Class 10 Geography Chapter 3: Water Resources - Notes, Important Questions and MCQs (2026-27)

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These Water Resources Class 10 notes cover Class 10 Geography Chapter 3 completely as per the 2026-27 NCERT book: water scarcity and its causes, the need for water conservation and management, Jal Jeevan Mission and Atal Bhujal Yojana, ancient hydraulic structures, dams and multi-purpose river projects, their advantages and problems, Pradhan Mantri Krishi Sinchayee Yojana, Sardar Sarovar, inter-state water disputes, and traditional and modern rainwater harvesting.

You also get comparison tables, a map-work list, NCERT-style questions with answers, 10 MCQs and a free PDF with no signup.

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Chapter Overview

Three-fourths of the earth’s surface is covered with water, but only a small proportion is usable freshwater, obtained from surface runoff and groundwater and renewed through the hydrological cycle. Yet many regions face water scarcity, and it was predicted that by 2025 nearly two billion people would live in absolute water scarcity.

The chapter explains that scarcity is mostly caused by over-exploitation, excessive use,

Important Topics and Concepts

Causes of water scarcity

- Water availability varies over space and time due to variations in seasonal and annual rainfall, but scarcity is mostly caused by over-exploitation, excessive use and unequal access among social groups.
- A large and growing population needs more water for domestic use and to grow more food. Irrigated agriculture is the largest consumer of water; farmers' own wells and tube-wells lower groundwater levels, affecting water availability and food security.
- Intensive industrialisation and urbanisation after Independence increased demand; industries use a lot of water and need power, much of it from hydroelectricity.
- Urban housing societies pump groundwater, over-exploiting fragile resources in many cities.
- Even where water is sufficient, it may be polluted by domestic and industrial wastes, chemicals, pesticides and fertilisers, making it unsafe (qualitative scarcity).

Need for water conservation and management

We must conserve and manage water to safeguard health, ensure food security, continue livelihoods and productive activities, and prevent the degradation of natural ecosystems. Over-exploitation and mismanagement can impoverish water resources and cause an ecological crisis. Agriculture also needs to adopt drought-resistant crops and dry farming techniques.

Government initiatives

- Jal Jeevan Mission (JJM): aims to give every rural household an assured supply of potable piped water at 55 litres per capita per day on a long-term basis by ensuring functional tap connections.
- Atal Bhujal Yojana (Atal Jal): implemented in 8,220 water-stressed gram panchayats of 229 blocks in 80 districts of seven states (Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh), which have about 37 per cent of India's water-stressed blocks. It aims to change community behaviour from consumption to conservation and smart water management.
- Pradhan Mantri Krishi Sinchayee Yojana (PMKSY): ensures protective irrigation for all farms; objectives include 'har khet ko pani' (expanding assured irrigation), 'per drop more crop' (water-use efficiency) and sustainable water conservation practices.

Hydraulic structures in ancient India

- First century BC: Sringaverapura near Allahabad had a sophisticated water harvesting system channelling floodwater of the Ganga.
- Chandragupta Maurya's time: dams, lakes and irrigation systems were extensively built.
- Sophisticated irrigation works found in Kalinga (Odisha), Nagarjunakonda (Andhra Pradesh), Bennur (Karnataka) and Kolhapur (Maharashtra).
- 11th century: Bhopal Lake, one of the largest artificial lakes of its time.

- 13th–14th century: tank in Hauz Khas, Delhi, built by Allauddin Khilji to supply water to Siri Fort.

Dams and multi-purpose river projects

- A dam is a barrier across flowing water that obstructs, directs or retards the flow, often creating a reservoir; it usually has a spillway or weir.
- Dams are classified by structure and material (timber, embankment, masonry) and by height (low, medium, high; or large and major dams).
- Dams were traditionally built for irrigation; today they serve irrigation, electricity, domestic and industrial water supply, flood control, recreation, inland navigation and fish breeding, so they are called multi-purpose projects.
- Examples: the Bhakra-Nangal project in the Sutlej-Beas basin for hydel power and irrigation; the Hirakud project in the Mahanadi basin for water conservation and flood control.
- Jawaharlal Nehru called dams the ‘temples of modern India’ because they would integrate agricultural and village development with industrialisation and urban growth.
- The Bhadu song of the Damodar valley shows how people suffered from floods of the Damodar, the ‘river of sorrow’.

