

South Dakota
Water Resources
Institute



WATER IN SOUTH DAKOTA

STAKEHOLDER GUIDED STRATEGIES FOR MOVING FORWARD

The 2017 Eastern South Dakota Water Conference included a stakeholder working session that resulted in over 350 comments. This paper reflects the challenges, goals and action items pertaining to South Dakota's water resources as identified by the state's diverse stakeholders.



**SOUTH DAKOTA
STATE UNIVERSITY**

INTRODUCTION



WATER QUALITY

Poor water quality is a critical issue facing South Dakota resulting in a substantial number of impaired water bodies. Nearly 80 percent of South Dakota's assessed lakes, rivers and streams are impaired, meaning that the measured value for a particular contaminant falls outside the acceptable standard for environmental or human health. Many of these impairments are likely caused by non-point sources such as agriculture, municipal stormwater or other urban-related runoff and wildlife.



A CHALLENGING PROBLEM

Non-point source (NPS) pollution results from many sources distributed across the landscape, making it difficult to identify the origin, measure its impact and treat the affected water. The diffused nature also results in many contributors to NPS pollution. From urban populations that fertilize their lawns or contribute pet waste to agricultural producers that fertilize fields or raise livestock, many water resource stakeholders contribute to water quality issues at some scale.

Another challenge related to addressing NPS pollution is the inconsistency in risk. NPS is influenced by many variables such as the time of year, weather, location relative to a waterbody and management practices. This can result in unexpected results related to water quality such as contaminant concentrations that continue to increase within a watershed despite the implementation of management practices. Societal and economic barriers further complicate the adoption of practices to reduce NPS pollution impacts on water bodies. For example, a NPS pollutant contributor may view their impact on water resources as minimal or the implementation of pollutant reduction practices beyond their economic means, which prevents action.



TARGETING A SOLUTION

Due to the distribution of pollution across many contributors as well as the inconsistency in spatial risk, there is a need for widespread, targeted adoption to see watershed-scale improvements in South Dakota's surface water quality. However, the majority of policies addressing non-point source pollution involve the assisted voluntary implementation of management practices, which often result in piecemeal "random acts of conservation" rather than a cohesive, targeted approach to address the watershed as a whole.

The South Dakota Water Resources Institute (S.D. WRI) at South Dakota State University provides leadership on evolving water concerns and problems being faced by South Dakota citizens through research, educational opportunities for students and professionals, and community outreach. To address issues related to South Dakota's water quality, the S.D. WRI hosted a stakeholder working conference in November 2017. The goal of the conference was to outline opportunities and actions that could be taken to sustain and improve our water resources in South Dakota. During the afternoon session, a set of questions were provided to the participants to guide discussions (Page 3) where four major themes were identified to substantially improve water quality in South Dakota:

1. Standards, regulations and policy;
2. Public awareness and communication;
3. Collaboration and partnerships; and
4. Funding.

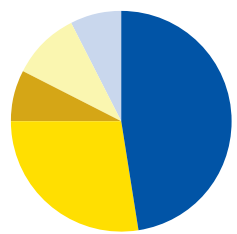
This publication summarizes over 350 stakeholder comments addressing the water quality challenges, goals and action items for South Dakota that were highlighted by participants of the 2017 working conference.

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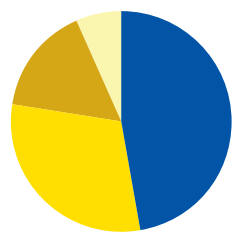


2017 EASTERN SOUTH DAKOTA WATER CONFERENCE WORKING SESSION PARTICIPANT QUESTIONS

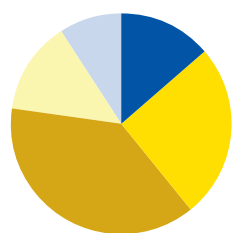
1 What do you see as the biggest challenges facing South Dakota surface and groundwater resources today?



