



Citizen Monitoring of Surface Water Quality

2005 Report to the Legislature

January 2005

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COVER PHOTOS:

Center: Students in the St. Louis River-River Watch program collect chemical, physical and biological data twice per year at river sites located throughout northeastern Minnesota. The data are shared among all schools, as well as with state and local communities, to protect and manage the Western Lake Superior Basin ecosystem.

Left: Mary Karius, Volunteer Stream Monitoring Program Director - helps adult volunteers identify macroinvertebrates.

Right: A Citizen Lake Monitoring Program volunteer lowers a Secchi disk to measure water transparency in Crow Wing Lake in Crow Wing County.

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This report can be made available in other formats, including Braille, large type, or audiotape upon request. This report is printed on paper with at least 20 percent post-consumer recycled paper.



A Cannon River Watershed Partnership volunteer records the transparency of the river in the Cannon River Wilderness Area.

INTRODUCTION

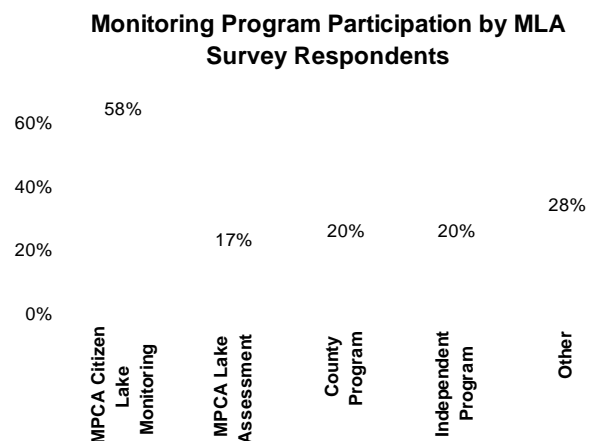
Minnesota is fortunate to have abundant water resources – 92,000 miles of rivers, 12,000 lakes and more than nine million acres of wetlands. Of the 48 contiguous states, Minnesota has the greatest amount of surface water, and Minnesota’s economy and recreational opportunities are dependent on the quantity, quality and diversity of its water resources.

With these abundant resources, however, come challenges – how to monitor, protect and restore such a vast number of waters. Citizen monitoring is a critical component in responding to the challenge, and its role is increasing over time – both in numbers of citizens participating and in use of citizen data.

The extent of citizen monitoring

Minnesota citizens have participated in monitoring Minnesota’s water resources since at least the 1970s. A survey conducted by the Rivers Council of Minnesota (RCM) in 2002¹ identified nearly 50 groups that organize/rely on citizen monitoring and work with about 4,000 volunteers. Since that survey, RCM has identified more than 90 organizations in Minnesota coordinating citizen monitoring, nearly doubling the number of organizations identified in 2002. This indicates the total number of volunteers likely greatly exceeds their 2002 estimate.

Also in 2002, the Minnesota Lakes Association (MLA) surveyed its members² regarding monitoring under way in lakes. Survey respondents indicated that 83 percent were involved in some type of lake water quality monitoring. The chart at right identifies the monitoring programs in which survey respondents participate.

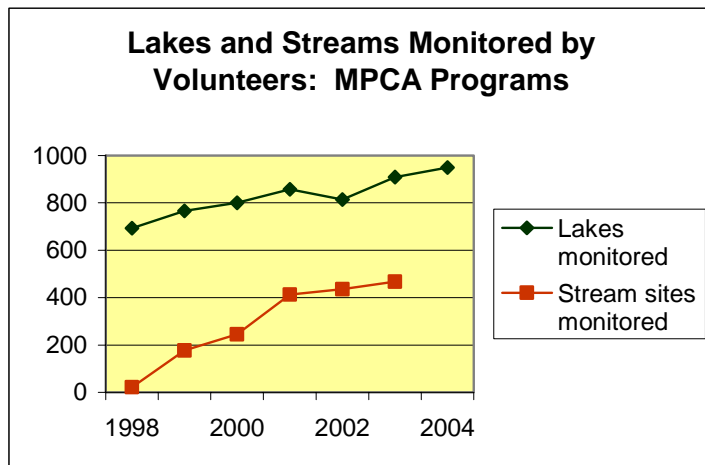


¹ Becker Kudelka, Angie, Rivers Council of Minnesota, and Geoff Dates, River Network. April 2003. *An Evaluation of Citizen Volunteer Water Quality Monitoring in Minnesota.*

