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OPEN RIVERS : RETHINKING WATER, PLACE & COMMUNITY

COMMITMENT

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An interdisciplinary journal of public scholarship rethinking water, place & community from multiple perspectives within and beyond the academy.

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The cover image of Asin-badakide-ziibi, the Baptism River, is courtesy of M. Baxley, Bear Witness Media.

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Editorial Board

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FEATURE

ON THE PHYSICALITY OF HOPE

By Joanne Richardson

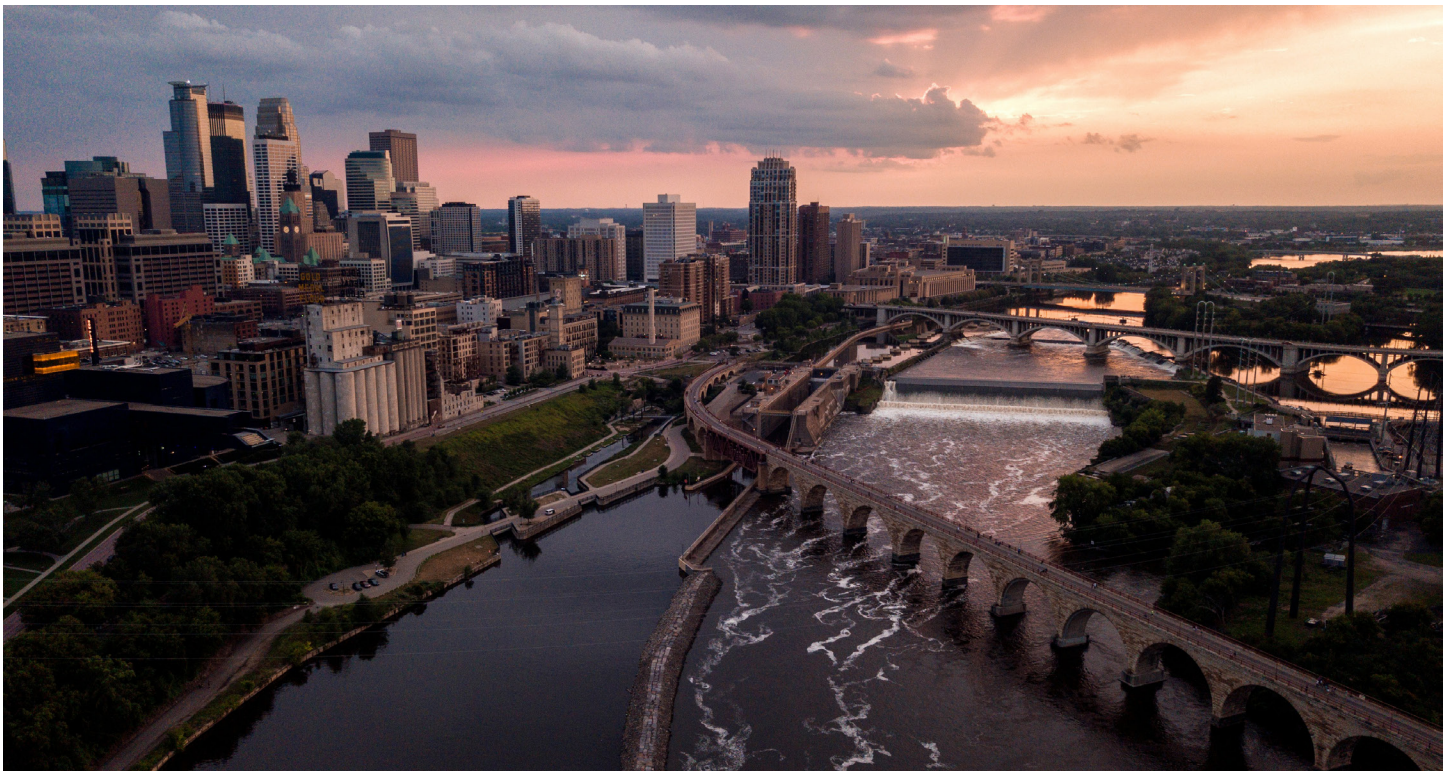
The following piece is also available as a StoryMap. StoryMaps combine media, maps, and text in richly activated ways to offer new perspectives. For the best experience, read this StoryMap online here.

We depend on water to sustain us, yet threats to our biogeophysical and social systems, which directly impact our water, are numerous. However, people are not sitting idle. They are tackling these challenges with analysis and action, in ways that ignite hope.

Hope can grow in both grand and unassuming ways. The drama and magic of a new law, policy, or initiative may be fleeting, but these small, unromantic efforts are the bedrock of our water futures, shaping them into more just and sustainable paths.

The maps, tools, organizations, and individuals shared in this article are not just symbols of work, but of meaningful change in our water systems and our relationships with them. These efforts, born from hope, ignite our imagination, showing us the potential for a better future and motivating us to take action.

See video: The Mississippi River flows through downtown St. Paul, Minnesota. Footage provided by Storyblocks.

