Policy Incentives and Disincentives to Water Retention Strategies in Agricultural, Residential, and Floodplain Settings in the Upper Mississippi River Basin

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Reporting Period: 8/21/2023 – 8/1/2024

Cooperative Agreement Between USGS UMESC and the Upper Mississippi River Basin Association – America's Watershed Initiative Subaward

Agreement Number: G23AC00610-00

With additional funding provided by:

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Table of Contents

1.0 Introduction

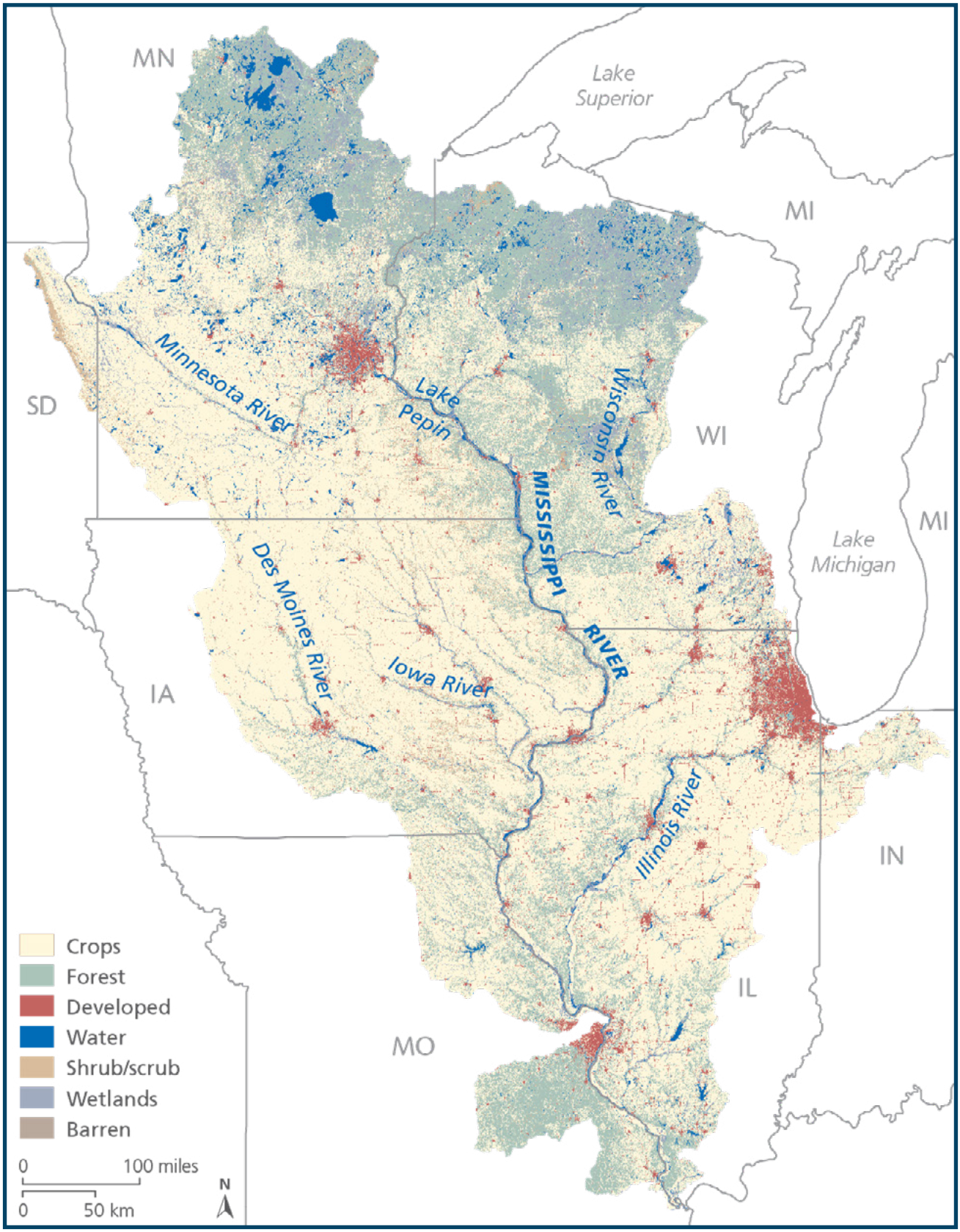
Retaining water on the landscape in agricultural, residential, and floodplain settings can have multiple economic, ecological, and social benefits, including flood mitigation, pollution reduction, and recreational enjoyment. Techniques to retain water that utilize sustainable management of ecological systems through natural processes are often referred to as nature-based solutions.

Nature-based solutions or NBS have many demonstrated benefits. NBS can help reduce the impacts of pollutants before they enter a water body and/or intercept them once they are in a water body. NBS can also be used to store and slow runoff, reducing river flow. In small to medium flood events, NBS can increase the time it takes for peak flow to occur and to reduce the height of the peak flow downstream. NBS, such as vegetated buffers, can reduce the impact of extreme rain events on soil erosion and improve water infiltration. NBS can aid climate change adaptation. For example, on farmland, NBS can capture carbon and help farmers store water when it's plentiful for use when it's scarce.

Currently, water management in response to extreme precipitation remains heavily dominated by traditional, human-built (i.e., 'gray') infrastructure, and the enormous potential for NBS remains under-utilized. While there are many potential reasons for this underutilization, the research explored how policies can be used to accelerate or impede the deployment of NBS, e.g., how policy can act as a lever. A lever, for the purposes of this study, is an intervention with a complex system where a small shift in one thing can produce big changes. We narrowed the research to consider large-scale rural and agricultural solutions for water retention and flood reduction in the Upper Mississippi River Basin. We chose this focus purposefully as the predominate land cover in the Upper Mississippi River watershed is farmland, forest, or pasture. Complementary urban solutions that arose during interviews were also included in this report.

Some of the primary practices researched as part of this study include levee set-backs, in-field practices, edge-of-field practices, retention ponds, and constructed wetlands. Other techniques that show promise, but where interviewees did not make explicit recommendations were floodplain reconnection and restoration, re-meandering river and streams, and afforestation.

Dog Tooth Bend 2016 Breach
The Nature Conservancy



Upper Mississippi River Basin (Figure 1)

University of Maryland, Center for Environmental Science

2.0 Project Description and Methodology

The aim of this project was to identify important federal, state, and local government policies and program guidance that either encourage or deter implementation of water retention strategies through nature-based solutions within the Upper Mississippi River Basin (Figure 1).

Two primary techniques were used to collect information on water retention NBS policies: one-on-one interviews and solicitation of feedback in a workshop setting. Selected staff from relevant federal and state agencies, non-government organizations, academic institutions, and industry were interviewed about existing policies and program guidance that supports and/or deters implementation of NBS-based water retention strategies. A total of 50, 30-to-60-minute interviews (Appendix A) were conducted and covered a range of questions (Appendix B). During the interviews, levers outside of policy were highlighted by participants as important factors in implementation of NBS. These enabling conditions are included as part of this report.

