Cedar Lake Watershed Project

Clean drinking water

Economic benefits

Recreation opportunities

Educational resources

A home for wildlife

Building a brighter future for Madison County

Cedar Lake Quick Facts

Watershed size:
10,700 acres
(17 square miles)

Lake size:
80 acres

Watershed land use:
79% crop rotation
5% pasture
6% woodland/trees
10% other

- Provides drinking water to 4,768 people in Madison County
- Has been a water supply since 1940
- Has been Winterset's *only* water supply since 1995
- The lake's surface area has decreased by 28 percent in the last 23 years
- Wetlands, buffers, in-field practices and lake expansion could substantially lower nitrate levels in the lake

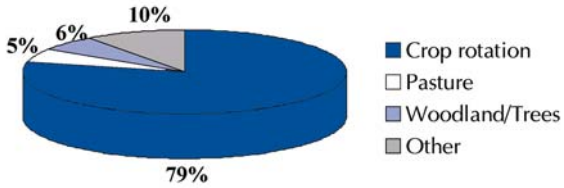
A 2003 summer intern walks past a newly constructed wetland.

A solution to water

For years, Cedar Lake has been there for the Winterset community, providing drinking water, offering recreational opportunities, teaching students outdoors lessons and giving wildlife a home. With water quality a serious concern, it is now our turn to be there for the lake.

The water quality of Cedar Lake needs improvement — nitrate levels in recent years have exceeded federal and state limits, placing the lake on the state's impaired waters list. Taking the entire Cedar Lake watershed into account is an important part of improving the lake's water quality.

Cedar Lake Watershed Land Use



The Cedar Lake watershed — an area of land that drains into a body of water — covers more than 10,000 acres (or 17 square miles) and includes a number of streams, farm fields and residential areas. Because water drains from these areas into the lake, both positive and negative actions throughout the watershed determine the lake's water quality. We are all part of the watershed, and local community support is essential in improving Cedar Lake's water quality.

The incredible shrinking lake

Since 1939, Cedar Lake has provided a place for Madison County residents to spend a quiet day fishing, picnicking, canoeing, walking, bicycling or just enjoying nature.

In 1940, Cedar Lake became a source of drinking water for Winterset. The lake has been the city's only drinking water source since 1995.

The lake was originally built to hold 350 million gallons of water and cover 90 acres of surface area. However, the Cedar Lake watershed is located amongst some of the most productive agriculutural areas in the county.

Erosion and runoff from agricultural land, streambanks, golf courses and residential lawns within the Cedar Lake watershed have added to sediment deposition in the lake. Extra sediment has contributed to the lake's storage capacity decreasing year by year.

A lake bottom survey completed in 1973 showed the lake's storage capacity had fallen to 115 million gallons. A spillway was raised in 1979 to increase the lake's storage to 315 million gallons.

A 1989 survey showed Cedar Lake's storage volume at 258 million gallons, an improvement from 1973, but still almost 100 million gallons lower than its original storage capacity.

quality problems: wetlands

DRINKING WATER IMPLICATIONS

Chemicals found in the lake are proving to be problems for the public water supply.

High nitrate levels in Cedar Lake can make drinking water unsafe for pregnant women and infants under six months old, even if the water is used in infant formula or is boiled or filtered. Shortness of breath and blue baby syndrome are nitrate-related health risks for infants. High nitrate levels have caused Winterset Municipal Water Utility to offer the public distilled water in the past.

Atrazine, a common herbicide, is also found in high levels in the lake. Liver, kidney, and heart damage, as well as birth defects, have been observed in animals exposed to atrazine, although these effects have not been proven in humans, according to the Agency for Toxic Substances and Disease Registry.

Nitrates, atrazine and other chemicals find their way into waterbodies as part of runoff from farm fields, residential lawns and golf courses.

Also, the size of the lake is becoming inadequate to serve the growth of the Winterset community. Soil deposits from erosion have reduced the lake's surface area by 28 percent in the last 23 years.

A farm wetland in the Cedar Lake watershed.

The current annual water use demand of 207 million gallons is close to the lake's storage capacity of 259 million gallons. Winterset Municipal Utilities estimates that demand will reach 266 million gallons in 2010 and 307 million gallons by 2020.

TREATMENT OPTIONS

Cedar Lake is not meeting its Class C designated use as a source of potable drinking water because it exceeds the nitrate-nitrogen maximum contaminant level (MCL) of 10 mg/L. As a result, the lake has been placed on Iowa's impaired waters list, making it a candidate for development of a Total Maximum Daily Load (TMDL).

