

The Earth's Surface

➤ To make investigations easier the surface of the Earth has been divided up into four interconnected spheres:

- Lithosphere
- Hydrosphere
- Atmosphere
- Biosphere



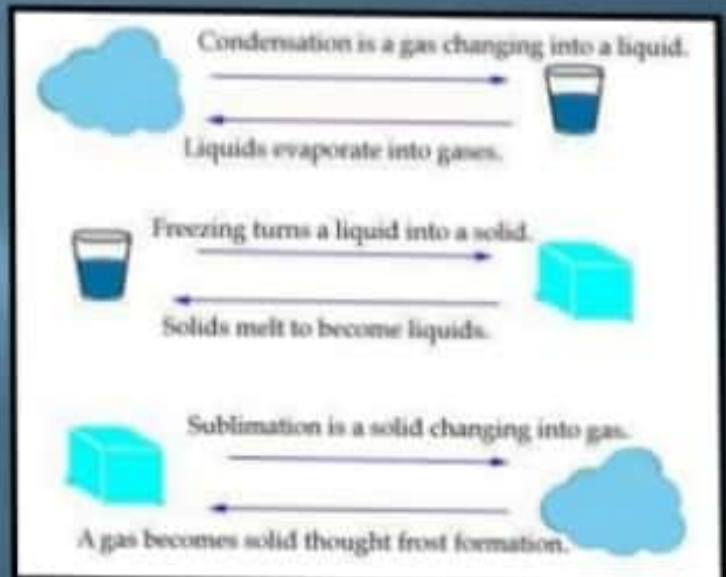
HYDROSPHERE

- ▣ It comes from the ancient Greek "hydro" which means water and "sphaira" which means sphere.
- ▣ It refers to water on, under and over the surface of the Earth.

