



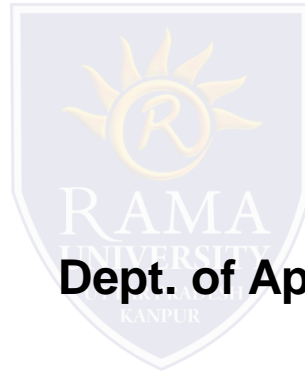
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FACULTY OF ENGINEERING AND  
TECHNOLOGY

## Lecture-6

# Water resources



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**Subject : Environmental Studies and Disaster Management**

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**Subject Code: PPY-211**

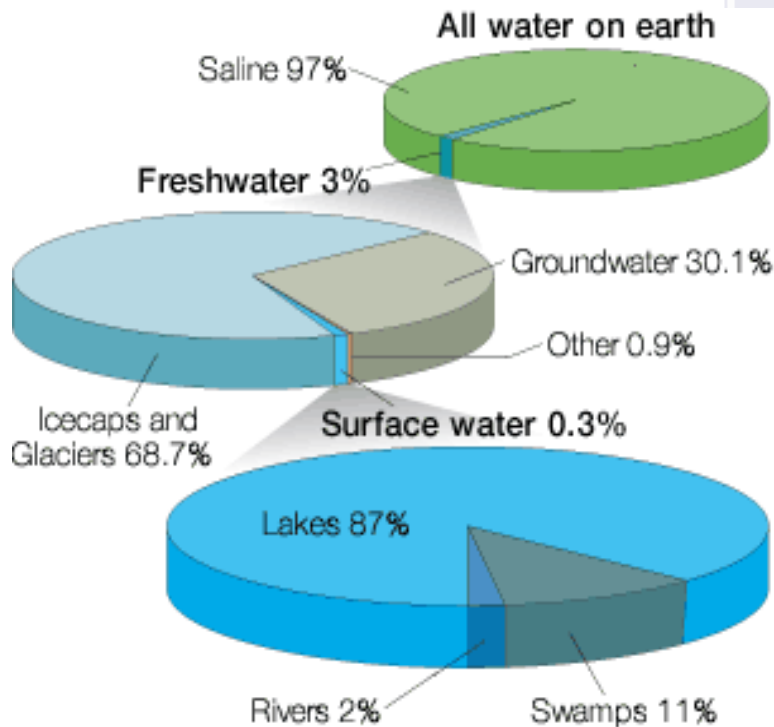
**Semester: II<sup>nd</sup> sem.**

# Water Resources

Water resources include all source of water i.e., rivers, lakes, ocean, etc.

Water is an important resource for all living organisms, required to survive.

Water is also used for agricultural, recreational and other activities.



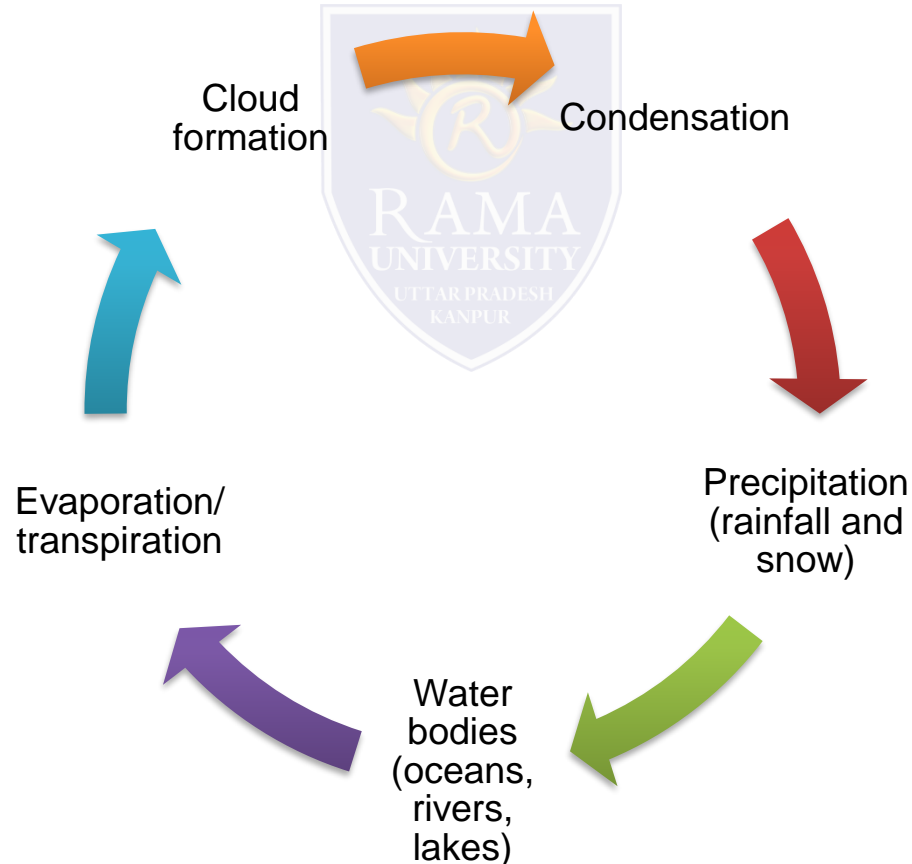
Nearly 71% of the earth surface is covered with water out of which oceans hold approximately 97% of total earth's water which has high salt content.

