Improving water quality

25% BY 2025

Northeast Minnesota

25BY25

Dear Fellow Minnesotans,

In the land of 10,000 lakes, clean water should be a right, not a privilege. But the reality is that the quality of our lakes, rivers, streams, and groundwater is threatened from many sources all across our state. We are at a crucial moment – we can continue to let water quality become worse or we can work together to reverse the damage that has been done and prevent future water degradation. That is why your involvement in this summer's Community Water Meetings is so important.

It will take all of us working together to protect our waters for ourselves and future generations. That is why, after hearing from citizens and experts at Water Summits in Morris and St. Paul, I set the goal to improve our State's water quality 25 percent by 2025. This goal does not mean that every pollutant will be reduced by 25 percent; it does not mean that every part of the state will improve 25 percent; but it means that in aggregate for the state and the many pollutants there will be a 25 percent improvement. At the current level of effort, there will be only a 7 percent improvement statewide, and without further action, water quality will get worse.

To be clear, this is not a regulation. More importantly, it is a call to action and the reason for Minnesotans to gather for Community Water Meetings this summer. I want to hear from people in every part of our State about the water concerns in their communities, how it will benefit our economy and quality of life to improve water quality, and what we can do to make greater progress toward clean water.

Thank you for your commitment to improving Minnesota's water quality.

Sincerely,

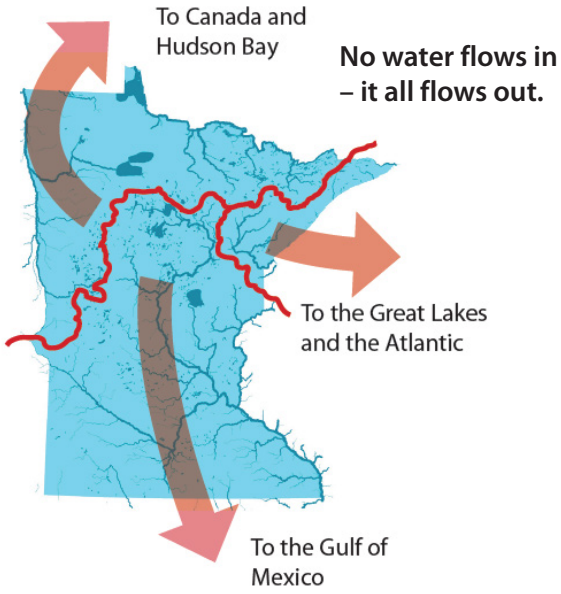
Mark Dayton
Governor

Good to know:
Northeast Minnesota

The waters of Northeast Minnesota are generally high quality and are a valuable resource for the region and the rest of the state. Lake Superior and many inland lakes are important economic drivers, providing destinations for tourists and residents alike.

This region includes land in all three major basins of Minnesota – sending water to Lake Superior, the Mississippi, and Hudson Bay. As a headwaters area, any water quality issues occurring in the region will affect watersheds downstream.

Northeast Minnesota is also home to rich mineral resources, with taconite mining and proposed copper-nickel mining at the forefront of economic and water quality discussions.



** Regions used for this project are from the Minnesota Association of Soil and Water Conservation Districts.*

Three out of four Minnesotans get their drinking water from groundwater sources, but the groundwater is threatened by overuse and contamination in some places.

Major threats to groundwater

Nitrate — One of the most common water pollutants in Minnesota groundwater, affecting a large number of private wells and public water supplies. Elevated nitrate in drinking water can be harmful to human health, specifically to the health of infants. Septic systems, fertilizers, and manure are major sources of nitrate pollution in Minnesota.

Road salt — The salt applied to roads, parking lots, and sidewalks during our icy winters contains chloride, a water pollutant.

Overuse — In general, water is being drawn out of the state's aquifers faster than it is being replenished. If this overuse continues, groundwater may not be available as needed in the future.

Site-specific contamination — Land that is contaminated by hazardous substances and industrial pollutants — such as Superfund sites — may affect groundwater nearby.

