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PROTECTING MINNESOTA'S ENVIRONMENT:

A Progress Report



Minnesota Pollution Control Agency

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About this report



This report meets the Legislature's requirements for a biennial report (Minn. Stat. §§ 115.42 and 116.10) and the Department of Finance's requirement for an executive summary of the Minnesota Pollution Control Agency's (MPCA) 1998 Agency Performance Report. It also serves as a public summary of the 1998 Self Assessment, an evaluation of the Environmental Performance Partnership Agreement developed by the U.S. Environmental Protection Agency and the MPCA. The information in this booklet is not intended to be a complete description of all the programs, services and activities of the MPCA. Instead it is a collection of measurements that reflects a broad view of the progress we have made in environmental protection over the last 30-plus years. Additional measurements and program descriptions are available in the 1998 Self Assessment on the Environmental Performance Partnership Agreement.

Note: This report does not include the annual report of air and water emissions required by M.S. 116.011. That report is based on information from the Toxics Release Inventory, which is not released until December each year, making it unavailable during preparation of this Biennial Report. Air and water emissions are reported later under separate cover.

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MPCA Mission and

Environmental Goals

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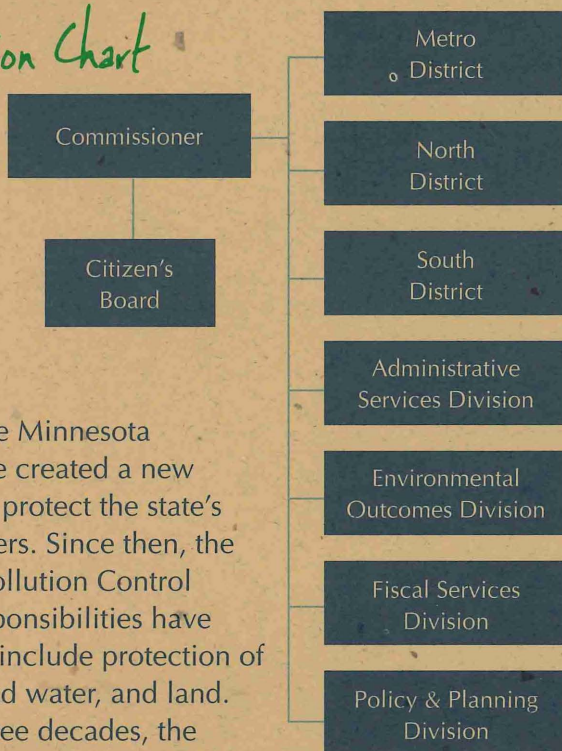
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The mission of the Minnesota Pollution Control Agency (MPCA) is to protect Minnesota's environment to secure the quality of life of its citizens. To accomplish this mission, the agency works to provide:

- Clean and clear air
- Fishable and swimmable lakes and rivers
- Uncontaminated ground water and land
- Sustainable ecosystems

Organization Chart



In 1967 the Minnesota Legislature created a new agency to protect the state's lakes and rivers. Since then, the Minnesota Pollution Control Agency's responsibilities have expanded to include protection of the air, ground water, and land. During its three decades, the MPCA has achieved recognition as a national leader among environmental regulatory agencies.


The major point sources of pollution that both the federal government and states took on in the late 1960s are now largely under control. Minnesotans today are turning their attention to a new generation of environmental challenges — a diverse set of smaller, nonpoint sources of pollution, the cumulative effects of which present significant environmental problems. These include

vehicle emissions, air deposition of mercury, unchecked urban sprawl, and the diffuse non-point pollution sources that are degrading water resources. Prescriptive, "command and control" regulations that worked well years ago on "end-of-the-pipe" pollution aren't always the best tools for the new generation of environmental issues.

For the past two years, MPCA management and staff have carefully evaluated the agency to position it to address these new challenges. The results are new strategies and a new structure that allow the agency to maintain the gains it has made, address new problems, and retain its position as an environmental leader.

The agency has moved to a more decentralized structure that combines a multimedia (air, water, land and waste) approach to address the most serious issues affecting each part of the state. The structure has three new geographic districts, where most of the agency's services will be delivered. Closer working relationships can now be forged with local units of government and communities to determine priorities, set policy, and implement solutions. Another new feature for the agency is a group of staff dedicated to measuring the environmental results of program activities as well as a group devoted to policy and planning issues.


As a result, the MPCA is well positioned to work together with federal, state and local government, citizens, environmental groups, and the regulated community to tackle the unique environmental challenges of the 21st century.



Protecting Air Quality

The federal Clean Air Act provides the national environmental framework for the MPCA air program's overarching goal of protecting public health and the environment from air pollution. In 1990, amendments to the Act dramatically expanded national regulation of air quality through assessment of emission fees, new permit and compliance requirements, and control activities for hazardous air pollutants. In 1997, the U.S. Environmental Protection Agency developed more restrictive standards for ozone and particulate matter, and, in 1998, was finalizing a new program to reduce regional haze and is considering issues related to climate change. In addition to the national air programs, the MPCA manages other state programs related to air pollutants such as mercury, hydrogen sulfide, lead paint and noise.

Overall, the quality of Minnesota's air has shown a positive trend in the past decade.

 The Minnesota Air Quality and Emission Trend Report, published by the MPCA in 1997, showed that emissions and ambient concentrations of most pollutants tracked were down significantly over the past 10 years.



The number of days that air pollution exceeded moderate levels in Minnesota's four largest urban areas declined from 498 days in 1984 to 95 in 1995 and 62 in 1997.

However, emissions and ambient concentrations of nitrogen oxide (a pollutant leading to ground-level ozone and smog) and emissions of carbon dioxide (a pollutant causing global warming) increased over this period.

One way to measure air quality is by using the Pollution Standards Index (PSI). The PSI values are based on the maximum concentrations of four air pollutants as measured each day by monitors in the Twin Cities area. When PSI values are above 100, the U.S. EPA considers the air to be unhealthy for residents. Air quality is considered moderate if the PSI is between 50 and 101. When the PSI is 50 or less, the air quality is considered