Remaining 3% of total water is freshwater that can be consumed by humans. However, nearly 2% of this freshwater is locked in ice caps and glaciers, and <1% is available for human consumption.

# Hydrological cycle

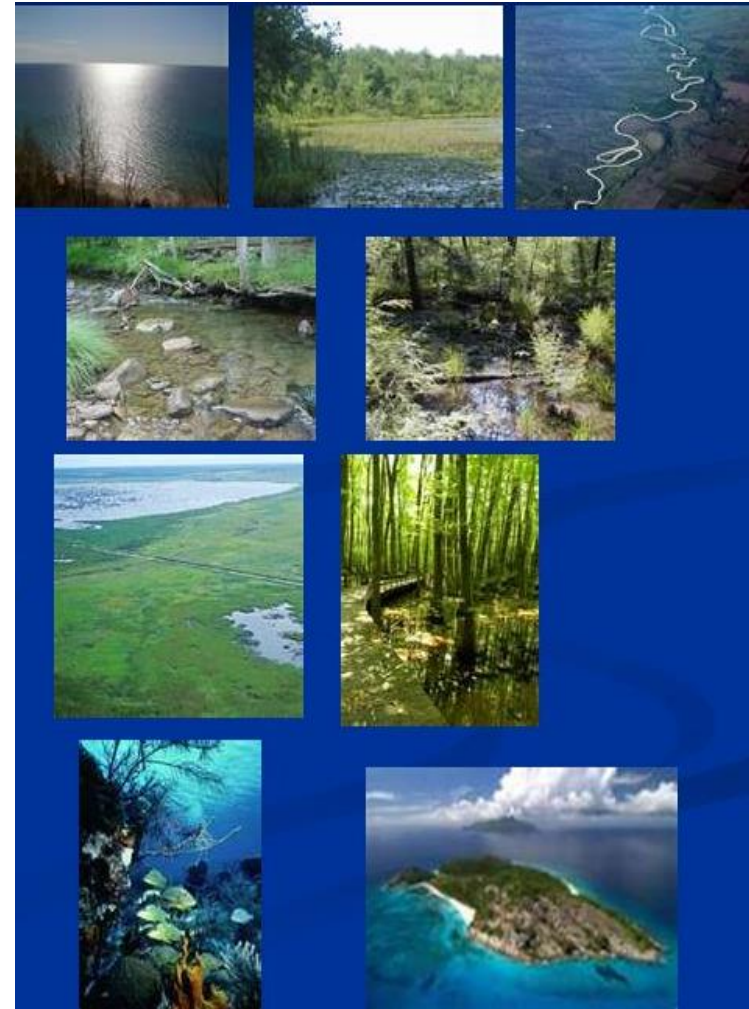
**Hydrological cycle** involves three process viz. evaporation/transpiration, condensation and precipitation

The evaporation of water from ocean, rivers, lakes, and transpiring plants takes water in the form of vapours to the atmosphere. This vaporized water subsequently cools and condenses to form cloud and water. This cooled water vapour ultimately returns to the earth as rain and snow, completing the cycle.