In hosting the workshop portion of the project, America's Watershed Initiative (AWI) partnered with the Upper Mississippi River Basin Association (UMRBA) to explore a variety of levers that could increase the deployment of Multi-Benefit Conservation Practices. Multi-Benefit Conservation Practices were defined for this audience as conservation efforts designed to simultaneously benefit local communities of people, enhance ecological function, and improve habitat quality for fish and wildlife. AWI staff facilitated a session on policy levers. Following this presentation, conference participants were asked to post ideas about how policy levers enabled or deterred water retention NBS strategies. These comments were summarized (Appendix C) and served as a topic template for interviews.

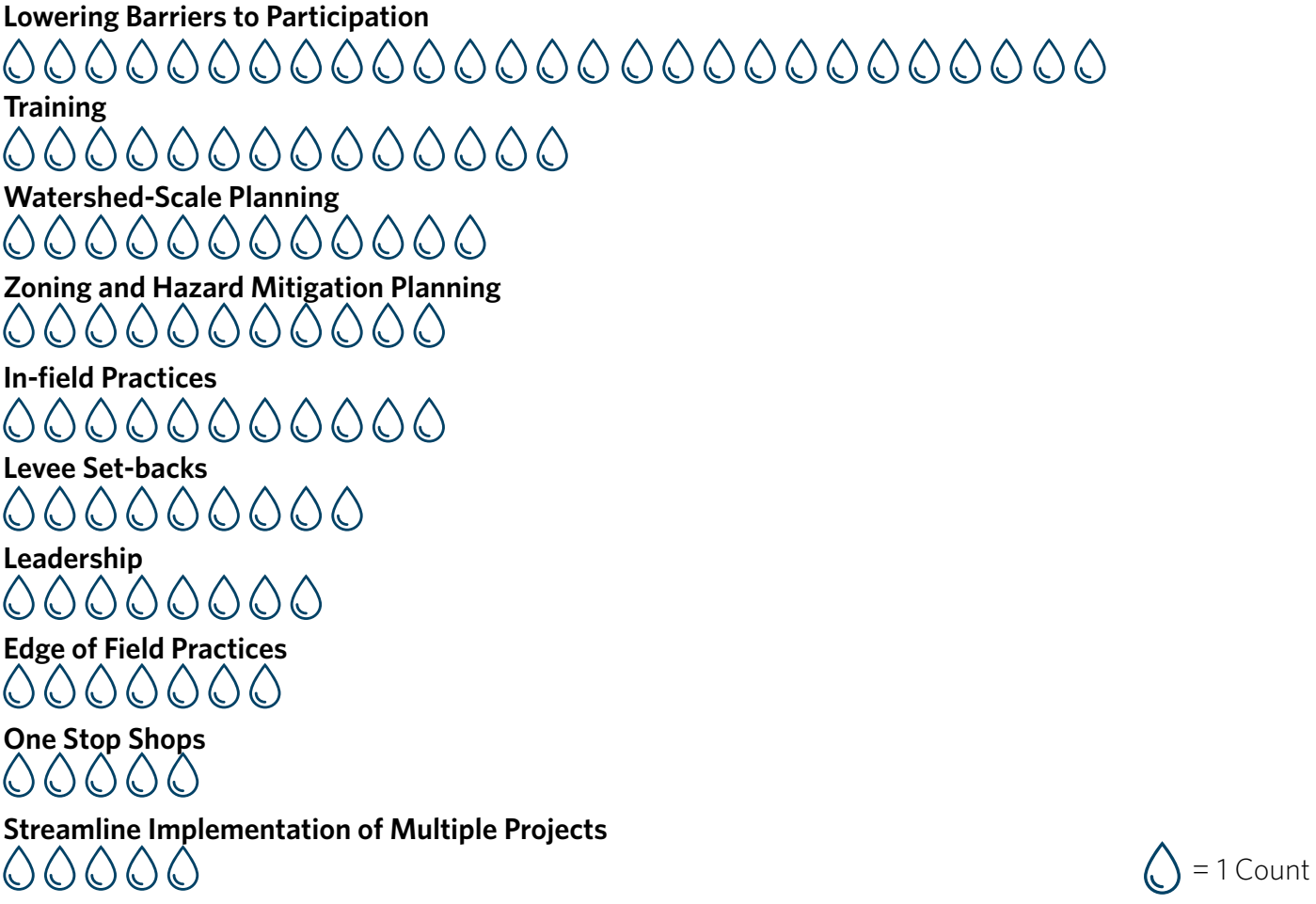
Levee Setback in Missouri
The Nature Conservancy

3.0 Levers to Accelerate Implementation of Nature-Based Solutions

The information that follows is based exclusively on interviews with 50 professionals who work directly or indirectly with the implementation of NBS projects in the Upper Mississippi River Basin and beyond. Where necessary, we reviewed source materials referenced by interviewees. However, due to the confined timeframe and scope of the project, novel research on potential policy levers is not included in the text below.

While the focus of the interviews was the impact of policy levers on accelerated deployment of NBS, interviewees often provide additional information on a host of issues they saw as important for NBS deployment. Ten thematic areas arose across the 50 interviews. Some of which are policy related and others touch on additional enabling factors. The ten areas highlighted below are organized in priority order, based on the number of mentions across the 50 interviews (Figure 2).

Levers Identified by Interviewees



NBS Report Data

Figure 2

3.1 Lowering Barriers to Participation in NBS Programs

A wide range of administrative barriers to individual farmers, local communities, and NGOs were noted by almost all interviewees. These included:

3.1.1 Inclusion of NBS in State Hazard Mitigation Plans

To be eligible for funding, some federal programs, such as Building Resilient Infrastructure and Communities (BRIC), require that states have language around NBS included in their State Hazard Mitigation Plans. A potential acceleration strategy would be to research which states lack the requisite language and to assist with plan updates.

3.1.2 Inclusion of NBS in Local Hazard Mitigation Plans

Similarly, local governments applying for BRIC grants often do so through their state emergency management agency. Local governments are required to have their own hazard mitigation plans in place with language around NBS. This can be a challenge for local governments that lack an up-to-date hazard mitigation plan. Creating such a plan can take 6-18 months and requires available staff and/or funding for a consultant. Similar to the above recommendation, interviewees suggested identifying priority communities, reviewing plans for the requisite language, and providing plan assistance.

3.1.3 Guidance on Benefit Cost Analysis for NBS

One of the largest barriers to federal funding for NBS is the Benefit-Cost Analysis (BCA) which is often required as part of the grant application process. For projects to be considered for funding, the benefit-cost ratio must be 1.0 or higher. Federal Emergency Management Agency (FEMA) has made significant positive steps towards including the value of ecosystem services in their BCA, beginning in 2013. However, the ecosystem service options are still limited, and many important benefits such as water quality improvements and lives saved are not considered within the BCA. Many other agencies have not made efforts towards including ecosystem services and other NBS benefits in their BCA. Additionally, the current system heavily favors gray infrastructure solutions despite the possible cost-saving benefits of NBS.