² Minnesota Lakes Association website: www.mnlakes.org

In addition to these organizations, a broad range of organizations work with citizen monitors – from local governments and watershed districts to non-profits and coalitions of water resource groups. A few examples provide a sense of the breadth of volunteer monitoring activity. The Wetland Health Evaluation Program (WHEP), a cooperative project of Dakota and Hennepin Counties and MPCA involved 137 volunteers and 147 volunteers in wetland monitoring in 2003 and 2004, respectively. Another metropolitan area project, the Volunteer Stream Monitoring Partnership (VSMP), coordinates stream monitoring by nearly 1,500 volunteers at 60 sites on 30 Twin-Cities-area streams. Metropolitan Council Environmental Services operates a Citizen Assisted Lake Monitoring Program (CAMP) for lakes in the metropolitan area, with 120 volunteers monitoring 148 different lakes in 2003-2004.

In Greater Minnesota, a wide variety of organizations work through citizens to monitor our water resources. From citizens monitoring stream sediments in southeastern Minnesota coordinated through a recent effort by Winona State University to volunteers monitoring Rainy Lake on both sides of the border, to a consortium of agencies and organizations comprehensively monitoring the Red River Basin, citizens can be found across Minnesota actively monitoring lakes and streams.



Statewide, citizen monitoring programs – the Citizen Lake-Monitoring Program (CLMP) and the Citizen Stream-Monitoring Program (CSMP) – have also increased the number of participants and lakes and streams monitored. In 2003, CLMP and CSMP have 1,297 and 521 volunteers respectively, and lakes and stream sites monitored have also increased over time as shown in the chart at left.

Purpose of this report

This report provides a 2003-2004 update on citizen monitoring activities, as required by Minn. Stat. § 115.06, subd. 4, highlighting the following areas:

- Improvements in MPCA’s overall monitoring activities
- Use of citizen monitoring data
- Technical/financial assistance
- Accessibility of data, including accessibility of citizen data
- Promotion of Citizen Monitoring

The report is intended to provide a brief summary of advances made in citizen monitoring in the last two years. A more complete description of state and local monitoring programs and purposes is contained in *Minnesota’s Monitoring Strategy 2004-2014*.

IMPROVEMENTS IN MPCA'S OVERALL MONITORING ACTIVITIES

In 2003 and 2004, MPCA made changes to its surface water quality monitoring activities. The changes came about as a result of recommendations of the Impaired Waters Policy Work Group (G16), funding from the Legislative Commission on Minnesota Resources (LCMR), and a revision of the MPCA's strategic plan. Many of the changes directly relate to citizen monitoring:

Minnesota Water Quality Monitoring Strategy. In 2004, MPCA developed a comprehensive strategy for water quality monitoring for the next ten years, covering both surface and ground water. The surface water assessment portion, developed in collaboration with the Impaired Waters Policy Work Group, includes a four-part approach: monitoring by the MPCA, monitoring by other organizations, remote sensing and citizen monitoring. The strategy will result in comprehensive assessment of Minnesota's lakes and streams from its current level of 8 percent and 14 percent of streams and lakes, respectively. Within the strategy, less-intensive citizen monitoring provides greater monitoring frequency and geographic coverage, supplementing the more rigorous monitoring of MPCA and other groups.

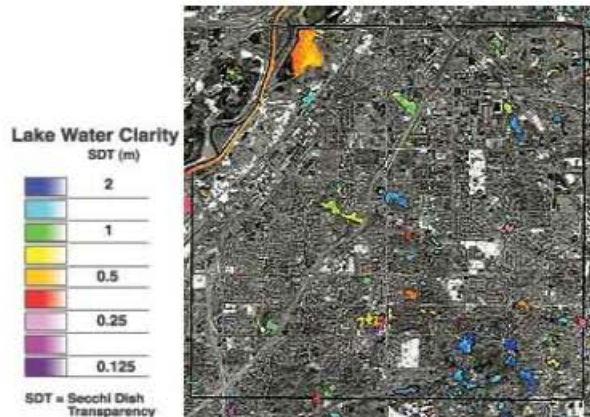
Remote Sensing of Lakes and Streams. With funding from the LCMR, the University of Minnesota completed a statewide remote sensing of lakes. While remote sensing provides the greatest level of geographic coverage at the least cost, the information generated is not sufficient to use in Clean Water Act water quality assessments. In Minnesota, remote sensing will be used as a targeting tool, to identify lakes and streams that warrant more rigorous monitoring and assessment. Development work for remote sensing of streams statewide is currently underway.