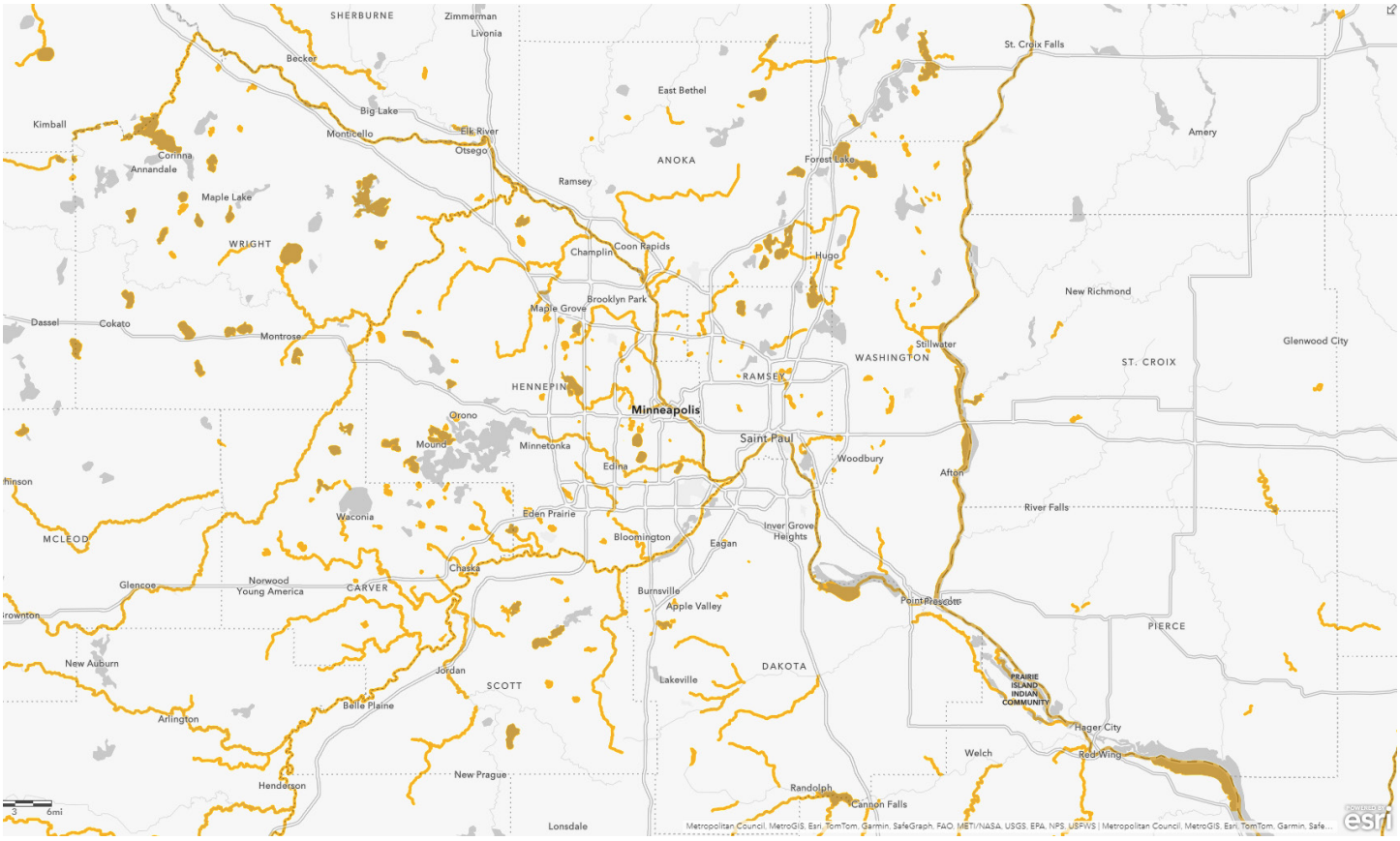


Aerial photograph of Minneapolis and St. Anthony Falls over the Stone Arch Bridge. Image via Unsplash by Nicole Geri.

Clean Water Act

The Clean Water Act (CWA), passed by the United States Congress in 1972, was a proactive measure that sought to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (Federal Water Pollution Control Act Amendment 1972, 816). This legislation was a significant stride toward reducing pollutant discharges into United States water bodies by setting wastewater standards and funding the construction of sewage treatment plants. It also granted the Environmental Protection Agency the authority to implement and enforce pollution control programs, instilling hope for a cleaner water future.

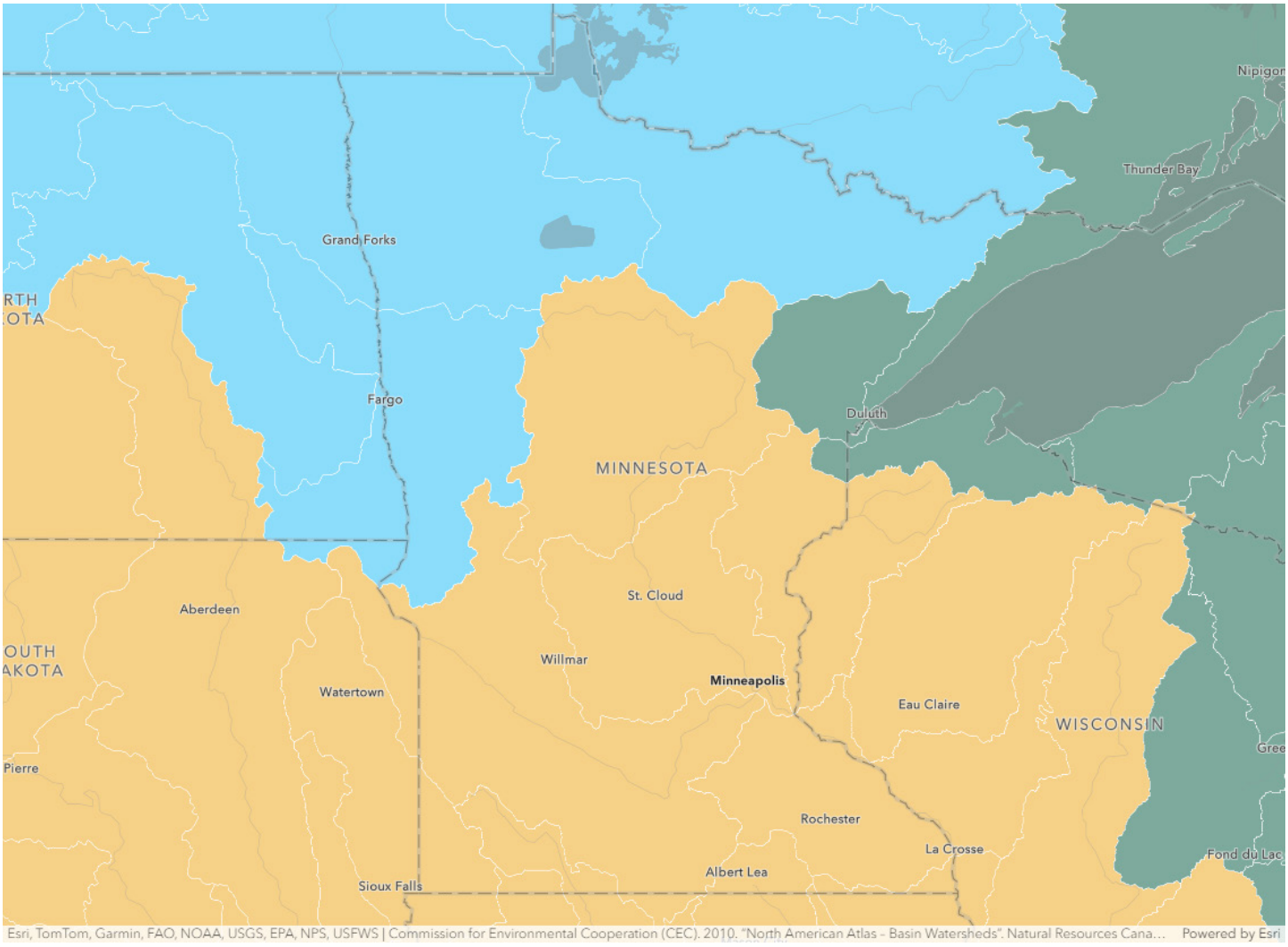
While the CWA and its subsequent enforcement have undeniably improved water quality throughout the United States, it's disheartening to see that rivers and streams still bear significant impairments, as indicated on the map below. In 2017, the National Water Quality Inventory: Report to Congress and the National Rivers and Streams Assessment 2008-09 reported that "46% of river and stream miles are in poor biological condition" across the United States (EPA 2017, 2). Rivers and streams do not bear the brunt of the hazards to water alone; lakes, ponds, reservoirs, coastal waters, and wetlands are similarly affected.