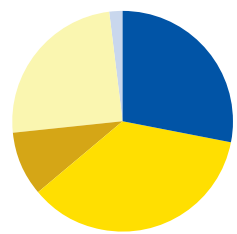
2 Based on the challenges identified by either your table or the conference workgroup, what do you think are realistic goals for water resource improvement in South Dakota? What do you think success would look like?



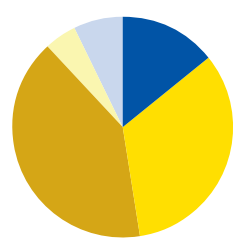
3 What are some examples of current efforts designed to address South Dakota's water resource challenges? In light of these ongoing efforts, what additional measures could be taken to meet the realistic goals that you identified earlier?



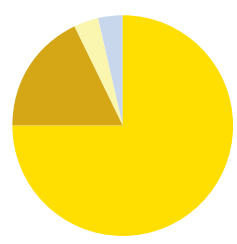
4 What are some of the challenges faced by existing efforts?



5 What are examples of action items that might be taken as individuals and as a group to improve water resources in South Dakota?



6 What ways do you think we could better engage and inform the public on water resource issues in South Dakota?



GRAPH KEY

Percent of responses related to each category

- Standards, Regulations and Policy
- Public Awareness and Communication
- Collaboration and Partnerships
- Funding
- Other

STANDARDS, REGULATIONS AND POLICY

Participants in the Eastern South Dakota Water Conference working session identified standards, regulations and policy as the No. 1 challenge facing South Dakota's water resources, with over 25 percent of the comments related to this topic.

Standards

Standards are used to measure and maintain a level of water quality consistent with its designated use. However, as research produces a more complete understanding of a pollutant's impacts, a simplified method is needed to update the standards, reflecting the updated state of the science. For example, most emerging contaminants (e.g. many pesticides, antibiotics and hormones) do not currently have environmental standards, but standards may be required as more scientific evidence about their environmental impact is gathered. After standards have been developed or updated, complementary water quality goals can be set.

Public and governmental agencies have employed a number of methods to achieve water quality standards and goals, including regulated mandatory action, incentivized voluntary action and non-incentivized voluntary action. Water pollution is divided into two categories, (1) point sources, which include a known point of pollution (e.g. pipe, wastewater treatment plant outfall and industrial outfall) and (2) non-point sources (NPS), which include sources that are diffused across the landscape (e.g. urban storm runoff and agricultural runoff). The passage of the Clean Water Act in 1972 provided the basic structure for regulating and setting standards concerning point source discharges. While regulation has been used for achieving improved water quality for point sources, voluntary action is more commonly used to address NPS pollution.

Regulations

Achieving significant voluntary action to improve water quality is challenging and, therefore, a common response is the desire to create mandatory regulation. While mandatory regulations have been effective at improving point source water quality, additional considerations must be made when using this method to manage NPS pollution.

"Current federal programs are rigid, resulting in the inability to experiment with new methods to improve water quality, account for site specific variables and account for weather variation."

For one, current federal programs are rigid, resulting in the inability to experiment with new methods of improving water quality, account for site specific variables and account for weather variation. Another issue with mandatory regulations is determining which variables to regulate. Many emerging contaminants lack enough information to determine an appropriate environmental regulatory limit; however, these contaminants, including pesticides, are of growing concern to many stakeholders. As we gain knowledge regarding the impact of contaminant concentration on human and environmental health, regulations need to be

updated. Changing current regulations are time intensive, thus a simplified pathway for regulatory change as we gain knowledge will be key. As regulations are updated, it is important that environmental standards are realistic and appropriate, reflect the state of the science, reflect the natural conditions and are delineated by watershed boundaries as opposed to political boundaries.

