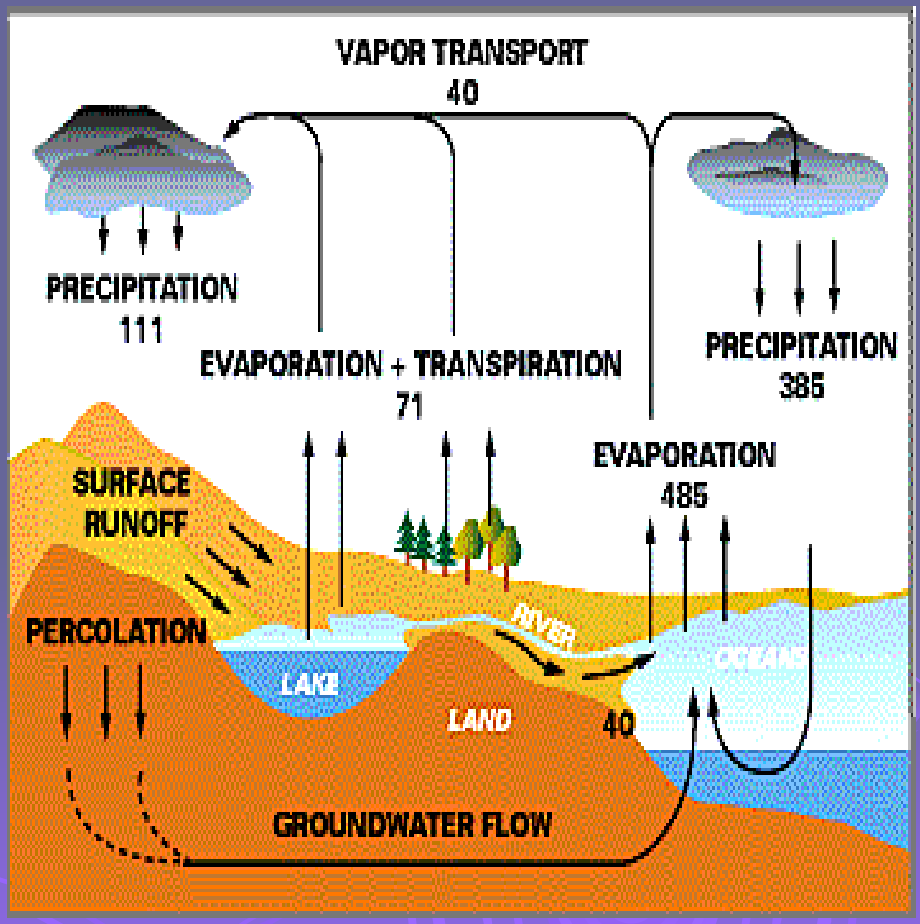
Ground water, Overuse, and Pollution

- Assignment # 21

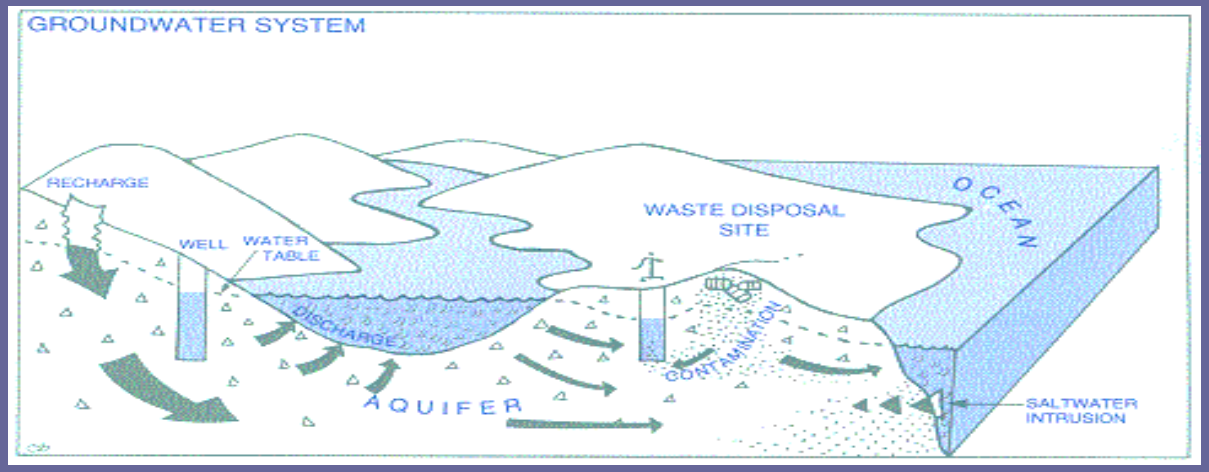
- What is ground water and what are some potential threats to it?