A TMDL is a calculation of the maximum amount of a pollutant (in Cedar Lake's case, nitrate) that a waterbody can receive and still meet the water quality standard. The difference between the TMDL load and the amount of nitrate currently entering Cedar Lake represents the amount of nitrate reduction necessary for the lake to achieve its designated uses.

Denitrification Plants

One option for removing nitrates from drinking water is a nitrate removal plant. However, installing such a plant will not impact the lake's nitrate levels, remove the lake from the state's impaired waters list or increase the lake's storage capacity.

Low water levels expose a boat dock along the Cedar Lake shore.

Even if the City of Winterset installed a treatment plant or switched to an alternative water source, a TMDL would still need to be completed for Cedar Lake.

Wetlands and Lake Expansion

Building watershed structures like wetlands can help filter out nitrates. Buffer strips and terraces can help control the amount of runoff and eroded soil entering the lake, including attached pollutants like atrazine and farm and lawn chemicals before they reach the lake. Combined with lake expansion, this can lower nitrate levels substantially.

"By installing wetlands in the watershed, we are attempting to correct the problem at the source," said Wayne Shafer, NRCS district conservationist. "If we can work with producers to apply less fertilizer and install wetlands that will use up the nitrogen in runoff, then we reduce the amount of nitrates being delivered to the lake."

Expanding the lake would increase storage capacity to 614 million gallons, creating an adequate water supply, and helping to reduce nitrate levels. Significantly lowering nitrate levels could allow Cedar Lake to be removed from the impaired waters list.

Cleaning up the lake: A comm

We all need clean water to drink. However, we also have a responsibility to make sure that our water stays clean. Keeping water clean begins at the source.

Duckweed and algae cover a tributary of Cedar Creek. The creek drains into Cedar Lake.

The Cedar Lake watershed project needs the help and support of both the urban and rural communities to be successful.

Getting involved with public meetings on the watershed project allows residents to voice their opinions and work towards the project goals and completion of watershed structures.

A number of local organizations are involved in working towards a better lake, including the City of Winterset, the Madison County Soil and Water Conservation District and the Cedar Lake Steering Committee. The committee is an advisory board that helps to pinpoint areas of major concern, and is open to the public.

In addition to supporting pollution reduction practices like wetlands, area residents can help improve and maintain Cedar Lake's water quality in a number of ways on an everyday basis.

Some possible everyday ways to help keep the watershed clean are:

- Conserving water, from shorter showers to less frequent lawn-watering
- Volunteer as a water monitor
- Dispose of all trash properly
- Perform regular maintenance on septic systems

Landowner's practices help

Tom Beeler

About three miles upstream of Cedar Lake, a wetland and pond on Tom Beeler's farm help trap soil and treat tile water from terraces.

A large percentage of his 160-acre farm west of Winterset is terraced, and Beeler is planning to reshape waterways and add more filter strips. Beeler also works with nutrient management.

"I'm not doing anything extraordinary," Beeler said. "It's just the way I feel I should conduct my farming business."

The two-acre pond and half-acre wetland, which is charged by the pond, provide both conservation and recreation benefits.

Beeler has seen an increase in wildlife and uses the pond for fishing and swimming.

The conservation practices have also helped Beeler to conserve soil.

"No one wants to apply nutrients and see them wash off before you can use them," he said.

Tom Beeler's farm pond attracts wildlife and helps filter water before it reaches Cedar Creek.

munity effort

- Avoid over-applying lawn and crop fertilizers: excess fertilizer, loaded with chemicals, can runoff with rainfall into bodies of water in the watershed

- Keep livestock out of streams

High school students learn about watershed practices and methods from a Madison County Conservation Board naturalist.

watershed

The structures on Beeler's farm help keep excess soil and nutrients from washing into Cedar Creek, which flows into Cedar Lake. Beeler said it's just part of an overall effort to clean up the watershed.

"There's a lot of people who use Cedar Lake for recreation," Beeler said. "With work, it could offer even more. But recreation is a fringe benefit — being a water source is the most important function."

Beeler's volunteer efforts are part of staying ahead of the game. If landowners weren't installing these practices now to improve water quality, it may become required in the future, he said.

"If enough of us do that, hopefully mandates won't come down," Beeler said.

CRP wetland adds to landowner's efforts

Larry Jackson

Saving soil and keeping water cleaner inspired Larry Jackson to install a five-acre wetland on his property in late 2003.

While the wetland is still a recent addition, watershed projects are nothing new to Jackson, who has used no-till farming methods for over 20 years. Filter strips are in place around water and grass waterways are planned for this spring.

