

# **Water Demand Supply & Distribution (CE-562)**

## **Lecture - 1**



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# WATER CYCLE

- Water cycle or **hydrological cycle** of the earth is the sum of all processes in which **water** moves from the land and ocean surface to the atmosphere and back in the form of precipitation.
- Water cycle deals with the origin and distribution of water on the globe.
- Complex pathways include passage of water from gaseous stage in the atmosphere to oceans, lakes, rivers etc.



# WATER CYCLE

Precipitation

Temperature

SNOW

Evaporation

Streamflow



# HYDROLOGICAL PROCESSES

➤ Hydrological cycle includes the following processes:

1. Evaporation
2. Condensation
3. Precipitation
4. Interception
5. Infiltration
6. Percolation
7. Transpiration
8. Runoff and storage

# EVAPORATION

- Evaporation occurs when water changes from liquid state to gaseous state.
- Evaporation occurs on water surfaces like lakes, seas etc. Evaporated moisture is lifted into atmosphere.
- **Evaporation** is the primary pathway in which water moves from the liquid state back into the water cycle as atmospheric water vapor.



# CONDENSATION

- Condensation is the process by which water vapor changes into water.
- Water vapor condenses to form dew, fog or clouds.
- Condensation takes place due to cooling of air.



# PRECIPITATION

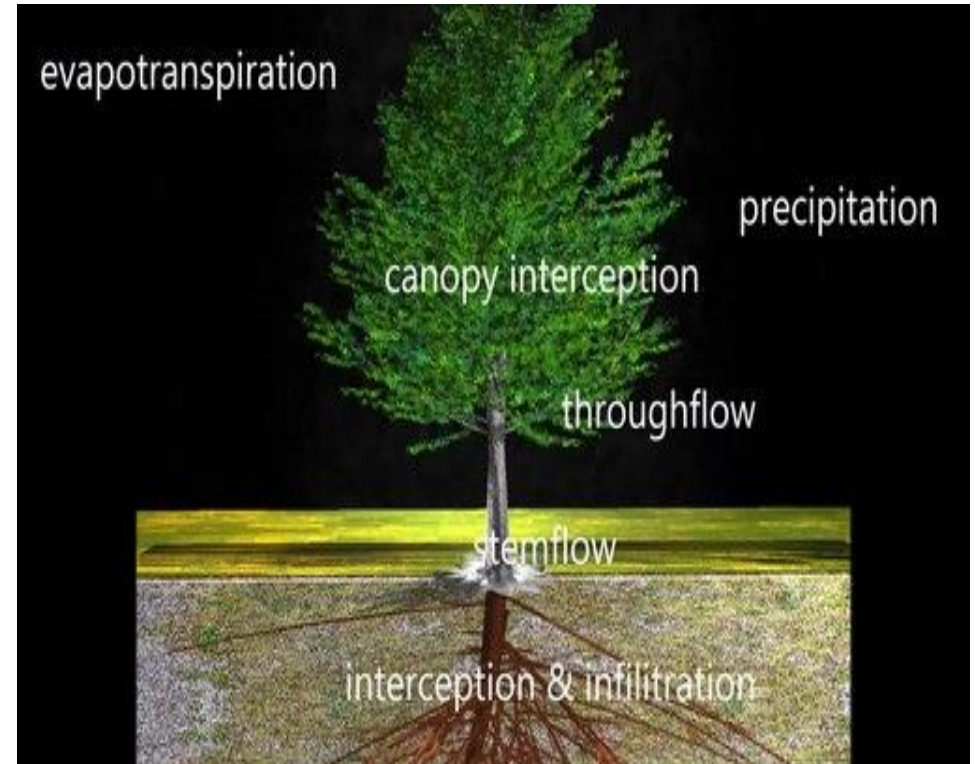
- Precipitation is the process that occurs when water particles fall from the atmosphere and reach the ground.
- Precipitated water may fall into water bodies or on land. It then goes to streams or penetrates into the soil.
- There are different types of precipitation including — rain, snow, hail, and sleet