Groundwater

- Water that soaks into the ground after rain
- Factors that determine the amount
  - Steepness of slopes
  - Type of surface materials
  - Intensity of rainfall
  - Type and amount of vegetation



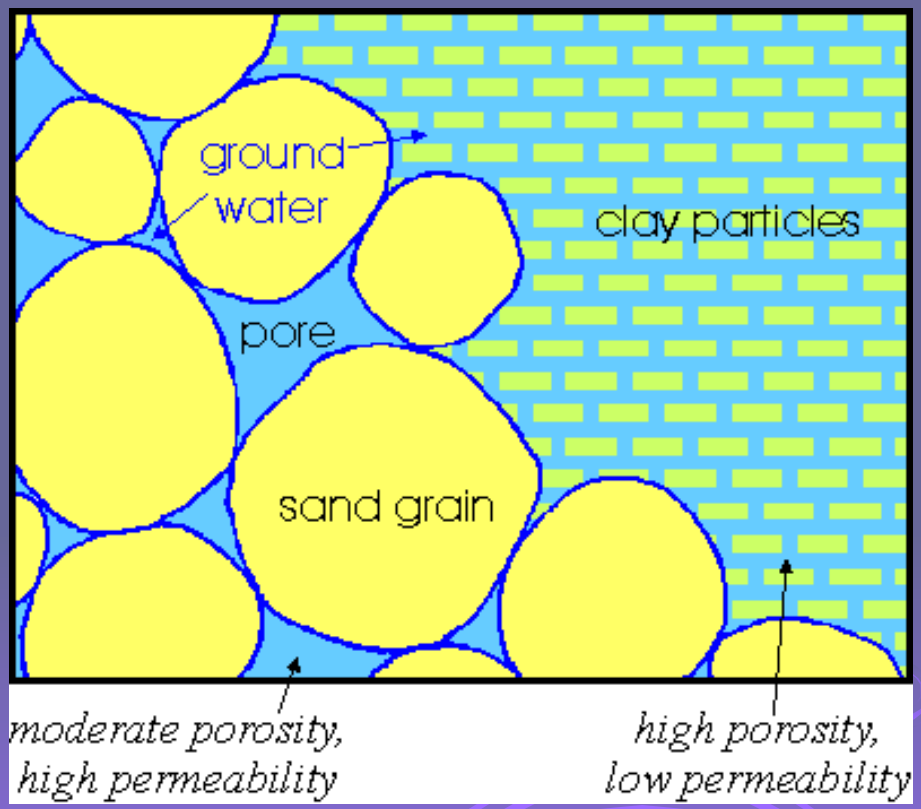
Distribution of Groundwater



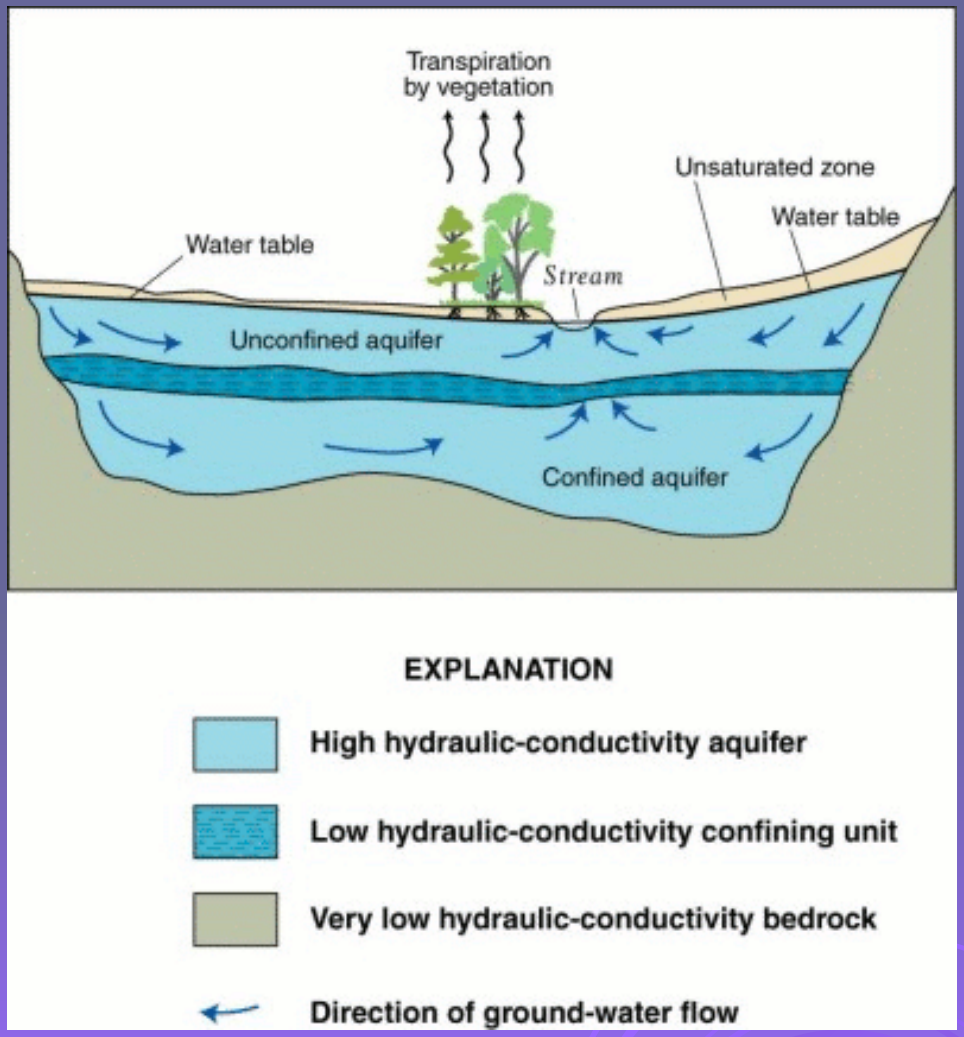
- Belt of Soil Moisture – water that covers the top of the soil
  - Roots, openings from decayed roots, animal burrows
- Zone of Aeration – area above the water table that contains air in between soil particles
- Zone of Saturation – open spaces in the soil fill with water (groundwater) that can be extracted by wells
- Water Table – boundary between the zone of aeration and zone of saturation

Porosity and Permeability

- Porosity – the amount of water that can be stored in the pore spaces in the rock or sediments
  - Joints, faults, and caverns are included
- Permeability – a material's ability to release water
  - If pore spaces are too small, the water cannot pass through – impermeable



