

# CENTER FOR WATERSHED PROTECTION

National Watershed Research Network

## 2023 – 2028 Project Priorities

### BACKGROUND

Communities across the country are working hard to meet clean water goals. Municipalities, nonprofits, and other organizations need answers to a growing set of research questions about the causes of watershed impacts and effective solutions to address them. Lack of information, funding, time, and staff resources often contribute to delayed or no progress on advancing the translation of research to measurable action within these communities. That's where the National Watershed Research Network comes in. This collaborative helps communities achieve clean water and healthy watersheds by funding applied research on topics determined by its members. Together, we aim to provide insights into the impacts of land use activities on water resources, and identify regulations, programs, and practices that can best prevent or mitigate these impacts and address community needs.

The goals of the National Watershed Research Network are to:

- Influence a ***national agenda*** on applied watershed research priorities and information needs
- Provide a ***forum for watershed practitioners, regulators, and researchers to collaborate*** on and refine research priorities and learn from each other
- Use a ***pooled funding approach*** to implement defined watershed research priorities
- Regularly ***synthesize*** existing watershed research, information, and practitioner knowledge to provide a national perspective that informs the creation of practical guidance and tools
- Make the results ***nationally accessible*** online and through training opportunities

The Center for Watershed Protection (CWP) is the Network lead and coordinates all activities, including administration, fiscal management, science synthesis, and communication of results. The Network's Steering Committee provides oversight, sets priorities, and helps to leverage funding and partnerships. Membership in the Network is open to all, with annual membership fees based on organization type and size. This document describes the priority topics for the Network over the next 3-5 years and the process used to identify these project priorities.

## PROCESS FOR IDENTIFYING RESEARCH PROJECT PRIORITIES

CWP conducted a nationwide survey of watershed research needs and held a National Watershed Research Network planning meeting in 2021 attended by 22 watershed and stormwater professionals from government agencies, consulting firms, and nonprofits. Based on input from these two sources, the most important watershed research and information needs were identified as follows:

Priority topics from 2021 planning meeting attendees:

- Best management practices (BMPs): improved technologies and cost-effectiveness, quantifying performance, maintenance, tracking
- How to get landowner and community support for BMPs
- Effective regulations (and how to enforce them)
- Identification of pollutant sources, transport, and impacts
- Impacts of climate change on stormwater management

Additional priority topics from the national survey:

- Updated guidance on watershed planning
- Agricultural watershed management
- Using trees for stormwater management
- Impacts of land use change on water resources

Several of these very broad topics were discussed in more detail at the 2021 planning meeting and through individual follow-up calls with attendees. As the National Watershed Research Network lead, one of CWP's first steps following the planning meeting was to identify a set of specific research projects that have wide applicability, can be implemented within a relatively short timeframe, and provide immediate, actionable information. There was also discussion at the meeting about the need to ensure the Network does not duplicate work that other, similar organizations may be doing. As a next step, CWP reviewed research plans and other papers that summarize needs for several of these entities. This helped to further refine the above topics and flesh them out into a set of nine concepts. These concepts were further evaluated based on the following criteria:

1. **Applicability** – is widely applicable nationwide, to a variety of community types
2. **Need** – addresses an identified gap; is unlikely to be funded through other sources; is not being addressed by other organizations
3. **Achievability** – can be accomplished in a relatively short timeframe; has a defined product that is not dependent on data availability; can be scaled to the available budget; has higher potential to leverage CWP ongoing work or other funding sources
4. **Suitability** - meshes well with the goals of the Network; CWP has the expertise to lead the project

Table 1 lists the nine concepts and shows the result of this exercise.

<b>Table 1. Assessment of Proposed Watershed Research Concepts</b>				
<b>Topic</b>	<b>Applicability</b>	<b>Need</b>	<b>Achievability</b>	<b>Suitability</b>
Green Infrastructure Performance, Longevity, and Maintenance	Urban	Low	Medium	High
Illicit Discharge Detection and Elimination	Urban	Medium	High	High
National Status, Trends, and Clean Water Act Policy Analysis	National	Medium	Low	High
How to Get Landowner and Community Support for BMPs	National	High	Medium	Medium
Watershed Planning Tools and Guidance	National	Medium	High	High
Effectiveness of Watershed Restoration	Urban	Low	Low	Medium
Compendium of State Stormwater Approaches	Urban	Medium	High	High
Stormwater Management and Climate Change	Urban	High	High	Medium
Economics of Source Water Protection	National	Medium	Medium	Medium

Four of the research concepts were ranked as High in terms of their achievability. These four concepts will be the focus of discussion and a vote by the Network’s Steering Committee to select one concept to work on in 2023. Once the topic is selected, CWP will review the available information and use Steering Committee input to flesh out a scope of work that can be accomplished with the available budget or conducted in phases, with the outcome of actionable information that can be used by communities. The four priority concepts are presented below, followed by the remaining five concepts which are longer-term .

