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Class 10 Geography — Contemporary India II

CHAPTER 3: WATER RESOURCES

■■ ■■■■■■ — Complete Question Bank

■ Section	Questions	Marks
Multiple Choice Questions (MCQs)	30 questions	30 marks
Fill in the Blanks	20 questions	20 marks
Matching Column A with Column B	10 pairs	10 marks
Short Answer Questions	20 questions	60 marks
Frequently Asked Questions (FAQ)	20 Q&A	Concept clarity
Long Answer / Essay Questions	10 questions	50 marks
TOTAL	110 questions	170 marks

■ CBSE Board | ■ UP/MP/Raj State Board | ■ UPSC/UPPSC | ■ NEET/JEE

SECTION A: MULTIPLE CHOICE QUESTIONS (MCQs)

Instructions: Choose the BEST answer from the options given. Read each question carefully before selecting. Answers are given after each question for self-checking.

Q1. Three-fourths of the Earth's surface is covered with water. What percentage of this is freshwater that can actually be used by us?

a) About 71%
b) About 25%
c) Less than 3%
d) About 50%

✔ Ans: c) Less than 3% — Most water is saline (oceans). Of the tiny freshwater fraction, most is locked in glaciers.

Q2. Water is described as a 'renewable resource'. Which of the following best explains why?

a) It can be manufactured in factories
b) The hydrological cycle continuously renews and recharges freshwater
c) The oceans never run out of water
d) Rain falls every year in all parts of India

✔ Ans: b) The hydrological cycle continuously renews and recharges freshwater — evaporation → clouds → precipitation → surface/groundwater.

Q3. By the year 2025, approximately how many people worldwide are predicted to live in conditions of absolute water scarcity?

a) 500 million
b) 1 billion
c) 2 billion
d) 4 billion

✔ Ans: c) 2 billion — This alarming figure is given in the NCERT textbook.

Q4. Which of the following is the LARGEST consumer of water resources in India?

a) Domestic use (drinking and cooking)
b) Industrial use
c) Irrigated agriculture
d) Hydroelectric power generation

✔ Ans: c) Irrigated agriculture — It accounts for approximately 70% of total freshwater use.

Q5. A region receives high annual rainfall. Yet it suffers from water scarcity. Which is the MOST likely reason?

a) The region has very low population
b) The region has high annual rainfall but a very large and dense population
c) The region has low annual rainfall and low population
d) Rain falls only in one season and there are no storage systems

✔ Ans: b) A large and dense population increases per-capita demand, causing scarcity despite high rainfall.

Q6. Jawaharlal Nehru proudly proclaimed dams as the 'temples of modern India'. He said this because dams:

a) Were beautiful architectural structures
b) Would integrate development of agriculture and the village economy with rapid industrialisation
c) Helped India win independence
d) Were built only in rural areas

✔ Ans: b) Nehru saw multi-purpose river projects as engines that would simultaneously boost agriculture, industry and urban growth.

Q7. Which of the following is NOT an advantage of multi-purpose river projects?

a) Irrigation for agriculture
b) Generation of hydroelectric power
c) Large-scale displacement of local communities
d) Inland navigation and flood control

✔ Ans: c) Large-scale displacement is a serious DISADVANTAGE, not an advantage.

Q8. The Bhakra-Nangal Project is built across which river?

a) Mahanadi
b) Narmada
c) Sutlej-Beas
d) Damodar

✔ Ans: c) Sutlej-Beas — Bhakra-Nangal is one of India's largest multi-purpose hydel projects.

Q9. The Hirakud Dam is situated on which river?

a) Krishna
b) Godavari
c) Mahanadi
d) Chambal

✔ Ans: c) Mahanadi — Hirakud Dam in Odisha is one of the longest dams in the world.

Q10. The Sardar Sarovar Project on the Narmada River benefits how many states?

a) Two states
b) Three states
c) Four states
d) Five states

✔ Ans: c) Four states — Maharashtra, Madhya Pradesh, Gujarat and Rajasthan.