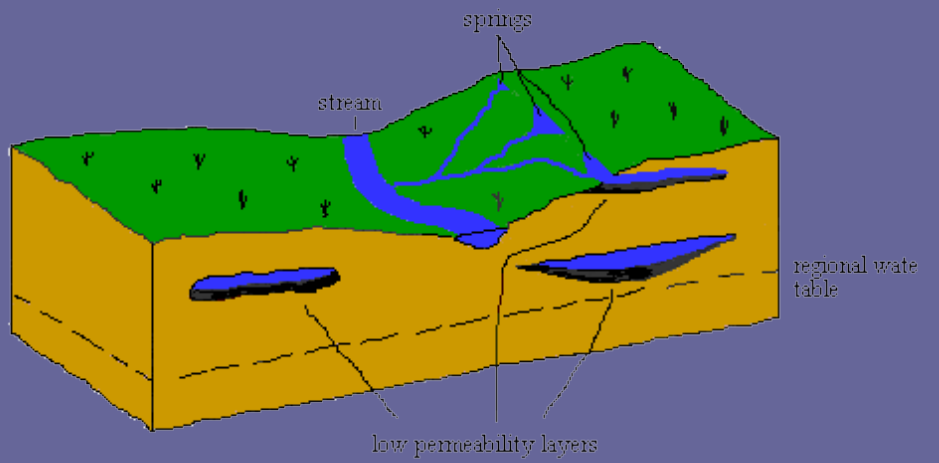
Aquifers



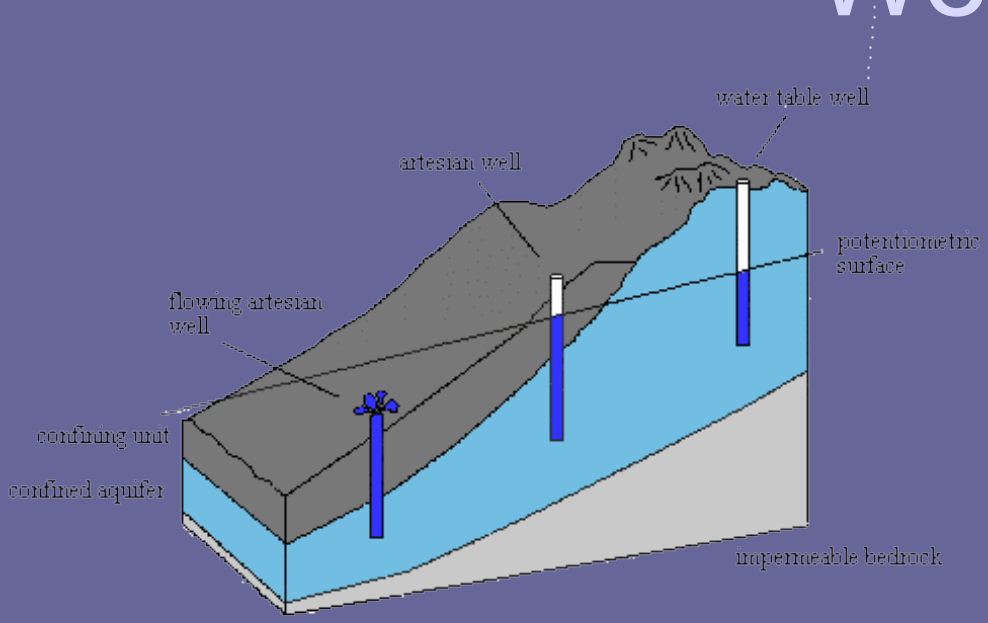
- Aquitard – formed by impermeable materials that create a zone of saturation above it
- Aquifer – permeable layers that allow water to flow freely through
  - The source of most water wells

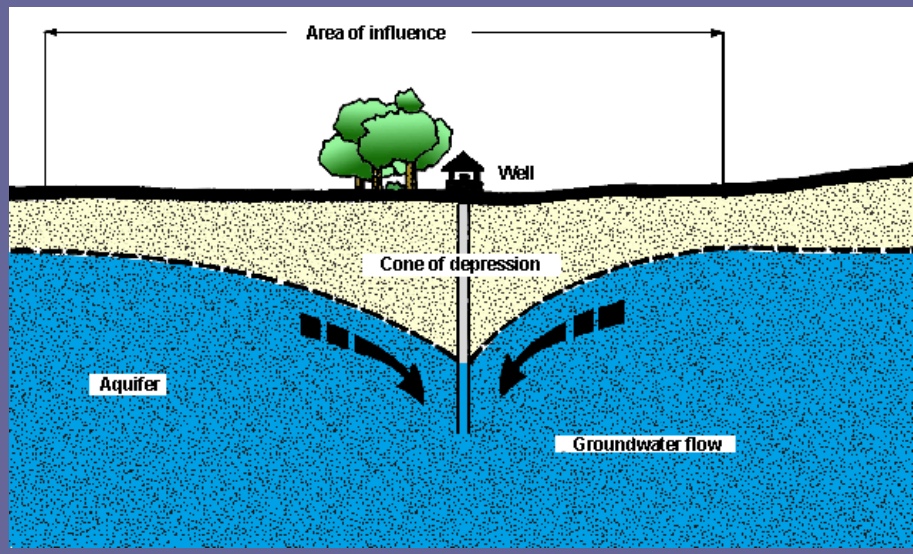
Springs and Geysers

- Spring – groundwater that emerges naturally from the ground surface
- Geyser – hot spring that shoots water up from the ground periodically