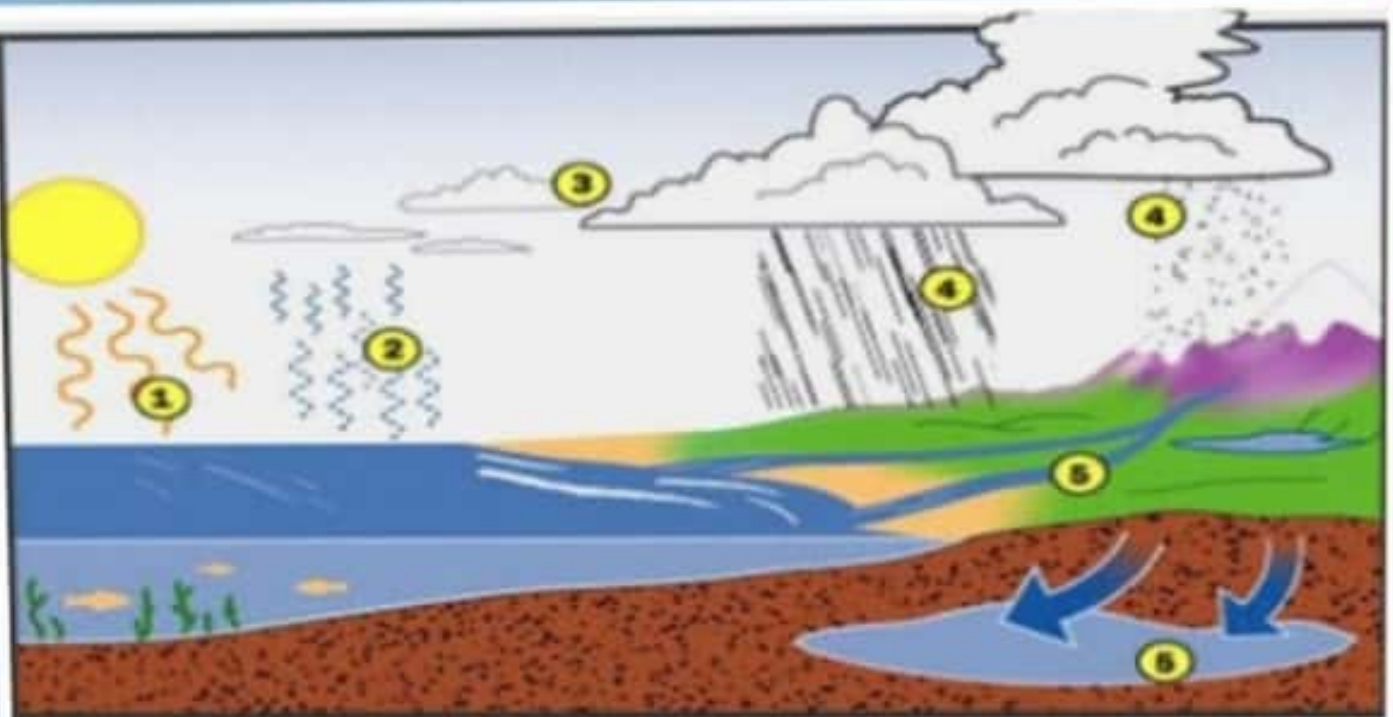


The Water cycle

- There is always the same amount of water on Earth.
- Water appears in different states (liquid, gas or solid form).
- Water continually move between the atmosphere, the oceans and the continents.



- ▣ This continual movement is called **the water cycle:**
 - **Evaporation:** water evaporates into the atmosphere, where it cools.
 - **Condensation:** As it get cooler on the atmosphere, it condenses and forms clouds.
 - **Precipitation:** when clouds cannot absorb any more water there is precipitation in the form of rain, snow or hail. Some precipitation falls on the land flowing into lakes and rivers, other water filters into the ground becoming groundwater.
 - **Transportation:** water in rivers or groundwater is transported to the oceans and seas again and the water cycle begins again.



