



WATER RESOURCES





WATER

Freshwater is mainly obtained from surface run off and ground water.

That is continually being renewed and

recharged through the hydrological cycle. All

water moves within the hydrological cycle

ensuring that water is a renewable resource

SOME IMPORTANT FACTS

■ **Water: Some facts and figures**

- 96.5 per cent of the total volume of world's water is estimated to exist as oceans and only 2.5 per cent as freshwater
- Nearly 70 per cent of this freshwater occurs as ice sheets and glaciers in Antarctica, Greenland and the mountainous regions of the world, while a little less than 30 per cent is stored as groundwater in the world's aquifers.
- India receives nearly 4 per cent of the, global precipitation and ranks 133 in the world in terms of water availability per person per annum.
- The total renewable water resources of India are estimated at 1,897 sq km per annum.





WATER SCARCITY-

**IT IS THE LACK OF SUFFICIENT AVAILABLE
WATER RESOURCES TO THE MEET THE
DEMANDS OF WATER USAGE WITHIN THE
REGION.**

**WHAT IS THE NEED FOR WATER
CONSERVATION AND MANAGEMENT**



Is
availability
of water
and water
scarcity
same or
different.

- The availability of water resources varies over space and time.
- Mainly due to the variations in seasonal
- Annual precipitation
- but water scarcity in most cases is caused by over- exploitation, excessive use and unequal access to water among different social groups

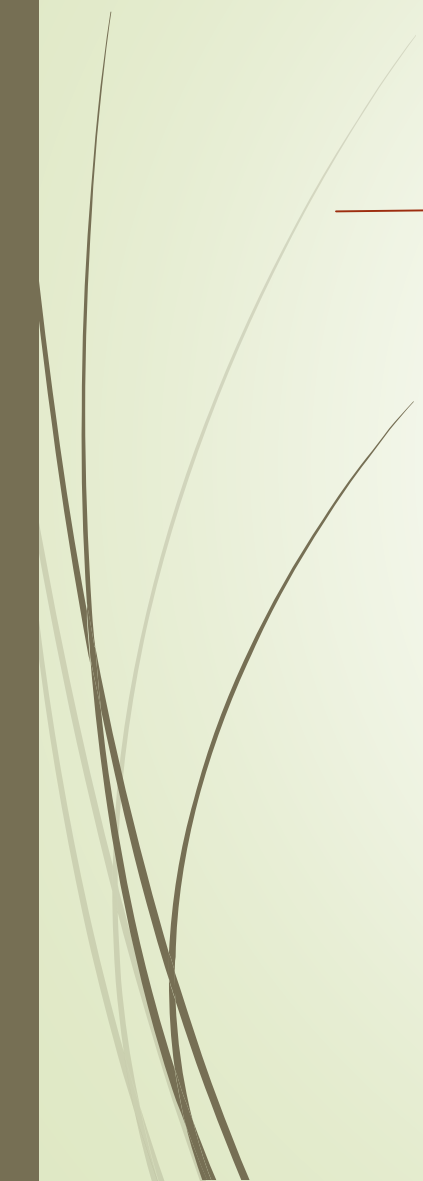


CAUSES OF WATER SCARCITY



1. QUANTITATIVE

2. QUALITATIVE



Growing population - greater demands for water, and unequal access to it.

Intensive farming- to facilitate higher food-grain production, water resources are being over-exploited to expand irrigated areas and dry-season agriculture

Intensive industrialisation and urbanisation- Industries, apart from being heavy users of water, also require power to run them urban lifestyles have not only added to water and energy requirements. People have their own groundwater pumping devices being overexploited and have caused their depletion



CAUSES OF
WATER
SCARCITY-
Quantitative
factors -

Bad quality of water can be due to

pollution done by domestic and industrial wastes, chemicals, pesticides and fertilisers used in agriculture, thus, making it hazardous for human use.



QUALITATIVE
FACTORS



What is the need of conserving and managing water resources.

- To safeguard ourselves from health hazards,
- To ensure food security, continuation of our livelihoods and productive activities
- To prevent degradation of our natural ecosystems.
- Over exploitation and mismanagement of water resources will impoverish this resource and cause ecological crisis that may have profound impact on our lives.

MULTI-
PURPOSE
RIVER
PROJECTS
AND
INTEGRATED
WATER
RESOURCES
MANAGEMENT

- Archaeological and historical records show that from ancient times we have been constructing sophisticated hydraulic structures like
- dams built of stone rubble,
- reservoirs or lakes,
- embankments and canals for irrigation.