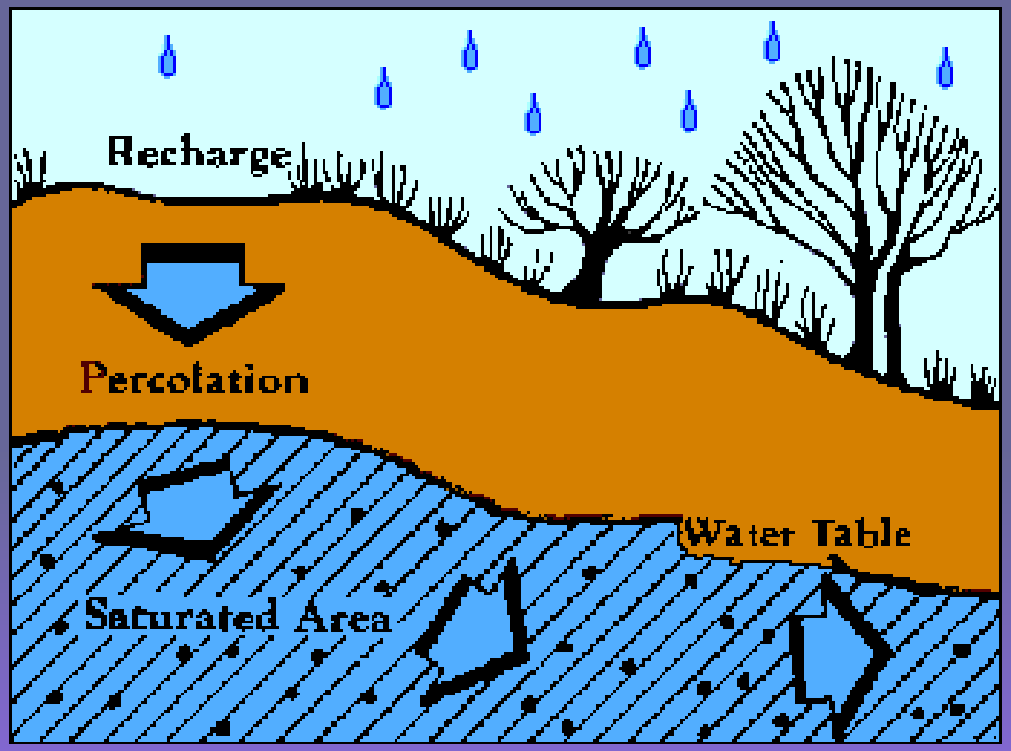
Wells





- A hole drilled into the zone of saturation for the purpose of extracting water
  - 65% of wells are for agricultural irrigation in the United States
  - The well must extend below the water table to account for the periodic rise and fall of the water level
- Artesian Well – the water in the ground rises under its own pressure

Groundwater Overuse



- Groundwater is replenished mostly by rain
  - If there is less rain than use of the water, the water level will decrease
  - If the water use is stopped, it may take thousands of years to completely replenish the groundwater

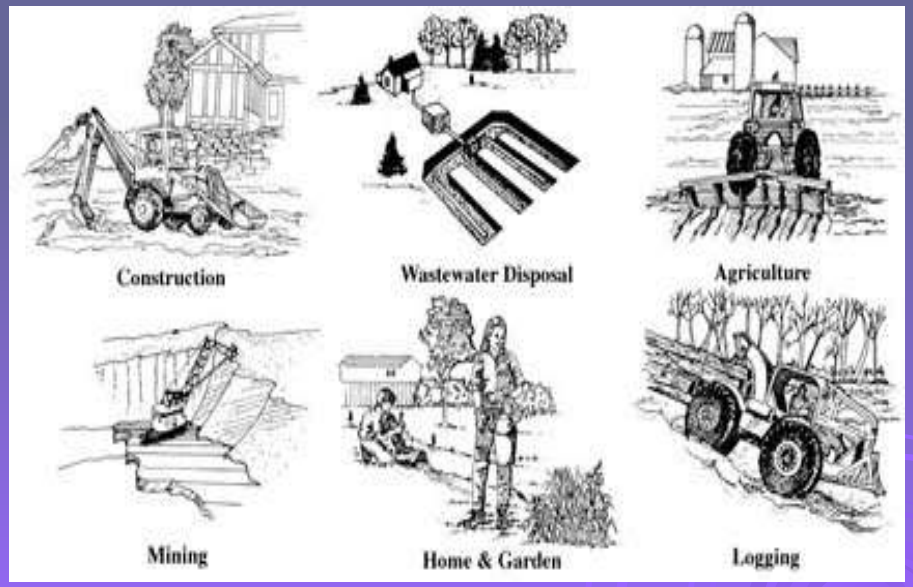
Groundwater Overuse *(cont'd)*

- Ground *subsidence* (sinking) can occur if water is used faster than it is replenished
  - Creates depressions or *sinkholes*