Jackson's farm, located about three miles west of Winterset, has about 400 acres in row crops. The land drains into Cedar Creek, which in turn drains into Cedar Lake.

"A lot of people depend on that lake," Jackson said. Watershed projects would "benefit the city a great deal."

The wetland was installed through the continuous Conservation Reserve Program (CRP) practice CP-9, or wetland creation on crop ground. The program offers annual rental payments and cost-share assistance to farmers wanting to build long-term conservation projects.

The cost of building a wetland was initially a consideration for Jackson, but CRP funding convinced him to go ahead with the wetland.

"It just sounded like a good deal," he said.

In addition to conservation benefits, the wetland also serves as a backup for fire departments. Jackson's farm features a dry hydrant, which allows firefighters to draw water from the wetland in case of a nearby fire.

The dry hydrant (inset) in Larry Jackson's wetland provides access for firefighters during rural fires. The CRP wetland is just one of Jackson's conservation practices.

Water quality benefits reach

Improvements to the quality of drinking water may be the most apparent benefit to creating watershed projects for Cedar Lake, but improving the lake's water quality can have other positive effects throughout the community.

Improved water quality could help create a better habitat for wildlife, like these geese, and in turn boost the local economy.

LOCAL ECONOMY

While building the watershed projects would create new jobs in itself, the economic benefits could last much longer.

A better lake would create a more suitable habitat for wildlife and aquatic species, which would increase fishing and other recreational opportunities. An increase in use of Cedar Lake would also increase local business.

An expanded Cedar Lake could also lead to new housing developments, bringing new residents to Winterset and Madison County, along with new businesses to serve these new residents.

EDUCATION

Currently, Cedar Lake is used as an educational resource for students from the elementary school level through college. Younger students learn about the water supply and water quality, while high school and college students volunteer as water monitors, watching how events throughout the watershed affect the lake.

A NRCS field technician explains global positioning (GPS) equipment to a high school student.

As improvement projects progress, students can learn how water quality projects and ecosystems work. When the watershed projects are completed, the lake and the surrounding

IOWATER: Water monitoring education

Some residents of the Cedar Lake watershed are taking water quality into their own hands.

High school students use an IOWATER testing kit.

Equipped with a test kit, volunteers venture to their chosen points throughout the Cedar Lake watershed to test water quality.

As part of the DNR volunteer program IOWATER, monitors collect information on the levels of nitrates, nitrites, dissolved oxygen, pH, chloride and phosphate in creeks, streams and the lake.

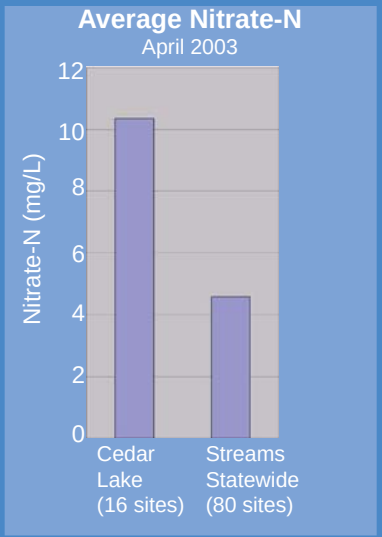
Some monitors also report on the water's temperature and color, and on biological life in the monitoring area, which is often an indicator of water quality.

Monitors report their data to the IOWATER online database, where the public can view water monitoring results from across the state.

In April 2003, a snapshot monitoring event was held, where 16 sites throughout the Cedar Lake watershed were sampled within a short period of time. The event's results were compared to monitoring results from 80 other Iowa sites.

This comparison found that nitrates in Cedar Lake were drastically higher than in other waters in the state.

To volunteer with IOWATER, contact Brian Soenen at (515) 281-6640 or e-mail iowater@iowater.net.



beyond the shoreline

area could serve as an outdoor classroom to nearby students.

In addition, the implementation of the watershed projects would give local residents an education on where water entering Cedar Lake comes from and what needs to be done to ensure the health of the water supply.

