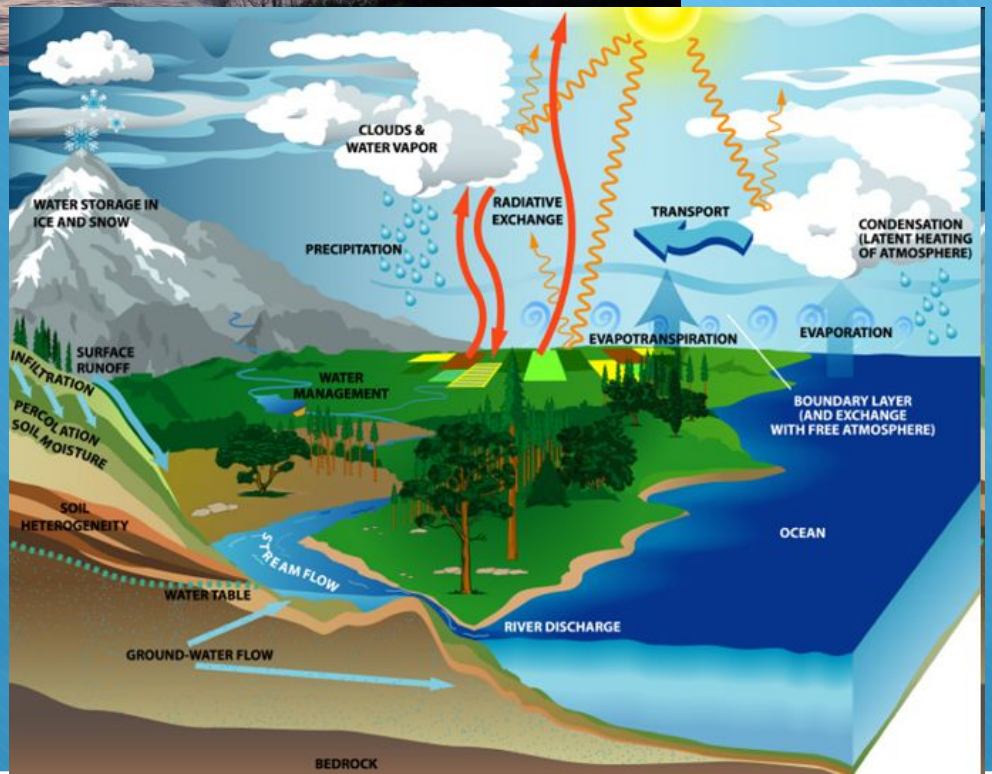
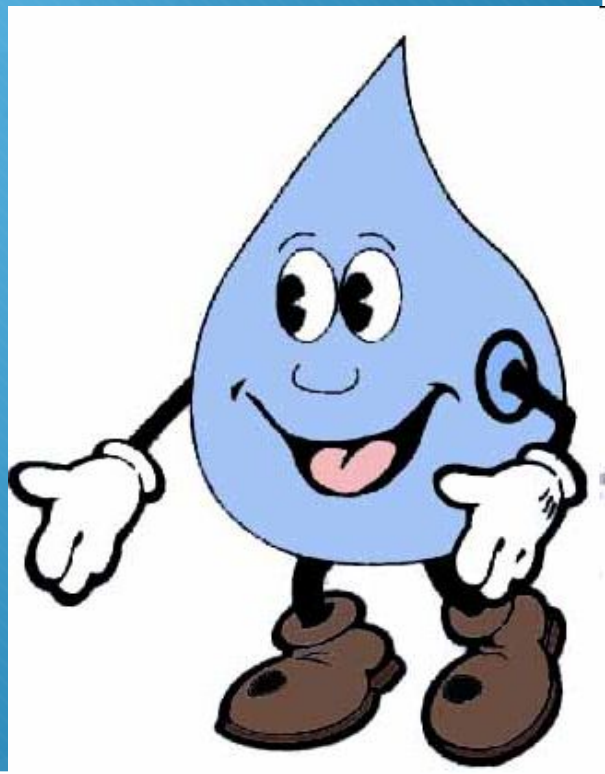
Water Resources in NC





Date: October 31st

1. Please retrieve your computer
2. Head to my website: www.biscardischs.weebly.com
3. Under Earth Science click on “Unit 6”
4. Under the calendar, click on the link for Tuesday’s activity. (Beware which you click on)
5. When you complete the Google Form, you can start/complete your vocabulary

Date: November 1st

Topic: Groundwater

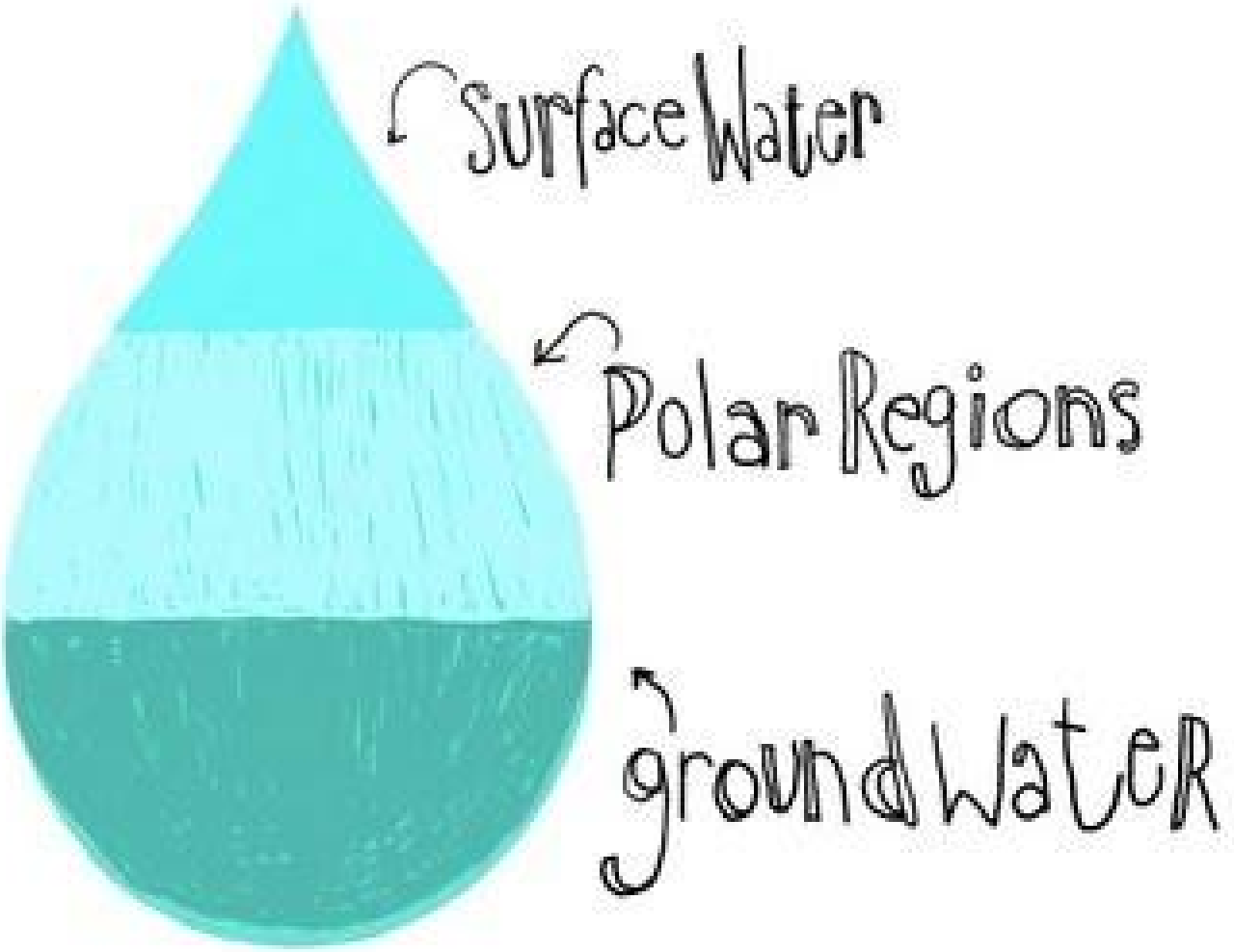
1. Pick up a piece of paper labeled “ Water Cycle Warm-up”
2. Glue or Tape into your notebook
3. Complete the warm-up!