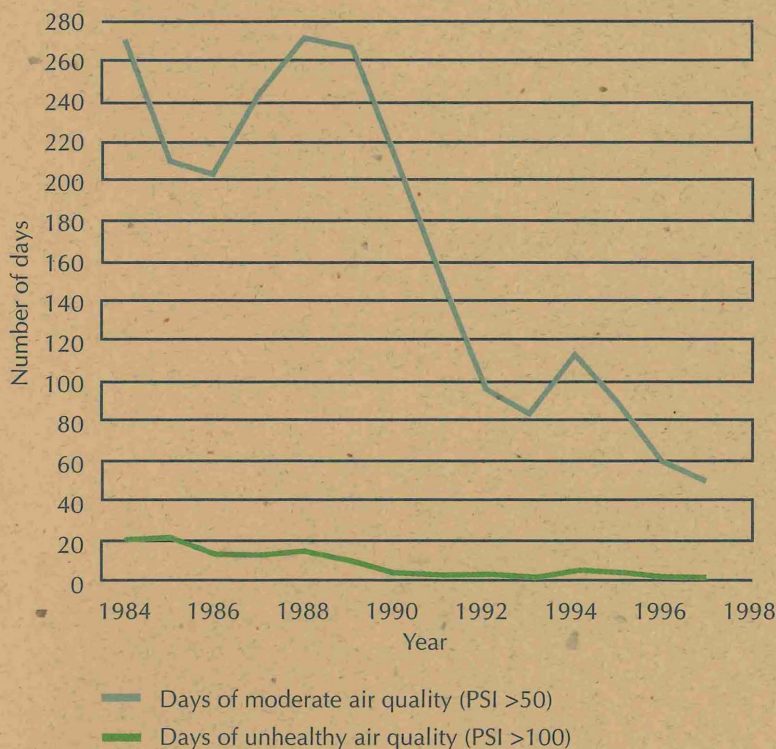
good. The graph shows that, over the past 10 years in the Twin Cities Metropolitan area, air quality has improved and the air has been in the "healthy" range about 90 percent of the time.

The information developed for this section tracks primarily pollutants for which the U.S. EPA has developed standards for the protection of human health. But there are hundreds of other potentially hazardous air pollutants, some of which may be present at levels which can have health impacts. The MPCA and other state and federal agencies are beginning to monitor these pollutants to try to understand them better and develop ways to deal with them.

Carbon monoxide (CO) is a highly toxic gas which in small amounts can impair alertness and cause fatigue and headaches. Motor vehicles contribute about 60 percent of the carbon monoxide in our air. CO levels in the Twin Cities metropolitan area have declined over the years due to improved vehicle technology and tighter regulation. (In fiscal year 1997, the Minnesota Vehicle Inspection Program reduced CO emissions from motor vehicles by about 12 percent and hydrocarbons by about five percent in the Twin Cities.) But because the number of vehicles on the road and vehicle miles traveled increases each year, it is uncertain whether these gains can be maintained in the future.

Another pollution problem related to motor vehicles and other combustion sources is ground-level ozone, commonly referred to as "smog."

Air quality trends for the Twin Cities area



The Pollution Standards Index measures the amount of particulates, sulfur dioxide, carbon monoxide and ozone in the air.

Residents in the Twin Cities area are fortunate not to have the severe smog problem of many other metropolitan areas. Measures to reduce some ozone-forming pollutants have kept the smog levels below health-based thresholds. The EPA has recently proposed new standards for ozone (and for particulate matter) which may make it harder for Minnesota to meet the standard in the future.

Measures are based on eight-hour averages.

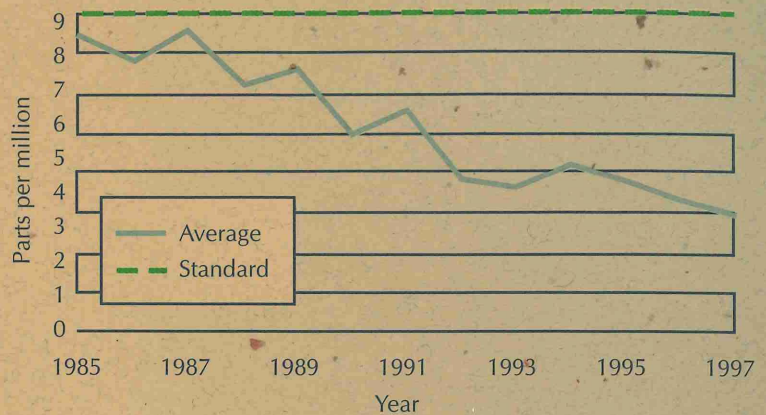
The MPCA regulates emissions of sulfur dioxide (SO_2) because it is a respiratory irritant and a major factor in causing acid rain. The burning of fossil fuels (oil and coal) is the principal source of SO_2 . The MPCA implemented a plan in 1985 to reduce SO_2 emissions from large electric utilities.

The new federal standard for ozone is based on eight-hour averages which are then averaged over three years.

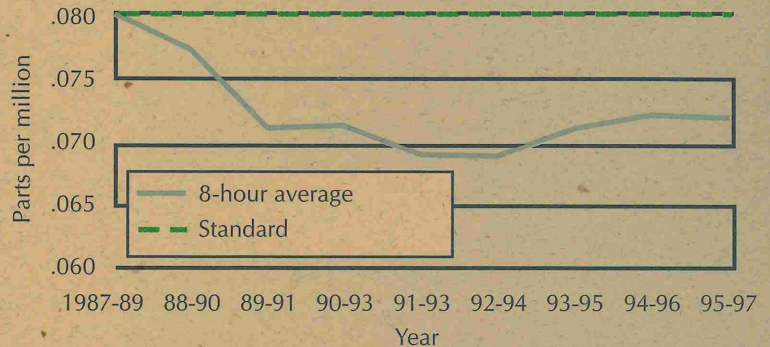
SO_2 emissions declined substantially under the plan, but have increased slightly in the last few years. Nonetheless they are still well below the limit set in the reduction plan.

Airborne particulates smaller than 10 microns (PM_{10}) can cause respiratory problems if inhaled in excess amounts. Minnesota's average is within the health-based standard.

