi River, its basin and the Gulf of Mexico. Hypoxia Task Force states have developed Nutrient Reduction Strategies to begin addressing their nutrient loading contributions to the Gulf of Mexico.

element in the draft policy framework.

In addition to tackling discrete policy elements, the group also considered the cross-cutting challenges of scale, data and communication, people, funding and capacity building. Participants identified these as common obstacles to achieving water quality improvements through individual watershed projects and to replicating or scaling up successful watershed projects. Discussion of these foundational topics – and concrete approaches for tackling these challenges – begins this report.

This report includes key insights gathered during the forum discussion. All meeting participants were invited to read and comment on a draft of this report. However, the group did not attempt to achieve consensus on each of the policy elements. Identification of a person or organization as a participant in the forum should not be interpreted as endorsement of this report. The views expressed herein do not represent those of any individual participant or state, Harvard Law School, Harvard University or the University of Minnesota.

The Agricultural Conservation Planning Framework (ACPF)

is a conceptual approach for watershed planning and an ArcGIS toolbox that facilitates locally led conservation planning and implementation in small – HUC 12 – watersheds. The ArcGIS toolbox identifies options for siting conservation practices in HUC 12 watersheds taking into consideration high-resolution topographic, hydrologic, soils, and land use data. Learn more at northcentralwater.org/acpf/

The EPA nine key elements for achieving water quality improvements through watershed planning

(1) Identify causes and sources of pollutant loading;
(2) Estimate load reductions expected from conservation practices;
(3) Describe needed conservation practices and targeted critical areas;
(4) Identify related loading/water quality success criteria or indicators;
(5) Describe interim measurable milestones;
(6) Describe load reduction modeling/ water quality monitoring approach;
(7) Describe an education/outreach plan for promoting conservation practices;
(8) Estimate technical and financial assistance costs; and
(9) Schedule implementation of conservation practices, assign tasks.

For more detail see www.epa.gov/nps/handbook-developing-watershed-plans-restore-and-protect-our-waters

Cross-cutting Issues for Watershed Planning and Implementation

Scale

Informational watershed planning is different than implementation-oriented watershed planning. Watershed monitoring and informational planning at larger scales (HUC 8 and HUC 10) helps to prioritize smaller-scale implementation-oriented planning, it is not a substitute for small-scale local plans. Locally developed, small-scale implementation plans are critical for effectively and efficiently restoring and protecting water quality through the application of targeted conservation practices. The Hydrologic Unit Code (HUC) 12 scale, which encompasses watersheds between 10,000 and 40,000 acres and may include as many as 200 producers has proven to be a manageable and effective scale for implementation-oriented watershed planning according to many participants. Larger scale plans (HUC 10 and 8) often fail to incorporate sufficient detail[6] to guide implementation and lack local leadership and support, unless they are based on HUC 12 building blocks or specifically target several smaller areas within the larger watershed. HUC 12 watersheds have proved to be a workable size area for identifying and prioritizing relevant practices and management measures, engaging local producers, and measuring social, implementation and water quality progress. Conservation practice implementation roadmaps included in well-developed HUC 12 plans attract public and private investment and enable interested partners to carry out implementation tasks without significant additional information or oversight from a planning committee.

MODEL EXAMPLE: Iowa's Clean Water Act section 319 and Total Maximum Daily Load (TMDL) programs focus on the development and implementation of HUC 12 watershed plans. Through its One Watershed One Plan approach, Minnesota encourages local stakeholders to focus on smaller HUC 10 and HUC 12 implementation areas within larger HUC 8s in the state. In Iowa, plans incorporate the nine key elements, and in Minnesota, similar planning contents are also required to ensure a thorough and science-based planning process that is focused on achieving implementation and measurable outcomes.

Data and Communication

Data sharing is critical for efficient and effective watershed planning and implementation. Currently, sharing of data among federal agencies, between federal and state agencies, among state agencies, between state and local agencies and among local NRCS and SWCD offices varies considerably. Data sharing is impeded in large part by a broad privacy provision from the 2008 farm bill, Section 1619.[7]

Absent individual producer consent or a data sharing agreement with the USDA, Section 1619 prohibits NRCS and its partners from sharing important farm and conservation practice implementation data. Individual producer consent is a high bar in local watersheds that may contain hundreds of producers and complicated farm management and ownership structures. A more narrowly tailored privacy provision could better balance producer privacy and watershed planning and research data needs.

6 The EPA nine key elements identify important details that should be included in all watershed implementation plans. EPA requires plans being implemented using Section 319 Clean Water Act funding to incorporate these elements. See above text box for more information.