NOT NEW TO INDIA ...

- In ancient India, along with the sophisticated hydraulic structures, there existed an extraordinary tradition of water-harvesting system.
- Rainwater storage reservoir in Dholavira - Harappan Civilization (2500-1900 BC)





What are
dams and
how do
they help us
in
conserving
and
managing
water?

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, inland navigation and fish breeding. Hence, dams are now referred to as **multi-purpose projects where the many uses of the impounded water are integrated with one another.**

For example, in 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.

MULTI PURPOSE RIVER VALLEY PROJECTS.

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- electricity generation,
- water supply for domestic and industrial uses,
- flood control, recreation, inland navigation
- and fish breeding. Hence, dams are now referred to as multi-purpose projects where the many uses of the impounded water are integrated with one another.



Bhakra Nangal Project

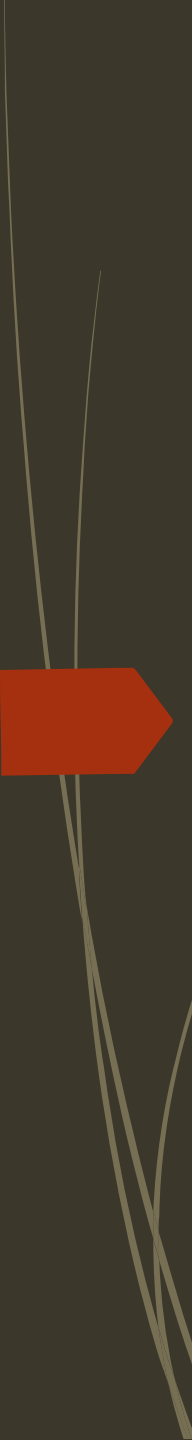
TEMPLES OF MODERN INDIA

- Jawaharlal Nehru proudly proclaimed the dams as the '**temples of modern India**' the reason being that it would integrate development of agriculture and the village economy with rapid industrialisation and growth of the urban economy



In recent years, multi-purpose projects and large dams have come under great scrutiny and opposition for a variety of reasons

- 1. Poor sediment flow and excessive sedimentation at the bottom of the reservoir
- 2. Displacement of people.
- 3. Submergence of natural vegetation
- 4. New social movements like the 'Narmada Bachao Andolan' and the 'Tehri Dam Andolan'
- 5. Farmers shifting to water intensive and commercial crops. This has great ecological consequences like salinisation of the soil.



DISADVANTAGES

- 6. unsuccessful in controlling floods at the time of excessive rainfall.
- 7. Release of water from dams during heavy rains aggravated the flood situation in Maharashtra and Gujarat in 2006.
- 8. caused waterborne diseases and pests and pollution resulting from excessive use of water.

WHAT IS MULTI PURPOSE PROJECT..???????

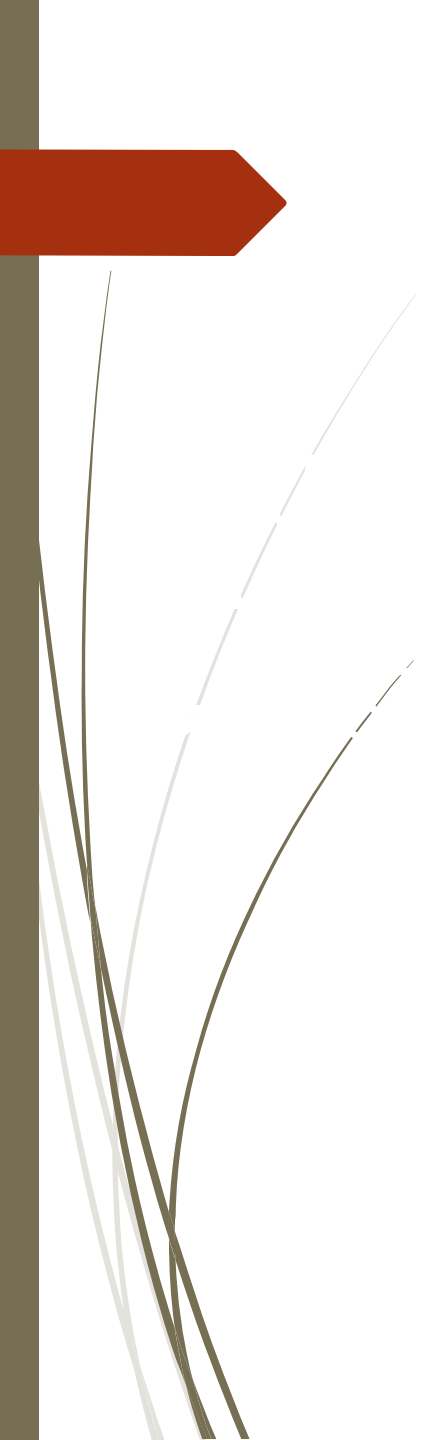
A multipurpose project is a large scale hydro project often including dams for water retention , canals for irrigation, water processing and pipe lines to supply water to cities and power generation. These often include transportation improvements and industrial growth. They are also developed to reduce the dangers of flooding.