This map shows polluted waters in the area around the Twin Cities in Minnesota according to Environmental Protection Agency data from 2015.

Minnesota

Minnesota, the source of the Mississippi River, is a touchstone for the history and future of impaired waters in the U.S. and beyond. It is situated at the top of three watersheds, which correspondingly drain to Hudson Bay, the Atlantic Ocean, and the Gulf of Mexico. According to the Minnesota Department of Natural Resources (MN DNR), Minnesota is unusual because very little water flows into the state (Minnesota Department of Natural Resources 2010, 26). Still, it is considered to be water-rich; there is a perception that there is enough water for all demands, even though much of that water is impaired.



This map shows the three major watersheds of Minnesota. The yellow watershed drains to the Gulf of Mexico, the blue watershed drains to Hudson Bay, and the green watershed drains to the Atlantic Ocean. Visit the map online to zoom in to see significant water bodies, including lakes, rivers, and streams. Zoom out to see the rest of the major watersheds in North America. Click on the watersheds to see the names of the river systems and the bodies of water to which they drain.

Water Ways, a water primer published by the Division of Ecological and Water Resources and MN DNR, observes that:

> Lakes, streams, or wetlands cover one out of every five square miles of surface area in Minnesota. Of all the states [in the U.S.], the U.S. Census Bureau ranks Minnesota eighth in the amount of surface area covered by water—and that's not counting numerous wetlands, bogs, and lakes smaller than 40 acres. (Minnesota Department of Natural Resources 2010, 17)

The scale of Minnesota's unique water environment makes it vulnerable to water quality issues; a high proportion of the state's surface area is covered with water and there are a very high number of stream miles that the state's residents and agencies must manage. Much of this bountiful water is increasingly imperiled despite the protections afforded by the CWA.

However, the scale of Minnesota waters also offers a unique stewardship opportunity for the residents and ecosystems of Minnesota and the downstream reaches.

Sustainable Development Goals

Water quality and stewardship issues are addressed at more than just the state and national levels. At the international level, the United Nations (UN) developed a 2030 Agenda for Sustainable Development, which outlines 17 Sustainable Development Goals (SDGs) adopted by all UN member states in 2015. These goals foster action and ambitiously address five critical

The 17 Sustainable Development Goals were adopted by all member states of the United Nations. Image via the United Nations.

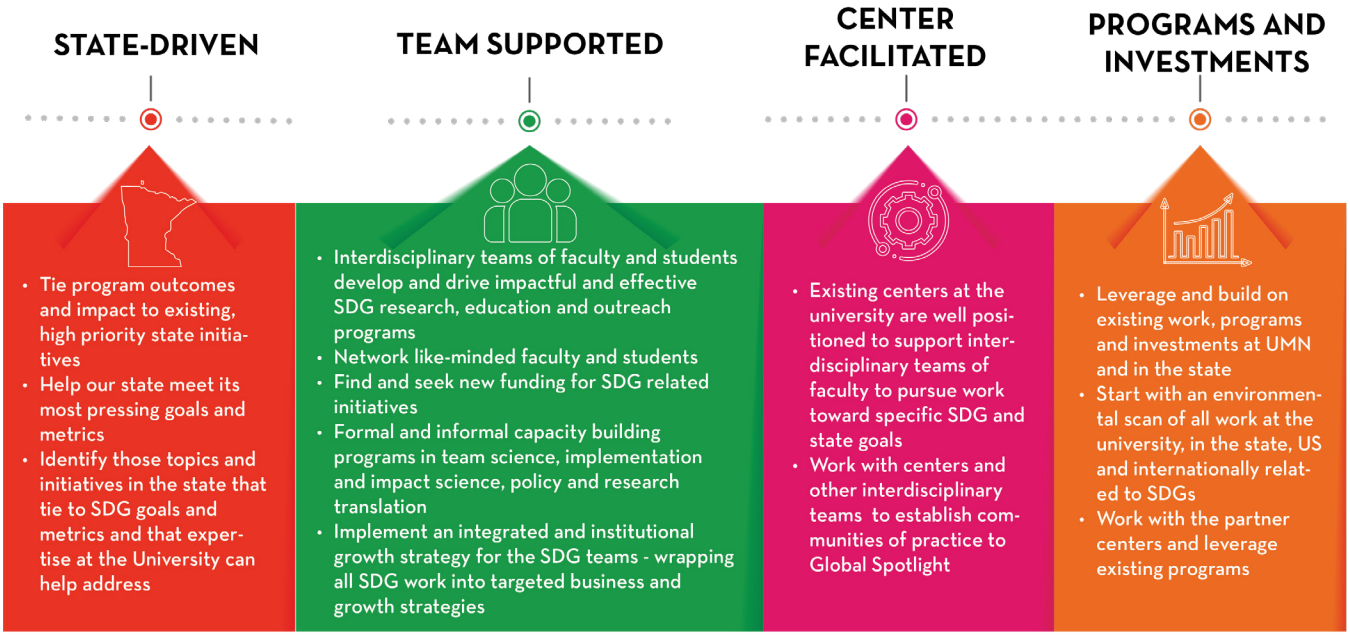
priorities: people, planet, prosperity, peace, and partnership (UN General Assembly 2015).