Good to know:
Northeast Minnesota

The geology of Northeast Minnesota—thin topsoil and hard bedrock—means there are few places for aquifers to form, leading to limited groundwater in the arrowhead region. The water supply needs of large volume users in northeastern Minnesota, are often met using surface water sources such as mine pits, Lake Superior or other lakes and streams.

In the southern part of this region groundwater is more available. There are some areas with sinkholes, including Pine County where there are over 200 sinkholes ranging from less than one meter to more than 100 meters in diameter. They form above openings in the bedrock that act as direct pathways for surface water to enter groundwater. As a result, wells near sinkholes are vulnerable to contamination.

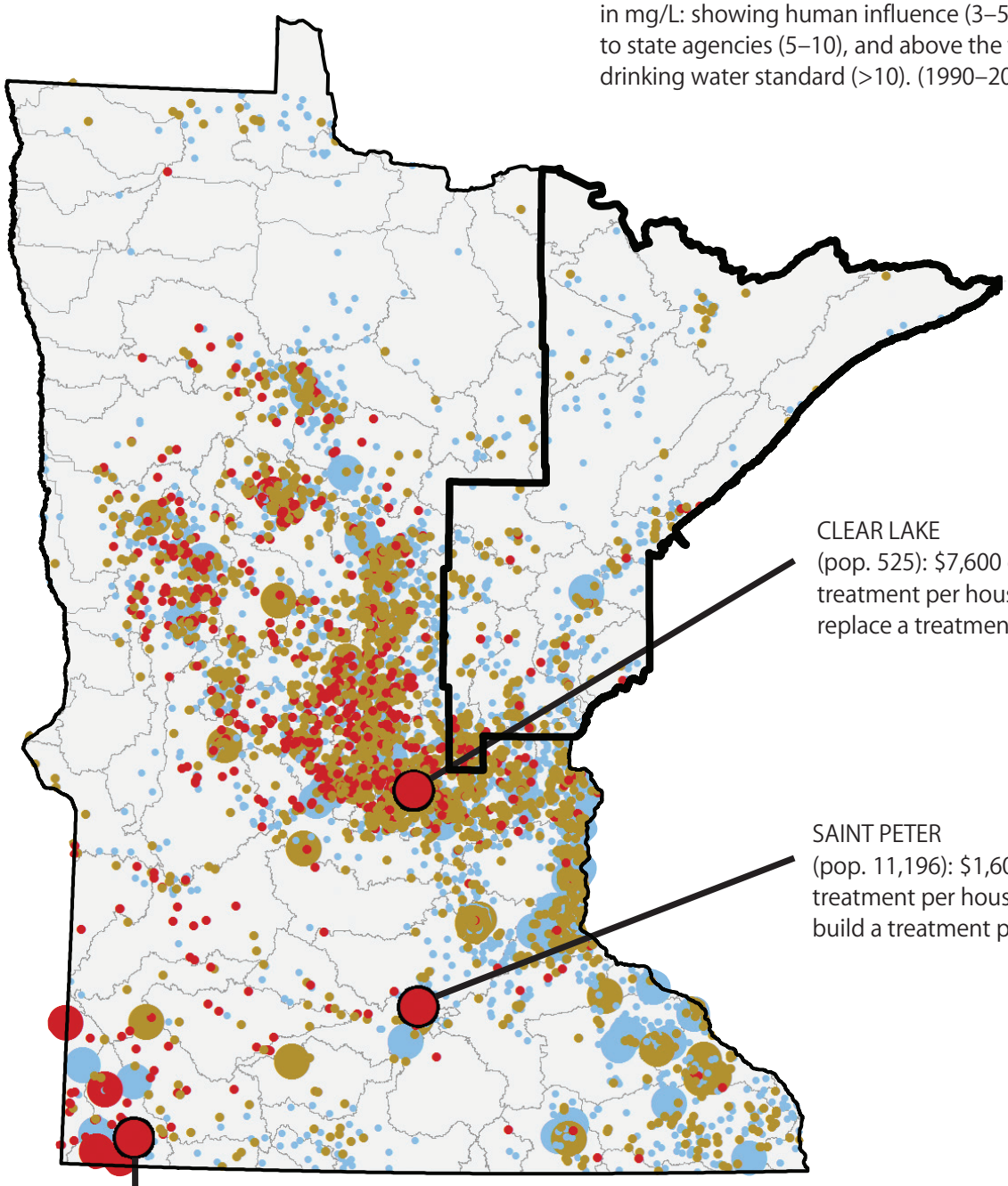
Sinkholes pose a threat to water quality.