Match the definitions with vocabulary words

Parts of the water cycle

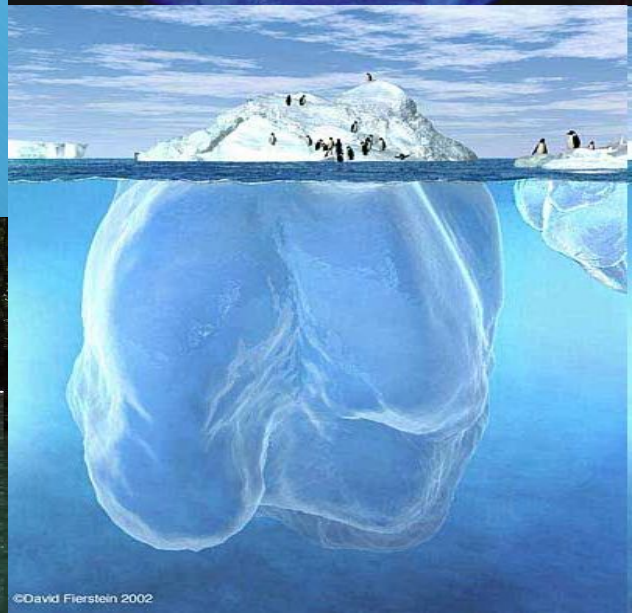
1.	Precipitation	a.	water changes into vapor into the air
2.	Transpiration	b.	water moving through the ground
3.	Evaporation	c.	water released from plants
4.	Infiltration	d.	liquid or solid water from the clouds
5.	Runoff	e.	when flash rain storm hits the ground and is not absorbed.

Water Supply in the World


Surface Water
Polar Regions
groundWater

Distribution of the Water on Earth

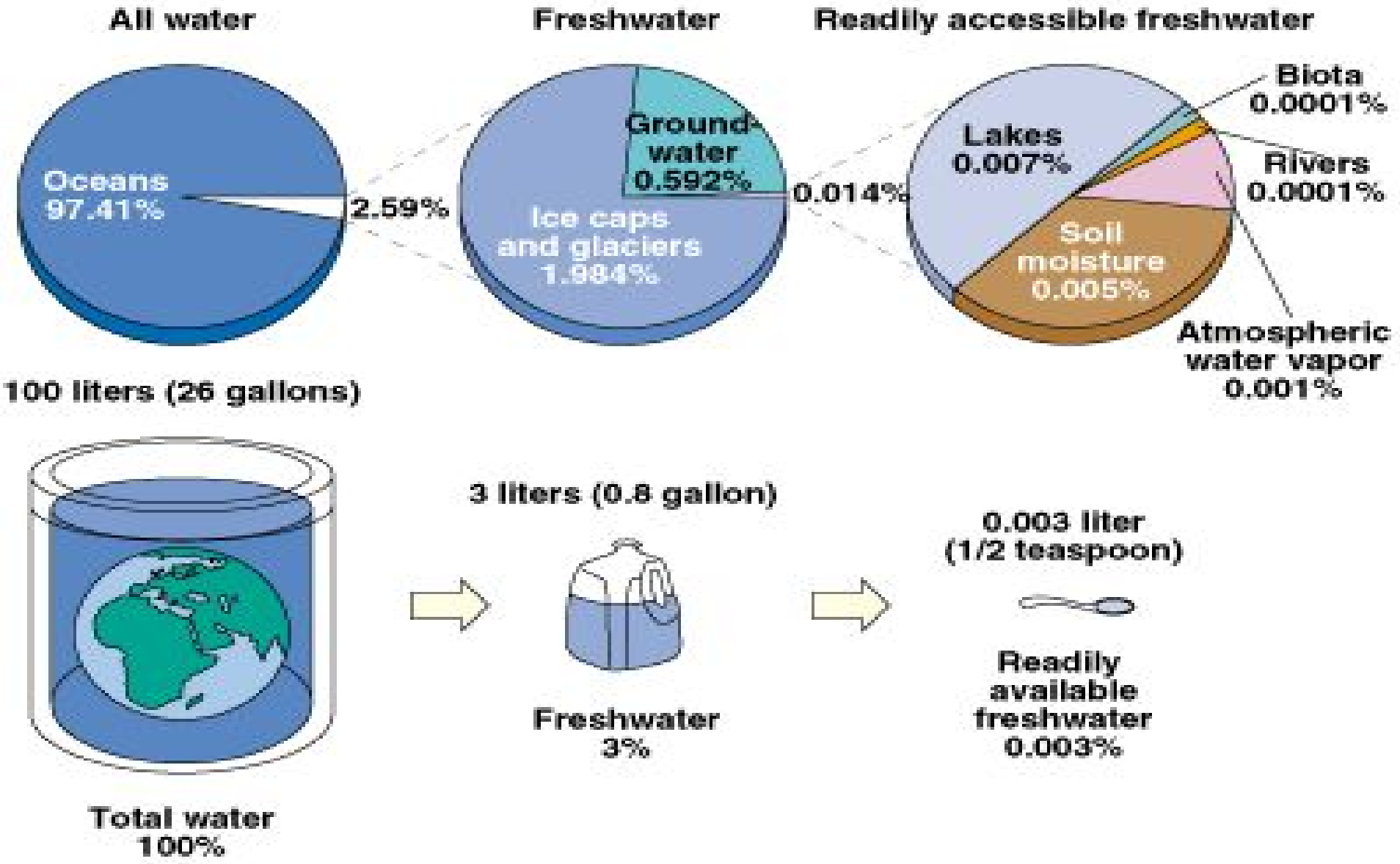
- 71% of Earth is water
  - 97% in the oceans
  - 3% is freshwater
    - 2% in ice and glaciers
    - 0.6% in underground water
    - 0.4% in rivers, streams, lakes and atmosphere



How is water used?

- 70% - Irrigation
- 20% - Industry
- 10% - Cities & Residence

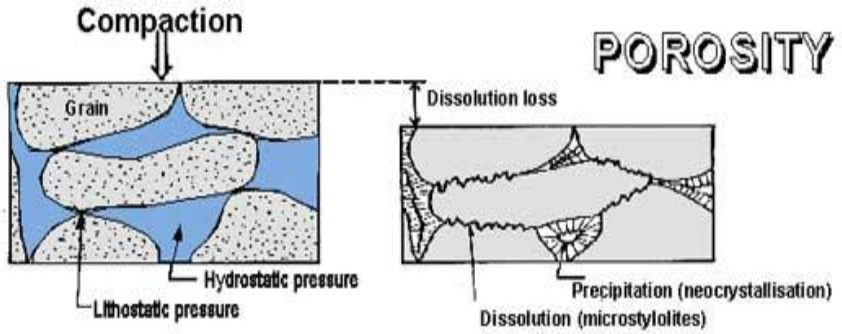
Water Supply & Use

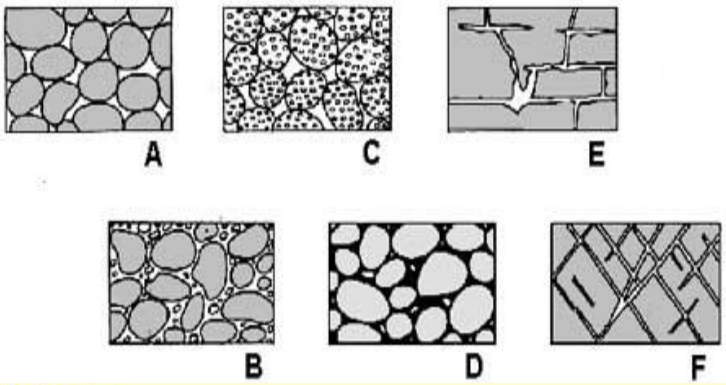


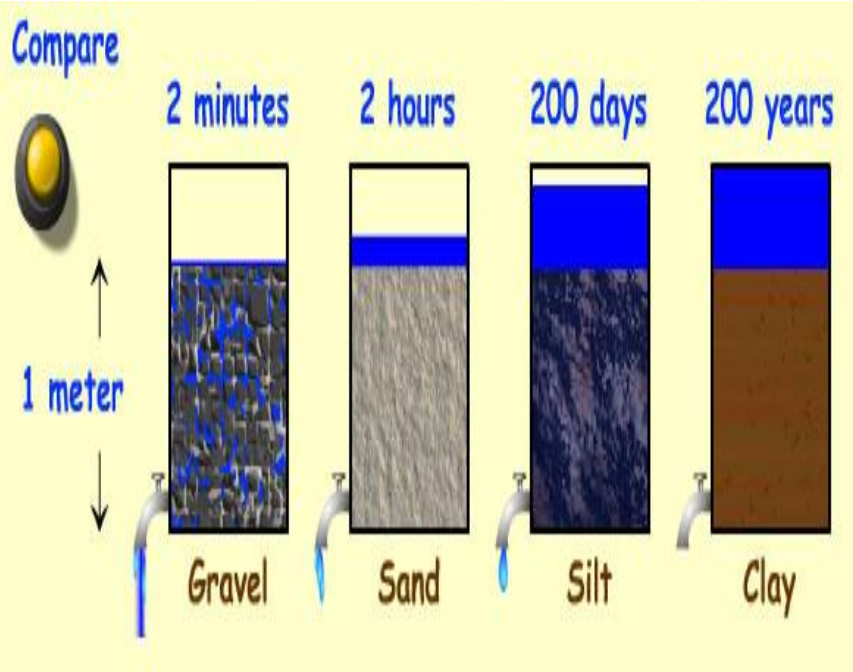
Groundwater

Movement of water underground

- **Porosity:** percentage of pore spaces showing how much water is stored
- **Permeability:** ability of water that can pass through connected pore spaces







Movement of water through soil types

- **Clay:** **smallest pore space – not permeable**
- **Silt:** medium pore space and permeability
- **Sand:** **largest pore space and very permeable**
- **Loam:** Mixture of all three soil types