The UN describes the agenda of these SDGs as "a plan of action for people, planet and prosperity [that] seeks to strengthen universal peace in larger freedom." (United Nations General Assembly, 2015). Many of these SDGs align with the work of the CWA, including, but not limited to, Clean Water and Sanitation, Sustainable Cities and Communities, Life Below Water, Life on Land, and more. The SDGs represent global hopes and ambitions to build a better future for all people and offer a way for the nations of the UN and beyond to coordinate efforts, share triumphs and challenges, and create a hopeful culture of change and action. By having distinct and measurable indicators linked to the SDGs, progress can be measured, managed, and made repeatable. Lofty ideals, which can be tenuous to grasp and hard to implement, are made achievable with solid and measurable real-world indicators. As the UN agenda explains:

> The SDGs framework includes 17 Sustainable Development Goals (SDGs) that provide a shared blueprint for peace and prosperity for people and the planet, and drives efforts at local, national, and global partnership levels. The SDGs offer an inherently integrative and interdisciplinary approach highlighting linkages between ending poverty, improving health and education, and addressing climate change and other environmental degradation. (United Nations General Assembly 2015)

UMN & the SDGs

The University of Minnesota (UMN), home of *Open Rivers*, has also adopted these 17 goals as a framework "to mobilize the resources at the University to advance a more socially and environmentally sustainable future in Minnesota, the U.S., and the globe through grants, information, and opportunities" (UMN Sustainable Development Goals Initiative 2024). Universities,



The four prongs of this approach guide University teams seeking to align their work with the SDGs. Image via the University of Minnesota SDG Initiative.

with their twin responsibilities to teach and research, are uniquely well situated to connect the policy work of nations, the advancement of knowledge, and the education of the next generation of policymakers, researchers, and residents. By embracing the SDGs, UMN not only supports the goals of the SDGs themselves but also fosters a future that advances the work to attain these goals, whether it be in the fine detail of the individual indicators or in support of the hopeful ideas that underpin the whole movement.

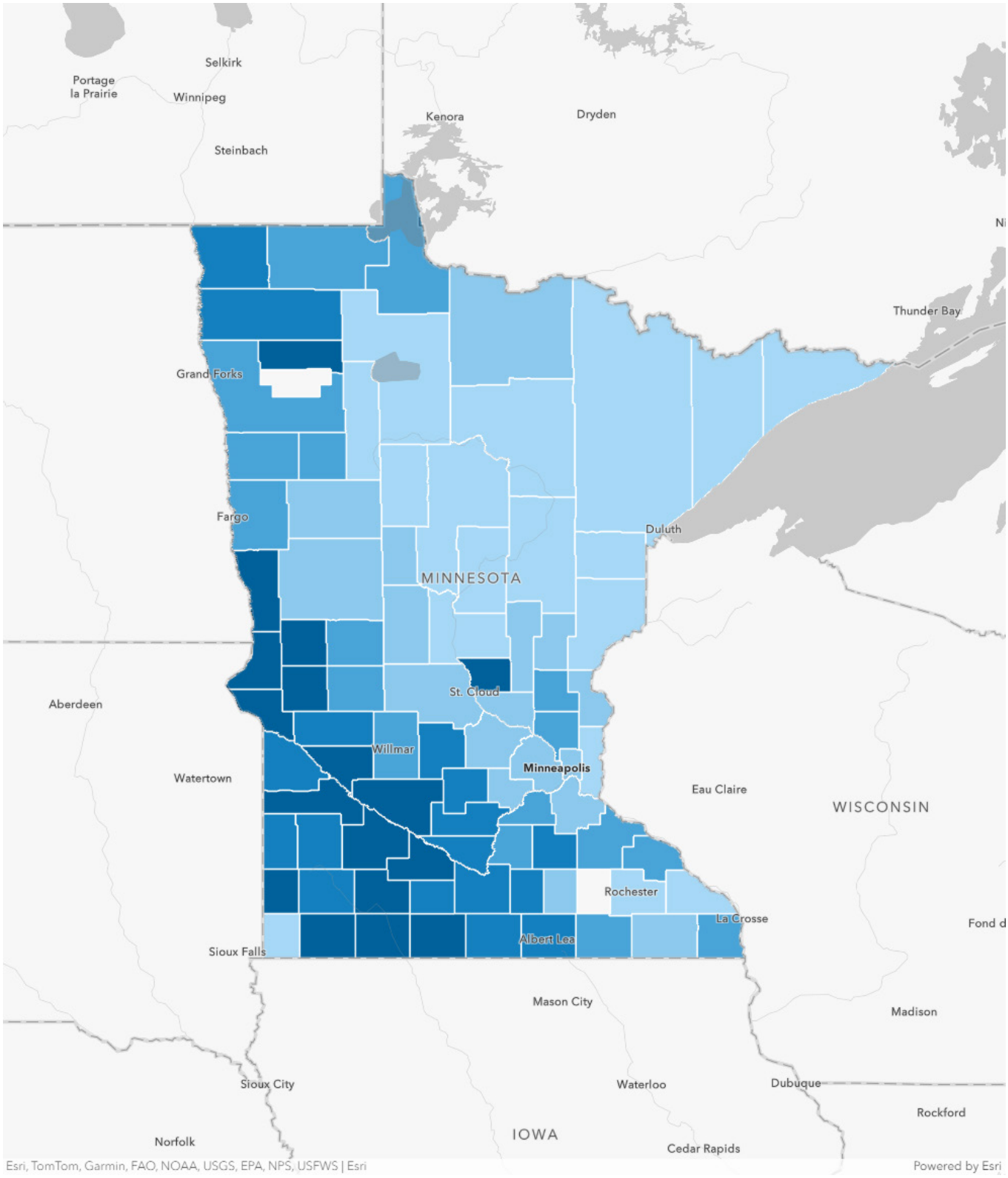
UMN's approach seeks to "leverage all corners of the University to achieve state, national, and international metrics" using the basic framework described in the graphic (UMN Sustainable Development Goals Initiative 2024).

The Spatial University

The SDGs are described precisely on the UN website as a series of discrete, measurable indicators. Many of these indicators are mappable, helping nations understand where progress is being made and identifying areas in crisis. This helps organizations allocate resources efficiently and analyze approaches that are effective to possibly replicate elsewhere. In particular, SDG Goal 14, Life Below Water, is precisely described in terms of data that can be displayed on a map, from "plastic debris density" to the "number of countries using ecosystem-based approaches to managing marine areas," and more (United Nations Department of Economic and Social Affairs: Sustainable Development n.d.).