Acceleration of Integrated Monitoring and Increased Use of Other Organizations' Data.

In 2004, with LCMR funding, MPCA accelerated its work on the Index of Biotic Integrity (IBI) for streams. Developing the statewide IBI will allow MPCA to assess streams for impairments based on biology, as well as chemical and physical changes. MPCA now expects to have completed IBIs for all basins in 2005, two years earlier than previously expected. This early completion will allow the agency to conduct integrated monitoring (biological, physical and chemical) on a rotating basin schedule beginning in 2006, giving a more comprehensive assessment of Minnesota stream conditions.

MPCA also increased its use of data from other organizations in its assessment processes. In 2004, 21 percent of the stream data used was collected by external parties and 19 percent collected jointly by external parties and MPCA. This has significantly increased since 1994, when the external parties collected only 6 percent and joint collection accounted for 7 percent of the data used in assessments.

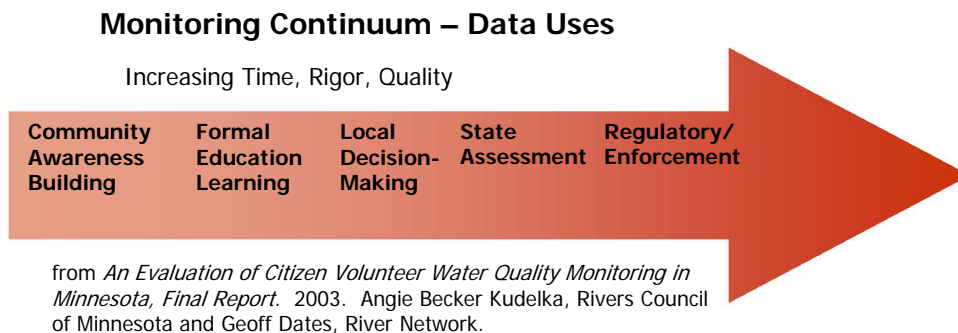
Remote Sensing: Map of lake water clarity for City of Eagan



Remote sensing measures light wavelengths from satellite images and aerial photography to show water clarity. The data is correlated to volunteer secchi disk readings, and the color reflects the clarity of the water body in meters of secchi disk transparency. Remote sensing along with volunteer monitoring provide a picture of more lakes at less cost and will be used to target and prioritize more rigorous monitoring.

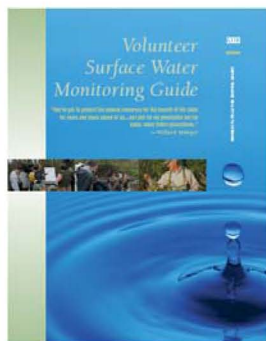
USE OF CITIZEN MONITORING DATA

MPCA, local governments and other organizations increased their use of citizen data over the last few years. Data can be used for a variety of purposes, illustrated in the monitoring continuum below. As organizations move their monitoring activities along the monitoring continuum, more rigorous and quality assured data is needed, which requires more time and cost.



Recent increases in the use of citizen monitoring data include:

Guidance for Volunteers. Volunteer monitors now have clear guidance on the data quality needed to have their data used in state assessments under the Clean Water Act. As part of producing the *Volunteer Surface Water Monitoring Guide*, developed by a stakeholder group as guidance for volunteer water monitors, specific monitoring requirements are documented for MPCA's 305b and 303d assessments (305b and 303d are sections of the Clean



Water Act, under which states identify the condition of waters and waters that are impaired). Volunteer monitors following these requirements and submitting their data to the MPCA can be assured that their data will be included in state assessments.