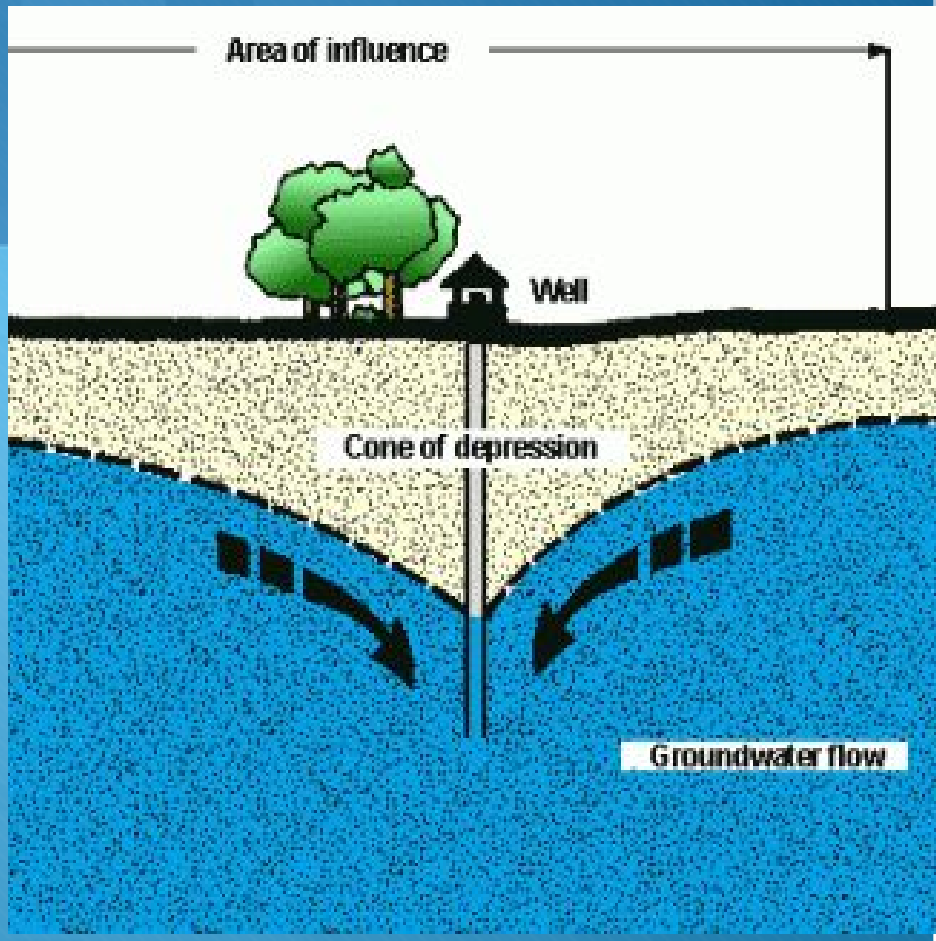
Groundwater

- **Zone of aeration:** area above the water table where water passes through
- **The water table: the upper level of the Zone of Saturation**
- **Zone of saturation:** area where the soil, sediments and rock are saturated with water.
- **Groundwater:** the water within the Zone of Saturation

Ground Water

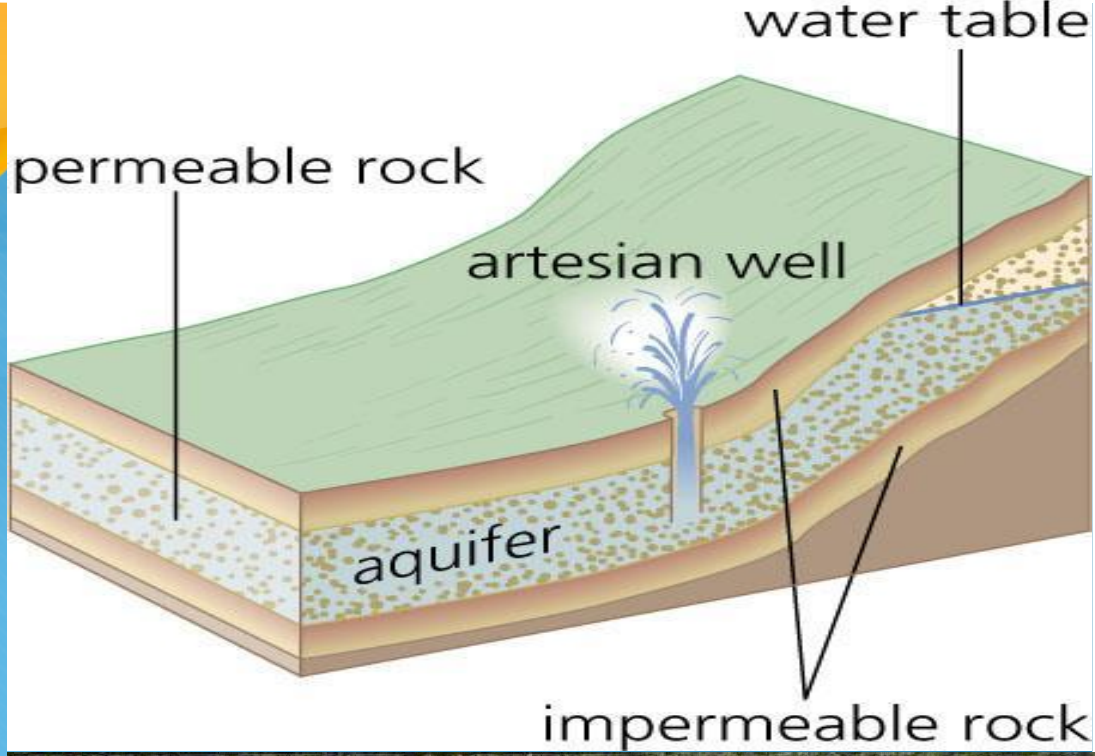
- **Aquifer:** underground layer of water-permeable rock (gravel, sand or silt) from which ground water can be extracted using a well.

- **A cone of depression occurs in an aquifer when a lot of ground water is pumped from a well.**

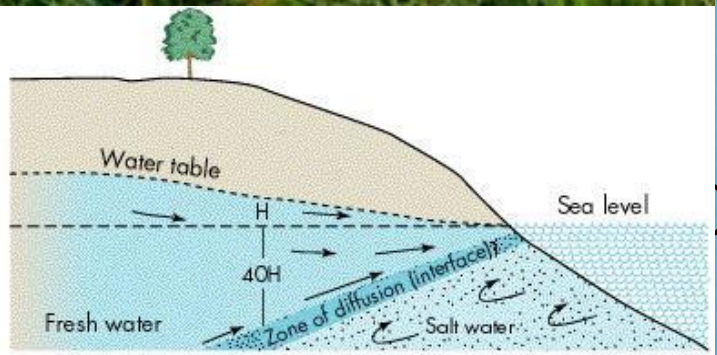


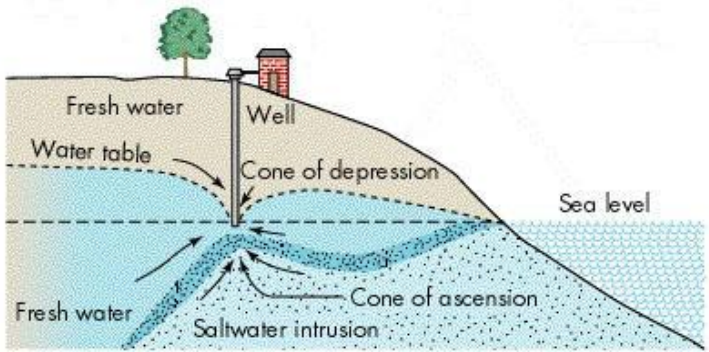
Wells:

- Pumping can cause the water table to be lower
- multiple wells in one area will deplete the supply of groundwater



Problems with Groundwater





- Withdrawing water for agriculture uses
- Toxic metals leaching into wells contaminating the water (arsenic, cadmium, lead)
- **Salt water intrusion where salt enters a well**

https://www.youtube.com/watch?v=PTdHygICVaw
https://www.youtube.com/watch?v=oNWAerr_xEE

Date: November 2nd

Topic: Soil Permeability Lab

1. Explain how aquifers, wells and the cone of depression are related in terms of the water table
2. Why is run-off a large issue to the landscape during rain storms ?