At UMN, U-Spatial works with people and departments to develop maps and other spatial products to help enrich their research and effectively communicate their results, including work connected to the SDGs. They developed a richly interactive spatial resource to help people and agencies navigate the specifics of SDG progress in Minnesota and "to support partners throughout the state to share data and access the most relevant information and analyses cued to their location" (U-Spatial n.d.).

This map, centered on Goal 14: Life Below Water, is "used by government agencies to monitor indicators for SDG Goal 14 and communicate relevant progress" (Crosson 2023). The map clearly shows the areas of Minnesota where the resources to mitigate water pollution, as correlated with water cloudiness, would be most effective and efficient. This targeted approach improves the stewardship of Minnesota waters and benefits not only the residents of the region but also the downstream reaches all the way to the ocean.



This map, developed by U-Spatial, shows indicators across Minnesota relating to SDG Goal 14: Life Below Water, explicitly relating to target 14.1, "prevent and significantly reduce marine pollution of all kinds." Visit the map online to click each county for a measure of average water cloudiness or turbidity recorded; the darker blue counties have cloudier water. For more information, visit the UN's Goal 14 Targets and Indicators page.

Public Scholarship

An increasingly essential strategy for telling the stories of these policies, goals, and reporting tools is public scholarship, which seeks to improve communication between the worlds of traditional academic research and the public. It encourages the sharing of experiences, interests, and knowledge by showcasing the work that bridges different kinds of expertise. *Open Rivers* is one of a variety of platforms that draws together disparate ways of knowing to catalyze change and transform our water futures for the better. *Open Rivers* publishes public scholarship by people working in academics, policy, and diverse communities and written for non-specialist audiences. By not charging authors to publish their work and not charging readers for access, the journal reduces barriers to the sharing of knowledge and facilitates discussions that inform public action.

The map below illustrates the global reach of the articles published in *Open Rivers* since 2015, including content which concerns the issues and goals of the SDGs.

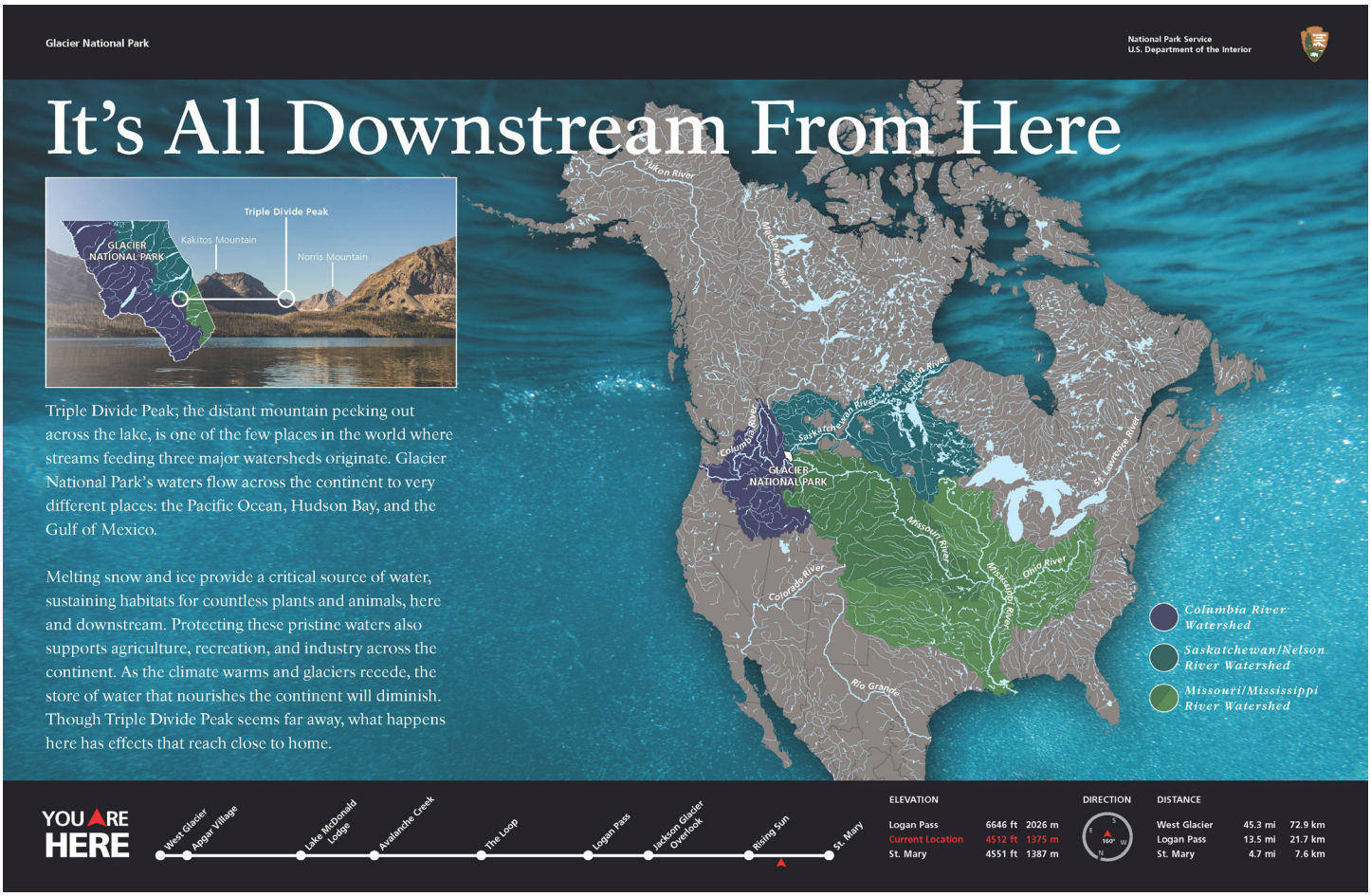
As you can see, there is a large cluster of points in Minnesota, *Open Rivers'* home state, and along the Mississippi River. The tour of *Open Rivers* content that follows explores some of these articles, many of which are along the Mississippi, our home river. The Mississippi, whose headwaters are in northern Minnesota, flows through the Twin Cities and

This is a map of articles published in Open Rivers, each associated with a location significant to the article's content. Visit the map online to zoom in using the controls on the screen and you can see specifics on each article by clicking on the associated blue spot.

the Minneapolis campus of the University of Minnesota all the way to the Gulf of Mexico. Its watershed is the fourth largest in the world, draining much of the United States between the Rocky and Appalachian mountains. The Mississippi is representative of many global water issues, and our stories of work and hope on our home river illustrate the advocacy, analysis, and stories of water work worldwide just as stories from other places inform understandings of our local waters.