Q11. In recent years, multi-purpose projects have faced opposition mainly because:

a) They produce too much electricity
b) They regulate river flow, cause sedimentation problems, displace communities and disrupt ecosystems
c) They are too expensive to visit as tourist spots
d) They bring too much water to farming areas

✔ Ans: b) All these ecological and social problems have fuelled widespread opposition to large dams.

Q12. What does 'tanka' refer to in the context of Rajasthan's traditional water harvesting?

a) A large river dam
b) An underground cylindrical cistern to store rainwater collected from rooftops
c) A canal system
d) A type of irrigation pump

✔ Ans: b) Tanka is an underground cistern — a traditional rooftop rainwater harvesting system common in semi-arid Rajasthan.

Q13. The rainwater stored in tankas is locally referred to as 'palar pani'. Why is it considered so special?

a) It is hot and good for cooking
b) It is considered the purest form of natural water
c) It comes directly from rivers
d) It contains natural minerals

✔ Ans: b) Palar pani — pure rainwater — is considered the purest natural water, especially valuable in dry summers.

Q14. Which state in India was the FIRST to make rooftop rainwater harvesting COMPULSORY for all houses?

a) Rajasthan
b) Maharashtra
c) Karnataka
d) Tamil Nadu

✔ Ans: d) Tamil Nadu — It made rooftop rainwater harvesting compulsory by law, with legal provisions to punish defaulters.

Q15. The Bamboo Drip Irrigation System is a 200-year-old traditional practice found in which state?

a) Assam
b) Meghalaya
c) Manipur
d) Sikkim

✔ Ans: b) Meghalaya — It uses bamboo pipes to divert stream and spring water directly to plant roots.

Q16. In the Bamboo Drip Irrigation System, the water finally delivered at the plant site reduces to approximately:

a) 10–15 litres per minute
b) 5–10 litres per minute
c) 20–80 drops per minute
d) 100 drops per minute

✔ Ans: c) 20–80 drops per minute — reduced channel sections ensure slow, precise drip delivery to roots.

Q17. Rooftop rainwater harvesting is the most common water conservation practice in Shillong, Meghalaya. This is surprising because:

a) Shillong has a very dry climate
b) Cherrapunji and Mawsynram nearby receive the highest rainfall on Earth, yet Shillong faces water scarcity
c) Shillong has no rivers
d) The government has banned the use of tap water

✔ Ans: b) Despite Cherrapunji (55 km away) recording world-highest rainfall, Shillong's urban area faces water shortage — showing that high rainfall alone does not guarantee water security.

Q18. The 'khadins' and 'johads' are traditional water harvesting structures found mainly in:

a) Northeast India
b) Rajasthan
c) Kerala
d) Andhra Pradesh

✔ Ans: b) Rajasthan — Khadins (Jaisalmer) and Johads are traditional structures that store water and moisten the soil.

Q19. In which century was the Hauz Khas water tank in Delhi constructed by Alauddin Khilji?

a) 7th–8th century
b) 11th century
c) 13th–14th century
d) 16th century

✔ Ans: c) 13th–14th century — Built to supply water to the Siri Fort area.

Q20. Sringaverapura, a sophisticated water harvesting site dating back to the 1st century BC, is located near which modern city?

a) Varanasi
b) Allahabad (Prayagraj)
c) Lucknow
d) Agra

✔ Ans: b) Allahabad (Prayagraj) — One of the earliest known examples of sophisticated water harvesting in ancient India.

Q21. What is the main purpose of the Jal Jeevan Mission (JJM) launched by the Government of India?

a) To construct large dams across all rivers
b) To provide 55 litres per capita per day of piped potable water to every rural household
c) To build swimming pools in every district
d) To privatise water supply in cities

✔ Ans: b) JJM aims to ensure assured supply of potable piped water at 55 litres/person/day to all rural households.

Q22. Which of the following is TRUE about irrigation and water use in India?

a) Less than 10% of freshwater is used for irrigation
b) Irrigation has helped stop soil salinisation completely
c) Water-intensive cropping patterns promoted by irrigation have in many regions led to soil salinisation
d) Drip irrigation is mandatory across all states

✔ Ans: c) Shift to water-intensive crops combined with over-irrigation has led to salinisation of soil in many regions.