3.1.4 Administrative and Technical Capacity

Many small businesses and individuals do not have the capacity on their own to apply for federal grants, and even less complex state grants can feel out of reach. Therefore, information hubs such as state agricultural extension offices, Councils of Government, local Natural Resource Conservation Service (NRCS) offices, or NGOs can provide much needed guidance to these resources.

If an entity does have the capacity to determine grant eligibility and to complete the grant, they then face the challenge of monitoring the project in the field, tracking financial requirements, and completing the often-burdensome report requirements.

There is not enough technical support for complex nature-based solution projects, often requiring a systems-approach to design and evaluate several NBS projects distributed across a watershed and draining to an impacted area or community (see Iowa Watershed Approach 3.9.2). The capacity of engineering firms and state agency technical resources is limited, and the demand outpaces current capacity.

3.1.5 Flexibility and Adaptive Management

Strict grant guidelines can keep projects from reaching their full potential. As with most on-the-ground projects, conditions may differ slightly from what was expected once implementation begins. Resources may change and specific products may no longer be available. Providing flexibility in grant language and having an open dialogue with grantees can support better outcomes even when on-the-ground conditions change.

3.2 Training

3.2.1 Tech Training and Certification Program in Minnesota

Minnesota, in partnership with the NRCS, provides a Technical Training and Certification Program that can lead to Job Approval Authority. Job Approval Authority (JAA) is a process to document employee technical capability to design and implement conservation practices. This process ensures that the practices are planned properly, designed to accepted criteria, and constructed safely. It minimizes risk and ensures that projects are durable. Although this process was designed to overcome the barrier of limited licensed professionals, there is still a deficit of trained professionals to support implementation.

Minnesota state employees working for conservation districts, or the Board of Water and Soil Resources are eligible to take courses on a variety of topics and then are provided with on-the-ground opportunities to utilize what they have learned and gain JAA. At the end of 2023, there were 55 different training courses available and 4,757 training attendees. This program is an important step to providing more people with JAA.

3.2.2 Green Jobs Training in Missouri

The Missouri Department of Conservation in partnership with The Nature Conservancy and several local St. Louis organizations is providing a green jobs training program to increase environmental literacy and to teach trainees skills necessary to work in green infrastructure roles. The program specifically focuses on youth and adults who have been failed by the education system. This 7-week paid training program also provides dedicated career specialists, through Employment Connection of St. Louis, to support trainees in securing employment. Two cohorts of students have completed the program, and there is significant interest in scaling-up the program. Additionally, Employment Connection recently developed a contract with a local community development organization to build a crew for maintaining select greenspaces in St. Louis with a goal of increasing green job placement opportunities and to help build capacity for greenspace management.

3.2.3 Extension-based collaboration across the North Central Region

The North Central Region Water Network is a 12-state collaborative, covering the Upper Mississippi River Basin and a portion of the Upper Missouri Basin. This collaborative is designed to improve "connectivity across regional and state water projects, develop and carry out integrated outreach and education efforts, and coordinate projects with measurable short and long-term environmental and social impacts. The network is overseen by an Ag Extension-based regional director; a team of Extension appointed state contacts."

A promising program titled: "Tap Your Potential: Training to Grow Farmer Leadership in Watershed Management" is training with the goal of growing farmer led leadership developed by the North Central Region Water. This online resource is a curriculum designed for use by outreach professionals and educators who work in agricultural watersheds and provides them with tools to recruit farmers to play a more proactive role in watershed management. This customizable curriculum provides six hours of materials, in three modules.

3.3 Watershed-Scale Planning

Watershed-scale planning was frequently raised as a valuable first step to increase implementation of nature-based solutions that benefit hydrological challenges such as extreme rain events. One challenge cited to this approach is that governmental systems are not typically established along watershed boundaries and crossing jurisdictions can be challenging for local governments. Often, projects in one locality may have unintended downstream effects in a neighboring county, city, or state.

3.3.1 Nebraska Natural Resources Districts

Nebraska's Natural Resources Districts are local government units focused on delivering programs to conserve and protect the state's natural resources. Established in 1972, Nebraska has a unique system of locally controlled, tax-funded, watershed-based conservation whose boundaries are organized based on Nebraska's major river basins.

Natural Resources Districts were created to address flood control, soil erosion, irrigation run-off, and groundwater quantity and quality issues. They are governed by locally elected Boards of Directors and managed by professional staff, the NRDs are a primary contact for Nebraska's farmers, businesses, schools, and citizens for information and assistance regarding natural resources conservation and management.

3.3.2 Iowa Watershed Approach

In 2008, a significant flooding event in eastern Iowa resulted in the creation of the Iowa Flood Center and the adoption of several statewide policies to reduce future flood damage. While the 2008 flood event and the damage from it was in the spotlight, significant federal funding was allocated to support disaster recovery. In 2010, the Iowa Flood Center received $8.8 million to lead a pilot program called Iowa Watersheds Project which focused on stream flow reduction during heavy rainfall using distributed NBS practices on private farmland. In 2016, the Iowa Flood Center received an additional $96.9 million for The Iowa Watershed Approach. This larger program worked in nine watersheds to implement flood resilience and water quality improvement strategies. This program often utilized NBS, to reduce the impact of flooding during heavy rainfall and improve water quality throughout the year. Volunteer landowners were eligible to receive a 90% cost share with the Iowa Flood Center for NBS projects on their property. This favorable cost share, combined with technical resources, resulted in many interested and willing landowners. Over 800 projects were implemented in sub-watersheds, resulting in peak stream flow reductions of 10% at several nearby rural communities. Unfortunately, in larger urban watershed scales, the stream flow reductions were much smaller, demonstrating the need for thousands of NBS projects across these larger areas to achieve the intended stream flow reductions.

Field Day
Iowa's Watershed Approach

3.4 Zoning and Hazard Mitigation Planning

3.4.1 Zoning

FEMA has developed a helpful resource entitled Building Community Resilience with Nature-based Solutions: A guide for local communities. This resource discusses ways in which communities can update their land use, zoning, or other local regulations to provide incentives for using NBS. Common zoning incentives include: allowing a greater height, density, or intensity of development if a developer uses nature-based approaches. Communities can also exempt green roofs or pervious pavements from any regulations that apply to impervious cover. Additional incentives for adopting nature-based approaches can be used in the development application and review period. These include discounted application fees and discounted or waived maintenance bonding requirements. For redevelopment, communities can also give a one-time tax credit for using nature-based approaches that benefit the public.