Using Citizen Data Locally: Awareness-Building and Education

- Volunteers have monitored **Bass Lake** in Wright County, near Annandale, Minnesota, for 14 years. Transparency data has shown a statistically significant decline in water clarity. As a result, the county and volunteers will work with MPCA staff to investigate why the lake is exhibiting the water clarity decline. This information can then be used to make management changes to improve clarity.
- The Rainy River Community College developed a curriculum around water monitoring on **Rainy Lake**. Students from three classes gather water quality data in the area west of the National Park boundary and to assess near-shore impacts of failing sewage treatment systems. On the Canadian side, about 5 volunteers participate in the project, and additional Canadian volunteers monitor transparency and phosphorus monthly.
- In the Red River Basin, 50-60 schools, as part of the River Watch, monitor the Red River six to eight times each year, covering the entire river from Wheaton to Roseau. Students monitor for chemical parameters and use T-tubes for transparency measurement. The data is used in basin planning and other assessments in the area.

Data Use in State Assessments. For many years, MPCA has used its CLMP Secchi disk transparency data in conjunction with nutrient data in assessing lakes for 305b and 303d reports. In addition, Metropolitan Council's CAMP nutrient and Secchi disk data is also used in assessments. To determine the feasibility of using Transparency-tube (T-tube) data for assessing streams, MPCA and other organizations collected simultaneous T-tube and turbidity readings across the state for four years. In the last year, the MPCA analyzed that data, finding a scientifically-based link between T-tube readings and

turbidity. With that link, the MPCA developed criteria for use of T-tube data in assessments. In 2006, MPCA will for the first time use T-tube data collected by citizens in determining stream turbidity impairments.

MPCA expects to have approximately 459 stream reaches that have sufficient data to be assessed in 2006 under the state's turbidity standard. Of those, 322 reaches will be assessed relying primarily on T-tube data. For lakes, of the 1,790 lakes with enough data to be assessed, 1,763 have Secchi disk data. The majority of the Secchi and T-tube data to be used for these assessments is collected by volunteers.

Remote Sensing Model Calibration. As noted earlier, citizen data is critical to the remote sensing currently being undertaken by the University of Minnesota. CLMP data is used to calibrate the remote sensing model, allowing the state to use a highly-efficient technique to get a statewide look at water quality in lakes. CSMP data will be used to calibrate the remote sensing model for streams as well.

Data Use for Lake Trends. Citizen Secchi disk data is the principal source of information for studying trends in lakes and providing information to potential property owners on the quality of specific lakes. MPCA also develops trend fact sheets for counties with 10 or more lakes and enough data to perform trend analysis (trend analysis identifies whether lake clarity is increasing or decreasing over time). The fact sheets are provided to volunteers and used by local resource managers in decision-making.

Using Citizen Data in Local Decision-Making

- CLMP volunteers monitored **Cedar Pond** in Eagan for decades, and the city performed chemical tests every two weeks in the summer. In 2000, WHEP selected the site for biological monitoring. WHEP's data showed severe degradation with little diversity, poor water quality and clarity and was used to make a case for restoration. In 2001, the city, county and DNR began a restoration – removing a retaining wall, planting native vegetation, and installing rain gardens. The city enlarged the pond's outlet, created two new inlets, and stocked the pond with chorus frog tadpoles. WHEP continues to monitor the pond and is finding improved scores for vegetation, however, to date, macroinvertebrates have not shown as much improvement.
- Becker County Coalition of Lake Associations initiated a citizen volunteer lake monitoring activity in 1993 to collect reliable total phosphorus and chlorophyll-a data along with CLMP transparency information. Today, eight counties have joined in the effort to form a **West Central Minnesota Coalition**, monitoring more than 250 lakes. Cooperators gain an improved understanding of the lakes; resource managers have current information for management decisions, and lake residents better understand the phosphorus/chlorophyll/Secchi disk relationship and pass on information to others. MPCA also uses the data in its impaired waters assessments.
- The **Cannon River Watershed** Partnership identified a way to estimate the phosphorus load leaving the Straight River based on volunteer transparency tube data, collected in collaboration with the CSMP. The Partnership used this information when they were examining the Byllesby Reservoir's nutrient budget and determining where to focus management efforts.