## **PRIORITY CONCEPTS FOR 2023**

### ***1. Illicit Discharge Detection and Elimination***

National guidance on illicit discharge detection and elimination (IDDE) programs is nearly 20 years old. In this time, new methods and approaches have been tested and applied but there is no way for regulated communities to easily learn from other communities’ programs.

Conduct a national survey and review of IDDE programs and gray literature to learn:

- What methods for outfall prioritization and screening are currently required by communities' permits/regulations?
- What new methods have been applied in the last 20 years?
- How cost-effective are different options for finding and fixing illicit discharges?
- How can a manager choose the best options for their water/sewershed condition?
- Are there unique methods available for different regions or climates?

*Deliverables:* Case studies and StoryMap highlighting existing IDDE programs and approaches

*Impact:* Facilitates sharing of lessons learned, knowledge and tools across MS4 communities

## **2. Compendium of State Stormwater Approaches**

The Clean Water Act provides the framework for implementation of the NPDES MS4 program; however, individual MS4 permit programs vary significantly due to the great flexibility provided to states responsible for implementing the program. Both experienced and newly permitted municipalities could benefit from learning how others are addressing the many challenges of implementing successful stormwater programs. A review of state programs would address the following questions:

- What approaches are used to require or encourage onsite retention
- What approaches are used to allow for offsite compliance?
- Is there sufficient guidance on BMP design, particularly green infrastructure?
- Have any states updated their design standards to account for climate change?
- What approaches are being used to ensure BMPs are properly maintained?
- What approaches are used to “credit” non-traditional stormwater BMPs like tree planting and stream restoration?
- Where are TMDLs being integrated into MS4 permits or stormwater design standards?
- Are MS4s taking advantage of State Revolving Fund programs for stormwater projects?
- How are stormwater programs funded and how does this vary regionally?

*Deliverables:* Storymap highlighting existing state stormwater programs with case studies of innovative approaches

*Impact:* Facilitates sharing of lessons learned, knowledge and tools across MS4 communities

## **3. Stormwater Management and Climate Change**

Traditional stormwater design has assumed that, while rainfall depths and water levels may vary from year to year, overall weather patterns remain constant over time. With climate change, however, communities are facing difficult choices given the uncertainty about how these patterns will change over time. Examples include how to invest wisely in measures to control flooding, and when to change development codes to account for the expected changes. Agencies at the federal, state, and local levels have been developing tools to understand the impacts of and interventions to manage climate change but these efforts have not been compiled or reviewed comprehensively.

This compilation would address the following questions:

- What tools are cities and states currently using to estimate the effects of climate change and how can they be incorporated into the planning process?
- How has green infrastructure been used to build resilience to flooding?
- How have communities incorporated planning for climate change into their stormwater and land development codes?
- Are there examples of approaches that can be phased in over time with lower initial costs?
- How do these approaches account for impacts of climate change on Environmental Justice communities?

- Which practices or approaches achieve multiple objectives related to climate change, such as reducing urban heat islands, reducing carbon footprint, reducing water use, or minimizing wildfire risk?

*Deliverables:* A “state of the practice” summary of approaches being implemented, including links to existing tools and profiles of successful efforts.

*Impact:* Provides communities with a set of tools to account for the impacts of climate change on stormwater management and adapt existing codes and standards.

#### **4. Watershed Planning Tools and Guidance**

Existing watershed planning guidance is 10+ years old and needs to be updated to reflect lessons learned over the past decade, new technology and data sources, emerging pollutants, climate change, and more. At the same time, watershed planning professionals need help filtering through the existing information, tools, training, and data to find what is most applicable to their state or region. They also want case studies, model ordinances and access to a network of peers to help troubleshoot watershed planning problems. Some key questions include:

- What technologies and data are being used to streamline watershed assessment and planning (e.g., ESRI public input maps, LiDAR data, real-time water data)?
- Do existing assessment methods need to be changed to reflect the state of the science in restoration and conservation?
- How can watershed plans be developed to better support community and social goals such as Environmental Justice, diversity equity and inclusion, economic revitalization, and public health?
- What data sources, tools, training and other resources are available to support watershed planning efforts, and how do they vary by state or region?
- Are there good examples of communities integrating watershed planning with source water protection, land use planning, and/or climate resiliency?

*Deliverables:* A web-based compendium of watershed planning tools, guidance, case studies, and other resources that can be filtered by state and topic.

*Impact:* This product will serve as a resource for watershed planning professionals.