Keeping lead out of drinking water

Water can pick up lead if it flows through lead pipe or plumbing. Because lead can be found in the plumbing of homes, all public water systems have to follow standards to make sure water does not easily dissolve lead while moving through pipes. Schools and homeowners can also test lead levels in their drinking water and learn about additional ways to reduce their exposure, like running water for 30-60 seconds before drinking.

Maximum nitrate-nitrogen concentrations in public and domestic wells

The map shows three categories of contamination in mg/L: showing human influence (3–5), of concern to state agencies (5–10), and above the federal safe drinking water standard (>10). (1990–2015)



CLEAR LAKE
(pop. 525): $7,600 cost for treatment per household to replace a treatment plant

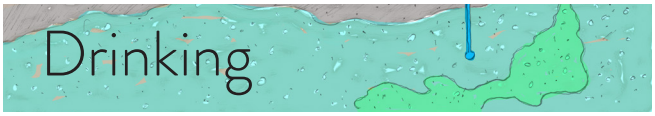
SAINT PETER
(pop. 11,196): $1,600 cost for treatment per household to build a treatment plant

ADRIAN
(pop. 1,209): $3,300 cost for treatment per household to seal wells and build a treatment plant

Domestic Wells
- >10 (mg/L)
- 5 – 10
- 3 – 5

Public Supply Wells
- >10 (mg/L)
- 5 – 10
- 3 – 5

SOURCE: MDH & MGS



Public water supply wells

People in the Northeast region rely on both groundwater and surface water for drinking water, including dozens of small lakes and streams in the Superior National Forest.

Public water supplies are monitored regularly for nitrate and other contaminants. It's increasingly common that public water supply systems need expensive nitrate treatment or are using strategies to reduce nitrate.

- In Northeast Minnesota, 42 public water supply wells, 3.0%, have nitrate above 3 mg/L.

When wells have levels of nitrate above 3 mg/L, preventative measures should be considered. The federal Safe Drinking Water Act standard is 10 mg/L. Public water supplies with nitrate levels above this standard must take action to reduce concentrations below 10 mg/L.

Public water supplies are protected from contamination by focused prevention activities. This region has about 68,000 acres prioritized for drinking water protection. Twenty-eight percent of these are at high risk of contamination. To protect our water we need to target protection of high risk areas.