7 Section 1619 provides:
(2) Prohibition Except as provided in paragraphs (3) and (4), the Secretary, any officer or employee of the Department of Agriculture, or any contractor or cooperator of the Department, shall not disclose—
(A) information provided by an agricultural producer or owner of agricultural land concerning the agricultural operation, farming or conservation practices, or the land itself, in order to participate in programs of the Department; or
(B) geospatial information otherwise maintained by the Secretary about agricultural land or operations for which information described in subparagraph (A) is provided. 7 U.S.C. §8791

MODEL EXAMPLE: Indiana has worked with USDA to develop a data-sharing agreement and designed an approach for exchanging watershed planning information among federal, state, and local agencies involved in watershed planning in the state. Indiana's data sharing approach encompasses state agricultural program data, state water program data, state Clean Water Act section 319 data, state Lake and River Enhancement data, state Clean Water Indiana data, and NRCS and FSA farm bill data (protected by Section 1619). The state agricultural agency has access to all of this data and uses it to calculate aggregated nutrient loading reductions from conservation practice implementation on an annual basis.

Communication about capacity among federal, state and local entities is also critical. Local NRCS officials are the go-to for technical assistance because they have engineering, agronomic, hydrologic and other expertise and relationships with local producers. However, local NRCS offices may face programmatic or staffing-level challenges that prevent them from providing technical assistance requested by SWCDs or other watershed project stakeholders. For example, even with additional funding, local NRCS offices may be unable to provide technical assistance that is not associated with quantifiable load reductions. Or, NRCS offices may lack the ability to allocate or hire staff to provide requested technical assistance. When NRCS offices fail to communicate these limitations, other stakeholders may become frustrated and projects may face significant delays or be abandoned altogether.

Equally important and almost always lacking are funded local watershed staff that can provide consistent communication with producers. Watershed projects cannot get off the ground and will stall out without a consistent point of contact that producers know and trust who has access to and can relay relevant information in a timely and accessible manner. Project staff that facilitate important producer communication include project coordinators, education and outreach staff, and technical assistance staff.

MODEL EXAMPLE: The Iowa Department of Natural Resources funds watershed project coordinators to work with local producers for the full implementation period of HUC 12 watershed projects, on the condition that the projects continue to demonstrate implementation progress. Iowa is currently funding project coordinators in 14 locally-led watershed projects including, Tete Des Morts, Black Hawk Lake, Rathbun, and Price Creek watersheds, among others, with its CWA section 319 dollars. Minnesota's section 319 program is in the process of transitioning to a model that will enable the program to provide longer-term small watershed project support including financial support for project staff.

People

A lack of staff is perhaps the most significant barrier to effectively carrying out and scaling up small-scale watershed planning and implementation in agricultural areas. Successful watershed projects, like the Iowa projects mentioned above, confirm the critical roles professional staff from local NRCS and SWCD offices play. These personnel have longstanding relationships with producers and deep local knowledge that supports education and outreach, technical assistance, and planning. Despite their importance, local NRCS offices in many states are operating without a full staff. Moreover, local SWCDs in many states have one part time staff person or no professional staff at all. SWCDs also have trouble retaining professional staff, because project funding tends to be grant-based and short-term, and funding from state and federal agricultural programs often cannot be used for staff. In many places, SWCDs have been operating as training grounds rather than places of permanent employment. This is a significant problem. Without consistent support staff on the ground for the duration of a 10-20 year small-scale watershed project, time and resources will be wasted and ultimate project success may be undermined.

Staff in support roles outside of local watersheds are also critical to the success of local watershed planning and implementation projects. State, and in some cases regional-level staff, provide monitoring, modeling, program and interagency communication support for local stakeholders carrying out on-the-ground planning and implementation. Providing a network of support at the state or regional level, rather than trying to create these positions in every local watershed project, is effective and efficient. It also ensures greater uniformity across a state. Unfortunately, instead of receiving funding for additional staff, several states are seeing reductions.

> MODEL EXAMPLE: In Kansas, the Kansas Department of Health and Environment provides state-level modeling, monitoring and programmatic support to local watershed projects. Indiana also has a small number of state-level watershed specialists working in assigned watersheds to help fill technical, financial and managerial gaps in local watershed project efforts. In Iowa, both the Department of Agriculture and Land Stewardship and the Department of Natural Resources provide state-level staff support for locally led watershed projects.

Funding

Funding for small-scale watershed planning and implementation is fragmented, insufficient and inflexible. Stakeholders must apply for and piece together funding from several different sources and even when successful may fall short of needed amounts. Moreover, funding is also often tied to unrealistic expenditure timelines that fail to take into consideration the limited windows of time each year during which project coordinators can work with farmers. For example, planning and education and outreach are usually limited to summer and winter months and implementation must occur during narrow spring and fall openings before planting and after harvest. These constraints, which can be exacerbated by unpredictable weather, make informed funding timelines critical. Without realistic timelines for obligating money, or provisions that allow funds to remain available until expended, watershed project coordinators may be forced to spend funds quickly instead of smartly. This has been an issue with the grant periods under the CWA section 319 program.