Why multi-purpose projects are opposed

- Damming affects the natural flow of rivers, causing poor sediment flow downstream and excessive sedimentation in reservoirs, leading to rockier stream beds and poorer aquatic habitats.
- Dams fragment rivers, making it hard for aquatic fauna to migrate for spawning.
- Reservoirs submerge vegetation and soil, which decompose over time.
- Dams built to control floods have sometimes triggered floods due to sedimentation, and failed to control floods during excessive rain; floodplains are deprived of fertile silt.
- Projects have induced earthquakes, caused water-borne diseases, pests and pollution.
- Irrigation changed cropping patterns towards water-intensive commercial crops, causing salinisation of soil.
- They have also led to displacement of local people and inter-state water disputes.

Sardar Sarovar Project and water disputes

- The Sardar Sarovar Dam on the Narmada in Gujarat is one of India’s largest water projects, covering Maharashtra, Madhya Pradesh, Gujarat and Rajasthan.
- It will irrigate 18.45 lakh hectares in 3,112 villages of 15 districts of Gujarat, 2,46,000 hectares in Barmer and Jalore in Rajasthan, and 37,500 hectares in the tribal hilly tract of Maharashtra through lift irrigation, helping make drought-prone areas drought proof.
- The Krishna-Godavari dispute arose from objections by Karnataka and Andhra Pradesh to Maharashtra diverting more water at Koyna for a multi-purpose project, which would reduce downstream flow.

Traditional rainwater harvesting

- Ancient Indians knew rainfall regimes and soil types and developed local techniques to harvest rainwater, groundwater, river water and floodwater.
- Hills: diversion channels called ‘guls’ or ‘kuls’ in the Western Himalayas for agriculture.
- Rajasthan: rooftop rainwater harvesting to store drinking water.
- Bengal floodplains: inundation channels to irrigate fields.

- Arid and semi-arid areas: fields converted into rain-fed storage structures such as ‘khadins’ in Jaisalmer and ‘johads’ in other parts of Rajasthan.

Tankas of Rajasthan

- In Bikaner, Phalodi and Barmer, almost every house had underground tanks (tankas) for drinking water; one in Phalodi was 6.1 m deep, 4.27 m long and 2.44 m wide.
- Tankas were connected to sloping roofs by pipes; the first spell of rain was not collected as it cleaned the roofs and pipes.
- Rainwater, called ‘palar pani’, is considered the purest form of natural water; underground rooms next to tankas kept houses cool.
- The practice is declining in western Rajasthan because of water from the perennial Indira Gandhi Canal.

Modern rainwater harvesting examples

- Gendathur village in Mysuru, Karnataka: about 200 households have rooftop rainwater harvesting; with 1,000 mm rainfall and 80 per cent efficiency, each house can collect about 50,000 litres a year.
- Tamil Nadu is the first state to make rooftop rainwater harvesting compulsory for all houses, with penalties for defaulters.
- Shillong, Meghalaya: despite Cherrapunji and Mawsynram (55 km away) receiving the highest rainfall in the world, the city faces water shortage, so nearly every house has rooftop harvesting, meeting 15–25 per cent of household water needs.
- Meghalaya’s 200-year-old bamboo drip irrigation system taps stream and spring water through bamboo pipes; about 18–20 litres enter the system and are carried long distances, reducing to 20–80 drops per minute at the plant site.

Advantages and Disadvantages of Multi-purpose Projects

A favourite long-answer question.