1 The sun heats the ocean.

2 Ocean water evaporates and rises into the air.

3 The water vapor cools and condenses to become droplets, which form clouds.

4 If enough water condenses, the drops become heavy enough to fall to the ground as rain and snow.

5 Some rain collects in groundwells. The rest flows through rivers back into the ocean.

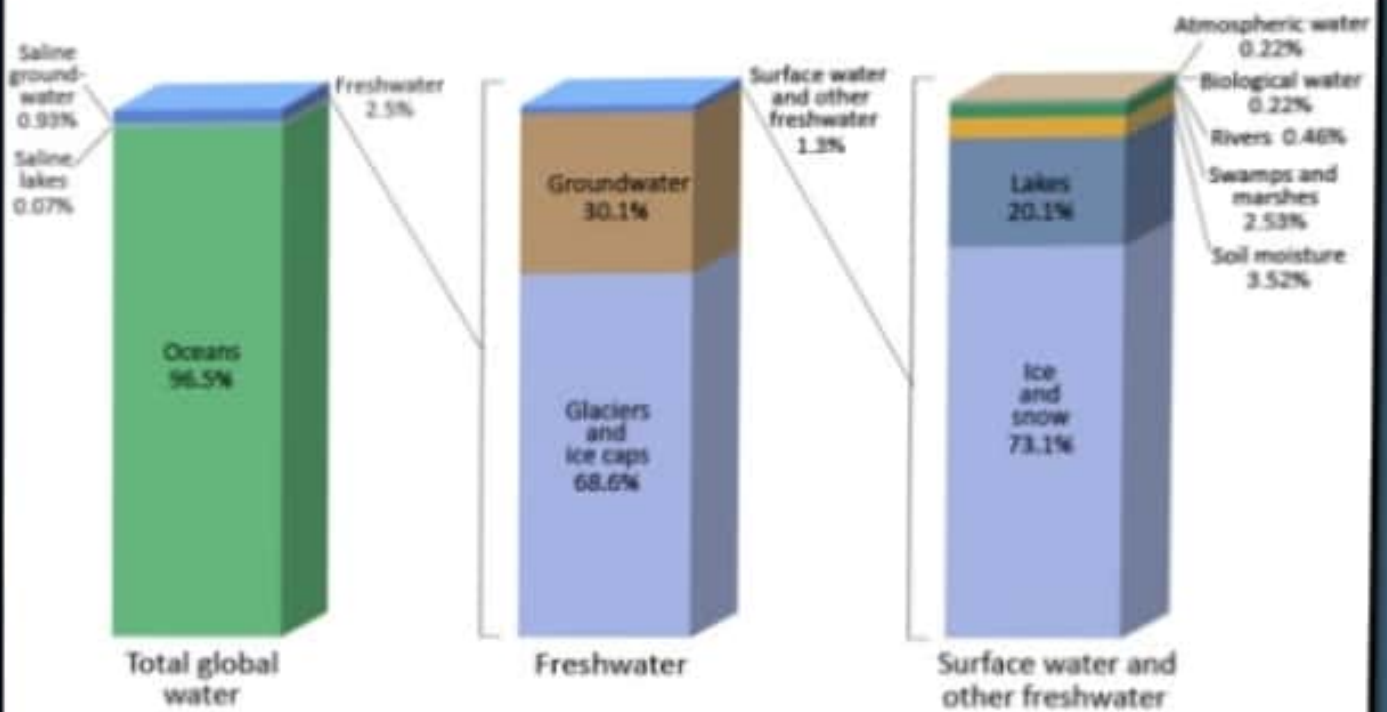


Types of Water

- ▣ **Saltwater:** 97% of the Earth's water is saltwater located mainly in the oceans and seas.
- ▣ **Freshwater:** 3% is fresh water located on continents and islands (river, lakes, groundwater, water vapour...)



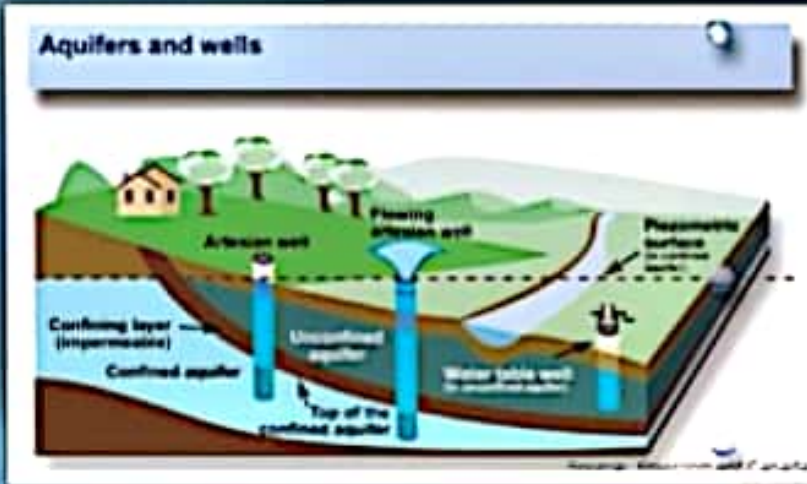
Distribution of Earth's Water



Source: Igor Shiklomanov's chapter "World fresh water resources" in Peter H. Gleick (editor), 1993, *Water in Crisis: A Guide to the World's Fresh Water Resources*.

Water can be found in

- ▣ **Oceans:** vast masses of saltwater that separate the continents.
- ▣ **Seas:** oceanic waters that are close to continents and not as deep as oceans.
- ▣ **Rivers:** continuously flowing currents of water that flow into seas, lakes and other rivers.
- ▣ **Tributary:** a river that flows into another river.
- ▣ **Groundwater:** rainwater that infiltrates rocks and soil into the Earth's surface.
- ▣ **Aquifers:** stores of groundwater that accumulate underground on top of impermeable layers of rock.
- ▣ **Wells:** holes that men do into the Earth's surface to bring underground water to the surface.



- ▣ **Glaciers:** huge mass of ice, formed from compacted snow, slowly flowing over a land mass.
- ▣ **Ice caps:** huge mass of ice and snow that permanently cover the poles of the Earth.
- ▣ **Lakes:** large bodies of water that accumulate in inland basins. They receive water from rivers, precipitation and groundwater.