# INTERCEPTION

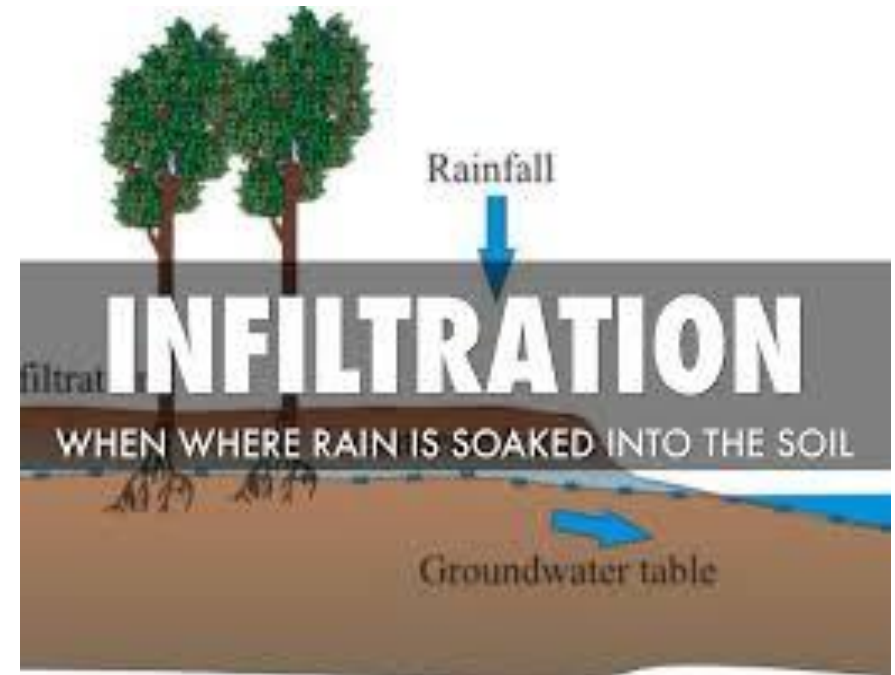
- Interception is the process of interrupting the movement of water in the chain of transportation events leading to streams.
- When rain first begins some part of the rain does not reach the streams instead intercepted by the leaves, branches of plants and the forest floor.





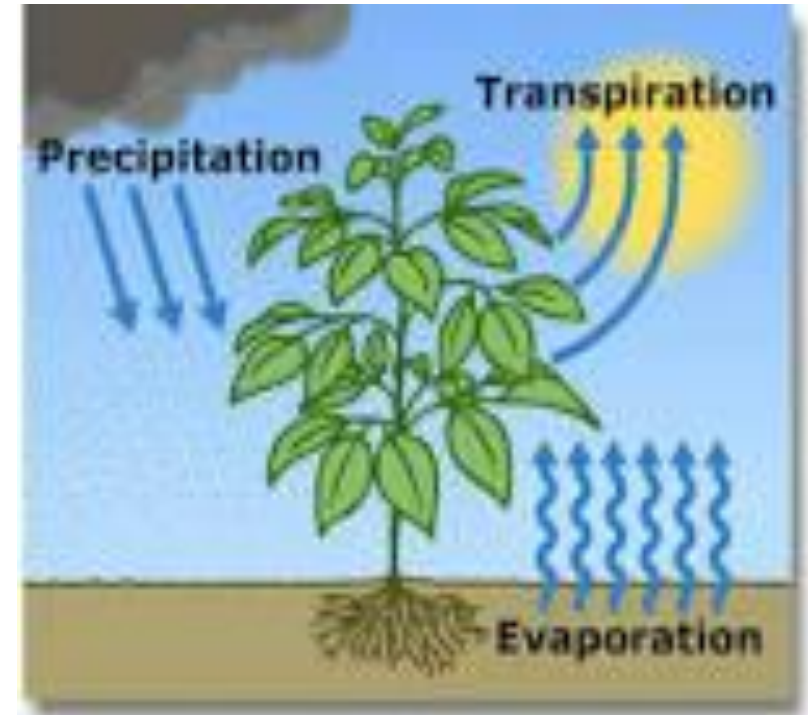
# INFILTRATION

- Infiltration is the physical process involving movement of water through the boundary area where atmosphere interfaces with the soil.
- Infiltrated water and water stored in the soil, can become subsurface runoff.



