NOTES

SOCIAL SCIENCE

(GEOGRAPHY)

WATER RESOURCES

10th

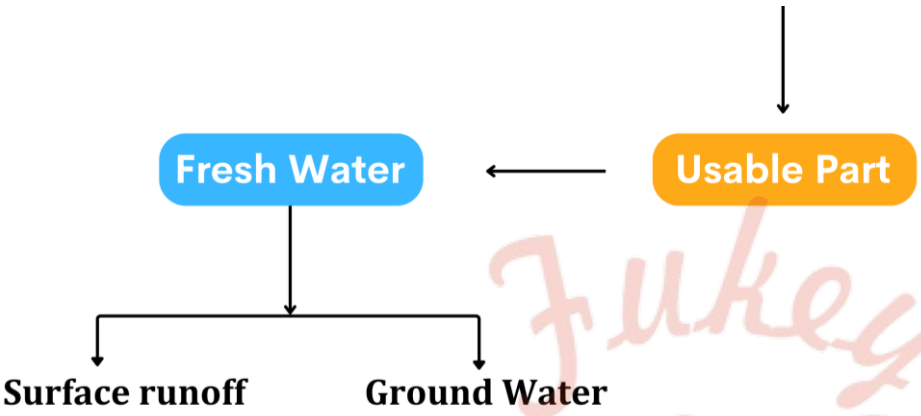
REVISION NOTES
CHAPTERWISE &
TOPICWISE

Chapter 3: Water Resources

Concepts Covered:

WATER AS A RESOURCE

Water is a renewable resource. three-fourth of the earth's surface is covered with water, but only a small proportion of it accounts for freshwater that can be put to use. This freshwater is mainly obtained from surface.



They are under great stress, mainly due to insensitivity to our environment.

WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT

Reasons for water scarcity

- India is a country of Monsoon climate. Sometime due to the failure of Monsoon the scarcity of water Increases.
- The rapid growth in the demand of irrigation water.
- Due to the industrial activity's downfall of underground water.
- Growing pressure on the water resources due to the pace of urbanisation.
- To meet the needs of the growing population.

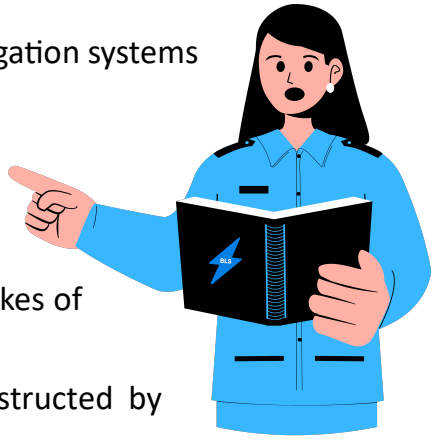
Need for water conservation and management

- Health hazards
- Ensure food security
- Degradation of natural ecosystem
- Over exploitation and mismanagement of Water
- Resources will impoverish this resource and cause ecological crisis.

MULTI - PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT

Hydraulic Structures in Ancient India

- In the first century B.C., Sringaverapura near Allahabad had sophisticated water harvesting system channelling the flood water of the river Ganga.
- During the time of Chandragupta Maurya, dams, lakes, and irrigation systems were extensively built.
- Evidence of sophisticated irrigation works have also been found in Kalinga, (Odisha), Nagarjuna Konda (Andhra Pradesh), Bennur (Karnataka), Kolhapur (Maharashtra), etc.
- In the 11th Century, Bhopal Lake, one of the largest artificial lakes of its time was built.
- In the 14th Century, the tank in Hauz Khas, Delhi was constructed by Iltutmish for supplying water to Siri Fort rea.



Dams

Meaning

A dam is a barrier across flowing water that obstructs, directs, or retards the flow, often creating a reservoir, lake, or impoundment.

“Dam” refers to the reservoir rather than the structure.

Most dams have a section called a spillway or weir over which or through which it is intended that water will flow either intermittently or continuously.