The challenges of insufficient funding and uninformed timelines may be compounded by the inflexibility of funding that is available. For example, as mentioned above, funding from state and federal agricultural programs often cannot be used to pay for watershed project staffing needs. In some cases, states are trying to fund local staff needs for existing projects by using a portion of their small pots of Clean Water Act (CWA) section 319 funds. Although CWA section 319 funds play an important gap-filling role, they are often insufficient to cover staff needs for existing watershed projects and are woefully insufficient to cover the staff funding that will be required to scale up successful watershed projects in states. Moreover, states may need additional flexibility to fund novel or modified best management practices that are scientifically sound and identified in well-developed local watershed plans but not included in approved state and federal practice lists. States may also need to provide additional funding, above established rates, for practices that are particularly critical for local projects.

> MODEL EXAMPLE: Missouri and Minnesota have temporarily increased their state sales taxes by small amounts to create flexible state water funds that are being used to scale up watershed planning and implementation work. Missouri increased its sales tax by one-tenth of one percent and Minnesota increased its sales tax by three-eighths of one percent. Minnesota's fund generates hundreds of millions of dollars annually for work related to improving water quality.

Substantial additional state and federal funding for watershed planning and implementation is critical for replicating successful projects and addressing water quality. Additional funding must be available when it is needed for the purposes identified in well-developed watershed plans and remain available until a project is completed, on the condition that a project continues to demonstrate implementation progress. In addition to being increased and appropriately tailored to the work at hand, funding must be coordinated. Without additional and appropriately tailored and coordinated funding, states will not be able to effectively and efficiently scale up watershed planning and implementation.

Capacity Building

Small-scale watershed planning and implementation presents a shift from much of the watershed planning that has occurred under state and federal water and conservation programs. For example, small-scale watershed plans are different than Total Maximum Daily Loads (TMDLs), which, in many places, are state-developed informational plans. Unlike TMDLs, small-scale watershed plans for agricultural areas are developed locally with producers and incorporate implementation steps for achieving necessary pollutant load reductions. Small-scale watershed planning also contrasts with state and federal agricultural programming that, at present, largely focuses on individual conservation plans for producers seeking assistance with natural resource concerns pertaining to their individual farms.

To succeed in using the small-scale watershed planning and implementation approach to restore water quality, NRCS, SWCD and other project staff will need training to understand how relevant programs will be utilized to carry out small-scale watershed planning and implementation. In addition, state and local watershed project personnel will need training on GIS/ technology tools, watershed project tasks, producer and agency communication responsibilities, project budgeting and project investment opportunities.

Although capacity building is a critical component of success, almost across the board, because of limited program funding for technology and people, staff are asked to carry out watershed planning and implementation work without mentorship or training and also without critical technology tools, adequate compensation and benefits, or guarantee of a long-term position. Providing needed technology and training is critical to retaining qualified professionals and ensuring the success of watershed projects.

> MODEL EXAMPLE: Recognizing the importance of building staff and technical capacity within local SWCDs, Minnesota has allocated $100,000 per year since 2016 to each SWCD in the state. Stakeholders in the state are working to make this funding permanent by including it in the state's general fund. SWCDs have discretion to spend these funds for additional staff or technology needs. In addition, Minnesota has made additional funds available to match, on a one to one basis, watershed planning and implementation dollars that counties contribute to SWCD watershed planning efforts.

Small-scale Watershed Planning and Implementation Framework Policy Discussion

The foundational challenges of scale, data and communication, people, funding and capacity building must be addressed to ensure that the small-scale watershed planning and implementation policy framework will work in practice. The main function of the policy framework is to show how relevant state and federal water and agricultural programs could be focused, coordinated and integrated to effectively and efficiently achieve the goal of restoring nutrient impaired waterbodies in agricultural watersheds. The framework provides steps and allows states to plug in existing and new programs to achieve water quality. The framework is a tool to assist agencies and policymakers with coordinating programs, identifying programmatic gaps and creating and allocating funding. It also enables watershed project stakeholders to understand their role in the statewide water quality restoration process, and helps the public understand the magnitude of the water quality challenge, the scope of work needed to address the challenge and the plan for achieving water quality goals.

At the August 31 workshop, as mentioned above, participants discussed a draft framework for small-scale watershed planning and implementation provided by Harvard EPI. Again, the elements of the draft framework are:

1. **Establish statewide numeric water quality standards covering all waterbodies.**
2. **Monitor phosphorus and nitrogen at the HUC 10 scale statewide and use measured impairment at the HUC 10 scale to prioritize and develop a timeline for statewide watershed planning and implementation.**
3. **Complete screening-level analyses of HUC 12s within prioritized HUC 10s according to the established timeline. Identify tiers of priority HUC 12 watersheds based on screening-level analysis and establish timelines for HUC 12 plan development and implementation.**
4. **Work with conservation districts (or comparable local entities) and local NRCS offices to complete HUC 12 plan development, implementation, monitoring and adaptive management. Ensure utilization of GIS tools like the Agricultural Conservation Planning Framework (ACPF) and nine key element or equivalent planning processes. (See boxes above for more about ACPF and the nine key element framework.)**
5. **Utilize monitoring from local HUC 12 watershed projects to track social, conservation practice implementation and water quality changes, support adaptive management and delist impaired waterbodies.**
6. **Reference prioritized HUC 10 and 12 watersheds on state impaired waters list and reference and track HUC 12 watershed planning and implementation in state nonpoint management plans and Nutrient Reduction Strategy documents.**

The remainder of the paper walks through each framework element, providing an overview of topics discussed with participants and highlighting model examples that further illustrate each element.