Tackling zoning issues is, however, a complex and time-consuming lever. Within a given jurisdiction, a zoning code may be hundreds of pages long and implementation involves many players. One focused suggestion from interviewees was to zone undeveloped land along waterways so that it can be developed in a way that supports nature-based solutions such as a stream side park that can act as a floodplain when needed. Such zoning changes expand opportunities to access land for nature-based solutions and protect the existing waterside development. Comprehensive zoning changes have been undertaken in cities experiencing devastating impacts of climate change, such as Norfolk, Virginia and New Orleans, Louisiana with positive impacts, but these changes require the kind of organized and committed leadership described in section 3.7.

3.4.2 Hazard Mitigation Planning

An important resource for communities that wish to tackle NBS is the Building Resilient Infrastructure & Communities program or BRIC. This legislation, authorized by the Disaster Recovery Reform Act of 2018 (DRRA) provides assistance to states, local governments, and Tribal governments in applying cost-effective hazard mitigation activities that complement a comprehensive mitigation program.

The BRIC program provides funds for hazard mitigation planning and the implementation of mitigation projects before a disaster event occurs. Funding these plans and projects reduces overall risks to populations and structures, while also reducing reliance on funding from actual disaster declarations. BRIC grants are awarded by FEMA on a competitive basis, with a focus on supporting communities through capability and capacity building; encouraging and enabling innovation; promoting partnerships; enabling large projects; and maintaining flexibility and consistency.

The most recent Notice of Funding Opportunity (NOFO) continues to invest more FEMA resources in capacity building; provides additional incentives for states and localities to adopt better building codes; and introduces special considerations for the new Community Disaster Resilience Zones Act established in law in 2022. This Act requires FEMA to utilize a natural hazard risk assessment index to identify census tracts which are most at risk from the effects of natural hazards and climate change. More information about the Act and its associated mapping toll can be found here.

3.5 In-field Practices

3.5.1 Agricultural Water Quality Certification Program

Over a million acres of land in Minnesota have been certified through the Agricultural Water Quality Certification Program. The program requires that certified landowners use conservation practices on their farms, and in return, they receive regulatory certainty (immunity from new water regulation) for 10 years as well as prioritized technical assistance. To date, over 1,500 producers and 1 million acres have been Water Quality Certified in Minnesota.

Some non-government organizations, however, have been concerned with both the threshold for certification and monitoring of conservation practices across the 10-year timeframe. While the idea is promising, further evaluation is needed to ensure it benefits both the environment and landowners.

3.5.2 Bunge and Nutrien Ag Solutions Pilot Program

Manufacturers have seen a rise in interest from consumers in conservation practices in farming and have engaged with corporations such as Bunge to engage more growers. In a new alliance announced in 2023, Bunge and Nutrien Ag are partnering to support U.S. farmers in the implementation of sustainable farming practices that will help increase the development of lower carbon products.

Bunge is providing financial support to over 3,000 soybean farmers who enrolled in the first year of the program to use NBS including reduced tillage, cover crops, and rotation diversification along with nutrient management practices. Farmers are asked for a 1-year commitment to encourage participation but hope to keep enrolling farmers year after year. Two of the pilot sites are in the Mississippi River Basin (Council Bluffs, Iowa and Decatur, Indiana).

This program provides considerable financial benefits in that farmers can stack federal incentives with Bunge's private funding incentives to make these practices affordable and accessible. It also provides an opportunity for farmers who may not be comfortable with government programs or lack the time and resources to access them. By providing a low friction option with a trusted partner, many new farmers are interested in these practices.

While measuring NBS outcomes is a critical part of the puzzle, it can also be a big ask for landowners to collect and manage their own data. Therefore, Bunge partnered with Nutrien Ag to provide professional data collection and management to document the benefits of these pilots. They are currently measuring carbon capture through these practices but hope to add additional measures such as nutrient runoff reduction as the program expands.

3.5.3 STAR Program

Saving Tomorrow's Agricultural Resources (STAR) is a national, non-profit organization established to develop and expand a framework for conservation practice evaluation, implementation, and valuation. The STAR program focuses on program support and funding to farmers prioritizing conservation practices. Initially developed by two Illinoisan farmers in 2017 and championed by the Champaign County Soil and Water Conservation District and local partners, STAR helps farmers meet the conservation practice implementation goals in the Illinois Nutrient Loss Reduction Strategy through a standardized approach for determining conservation progress.

The STAR framework supports farmers and ranchers in conservation practice adoption and implementation across agricultural production systems through a state-level network of STAR Affiliates. The STAR tool prioritizes solutions at the local level to connect perceptions of conservation and sustainability with outcome-driven supply chain sustainability programs.

The STAR program was established in Illinois and Colorado and emerging in Missouri and Iowa. The program aims to establish contingencies within other Mississippi River Watershed states.

3.5.4 Market-based Alternative Crops and Cover Crops

While producing some crops within the Mississippi River Watershed is typically easier than others due to easy access to seed and processors, University of Minnesota has found strong evidence that expanding the use of alternative and crop covers can increase expected yields and produce new commodities while improving wildlife, soil, and water health. As a result, the Forever Green, along with other organizations, have been working to build infrastructure for more diverse crop options.

3.6 Levee Setbacks

Public Law 84-99 (PL 84-99) gives the US Army Corps of Engineers (USACE) the authority to support a community in response to natural disasters. This law is commonly used across the Mississippi River Watershed to respond to breeched levees. As part of PL 84-99, USACE can provide financial and technical aid when rebuilding a breached levee. At present, the USACE will only provide funds for a levee setback (vs. a levee replacement with the same configuration) if the setback is lower in cost. USACE does not allow real estate acquisition under PL 84-99, therefore land needed for the setback must be owned or acquired by their levee sponsor. As a result, the cost-benefit analysis for setback does not currently consider the potential cost of repetitive breaches if the levee is rebuilt with the same configuration. For those interested in additional information about this strategy, The Nature Conservancy has developed a detailed guidebook for levee setbacks that can be found here.

Levee Setback
The Nature Conservancy

3.7 Leadership

Interviewees noted the importance of an NBS advocate situated in a key leadership position at any level of government including mayors, state agency leaders, federal agency leads and members of the executive branch. Many stated that when agencies/local governments are not yet viewing NBS as a viable tool, having a champion can be an important inflection point in advancing NBS deployment. While this lever can have a policy focus, it can also manifest in other ways as the examples below illustrate.

3.7.1 Federal Leadership - Assistant Secretary of the Army for Civil Works

A great example of leadership valuing NBS and integrating it within a federal agency was the April 22, 2024 memo released by the Office of the Assistant Secretary of the Army Corps for Civil Works, Michael Connor. The memorandum acknowledges the progress the Corps is making in developing and using NBS in civil works projects and provides guidance to incorporate NBS where appropriate. Data gaps and challenges in implementing NBS are mentioned along with a recognition of the role the USACE can play in pursuing future research and analysis to address these gaps. The overall intent of the memorandum is to expand the use of NBS by identifying challenges and possible solutions for implementation. The memorandum applies to all Civil Works programs.