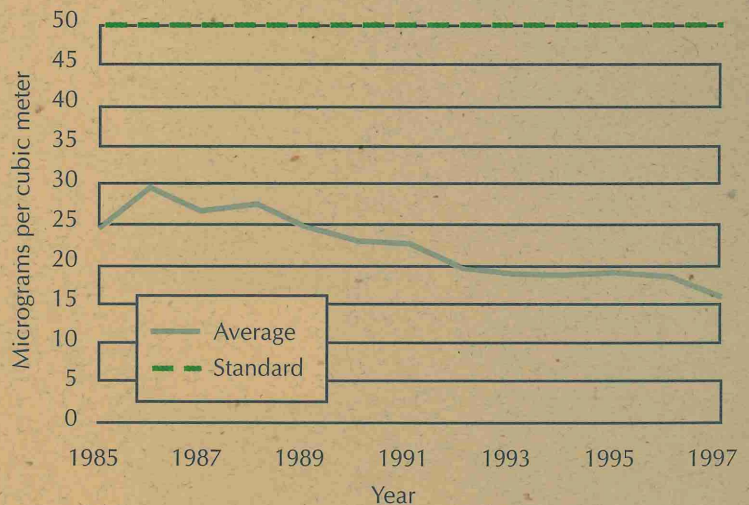
Levels of carbon monoxide in the air



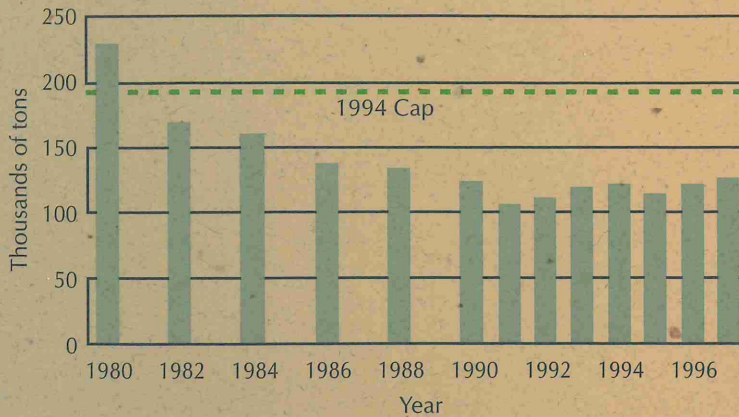
Levels of ground-level ozone in the air (3-year average)



Average amounts of small particles in the air (All Minnesota sites)



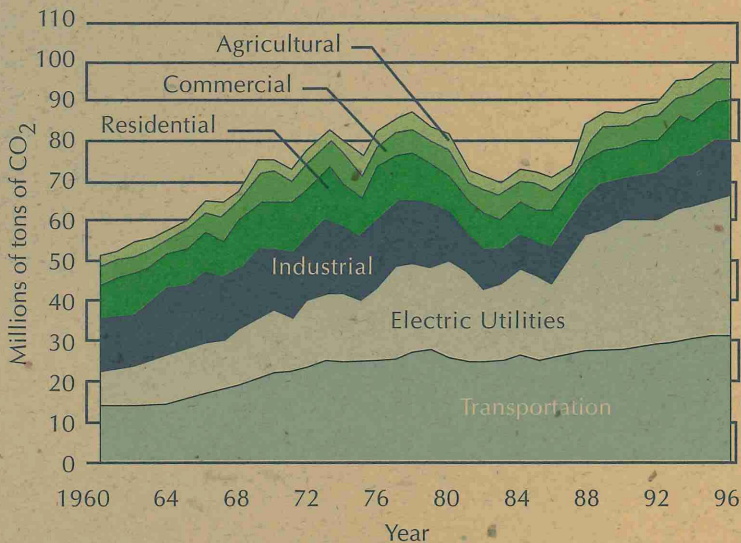
Sulfur dioxide emissions



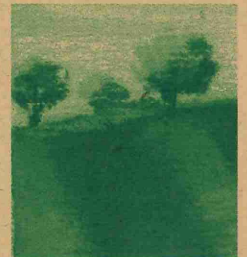
▲ The chart shows the Twin Cities' annual average of SO_2 compared with the federal standard for protection of health.

Carbon dioxide (CO_2) is the principal gas implicated in global warming, also known as global climate change. Most CO_2 emissions come from fossil-fuel combustion, generation of electricity, and transportation. Estimated CO_2 emissions in Minnesota have risen since the beginning of the decade, primarily due to increases in electricity generation and transportation. In an international agreement, the U.S. has committed to capping CO_2 emissions to 1990 levels. To do our part, Minnesota will need to devise a strategy to reduce the amount of CO_2 being released in the state.

Carbon dioxide from fossil fuel combustion



▲ The drop in CO_2 emissions in the 1980s can be partially explained by an economic recession, a lagging Midwest economy, and a general decline in the amount of energy used by a variety of sectors.





Protecting Water Quality

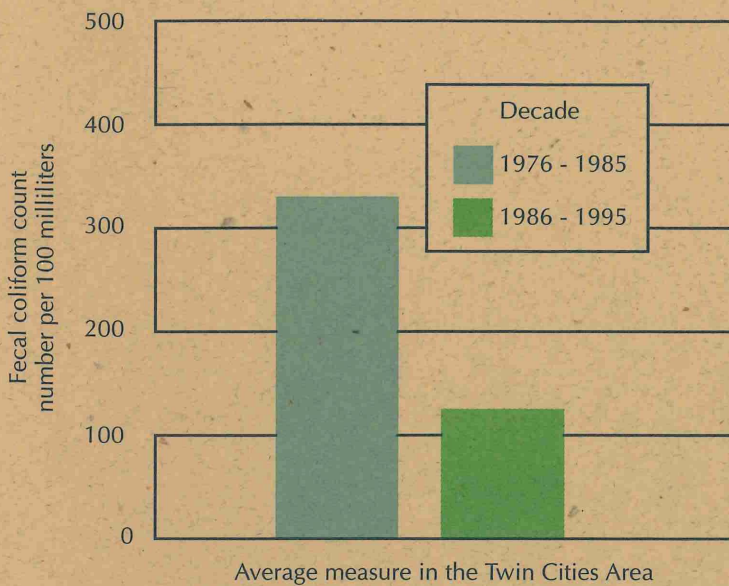
The overarching goal of the MPCA's water-quality program is to protect and improve Minnesota's rivers, lakes, wetlands and ground water so that they support healthy aquatic communities and designated public uses such as fishing, swimming and drinking water.

The key strategies for accomplishing this goal include regulating municipal and industrial point-source discharges, controlling nonpoint sources of pollution, and assessing water quality to provide information and data upon which to make social, financial, technical and environmental management decisions.

The best measure of the progress of these programs is the actual quality of our waters — is it improving, declining, or holding steady? The MPCA and those permitted to discharge wastewater collect thousands of water samples annually and analyze them for pollutants to try to answer these questions.

One of the state's primary water resources is, of course, the Mississippi River. Measurements of the Mississippi's quality show that it has improved dramatically over the past few decades. One basic indicator of water quality is the level of fecal coliform bacteria. The amount of fecal coliform in the water provides a good indicator of the amount of untreated wastes which are

Fecal coliform levels in the Mississippi River



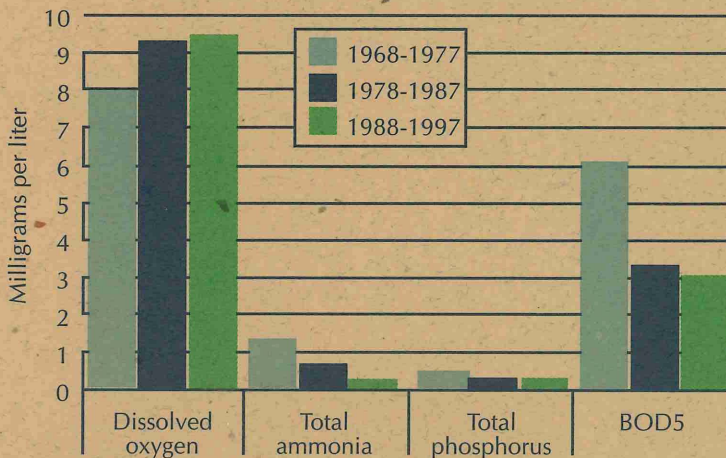
entering the river from sewers and runoff. Fecal coliform levels in the Mississippi have fallen significantly.