# Fresh and Marine (salt) water

<b>Fresh water</b>	<b>Marine (salt) water</b>
It has low salt concentration- less than 1%	It has high salt concentration- around 3.5%
Freshwater can be surface water or ground water	Marine water is surface water
Freshwater is found in rivers, lakes, streams, ponds, aquifers, etc.	Marine water is found in oceans, seas and estuaries
Humans can consume freshwater	Humans cannot consume marine water



# Water Resources: Uses and over-exploitation

## Uses of water

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graph TD; A[Uses of water] --> B[Agricultural use: Major portion of freshwater is used in agricultural activities such as irrigation and aquaculture]; A --> C[Industrial use: Manufacturing units, and cooling processes]; A --> D[Household use: Drinking, bathing, washing, cooking, sanitation, and gardening]; A --> E[Recreational use: swimming, boating, etc.]; A --> F[Environmental use: wildlife habitat, artificial wetlands, hydrological process]; A --> G[Other uses: Production of energy];
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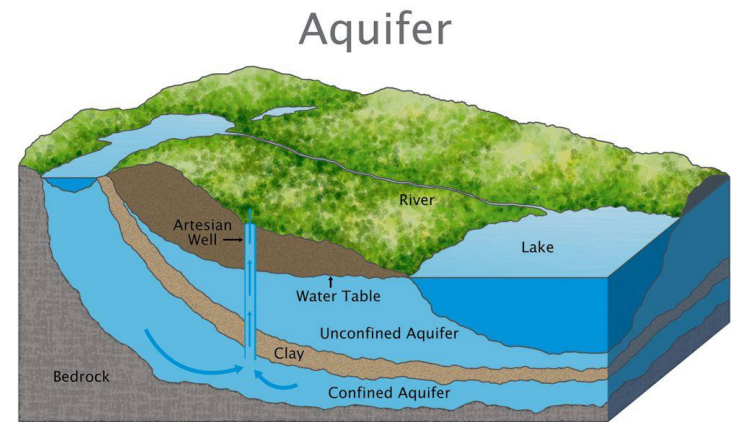
**Environmental use:** wildlife habitat, artificial wetlands, hydrological process

**Other uses:** Production of energy

Due to rapid increase in human population and industrialization, need and demand for water resources has been increased. This has led to over-exploitation of water resources.

The over-exploitation of water resources have resulted in:

- Reduced availability of potable water.
- Increased water pollution.
- Increased ground subsidence.
- Reduced water table due to extraction of ground water at rate faster than its natural recharge.
- Decrease in water table has increased incidence of earthquakes, landslides and drought.



# Floods

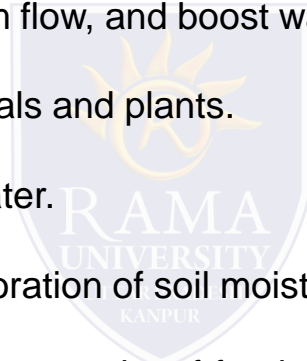
- A **flood** is an overflow of water that inundate land.
- It generally occur in low-lying areas.
- Floods can also occur in rivers when the flow rate exceeds the capacity of the river channel due to excess precipitation, ice-melt, natural disaster like landslide, Tsunami, and/or sudden release of water from dams.
- Flood is second most common natural disaster on earth.
- It cause damage to properties, human life, agriculture, animals and other built structures like bridges, roads, etc.
- Flood cause indirect effects like economic losses, spread of water-borne diseases, food shortage, etc.
- Flood also induce benefits including ground water recharge, increasing nutrient in some soil thereby enhancing soil fertility, and improve nutrient level in lakes and rivers that boost biomass production and improve fisheries.





# Drought

- A **drought** is an event of prolonged shortages in the water supply in an area or region due to occurrence of below-normal precipitation.
- The lack of sufficient precipitation, either in form of rain or snow, can reduce soil moisture or groundwater, diminish stream flow, and boost water shortage.
- Drought claim life of several humans, animals and plants.
- It reduces accessibility to clean drinking water.
- Drought increases soil salinity due to evaporation of soil moisture.
- It detrimentally affect agriculture resulting in scarcity of food supply in many regions and also incur economic losses.
- Droughts are the second-most costly weather events after hurricanes.
- The most prolonged drought ever in the world in recorded history occurred in the Atacama Desert in Chile.