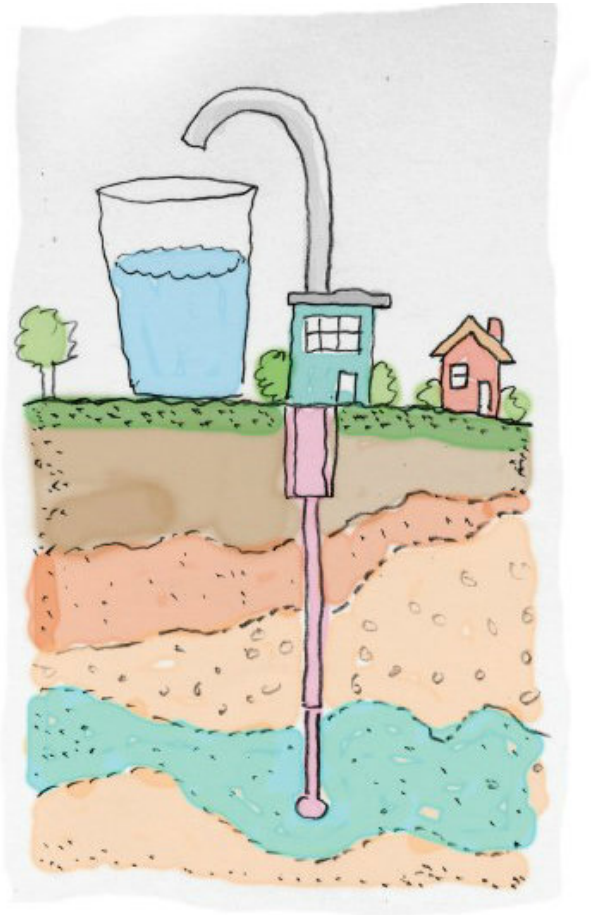
Good to know:
Northeast Minnesota

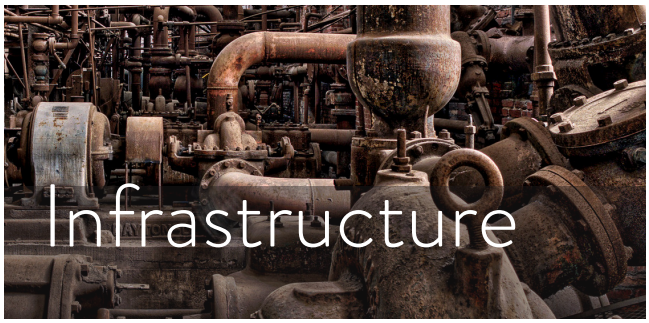
Private wells

Forty percent of residents in this region obtain their water supply from a private well.

Well owners are responsible for testing their own water and treating it, if needed. Well owners in this area should have their water checked for boron, along with other regular testing for bacteria, nitrates, and arsenic.

In agricultural areas with vulnerable groundwater, private wells are sampled for nitrate and pesticides for free under the Township Testing program: **www.mda.state.mn.us/townshiptesting**.





Infrastructure

Our modern water infrastructure is something that most of us barely think about. We take for granted the drinking water, wastewater, and stormwater infrastructure built up over the last 100 years — and the hard work and public investment that goes into it.

Badly in need of attention

Many factors are putting stress on our water systems:

Systems are aging and equipment and pipes are at the end of or past expected life span.

Newly discovered contaminants and water quality standards are making it necessary for drinking and wastewater treatment to add new technologies.

Extreme rainfalls, made more common by climate change, can quickly overload storm drain systems and increase infiltration into sanitary sewers.
The frequency of mega-rain events in Minnesota has been increasing sharply, and 2016 became the first year on record with two mega-rains in the state.

Mound septic system built in St. Louis County

Good to know:
Northeast Minnesota

Infrastructure priorities

The 2017 Clean Water Project priority list for wastewater infrastructure projects in northeast Minnesota includes 43 projects totaling $175 million dollars. Most of these costs in Minnesota (90%) are to repair and replace aging treatment plants and sewer lines while a smaller portion are to address water standards. Old and aging sewer lines can let rainwater or groundwater into pipes, adding unnecessary volume to the system.

The Drinking Water Project Priority List has 25 projects to repair and replace aging drinking water treatment plants, water mains, and sewer lines, totaling $58.5 million dollars.

Thin top soil requires carefully designed septic systems

Thin, low quality top soil creates infrastructure issues related to septic systems. A non–compliant or failing septic system poses a threat to public health and water quality. Mound septic systems are common where soil conditions make buried treatment impractical.

The lack of planned funding

Over the next 20 years, Minnesota will have some big bills to pay:

Cost to upgrade waste-water infrastructure needs over next 20 yrs.
$4 billion

Cost to meet drinking water infrastructure needs over next 20 yrs.
$7 billion

And worse, yet ...

In small towns there are fewer people to share the costs of expensive water projects that protect human health and the environment.

Statewide, 40% of the lakes and streams in Minnesota are not meeting standards set for safe swimming, fishing or drinking.

Major threats to lakes

Contaminated runoff, erosion, and sediment — Runoff from agricultural and urban land and lakeshore development raises the amount of phosphorus in Minnesota lakes, which in turn causes algae to grow and can fuel toxic blue-green algae blooms.

Road salt — The salt applied to roads, parking lots, and sidewalks during our icy winters contains chloride, a water pollutant. When snow and ice melt, the salt goes with it, washing into our lakes. At high concentrations, chloride can harm fish and plant life.

Invasive species — Non-native species, such as zebra mussels, Starry Stonewart, and invasive carp, can cause economic or environmental damage or harm human health. About 5% of Minnesota's lakes are infested with invasives.