Advantages	Disadvantages
Irrigation for agriculture	Poor sediment flow and excessive sedimentation
Hydroelectric power	Fragmented rivers harm aquatic life and fish migration
Domestic and industrial water supply	Submergence of vegetation and soil
Flood control	Floods triggered by sedimentation; silt loss on floodplains
Inland navigation and fish breeding	Induced earthquakes, water-borne diseases, pests and pollution
Recreation and tourism	Displacement of people; shift to water-intensive crops and soil salinisation; inter-state disputes

Traditional Rainwater Harvesting Methods

Region-wise methods, often asked as MCQs and in map-based questions.

Method	Region	Use
Guls or kuls	Western Himalayas	Diversion channels for agriculture
Rooftop harvesting and tankas	Rajasthan (Bikaner, Phalodi, Barmer)	Drinking water storage
Inundation channels	Floodplains of Bengal	Irrigating fields
Khadins and johads	Jaisalmer and other parts of Rajasthan	Rain-fed storage to moisten soil
Bamboo drip irrigation	Meghalaya	Carrying stream and spring water to plants
Rooftop harvesting	Gendathur (Karnataka), Shillong, Tamil Nadu	Household water needs

Map Work: Major Dams

Practise locating these dams on an outline map of India.

- Salal (Jammu and Kashmir)
- Bhakra Nangal (Himachal Pradesh–Punjab)
- Tehri (Uttarakhand)
- Rana Pratap Sagar (Rajasthan)
- Sardar Sarovar (Gujarat)
- Hirakud (Odisha)
- Nagarjuna Sagar (Telangana–Andhra Pradesh)
- Tungabhadra (Karnataka–Andhra Pradesh)

Water Schemes in the 2026-27 NCERT Book

Scheme	Main aim
Jal Jeevan Mission	Piped potable water to every rural household at 55 litres per person per day
Atal Bhujal Yojana	Community-led groundwater management in 8,220 water-stressed gram panchayats of seven states
Pradhan Mantri Krishi Sinchayee Yojana	Har khet ko pani, per drop more crop, and sustainable water conservation
Sardar Sarovar Project	Irrigation and water for drought-prone areas of Gujarat, Rajasthan and Maharashtra

Important Definitions and Terms

Term	Meaning
Hydrological cycle	Continuous movement of water that makes it a renewable resource
Water scarcity	Shortage of water due to over-exploitation, excessive use, unequal access or pollution
Dam	A barrier across flowing water that obstructs, directs or retards its flow, often creating a reservoir
Spillway or weir	Section of a dam over or through which water flows
Multi-purpose project	A river project serving irrigation, power, water supply, flood control and other uses together

Term	Meaning
Sedimentation	Deposition of silt at the bottom of a reservoir
Rainwater harvesting	Collecting and storing rainwater for later use
Guls or kuls	Diversion channels in the Western Himalayas
Khadins and johads	Rain-fed storage structures in Rajasthan
Tanka	Underground tank for storing rainwater in Rajasthan
Palar pani	Rainwater, considered the purest form of natural water in Rajasthan
Bamboo drip irrigation	Meghalaya’s system of carrying water through bamboo pipes

Short Answer Questions

Q1. Explain how water becomes a renewable resource.

Water moves continuously within the hydrological cycle through evaporation, condensation, precipitation, surface runoff and groundwater recharge. Because freshwater is constantly renewed and recharged this way, water is a renewable resource.

Q2. What is water scarcity and what are its main causes?

Water scarcity is the shortage of usable water. It is mainly caused by over-exploitation, excessive use and unequal access among social groups, a growing population, irrigation demand, industrialisation, urbanisation and pollution of water.

Q3. How can an area have enough water but still face water scarcity?

When water is polluted by domestic and industrial wastes, chemicals, pesticides and fertilisers, it becomes hazardous for use. So even if quantity is sufficient, poor quality causes scarcity.

Q4. Why are dams now called multi-purpose projects?

Because their impounded water is used for many integrated purposes: irrigation, electricity generation, domestic and industrial water supply, flood control, recreation, inland navigation and fish breeding.

Q5. Why did Nehru call dams the ‘temples of modern India’?

He believed dams would integrate the development of agriculture and the village economy with rapid industrialisation and growth of the urban economy, leading India to progress after its colonial past.