Within the memo, USACE announced a possible change to Agency Specific Procedures (ASPs) for the Principles, Requirements, and Guideline (PR&G) that would require all new projects to include a fully NBS alternative in their alternative analysis. This policy change could have profound impacts on not only the implementation of NBS, but also the research and monitoring of projects as they seek to better understand the value of NBS.

3.7.2 County Leadership, Monroe County, Wisconsin

Since 2007, the Coon Creek Watershed has suffered multiple historic floods with rainfall intensity during the most damaging events averaging 2-6 inches per hour. During the floods of 2018, seven PL 566 flood control dams were overtopped, and three dams were breached, sending flood waters throughout the Coon Creek Watershed. This notable flood event destroyed homes, farms, businesses, roads, and bridges. The extensive flooding led to a Presidential Disaster Declaration.

Following the 2018 disaster, the Monroe County Board of Commissioners launched a Climate Change Task Force (CCTF) that acknowledges among other provisions that 1) adequate floodplain management can help alleviate future property damage, 2) updating and/or creating the county's regulatory floodplain map will more accurately reflect current flood risk, and 3) identifying current land use trends will allow the county to improve enforcement of standard zoning policies and practices to create sustainable land use decisions. The CCTF unanimously approved by the County Board of Commissioners, established specific projects that support NBS concepts including: 1) enhancement of weather monitoring equipment in partnership with the National Weather Service, 2) a home buyout program in floodplains, 3) a stream crossing inventory assessment, and 4) a land use and infiltration assessment.

3.8 Accelerating Edge of Field practices

3.8.1 Minnesota's Buffer Law

Enacted in 2015, Minnesota's Buffer Law requires perennial vegetative buffers of 16.5-foot width along public ditches and of 50-foot average width, or 30-foot minimum width along waterways and around lakes. Prior to the Buffer Law, the rules that required "buffers to be in place" were only enacted under specific conditions, most commonly for urban development zoning permits. Local officials oversaw tracking buffer systems within their jurisdictions resulting in no centralized tracking system. After the Buffer Law was enacted, state agencies were able to map required buffers, create a statewide buffer database, and to monitor compliance. As of 2019, compliance for public waters is 99.9% and for public ditches it is 99.2% for a combined compliance is 99.8%. The Buffer Law has resulted in significant improvement in buffer implementation, especially for public ditches.

The many benefits of buffers include:

- Capturing non-point source pollutants carried by surface water runoff and removal the excess nitrogen, phosphorus, and other substances that can pollute water bodies;
- stabilizing stream banks and minimizing erosion;
- decreasing the frequency and intensity of flooding and low stream flows;
- preventing sedimentation of waterways;
- providing food and habitat for wildlife of the land, water and air and allowing for wildlife movement within natural corridors; and
- replenishing groundwater and protect associated wetlands.

Filter strips and riparian herbaceous buffers

Xiaoqiang Liu, Food, Agricultural and Biological Engineering, The Ohio State University

3.9 One Stop Shops

Interviewees discussed the need for organizations and programs that offer a single delivery point for a variety of services. We provide two examples below.

3.9.1 Illinois Sustainable Ag Partnership

Sustainable agriculture leaders in Illinois formed the Illinois Sustainable Ag Partnership (ISAP) in 2017 to ensure unified action in meeting the Nutrient Loss Reduction Strategy (NLRS) goals. The collaborative work of ISAP has led to successful education, demonstration, and research programs focused on building the capacity of conservation practitioners to meet the needs of Illinois farmers and advisors as they work to improve the efficiency of their production systems and environmental outcomes. Specifically, ISAP is providing opportunities for landowners to engage in in-field and out-of-field practices. ISAP provides networking and training opportunities for agronomists, researchers, educators, conservation practitioners, and industry partners networks.

3.9.2 Engineering With Nature

For over 10 years, the Army Corps has been researching and studying how their programs can utilize natural processes to sustainably deliver economic, environmental, and social benefits through their Engineering With Nature program. Engineering with Nature provides many resources including example projects, a network for discussion, and a research library. Engineering with Nature works on projects across the United States, with various national partners, as well as collaborates with partners across the world. They are continuing to test new practices and innovations through their "proving grounds" program. Their work has been instrumental in educating the United States Representative and Executive branches on the benefits of nature-based solutions.

Dick Sloan has farmed since 1978, here he shows cover crop rye fields to University of Iowa students.
Iowa Flood Center, University of Iowa

3.10 Streamlining Implementation of Multiple Projects

As noted above (3.1), the administrative burden on individual farmers or communities is a challenge that was mentioned time and again. Techniques that reduce this administrative burden are therefore key to implementing more NBS projects.

3.10.1 Batch and Build

In 2023, the Iowa Department of Agriculture and Land Stewardship (IDALS) began to test an innovative approach designed to get as many water quality practices on the ground as quickly as possible. These projects, referred to as Batch and Build, are designed to support the water quality and soil health goals of the Iowa Nutrient Reduction Strategy (INRS), a statewide effort to assess and reduce nutrients in Iowa's creeks, streams, and rivers.

The Batch and Build model allows for the implementation of a single practice in multiple locations at once. It can save money and time, since dozens of small projects can go through the permitting and design stage at once resulting in back-to-back construction. Not only are projects completed faster, but the streamlined process leads to significant cost savings as grouping projects enables contractors to deploy personnel and resources more effectively. During the three-year pilot phase, 100% cost share is available and all paperwork, including site planning, contractor hiring, government approvals and project funding, is coordinated with a city or county acting as fiscal agent. Although the practices Iowa has focused on are for nutrient reduction, this model could be used as a water retention strategy across the Mississippi River Basin.

3.10.2 Cutting Green Tape Permitting

While not a Mississippi River Basin program, we learned of this through one of the interviewees and as cutting red tape was a common theme this example from outside the basin was included here.

The California Natural Resources Agency (CNRA) launched a state-wide initiative Cutting Green Tape in 2020 designed to increase the pace and scale of environmental restoration and stewardship by streamlining various government processes. The initiative is focused on improving interagency coordination, agency processes, and policies to make restoration activities happen faster and more cost-effectively.

A 2022 report began to outline progress seen through adoption of this initiative. Areas of increased performance fall into four primary areas:

- Improve permitting and regulatory processes to expedite approvals for environmental restoration.
- Clarify and improve the use of California Environmental Quality Act (CEQA) exemptions where appropriate.
- Simplify grant and loan programs to more quickly and cost-effectively deliver projects.
- Enhance communication, coordination, and collaboration across public agencies and non-governmental groups to better deliver restoration.