1. Establish Numeric Water Quality Standards

The first element of the framework recommends that states establish lake and in-stream numeric water quality standards for nitrogen and phosphorus. At present, the majority of states do not have numeric standards that can serve as the starting point for watershed planning. (See charts below.) Instead, small-scale watershed planning may focus on other goals like attaining the pollutant reductions identified by the regional Hypoxia Task Force (Task Force)[8]. Task Force goals are a good starting point and can be used to begin planning and implementation where state specific standards have not been used to assess waterbody impairments. However, achieving Task Force reduction levels will not restore water quality in waterbodies where reductions greater than those provided for by the Task Force are needed.

State specific numeric standards help to create a science-based and level playing field for assessment, permitting and watershed planning. Numeric standards can be paired with biological and other criteria and used together to determine impairments. Without numeric standards, states are slowly and unevenly identifying impaired waterbodies based on dissolved oxygen (DO) signatures and narrative water quality standards and developing numeric water quality standards and needed reductions through TMDLs on a case-by-case basis. A small-scale planning approach that aims to achieve state numeric water quality standards helps to ensure that algae blooms and dead zones in intrastate waterbodies that are affecting health, recreation and local and state

8 The 2008 Gulf Hypoxia Action Plan developed by the Hypoxia Task Force states that 45% reductions in phosphorus and nitrogen loads may be necessary to meet restoration goals for the Gulf of Mexico.

economies will be addressed effectively and efficiently in a prioritized manner statewide.

MODEL EXAMPLES: Wisconsin and Minnesota have established statewide numeric water quality standards for phosphorus in lakes, rivers and streams. Minnesota has paired its numeric standards with response criteria (sechi, chlorophyl a, BOD, DO). In addition to exceeding the numeric criteria, in Minnesota, a waterbody must also meet one response criterion to be listed as impaired. (See charts below.) Since establishing these criteria, these states have not had to develop site-specific criteria that deviate from the established statewide standards. Wisconsin has completed statewide monitoring at the HUC 10 scale using its numeric criteria, and Minnesota is in the process of doing the same.

- Overview of WI standards development process for streams and rivers: Before finalizing its numeric standards for phosphorus, Wisconsin assessed phosphorus and nitrogen levels in 240 streams and 42 rivers covering a range of waterbody health conditions from very good to very poor. Wisconsin did not develop phosphorus standards based on geographic regions because it found that waterbody responses to phosphorus concentrations did not vary based on geographic regions. The state analyzed impacts on fish, aquatic insects, diatoms, benthic algae, suspended algae and looked at individual metrics as well as community indices. Wisconsin was able to Identify breakpoints for phosphorus - concentrations of phosphorus at which waterbody health declined.
- Overview of MN standards development process for streams and rivers: To develop its phosphorus standards, Minnesota started with geographic regions identified by the EPA as ecoregions and then further grouped regions into River Nutrient Regions based on land use, soil type, geomorphology, nutrient loading and processing of nutrients in rivers. The state assessed streams and rivers at a HUC 8 scale and finalized numeric criteria within HUC 8 River Nutrient Region borders.

Adopted Phosphorus Criteria by Type of Water Body	Total Phosphorus in ug/L
NR 102.06 listed rivers	100
All other streams	75
Stratified reservoirs	30
Non-stratified reservoirs	40
Stratified "two-story" fishery lakes	15
Stratified drainage lakes	30
Non-stratified (shallow) drainage lakes	40
Stratified seepage lakes	20
Non-stratified (shallow) lakes	40
Impoundments	Same as inflowing river or stream
Lake Michigan open and nearshore waters	7
Lake Superior open and nearshore waters	5
Note: There are some exclusions, such as lakes under 5 acres and ephemeral streams	

Wisconsin's numeric water quality standards for phosphorus

Lake Eutrophication Standards

Lake Type	TP (µg/L)	Chl-a (µg/L)	Secchi (m)
Northern Lake Trout Lakes	12	3	4.8
Northern Stream Trout Lakes	20	6	2.5
Northern Lakes	30	9	2.0
Central Stream Trout Lakes	20	6	2.5
Central Deep Lakes	40	14	1.4
Central Shallow Lakes	60	20	1.0
Southern Deep Lakes	65	22	0.9
Southern Shallow Lakes	90	30	0.7

River Eutrophication Standards

Stream Type	TP (µg/L)	Chl-a (µg/L)	DO Flux (mg/L)	BOD_5 (mg/L)
North	50	7	3.0	1.5
Central	100	18	3.5	2.0
South	150	35	4.5	3.0

North = Northern Lakes and Forests, Northern Minnesota Wetlands
Central = North Central Hardwoods, Driftless Area
South = Northern Glaciated Plains, Western Corn Belt Plains, Lake Agassiz Plain

Minnesota's numeric water quality standards for phosphorus

States that have not yet developed numeric standards may need more data before they can develop these standards. While they could collect local data, states might also consider using relevant data from a regional data pool, to speed up the process. EPA Region 7 has discussed this approach. Collecting similar types of data using uniform data collection processes across jurisdictions would help facilitate data-sharing.