Q6. What is the Jal Jeevan Mission?

It is a government mission to give every rural household an assured supply of safe piped drinking water at 55 litres per person per day on a long-term basis by ensuring that tap connections function.

Q7. Describe the tanka system of Rajasthan.

Houses in Bikaner, Phalodi and Barmer had underground tanks connected to sloping roofs by pipes. Rainwater from roofs was stored after the first spell of rain cleaned the roofs. It was a reliable source of drinking water in summer and kept adjoining rooms cool.

Q8. Why does Shillong face water shortage despite heavy rain nearby?

Long Answer Questions

Q1. Why are multi-purpose projects and large dams facing resistance? Explain.

Damming disrupts the natural flow of rivers, causing poor sediment flow downstream and excessive sedimentation in reservoirs.

It fragments rivers, harming aquatic life and fish migration, and submerges vegetation and soil.

Sedimentation has triggered floods and deprived floodplains of fertile silt, adding to land degradation.

Projects have induced earthquakes and caused water-borne diseases, pests and pollution.

Irrigation encouraged water-intensive commercial crops, leading to soil salinisation.

Large-scale displacement of local communities and inter-state disputes such as the Krishna-Godavari dispute have also caused opposition.

Q2. Describe how traditional rainwater harvesting has been adapted in modern times to conserve water.

Rooftop rainwater harvesting in Rajasthan’s tankas stored drinking water; the idea is now used in cities and villages.

Gendathur village in Karnataka has rooftop harvesting in about 200 houses, each collecting about 50,000 litres a year.

Tamil Nadu has made rooftop rainwater harvesting compulsory for all houses.

In Shillong, nearly every house harvests rooftop rainwater.

Meghalaya’s bamboo drip irrigation continues to carry water efficiently to plants.

Recharging groundwater through abandoned dug wells and hand pumps is another modern adaptation.

Q3. Why is water scarcity increasing in India, and what steps can be taken to conserve water?

A growing population needs more water for homes and food production; irrigation is the largest user, and private wells lower groundwater.

Industrialisation and urbanisation increase demand for water and hydroelectric power.

Pollution by wastes and chemicals makes available water unusable.

Steps: rainwater harvesting, recharging groundwater, efficient irrigation (per drop more crop), drought-resistant crops and dry farming.

Government schemes such as Jal Jeevan Mission, Atal Jal and PMKSY promote safe supply and community-led conservation.

Individuals can reduce wastage, reuse water and avoid polluting water bodies.

MCQs with Answers

1. Which is the largest consumer of water in India?(a) Industry (b) Domestic use (c) Irrigated agriculture (d) HydroelectricityAnswer: (c) Irrigated agriculture

2. Who called dams the ‘temples of modern India’?(a) Mahatma Gandhi (b) Jawaharlal Nehru (c) B.R. Ambedkar (d) Sardar PatelAnswer: (b) Jawaharlal Nehru

3. The Hirakud project is built on the river(a) Sutlej (b) Narmada (c) Mahanadi (d) KrishnaAnswer: (c) Mahanadi

4. Guls or kuls are diversion channels found in the(a) Western Himalayas (b) Thar desert (c) Bengal plains (d) Western GhatsAnswer: (a) Western Himalayas

5. Khadins are traditional water harvesting structures of(a) Bengal (b) Jaisalmer, Rajasthan (c) Meghalaya (d) KarnatakaAnswer: (b) Jaisalmer, Rajasthan

6. Which state first made rooftop rainwater harvesting compulsory for all houses?(a) Rajasthan (b) Karnataka (c) Tamil Nadu (d) MeghalayaAnswer: (c) Tamil Nadu

7. The bamboo drip irrigation system is practised in(a) Assam (b) Meghalaya (c) Sikkim (d) KeralaAnswer: (b) Meghalaya

8. Jal Jeevan Mission aims to supply piped water to rural households at(a) 40 litres per capita per day (b) 55 litres per capita per day (c) 70 litres per capita per day (d) 100 litres per capita per dayAnswer: (b) 55 litres per capita per day