4.0 Emerging Ideas

During the 50 interviews, seven themes were voiced that are not as actualized as those programs above, but that based on multiple mentions, merit further investigation. These emerging ideas fell into one of two categories. The first, as exemplified by the education category, are general ideas that were provided without reference to a specific program. The second are novel ideas that have yet to show impact but are worthy of monitoring. These emerging ideas are listed below.

4.1 Education

The importance of education was voiced by interviewees as an important tool in the implementation of NBS. Two tacks emerged in these conversations. The first was a focus on educating the public. Interviewees expressed that public opinion often influences their ability to enact a change in practices, such as NBS. By educating the public about the value of nature, organizations can increase critical base-line knowledge leading to further interest in NBS projects. One potential idea is to do this through the public school system, providing students with practical knowledge that they may share with their families and hold onto for a lifetime.

Another idea that surfaced was to work with colleges and universities to improve access to NBS coursework as a strategy for career readiness. Engineering programs often lack courses that support future engineers working within the nature-based solutions space. There are no requirements from the Accreditation Board of Engineering and Technology or the National Council of Examiners for Engineering and Surveying for nature-based solutions to be required in engineering coursework for any degree. Only a handful of professional societies such as the American Society for Civil Engineers have started including the value of NBS and adding educational opportunities for their members.

4.2 Trust and Language

Fostering trust and using language that engages a given audience was noted as a major factor for implementation of NBS, especially when working with the public. Agencies, organizations, and companies that have strong community relationships, prior to introducing nature-based solutions, have the best results. If there is a relationship already established, it can make it easier to use language that resonates with the citizens they are working with. For example, switching from conservation-based wording to agricultural-based wording resulted in a large increase in interest. Creating trusting relationships and talking to the public in a way that resonates with their personal goals is invaluable.

Several interviewees noted that seeing is believing and emphasized the importance of experiencing NBS firsthand. A successful levee setback was put into place in northwest Missouri that led to reduced flooding for the surrounding community. Once this successful project was in place, neighboring communities saw the positive impacts, and are now interested in levee setbacks in their community.

4.3 Insurance

Innovative insurance solutions could improve the financial resilience of communities by protecting governments, businesses, and homeowners from the potentially devastating financial impacts of extreme rainfall events. While this is a relatively new field, there are a few examples being tested in coastal systems. One such example is a partnership between the reinsurance company Swiss Re and The Nature Conservancy, where a reef insurance policy was established to insure a section of the Mesoamerican reef and adjacent beaches along the Yucatan Peninsula in Mexico. The insurance policy was purchased by the State Government's Coastal Zone Management Trust. It was designed to ensure the health of the coral reef, and to reduce flooding damage in coastal communities. The policy was activated in October 2020 following the impacts of Hurricane Delta and resulted in thefirst ever coral reef insurance payment. These funds are being used to help local communities launch restoration actions and accelerate the recovery process following natural disasters.

Wetland installed through the Iowa Watershed Approach located in Middle Cedar Watershed

Iowa Flood Center, University of Iowa

4.4 US Department of Transportation PROTECT Program

The United States Department of Transportation (DOT) received funding for the Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) Program from the Bipartisan Infrastructure Law. The program provides a total of $1.4 billion over 5 years, the most of any NBS program in either the Bipartisan Infrastructure Law (BIL) or Infrastructure Investment and Jobs Act (IIJA). Grants are open to state governments, local governments, federally recognized Tribes, planning and project organizations, and US territories.

Unfortunately, state departments of transportation do not typically have strong relationships with other state agencies that work in this realm. As flooding is becoming more and more of a threat to roadways and public transportation, it could be beneficial to create interagency Memorandum of Understanding (MOU), so that state agencies can work together to protect transportation systems both on land and riverine, and the environment around them. Connecting the US DOT to state DOTs seems to be a promising strategy.

4.5 Marathon to 5k – American Flood Coalition

For many communities, a federal grant can make or break a flood project. But despite the availability of infrastructure funds, most communities have trouble navigating the long, complicated process of federal grant applications. Such a process can deter communities, especially under-resourced ones, from applying altogether. The American Flood Coalition (AFC) compares this long, complex process to a marathon. Rather than pushing communities to finish this race, the federal government should simplify the process altogether, transforming it from a marathon into a more direct 5k. AFC hopes to achieve this goal by working with federal agencies to simplify federal programs and their applications, as well as create clear federal structures communities can easily follow. With these changes, communities will be better positioned to access funding for flood projects and, in turn, be more prepared for the future of stronger storms and more frequent flooding.

4.6 Categorical Exclusions

The National Environmental Policy Act outlines a number of categorical exclusions, e.g., actions that have been determined not to significantly affect the quality of the human environment. Nature-based solutions in some form could be added to categorical exclusions. There may be room for categorical exclusions within other organizations as well, such as exclusions for cost-benefit analyses for certain NBS practices.

5.0 Conclusions

When proposing this project, America's Watershed Initiative staff posited that policy would be emphasized by practitioners in the Mississippi River Basin as a key lever in influencing improved implementation of NBS and/or surface as a barrier to implementation. This hypothesis was based on direct experience in small dam removal work in the eastern United States. Policy changes across several New England states including streamlining of state permitting (including one-stop permitting) and changes to the incentive structure (including enhanced scoring for NBS projects), led to faster project approval and lower costs for removing small privately owned dams. Our hypothesis was further bolstered by conversations with NBS experts, and the extensive policy recommendations proposed by the Council for Environmental Quality in a 2022 paper where policy featured heavily as an accelerator.

Our 50 conversations revealed policy is indeed a barrier to implementation. This was particularly true in respect to the administrative burdens associated with current policies, be it the process of identifying projects, securing funding, funding requirements, or reporting. Some specific recommendations to address these challenges also emerged including examples such as the Iowa Watershed Approach and Nebraska's Natural Resource Districts, where a statewide approach helped bring resources and planning to achieve more rapid and targeted implementation of projects. Iowa's Batch and Build Program that seeks to permit and construct multiple projects concurrently was another idea that could address this obstacle. And while not a Mississippi Basin tool, California's Cutting Green Tape program provides an example of how a statewide approach to streamlining processes could address the administrative burden raised by the interviewees.

Over 100 attendees from five different states visit the Middle Cedar Watershed, Benton CO, Iowa to view flood mitigation practices installed through the Iowa Watershed Approach Program

Iowa Flood Center, University of Iowa

Buffer Strips

University of Missouri, Center for Regenerative Agriculture

Other specific policy recommendations identified included new guidance elevating NBS (see Section 3.4.2 and 3.7.1) in federal programs such as USACE civil works projects and FEMA's BRIC program. We also heard specific recommendations to make levee setback projects simpler to execute by allowing applicants to spend more upfront to ensure lower costs over time as the setback levee is less likely to require frequent repair (Section 3.6). Minnesota's buffer law was also cited as a well-designed and implemented policy that resulted in rapid and extensive compliance (Section 3.8) and a specific policy that could be exported throughout the region. Access to technical resources was also frequently cited as an issue and incorporated throughout the document. These technical challenges include a lack of access to high quality economic and hydrologic models, including forecasting of future climate conditions. Such tools could improve the ability to quantify the benefits of NBS.