The two decades shown represent the 10 years before and during the time the Twin Cities sewer separation project was under way.

One major reason for this is the successful 10-year effort, completed in 1996, to separate storm from sanitary sewers in the Twin Cities.

Minnesota has been successful in controlling the end-of-pipe discharges from wastewater treatment plants and industries to our state's waters. But at the same time, the challenges posed by nonpoint sources of pollution, for example runoff from cities and agricultural areas, are increasing in proportion with changing land uses and expanding population and development. To deal with these newer challenges, the MPCA uses a "basin management" strategy. In

Water quality in the Mississippi River downstream of the Twin Cities



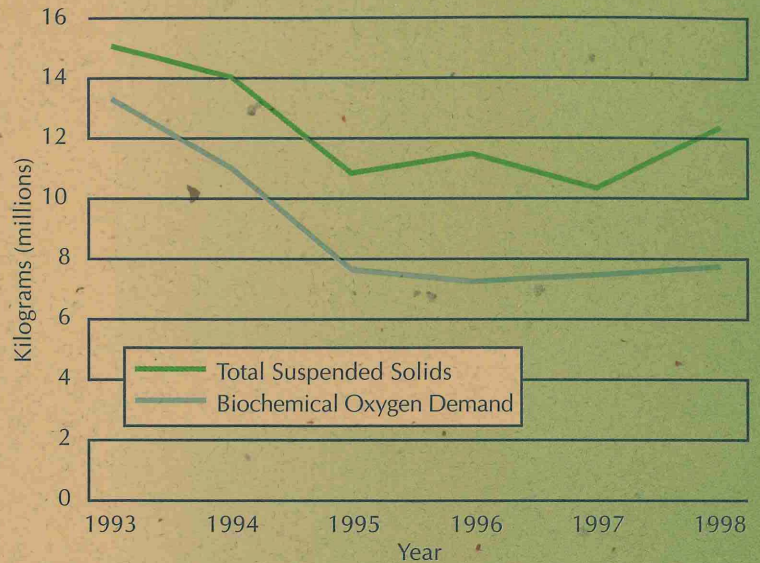
The chart compares three decades of water quality in the Mississippi for four measures. All measures indicate water quality is improving. Dissolved oxygen, necessary to support aquatic life, has increased; ammonia, a toxicant to aquatic life, has decreased; phosphorus, a primary nutrient contributing to excess plant and algae growth, has fallen slightly or remained steady; and biological oxygen demand (BOD5), a measure of organic matter which uses up oxygen as it decays, has fallen significantly.

basin management, staff assess the quality of water within drainage basins, and then work with local governments, industries, land owners and citizens to establish shared water-quality goals, determine where they're not being met, and prioritize control activities. Follow-up measurements then determine whether progress is being made in achieving the shared goals.

Minnesota has about 10.6 million acres of wetlands remaining from a presettlement estimate of 18.6 million

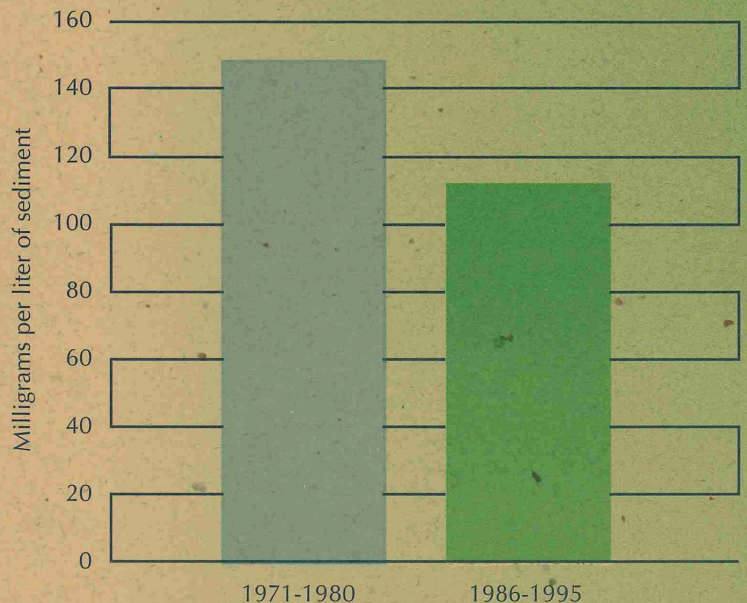
The amounts of "conventional" pollutants (TSS and BOD) released into Minnesota's waters are regulated by permits.

Total pollution discharges from permitted facilities in Minnesota



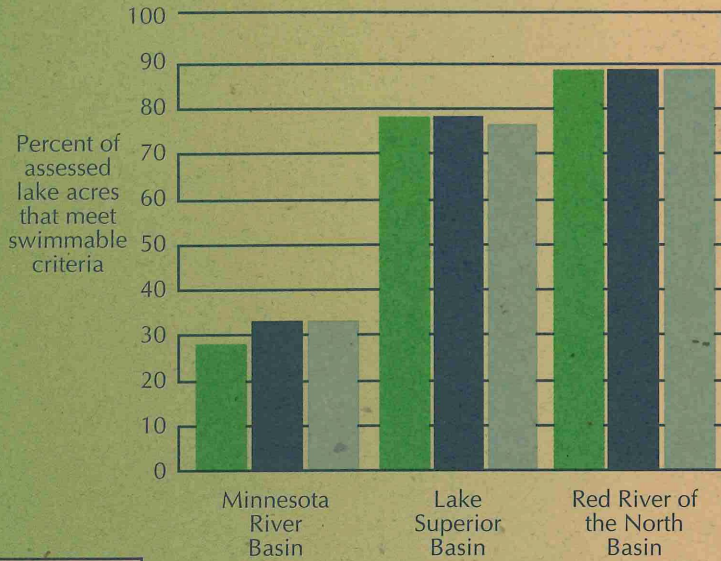
The Minnesota River, long considered one of the most polluted rivers in the state, is on the mend. The chart compares two decades of measurements which show significant declines in the amount of sediment carried by the river at median flow rates.