In addition, states may be able to speed up standard development by reducing the time spent on point source permit discussions during the formal standard development process. Wisconsin and Minnesota spent considerable time answering permit questions from point sources while they were developing standards. They realized that while discussions initially focused on the level of standards, the permittees' real concern was how the standards would be translated into stricter permit limits and what the compliance timeline would be. States could consider establishing a separate, earlier forum for discussing the implications of numeric phosphorus and nitrogen standards for permittees – including permit requirements, compliance flexibility, etc. Holding a point source permit discussion before the water quality standards rulemaking process could help minimize potential delays.

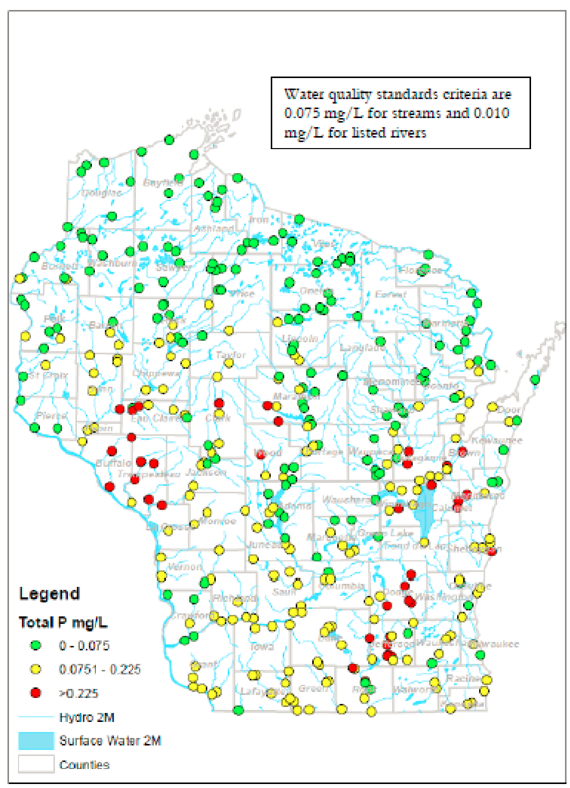
While Minnesota and Wisconsin both stressed the importance of establishing multiple lines of evidence, there is a concern that the peer review process for journal publications for researchers may unduly delay standard development. It is beneficial for researchers that work on standard development to disseminate information through peer-reviewed outlets to broader audiences. However, states need not wait for the final publication of research results to finalize their standards.

Numeric water quality standards will need to be submitted to the Environmental Protection Agency (EPA) for approval. Wisconsin and Minnesota experienced challenges in this approval process. Moreover, after Missouri underwent substantial work to develop standards, EPA rejected the state's standards on the grounds that they were not protective enough. The states perceive differences in the way EPA regions handle the review process. Clarifying agency requirements and the review process will be important for encouraging further standards development in the states.

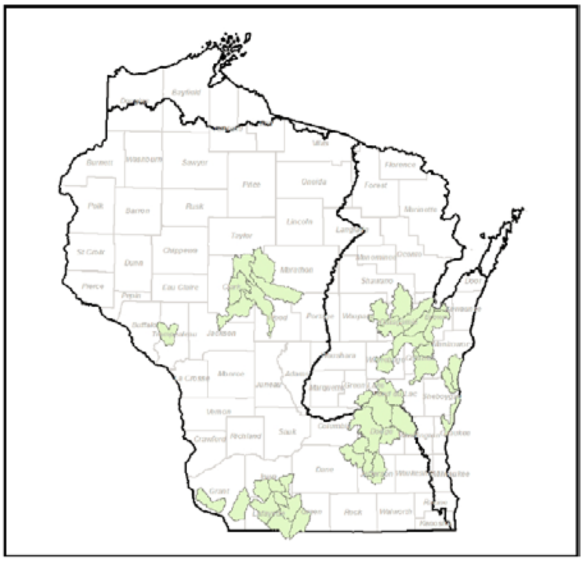
2. Monitor and Assess HUC 10s

After establishing statewide numeric water quality standards, states can conduct statewide monitoring at the HUC 10 scale and use the results to prioritize screening-level assessments for HUC 12s. As mentioned, Wisconsin completed statewide phosphorus and nitrogen monitoring at the HUC 10 scale to develop its Nutrient Reduction Strategy. (See images below.) Min-