Date: November 2nd

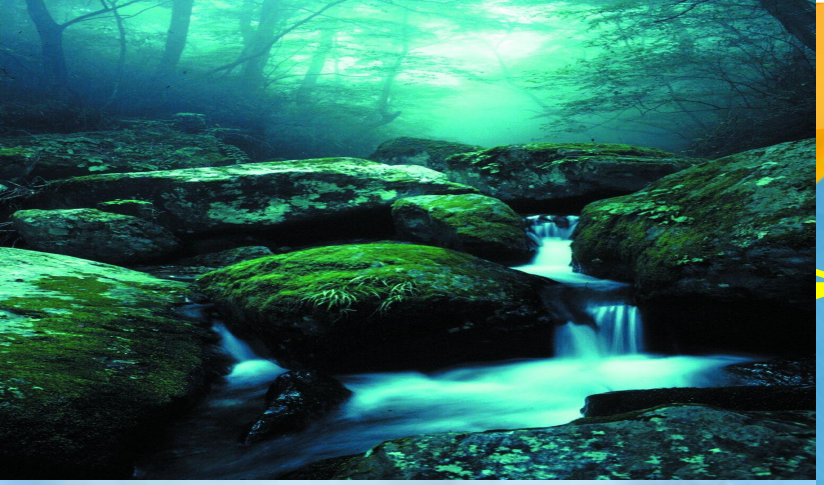
Topic: Virtual Lab (Standard)

1. How are surface water and groundwater different?
2. How are wells useful during large rainstorms?

Caverns

- A **cavern** is a naturally formed underground chamber when water is withdrawn leaving it empty.
  - Erosion forms most caverns at or below the water table
- **Sinkholes:** near the surface where the land collapses due to an existing cave has eroded the soil/rock material.
- **Watershed Link**

Rivers

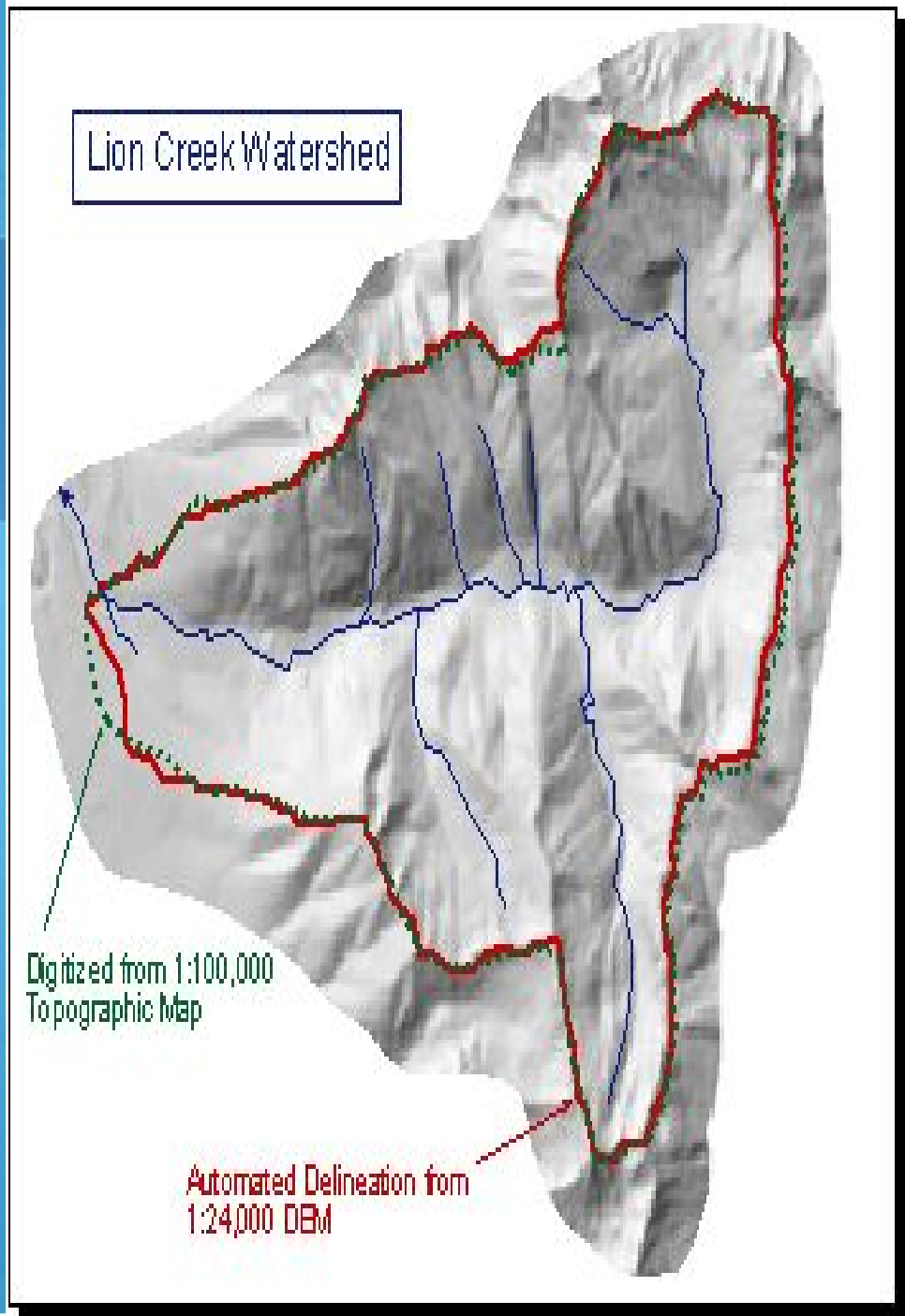


A stream's profile

- **Headwater** (mountains)
  - at the beginning of a stream Temperatures are cooler
  - Higher Dissolved Oxygen
  - Fish found: trout
- **Mouth** (oceans)
  - at the end of a stream
  - Murky waters
  - Lower Dissolved Oxygen
  - Fish found: catfish and carp

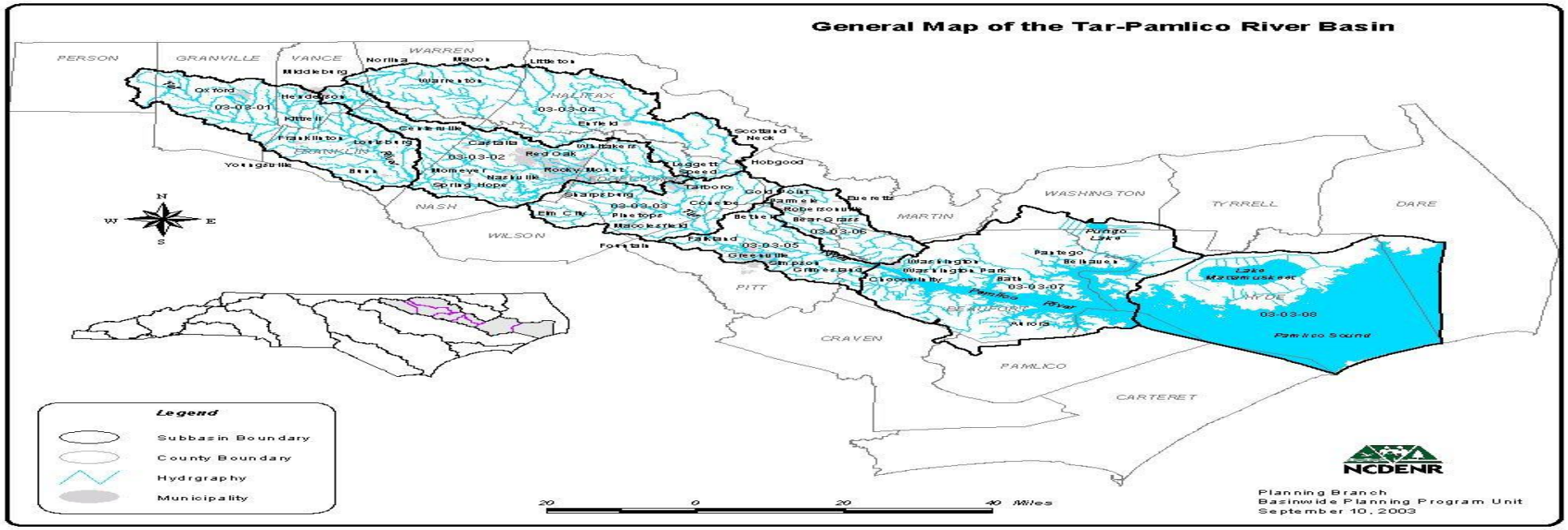
Watershed

- An area of land that contains a common set of streams and rivers found in a River Basin
- **Tributary:** a stream that empties into another stream