Water quality of the Minnesota River at Mankato (Amount of suspended solids)



Water quality in watershed basins

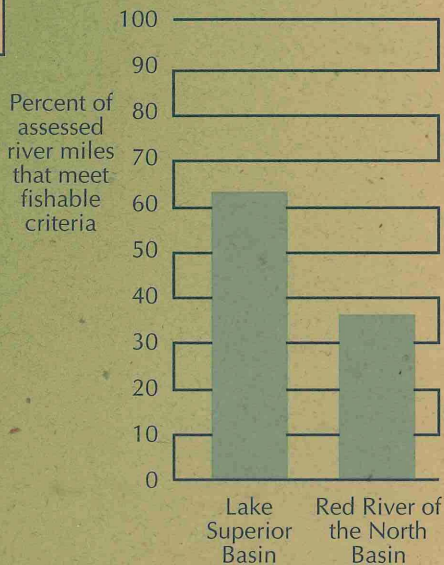
Swimmable



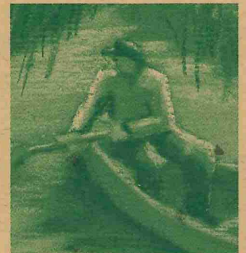
acres. There has been little systematic monitoring of wetland loss or water quality, but recently some important first steps have been taken, including development of "biocriteria" for evaluating the ecological integrity of wetlands. In the future these and other efforts will provide a better picture of wetland health in Minnesota.

About 75 percent of the state's lake acres have been assessed, but only about 13 percent of the stream miles have been. The MPCA has recently begun changing its data-gathering methods to a statistically based system, which will provide better trend comparisons in the future.

Fishable



The graphs represent the status of surface waters for the general uses of swimming and fishing. Support of swimming is determined either by the concentration of phosphorus and chlorophyll-a, or by water clarity. Support of fishing is determined by whether water-quality standards for the protection of aquatic life are met.





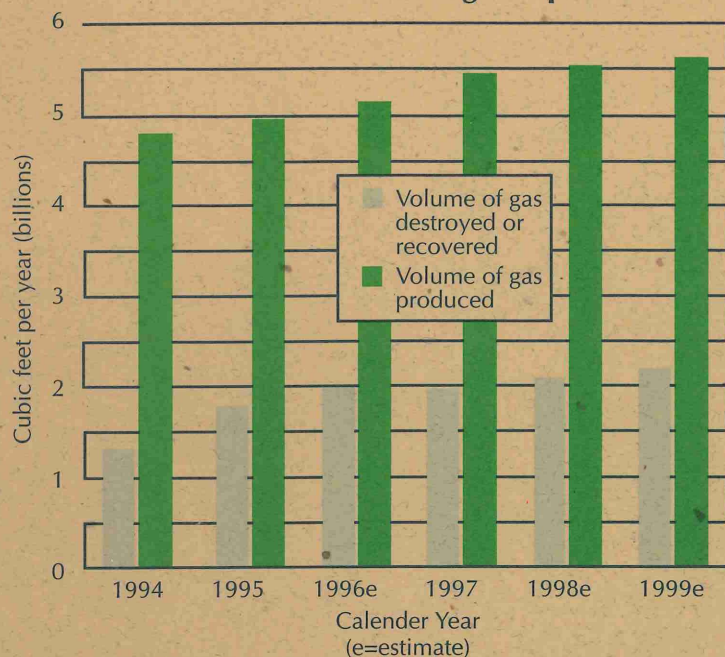
Protecting The Land

Out of sight, out of mind: The environmental impacts of the disposal of household garbage, industrial waste, and hazardous chemicals often go unrecognized, now that open dumps and uncontrolled garbage burning have become part of our past. Still, beneath the surface, former waste disposal practices continue to have an effect on communities and ecosystems exposed to contaminated soil and on the ground-water aquifers that provide 70 percent of Minnesota's drinking water.

The key to protecting ground water is managing wastes properly. The MPCA's approach to open and closed landfills continues to be a national model. Landfill liners, covers and monitoring prevent old wastes from generating new hazards. As waste in landfills decomposes, it produces contaminated water called leachate. Over the last biennium, covered and lined landfills have kept 25 million gallons of leachate out of ground water. More than 75 percent of all leachate from Minnesota landfills is recovered. Methane, one of the "greenhouse" gases contributing to global warming, is also generated during waste decomposition; methane is now recovered at an increasing number of Minnesota landfills.

Despite increases in recycling, yard-waste composting, and waste reduction, the state's total waste volume has increased by at least one percent per year

Methane emission reductions as a result of active gas capture



over the last 30 years. It will take public commitment, stewardship by manufacturers, and effective waste management to achieve a more

The migration of methane gas to adjacent property and the atmosphere from closed landfills is addressed through the installation of active gas treatment systems.

sustainable future through waste reduction.

Two studies completed in 1998 tell the tale of how wastes affect the state's ground waters. A five-year baseline

assessment of the state's aquifers indicates the extent of nitrate (see map, next page), metals and industrial chemicals in our ground water. And a St. Cloud-area study illustrates how human activities such as agriculture affect our ground-water resources. This knowledge helps the MPCA work with partners in other

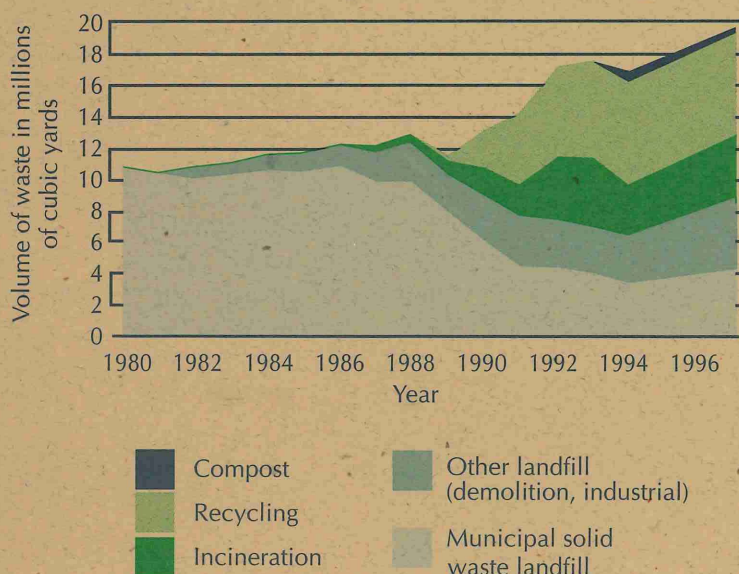
Although the total volume of wastes continues to increase, there has been a significant shift from disposal in landfills to recycling and waste destruction in incinerators.

state and local water agencies to direct protection efforts where they are needed most.