In addition, the time and resources required for monitoring, permitting, sample analysis and other associated tasks to hold NPS contributors accountable would be substantial. Quantifying pollutants from all NPS contributors in South Dakota would require assessing over 300,000 households and over 30,000 farms or ranches in addition to municipalities, parks, etc., making the financial and personnel commitment impractical with the resources currently allocated to environmental quality in the state. Without the flexibility to address site specific variables, the opportunity for adaptive management and the ability to monitor and enforce NPS pollution, questions remain regarding the ability for water quality to be sufficiently improved by mandatory regulation.

Many stakeholders want to avoid regulations, making regulations politically challenging. However, as regional and national issues come to the forefront, such as the dead zone in the Gulf of Mexico, more pressure is placed on regulating upstream NPS contributors. While changes must be made to improve water quality, stakeholders may be able to avoid regulation by being proactive and taking voluntary action.

Policy

To motivate the adoption of management practices that improve water quality, NPS contributors must be made aware of both the wider water quality issues and their personal contribution. Multiple entities (e.g. commercial developments and municipalities) and individual landowners need to implement best management practices (BMPs) to achieve significant water quality improvements. BMPs are management practices that beneficially impact environmental health. Implementing BMPs is the primary mechanism used to prevent or mitigate NPS pollution and achieve water quality goals.

Policy can provide a means of incentivization for implementing BMPs that reduce NPS pollution. Financial incentivization is a common practice used to encourage adoption. With the predominance of agricultural land in many South Dakota watersheds, the majority of BMP incentivization occurs through programs focused on agricultural production including federal programs such as the USDA Conservation Reserve Program, the Conservation Stewardship Program and the Environmental Quality Incentives Program; as well as local programs, such as the Seasonal Riparian Area Management program. While these programs are voluntary, the incentives can be tied to rigid policy allowing for only proven BMPs to be added or require a management practice to be implemented even when it is not appropriate. For example, producers can apply for financial incentives to plant a cover crop,



but the program is inflexible to account for inadequate soil moisture, which results in the failure of the cover crop with no conservation benefit realized. Allowing for more control and decision-making at the local level as conditions present themselves is one way to potentially improve program participation. Another challenge with voluntary programs is how to implement BMPs in a systematic way, where they will provide the largest benefit. Most programs provide equal incentives despite site specific variables that impact NPS contributions to waterways, such as proximity and soil type. Thus, adoption occurs with willing producers rather than producers who have the largest impact. Tiered incentives are one method to provide greater motivation, through greater payouts, for the adoption of BMPs to producers who have sites that are the most vulnerable to NPS pollution.

Voluntary BMP adoption without financial incentivization is challenging as the NPS contributor is responsible for all costs associated with the practice. The adopted BMPs must be economically and environmentally sustainable to effectively use this method. The main benefit of nonincentivized, voluntary adoption is the ability to tailor a program to the individual NPS contributor. Stakeholders can draw upon many publically available resources, including extension and agency personnel, for assistance with planning and design of BMPs that are appropriate for their site specific conditions; however, more information is needed on the economics of each BMP for more incentivization and better, more informed decision making.

While the challenges with regulation, standards and policy remain, the widespread adoption of BMPs is critical to achieving improved water quality in South Dakota. With this in mind, stakeholders identified a goal that 50 percent of agricultural producers adopt management practices that improve environmental quality. Though it is difficult to achieve BMP adoption, three approaches that may improve adoption rates are accreditation, tiered incentivization and a Nutrient Reduction Strategy.

Accreditation programs have been proven effective in other areas. For example, the Sustainable Agricultural Network and the Rainforest Alliance have jointly created a certification program for sustainable agricultural practices and found more employment of sustainable practices, improved water quality and economic benefits for participants through improved yields. Though it is not a BMP practice in the traditional sense,

holistic farm conservation plans that improve soil health and build soil carbon could also substantially contribute to reduced NPS pollution while simultaneously providing economic benefits to producers. Multiple stakeholder groups have made progress on this front through South Dakota's Every Acre Counts Program, which is a working lands initiative designed to demonstrate and educate producers on alternative management practices for marginal lands that result in improved economic return, soil health and water quality.

