



Montmorency Conservation District
13210 M-33 North (Fairgrounds)
P.O. Box 789
Atlanta, MI 49709
989-785-4083
montmorencycd.org

Groundwater

The last several articles have dealt with the Thunder Bay River watershed in terms of definition and sources of pollution. In this article we want to take a look at one more aspect of the watershed—our groundwater.

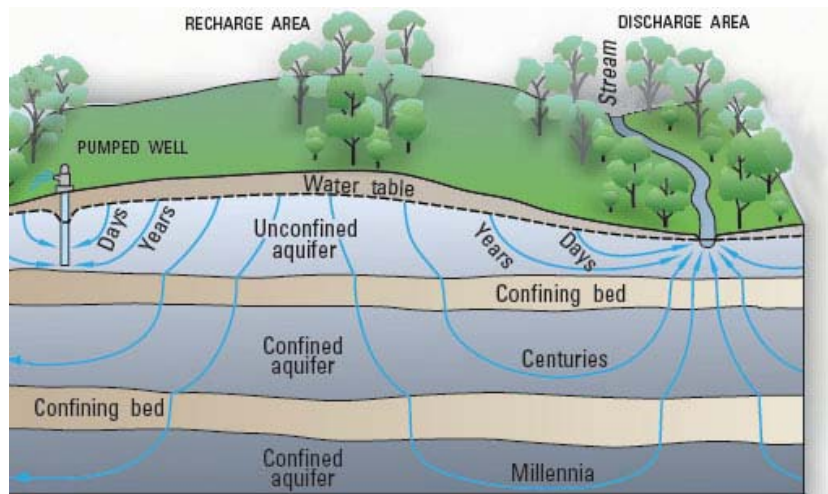
Groundwater is the water that soaks into the soil from rain or other precipitation and moves downward to fill cracks and other openings in beds of rocks and sand. Where water infiltrates the ground, gravity pulls the water down through the pores until it reaches a depth in the ground where all of the spaces are filled with water. These water bearing areas are referred to as aquifers.

Groundwater flows through the pores of the soil or rock both laterally and vertically and is interconnected with our lakes, rivers, streams, and wetlands. Water moving from an aquifer and entering a stream or lake is called groundwater discharge, whereas any water entering an aquifer is called recharge.

The entire state of Michigan has abundant groundwater. About half of all Michigan residents depend on groundwater as their primary source of fresh drinking water - either through public water supply systems or private drinking water wells. These wells are drilled through various layers of soil and rock until they hit an aquifer. Water that is drawn out by wells (discharge) is replaced by the water seeping back down (recharge).

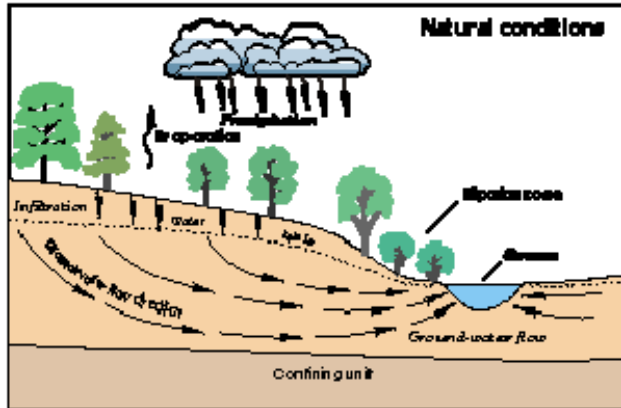
This can lead to two possible problems. One is that the water seeping down can contain contaminants if chemicals, oils, etc. are on the surface of the ground either by an accidental spill or by people who dispose of household hazardous waste by pouring it down a drain or out on the ground. Many contaminants are filtered out by the soils and the organisms in them, but not all. If these substances reach the groundwater it can pollute thousands of gallons of drinking water.

The second potential problem goes back to the last article on stormwater runoff. If stormwater is channeled directly to rivers it never has a chance to seep into the ground to recharge the groundwater. Northern Michigan is fortunate because we have large amounts of natural spaces. But areas like Chicago and southern Wisconsin saw a 900 ft. drop in the water table due to high usage from wells and low recharge due to a high percentage of impervious surfaces.