Q23. The 'kuls' or 'guls' are diversion channels used for water harvesting. They are found in:

a) Deccan Plateau
b) Western Himalayas
c) Coastal Andhra Pradesh
d) Gangetic Plain

✔ Ans: b) Western Himalayas — These channels divert flood water from streams to fields in mountainous areas.

Q24. Inundation channels for irrigation were traditionally used in the flood plains of which region?

a) Rajasthan
b) Punjab
c) Bengal
d) Tamil Nadu

✔ Ans: c) Bengal — Flood plains of Bengal used inundation channels to irrigate fields using monsoon floodwater.

Q25. What is the significance of the village Gendathur in Mysuru, Karnataka?

a) It has the largest dam in Karnataka
b) About 200 households have installed rooftop rainwater harvesting and harvest around 1,00,000 litres annually
c) It is famous for bamboo drip irrigation
d) It is the driest village in India

✔ Ans: b) Gendathur is a model village — 200 households collectively harvest 1,00,000 litres of rainwater annually.

Q26. The Krishna-Godavari water dispute involves which states?

a) Karnataka and Tamil Nadu
b) Rajasthan and Gujarat
c) Karnataka, Andhra Pradesh and Maharashtra
d) UP and Bihar

✔ Ans: c) Karnataka and Andhra Pradesh (objecting to Maharashtra diverting more water at Koyna for a multi-purpose project).

Q27. The Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) aims to:

a) Build new dams on every major river
b) Ensure physical access of water on the farm and expand cultivable area under assured irrigation ('Har Khet Ko Pani')
c) Provide free electricity to all farmers
d) Distribute water tankers to drought-hit villages

✔ Ans: b) PMKSY's goal is 'Har Khet Ko Pani' — assured protective irrigation for all agricultural lands.

Q28. Atal Bhujal Yojana is being implemented in approximately how many Gram Panchayats across India?

a) 1,000
b) 4,000
c) 8,220
d) 15,000

✔ Ans: c) 8,220 Gram Panchayats in 229 administrative blocks across 80 districts in 7 states.

Q29. Which of the following correctly identifies a false statement about dams?

a) Dams help in flood control by regulating river flow
b) Big dams have mostly been successful in controlling floods during excessive rainfall
c) Dams are used for recreational purposes like water sports
d) Dams provide water for domestic and industrial supply

✔ Ans: b) FALSE — Big dams have largely FAILED to control floods during excessive rainfall due to siltation reducing reservoir capacity.

Q30. Which popular Bhadu song is associated with the flooding of the Damodar River, once called the 'River of Sorrow'?

a) 'We will fill Bhadu in Ganga'
b) 'We have sown the crops in Asar / We will bring Bhadu in Bhadra / Floods have swollen the Damodar'
c) 'Rain falls on the mountains'
d) 'The river runs to the sea'

✔ Ans: b) This folk song captures the suffering of people of the Damodar valley due to repeated devastating floods.

SECTION B: FILL IN THE BLANKS

Q1. About _____ of the Earth's surface is covered with water, but freshwater available for use is less than _____.

✔ **Answer: three-fourths (71%); 3%**

Q2. Freshwater is a _____ resource because it is continuously renewed through the _____ cycle.

✔ **Answer: renewable; hydrological**

Q3. The immediate image of water scarcity is regions with _____ rainfall, such as the deserts of _____.

✔ **Answer: low; Rajasthan**

Q4. Irrigated agriculture is the _____ consumer of water.

✔ **Answer: largest**

Q5. Multi-purpose river projects serve purposes such as irrigation, electricity generation, _____ control, and inland navigation.

✔ **Answer: flood**

Q6. Jawaharlal Nehru called dams the '_____ of modern India'.

✔ **Answer: temples**

Q7. The Bhakra-Nangal Project is built across the _____ river.

✔ **Answer: Sutlej-Beas**

Q8. The Sardar Sarovar Dam is built on the _____ River and benefits _____ states.