Where the Water Flows: Understanding Glacier's Triple Divide Peak

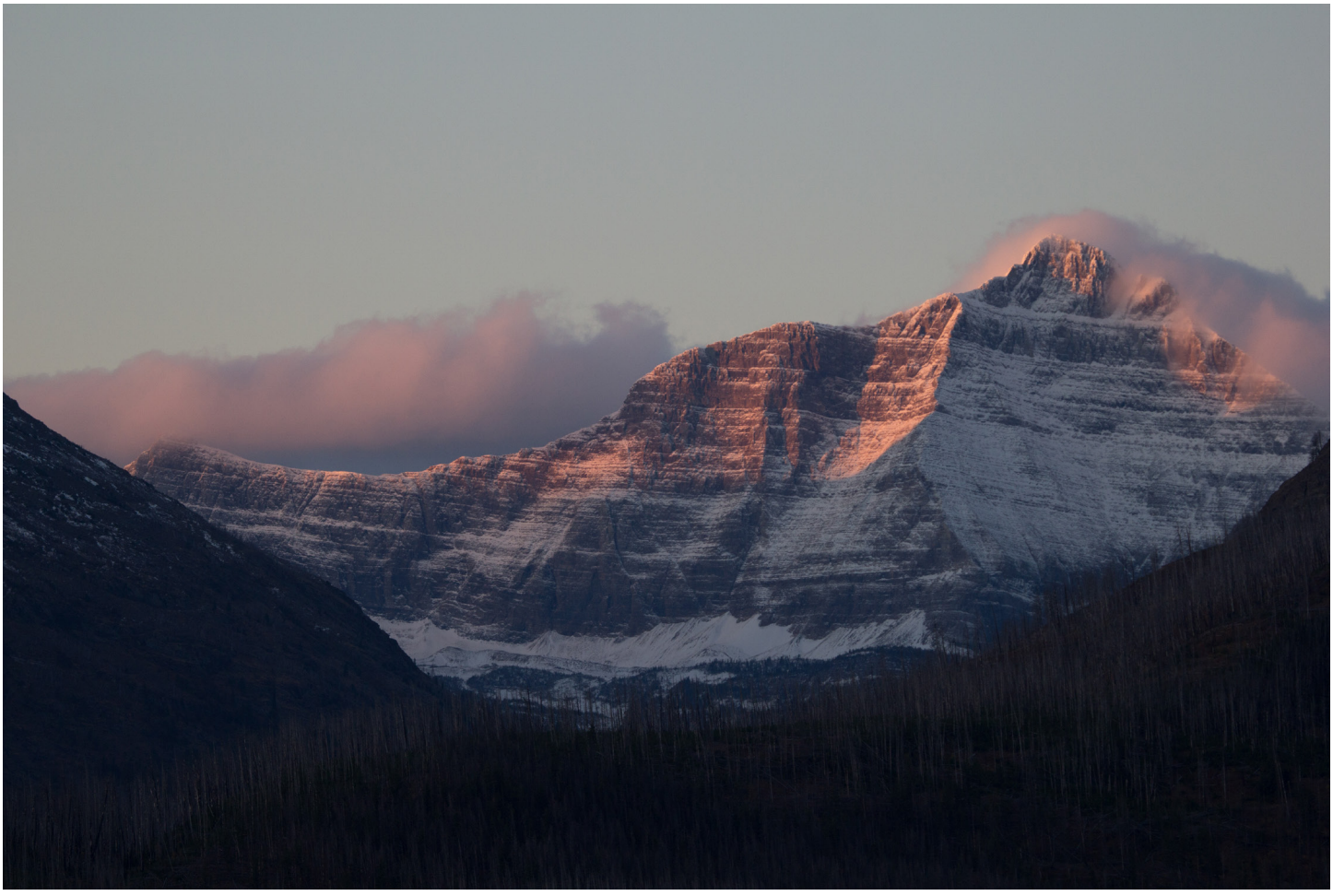
This article by Quinn Feller (2018) discusses the interpretation of Triple Divide Peak by the National Park Service in Glacier National Park, Montana, for their visitors. In this place, three watersheds come together as they do in northern Minnesota. Centered 851 miles west of the headwaters of the Mississippi, the sign shown on the right begins, "Triple Divide Peak, the



"Triple Divide Peak, the distant mountain peeking out across the lake, is one of the few places in the world where streams feeding three major watersheds originate. Glacier National Park's waters flow across the continent to very different places: the Pacific Ocean, Hudson Bay, and the Gulf of Mexico." Image of the sign courtesy of Glacier National Park.

distant mountain peeking out across the lake, is one of the few places in the world where streams feeding three major watersheds originate. Glacier National Park's waters flow across the continent to very different places: the Pacific Ocean, Hudson Bay, and the Gulf of Mexico."

This sign and the article help the visitor and reader understand the connectedness of landscapes and the issues that trouble them. A Montana mountain is as profoundly connected by water to the Mississippi River as to the Pacific Ocean and Hudson Bay. At the core of the National Park Service's mission, this outreach and education work communicates the scope and scale of water landscapes. This knowledge and awareness are fundamental to protecting water in all its forms.



First snow at Triple Divide Peak. Image courtesy of Daniel Lombardi.

Maps, Geographies, and the Mississippi

Far away from the rarefied mountains of Montana, the Mississippi River flows through the urban core of the Twin Cities. The challenges of the river and the watershed are made visible by the joining of the Mississippi and Minnesota Rivers, as seen in the image below. The viewer may well wonder why these rivers are so different. What tools do we have at our disposal to investigate and understand?

A powerful tool for addressing these questions is described in this article which discusses the university's role in "helping people discover and analyze geospatial data," that is, information that can be put on a map, such as the differing water qualities in the Minnesota and Mississippi Rivers (Kne 2016). Author Len Kne (2016) of U-Spatial remarks that "creating informative maps has gotten easier, thanks to several web-based GIS tools [used to] make compelling maps that can be easily shared."

These resources that Kne mentions are critical to the work of the university which then feeds the hopeful actions and initiatives aligned around the global SDG goals and other environmental work.

This image from the article shows the confluence of the Minnesota and Mississippi rivers. Kne (2016) says, "Using satellite imagery, we can compare the amount of sediment coming into the Mississippi River from the Minnesota River (the lower river)." Satellite Images Courtesy of DigitalGlobe Foundation.