Classification

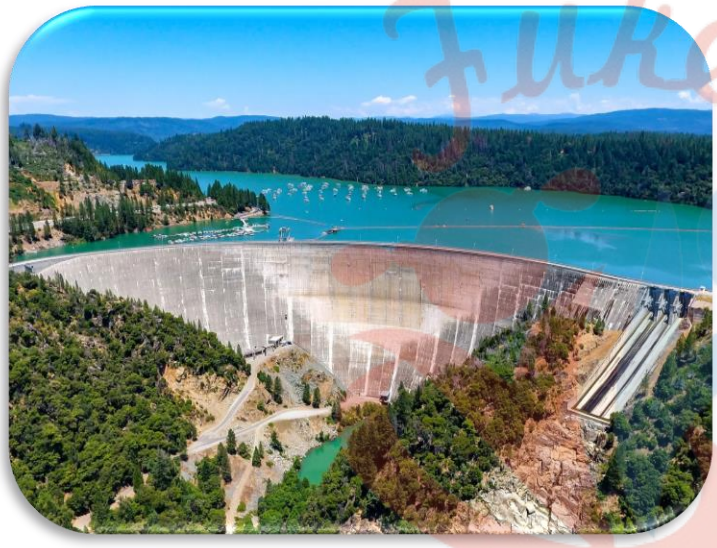
- Based on structure and the materials used, dams are classified as timber dams, embankment dams or masonry dams, with several subtypes.
- According to the height, dams can be categorised as large dams and major dams or alternatively as low dams, medium height dams and high dams.

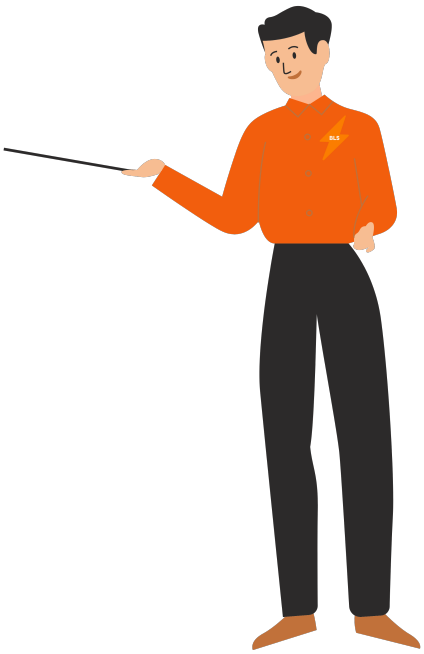
MULTI PURPOSE PROJECTS

Meaning

Dams were traditionally built to impound rivers and rainwater that could be used later to irrigate agricultural fields. Today, dams are built not just for irrigation but for electricity generation.

- Water supply for domestic and industrial uses.
- Flood control
- Recreation





Dams are now referred to as multi-purpose projects where the many uses of the impounded water are integrated with one another.

For example,

- The Sutluj - Beas River basin, the Bhakra – Nangal project water is being used both for hydel power production and irrigation.
- Similarly, the Hirakud project in the Mahanadi basin integrates conservation of water with flood control.

Hirakud Bandh

Bhakra Dam

Reasons for Opposition

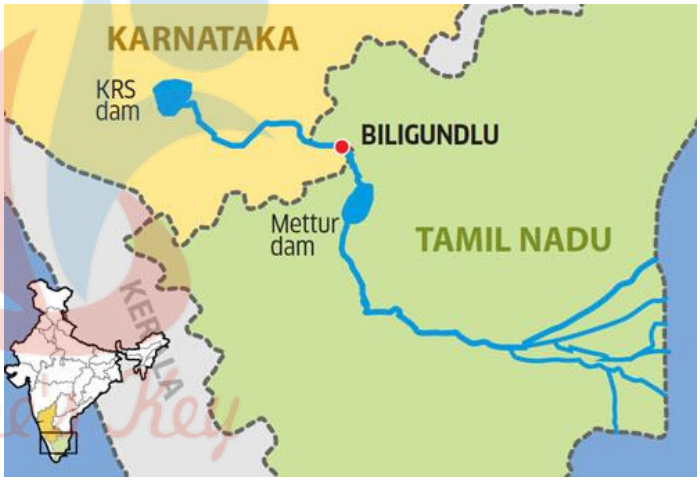
1. Regulating and damming of rivers affect their natural flow causing poor sediment flow and excessive sedimentation at the bottom of the reservoir,
    - Resulting in rockier stream beds.
    - Poorer habitats for the river's aquatic life.
    - Dam fragment rivers making it difficult for aquatic fauna to migrate, especially for spawning.
    - Submerge the existing vegetation and soil leading to its decomposition over a period of time.

Opposition of multipurpose projects

2. Multi-purpose projects and large dams have also been the cause of many new environmental movements like the 'Narmada Bachoo Andolan' and the 'Tehri dam Andolan' etc.
    - Large-scale displacement of local communities.
    - Local people often had to give up their land, livelihood and their meagre access and control over resources for the greater good of the nation.

