

MINNESOTA GROUNDWATER CONDITIONS

Groundwater Importance: Even in the Land of 15,000 Lakes, no water resource is more important to Minnesotans than their groundwater. Seventy percent of us rely on groundwater for drinking water (25% who use private wells and 45% supplied by public water systems). Ninety-eight percent of community water supply systems draw from groundwater sources. Groundwater is vital for irrigation and industrial needs, and it supplies base flow to the state's lakes, streams, and many wetlands. Minnesota's 1993 drought response plan is in the process of being updated.

Where Is It? Although the state has large supplies of groundwater, they are not uniformly distributed. Some areas, such as the southeastern corner of the state, have three or more aquifers. Other areas, such as the southwestern corner, have very limited aquifer availability. Most areas have one aquifer that will supply community water needs. But since these aquifers are often geologically sensitive, they could easily become contaminated.

Aquifer availability is limited in many of the areas where population growth is rapidly expanding or is projected to expand over the next 20 years. For example, in the western and northern parts of the Minneapolis-St. Paul metropolitan area, where half the state's people live, the limited availability of groundwater to supply parts of the growth fringe is an increasing concern.

How Good Is the Water? While natural groundwater quality is generally good, there are trouble spots throughout the state.

Recent changes in the federal drinking water standard for arsenic have resulted in concerns over natural groundwater quality in many areas. Groundwater commonly contains naturally high concentrations of dissolved solids that limit its use in some of the western parts of the state. Also, groundwater contains naturally high concentrations of arsenic, boron, and other dissolved constituents locally.

The most common impact related to the effects of land use on groundwater quality is nitrate degradation. Elevated nitrate levels (greater than 3 parts per million or ppm) occur over large areas of agricultural land use and areas of urban development. Elevated nitrate levels are also common in septic tank areas, especially where many septic tanks are grouped together on properties with small lot sizes. Four percent of all groundwater and 9% of groundwater that is geologically and chemically vulnerable to nitrate contamination exceeds the 10 ppm drinking water standard. Nitrate contamination is especially common in central and southern Minnesota. Elevated nitrate levels usually occur in aquifers that have poor natural protection and where sources of nitrate are not properly managed.

Groundwater is also contaminated locally by spilled and leaked industrial chemicals, gasoline and other fuels, and trace levels of the most common herbicides and their breakdown products. For example, of the approximately 14,000 identified leak sites in Minnesota, there are still approximately 2,400 sites that need to be closed. Also, there are thousands of Class 5 underground injection wells that present a concern in some areas because of their potential to contaminate near-surface groundwater.

Costs of Contamination: Generally, it costs much less to prevent contamination of groundwater resources than to clean them up. Studies conducted by the U.S. EPA indicate that cleanup costs are often over ten times the cost of prevention. Also, overuse of the resource can lead to the spread of contamination. From 1995 through 2001, remediation efforts in Minnesota related to state and federal Superfund sites alone have typically cost \$35 – 39 million dollars per year with a high of about \$57 million dollars in 1996. The majority of these dollars were spent by potentially responsible parties (PRPs). Since the mid 1980s, the Petrofund has provided approximately \$325 million to 9,450 different applicants for leak site cleanups.

Efforts to Protect Groundwater: Protection of groundwater has been a priority for Minnesota state government, local governments, water suppliers, and many citizens, although major threats to the groundwater supply remain. Protection efforts arise from the 1989 Minnesota Groundwater Protection Act and many other authorities. These range from contaminated site cleanup and facility safeguards to management of the areas surrounding and supplying drinking water wells. Among Minnesota's ongoing efforts are the following:

- ◆ contaminated site cleanup and 'brownfields' redevelopment, including state and federally funded Superfund, petroleum, agricultural chemical, and voluntary cleanup programs;
- ◆ pollutant containment as a required part of the ongoing management of a variety of facilities, such as landfills and animal manure storage;
- ◆ wellhead protection requirements for all public water supply systems;
- ◆ state-local shared responsibilities and funding in areas such as feedlots, manure, and septic tank management; well construction and licensing; and water planning and management;
- ◆ promotion of best management practices for home and business owners, well owners, farmers, and others;
- ◆ required plans and permitting of large-quantity groundwater pumpage for municipal, irrigation and industrial uses; and
- ◆ application of newer techniques such as age-dating to evaluate groundwater vulnerability.

What Else Is Needed? Much remains to be done to protect Minnesota groundwater. Cleanup efforts at many large point sources of groundwater contamination are nearing or at completion, but long-term monitoring and maintenance may be needed in many cases. Over much of the state, local governments are ill-equipped to address the great variety of threats to groundwater, and information about the groundwater resource is limited.

Budget cuts to state and local governments over the past several biennia have resulted in greatly diminished capabilities to understand and protect the state's groundwater resources. For example, programs have been cut or reduced to 1) conduct ambient groundwater quality monitoring, 2) develop and improve the statewide well record database, 3) map the geology and groundwater resources of counties, 4) maintain effective databases of contamination sites and water quality and 5) educate children about the need to understand and protect groundwater resources.

State and local government need to be able to develop and provide more information about the resource and to offer assistance on how to protect it in ways such as those listed below:

- ◆ enlisting and better supporting partners to properly manage numerous sources that continue to degrade groundwater;
- ◆ restoring mapping and assessment of both the overall condition of groundwater and of land use trends such as urban sprawl, livestock concentration, and irrigated production of potatoes and other crops;
- ◆ assessing, reporting on and educating decision makers about the limitations on ground water availability and capacity by location in Minnesota;
- ◆ evaluating how effective groundwater protection efforts are, and how they can be made more effective;
- ◆ integrating and accessing monitoring and other information from multiple sources, and making available technical tools such as groundwater models; and
- ◆ incorporating aquifer and wellhead protection into watershed management and county-level water planning