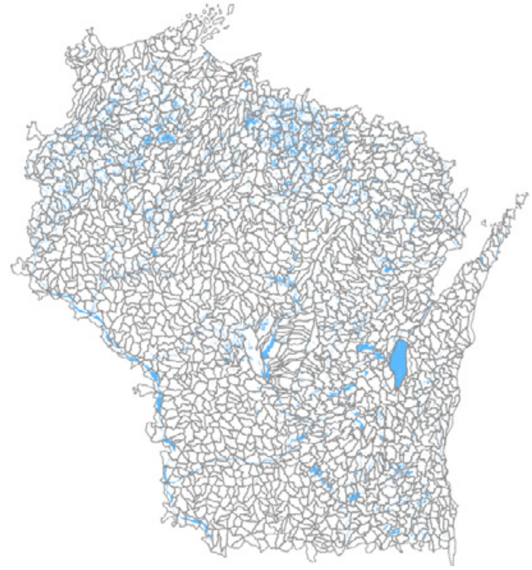
Map of HUC 10 watersheds in Wisconsin



Wisconsin's HUC 10 monitoring results for phosphorus



Wisconsin's first group of prioritized HUC 10s



Map of HUC 12 watersheds in Wisconsin

nesota is in its second year of monitoring phosphorus at the HUC 10 scale to implement its numeric phosphorus standards. Minnesota is implementing its standards statewide through a 10-year process. Each year, the state will conduct monitoring of HUC 10 pour points and lakes within a selected HUC 8.

States will need to take a prioritized approach to HUC 12 planning and implementation. It is impracticable for states to work with local stakeholders to immediately develop and implement watershed plans for all HUC 12 watersheds within their borders. Participants noted that there can be 1500-1900 HUC 12 watersheds within a Midwestern state. Attaching the same planning and implementation priority to all HUC 12s would not be wise because these subwatersheds contribute different size pollutant loads to nutrient impaired waterbodies. Prioritizing HUC 12s is also important because of varying local capacities and levels of interest. Local stakeholders may need time to develop enthusiasm, expertise, and partnerships to effectively carry out a planning effort.

Iowa and Kansas have begun prioritizing planning and implementation in HUC 12s that contribute to water quality impairment in drinking water sources or important recreational waterbodies. These and similar efforts in other states should continue, with care not to undermine efforts to develop a comprehensive HUC 12 prioritization strategy based on the severity of measured water quality impairments at the HUC 10 scale.

As with collecting scientific data and establishing numeric standards, to the extent that can states identify and use similar monitoring protocols, they will be able to leverage each other's experience and resources, and help to coordinate efforts in the region.

3. Screen and Prioritize HUC12s

Even after reducing the potential universe of target HUC12s by focusing first on those in priority HUC10 areas, states will likely be faced with a large number of HUC12s in need of watershed planning and implementation. Further stratifying HUC 12s in priority HUC 10 watersheds will provide a clear roadmap for implementation at the HUC 12 scale. However, individually ranking HUC 12s within each priority HUC 10 in a state would take a huge amount of time and is not likely to be an effective approach. (See map of all HUC 12 watersheds in Wisconsin above.) Instead, using a screening-level analysis, states could establish tiers of priority HUC 12s. States could create and utilize screening indices that look at land use, fish and wildlife, habitat, and other relevant information - a screening approach similar to the one that EPA recommends as part of its Healthy Watershed Initiative[9], which identifies healthy watersheds for protection.

In addition, states should also consider local capacity (staff capacity in local SWCDs, local water authorities, NRCS offices, municipalities, counties, etc.) and producer interest in setting priorities. As discussed in framework element 4, local stakeholders and producers lead HUC 12 watershed planning and implementation. If a HUC 12 that a state prioritizes based on water quality, geographic and environmental considerations cannot be selected because of lacking local capacity and/ or producer interest, state effort/funding should be directed to building local capacity and producer education and outreach, so that producers and local stakeholders become empowered to lead local watershed

9 https://www.epa.gov/hwp/developing-watershed-health-index-introduction

planning and implementation. By following recommendations in the EPA social indicator guide[10], states can gauge local interest and capacity and track social progress.

Developing and implementing plans for all HUC 12s contributing to water quality impairments will be a long process. HUC 12 watershed plans for agricultural areas take 1-2 years to develop and may take 5-20 years to implement. It is likely that agricultural states will have to develop a substantial number of HUC 12 plans. Even with sufficient funding and state and local capacity, it could take several decades to achieve full implementation. States could systematically and comprehensively facilitate implementation by identifying staggered plan development and implementation timelines and providing coordinated state-level plan development and implementation support. States could identify, in part based on the capacity of state-level staff providing support for local planning, groups of HUC 12 plans to be developed every two to four years. Timelines for achieving full implementation may need to be amended due to changing circumstances, such as large landscape changes, on the ground. In addition to revising timelines to account for large landscape changes, in cases where nutrient runoff is contributing to imminent human health threats, states may need to work with local stakeholders to drastically speed up planning and implementation to address these concerns.