9. The Sardar Sarovar Dam is built on the(a) Godavari (b) Narmada (c) Tapi (d) MahiAnswer: (b) Narmada

10. Bhopal Lake, one of the largest artificial lakes of its time, was built in the(a) First century BC (b) Fourth century (c) Eleventh century (d) Fourteenth centuryAnswer: (c) Eleventh century

Quick Revision Points

- Only a small part of earth’s water is usable freshwater, renewed by the hydrological cycle.
- Scarcity: over-exploitation, excessive use, unequal access, population, irrigation, industry, urbanisation, pollution.
- Irrigated agriculture is the largest consumer.
- JJM: 55 litres per capita per day; Atal Jal: 8,220 gram panchayats in 7 states; PMKSY: har khet ko pani, per drop more crop.
- Ancient structures: Sringaverapura, Chandragupta Maurya, Bhopal Lake (11th century), Hauz Khas (Allauddin Khilji).
- Multi-purpose projects: Bhakra-Nangal (Sutlej-Beas), Hirakud (Mahanadi).
- Nehru: dams are temples of modern India.
- Problems: sedimentation, fragmented rivers, submergence, floods, earthquakes, diseases, salinisation, displacement, disputes.
- Sardar Sarovar on Narmada; Krishna-Godavari dispute over Koyna.
- Traditional harvesting: guls/kuls, tankas, inundation channels, khadins, johads.
- Tamil Nadu: compulsory rooftop harvesting; Gendathur: 50,000 litres per house; Shillong: 15–25% needs.

- Meghalaya bamboo drip irrigation: 200 years old.

Chapter Summary

Although water is renewable through the hydrological cycle, India faces water scarcity mainly because of over-exploitation, unequal access, growing population, irrigation, industrialisation, urbanisation and pollution. Conservation and management are essential, supported by schemes such as Jal Jeevan Mission, Atal Bhujal Yojana and PMKSY.

India has a long tradition of hydraulic structures. After Independence, multi-purpose projects like Bhakra-Nangal, Hirakud and Sardar Sarovar were built for irrigation, power and flood control, but they have faced opposition for ecological damage, floods, displacement and disputes. Rainwater harvesting, both traditional (guls, tankas, khadins, johads, bamboo drip irrigation) and modern (Tamil Nadu, Gendathur, Shillong), is a sustainable alternative.

Exam Tips and PYQ Pattern

- Long questions on why dams are opposed and on rainwater harvesting are very common.
- Learn the traditional harvesting methods table region-wise for MCQs.
- Map work: locate major dams like Salal, Bhakra Nangal, Tehri, Rana Pratap Sagar, Sardar Sarovar, Hirakud, Nagarjuna Sagar and Tungabhadra.
- The newer NCERT additions (JJM, Atal Jal, PMKSY, Sardar Sarovar figures) can appear in case-based questions.
- Write answers point-wise with examples and figures.

Frequently Asked Questions

What are multi-purpose river projects?

Dams and reservoirs whose water is used for irrigation, power, water supply, flood control, navigation, fish breeding and recreation together.

Why are dams opposed?

Because of sedimentation, harm to aquatic life, submergence, floods, earthquakes, water-borne diseases, salinisation, displacement and inter-state disputes.

What is rainwater harvesting?

Collecting and storing rainwater, for example from rooftops, for later use or to recharge groundwater.

Is Water Resources in the 2026-27 syllabus?

Yes, it is Chapter 3 of the Class 10 Geography book for 2026-27, including map work on dams. Confirm the assessment scheme with your school.

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Conclusion

Water Resources shows that water scarcity is largely a human-made problem and that wise management, community efforts and rainwater harvesting can secure our future. Revise the dams table, harvesting methods and new government schemes, and practise the dam map work.

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Author Bio: Written and reviewed by the Nextoper Editorial Team, a group of CBSE social science educators who build chapter notes directly from the NCERT textbook and past board paper patterns.

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