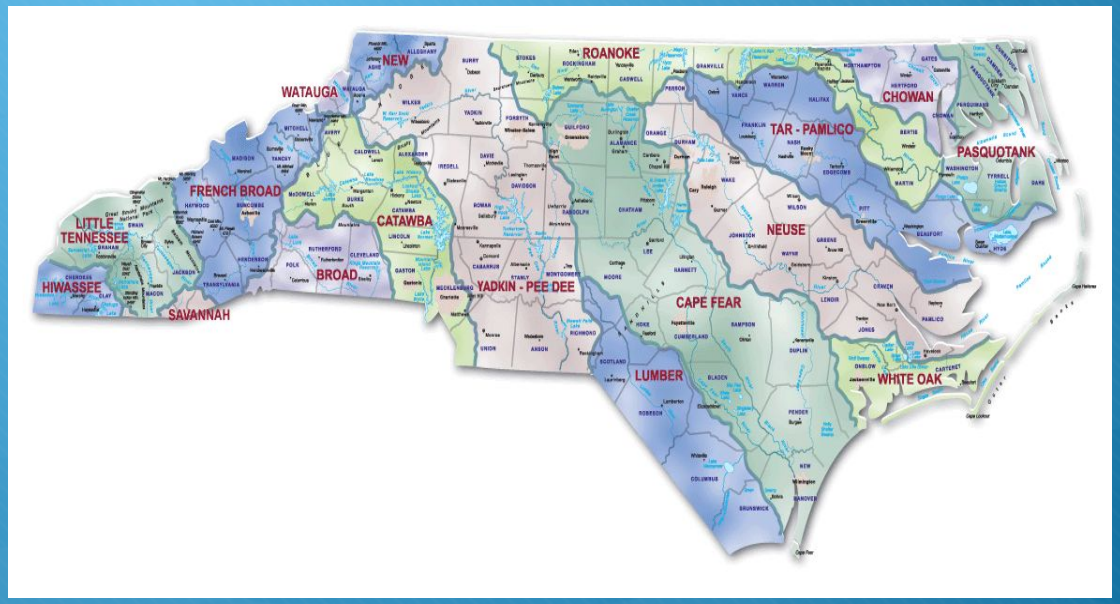
Drainage Basins

- A **drainage basin** is the area where rain or snow melt drains downward into a body of water



NC River Basins

- There are 17 River Basins running through NC with only four of these are unique to NC.
  - Cape Fear (largest)
  - Neuse
  - Tar-Pamlico
  - White Oak

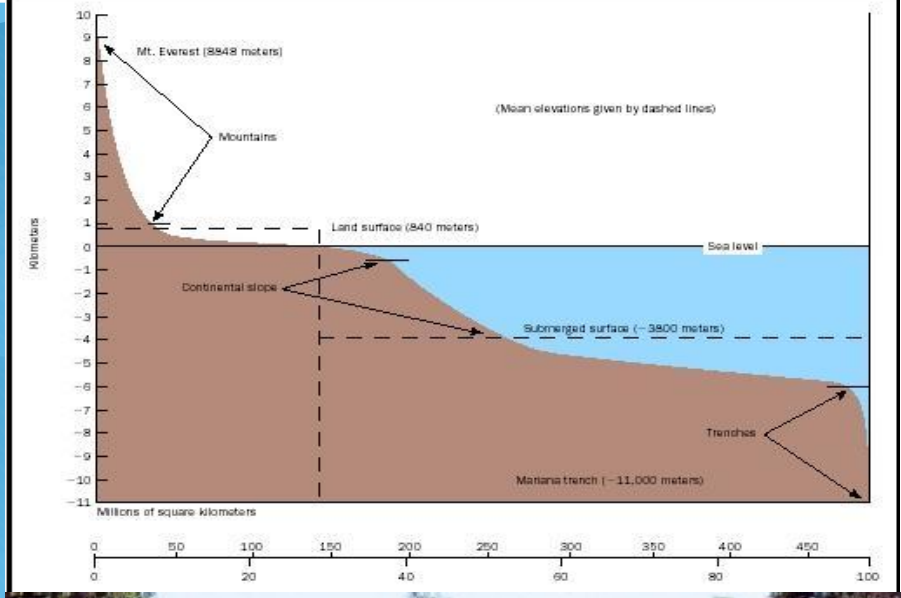


Base level

- **Lowest point** to which a stream can erode
- **Ultimate base level is** sea level
- **Temporary or local base levels**
  - lakes
  - main streams

Meandering Stream

- Slow moving stream located in the flat regions or territory



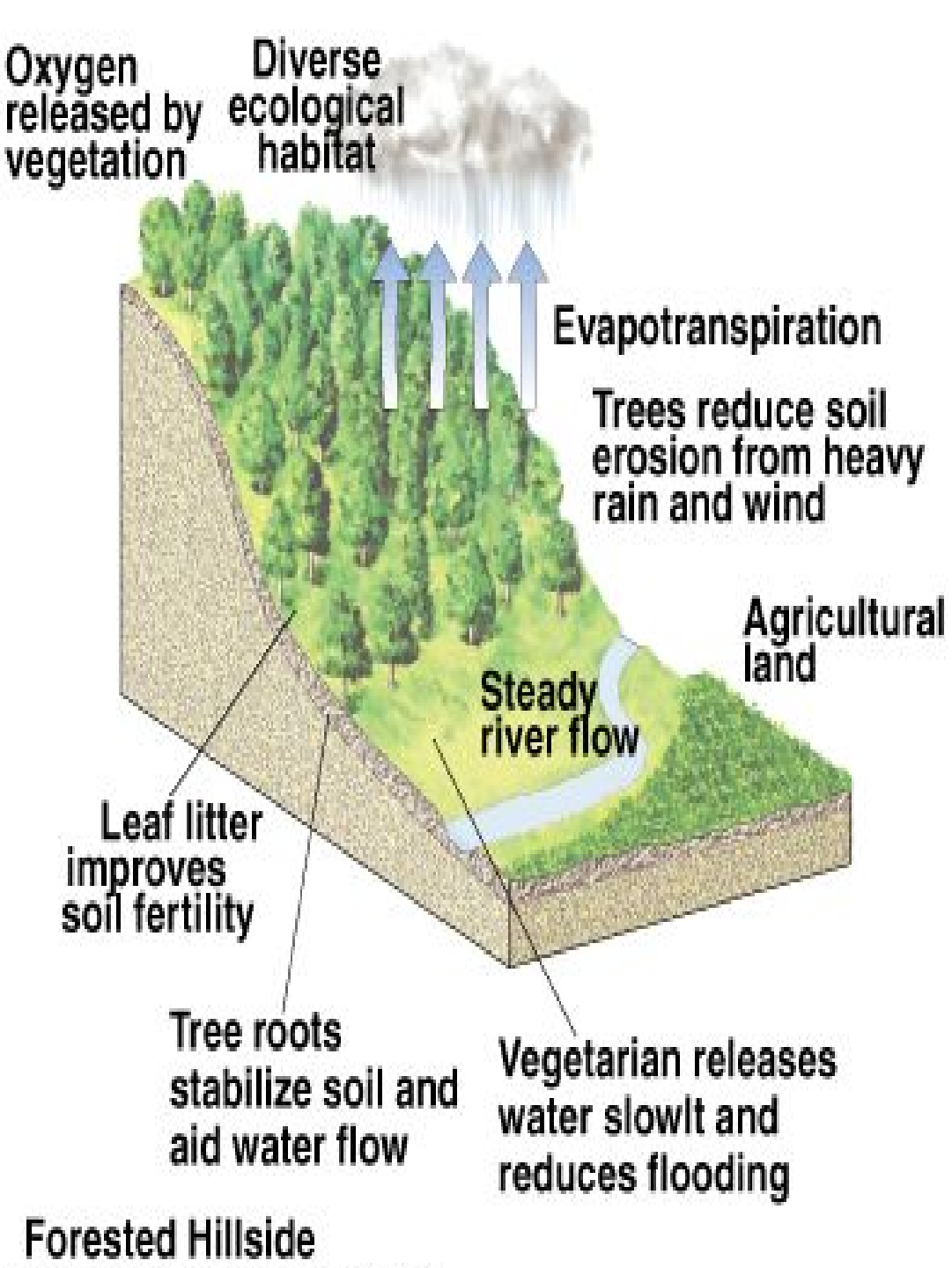
Flooding

What is Flooding?

- Flooding is a natural event where land that is too dry suddenly becomes submerged in water.
  - Can wipe out farms and trees
  - Damage homes, cars, and furniture
  - Displace families
  - Flooding: Is it climate change?

Results of Floods

- **Floodplains** – areas where water floods the land
  - Provides a supplement of nutrient-rich silt to floodplain areas
  - Recharge groundwater
  - Kill and causes property damage



Human activities causing Flooding

- removing vegetation
- logging
- overgrazing
- forest fires
- mining
- destruction of wetlands
- building on floodplains
- urbanization

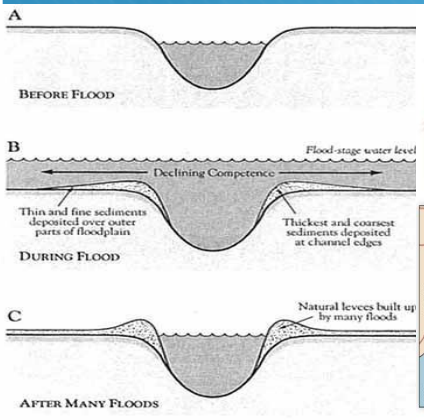
Ways to Prevent Floods

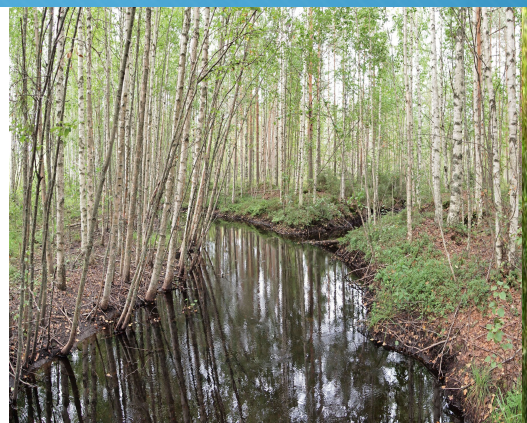
Artifical and Natural Levees

- **A levee** parallels a stream and helps to contain its waters, except during flood stage

Vegetation

- Planting trees, shrubs, and grass help protect the land from erosion.