TECHNICAL AND FINANCIAL ASSISTANCE FOR CITIZEN MONITORING

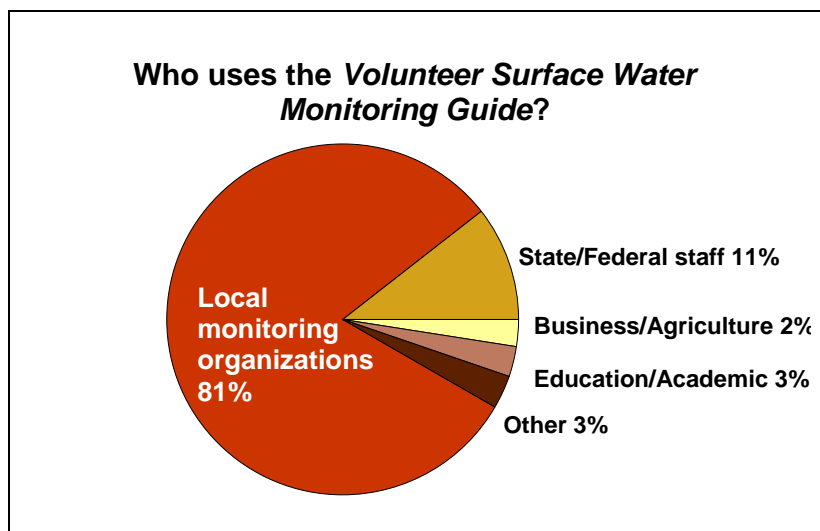
In the last few years, a number of advances in providing technical and financial assistance to citizen monitors have occurred, in part due to Legislative Commission on Minnesota Resources (LCMR) funding.

Rivers Council of Minnesota (RCM) has developed a **Service Provider Directory website**. This allows citizens to search through the list of over 90 providers to find an organization which provides direct, technical, or resource services. These services range from training and data analysis to financial assistance through loans or grants. <http://www.riversmn.org/directory.html>

Volunteer Monitoring Guidance. In 2002 and 2003, MPCA and a group of stakeholders developed a much-needed *Volunteer Surface Water Monitoring Guide*. The *Guide* addresses monitoring plan design, data storage, data quality, and data management, to help local groups in decision-making about their monitoring projects. More than 950 copies of the *Guide* have been distributed in hard copy or on CD, the majority of which are being used by local monitoring groups.

Training Courses/Activities

In order for citizen volunteers to conduct the monitoring necessary for the variety of purposes along the monitoring continuum, training is necessary. A number of organizations exist to train volunteers to collect chemical, physical, and/or biological data from rivers and streams. The training programs vary depending on the focus of the monitoring.



The MPCA offers volunteers a basic transparency monitoring program for both rivers and streams state wide. The **CLMP** involves monthly Secchi disk readings at an established location on a lake. The **CSMP** involves weekly transparency measurements at an established stream site and daily rainfall observations. Both provide data that is used in trends and assessments. The CLMP also offers a 'Plus' program. This program works collectively with local water resource staff, lake volunteers, and MPCA staff to monitor a set of lakes for chemistry and temperature, in addition to transparency over the course of a summer. This program is driven by local interest, moving to a different county each monitoring season.

For metropolitan area lakes, the Metropolitan Council Environmental Services operates a program similar to MPCA's CLMP Plus program, the **CAMP**. Through the program, citizens collect chemistry data, Secchi transparency measurements and user perception information about the lake's physical and recreational condition, on a bi-weekly basis, April through October. The data is used to provide water quality information to lake and watershed managers to help them properly manage the resources and also help document water quality impacts and trends.

The **VSMP** and **WHEP** both fill a niche in the metropolitan area that is currently missing at the statewide level. The WHEP program provides volunteer biological monitoring of wetlands in Dakota and Hennepin counties. This program involves a partnership between the MPCA, local water resource managers, counties, and citizens to monitor the macroinvertebrates in wetlands. The VSMP is a macroinvertebrate monitoring program for streams in the metropolitan area. This program works with local water resource managers, county staff and area schools to monitor the biological health of neighborhood streams. In addition, VSMP in conjunction with the University of Minnesota developed the *Guide to Aquatic Invertebrates of the Upper Midwest*. This guide is available to the public at wrc.coafes.umn.edu/VSMP/education.htm or in print from the University of Minnesota Water Resources Center. The guide is designed for use by students, citizens, and professionals for identifying aquatic macroinvertebrates.