The second strategy is to provide tiered incentives, which would target producers at the greatest risk of contributing NPS pollution to waterways (e.g. proximity to waterways) and offer a higher incentive as compared to those with lesser NPS pollution risk.

"... holistic farm conservation plans that improve soil health and build soil carbon could also substantially contribute to reduced NPS pollution while simultaneously providing economic benefits to producers."

Lastly, South Dakota would benefit from an integrated, state-wide Nutrient Reduction Strategy. A S.D. Nutrient Reduction Strategy would be a voluntary comprehensive plan designed to monitor, assess and reduce the nutrients, primarily nitrogen and phosphorus, delivered to South Dakota's waterways. Reducing nutrient loading to waterways will reduce treatment costs for drinking water and decrease occurrences of algal blooms, which impact recreation as well as human and animal health. This strategy would be developed to coordinate and focus efforts, recommend specific BMPs known to reduce NPS pollution, direct effective spending of the state's limited financial resources, and support the research and development of new approaches.

Voluntary implementation can only be effective if a sufficient number of individuals implement practices. The need to increase voluntary efforts, both rural and urban, is key to improving South Dakota's water resources.



PUBLIC AWARENESS AND COMMUNICATION

Addressing NPS pollution is challenging due to the diffused nature of the sources and, consequently, achieving the desired water quality goals are difficult. To effect change, stakeholders must progress from awareness to acceptance to action. Awareness includes knowledge about the problem, the environmental and human impact, solutions to the problem and opportunities or resources available that assist NPS contributors with implementing solutions. Acceptance and action are decided by the individual stakeholder. Acceptance includes both the understanding that there is a problem and acknowledging that you are a part of the problem. Water professionals can play a significant role in this process by providing decision makers with unbiased information as well as assisting with decisions and encouraging action through decision tools, providing scientific evidence for economic benefits and conveying existing opportunities, such as those for funding. Ultimately, though, it is up to the stakeholder to choose action over apathy.

Existing Programs

A number of programs exist in South Dakota to educate the public. Many of these efforts use a “learn by doing” approach by involving stakeholders in citizen science. Two examples include the East Dakota Water Development District’s Water Watch program and the Community Collaborative Rain, Hail

and Snow Network (CoCoRaHS). The Water Watch program trains citizen volunteers to gather water quality information on lakes, streams and wetlands to help fill data gaps while CoCoRaHS uses citizens to report on weather conditions, providing higher resolution weather data. Volunteers involved in citizen science programs gain a deeper understanding of human impacts first hand, providing them a greater appreciation for their local water sources. Training provided to the volunteers gives them an understanding of the implications of the information they gather and the efforts required for water quality monitoring.

Other programs, such as educational workshops, demonstrations and field days, are provided by state extension, agencies and industry to inform stakeholders about a variety of water-related topics from soil health to edge of field BMP water treatment systems.

There has also been an emphasis on youth water programming in the state to educate the next generation, including organized events and programs. Engaging South Dakota’s future leaders is critical and additional support for expanded efforts is needed to successfully increase knowledge and encourage behavior change (e.g. more BMP adoption). Additional efforts could include curriculum development, interactive tools and teacher education.

“Since public education and awareness is such an important first step in transforming water quality within the state, focus and resources must be directed toward this effort, including data gathering, processing and publication. In a state with limited financial resources, collaborative partnerships may further opportunities for stakeholders to raise public awareness of our water quality issues and initiate a call to action.”

Communication Gaps

Despite the success of current efforts and the wealth of water information, gaps remain in transferring information to the public. With a large portion of the state devoted to agricultural production, it is easy for stakeholders to focus on agriculture when considering NPS contributions; however, NPS pollution comes from both rural and urban environments. Public awareness efforts should span the spectrum from potential residential, municipal, industrial, agricultural and natural sources. This will provide stakeholders with an understanding of how they, as an individual, can contribute to NPS pollution with the goal to inspire action and reduce accusational tendencies. Education on individual NPS contributions would help turn the focus to what the stakeholder can do to improve water resources. However, support is required for additional programming to assist stakeholders in overcoming barriers that prevent them from implementing practices designed to improve water quality.