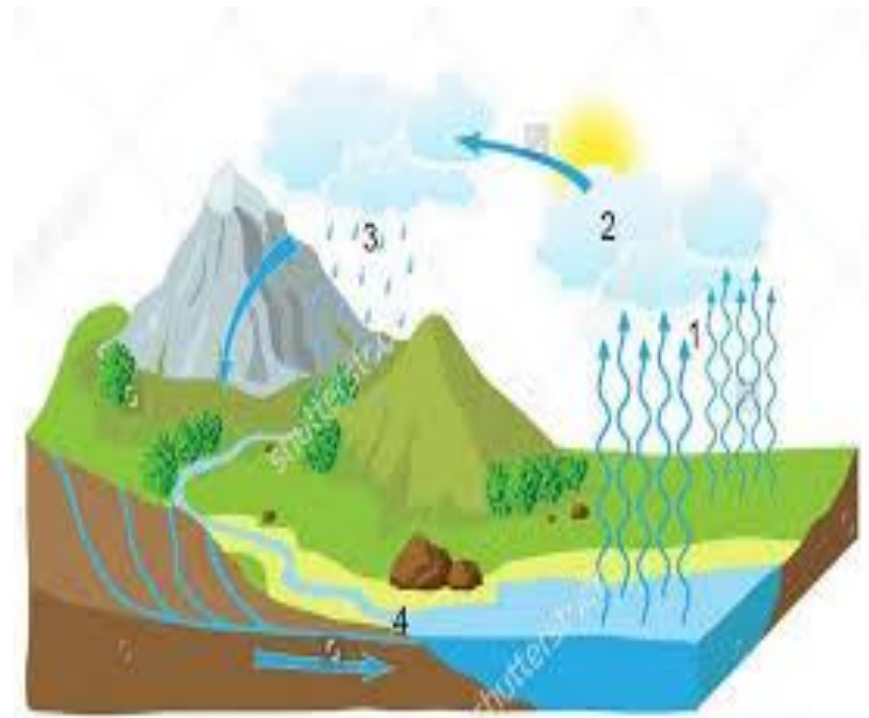
# TRANSPIRATION

- **Transpiration** is the process by which plants lose **water** out of their leaves.
- **Transpiration** gives evaporation a bit of hand in getting the **water** vapor back up into the air.



# SURFACE RUNOFF

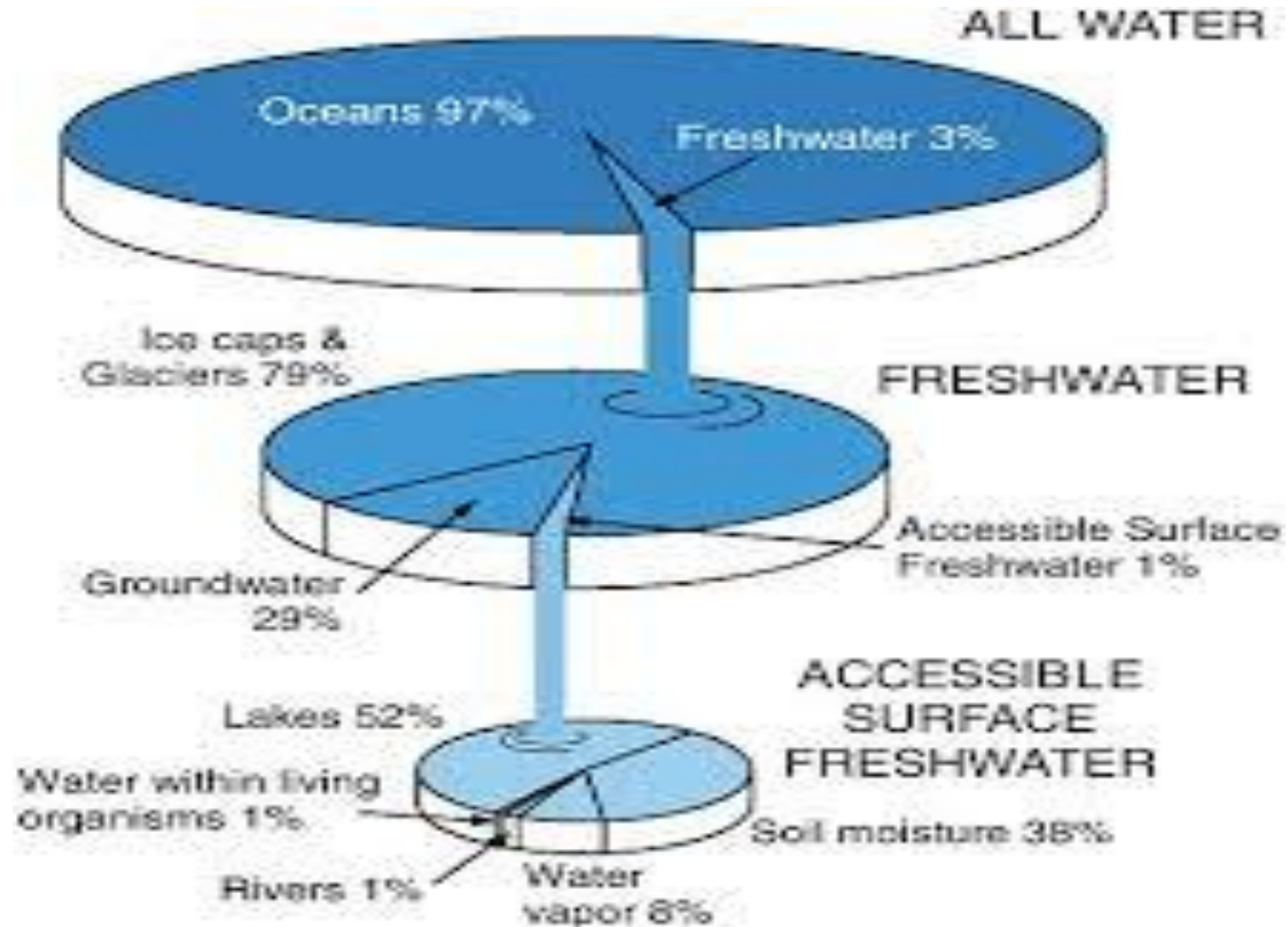
- Runoff is a flow from a drainage basin / catchment area in surface streams.
- It generally consists of the flow that is unaffected by artificial diversions or storages.