In addition to policy levers, the interview process confirmed that there is a suite of additional levers that will need to be applied to ensure acceleration. Interviewees most frequently mentioned education and training. Interviewees believed that more education, whether it be for the public or practitioners, was vital to implement more nature-based solutions. Many of the organizations we talked with, including state agencies, are reliant on public interest to encourage implementation. New practices can be concerning to the public, especially when their livelihoods or property are at potential or perceived risk. Practitioner education and increased workforce training and capacity was also noted as especially important in this fast-growing field with limited institutional knowledge.

It was clear from these 50 conversations that a multifaceted approach that considers not only policy, but other enabling conditions, will be key to advancing NBS across the basin. We also recognize that NBS, even widely deployed, will be insufficient to address the catastrophic floods that have recently impacted the region. While green infrastructure has enormous potential to ameliorate smaller, local flood events, we recognize that pairing green and gray infrastructure can generate more benefits and climate resilience for people and nature than either strategy applied alone. Examination of the potential green-grey matrix of projects across the basin could be a powerful opportunity to protect communities, provide jobs and achieve environmental benefits.

We also recommend further investigation of a Mississippi River Basin strategy that elevates the full suite of levers. A strategy that includes policy, education of the public and our workforce is needed as we move forward to a landscape where we seek to equally prioritize the conservation of nature and the provision of critical services to communities.

Appendix A - Interviewees

Name	Title	State	Email	Organization
Chris Strum	Watershed Program Director	Colorado	chris.sturm@state.co.us	Colorado Water Conservation Board
Christine Davis	Manager Watershed Management Section	Illinois	christine.davis@illinois.gov	Illinois Environmental Protection Agency
Lauren Lurkins	Founder	Illinois	lauren@lurkinsstrategies.com	Lurkins Strategies
Erin Delawalla	Client Solutions Manager	Illinois	edelawalla@res.us	RES
Nicole Chavas	President & COO	Illinois, Wisconsin, Missouri	nicole@greenprintpartners.com	Green Print Partners
Justin McAllister	Regenerative Agriculture Lead	Iowa	Justin.McAllister@bunge.com	Bunge
Harry Huntley	Senior Agriculture Policy Analyst	Iowa	hhuntley@policyinnovation.org	Environmental Policy Innovation Center
Matt Lechtenberg	Water Quality Initiative Coordinator	Iowa	Matthew.Lechtenberg@iowaagriculture.gov	Iowa Department of Agriculture and Land Stewardship
Adam Schneiders	Water Quality Resource Coordinator	Iowa	adam.schnieders@dnr.iowa.gov	Iowa Department of Natural Resources
Catherine DeLong	Water Quality Program Manager	Iowa	crdelong@iastate.edu	Iowa State University
Larry Weber	Hydroscience & Engineering Director	Iowa	larry-weber@uiowa.edu	University of Iowa
Kevin McAlsee	President & CEO	Iowa, Illinois, Indiana	kmcaleese@sandcountyfoundation.org	Sand County Foundation
Ronald Graber	Watershed Specialist	Kansas	rgraber@ksu.edu	Kansas State Extension
John Montgomery	Sector Leader, Water Resources	Kentucky	john.montgomery@stantec.com	Stantec
Shelly Morris	Director of Freshwater Conservation	Kentucky	Mmorris@tnc.org	The Nature Conservancy
Charles Hess	President, Infrastructure and Coastal Restoration	Louisiana	charlie.hess@brownandroot.com	Brown & Root
Hannah Amsterdam	Senior Policy Associate	Louisiana	hannah.amsterdam@tnc.org	The Nature Conservancy
Christopher Dalbom	Director	Louisiana/National	cdalbom@tulane.edu	Tulane Institute on Water Resources Law & Policy
Haley Gentry	Senior Research Fellow	Louisiana/National	hgentry@tulane.edu	Tulane Institute on Water Resources Law & Policy
Kelly McGinnis	Executive Director	Mainstem	kmcginnis@1mississippi.org	Mississippi River Network
Brandt Thorington	Policy Director	Mainstem	bthorington@mrcti.org	Mississippi Rivers and Towns Initiative
Sara Burns	Water Program Specialist	Mainstem (lives in MI)	sburns@ducks.org	Ducks Unlimited
Lori Cox	Citizen Board of MN Water and Soil Resources	Minnesota	rootsreturn@gmail.com	Citizen Board of MN Water and Soil Resources
Nicholas Jordan	Professor of Agronomy & Plant Genetics	Minnesota	jorda020@umn.edu	Forever Green Initative
Peter LaFontaine	Agricultural Policy Manager	Minnesota	plafontaine@fmr.org	Friends of the Mississippi River
Martin Moore	Policy Department Organizer	Minnesota	MMoore@landstewardshipproject.org	Land Stewardship Project

Name	Title	State	Email	Organization
Tom Gile	Resource Conservation Section Manager	Minnesota	tom.gile@state.mn.us	Minnesota Board of Water and Soil Resources
Julie Westerlund	One Watershed, One Plan Coordinator	Minnesota	julie.westerlund@state.mn.us	Minnesota Department of Natural Resources
Brett Olson	Co-Founder	Minnesota	brett@rtcinfo.org	Renewing the Countryside
Amanda Tritinger	Research Hydraulic Engineer	Mississippi	Amanda.S.Tritinger@erdc.dren.mil	Army Corps of Engineers/ Engineering with Nature
Eddie Brauer	Technical Specialist, River Engineering	Missouri	Edward.J.Brauer@usace.army.mil	Army Corps of Engineers/ Engineering with Nature
Matt Vitello	Policy Coordinator	Missouri	Matt.vitello@mdc.mo.gov	Missouri Department of Conservation
Josh Ward	Community Conservation Planner	Missouri	Josh.Ward@mdc.mo.gov	Missouri Department of Conservation
Michal Weller	Surface Water Section Chief	Missouri	michael.weller@dnr.mo.gov	Missouri Department of Natural Resources
Viv Bennett	Director, Land Protection & Strategy	Missouri, Illinois	vbennett@tnc.org	The Nature Conservancy
Mahtaab Bagherzadeh	Senior Program Manager, Mississippi River	Most of MS basin	bagherzadehm@nwf.org	National Wildlife Foundation
Gian Traverse	Associate Strategy Director	National	gian@floodcoalition.org	American Flood Coalition
Yasmine Dyson	Associate Director of Strategic Engagement	National	yasmine@floodcoalition.org	American Flood Coalition
Danielle Bissett	Restoration Permitting Policy Lead	National	dbissett@policyinnovation.org	Environmental Policy Innovation Center
Emily Donahoe	Policy Specialist, Resilient Coasts and Floodplains	National	donahoee@nwf.org	National Wildlife Foundation
Dean Edson	Executive Director	Nebraska	dedson@nrdnet.org	Nebraska Association of Resource Districts
David Crane	Engineering with Nature Riverine Practice Lead	Nebraska	David.J.Crane@usace.army.mil	The US Army Corps of Engineers
Kayla Key	Ecologist	Tennessee	kayla.key@tn.gov	West TN River Basin Authority
Zach Lutrell	Director of Agriculture	Tennessee, Kentucky	Zachary.luttrell@tnc.org	The Nature Conservancy
Claire Lindahl	Chief Executive Officer	Upper Miss	clare.lindahl@swcs.org	Soil and Water Conservation Society
Adam Reimer	Outreach and Evaluation Scientist	Upper Miss, Lower Miss	ReimerA@nwf.org	National Wildlife Foundation
Kata Young	Natural Climate Solutions Manager	Wisconsin	kyoung@cleanwisconsin.org	Clean Wisconsin
Meg Kelly	Director, Illinois Coastal Management Program	Illinois	Meg.Kelly@illinois.gov	Space to Grow / Department of Natural Resources
Ken Geskow	Professor, Water Resource Specialist	Wisconsin	kgenskow@wisc.edu	University of Wisconsin Madison
Matt Claucherty	Water Resource Management Specialist	Wisconsin	Matthew.Claucherty@wisconsin.gov	Wisconsin Department of Natural Resources