Current educational programming would also benefit from additional efforts on the ecological and human health impacts of various contaminants. For example, excess nutrients can result in algal blooms, some of which can release toxins (harmful algal blooms) and impact the ecological health of the waterbody as well as human and animal health. Understanding the system on a wider scale, including what is considered excess for a particular contaminant, the ecological and human impacts of excess contaminants, water treatment methods to remove contaminants and drinking water sources and their quality is important so stakeholders understand the implications of impaired waters.

Programming Methods

There are two methods of educational programming, passive and active. Passive programming includes signage to help stakeholders understand locally relevant information. Posted information might include background information about water processes (e.g. the water cycle, water treatment and ecological processes) as well as BMPs (e.g. saturated buffers, rain gardens, rain water harvesting and bioreactors). Active programming includes interaction between an educator and stakeholders. In addition to traditional efforts, such as workshops and field days, the “train the trainer” educational method has been gaining interest. In this education style, extension or agency personnel train professionals who interact regularly with the target audience. One example is to provide training to agronomists on best practices for improved water quality. This creates a wider network of educators who interact with the target audience in a different way.

Educating different groups of stakeholders is important but challenging due to different backgrounds and objectives that require different programming methodologies. For one, many groups, including congressional representatives, do not have formal backgrounds in water resources, but need clear, science based information to develop and implement scientifically-based water policy. Another issue is communicating with stakeholders from different generations. While there are many opportunities to use electronic means to communicate the water resource message, a significant portion of stakeholders may be excluded if this is the only means of communication.

Communication Challenges

In addition to programming challenges, data availability and interpretation for the public is a critical area for improved communication between water professionals and stakeholders; however, putting the data into context is labor intensive. Data processing, quality assurance/quality control and the digitization of metadata (the information describing the data such as location and method of analysis) require substantial resources. In addition, the raw data does not communicate the entire story; spatial and temporal trends, exceedance rates and impacts of land use or management change all require additional processing. Instead, summarizing the data in a series of interactive maps and graphs with associated contextual information would provide a clearer picture of South Dakota’s water resources to stakeholders. These interactive maps and graphs could also be used to translate the integrated report into a more easily understandable format. S.D. DENR has recently improved access to water quality data through the DENR Water Quality Monitoring Access Portal, an online interactive map that is publicly available to interested stakeholders. To expand on these efforts, DENR may consider incorporating data from other entities to increase temporal and spatial distribution. Additional steps could include further interpretation of results for public understanding such as desired targets.

As stakeholders gain understanding of the problem and their impact, they also need the means to act on this knowledge. While there is financial assistance available for individuals to implement BMPs, central databases for information, such as funding opportunities, are difficult to find or do not exist. Assistance programs for management-practice implementation are spread across several entities, including DENR, NRCS and nonprofit organizations. A one-stop shop should improve efficiency, elevate public awareness of lesser-known opportunities and increase applications.

Finally, stakeholders would benefit from knowing how their actions are impacting water quality, which requires communicating water quality information to users in real time. Access to data that is easily understood can increase awareness of local water quality issues. For real time, or near-real time communication to occur, resources must be committed to data collection, processing and publication.

Since public education and awareness is such an important first step in transforming water quality within the state, focus and resources must be directed toward this effort, including data gathering, processing and publication. In a state with limited financial resources, collaborative partnerships may further opportunities for stakeholders to raise public awareness of our water quality issues and initiate a call to action. Greater connectivity is needed between researchers, agencies, project leaders and outreach personnel to create a network of awareness within the professional water community of efforts and information that is currently available. Some strong partnerships exist within the state for information dissemination, such as the NRCS and the Soil Health Coalition. The state can use these partnerships as models to continue to develop and strengthen partnerships within South Dakota with specific water quality objectives.



