

Surface Water and Groundwater

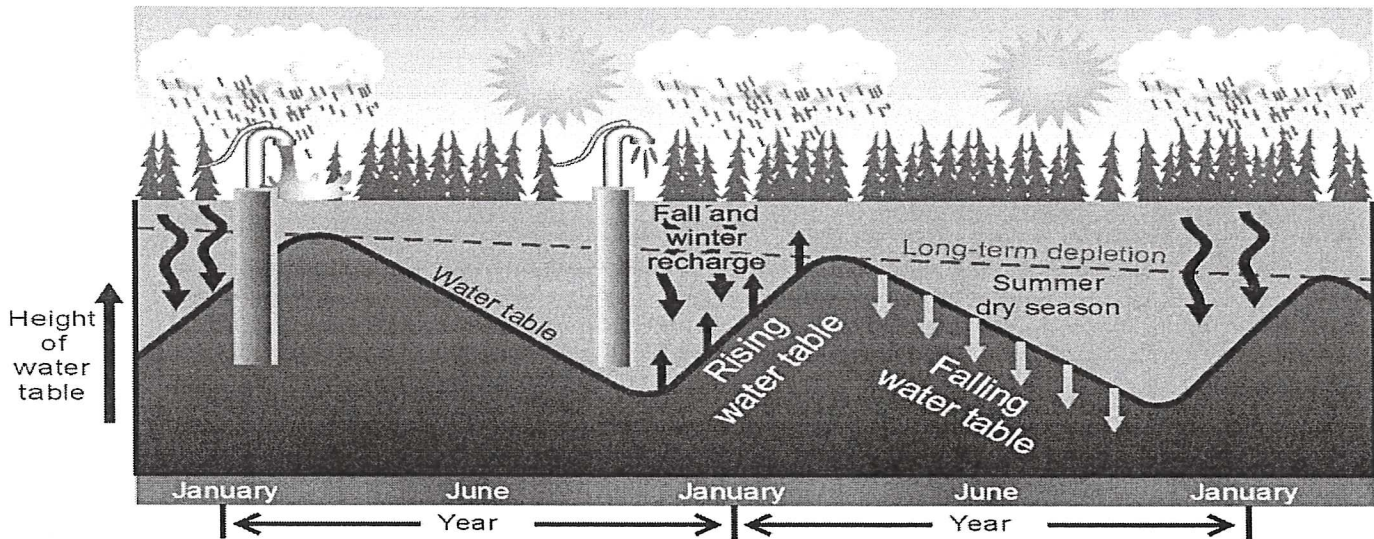
- About 3 % of Earth's water is fresh water.
- About 1 % of Earth's water is accessible.
- Fresh water is used for industry, transportation, recreation and agriculture.
- Water provides a place to live for many plants and animals.

Where on Earth is fresh water found?

- On Earth's Surface
 - Water above Earth's surface is called surface water.
 - Streams, rivers and lakes
 - Either comes from precipitation or comes up from ground (springs).
 - Surface water flows from higher ground to lower ground making its way toward large bodies of water.
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Beneath Earth's Surface

- Some runoff and surface water seep down into the ground.
 - Water drains through soil and collects in spaces between rock particles
- The water found in spaces between rock particles below Earth's surface is called groundwater.
- The water table is the upper boundary, or surface, of groundwater.
 - To use, people drill down to the water table to reach reservoirs of groundwater.



How does water move on Earth's surface?

Channel

- As water erodes rock and soil a channel is formed.
 - The pathway of a stream
- Over time, a channel gets wider and deeper, as the stream continues to erode rock and soil.