In watersheds dominated by agricultural and urban land, half or fewer of the lakes fully support the water quality standards for swimming because of elevated phosphorus, which causes algae to grow and makes lakes less attractive, or even dangerous, for swimming.

Good to know:
Northeast Minnesota

Sustaining high quality watersheds

Water quality in this region is generally very good, with many lakes and streams ranking among the cleanest in the state of Minnesota. Forestland provides source water protection and improves lake and stream water quality through erosion control and stable flows of water. Communities here have the opportunity to think about protection, not just restoration, of the clean waters they enjoy. Potential threats to lakes and streams include urban and shoreline development, invasive species, climate change, and construction and industrial operations.

Forest cover on Lake Minnewawa in the Grand Rapids watershed

Lake Superior

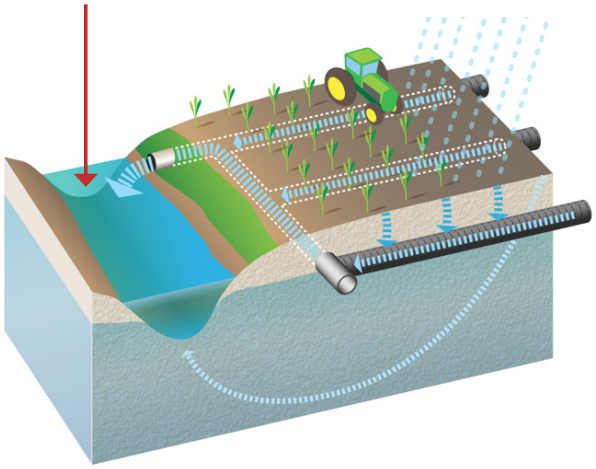
Water quality in the Lake Superior Watershed is generally good and consistently meets state standards for water quality due to its lightly-developed, heavily-forested landscape. The area is renowned for its recreational value and natural beauty. The quality of the Lake Superior Watershed faces challenges from increased bacterial contamination, turbidity, and increased algae or sediment. These problems limit the potential for recreation, impact the aesthetic appeal, and threaten aquatic habitats.

Healthy fish need healthy lakes and streams. Much of our flowing water — including streams and ditches — is under threat from nutrient runoff and increased speed of flow.

Major threats to rivers

Straightened stream beds — Channeling, ditching, and damming projects have changed the natural course of **half of Minnesota's 83,000 stream miles**. This often leads to higher flow rates, bringing more pollutants to our waterways.

Drain tile and ditches in agriculture — Drain tile is plastic pipe installed under farmland to create optimum moisture conditions for crops. In tiled cropland, rainwater flows through tile drainage and ends up in ditches and streams, **carrying nutrients along with it and causing streambank erosion**. Use of drain tile in Minnesota is increasing.



Hard surfaces in urban areas — Hard surfaces, such as roofs, streets, and parking lots, abound in cities and towns. Rain washes across these "hardscapes" rather than soaking into the ground and **carries contaminants into storm drains** and on to rivers and streams.

Good to know:
Northeast Minnesota

St. Louis River Area of Concern

Decades of uncontrolled pollution contaminated riverbed sediments of the St. Louis River and the Duluth Harbor with mercury, dioxins, and other toxins. Consequently, 39 miles were federally designated as an "Area of Concern" requiring immediate clean-up action. The plan to minimize the exposure of aquatic ecosystems to contaminated sediments while preserving economic functions of the port should allow the area to be delisted as an Area of Concern by 2025.

Radio Tower Bay was the site of two late 19th Century sawmills before recent restoration projects.

A mercury mystery

Fish in the St. Louis, Kettle, and three Northwest Minnesota rivers have relatively higher concentrations of mercury in the fish tissue than in other Minnesota lakes and rivers. The state is studying these rivers to better understand why.