# STORAGE

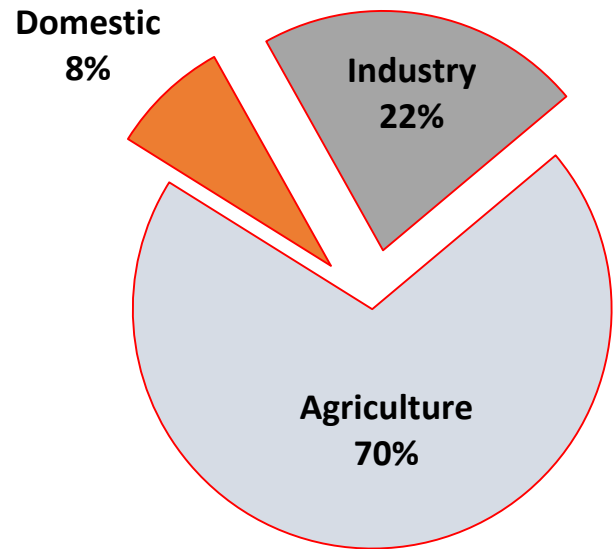
- There are three basic water storage places:
  1. in atmosphere
  2. on earth's surface
  3. in the ground
- Surface storage places are: ocean, lake, reservoirs, glaciers.
- Underground storage occurs in soil, underground aquifers and in the cracks of rocks etc

# EARTH WATER COMPOSITION

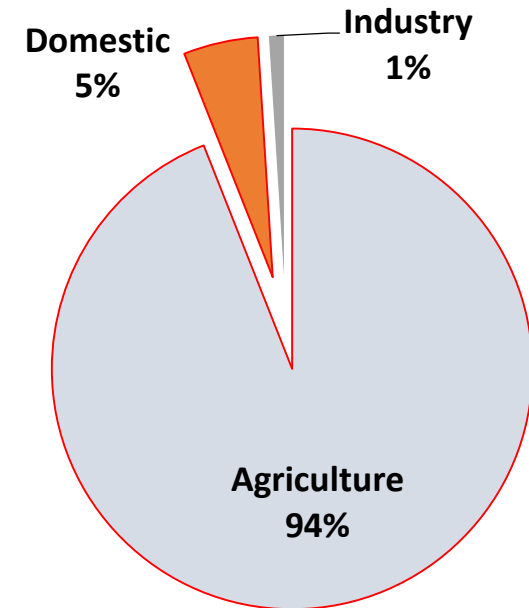


# SECTOR WISE WATER DISTRIBUTION

## World



## Pakistan



**Thank You**