COLLABORATIONS AND PARTNERSHIPS

The resources required to address the number and degree of water-related issues in South Dakota are significantly greater than those currently available. Strategic collaboration and partnerships can serve to increase resource efficiency, resource impact and public awareness of water quality. During the 2017 Eastern South Dakota Water Conference, stakeholders emphasized three partnership opportunities: public education; data collection, management and sharing; and leveraging funds for mutual gain.

Educational Partnerships

While many entities have educational programs, additional collaborations between groups can expand the capabilities and reach of existing work. Partnering with groups that have positive, close working relationships with potential NPS contributors could improve awareness of their impact, methods of reduction and assist with linking concerned NPS contributors with potential funding opportunities for BMP implementation. Commodity groups are one example of an entity that has a close relationship with potential NPS contributors, in this case agricultural producers. The Iowa Soybean Association, for instance, partnered with producers to collect over 2,500 water samples from over 300 locations, analyze them for nitrates and provide a report of the results, making producers aware of their nitrate contributions. Taking a similar approach in South Dakota and partnering with groups that have close relationships with potential NPS contributors will expand connections with people who are currently engaged in water resource issues to those who are cautious, doubtful or disengaged. Establishing these relationships have begun. For instance, SDSU Extension and Dakota Rural Action partnered to educate residential

homeowners on rain gardens and urban NPS pollution. This expanded stakeholder engagement by connecting a previously underserved audience with information and experience from subject matter experts.

Data Collection

Additional partnerships can be developed for data collection, data management and making the data publicly available. All three of these activities are resource intensive, both monetarily and in terms of personnel time. Collecting and processing samples is costly, particularly when multiple parameters are analyzed with high spatial and temporal frequency. Perhaps more than the financial limitations of sample processing, the available personnel time limits water quality data. Substantial time is required for collection, quality assurance/quality control of the data, data analysis, recording appropriate metadata and distilling all the data into publicly available resources that are easily understood by the general public, such as interactive water quality maps and graphs.

“By seeking collaborative opportunities, water resource personnel can create a more efficient data cycle and avoid duplicate efforts.”

To maximize both monetary and personnel resources, sharing information is essential. Information about when water samples are being collected, where water samples are being collected and what parameters are being measured



will provide opportunities for data synchronization between groups. For example, instead of two entities sampling from the same location for two different parameters, one entity could sample the location and analyze for both parameters, reducing the personnel cost and helping to determine links between the parameters by having more parameters evaluated at the same time. Combining data from various entities will provide more information by increased spatial resolution, temporal resolution or number of parameters evaluated at a single location. Sharing data as well as what does and does not work will help improve understanding of water issues, resulting in more informed decisions.

Partnerships Across Diverse Groups

Though partnerships have many advantages, some considerations are needed. Bringing together groups with opposing views can be a challenge, but cooperation and compromise to achieve a common goal could bring about substantial gains. An example of diverse groups working together include NRCS, Pheasants Forever, South Dakota State University and South Dakota Corn who all support soil health and are using their combined resources to tackle several water-related issues including salinity resulting from elevated water tables in some areas of the state. While their priorities may differ, these groups have found common cause by promoting and advocating the principles of soil health, which ultimately impacts our waterways. Regular meetings between entities (e.g. producers, researchers, agencies, industry) to discuss current issues each are facing and available resources to address them would keep lines of communication open and spread awareness within the water

community of emerging issues, findings and needs. Integrating periodic working sessions into the Eastern South Dakota Water Conference is one way to facilitate these discussions.