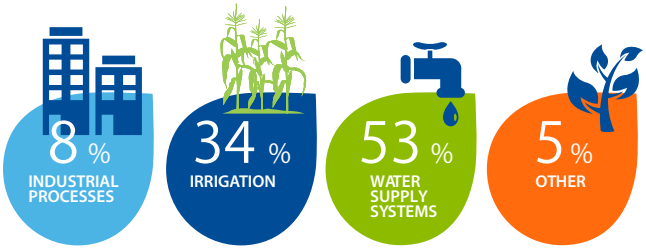
Mercury falls with rain and snow and runs into lakes and streams. Part of that mercury gets into the food chain and builds up to higher levels in fish. This build up appears to happen more efficiently in certain lakes and rivers. Understanding why mercury behaves differently in some water bodies will allow the state to make a plan to reduce mercury in fish tissue in these unique rivers.

Four things crucial for progress in MN

1 Water conservation: in agriculture, industry, and at home

Groundwater use has increased 35% over the past 25 years due to population and economic growth. This trend may not be sustainable. Parts of Minnesota are vulnerable to groundwater shortages. The state is not yet in crisis, but there are signs we may have problems in the future.

How we use water in Minnesota (average yr)



What we need to do

Our water supply makes Minnesota attractive to water-intensive industries, including agriculture, fishing, manufacturing, food production, micro brewing, mining, and shipping. But we need to encourage water conservation by both businesses and individuals.

- Improve industrial water efficiency with conservation-based processes and equipment.

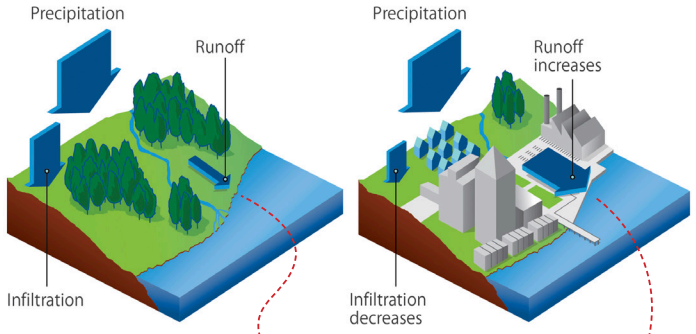
- Use agricultural irrigation water more efficiently with technologies such as low-pressure irrigation and precision weather data.

- Improve residential water use efficiency with technologies like soil moisture sensors for lawn watering and water efficient toilets.

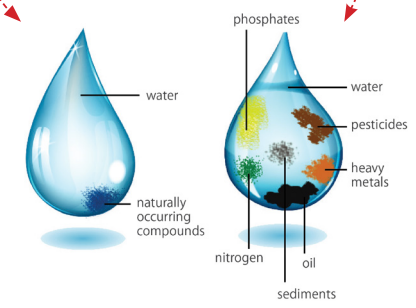
2 Green infrastructure: managing runoff in cities and towns

Green infrastructure helps built and urban environments behave more like a natural landscape by holding water on the landscape after rain, rather than allowing it to rapidly run into storm sewers, lakes, and rivers.

Buildings, houses, parking lots, and roads mean less water soaks in

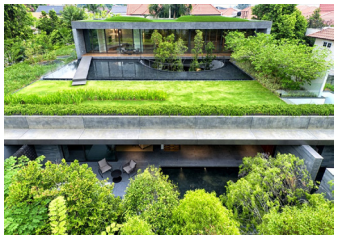


When we build roads, sidewalks, buildings, parking lots, and other impervious surfaces, we change the flow of water. We increase the speed and quantity of water (and pollutants) entering storm drains, lakes, wetlands, and rivers.



What we need

- Trees
- Pervious pavement
- Swales
- Rain gardens
- Infiltration strips
- Green street design
- Green roofs

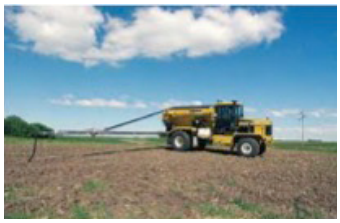


3 Farming practices that protect water

Agriculture conservation practices are key. Many farmers are already using these methods, and programs are available to help get started.