Sources of Groundwater Contamination

- Sewage from septic tanks, farm wastes, inadequate or broken sewers
- Fertilizers and pesticides from agriculture
- Residential runoff
- Highway salts
- Chemical and industrial materials that leak from pipelines, storage tanks, landfills, or holding tanks
- Saltwater in coastal areas
- Minerals and nutrients from dissolved rock and other natural materials

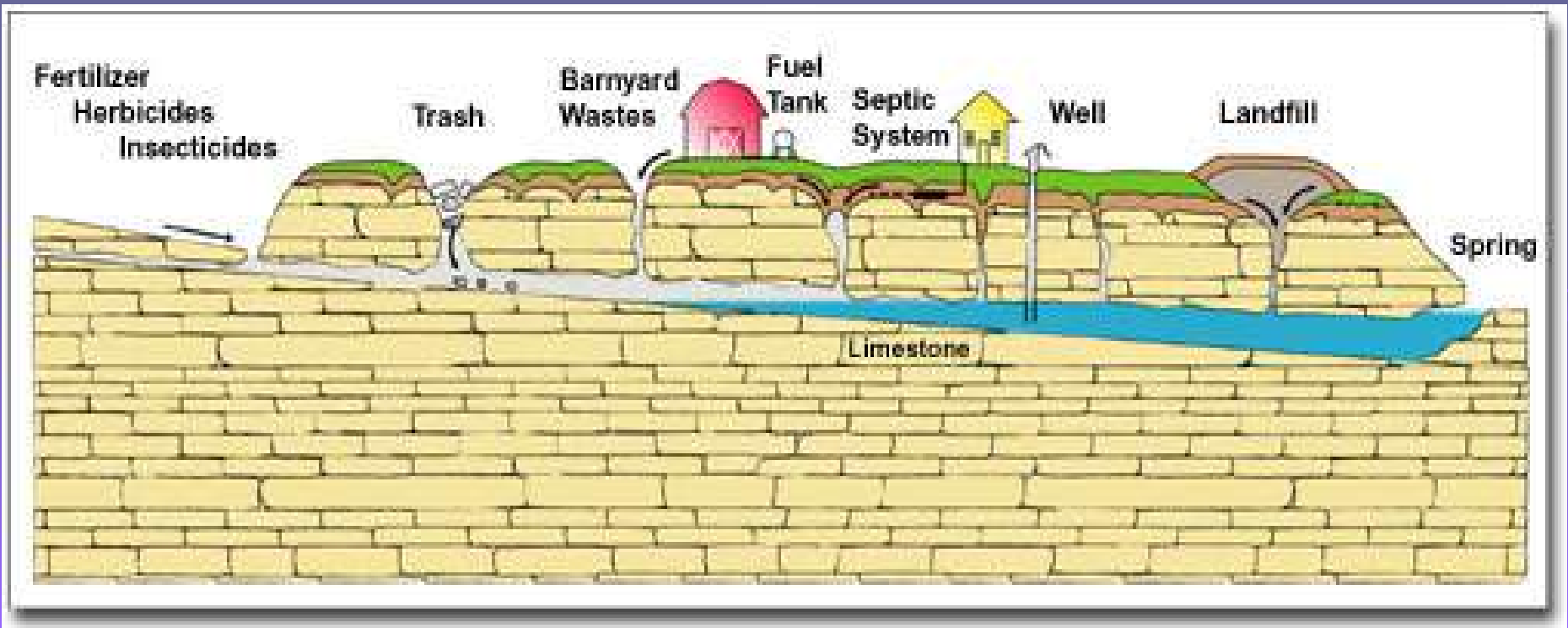
Types of Groundwater Pollution



- Point Source Pollution – contaminants have an identifiable source
  - Smokestacks, car tailpipe
- Nonpoint Source Pollution – contaminant source cannot be found
  - Several farmlands in the same area

Contaminant Spreading

- Flow downhill – contaminants leaked into the ground at the top of a hill will flow downhill
- Rainwater – runs through the contaminant, absorbs it, and transfers it to another area



Groundwater Cleaning

- If water travels slowly through sand or permeable sandstone, the water is purified
- Sometimes contaminated water is pumped out of an aquifer and treated; the aquifer is replenished naturally or with the treated water