An advisory council can be a means of providing leadership regarding state water matters. Stakeholder comments were made advocating for the formation of such a group. It is recommended by the authors to utilize the existing resources and work with the South Dakota Nonpoint Source Task Force (NPSTF) as a foundation to develop a state advisory council on water related issues. The South Dakota NPSTF is a group of over 20 agencies and interest groups whose primary role is to make recommendations for funding allocations through Section 319 of the Clean Water Act. The NPSTF, or a NPSTF subcommittee, would provide an ideal platform to facilitate the prioritization of water issues within the state, increasing awareness among their constituents, the promotion of collaborations both within and outside the task force, documenting existing efforts, communicating funding opportunities, publicizing success stories, and providing insight and background material regarding water issues to legislative decision makers.

Not only can these partnerships increase awareness, but they can also be used to collect data providing information on baseline conditions, management practice efficiency and pinpointing areas of concern. Though partnerships will assist with leveraging current resources, more monetary and personnel resources will be required to combine and analyze existing data, fill the gaps in information and create public resources.



FUNDING

Regular monitoring of our water resources for bacteria, heavy metals and other hazards is important to protect public and environmental health as well as providing a means to alert authorities to potential issues before they become crises. Public health, animal health and ecosystem services are all impacted by the quality of water they encounter. Understanding water quality and its impact can help us assess and predict risks, thus maintaining healthy populations and environments. However, assessing water quality trends requires large temporal and spatial datasets; insufficient funding and personnel limits the ability to adequately determine how water quality is changing through time and space, resulting in data gaps that can hinder our ability to identify both trends and potential risks.

Funding for Proactive Water Management

To achieve adequate spatial and temporal data resolution, funding is required to process additional samples as well as hire personnel or fund personnel time to collect samples, manage the data and analyze the data. The majority of funds for South Dakota's surface and groundwater monitoring networks come from federal agencies, primarily the U.S. EPA. Currently there is pressure to reduce federal funding for environmental programs, so to maintain and expand monitoring, additional funding will need to come from within the state of South Dakota. Additional data will provide the baseline to better understand South Dakota's water quality trends (e.g. nitrate concentrations in tile drainage water)

by filling the gaps in space and time that currently exist. In addition, researchers and water resource personnel can use these data to:

1. Develop tools for risk assessments,
2. Evaluate the impact of current management practices,
3. Develop new management practices for improved water quality,
4. Develop a strategy to improve water quality, and
5. Predict the impacts of changing management practices and climate extremes on water resources.

Additional data and personnel can also be used to develop interactive educational materials for greater public understanding and awareness.

“Ultimately, the expanded dataset and additional personnel allows for rapid response to potential hazards and proactive management of our water quality within South Dakota.”

POSSIBLE FUTURE FUNDING MECHANISMS INCLUDE:

- 1** A dedicated state funding source for water quality improvements by reviewing the S.D. Lottery proceeds directed to the Water and Environment Fund.
- 2** Industry and utility funding for watershed improvements, particularly large users of water and entities that impact water quality.
- 3** An additional funding stream for hunting access that would pay for habitat enhancement on private lands.
- 4** Expanding the fertilizer fee to include all fertilizers and dedicating some of the funds to priority monitoring areas related to nutrients identified by a water task force.

Funding Solutions

As we gain understanding of the current state of water quality and the effectiveness of BMPs through additional monitoring, we can target implementation by type, position within the landscape and number of BMPs needed to achieve the water quality standard. Perceived and actual financial barriers must be removed to make adoption economically feasible. To assist with adoption, more detailed documentation of the economic benefits of BMPs must be completed. This will help producers accept BMP implementation at the optimal incentive rate. The optimal incentive rate would provide enough economic incentive for producer participation without providing excess funds.

Unique programming options can reduce the optimal funding rate, such as the Seasonal Riparian Area Management (SRAM) program. The City of Sioux Falls has provided financial assistance for producers to create a buffer along streams, but the program allows for haying during the summer season and grazing during winter months. Since the producers still maintain some use of the land, they do not require as much financial assistance as they would taking land completely out of production. This results in lower payments than CRP and more producers enrolled in the program with the same amount of money. Federal conservation incentive programs including CRP and EQIP are largely dependent on decisions made in the farm bill. The number of acres that gets allocated for funding may or may not meet the need of a watershed. Determining economic return or economic efficiency for each BMP allows

available funds to have a greater impact and reduces the uncertainty present in federal funding decisions.