✔ **Answer: Narmada; four**

Q9. The Hirakud Dam is built on the _____ river in the state of _____.

✔ **Answer: Mahanadi; Odisha**

Q10. Regulating and damming of rivers affects their natural flow causing poor _____ flow and excessive sedimentation.

✔ **Answer: sediment**

Q11. Underground cylindrical cisterns used in Rajasthan for storing rooftop rainwater are called _____.

✔ **Answer: tankas**

Q12. Rainwater stored in tankas is locally called '_____', which means it is considered the purest form of natural water.

✔ **Answer: palar pani**

Q13. Tamil Nadu is the first state in India to make rooftop rainwater harvesting _____ for all houses.

✔ **Answer: compulsory**

Q14. The Bamboo Drip Irrigation System is a _____-year-old method found in _____.

✔ **Answer: 200; Meghalaya**

Q15. The traditional water harvesting channels in the Western Himalayas are called '_____' or '_____'.

✔ **Answer: kuls; guls**

Q16. In Bengal, people developed _____ channels to irrigate their fields using floodwater.

✔ **Answer: inundation**

Q17. 'Khadins' and 'johads' are found in _____ and are used to _____ the soil by storing water.

✔ **Answer: Rajasthan; moisten**

Q18. The ancient water harvesting site at Sringaverapura near Allahabad dates back to the _____ century BC.

✔ **Answer: 1st**

Q19. The Jal Jeevan Mission aims to provide _____ litres per capita per day of potable piped water to every rural household.

✔ **Answer: 55**

Q20. In Gendathur village, Mysuru, about _____ households have installed rooftop harvesting systems, collecting _____ litres annually.

✔ **Answer: 200; 1,00,000**

SECTION C: MATCH THE COLUMNS

Column A	Column B
1. Bhakra-Nangal Dam	a. 1st century BC water harvesting, near Allahabad
2. Hirakud Dam	b. Sutlej-Beas River, Punjab / Himachal Pradesh
3. Sardar Sarovar Dam	c. Underground cisterns for rainwater storage in Rajasthan
4. Hauz Khas Tank	d. First state to make rooftop harvesting compulsory by law
5. Sringaverapura	e. Mahanadi River, Odisha
6. Tankas	f. Narmada River — benefits 4 states including drought-prone Rajasthan
7. Kuls / Guls	g. 200-year-old system in Meghalaya using bamboo pipes
8. Bamboo Drip Irrigation	h. Diversion channels for flood water harvesting in Western Himalayas
9. Jal Jeevan Mission	i. 13th–14th century water tank built by Alauddin Khilji, Delhi
10. Tamil Nadu	j. Provides 55 litres/day piped water to every rural household

✔ ANSWER KEY
1 → b
2 → e
3 → f
4 → i
5 → a
6 → c
7 → h
8 → g
9 → j
10 → d

SECTION D: SHORT ANSWER TYPE QUESTIONS

Q1. Why is water considered a renewable resource? Explain in your own words. [2 marks]

Water is renewable because the hydrological cycle continuously replenishes it. The sun heats water, which evaporates into the atmosphere, forms clouds, falls as rain or snow, and flows back into rivers, lakes and groundwater — ready to be used again. This natural cycle keeps going endlessly, which is why water is called renewable.

Q2. Define water scarcity. What are its two main types? [2 marks]

Water scarcity means an insufficient supply of usable water relative to demand. The two types are: (1) Physical scarcity — there is actually not enough water in a region (e.g., deserts of Rajasthan). (2) Economic/quality scarcity — water is physically present but so heavily polluted by industrial waste, chemicals or pesticides that it cannot safely be used.

Q3. Give any three reasons why water scarcity exists even in water-abundant regions. [3 marks]

Three reasons: (1) Rapid population growth — more people = more demand for drinking, cooking, sanitation and food production. (2) Industrialisation — factories consume enormous quantities of water and discharge pollutants that make more water unusable. (3) Unequal distribution — rich urban colonies have overhead tanks, water purifiers and swimming pools while poor areas go without. Even if a region gets good rainfall, these pressures can still cause scarcity.