3. Irrigation has also changed the cropping pattern of many regions with farmers shifting to water intensive and commercial crops.
   a) Salinisation of the soil
   - Excessive irrigation leads to increase in the salt content in the soil.

   b) Transformed Social Landscape
   - Increasing the social gap between the richer landowners and the landless poor
4. The dams did create conflicts between people wanting different uses and benefits from the same Water Resources.
   - In Gujarat, the Sabarmati-basin farmers were agitated and almost caused a riot over the higher priority given to water supply in urban areas.
5. Inter-state water disputes are also becoming common with regard to sharing the costs and benefits of the multi-purpose project.
   - Krishna - Godavari Dispute
   - Kaveri Dispute



6. Most of the objections to the projects arose due to their failure to achieve the purposes for which they were built.

   Dams constructed to control flood they have triggered the flood.

   - Sedimentation in the reservoir
   - Unsuccessful in controlling floods at the time of excessive rainfall.

Negative Impacts

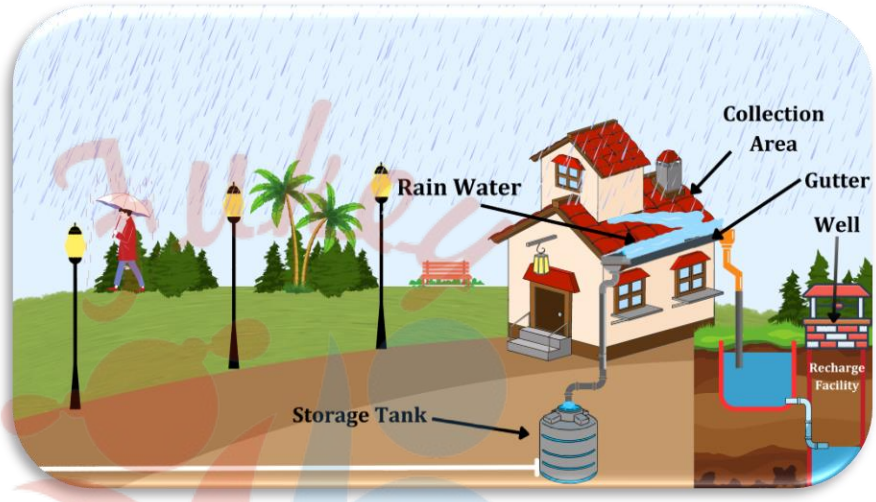
- Caused flood floods to have devastated life and property.
- Caused extensive soil erosion.

- Sedimentation also meant that the flood plains were deprived of silt, a natural fertiliser, further adding on to the problem of land degradation.
- It was also observed that the multi-purpose projects induced earthquakes.
- Caused water-borne diseases and pests and pollution.

RAINWATER HARVESTING

Meaning

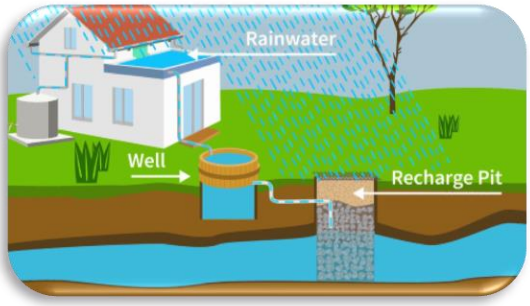
Many thought that given the disadvantages and rising resistance against the multipurpose projects, water harvesting system was a viable alternative.

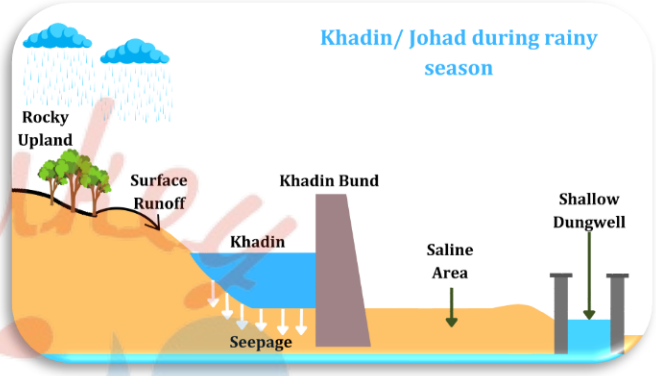


Different methods of Rainwater harvesting in India

In ancient India, along with the sophisticated hydraulic structures, there existed an extraordinary tradition of water-harvesting system.

- In hill and mountainous regions, people-built diversion channels like the 'guls' or 'kuls' of the Western Himalayas for agriculture.
- 'Rooftop rainwater harvesting' was commonly practised to store drinking water, particularly in Rajasthan.
- In the flood plains of Bengal, people developed inundation channels to irrigate their fields.
- In arid and semi-arid regions, agricultural fields were converted into rainfed storage structures that allowed the water to stand and moisten the soil like the 'khadi's' in Jaisalmer and 'Johads' in other parts of Rajasthan.