Drought

What is a drought?

41% of people live in river basins that do not have enough fresh water!

- Dry climate
- Drought
- Too many people using and wasting water
- Lack of money to drill deep wells and build storage How to remedy California's drought - clip

- **Causes of droughts**
  - Dry climate
  - Drought - a period in which precipitation is much lower and evaporation is much higher
  - Desiccation - drying of soil because of such activities as deforestation and overgrazing
  - Water stress - low per capita availability of water caused by overpopulation

How can I prevent a drought?

- Water Conservation Practices:
  - Turn the faucet off when brushing teeth
  - Use water saving devices in homes (toilets, water heaters, etc)
  - Water recycling: gray water (used water) is reused for other needs. (businesses, homes – toilets and gardens)
  - Build dams to conserve water for future needs

Oceans currents

Date: November 3rd

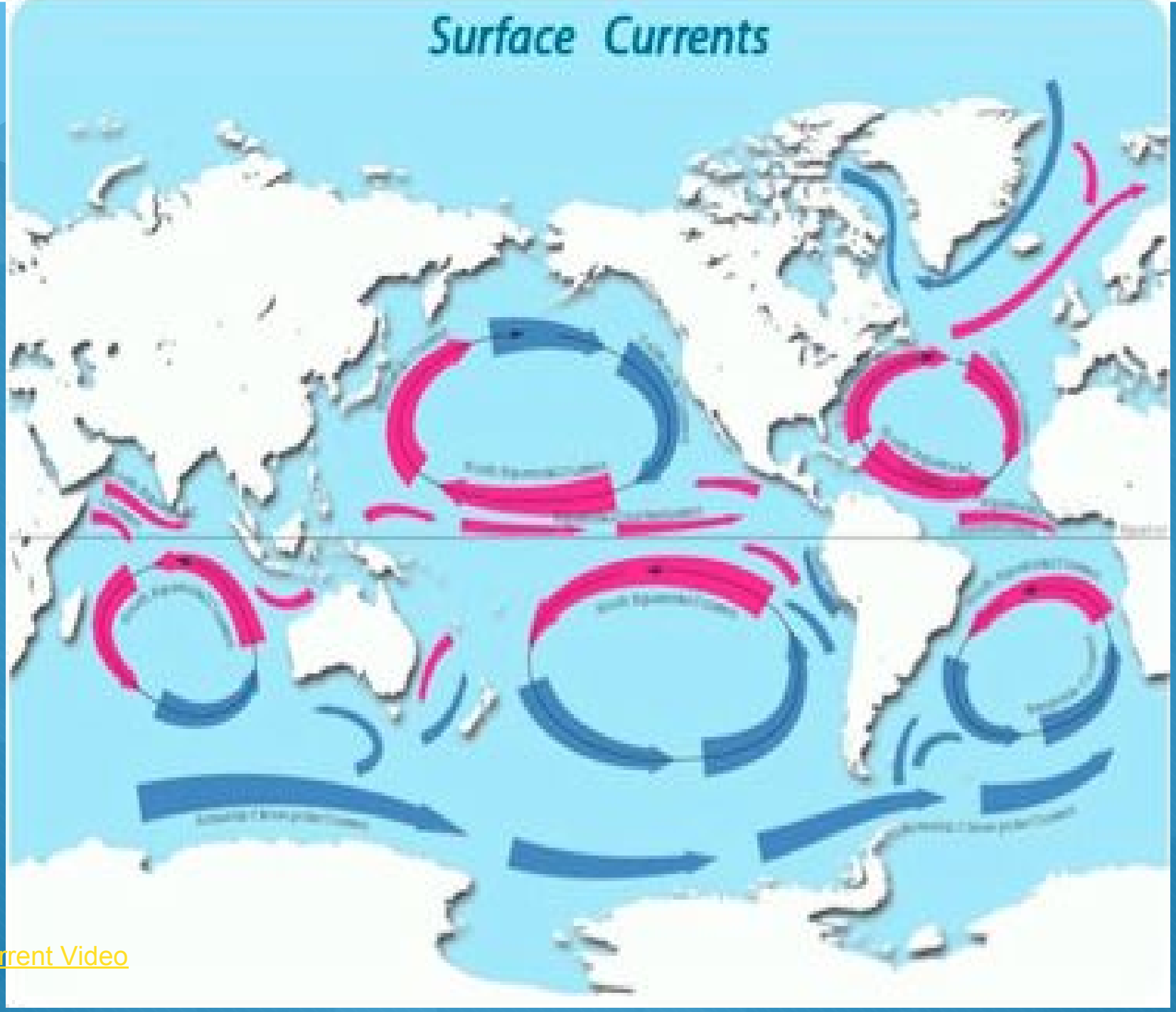
Topic: Global Conveyor Belt

1. Take out/Show me your Global Conveyor Reading when I come around
2. Create a summary using the following words:
    a. Permeability, Porosity, Water Table and Saturation

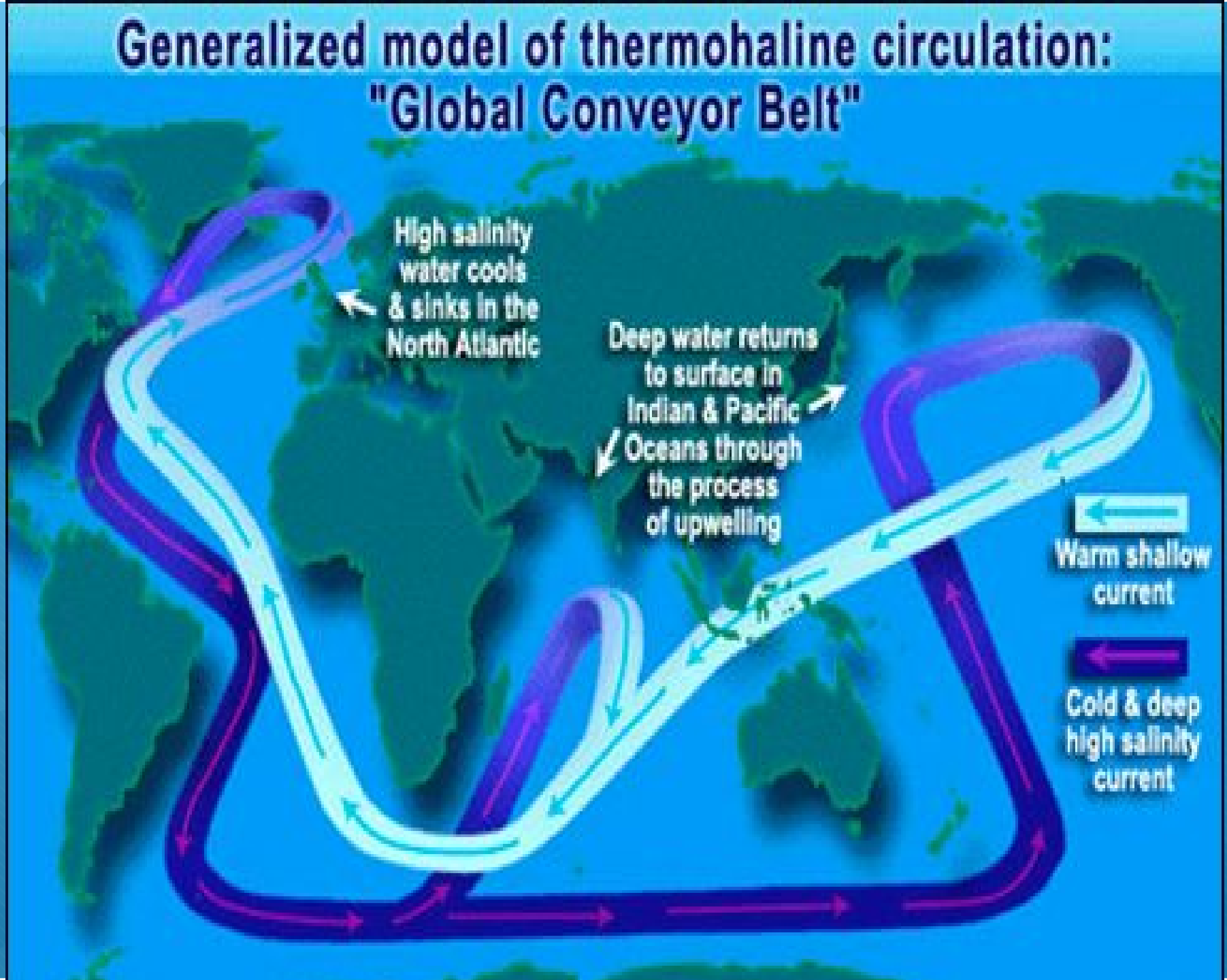
Surface Currents

- Driven by winds
- Affect land and wave formation - cold air causes water to sink and warm air causes water to rise