Tributary

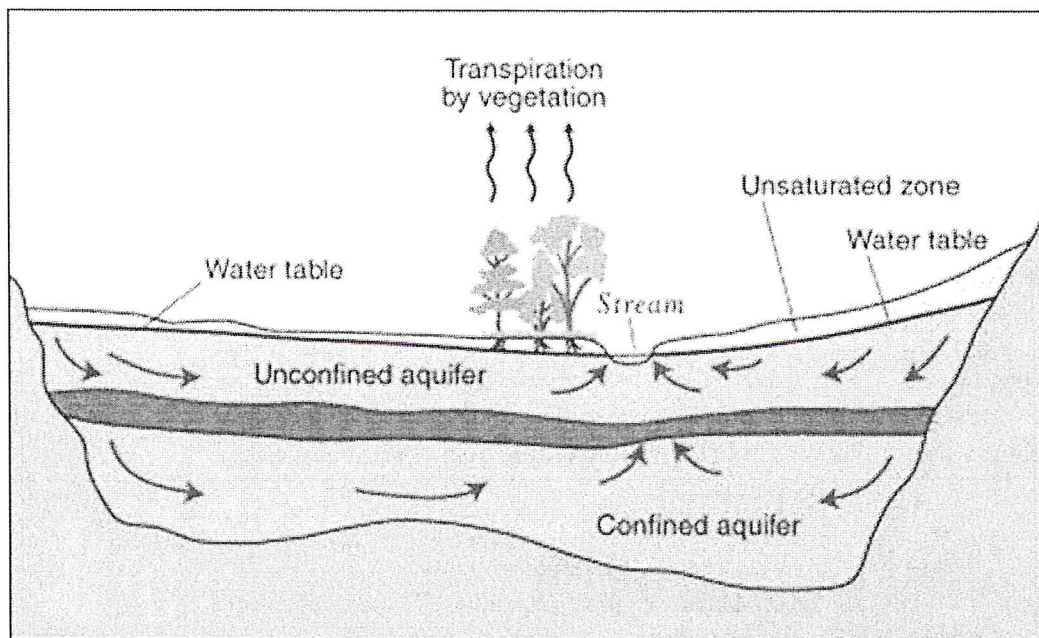
- A tributary system is a smaller stream that feeds into a river and eventually into a river.
- A river system is a network of streams and rivers that drains an area of its runoff.

- A watershed is the area of land that is drained by a river system.
 - Watersheds are separated from one other by a ridge or an area of high ground called a divide.
- Precipitation falls on one side of a divide and enters one watershed while precipitation that falls on the other side of a divide enters another watershed.

What is the biggest watershed in the United States?

Mississippi River Watershed

- Gradient – a measure of the change in elevation over a certain distance.
 - The higher the gradient the faster the water moves and more energy it has to erode rock and soil.
- Flow – amount of water that moves through the river channel in a given amount of time.
 - Increases during storms or melting snow which can cause increase in river speed.
- Stream Load – materials carried by a stream.
 - High flow = Larger stream load
 - Faster streams can carry larger particles, usually deposited when river slows down as it enters lakes or oceans.

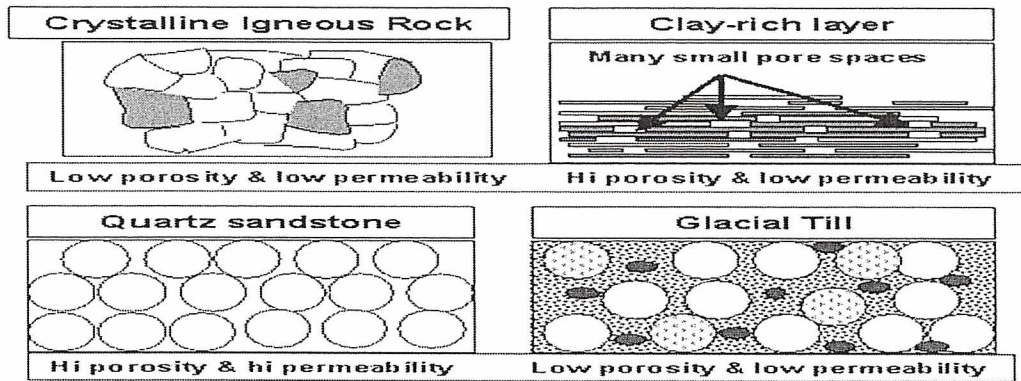


How does groundwater flow?

It trickles down from Earth's surface

- Groundwater can either stored or flows until it enters back into streams and lakes.
- An aquifer is a body of rock or sediment that stores groundwater and allows it to flow.

- Water table can rise or fall depending on how much water is in the aquifer
- wet regions = at or just beneath soil surface
- Wet lands = is above soil surface



It fills tiny spaces underground

- An aquifer stores water in open spaces, or pores between particles of rock or sediment.
 - Porosity: % of the rock that is composed of pore space
 - cup of gravel has higher porosity than a cup of sand
 - Permeability: measure of how easily water can flow through an aquifer
 - High permeability means that many pores in the aquifer are connected, so water can flow easily.

- Water is recharging when reaches the water table and enters the aquifer (the recharge zone).
- The process by which groundwater becomes surface water is called discharge and happens in discharge zones.
 - Discharged water feeds rivers, streams, and lakes
 - Discharging also occurs when water is extracted from wells.
- Through discharge and recharge, the same water circulates between surface water and groundwater.