Why so much sand in the Lower Minnesota River?

The images of the confluence of Minnesota and Mississippi Rivers seen above beg the question of why the waters are so different. Carrie E. Jennings (2016) wrote about water cloudiness in the Minnesota River remarking, "The Lower Minnesota River, from Carver Rapids to the confluence with the Mississippi, is a low-gradient, broad reach of the river. If you wade into the brown water you may be surprised to find that the bottom is actually sandy. Based on the yearly gaging data, about half an inch of sand would accumulate in the channel each year if it were not dredged. That is about six times more than the average, pre-European-settlement accumulation rate."

The sand and the water cloudiness impact the ecosystems of the river, burying riverbeds that fish use for spawning, and reducing the light available in the water for aquatic plants (Marohn 2020). The dredging necessary to keep the main channel of the river clear of the sand deposition also harms the river bottom and the ecosystems that thrive there. The deposition is costly to remove, and threatens navigation. These impacts travel with the water and can cause the same problems for all of the downstream reaches.

Jennings' work communicating the complexities of the Minnesota River's physical constitution promotes understanding. The geography of the

This image shows the Minnesota River during high flows in 2016. Image courtesy of Carrie E. Jennings.

river, its history, and the historic and present management practices all contribute to the river's current condition, and the solutions are far more complex than just addressing any one of the issues. This nuanced perspective is important, and while describing a river in peril, also embodies hopefulness in describing practices that are likely to help.

Agriculture and the River: The University's Role in Societal Learning, Innovation, and Action

River work goes beyond the scope of protecting water quality, as evidenced by Nicholas R. Jordan, Carissa Schively Slotterback, David Mulla, and Len Kne (2017) who describe rivers as "critical connectors across our communities, states, and national boundaries. They offer essential benefits in the form of drinking water, recreation, transport, food, and aesthetics." The authors continue to observe that "we believe that universities…are well positioned to play a distinctive and necessary role in addressing these complex problems" (Jordan et al. 2017).

The article outlines an approach that includes learning, innovation, and coordinated action, acknowledging that "significant shifts" are required

The image above shows an example of eroded stream and river banks that allow excess sediment—primarily clay and silt—into waterways. Sediment is considered a contaminant and contributes to cloudy, murky water and degrades fish and aquatic life habitats. Image via Flickr by MPCA Photos.

(Jordan et al. 2017). The authors highlight the Forever Green Initiative as one such shift; the Forever Green Initiative seeks to "substantially increase the quantity and variety of marketable agricultural products produced by Midwest agriculture and thereby to achieve previously unattainable solutions to the state's water-quality challenges" (Jordan et al. 2017). A recent report, on the effectiveness of their Continuous Living Cover cropping systems, "found that even modestly integrating these [systems] can cut nitrogen loss, reduce soil erosion, blunt greenhouse gas emissions and increase farm profitability," which offers great hope for the areas of Minnesota that struggle with issues of water quality (Friends of the Mississippi River 2023, 1).

Mosquitoes, Muck, and Mussels: A Look Into Scientific Research

The work of universities is also to prepare the next generation of river workers, thinkers, and doers. Through coursework and research opportunities, students get to do meaningful work that has real effects. For example, in 2018, Lea Davidson, James Doherty, Laura Gould, and Hayley Stutzman, then undergraduates, discussed their experiences analyzing water quality in northern Minnesota. The fieldwork was grueling and beautiful as they worked "amid swarms of mosquitoes, wading into the dark, murky brown waters of agricultural rivers" (Davidson et al. 2018). The students were "monitoring…native freshwater mussel populations [which] provides insight into the health of a river system. Without mussels, streams lose an important source of riverbed stability, because mussels anchor the sediment as they burrow [and] filter the water column" (Davidson et al. 2018).

This image shows the students digging up the river bottom in a study area. The load is lifted from the water and dumped onto the mesh-covered middle of the inner tube. Then it is thoroughly searched for mussels (live or dead) and shell fragments and assessed for sediment composition. Image courtesy of Mark Hove.

These students found themselves digging sediment out of rivers for analysis, and they engaged deeply with the communities in which they worked. They remark, “People were amused to see us decked out in wetsuits, digging in the river, but simultaneously genuinely interested in the ‘clams’ in their own backyards. They, too, are curious, about the details of the environment in which they live” (Davidson et al. 2018).

Collaboration for a Common Goal

Work that inspires hope is neither limited to Minnesota nor to universities. In Iowa, work with the land and policy come together to create a culture and practice of meaningful change for agriculture and the river. In 2022, Mollie Aronowitz, Jennifer Terry, Ruth McCabe, and Mary Beth Stevenson shared their work with *Open Rivers* to tell a story that demonstrates how combining a common goal with compromise

Soil leaving the farm reduces the return on investment for landowners and farmers. The soil moving here may seem minimal in the grand scheme, but the damaging effects can multiply over time. Image courtesy of Mollie Aronowitz.

and deliberate action leads to creative solutions and meaningful progress. Our professional backgrounds and experiences are diverse—our group includes a professional land manager, a clean water policy attorney, a conservation agronomist, and a municipal watershed manager. [Our stories] focus on the impactful change that comes from setting aside ego and agenda in favor of intentional action with a shared goal: sustaining Iowa's agricultural legacy while improving Iowa's water quality one field and stream at a time.

On the impact of their work and methods, they say,

> In the current state of political affairs in Iowa and the nation, 'partnership' has almost become a dirty word. But never has the need been greater for us to set aside our differences and identify a path forward to achieve our goals. Now is not the time to sit on our hands. Partnership matters. Collaboration matters. Joining our voices together matters. And through these partnerships, we are effecting change. (Aronowitz et al. 2022)

These waterways are purposefully shaped and planted with strong-rooted grasses to help channel water above ground and off the farm after weather events. The lighter area in the photo has been shaped and planted with grass seed in a straw mat to help with establishing the grasses. Image courtesy of Mollie Aronowitz.

Water, Conflict, and Peace

The impact of work to protect water quality and access is universal. Embodying the hope for a better and more just future, the UN says of the SDGs that "this Agenda is a plan of action for people, planet and prosperity. It also seeks to strengthen universal peace in larger freedom" (UN General Assembly 2015).

Water is often inextricably at the center of issues of conflict and peace. In 2018, Peter Gleick wrote that "for humans, fresh water is critical for life, health, our economies, and vibrant ecosystems."