Rainwater Harvesting

- Rooftop rainwater is collected using a PVC pipe.
- Filtered using sand and bricks.
- Underground pipe takes water to sump for immediate usage.
- Excess water from the sump is taken to the well.
- Water from the well recharges the underground.
- Take water from the well (later).

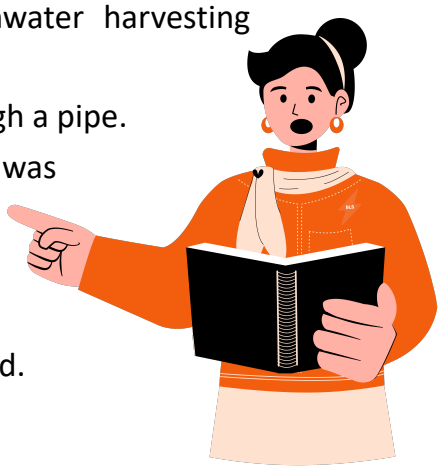
(a) Recharge through Hand Pump

(b) Recharge through Abandoned Dugwell

Tankas in Rajasthan

- In the semi-arid and arid regions of Rajasthan, particularly in Bikaner, Phalodi and Barmer, almost all the houses traditionally had underground tanks or tank for storing drinking water.

- The tankas were part of the well-developed rooftop rainwater harvesting system and were built inside the main house or the courtyard.
- They were connected to the sloping roofs of the houses through a pipe.
- Rain falling on the rooftops would travel down the pipe and was stored in these underground 'tankas'.
- The first spell of rain was usually not collected as this would clean the roofs and the pipes.
- The rainwater from the subsequent showers was then collected.



Advantages of Tankas

- The rainwater can be stored in the tankas.
- Reliable source of drinking water when all other sources are dried up.
- Rainwater, or palar pani, as commonly referred to in these parts, is considered the purest form of natural water.
- Many houses constructed underground rooms adjoining the 'tanka' to beat the summer heat as it would keep the room cool.

Rooftop Rainwater Harvesting in Present time.

Today, in western Rajasthan, sadly the practice of rooftop rainwater harvesting is on the decline as plenty of water is available due to the perennial Indira Gandhi Canal, though some houses still maintain the tankas since they do not like the taste of tap water.

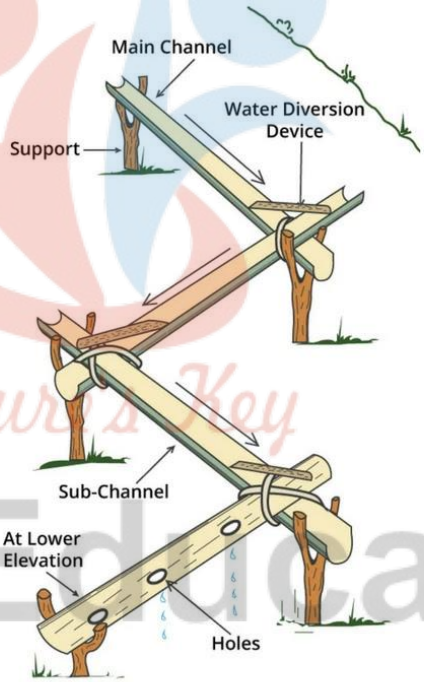
Case study of Gendathur

- In Gendathur, a remote backward village in Mysuru, Karnataka, villagers have installed, in their household's rooftop, rainwater harvesting system to meet their water needs.

- Nearly 200 households have installed this system, and the village has earned the rare distinction of being rich in rainwater.
- Gendathur receives an annual precipitation of 1,000mm, and with 80 percent of collection efficiency and of about 10 fillings, every house can collect and use about 50,000 litres of water.
- annually.
- From the 200 houses, the net amount of rainwater harvested annually amounts to 1,00,000 litres.

Bamboo drip irrigation System

- In Meghalaya, a 200-year-old system of tapping stream and spring water by using bamboo pipes, is prevalent.
- About 18-20 litres of water enters the bamboo pipe system, gets transported over hundreds of metres, and finally reduces to 20-80 drops per minute at the site of the plant.



DRIP IRRIGATION USING BAMBOO

Part - 1

Bamboo pipes are used to divert perennial springs on the hilltops to the lower reaches by gravity.

Part - 2

The channel sections, made of bamboo, divert water to the plant site where it is distributed into branches, again made and laid out with different forms of bamboo pipes. The flow of water into the pipes is controlled by manipulating the pipe positions.

Part - 3

If the pipes pass a road, they are taken high above the land.

Part - 4

Reduced channel sections and diversion units are used at the last stage of water application. The last channel section enables water to be dropped near the roots of the plant.

03 WATER RESOURCES

MIND MAP