Who pays for providing clean water and monitoring our waterways is a commonly asked question. Currently, much of the state's monitoring network and incentive programs for BMP adoption are funded by state and federal agencies, such as the U.S. EPA and USDA. An expanded constellation of funding mechanisms will be needed to achieve the water quality goals within the state. Water resources are used by all, so one suggested method to expand funding is for the consumer or public to invest in South Dakota's water resources. For example, cities that deal with flooding issues spend a significant amount for flood mitigation in the city center. Additional opportunities for flood mitigation could be explored upstream through investments in soil health (increased water holding capacity) or water storage structures (wetland areas or retention ponds) to reduce overall runoff, which in turn could reduce flow volume in the city center.

Finally, stakeholders must be involved in helping guide funding decisions. Water issues affect and are affected by many groups with different viewpoints. To embrace a watershed approach, South Dakota stakeholders should be at the table when discussing water decisions. One way to accomplish this is through an expanded NPS task force who could assist with identifying and prioritizing current gaps in research, monitoring, education and resources as well as promoting funding opportunities through a central location.



SUMMARY

Maintaining and improving South Dakota's water resources is not a simple task. However, it is apparent through the 2017 Eastern S.D. Water Conference that the stakeholders of South Dakota are prepared to engage with each other in a more constructive capacity through some of the expanded efforts discussed in this paper. Based on stakeholder guidance, there were three overarching objectives that the authors propose for the state of South Dakota: (1) use the existing S.D. Non-point Source Task Force as a foundation to establish a statewide steering group to guide and promote water quality; (2) create a comprehensive nutrient reduction strategy; and (3) fund and commit additional personnel to expand research, monitoring, data analysis and increase public awareness and education programming on water quality issues.

The South Dakota Non-point Source Task Force is a diverse collection of over 20 stakeholder groups that can leverage their influence to be leaders for improved water quality in South Dakota, initiate a call to action and facilitate change. It is recommended that the NPSTF explores and promotes partnership opportunities to expand capabilities for public education; data collection, management and sharing; and leveraging funds for mutual gain. Finally, the task force can serve as the bridge between research, education and policy to work with decision makers and influencers to understand water quality and its impacts.

Part of the task force's expanded role could include facilitating discussion on the development of a nutrient reduction strategy for South Dakota. A nutrient reduction strategy provides a goal and roadmap to maintain nutrient levels at acceptable levels in South Dakota lakes and streams. This strategy would coordinate and focus efforts, recommend specific BMPs known to reduce NPS pollution, direct effective spending, and support the research and development of new approaches.

Additional suggestions made by stakeholders during the conference for consideration include:

1. Allowing more control and decision-making at the local level as conditions present themselves,
2. Providing tiered incentives for adoption of BMPs, with the greatest payouts going to sites that are the most vulnerable to NPS pollution,
3. Considering an accreditation program to improve BMP adoption rates and public relations.

Lastly, it is recommended that the appointment of additional personnel along with additional funding be considered. A prudent workforce expansion would increase the capacity to gather and process adequate spatial and temporal water quality data. It is important to establish baseline water quality data to determine where efforts should be focused and how much improvement is being made. Additional personnel is required to achieve this. The increased capacity to summarize the data for public consumption would also be a priority. Additional personnel could also be used as a liaison when developing the collaborations and partnerships needed to support and promote water quality improvements through BMP adoption rates.

The S.D. Water Resources Institute would like to thank all the stakeholders that took part in the 2017 Eastern S.D. Water Working Group Conference. We sincerely appreciate all of the comments that were received and believe this paper reflects those ideas and conversations. We hope that this paper will act as a springboard to continue those conversations needed to improve the condition of our water resources in South Dakota.

Dr. Rachel McDaniel

Dr. John McMaine

Mr. David Kringen



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