4. Work with Local Stakeholders to Plan and Implement at the HUC 12 Scale

HUC 12 watershed planning and implementation is carried out primarily by local stakeholders. States will need to provide monitoring, modeling and financial support, but local stakeholders must lead and maintain HUC 12 planning efforts. Monitoring and modeling support for HUC 12 projects could be provided by state-level coordinators assigned responsibility for projects in one or more designated HUC 10 watersheds.

In addition to identifying how they will achieve water quality goals for their local HUC 12 watershed, local stakeholders may highlight or incorporate other concerns including soil health, water quantity, habitat, altered hydrology, etc. into watershed plans. Identifying multiple goals can be important for encouraging local leadership and stakeholder engagement and can be an efficient way of realizing multiple benefits. However, multiple benefit planning should not unreasonably extend the timeline for achieving water quality goals for a HUC 12 watershed. Locally developed HUC 12 watershed plans should incorporate the EPA nine key elements for watershed plans, or equivalent planning elements that provide a clear implementation roadmap for achieving water quality goals. Any plan utilizing Clean Water Act section 319 funds will be required to include these planning elements.

The databases and GIS map outputs from the Agricultural Conservation Planning Framework (ACPF) toolbox, where available, should help states and local project stakeholders to develop, finalize and adaptively manage HUC 12 watershed plans. The ACPF, developed by the USDA, Agricultural Research Service, has proven to be a successful tool for identifying in-field, edge of field, and riparian conservation practice options for reducing agricultural runoff in HUC 12 watersheds. The tool's map outputs help facilitate producer engagement in planning.

> MODEL EXAMPLE: The Iowa Soybean Association utilizes the ACPF to work with local producers on developing HUC 12 watershed implementation plans. The graphic below provides an example of a map of conservation practice opportunities that Iowa Soybean Association developed using the ACPF. The Iowa Soybean Association utilizes these maps in conversations with local producers and develops final conservation practice maps for HUC 12 watersheds with local producer consultation.[11]

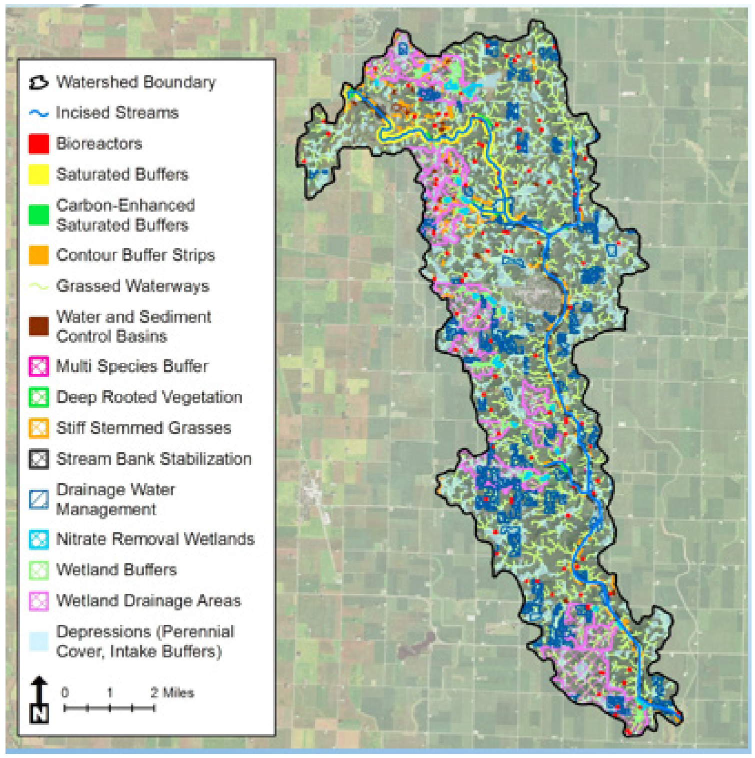
In areas with significant agricultural land use, SWCDs working with local NRCS offices could lead HUC 12 watershed planning and implementation. Local SWCD and NRCS staff have relationships with producers and local knowledge needed for successful planning and implementation in agricultural areas. As mentioned above, to enable SWCDs and local NRCS offices to take on the additional responsibilities associated with HUC 12 planning and implementation, it is important to focus financial support for staff, technology and capacity building efforts on these local entities. Municipalities, NGOs or other groups may also take leadership roles in local watershed planning and implementation efforts, but, in agricultural areas, these other entities should coordinate with SWCDs and local NRCS offices.

5. Track Progress and Adapt

Monitoring of HUC 12 watershed project progress should track social, conservation practice implementation, and water quality measures. As the number of local HUC 12 watershed plans being implemented grows, states will be able to report on the achievement

10 The Great Lakes Regional Social Indicators Team, EPA Region 5, The Social Indicator Planning & Evaluation System for Nonpoint Source Management, A Handbook for Watershed Projects (2011)

11 Map developed and provided by Adam Kiel of Iowa Soybean Association.



of interim measurable milestones for these categories and clearly indicate progress in addressing impaired waterbodies. Implementation progress can be tracked in state nonpoint management program plans and Nutrient Reduction Strategies.