Q4. What is a dam? What is a spillway? [2 marks]

A dam is a barrier built across a flowing river that obstructs, directs or retards the water's flow, creating a reservoir or lake behind it. A spillway (also called a weir) is a specially designed section of the dam over or through which excess water flows to prevent the dam from overflowing. It acts as a safety valve for the reservoir.

Q5. Why did Jawaharlal Nehru call dams the 'temples of modern India'? [3 marks]

Nehru believed that large multi-purpose dams were the key to transforming independent India. Just as temples were once the centres of community life, dams would become the centres of national development. They would integrate agriculture (irrigation) with industry (hydroelectric power), uplift the village economy, and drive rapid urban and industrial growth — placing them at the heart of the new nation's progress.

Q6. List any four benefits of multi-purpose river projects. [2 marks]

Four benefits: (1) Irrigation — provides water for farming, especially in dry seasons and drought-prone areas. (2) Electricity — hydroelectric power supports industries, homes and infrastructure. (3) Flood control — reservoirs store excess water during heavy rain, reducing flooding downstream. (4) Water supply — provides drinking and industrial water to towns and cities. Additional benefits include inland navigation, fish breeding and recreation.

Q7. What problems arise from large-scale displacement caused by dams? [3 marks]

When a dam creates a large reservoir, entire villages, forests and farmland are submerged. The affected people — usually poor farmers, tribals (Adivasis) and forest-dwelling communities — are forcibly displaced. They lose their homes, livelihoods, cultural sites and community bonds. Rehabilitation is often inadequate. The Narmada Bachao Andolan (led by Medha Patkar) became a powerful movement highlighting this injustice caused by the Sardar Sarovar Dam.

Q8. How do dams affect a river's natural flow? Why is this a problem? [3 marks]

Dams block a river's natural flow and trap its sediment (fine soil and minerals). This creates rockier, shallower stream beds below the dam and deprives the floodplain and delta of the fertile silt they normally receive. It also destroys habitats for fish and other aquatic life by fragmenting the river. Fish cannot migrate for spawning, and overall biodiversity suffers.

Q9. What is a 'tanka'? Where is it traditionally used? [3 marks]

A tanka is a large underground cylindrical cistern — essentially a buried tank — traditionally used in the semi-arid regions of Rajasthan, particularly in Bikaner, Phalodi and Barmer. Rainwater falling on the sloping rooftop of a house is channelled through a pipe into the tanka. The first spell of rain is not collected (to clean the roof and pipes); subsequent clean rainwater is stored. One household tanka could be 6.1 m deep, 4.27 m long and 2.44 m wide.

Q10. Why was rooftop rainwater harvesting declining in western Rajasthan? [2 marks]

The arrival of the Indira Gandhi Canal brought perennial water supply to parts of western Rajasthan. As piped tap water became available, people stopped maintaining their tankas and felt they no longer needed them. However, many still prefer the taste of stored rainwater (palar pani) and some households continue the tradition. The decline in traditional harvesting has made communities increasingly dependent on a single source.

Q11. Describe the Bamboo Drip Irrigation System of Meghalaya. [3 marks]

This 200-year-old system uses bamboo pipes to divert water from perennial hill-top springs and streams. About 18–20 litres of water enters the bamboo pipe network, travels hundreds of metres through channel sections, gets distributed into branches, and is finally reduced to 20–80 drops per minute at the plant site through reduced channel sections and diversion units. It is a completely natural, low-cost, gravity-driven drip irrigation system that precisely delivers water to plant roots.

Q12. Why is Shillong's case with rainwater harvesting considered surprising? [2 marks]

Shillong in Meghalaya has the highest practice of rooftop rainwater harvesting in India — and almost every household has such a structure. This is surprising because the towns of Cherrapunji and Mawsynram, situated just 55 km away, receive the highest rainfall on Earth. Yet Shillong itself faces an acute water shortage. This shows that proximity to high-rainfall areas does not automatically ensure water availability in cities, making local harvesting essential.