Appendix B

During the one-on-one interviews, the following questions were explored. Relevant, follow-up questions were asked based on interviewee responses. Questions varied depending on the how the interviewee was engaged in NBS; one set of questions was designed for implementers and a second set of questions was designed for policy advocates and grant funders.

Implementers:

- Describe your organization and role
- Describe the projects you are involved in that utilize nature-based solutions (NBS)
- Were there any policy barriers you encountered on this project?
- Were there any policy incentives that affected your organization's ability or willingness to complete this project?
- What type of policy incentives related to NBS have you seen that are beneficial to implementation?
- What policy barriers have you seen? You can include outdated policy, inadequate incentives, etc.
- What do you see as the greatest hurdles to accelerating NBS projects?

Policy advocates/grant funders:

- Describe your organization and role?
- What types of incentives for NBS have you seen work best?
- What challenges do people have accessing these incentives?
- What incentives have not worked well?
- What policy barriers have you seen? You can include outdated policy, inadequate incentives, etc.
- What do you see as the greatest hurdles to accelerating NBS projects?

Oxbow Experiment installed in the Middle Cedar Watershed

Iowa Flood Center, University of Iowa

Appendix C - Workshop on Multi-Benefit Conservation Practices

The Upper Mississippi River Basin Association held a workshop in Wisconsin on October 3-4, 2023 on multi-benefit conservation practices (also known as nature-based solutions or NBS). America's Watershed Initiative led an activity in which participants discussed policy barriers and incentives related to these practices. Participants wrote down on post-it notes their ideas and concerns related to NBS policy. Below is a summary of the takeaways from the meeting along with a color coded list of post-it note transcriptions.

Summary:

We must first understand the legislative and permitting barriers that are in place. We can then remove barriers, streamline permitting, review and update policy that is already in place, discard outdated policy, and introduce flexible and innovative alternatives that align with current needs. When writing new policy, we need to ensure that it is based in science and recognize policy development impacts at multiple scales. Policy should be written with a bottom up approach in order to hear the voices of those on the ground making it happen. These changes will help make NBS more accessible and successful.

One way we can ensure the success of NBS projects is to use completed projects as examples both for what worked well and where we can improve. There is value in creating a flexible process as each project will differ based on the location, community needs, technology available, etc. As new technology develops and becomes widely available it is important to consider its role and how it may benefit projects.

NBS policy incentives could include direct incentives for farmers, as well as incentives targeted toward broader markets. One creative solution suggested is to create policy that affects the market of sustainably grown commodities. Another is to regulate the food companies to require sustainable nutrient farming. When making sweeping regulation like that though, we must take into account impacts at multiple scales including the concerns of and risks to farmers. One way we can ease the risk for farmers is to provide grants and ensure that they are reasonable to acquire and can come from more than one agency. Building trust with those on the ground doing the work is essential to understanding the situation thoroughly and creating policy that works.

Category	Note
Streamlined Permitting	Reduce Red Tape - Associated with participation in conservation programs
	Streamlined Permitting - 404/401, floodplain, cultural resources
	Streamlined Permitting
	Streamlined Permitting
Flexibility and Adaptability in Policy	Don't wait for perfection before rolling out flexible policies that can be adjusted quickly when needed
	Don't be limited by tradition
	Support Innovation - E.g. rely coupling
	Flexible rules to tailor for implementation needs
	More flexible options for permit compliance - WQ credit training
	Permit flexibility when outcomes are beneficial for wetlands and waterways
	Ensure flexibility to choose what works best and where
	Create flexible policies and standards - GAPs evaluation, NRCS standards
	Broader eligibility for urban-rural relationships
	Avoid prescribing how and instead allow innovation and adaption
	Adapt with new tech, learn from traditional ways but don't stay stuck in the way we have always done it
	Replicate Programs that have shown success - Implementation of practices on new acres/in other states or regions
	Organize to support good examples and why they are working (ie defining the prob)
	Advance the adoption of new technical standards and retire existing standards at a faster rate
	Use data and individual experience from successful projects or programs to drive and generate more participation and/or policy and programming
Relationship Development/ Capacity	Build partner trust which will be less needed for restrictive policy
	Encourage and Equip farm leaders
	Ensuring participation and involvement of all partners benefiting from a given practice
	Non-ask contacts - Relationship development
	Increased engagement with stakeholders for policy creation
	Understanding and appreciating risk to farmers while also addressing perceived and real risks
	More Boots on the Ground
	Need Capacity - Financial, Human
	Engineering - quicker plan turnaround, more of them
	Diversifying job approval authority in more than one agency
Financial	Create incentives for MBCP projects
	Ensure market based and incentive driven
	Access to federal conservation funding in more than one agency
	Address the barrier: length/timing of fed funding process - Streamline and simplify
	Making processes like grant applications move
	Allow Stacking
	Use SRF and 319 funds to support equipment and management change
Large Scale Regulation	Improve markets for commodity crops grown with conservation practices
	Required sustainability for food companies - As opposed to regulating farmers directly
	Regulate cooperatives to require nutrient management
	Change farm bill to support conservation practices
Trust and Language	Consistency is invaluable
	Comprehensive arguments
	Different interpretations cause confusion and unrest w/ stake holders and professionals causing reduced conservation practices
	Shared language, shared metrics
Other	Ensure science based
	Adaptive management concepts vs trading
	Support bottom-up policy options rather than always being top-down
	Bottom-up instead of top-down - scale
	Recognize policy development impacts at multiple scales