Positives:

- 1) Eliminates or reduces flooding
- 2) impounds water for later use - irrigation, human consumption, industrial consumption
- 3) lake fisheries
- 4) power generation
- 5) transportation
- 6) recreation

Negatives:

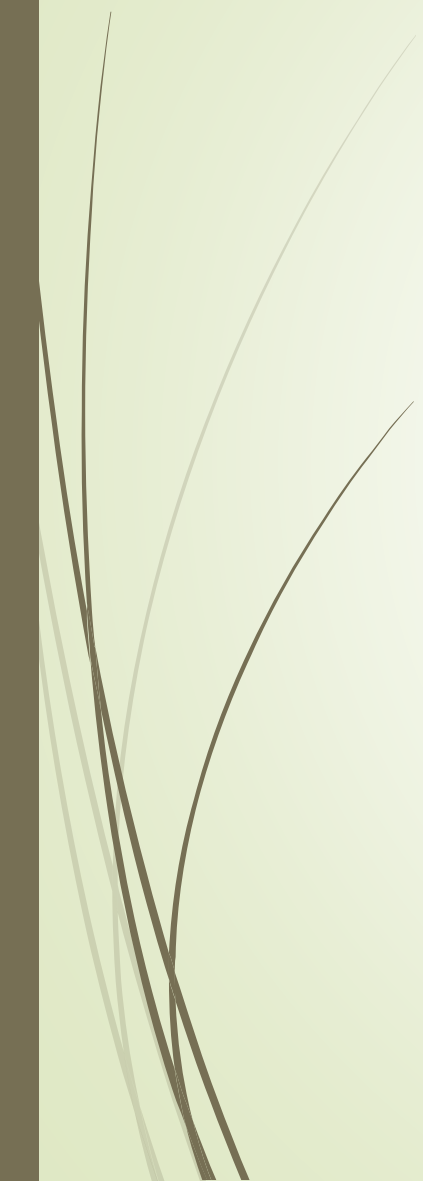
- 1) displaces many people
- 2) destroys prime agricultural lands
- 3) destroys riverine ecologies and habitat
- 4) destroys historic and archaeological sites
- 5) may damage down stream ecologies including estuary fisheries
- 6) disrupts existing infrastructure
- 7) can increase the needs for fertilizers and thus increasing the incidents of pollution.



Disadvantages and rising resistance against the multi purpose projects, water harvesting system was a viable alternative, both socioeconomically and environmentally.



Objectives of rain water harvesting :

1. Eco friendly and cheap method
 2. Capturing and rainwater during rainy period - Conservation of water
 3. To reduce the runoff, which chokes the drains.
 4. To raise the underground water table: water penetrate inside the soil when we collect .
 5. Supplement domestic needs and expansion of irrigation
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Different techniques of rainwater harvesting done in India.

- In hill and mountainous regions, people built diversion channels like the 'guls' or 'kuls' of the Western Himalayas for agriculture.
- 'Rooftop rain water 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 rain fed storage structures that allowed the water to stand and moisten the soil like the 'khadins' in Jaisalmer and 'Johads' in other parts of Rajasthan

INUNDATION CHANNEL...

- In the flood plains of Bengal, people developed inundation channels to irrigate their field
- Floodwater entered the fields through the inundation canals.
- The waters brought in rich silt and fish
- The fish fed on mousquito larva and helped check malaria in this region.



- GUL OR KUL IN WESTERN HIMALAYAS.



KUL IRRIGATION...

In hill and mountainous regions, people built diversion channels like the 'guls' or 'kuls' of the Himalayas for agriculture.



METHOD...

- Roof top rain water 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



(a) Recharge through Hand Pump

Johads of Rajasthan

(provide water for domestic use)



Photo by Farhad Contractor, taken in Alwar district of Rajasthan

Read about revival of Johads in 'Reviving India's water harvesting systems'

BAMBOO DRIP IRRIGATION

Less cost
to invest

Eco
friendly

Avoids
salination