Using funding awarded by the Legislative Commission on Minnesota Resources, Minnesota Lakes Association and Rivers Council of Minnesota developed a **Monitoring Plan Training** program. This training takes lake and river groups through the steps of developing a plan for the “who, what, where, when, why, and how” they will monitor their waterbody. This training connects citizens with their local water resource managers to ensure that the data is used locally. In addition, volunteers who go through the program also receive the *Volunteer Guide to Surface Water Monitoring* and are introduced to the steps necessary for their data to be used in state assessments by the MPCA.



On the banks of the Vermillion River in Hastings, Joe Beattie, Hastings Public Schools instructor, provides training to students in the Vermillion River Watch Program. The Hastings High School Journalism Class is filming the training event.

Training for **high school and college students** to monitor water quality is also occurring around the state through River Watch and other similar programs. The programs link teachers and students with monitoring experts to provide hands-on environmental education, promote river stewardship and gather water quality data.

The MPCA produced a 50-minute **training video** for volunteer lake and stream monitors in both VHS and DVD formats. The video shows volunteers how to properly conduct their monitoring activities ranging from how to take transparency readings on lakes and streams to how

to properly collect water quality samples. The video will have closed-caption availability. Small clips will also be available on the MPCA web site.

Each of these training programs offers a different level of involvement for the volunteer, a different level of data collection (single parameter vs. multi-parameter), and a different level of cost associated with the training necessary to collect the data. The table below compares the cost, training materials, number of participants trained in this biennium, and level of data produced. As would be expected, there is a noticeable increase in the cost of training a volunteer from a single parameter program to a multi-parameter program, as the complexity of the monitoring activity increases.

Minnesota Volunteer Monitoring Training Activities Summary Table

Training Activity	#s trained (2003-04)	Cost per participant ¹	Training materials	Outcome
CLMP: Single parameter: transparency (use of Secchi disk)	~180 individuals	\$30	Kits and instructions sent to volunteers	Transparency data at new or continuation sites. Data summarized in annual report and used in state water quality assessments, trend reports.
CSMP: transparency (use of T-tube), rainfall, water level	~100 individuals	\$57	Kits and instructions sent to volunteers	Transparency data at new or continuation sites. Data summarized in annual report and used in state water quality assessments.
CLMP Plus: Water chemistry, temperature along with transparency	~10 lakes/yr	\$80	Advanced kit and instructions (reusable kit costs \$200)	Chemical, physical, transparency data for 7 lakes in Cook Co. in 2003; 15 lakes in Aitkin Co. in 2004.
WHEP: Biological monitoring training; sessions on field, plant and macroinvertebrate ID	365 individuals	\$74	Macroinvertebrate and vegetation guides	2004: 147 volunteers monitored 49 wetlands dedicating 2,439 hours in Dakota, Hennepin counties.
Monitoring Plan Pilot Training: RCM/MLA A train-the-trainer model. 3-day training focused on developing plans; follow-up and review of plans and \$3,000 to 6 groups for plan implementation.	~ 50 leaders (14 groups)	NA ²	<i>Monitoring Plan Training Manual/Workbook</i>	Each group develops a monitoring plan and writes a final report, with lessons learned
Monitoring Skills Enhancement Training RCM/MLA: 8 training sessions in 2004/2005 to build specific skills (data collection, analysis, etc.)	Underway. ~20 groups by end of 2005	NA ²	Depends on skills topic	The training will enhance or expand current skills and monitoring activities.
VSMP: Introductory and advanced macroinvertebrate identification; use of centralized database	85 individuals	\$60 (Training is continued as needed locally)	<i>Guide to Aquatic Invertebrates of the Upper Midwest</i> ; VSMP Workbook	Individual county water resource offices. Counties generate reports and data is used/presented to local water groups/county meetings.
CAMP: Water chemistry (phosphorus, nitrogen, chlorophyll), temperature, user perception, weather, transparency	~120 individuals	\$30	Kits which are reusable in following years (~\$150 and paid for by enrolling entity) and training handbook	Chemical, physical, user perception and transparency data for 128 metropolitan lakes in 2003 and 133 lakes in 2004 (total of 148 different lakes). All data are summarized in an annual report and stored in STORET.