> MODEL EXAMPLE: As shown by the graphic below, Iowa's Nutrient Reduction Strategy[12] is an example of a planning document that proposes to use social, conservation practice implementation and water quality metrics to gauge implementation progress.

Measuring water quality improvements from implemented conservation practices can be complicated by the position of a HUC 12 subwatershed within a larger watershed, legacy pollutant issues, and weather events. For these reasons, it is anticipated that states will not be able to directly measure water quality improvements immediately for many fully implemented HUC 12 watershed projects. However, as implementation proceeds through clustered HUC 12 watersheds and legacy issues and pollution spikes from heavy rain events are better understood and accounted for, states will ultimately be able to measure and report on water quality progress to the public and to EPA.

6. Link Small-scale Watershed Planning and Implementation to Clean Water Act Goals

To address CWA requirements, states list impaired waterbody segments on state impaired waters lists and indicate Total Maximum Daily Load (TMDL) development priority for listed waterbody segments. The proposed framework suggests that this listing process be integrated with a coherent small-scale watershed planning and implementation strategy,

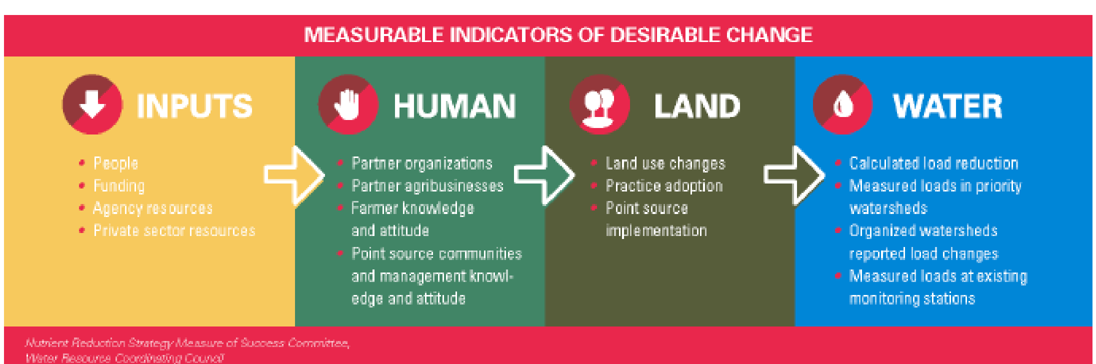


Figure 1: The logic model of the Iowa Nutrient Reduction Strategy, guided by measureable indicators of desirable change.

12 Iowa Nutrient Reduction Strategy 2015-16 Annual Progress Report, available at: http://www.nutrientstrategy.iastate.edu/documents

and be used to facilitate and organize local watershed planning and implementation efforts statewide. For example, states could incorporate HUC 12 watershed plan development and implementation timelines into their state impaired waters lists or utilize a cross-referencing approach to link impaired waterbody segments identified in impaired waters lists with HUC 12 planning and implementation timelines identified in state nonpoint program plans or Nutrient Reduction Strategy documents.

States could also indicate in their impaired waters lists whether a small-scale watershed plan will be used as an alternative to a TMDL for addressing a waterbody impairment. EPA indicated in its 2013 program guidance that a state could utilize alternatives to TMDLs, if alternatives are likely to more effectively and efficiently restore water quality.[13] EPA also developed new program evaluation criteria so that TMDL-alternative planning and implementation efforts could be counted as progress toward addressing impaired waterbodies.

Despite the guidance and criteria, states have had mixed experiences with EPA oversight. In some cases, EPA regional staff seem to give program credit for TMDL-alternative watershed planning and implementation efforts and proportionally reduce TMDL development expectations. In others, states are feeling the same pressure to develop TMDLs notwithstanding effort being expended on TMDL-alternative watershed planning and implementation efforts. Further clarification from EPA on whether and how state work on TMDL-alternative watershed planning and implementation will reduce the agency's expectations for TMDL development would be helpful.

Conclusion

Among participants at the convening, there was broad agreement that small-scale watershed planning and implementation is critical for addressing nutrient runoff and restoring health to impaired waterbodies in agricultural watersheds. There was also agreement that a comprehensive policy framework on paper is not enough. The draft framework discussed at the convening cannot be actualized and used to meet water quality goals in an acceptable period of time unless the cross-cutting issues of scale, data and communication, people, funding and capacity building are addressed. Only when states embrace comprehensive policy frameworks for small-scale watershed planning and address these cross-cutting issues can the small-scale watershed planning and implementation approach be successfully used to restore nutrient impaired waterbodies and protect public health.

13 "A Long-Term Vision for Assessment, Restoration and Protection under the Clean Water Act Section 303(d) Program" available at: https://www.epa.gov/tmdl/impaired-waters-and-tmdls-new-vision-cwa-303d-program-updated-framework-implementing-cwa-303d