A critical source of contamination in soil and ground water is leaking petroleum

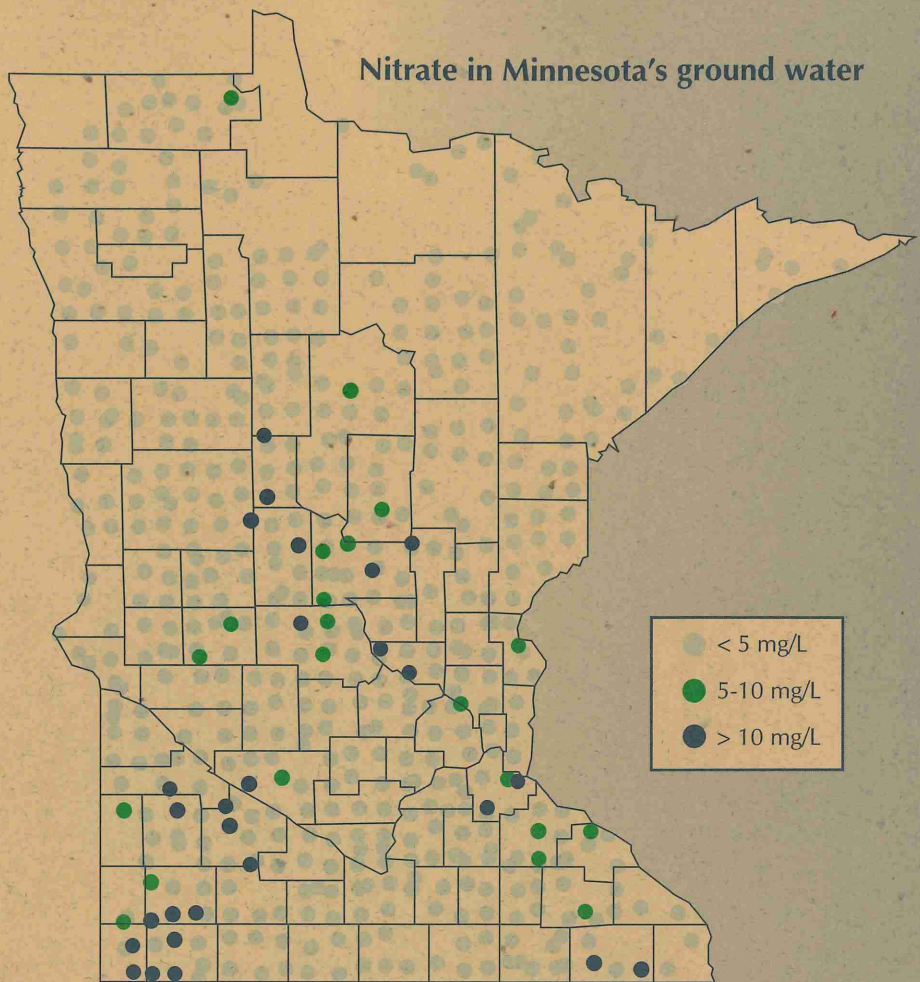
storage tanks, and Minnesota has been very successful at preventing leaks and spills from above- and below-ground petroleum storage tanks. Since 1991 there has been a steady decline in leaks, and a steady increase in cleanup and closure of leak sites. An estimated 75 percent of tank owners have upgraded to more

Trends in municipal solid waste management



Statewide data collected between 1992 and 1996 show 14 percent of the state's ground-water supply has nitrate levels greater than one part per million; four percent contains nitrates above the state's drinking-water standard of 10 parts per million. (ppm and mg/l are roughly equivalent.)

Nitrate in Minnesota's ground water



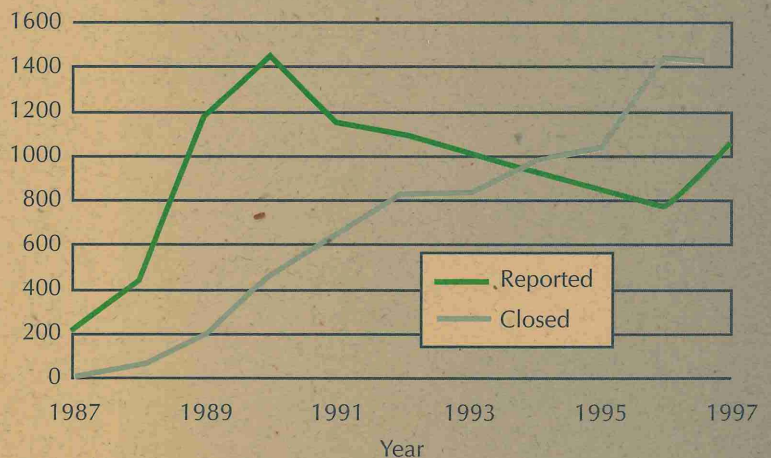
protective state and federal standards.

A recent federal upgrade deadline, which has been phasing in for 10 years, will shut down most of the remaining older, leak-prone systems.

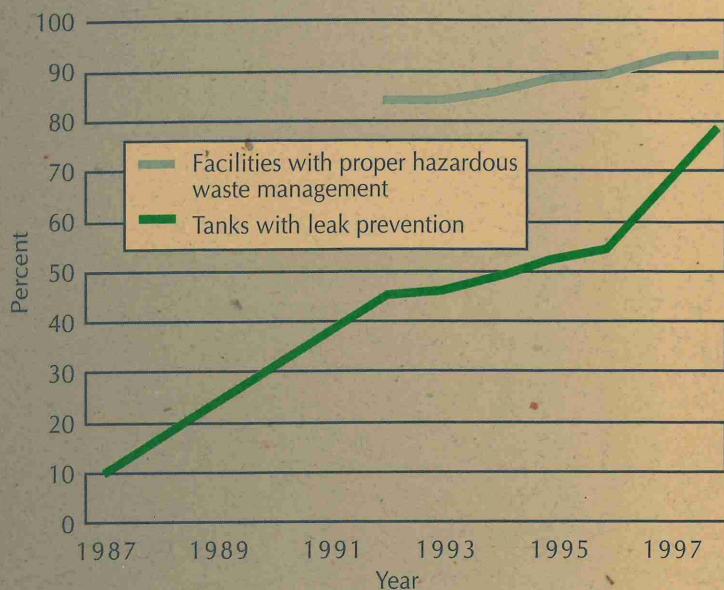
Compliance with laws on management and disposal of hazardous waste laws improves every year. But it's not clear whether the trend in overall use of such chemicals is upward or downward.

As the number of reported storage-tank leaks has decreased, the number of sites closed (investigated and/or cleaned up) has increased. Reported leaks have increased since 1996 as tank owners rushed to qualify for assistance before the federal cutoff of Dec. 22, 1998.

Number of leaking underground storage tanks reported and sites closed per year



Rates of compliance with prevention programs



While disposal of some chemicals, such as benzene and silver, seems to be decreasing, others like cadmium, nickel, and xylene are increasing.