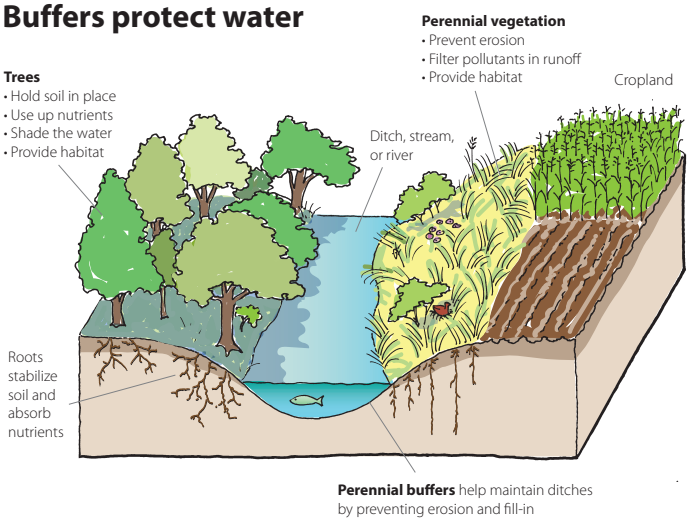
What we need to do

Planting more **cover crops**, **buffer strips**, or **perennials** reduces erosion and can help recycle nitrate nitrogen before entering groundwater.



Applying nitrogen fertilizer at the proper **rate** and **time** minimizes loss to ground and surface water and improves farm profit. Installing more **grass waterways**, **sediment basins, and terraces** in targeted areas slows and filters runoff.

Buffers protect water



The 2015 buffer law
This designates about 110,000 acres of land to living cover to protect water from pollution. These buffer strips along rivers, streams, and ditches will filter out phosphorus, nitrogen, and sediment.

Conservation tillage

Farmers leave plant residues on longer, or permanently, helping keep soil and nutrients in the field.

Minnesota Agricultural Water Quality Certification Program

Participants implement a combination of these practices voluntarily to treat site-specific water quality risks.

4 Protecting the good is cheaper than fixing it later

Minnesota is fortunate to have some water bodies that meet, or are better than, our water quality standards. These lakes, streams, and groundwater sources need protection.

What we need to do

- Pay attention to wetlands and forested land to protect pristine waters.
- The cost of removing nitrate from water is much higher than keeping it out of the water to begin with. Follow Wellhead Protection Plans to protect drinking water sources.

Living cover: filtering and reducing runoff

Living cover is a key strategy for protecting drinking water, especially within lands surrounding a public water supply well, to keep contaminants from reaching the well or well field. Living cover holds water, filters contaminants, and reduces runoff.

Perennial crops: Perennial grasses, hay, and pasture.

Cover crops: Grasses, small grains, legumes, and winter annuals.

Prairie and grasses: Grasses and prairie plants.

Wetlands: Natural and constructed.

Forests: The king of living cover.

Minnesota's framework for improving water

Cleaner water through federal, state, and local collaboration in a "plan-do-check" cycle

Check: NE Minnesota

Watershed Restoration and Protection Strategy Reports (WRAPS) are available for the:

- Little Fork River – in progress
- St. Louis River – in progress
- Nemadji River – in progress
- Rum River – in progress
- Snake River

Plan: NE Minnesota

One Watershed, One Plan is a comprehensive management plan for groundwater and surface water. One watershed is using the program now, with more in the future:

- Lake Superior North

Do: NE Minnesota

Individuals and communities can find support from local watershed organizations to:

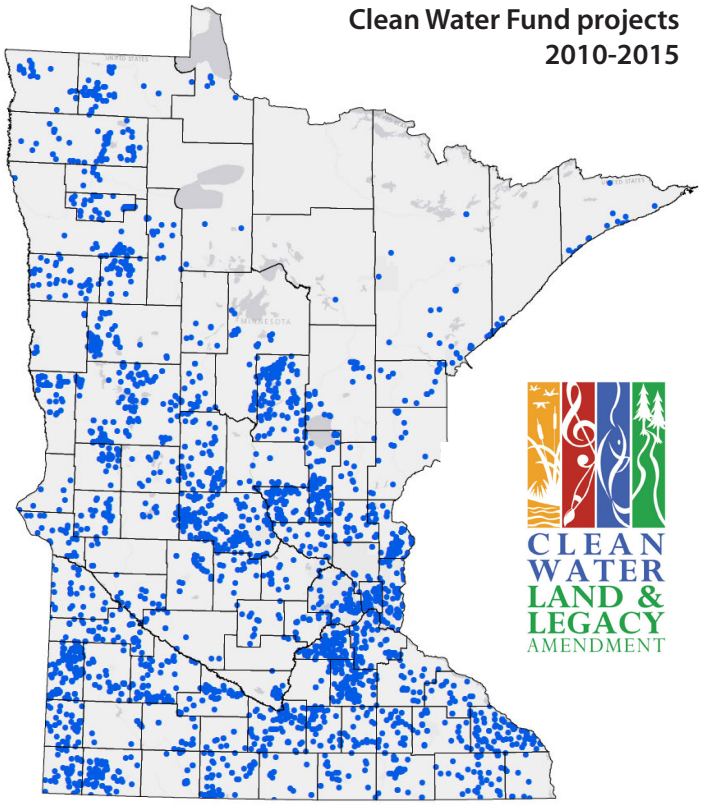
- Implement conservation practices on your land
- Find out about financial resources
- Receive technical assistance
- Learn more about conservation practices

Helping Minnesota communities thrive

The Clean Water Fund, established by the Clean Water, Land and Legacy constitutional amendment in 2008, has been critical in moving many statewide water quality initiatives forward. The fund provides approximately $85 million per year in funding to State agencies for implementation projects, including conservation work being done at the local level.

Examples of Clean Water Fund projects in Northeast Minnesota include:

- A partnership between local governments and lake and resort associations to install stormwater practices to protect Lake Vermillion
- Rain gardens in the City of Grand Marias to reduce direct storm water impacts to Lake Superior
- Shore land management practices to protect Big Sandy Lake in Aitkin County
- Restoring Elm Creek, a tributary to the Nemadji River in Carlton County, by retrofitting failing sediment control structures.
- The Minnesota Agriculture Water Quality Certification Program has certified 32 producers in Northeast Minnesota, representing 7,718 acres, as of June 1, 2017



Investment in action: Knife River

The Knife River plays an important role in the Northeast region. It is home to Minnesota's naturalized wild steelhead trout population and water quality in the river affects Lake Superior. Currently, the Knife River is impaired due to soil erosion along the river's banks, causing cloudy water.

The Lake County Soil and Water Conservation District (SWCD) received funding from the Clean Water Fund to stabilize the largest bank in need of repair. The project restored the natural channel and has drawn interest as a demonstration site for this approach to river restoration.

The project reduced sediment load, encouraged vegetation growth, and restored banks. "You can already visibly see how it's keeping sediment out of the river," Dan Schutte, Lake SWCD Manager said. "We've set ourselves up for success."

Building momentum

Resources to support your involvement

Sign up for email updates on 25% by 2025: **www.eqb.state.mn.us/25by25**

Test your private well: **www.health.state.mn.us/divs/eh/wells/waterquality/test.html**

Check the health of your lake or stream: **www.pca.state.mn.us/data/surface-water**

Make changes at home: **www.pca.state.mn.us/12things**

Participate in conservation programs through your county Soil and Water Conservation District:

- Technical assistance and guidance on projects
- Conservation Reserve Enhancement Program (CREP) and Reinvest in Minnesota Wetlands Program
- Minnesota's Erosion Control Cost Share Program

Encourage your city to join the Minnesota GreenStep Cities program: **greenstep.pca.state.mn.us**

Participate in the Minnesota Agriculture Water Quality Certification Program. Contact your local SWCD to apply; learn more at **www.mda.state.mn.us/awqcp**

Volunteer to monitor a local lake or stream: **www.pca.state.mn.us/cmp**

Connect with your watershed organization for education, volunteer opportunities, technical assistance, and connection to financial resources:

- St. Louis River Alliance: **www.stlouisriver.org**
- Lake Superior Streams: **www.lakesuperiorstreams.org**
- Friends of the Cloquet Valley State Forest: **www.friendscvsf.org**
- Your county Soil and Water Conservation District: **www.maswcd.org**