¹ Costs are estimated based on time (contact hours, preparation, etc.) and materials.

² RCM/MLA trainings, funded by LCMR (\$75,500 for Monitoring Plan Pilot Training and \$28,000 for Monitoring Skills Enhancement Training), are in a pilot development stage. Due to the pilot nature of this program, costs per participant or group monitored are not available because it is difficult to separate development costs from time and materials costs.

ACCESSIBLE DATA AND INFORMATION

Increasing monitoring and data collection, in itself, is not enough unless the data is accessible and available for use. In the past two years, MPCA and others have undertaken a number of initiatives to make data more accessible.

The MPCA developed the **Environmental Data Access (EDA)** system to improve public access to environmental data (<http://www.pca.state.mn.us/data/eda/index.cfm>). The initial focus was to make statewide surface-water monitoring data more accessible to water resource planners and managers, and the public (air quality and ground water data will be added in the future). Users can access information about Minnesota's lakes and streams via the internet, through either map-based or text-based searches. All data in STORET, the state and federal water quality database, is accessible through the system. EDA has recently won both global and statewide awards for its design and ease of use. In addition to being available via the EDA, MPCA's citizen stream and lake monitoring data are available directly from the MPCA's CSMP and CLMP websites.

In 2003, MPCA hired a staff person to work exclusively with external organizations to assist in **ensuring that external data is entered into STORET**. As a result, STORET currently contains data from 22 citizen monitoring organizations, and the previously existing backlog of data awaiting entry into STORET has been eliminated. All data currently submitted for entry into the database is now entered in a timely manner. MPCA staff is currently developing a Water Quality Web Entry Tool (WQ-WET), to allow local water quality projects to more easily submit their data as a spreadsheet for loading into STORET, providing faster turnaround for data access. WQ-WET will be available for use in 2005.

Lake Siseebakwet: Citizen data helps to understand local lake

Citizens monitoring Lake Siseebakwet, 10 miles south of Grand Rapids, noticed water clarity decreasing almost 50 per cent from 1987 to 1997. Understandably, lake residents were very concerned and turned to local and state agencies for help. A comprehensive lake/groundwater assessment was undertaken by the MPCA, the lake association and Itasca Soil and Water Conservation District (SWCD). The assessment identified a strong effect on water clarity caused by high levels of dissolved calcium, likely derived from glacial sediments. The study also found that Siseebakwet Lake has a very high groundwater contribution to its annual water budget (about 40 percent).

Without the Secchi monitoring on this lake, residents would have had difficulty tracking the yearly, monthly and even daily changes in water clarity – changes that appear to be the result of factors other than increases in nutrients as originally feared. As a result of the detailed study of the lake, residents and others also have a better understanding of the groundwater flow that enters and leaves the lake, and how it influences water quality from shoreland development. While residents are still concerned about phosphorous and other nutrients entering their lake, their concern is tempered with knowledge of other, more natural causes of the water clarity changes.

The years following 1997 have shown an increase of water clarity back to the long-term average of about 12 feet. How much of the change in water clarity are due to changes in summertime calcium precipitation is not completely understood, but it does seem to correlate with yearly precipitation amounts, which are thought to drive groundwater flow to this lake.

– Art Norton, Manager, Itasca SWCD

Reports on wetland monitoring in Dakota and Hennepin counties are available on the **WHEP website** (www.mnwhep.org). MPCA is currently working with WHEP on a pilot project to enter the citizen biological wetland data into STORET. If successful, this will be the first time in Minnesota biological data will be available through STORET. MPCA-collected biological data for streams and wetlands are accessible through the MPCA's website. (www.pca.state.mn.us/water/biomonitoring/index.html)

The DNR **Lakefinder internet database** (www.dnr.state.mn.us/lakefind/index.html) is now linked to MPCA's CLMP and Lake Assessment Program data, allowing users to view both lake quality and other hydrologic information through the same site.

The **Metropolitan Council's CAMP** data are presented in an annual report, with a "report card" grade for the water quality of each lake. The lakes are graded for total phosphorus, chlorophyll-a, and water clarity, along with an overall grade combining the three. (www.metrocouncil.org/environment/RiversLakes/index.htm).