Surface Currents



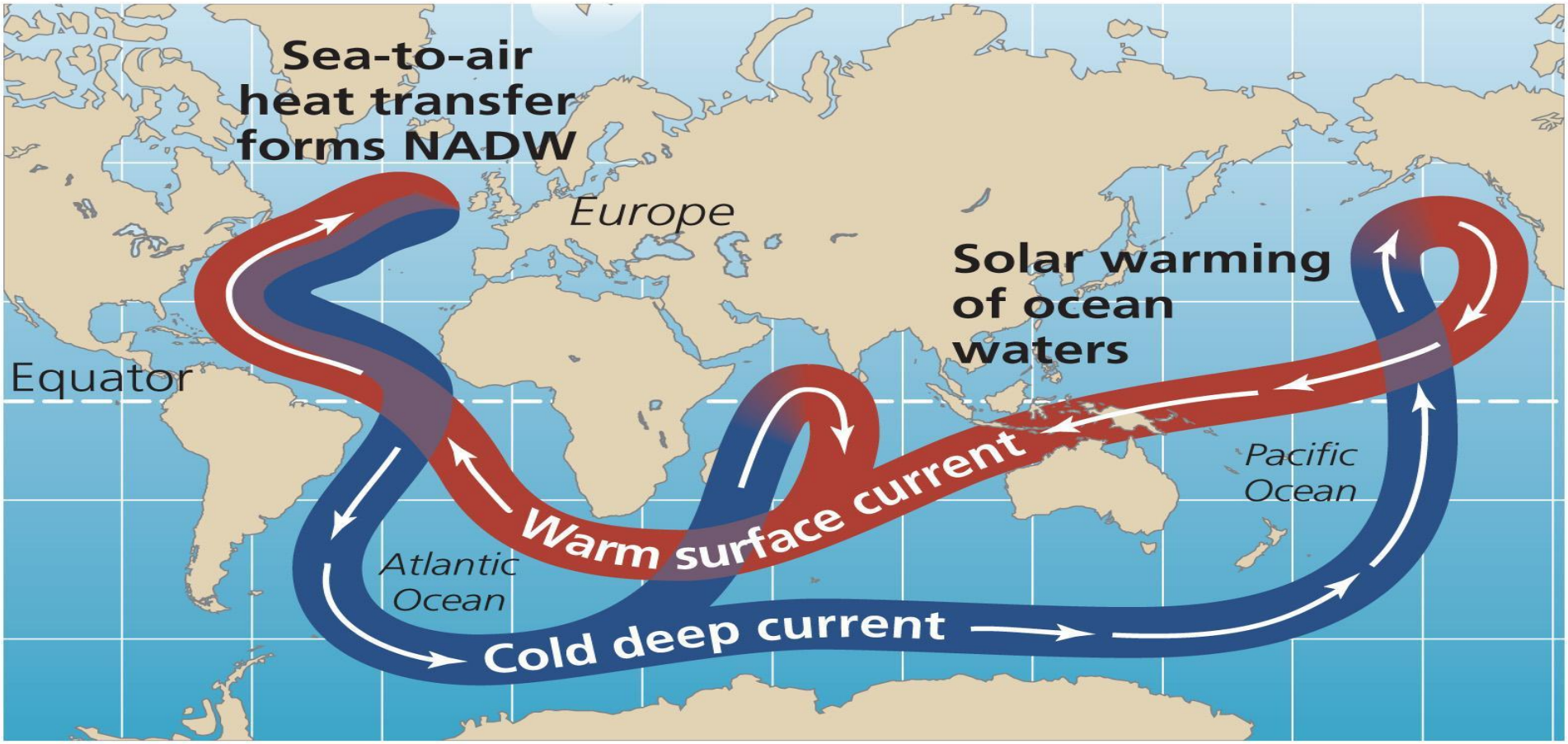
Current Video


Generalized model of thermohaline circulation:
"Global Conveyor Belt"
High salinity water cools & sinks in the North Atlantic
Deep water returns to surface in Indian & Pacific Oceans through the process of upwelling
Warm shallow current
Cold & deep high salinity current

Ocean circulation also influences climate

- Ocean circulation: ocean water exchanges heat in the water with the atmosphere
- Warm & Fresh water moves from East to West (Pacific to Atlantic (Europe)
- Denser, saltier, cool water that sinks in Atlantic and moves deep beneath the surface in the Pacific & Indian Oceans (Asia)

- If **Greenland's ice melts**, freshwater runoff would dilute surface waters, making them less dense, and stopping the movement – This has occurred in the past



Tides and Gravity

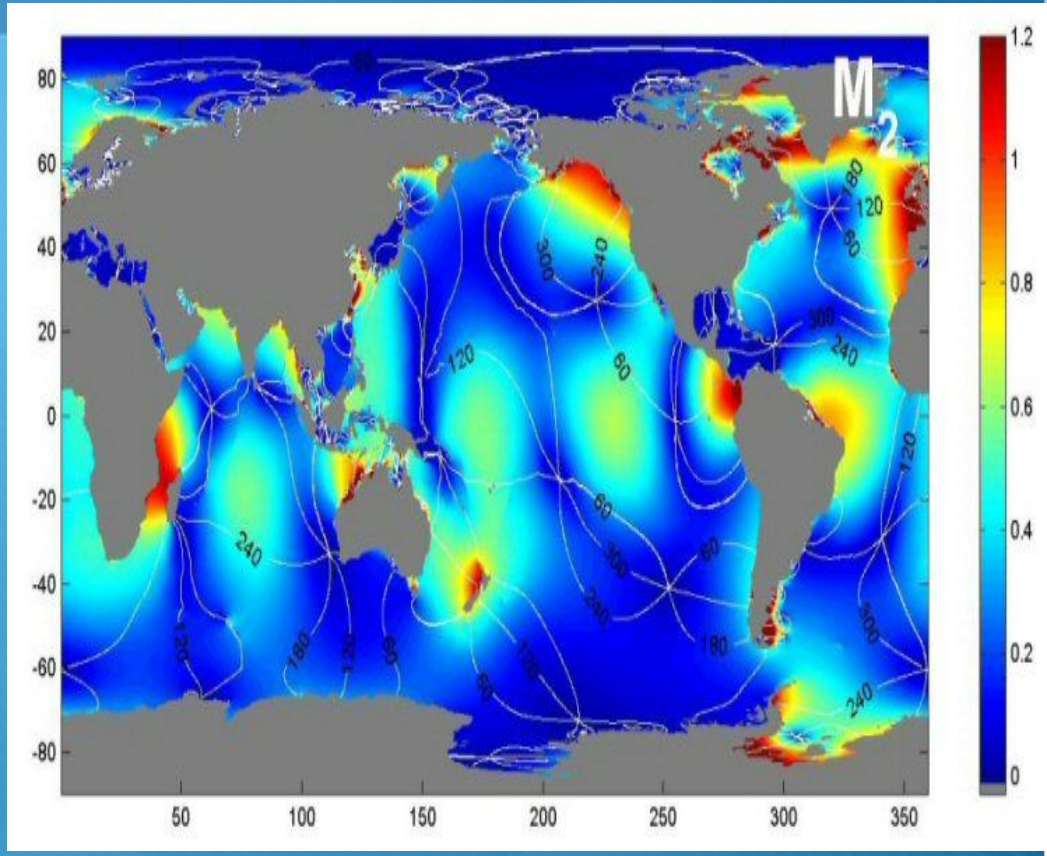
Date: November 6th

Topic: Tides

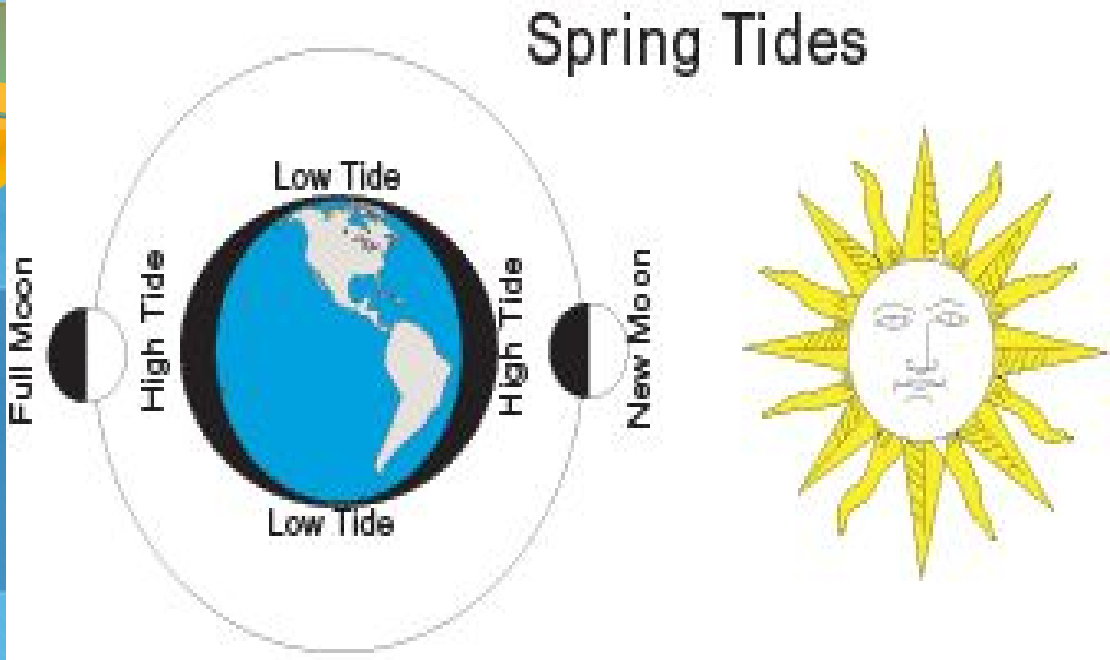
1. Discuss why cold water moves from West to East?
2. How does the atmosphere affect which direction currents move?