He continues:

> There is no lack of water crises: toxic water contamination, water-related diseases, inadequate access to safe and affordable drinking water and sanitation for billions of people, death and destruction from extreme hydrological events, collapsing fisheries and disappearing wetland ecosystems, and now human-caused climate change. These crises cause widespread human suffering. The United Nations estimates that more than a million people die every year from preventable water-related diseases.

Qadisiyah Reservoir on the Euphrates River, Iraq. This image, taken in 2009, shows the reservoir at less than half its size in 2003 due to human consumption of water for drinking and agriculture. Image via NASA.

> The issue is not "water wars," despite the euphonious and alliterative nature of the term and the attractiveness to headline writers. Wars are big, brutal, miserable things, and they start for complex economic, political, ideological, religious, and historical reasons. Rarely is any "war"… attributable to a single cause. Yet it is indisputable that fresh water is—and has been for millennia—a trigger, weapon, and casualty of conflict, violence, and war. (Gleick 2018)

The work of the SDGs specifically addresses these water issues along with other drivers of conflict such as poverty, hunger, inequalities, and injustice. Together they promote peace, by removing or ameliorating the issues that cause conflict, not just around water, and not by the brutal work of war, but through the hopeful building together of a more just world.

In Conclusion

Gleick's (2018) hopeful and cautionary conclusion echoes the work and findings of so many others:

Water is a critical resource for the production of food, goods, and services, the health of humans and natural ecosystems, and the successful functioning of modern society. Violence and conflict related to water resources are worsening for many reasons, including growing populations and water demand, expanding economies, widespread water contamination, worsening human-caused climate change, and weak water management and governance. Strategies for reducing water-related conflicts exist, including improvements in technology, more sustainable water supply and demand options, and a wide range of legal, political, and institutional tools. But unless these are more quickly and widely deployed, the risks of conflicts over water seems likely to continue to worsen.

We can achieve measurable and repeatable success by using the considerable tools at our disposal, leveraging our common resources and information, and sharing our goals, challenges, and triumphs. We learn through this work about the things that work and those that don't. We start to understand where we have gaps in our knowledge and skills, and we can begin to see a way forward. Solutions may be puzzling, but action can be clear and measurable and embody the hope that is so very human and necessary.

References

Aronowitz, Mollie , Jennifer Terry, Ruth McCabe, and Mary Beth Stevenson. 2022. "Collaboration for a Common Goal." *Open Rivers: Rethinking Water, Place & Community*, no. 21. https://doi.org/10.24926/2471190X.9253.

Crosson, Shana. 2023. "Goal 14: Life Below Water." MN SDGs. https://sdg-umn.hub.arcgis.com/maps/8fa0dfb546cc4e12abeadcbcc5a3dc58/explore?location=46.166049%2C-93.365492%2C5.93.

Davidson, Lee, James Doherty, Laura Gould, and Hayley Stutzman. 2018. "Mosquitoes, Muck, and Mussels: A Look Into Scientific Research." *Open Rivers: Rethinking Water, Place & Community*, no. 9. https://openrivers.lib.umn.edu/article/mosquitoes-muck-and-mussels-a-look-into-scientific-research/.

EPA. 2017. National Water Quality Inventory: Report to Congress. EPA 841-R-16-011. https://www.epa.gov/sites/default/files/2017-12/documents/305brtc_finalowow_08302017.pdf.

Federal Water Pollution Control Act Amendments. 1972. Pub. L. No. 92-500. 86 Stat. 2770. https://www.govinfo.gov/content/pkg/STATUTE-86/pdf/STATUTE-86-Pg816.pdf.

Feller, Quinn. 2018. "Where the Water Flows: Understanding Glacier's Triple Divide Peak." *Open Rivers: Rethinking Water, Place & Community,* no. 9. https://openrivers.lib.umn.edu/article/where-the-water-flows-understanding-glaciers-triple-divide-peak/.

Friends of the Mississippi River. 2023. "Overview of Putting Down Roots: The Opportunity for a More Sustainable, Prosperous Minnesota through Continuous Living Cover." Friends of the Mississippi River. https://fmr.org/files/putting_down_roots-4_page_overview-with_url-for_printing.pdf.

Gleick, Peter. 2018. "Water, Conflict, and Peace." *Open Rivers: Rethinking Water, Place & Community,* no. 11. https://openrivers.lib.umn.edu/article/water-conflict-and-peace/.

Jennings, Carrie E. 2016. "Why so much sand in the Lower Minnesota River?" *Open Rivers: Rethinking The Mississippi*, no. 4. https://openrivers.lib.umn.edu/article/why-so-much-sand-in-the-lower-minnesota-river/.

Jordan, Nicholas R., Carissa Schively Slotterback, David Mulla, and Len Kne. 2017. "Agriculture and the River: The University's Role in Societal Learning, Innovation, and Action." *Open Rivers: Rethinking The Mississippi*, no. 6. https://doi.org/10.24926/2471190X.2778.

Kne, Len. 2016. "Maps, Geographies, and the Mississippi" *Open Rivers: Rethinking The Mississippi*, no. 2. https://openrivers.lib.umn.edu/article/maps-geographies-and-the-mississippi/.

Marohn, Kirsti. 2020. "Tiny Particles, Costly Problems: Too Much Sediment in Upper Mississippi River." MPRNews. August 20. https://www.mprnews.org/story/2020/08/20/tiny-particles-costly-problem-too-much-sediment-in-upper-mississippi-river.

Minnesota Department of Natural Resources. 2010. *Water Ways: A Minnesota Water Primer and Project WET Companion*. St. Paul, MN: Minnesota Department of Natural Resources.

U-Spatial. N.d. "MN SDGs." https://sdg-umn.hub.arcgis.com/. Accessed March 1, 2024.

UMN Sustainable Development Goals Initiative. 2024. "About." University of Minnesota. https://sdg.umn.edu/about.

UN General Assembly. 2015. Resolution 70/1. Transforming Our World: The 2030 Agenda for Sustainable Development. A/RES/70/1. October 21. https://sdgs.un.org/2030agenda.

United Nations Department of Economic and Social Affairs: Sustainable Development. N.d. "Goal 14: Conserve and Sustainable Use the Oceans, Seas, and Marine Resources for Sustainable Development." United Nations. https://sdgs.un.org/goals/goal14#targets_and_indicators. Accessed March 1, 2024.

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