

Groundwater



What you need to learn

- ❑ How large amounts of water are stored underground
 - ❑ How groundwater dissolves limestone and forms caves and other natural features
 - ❑ How groundwater is removed from the ground by humans and what problems endanger our groundwater supply
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Movement and Storage



- Groundwater is present everywhere beneath the surface of land, but is only a small fraction of all water on Earth
 - Hydrosphere: all the water on or in Earth
 - 97% oceans 3% by landmasses
 - 90% of freshwater is found in ice
 - Ultimate source of water is in the oceans
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How is groundwater stored?

- Water that doesn't runoff the land is absorbed into the ground by **infiltration**
 - The **porosity** of a material determines how much water it can hold
 - Well sorted material contains around 30%
 - **Zone of Saturation**: depth below the surface that all the pores fill up with water
 - The upper portion is called the **water table**
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The Water Table

- Depth depends on local conditions
 - It is shallow if there is a lot of surface water
 - Changes with the topography
 - Changes with the precipitation
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Groundwater Movement

- ❑ Flows downhill in the direction of the slope
 - ❑ The speed is extremely slow, but depends on the materials **permeability**
 - ❑ Most ground water moves through permeable layers called **aquifers**
 - ❑ Aquicludes: are impermeable layers
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Erosion and Deposition



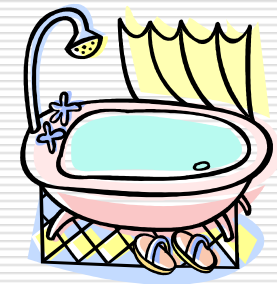
- ❑ Groundwater is slightly acidic and can corrode carbonate rocks (such as limestone)
 - ❑ **Caves** are produced when groundwater dissolves limestone
 - ❑ **Sinkholes** are produced when caves or bedrock collapse and sink the surface of the ground sinks
 - Regions of sinking landscape are called karst topography
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cave



sink hole



Groundwater Deposits

- ❑ Hard water: contains high concentrations of calcium
 - ❑ Natural deposits: dripstone formations found in caves
 - **Stalactites**: hang from cave ceiling
 - **Stalagmites**: form on the cave floor
 - Columns: form when they grow together
 - **Travertine**: the type of limestone that makes them
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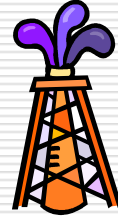


Groundwater Systems



- Groundwater eventually reaches the surface after hundreds of years
 - **Springs**: natural discharges of groundwater
 - The temperature of the water usually matches the area and is colder in the summer and warmer in the winter
 - **Hot springs** have temperatures above 98°
 - **Geysers** are explosive hot springs
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Wells



- Wells are holes dug or drilled deep into the ground to an aquifer
 - Overpumping of a well can cause **drawdown** where the water table lowers
 - Watertables can recharge with increased precipitation
 - Aquifers that are under pressure are called **Artesian wells**
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Threats to our water supply

- ❑ Overuse
- ❑ Subsidence – the sinking of land
- ❑ Pollution – sewage, industrial waste, landfills, and agricultural chemicals
- ❑ Chemicals
- ❑ Salt
- ❑ Radon – causes cancer