PROMOTING CITIZEN MONITORING

Despite the increase in citizen monitoring over the last few years, Minnesota is far short of its Monitoring Strategy 2014 goal of citizen T-tube monitoring at 3600 sites and citizen Secchi disk monitoring at all lakes larger than 100 acres (about 4,000 lakes). And, multi-parameter monitoring suitable for use in state assessments is expected to increasingly be conducted by groups external to the MPCA, including citizen groups. In light of this, monitoring coordination organizations engage in a variety of educational and promotional efforts to raise awareness about and promote citizen monitoring.

Rivers Council of Minnesota and Minnesota Lakes Association sponsored a **Lakes and Rivers Conference** in Spring 2004, with 325 participants, funded in part by the Legislative Commission on Minnesota Resources. The conference included more than 35 sessions and workshops on topics ranging from information on lake and river issues to training in water quality monitoring, dealing with local governments, communications and organizational capacity building. Workshops and sessions provided an opportunity for local monitoring groups to share information, improve their understanding of key water resource issues and enhance their monitoring skills. The Monitoring Congress track with seven sessions averaged around 50 participants each.

A new tool in 2004: a lightweight Secchi disk for use by Boundary Waters Canoe Area Wilderness visitors!



In 2004, its inaugural year, more than 20 people used the new lightweight plastic disk. MPCA partnered with the Friends of the Boundary Waters Canoe Area Wilderness for advertising, recruiting, and distributing the kits -- a disk, laminated instructions, and waterproof datasheet postcards. Kits and datasheets are returned via business reply mail. The kits proved to be up to the challenges of a Boundary Waters trip!

Minnesota citizen monitoring coordinating groups come in a variety of shapes and sizes. **Rivers Council of Minnesota's Service Provider Directory** is an internet directory of local government, non-profit and private organizations in Minnesota which provide technical and/or resource services to assist citizen monitors (<http://www.riversmn.org/directory.html>). The Directory, which contains more than 90 organizations, links citizen monitors with local organizations and includes a description of the type of assistance that can be provided.

VSMP sponsored annual **River Summits** in 2003 and 2004. The events bring together volunteer stream monitors from the metropolitan area to share information and receive recognition for their efforts. Attendance at the 2003 event exceeded 200, with 175 attending in 2004.

The **CLMP and CSMP** programs focused their marketing and recruiting efforts on distributing posters (1,700 distributed in 2004); targeted news releases recruiting volunteers; an advertisement in DNR's fishing regulations booklet; news media coverage; and through state and local fairs. Staff is working with the University of Minnesota Carlson School of Management to determine whether marketing students will be available to assist MPCA in developing a marketing strategy for CLMP/CSMP. In addition, CSMP partners with county and watershed project staff to recruit and maintain volunteer involvement.

SUMMARY

Citizen monitoring is an important part of Minnesota's water quality monitoring strategy, producing several beneficial outcomes and advances:

- Increased numbers of citizen monitors, new guidance and training programs and new uses for the data have occurred over the past two years;
- Volunteers are providing valuable water quality information on Minnesota's lakes, rivers and wetlands, that can be used for a variety of purposes at the local and state levels; and
- As part of collecting water quality samples, volunteers also develop an increased awareness of the condition of their lake, stream or wetland, fostering local stewardship efforts.



Wetland Health Evaluation Program volunteers monitor plants and macroinvertebrates in an Eden Prairie wetland, Hennepin County.

Technical and financial assistance from the Legislative Commission on Minnesota Resources, state agencies, local governments, non-profits and others helped to advance the citizen role.

A number of effective models for providing assistance to citizens have emerged. In all the models, an organizing entity providing communications, technical assistance and data management is essential. That organizing entity can be a county office, a non-profit organization, the state, an academic institution, a school program, etc.; however, it must have the resources and expertise to provide needed support to the volunteers.

In coming years, the role of volunteer monitoring can be expected to continue to expand in Minnesota, bringing much-needed volunteer efforts and stewardship to help protect Minnesota's waters. While many challenges remain, Minnesota has demonstrated a strong commitment to volunteer monitoring as an important component of the state's overall monitoring program.