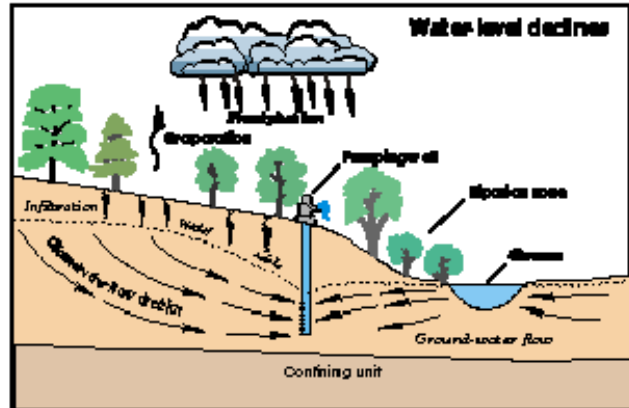


In 2003 Michigan passed Act 148 and Act 177 which 1) Inventoried the groundwater resources of the state; 2) Required large volume withdrawals of groundwater to be reported to the state; and 3) set up a method to resolve disputes over groundwater usage within the state.

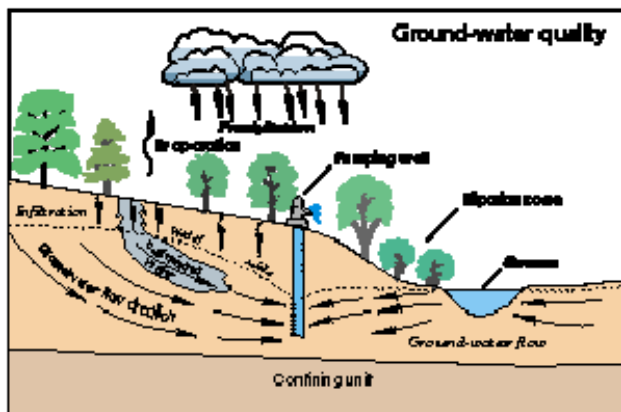
All residents of the watershed and the state should have a basic understanding of groundwater resources and potential sources of groundwater contamination. This article only introduces the subject. Links to more information on groundwater are below.



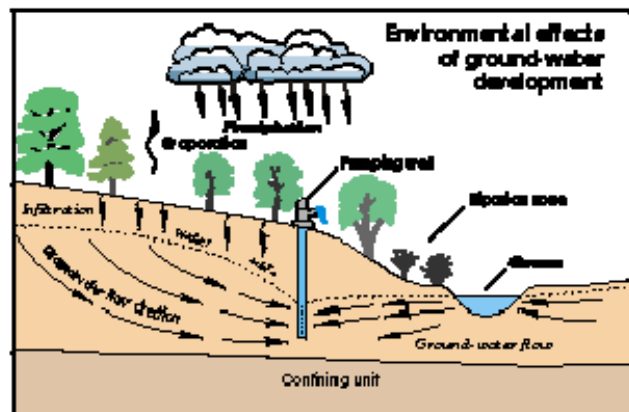
Water is recharged to the ground-water system by percolation of water from precipitation and then flows to the stream through the ground-water system.



Water pumped from the ground-water system causes the water table to lower and alters the direction of ground-water movement. Some water that flowed to the stream no longer does so and some water may be drawn in from the stream into the ground-water system, thereby reducing the amount of streamflow.



Contaminants introduced at the land surface may infiltrate to the water table and flow towards a point of discharge, either the well or the stream. (Not shown, but also important, is the potential movement of contaminants from the stream into the ground-water system.)



Water-level declines may affect the environment for plants and animals. For example, plants in the riparian zone that grew because of the close proximity of the water table to the land surface may not survive as the depth to water increases. The environment for fish and other aquatic species also may be altered as the stream level drops.

Above images from: [A Report to Congress on Ground Water](#)

The Hydrologic Cycle

<http://www.iwr.msu.edu/edmodule/water/cycle.htm>

Michigan Ground Water Conditions

http://www.gwpc.org/e-library/documents/state_fact_sheets/michigan.pdf

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Understanding Groundwater – Information for private well owners

http://www.wellowner2.org/2009/index.php?option=com_content&view=category&layout=blog&id=46&Itemid=44

Michigan DEQ: Water Use Program – Information, Laws, and Rules

http://www.michigan.gov/deq/0,4561,7-135-3313_3684_45331---,00.html

DEQ slideshow – Groundwater Contamination

<http://tecalive.mtu.edu/meec/module04/title.htm>

Michigan Water Stewardship Program: Information for residents, games for children, resources for educators.

<http://www.miwaterstewardship.org/>

The Importance of Ground Water in the Great Lakes Region Water Resources Investigations Report 00 – 4008

<http://water.usgs.gov/ogw/pubs/WRI004008/gw2.htm>

Home*A*Syst – Chapter 10 – Protecting Your Drinking Well Water

http://www.msue.msu.edu/objects/content_revision/download.cfm/revision_id.484542/works_pace_id.-30/HAS%2010%20drinking%20water%20well.pdf

Michigan Citizens for Water Conservation v. Nestlé Waters North America, Inc.

http://www.justice4michigan.org/files/hfp_nestle_case.pdf