Compliance with laws and rules designed to prevent environmental contamination by petroleum products or hazardous wastes continues to increase.

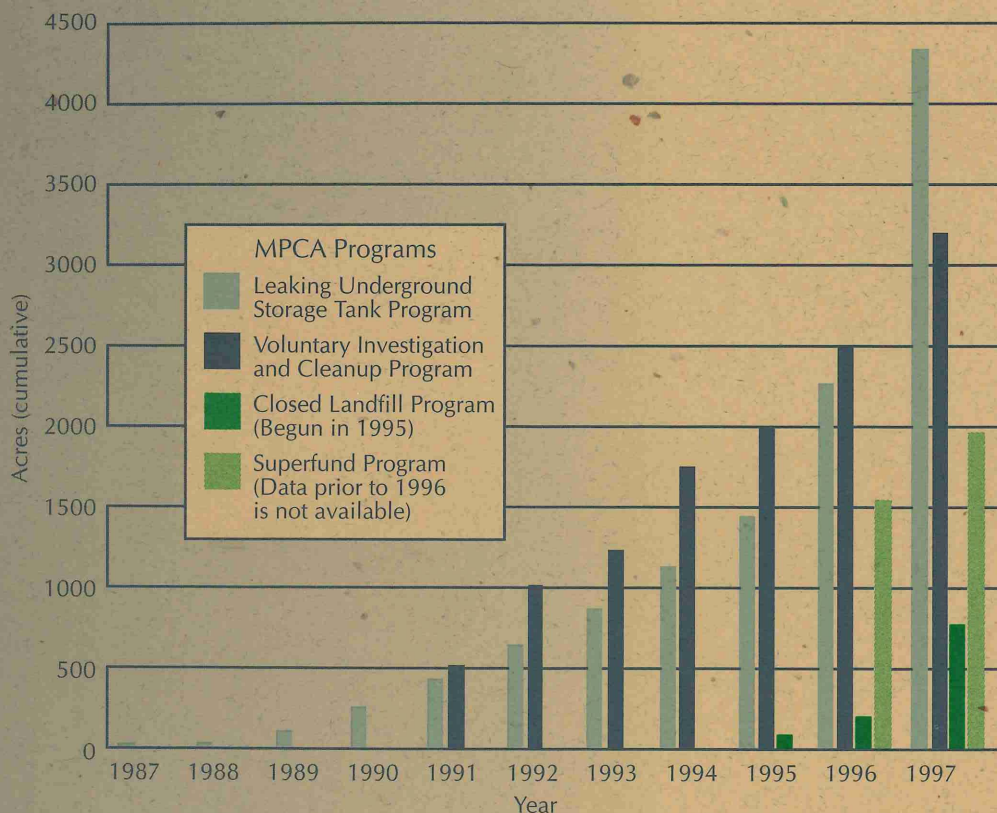
However, background levels of some toxic pollutants are declining, for example PCBs and dioxins/furans. (Data is insufficient to chart these trends at this time.)

The state Superfund program has been very successful in cleaning up

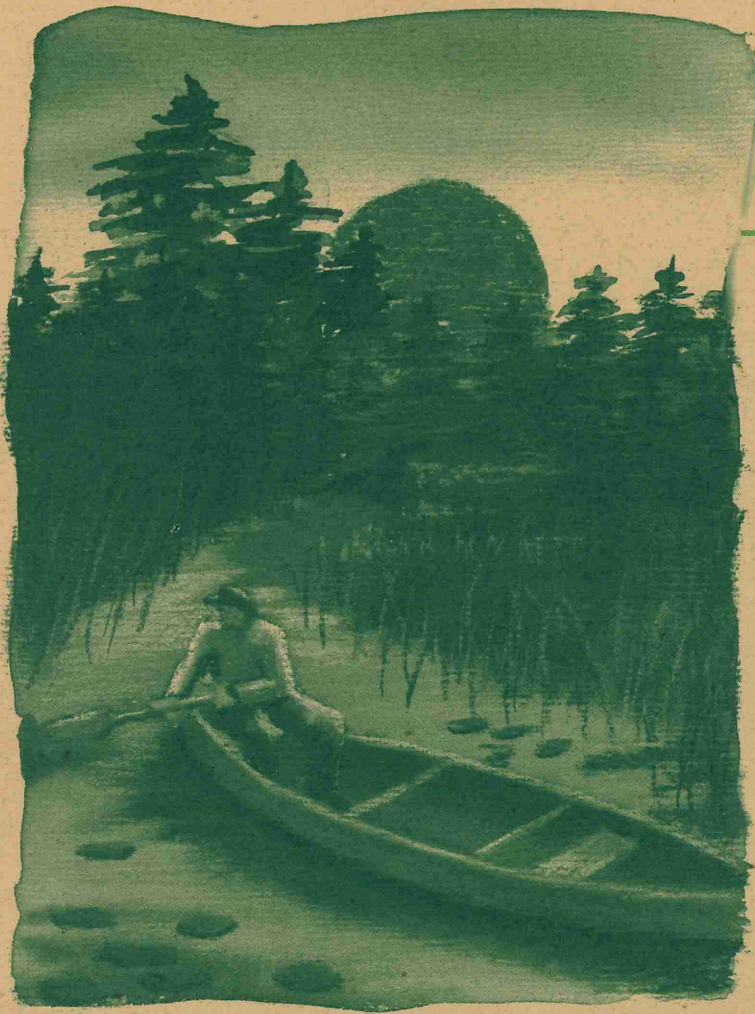
contaminated sites. Most of the high-risk sites common in the 1970s have been cleaned up. Many of the remaining sites will be cleaned up voluntarily by developers interested in restoring sites to productive use under

"brownfields" cleanup programs. A few new sites continue to be identified, but it appears the peak of identifying new sites is well behind us.

Acres of land returned to productive use



Not only does cleaning up contaminated land provide environmental benefits, it boosts economic development by restoring formerly unusable sites to productive use.



Emerging Issues

Environmental issues



Feedlots

The business of intensive livestock operations in confined feeding facilities has seen dramatic growth in Minnesota. With this growth, air emissions from animal feedlots have become a major focus for the MPCA since 1998. Hydrogen sulfide (H_2S) emissions seem to be a particular problem. Although many states have ambient standards for H_2S , Minnesota is the first state to apply its standard specifically to feedlots. Recent monitoring has identified many feedlots, particularly those with manure lagoons, which may exceed the ambient standard. Early experience indicates that reducing H_2S also appears to reduce nuisance odors which increasingly cause complaints from neighbors as the number and size of such facilities increases.