Rivers

- ▣ There are 3 stages in the **course** of a river:
 - **Upper Course:** from the river's source down the mountains water flows rapidly eroding rocks.
 - **Middle course:** water flows less rapidly depositing sediments.
 - **Lower course:** the river reaches its mouth into a lake, another river or a sea. Water flows slowly depositing sediments.
- ▣ The **flow** is the amount of water in a river. It depends on:
 - The amount of rainfall.
 - The type of soil





Uneven water distribution

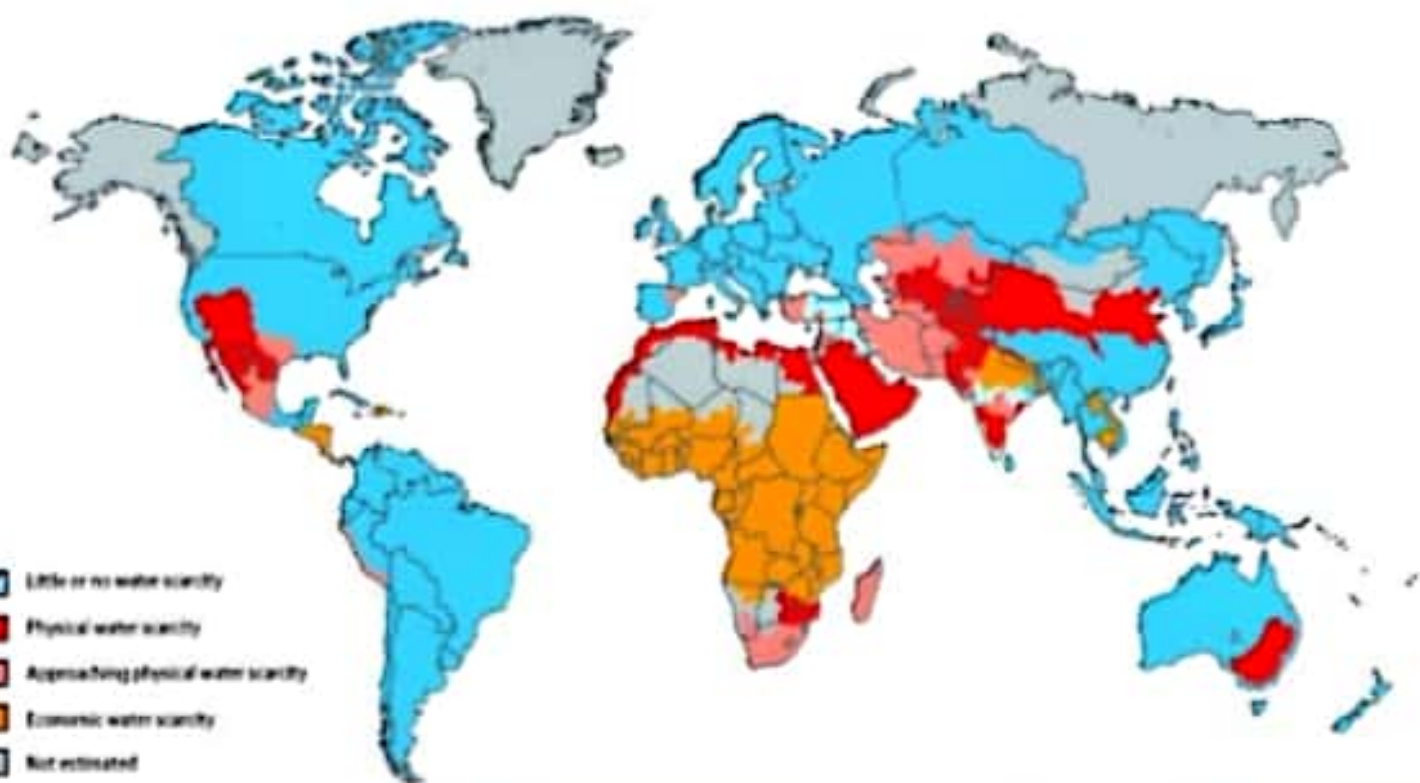
- ❑ Water is essential for life. Humans can only drink fresh water that needs to be purified.
- ❑ As most fresh water is trapped in ice and glaciers there is not much water for human consumption left.
- ❑ So we need to recycle water to assure our livelihood.



- ❑ Although water is found in a considerable amount in temperate and tropical regions where there is a lot of precipitation there is an uneven distribution of water on the Earth.
- ❑ **Floods:** the inundation of land that is normally dry through the overflowing of a body of water
- ❑ **Droughts:** a long period of scanty or low rainfall that normally affects growing or living conditions.



Areas of physical and economic water scarcity



Source: FAO report, Insights from the Comprehensive Assessment of Water Management in Agriculture, 2009, p. 28