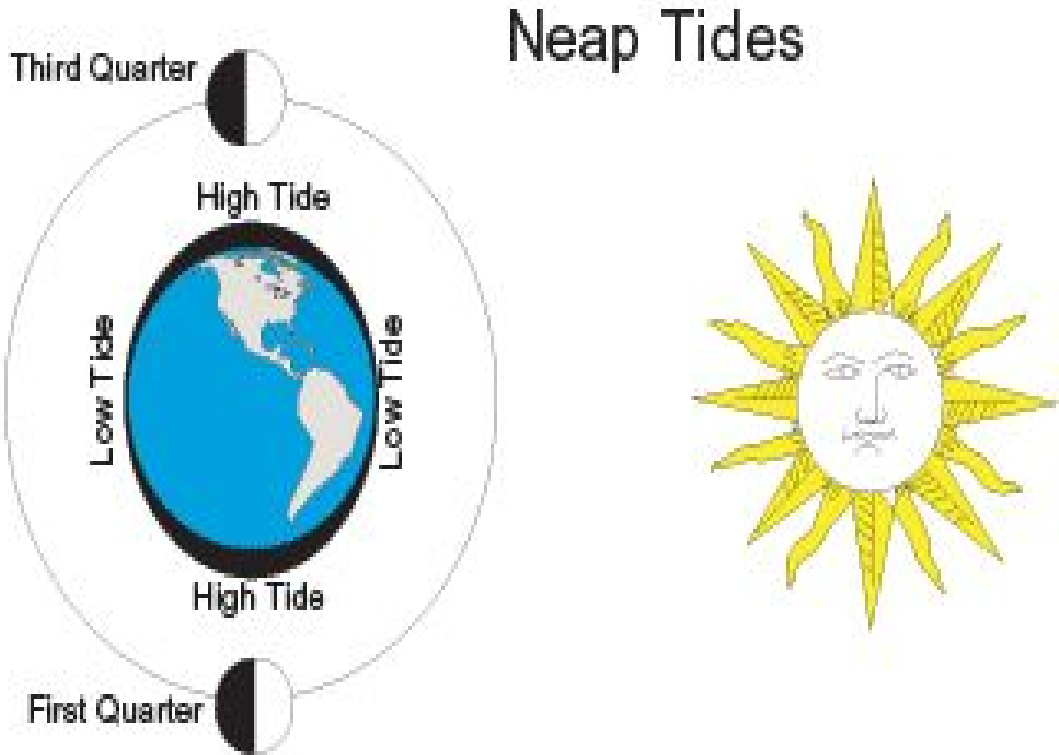
Tidal Currents

- Currents generated by tides
  - Gravitational pull of the moon
  - Strongest at high and low tides



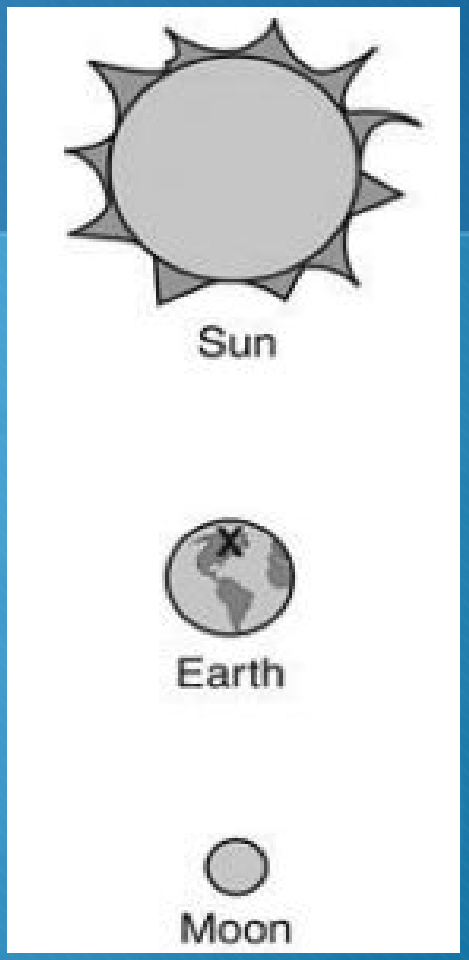
- **What are Tides?**
  - changes in elevation of the ocean surface
- **What causes Tides?**
  - Gravitational forces of the moon and sun



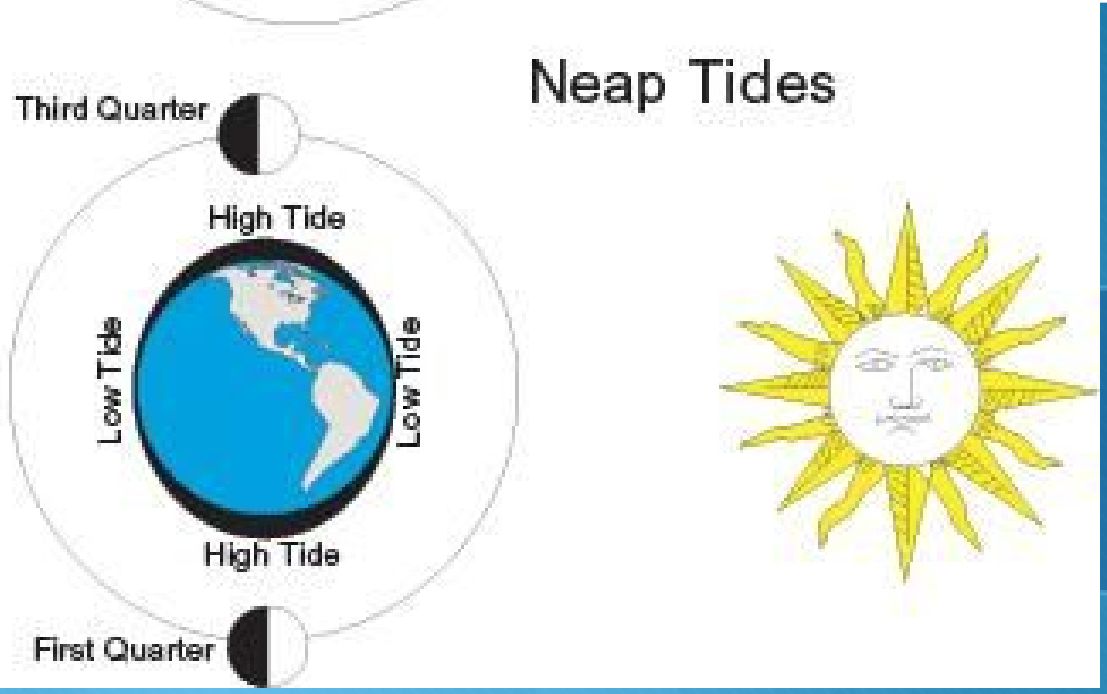


Spring Tides

- Occur during the **new and full moons**
- **All gravitational forces are added together**
- **Extreme high and low tides**
- High tidal range



Neap Tides



- During the 1st and 3rd quarters of the Moon
- **Gravitational forces are offset (__)**
- **Tidal range is the <u>smallest</u> value**

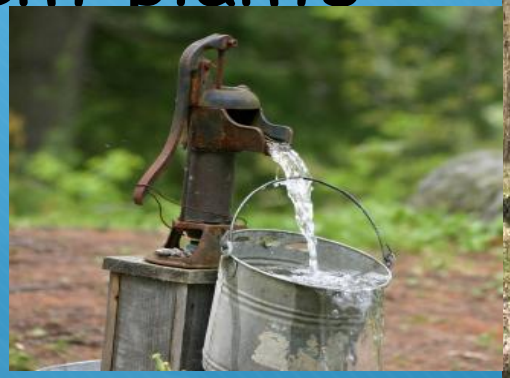
Laws and Methods to keep our water clean and abundant

Clean Water Act

- The Clean Water Act OF 1972
  - Regulates the discharges of pollutants in the US **rivers and streams**

Safe Drinking Water Act

- The Safe Drinking Water Act (1974) was established to protect the quality of **drinking water** in the U.S
  - Water treatment plants
  - Well water



Water Conservation Methods

- Repair leaking faucets and underground pipes
- Landscape year with plants that use little water
- Use drip irrigation in your yard and crops

Water Conservation Methods

- Use water saving toilets, showerheads, dish washers
- Purify and reuse water for houses and gardens
  - Rain Barrels