The MPCA is increasing its regulatory and study efforts related to the environmental impact of feedlots by temporarily reallocating resources internally. In addition, we are seeking additional resources to address long-term needs. The agency is also investigating, through the use of monitoring and computer modeling, the potential cumulative impacts of feedlots and some food processing facilities on air quality.

Mercury

Since the early 1990s the MPCA has paid special attention to mercury pollution. A state Mercury Advisory Council, representing a broad range of stakeholders and interests, began meeting in May 1997. The council has evaluated strategies for reducing mercury use and has recommended policy changes to the agency, taking into account the feasibility of reducing mercury contamination.

The council recently (December 1998) recommended a state strategy for mercury reduction, which emphasizes voluntary cooperation, additional research, state and federal action, and consumer education. The strategy contains both regulatory and non-regulatory opportunities for reducing mercury use and emissions. The goal is to reduce mercury releases to Minnesota's air and water by 70 percent (compared to 1990 levels) by the year 2005.

Lakes

Despite their abundance and value, Minnesota lakes face tremendous pressure from shoreland and watershed development, expanding uses and users, the spread of exotic species, and water pollution from nonpoint sources (e.g., failing septic systems and runoff). Phosphorus is the primary pollutant associated with this human-caused degradation of Minnesota's surface waters.

The state's lakes strategy for the next 10 years is: 1) Define a policy that supports a sustainable

future for lakes; 2) streamline access to lake-protection services offered by state agencies; and 3) build local ability to lead lake protection and management. In addition, the MPCA recently developed a strategy to address increasing concerns over phosphorus.

Phosphorus in rivers is a relatively new area of regulatory concern; over the past year it has been elevated by citizen groups and local jurisdictions. Future direction is reflected in the issuance of several recent major wastewater discharge permits containing new limits for phosphorus.

Mobile sources

While technological advances in limiting air pollution are being made, pollution from mobile sources (primarily automobiles, but also other transportation-related sources) continues to increase with the growth and spread of population and commerce. In the past 15 years, the number of vehicle miles traveled in Minnesota has increased by 35 percent, and 60 percent of the air pollution in the Twin Cities comes from vehicles. Motor vehicles contribute a major portion of the emissions of carbon monoxide (CO), ozone precursors (contaminants which can combine with others to form ozone), and toxic air pollutants. Recent air-quality monitoring has identified two days in May 1998 when the new, more stringent EPA standard for ozone was exceeded.

Nonetheless, gains are being made. Previously the Twin Cities area did not meet national standards for CO, an area in Rochester did not meet the standard for sulfur dioxide (SO₂), and a small area of St. Paul could not meet standard for airborne particulates. Although EPA has yet to officially reclassify these areas as being in attainment (meaning they meet the national ambient standards), plans are being reviewed to do so for both the Twin Cities CO and the Rochester SO₂ nonattainment areas.

The MPCA is considering an approach to mobile sources that would sunset the vehicle inspection program and create a voluntary public education program to reduce ozone precursors, and a voluntary ozone alert program to help reduce ozone levels on days when pollution is expected to be high.

Unsewered communities and nitrates

Statewide data for 1992-1996 indicate 14 percent of the state's ground-water supply has nitrate levels greater than one part per million, with four percent containing nitrates above the state's drinking-water standard of 10 parts per million. Sources of nitrate in ground water include agricultural practices, failing septic systems, and atmospheric deposition. Unsewered communities — areas of residential concentration which lack or have inadequate centralized wastewater treatment — are becoming better understood as sources of ground- or surface-water pollution. A detailed study in the St. Cloud area found that ground water beneath unsewered residential developments has more nitrates than in areas with community wastewater treatment. Unsewered areas also contribute to surface-water degradation and associated health problems. The MPCA is implementing a comprehensive strategy for addressing these issues, rather than addressing communities one by one.

Operational Issues



Basin management

Identifying and regulating sources of nonpoint-source water pollution (for example, runoff from cities and agriculture) is an increasing source of concern in the effort to protect our water resources. Recognizing this changing emphasis from point (i.e., end-of-pipe) to nonpoint sources, the MPCA is implementing a geographically based approach for managing the state's water-quality resources more holistically. Called basin planning and management, this approach targets the state's 10 major river basins and, where appropriate, sub-watersheds within them.

The key elements of basin management include emphasizing environmental results (as opposed to program outputs), working with partners to establish shared goals, setting water-quality priorities, and developing integrated point/nonpoint-source reduction strategies. The basin management process allows the state to identify and prioritize locally or regionally significant resources in need of protection and improvement.

As previously mentioned, the role of excess phosphorus in the quality of our lakes and rivers is receiving more scrutiny by the MPCA. The state's recently developed strategy for reducing the impact of phosphorus will play an important part in basin management.



Managing Data

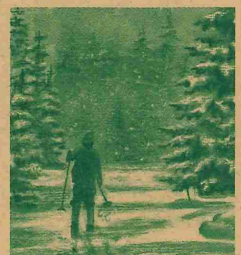
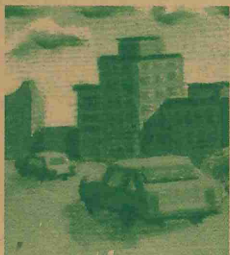
One of the foundations of the MPCA's recent reorganization is to measure progress by quantifying the actual environmental results of our work, not just the outputs of MPCA programs. To do this effectively, a more complete and integrated system of environmental monitoring is needed. Like many environmental agencies, the MPCA has large amounts of data in some areas and not enough in others. This issue of data quantity is compounded by limitations in the quality and interpretation of data. What is needed is a better way to manage and interpret what all these data are telling us about the environment, so we can make better decisions and shift priorities if necessary.

The reorganized MPCA includes a new division whose job in part is to address these issues related to data. The Environmental Outcomes Division will coordinate and supplement existing data monitoring, focus on the long-term development of environmental performance indicators, and enhance our data management through existing and new initiatives. In addition, the agency will focus resources on developing a performance management system to better track and report environmental and operational information.

Funding flexibility and issue prioritization

Over the past few years, the MPCA has been refining its efforts to better prioritize work, as older environmental threats are successfully addressed and new challenges arise. This is necessary to ensure the agency is "doing the right things" by focusing limited resources where they are needed most. However, even when new priorities are identified, a major constraint on taking action has been the inability to shift funding and staff to new priorities because they are committed to other efforts. This constraint on flexibility occurs at both the federal and state level. The MPCA is devoting greater attention to ways we can become more flexible in our ability to act.

In 1997, the MPCA received authority to shift some of the federal funding it receives to environmental issues of the greatest need. Even with this new flexibility, a great deal of the MPCA's funding still is obligated to specific uses, which complicates the effort to shift resources. To help us gain this needed flexibility, the MPCA is developing improved methods to track and prioritize issues which will incorporate a wide range of input, including both environmental data and citizen input.



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