### **Long-Term Research Priorities**

#### **5. Green Infrastructure Performance, Longevity, and Maintenance**

Communities are investing millions in green infrastructure. They need to know if these projects are working as intended and how to best protect this investment.

Compile and analyze data from a variety of sources to assess the following questions:

- How long do green infrastructure projects last?
- Are they being properly maintained?
- Are they being installed properly?
- What are the installation and maintenance costs?

- What is their effectiveness to remove pollutants, reduce flooding, and provide other benefits?
- How do the above vary by region?

*Deliverables:* Meta analysis and white paper

*Impact:* Informs municipal regulations, policies, procedures, and budgeting regarding green infrastructure planning, construction, and maintenance

## **6. National Status, Trends, and Clean Water Act Policy Analysis**

State assessments of the use attainment status of their waters are completed every two years and provide a wealth of information on impairments and their causes and sources. Yet no one is compiling this data at a national or regional scale to evaluate the status and trends, or to assess if the Clean Water Act is effectively being applied to protect and restore our waters.

Compile, review, and analyze state Integrated Report data, water quality standards, and other geospatial data to assess questions such as:

- Which waterways are fishable, swimmable, and drinkable?
- Are there any trends in the number of impaired waters identified over time?
- What are the most common impairments and their causes and sources?
- Do these impairments correlate with any specific local characteristics?
- Do TMDL and antidegradation requirements appear to be effective based on approval of permits in these watersheds?
- Which waters need further assessment?
- Which streams are good candidates for enhanced protection?
- Do impaired waters areas disproportionately overlap with underserved communities?

*Deliverables:* StoryMap and a report with results

*Impact:* Informs changes to federal, state, and local policies; Facilitates targeting and prioritization of local assessment, protection, restoration, and enforcement activities.

## **7. How to Get Landowner and Community Support for BMPs**

One of the biggest challenges with watershed protection and restoration is getting community support for projects, which often involves convincing landowners to install a project or otherwise change how they manage their land. The application of psychology and marketing to environmental science is a relatively new field and the resulting research shows that the most effective methods for getting support vary by the audience and the type of BMP.

The key research questions for this topic are:

- What approaches (incentives, outreach, regulatory mechanisms) are most effective to motivate adoption of watershed protection or restoration practices?
- How do these results vary by audience and landscape (urban, agricultural, forested)?

*Deliverables:* Literature synthesis, organized by BMP/behavior type.

*Impact:* Results would inform outreach methods used by a wide variety of organizations (e.g., MS4 outreach staff, soil conservation district staff, watershed coordinators, local watershed organizations) regarding BMP adoption and can also help to inform regulations and incentive programs for BMPs on private lands.

## **8. Effectiveness of Watershed Restoration**

The Clean Water Act sets forth an established process for identifying and restoring impaired waterways. Many communities have made significant investments in watershed restoration but due to the complex nature of watersheds, continued land uses changes, and the lag time between project implementation and improvement of stream conditions, it is difficult to tell whether restoration efforts are successful.

The key research questions are:

- To what extent have restoration plans been implemented, as measured by the number or extent of practices installed or policies changed, and what techniques or conditions support better and more timely implementation?
- In watersheds where restoration plans have been implemented, have these efforts achieved their stated goals (e.g., meeting “fishable” or “swimmable” standards)?
- How do watershed characteristics impact the success of restoration (e.g., large versus small watersheds, urban versus rural)?
- Are there thresholds of urbanization above which restoration of certain functions (e.g., biological uplift) are not cost-effective or even achievable?
- Which practices or techniques are the most effective, both in terms of their implementation and success in achieving watershed goals?
- To what extent are restoration practices impacted by land cover changes?

*Deliverables:* A meta analysis of data from existing restoration efforts and white paper summarizing results.

*Impact:* results will inform potential regulatory changes and help communities direct their investments to the most effective restoration practices and/or watersheds

## **9. Economics of Source Water Protection**

One of the biggest challenges water suppliers face with source water protection is that they generally have little control over decisions about land use in the source water area. Unfortunately, declining water quality results in increased water treatment costs, and potential health hazards. Better quantifying these costs makes the case for land preservation and other watershed management practices in source water areas. There is a need for:

- Examples of approaches used by communities to successfully protect land in drinking water source areas
- Water treatment cost data that can be compared with changes over time to intake water quality data as well as land use changes in the source area
- Case studies of both successful and unsuccessful source water protection efforts and related costs.

*Deliverables:* A survey of drinking water utilities and literature survey to develop case studies and quantify water treatment costs.

*Impact:* This research will help inform policy decisions for drinking water utilities, and ultimately protect the health of drinking water customers.