RECREATION

Cedar Lake is a public park, maintained by Winterset Municipal Utilities. Some possible recreation opportunities that could be considered to accompany lake improvement projects include:

- Adding a bike/hiking trail, running from Winterset and around the lake
- Improving picnic and fishing areas around shoreline
- Adding hiking areas near lake
- Increase local hunting opportunities for deer, ducks or geese
- Increase fish habitat
- Hosting more events, like the previous Kids Fishing Days and Free Fishing Days

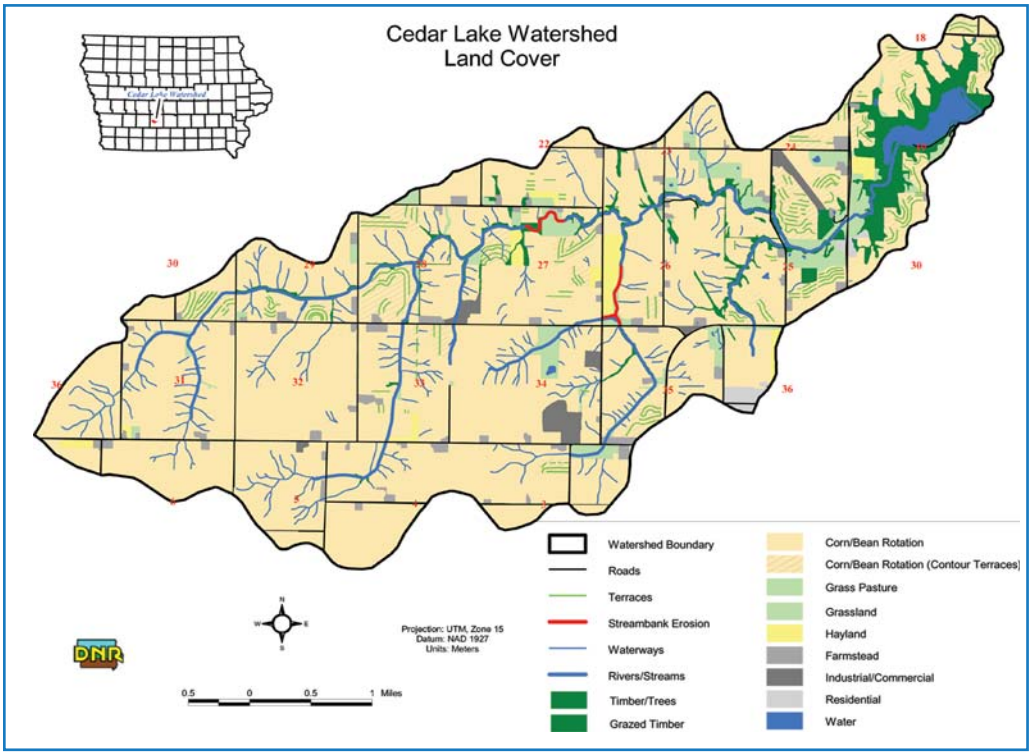
Goals of the watershed project

- To build large wetlands to remove nitrate from tile drained cropland areas.

Landowners with land that meets Conservation Reserve Enhancement Program (CREP) criteria for nitrate-removal wetlands may be eligible for federal and state incentives.

The watershed project would also include these other practices and structures:

Contour Buffer/ Filter strip
Riparian Buffers
Nutrient and Pest management
Rotational Grazing
Terraces
Erosion control basins



This diagram shows how land is used throughout the Cedar Lake watershed. Land use ranges from residential, commercial and industrial areas to cropland, pastures, grasslands and timber areas.

The actions and practices that take place in these areas affect not only nearby bodies of water, but all downstream water sources, including Cedar Lake.

CREP helps landowners build wetlands

CREP, or the Conservation Reserve Enhancement Program, works with landowners to establish wetlands and improve water quality.

Wetlands similar to this one can be built with help from CREP funding.

By enrolling in CREP, landowners receive long-term financial assistance from federal and state funds for conservation projects.

A 15-year CREP contract provides:

- Annual rent payments from U.S. Department of Agriculture of 150 percent of the weighted average cropland soil rental
- 100 percent cost share for installing CREP practices
- $5 per acre annual maintenance payments
- A one-time payment of $600 per acre from the state for a perpetual easement or $325 for a 30 year easement

Specific eligibility criteria have been established for the Iowa CREP to assure site feasibility and nitrate removal performance:

- Drainage area greater than 500 acres
- Wetland should be 0.5 - 2 percent of watershed drainage area
- To maintain wetland vegetation, no more than 25 percent of the wetland should be three feet in depth
- The wetland shall not damage the value of property in any public or private system without the property owner's consent

Research at Iowa State University has shown that wetlands meeting program requirements will remove between 40 and 90 percent of the nitrate received.

The wetland remains the property of the landowner and can be used for personal recreation or leased for outdoor recreation.

Besides the economic benefits of building a CREP wetland, landowners may see an increase in wildlife and improved water quality.

For more information on CREP, contact the Madison County Soil and Water Conservation District at (515) 462-2961.

For more information

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