

Chapter 3: Water Resources

1. Introduction to Water Resources

Water is a renewable resource, essential for life, agriculture, and industry.

96.5% of the world's total water is in oceans and seas, which is saline.

Only 2.5% of water is fresh, but a large part of it is locked in glaciers and polar ice caps.

India is endowed with 4% of the world's water resources but houses 18% of the world's population, creating a challenge of water scarcity.

2. Water Scarcity and the Need for Water Conservation and Management

Water Scarcity: The lack of sufficient water to meet the needs of the population and ecosystem.

Causes include increasing population, urbanization, over-exploitation of water resources, and uneven distribution of rainfall.

Industries and agriculture also use up large amounts of water. Irrigation consumes more than 70% of water resources in India.

Water Conservation: Sustainable management and use of water resources to prevent over-exploitation.

Traditional water conservation methods like rainwater harvesting, watershed management, and construction of dams are crucial.

3. Multi-purpose River Projects and Integrated Water Resources Management

Multi-purpose River Projects: These are large dams constructed across rivers for various purposes such as:

Irrigation (helping agriculture).

Hydroelectric Power (clean energy generation).

Flood Control.

Drinking Water Supply.

Recreation (tourism).

Examples of multi-purpose river projects:

Bhakra Nangal Dam on the Sutlej River.

Hirakud Dam on the Mahanadi River.

Damodar Valley Project.

Controversies of multi-purpose river projects:

Large dams often lead to displacement of people and loss of biodiversity.

Issues of inequitable distribution of water and conflicts between states arise (e.g., Kaveri water dispute).

There is concern over the siltation of reservoirs and long-term environmental impact.

4. Rainwater Harvesting

Rainwater harvesting is the process of collecting and storing rainwater for reuse.

In urban areas, it helps recharge groundwater, while in rural areas, it helps address water scarcity for drinking and irrigation.

Traditional methods of water harvesting include:

Khadins in Rajasthan.

Tankas in Rajasthan.

Kuls in Himachal Pradesh.

5. Groundwater as an Important Resource

Groundwater is a major source of water for agriculture and domestic use, especially in rural India.

Over-extraction of groundwater can lead to:

Lowering of the water table.

Groundwater depletion.

Contamination of aquifers with fluoride, arsenic, and other toxic substances.

Sustainable management of groundwater includes:

Controlled use of borewells.

**Recharging aquifers through percolation pits
and check dams.**

6. Challenges and Solutions to Water Management

**Challenges in water management include
uneven rainfall, seasonal availability, water
pollution, and wastage.**

Solutions:

1. Efficient irrigation methods like drip irrigation to reduce water wastage.

2. Cleaning and managing rivers to prevent pollution (e.g., Namami Gange project).

3. Public awareness about water conservation and community participation in managing water resources.

NCERT Textbook Exercise Questions and Answers

Q1. Multiple Choice Questions

i. Which one of the following is an example of a multi-purpose project?

- a. Indira Gandhi Canal**
- b. Bhakra Nangal Dam**
- c. Hirakud Dam**
- d. All of the above**

Answer: d. All of the above

ii. Which one of the following is NOT a reason for water scarcity in India?

- a. Rapid growth of population**
- b. Over-exploitation of water resources**
- c. Abundant rainfall**
- d. Unequal access to water among different social groups**

Answer: c. Abundant rainfall

iii. Which of the following statements is true about water resources in India?

a. India has 8% of the world's water resources.

b. India receives adequate rainfall throughout the year.

c. Most of India's fresh water is locked in glaciers and ice caps.

d. India has only 4% of the world's fresh water resources.

Answer: d. India has only 4% of the world's fresh water resources.

Q2. Answer the following questions briefly:

i. What are the main causes of water scarcity in India?

Answer:

The main causes of water scarcity in India are:

Overpopulation leading to increased demand for water.

Over-exploitation of groundwater for agriculture and industry.

Urbanization leading to greater water consumption and pollution.

Uneven distribution of rainfall across the country.

Wastage of water due to inefficient irrigation and water management practices.

ii. What is a multipurpose river valley project? Give any two examples.

Answer:

A multipurpose river valley project is a large dam built across a river for various purposes such as irrigation, flood control,

hydroelectricity generation, and providing drinking water. Two examples are:

Bhakra Nangal Dam on the Sutlej River.

Hirakud Dam on the Mahanadi River.

iii. Explain how rainwater harvesting is done in semi-arid regions.

Answer:

In semi-arid regions, rainwater harvesting is done by:

Collecting and storing rainwater in underground tankas (in Rajasthan) or in earthen bunds that prevent water runoff.

Constructing check dams and percolation pits to store water for irrigation and to recharge groundwater.

Q3. Why should we conserve and manage our water resources?

Answer:

We should conserve and manage water resources because:

Water is a limited and essential resource for life, agriculture, and industries.

Increasing population and urbanization put pressure on water resources, leading to water scarcity.

Over-extraction of water leads to groundwater depletion and environmental degradation.

Sustainable management ensures availability of water for future generations and helps in mitigating disasters like droughts and floods.

Q4. Compare the advantages and disadvantages of multipurpose river valley projects.

Answer:

Advantages:

Provide irrigation water for agriculture, boosting food production.

Generate hydroelectric power, a renewable source of energy.

Help in flood control by storing excess water.

Provide drinking water and support recreational activities like boating.

Disadvantages:

Large dams lead to the displacement of people and destruction of natural habitats.

They can cause siltation in the reservoir, reducing the efficiency of the dam.

They may create water disputes between states and inequitable distribution of water.