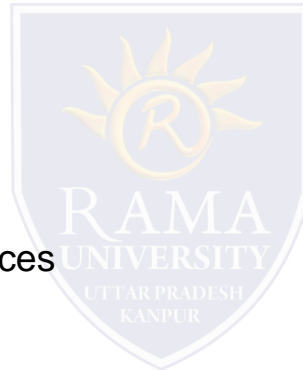


# Conflicts over water

Water is a common and shared resource. When demand for water resources exceed above supply and/or desire for control access and allocation over water resource result into conflicts between consumers (individual or group) either at local, national (inter-state) or international level.

## ***Major drivers for conflicts over water are:***

- Scarcity of water
- Improper supply of water
- Water pollution
- Greed for property right over water resources



## ***Major dispute over water in India at national and international level:***

- Cauvery river: disputes between Karnataka and Tamil Nadu
- Godavari river: disputes between Andhra Pradesh, Madhya Pradesh, Chhattisgarh, Orissa, and Karnataka
- Ravi and Beas river: disputes between Punjab, Rajasthan and Haryana
- Brahmaputra: dispute between India and China
- Mahakali river: disputes between India and Nepal

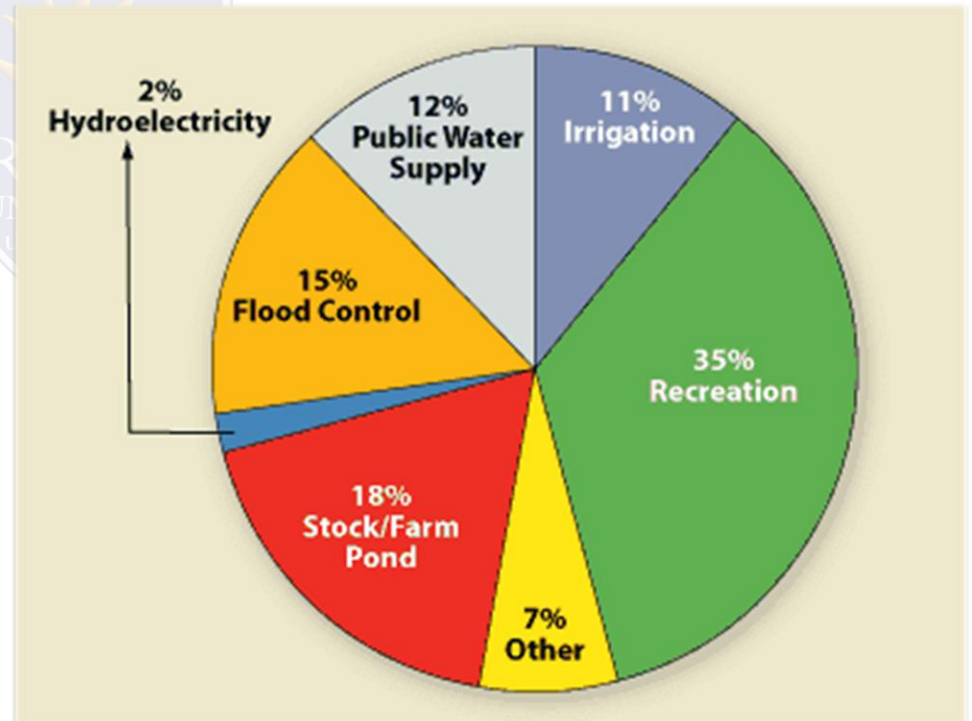


# Dams: Benefits and Problems

Dams are manmade structure designed to manage water resource.

***Dams provide various benefits such as:***

- Water storage and supply for irrigation, fire and farm pond, household activities and others;
- Prevention of flood;
- Production of renewable energy;
- Navigation;
- Recreational activities; and
- Habitat for aquatic animals and water birds.



**Benefits of Dams**

***Problems associated with Dams:***

- Inundate large land area;
- Loss of livelihood;
- Displacement of tribal's;
- Reduce soil fertility and increase salinity
- Destruct wildlife habitat forcing them to die;
- Increase seismic activities ;
- Increase water pollution and water-borne diseases
- Affect aquatic life
- Deforestation;
- Methane production and global warming; and
- Require high cost and long time for construction