Q13. What is the Jal Jeevan Mission? What is its main goal? [2 marks]

Jal Jeevan Mission (JJM) is a Government of India scheme with the goal of providing every rural household with assured, regular supply of potable piped water at 55 litres per capita per day. It focuses on improving the quality of life — especially in rural areas — and ensuring that no family, particularly the poor, has to face water insecurity. The Economic Survey 2020–21 noted it as a top priority.

Q14. What are 'kuls' or 'guls'? Where are they found? [2 marks]

Kuls (also called guls) are diversion channels — essentially small man-made waterways dug to redirect flood water from streams and rivers towards agricultural fields and storage areas. They are found in the hill and mountainous regions of the Western Himalayas and are a key traditional water harvesting technique. In this hilly terrain, kuls channel surplus monsoon runoff efficiently for farming.

Q15. Why did irrigation by large dams lead to soil salinisation in some areas? [3 marks]

Over-irrigation, especially in canal-irrigated areas, causes waterlogging — the soil becomes saturated. As the excess water evaporates, it draws dissolved salts up to the surface. These salts accumulate, forming a crusty white layer that makes the land infertile and barren over time. This is known as salinisation. It is worsened when farmers, encouraged by abundant water, shift to water-intensive crops year-round.

Q16. What are inundation channels? Which region uses them traditionally? [2 marks]

Inundation channels are channels dug in flood plain areas to direct the natural floodwater that overflows from rivers during the monsoon season onto agricultural fields. They do not require pumps or dams — the flood itself fills them. They are a traditional irrigation method used in the flood plains of Bengal. Farmers used them to take advantage of the annual floods to water their crops naturally.

Q17. Name any two ancient hydraulic structures in India and state their approximate dates. [3 marks]

(1) Sringaverapura (near Allahabad) — a sophisticated flood water harvesting system dating back to the 1st century BC. It used a series of channels to store and reuse Ganga floodwater. (2) Hauz Khas, Delhi — a large water tank built in the 13th–14th century AD by Alauddin Khilji of the Delhi Sultanate to supply water to the Siri Fort area. (Other valid examples: Bhopal Lake — 11th century; Kolhapur tanks; Nagarjunakonda irrigation.)

Q18. Why are dams largely considered to have 'failed' at flood control? [3 marks]

Ironically, many dams designed to control floods have ended up triggering floods. The main reason is siltation — sediment carried by the river gradually fills the reservoir, reducing its capacity to store floodwater. During periods of extremely heavy rainfall, the reservoir fills quickly and gates must be opened, releasing a sudden surge of water downstream — sometimes causing more catastrophic flooding than would have occurred naturally.

Q19. What inter-state water disputes exist in India? Give one example with the states involved. [3 marks]

India has several inter-state water disputes arising from shared rivers. A well-known example is the Cauvery Water Dispute between Karnataka and Tamil Nadu — both states claim the right to use the river's waters for their agriculture and urban needs. Another example is the Krishna-Godavari dispute, where Karnataka and Andhra Pradesh have objected to Maharashtra diverting more water from Koyna, which would reduce downstream flow in their states with serious consequences for farming.

Q20. What does the Atal Bhujal Yojana aim to achieve? [3 marks]

Atal Bhujal Yojana (Atal Jal) aims to bring about behavioural change in communities regarding water use — shifting from a culture of consumption to conservation and smart water management. It is implemented in 8,220 Gram Panchayats across 229 blocks in 80 districts in seven states (Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh), focusing on water-stressed, over-exploited and semi-critical groundwater areas.

SECTION E: FREQUENTLY ASKED QUESTIONS (FAQ)

Q1. Why do we have water scarcity if three-fourths of the Earth is covered with water?

Great question — and one that confuses many students! The key is the TYPE of water. About 97.5% of all water on Earth is salt water in the oceans, which we cannot drink or use for irrigation. Of the remaining 2.5% freshwater, most is locked up in glaciers and ice caps. The tiny fraction left in rivers, lakes and groundwater is what the entire human population (and wildlife) depends on. Add to this unequal distribution, pollution, and growing demand — and scarcity becomes very real.

Q2. Is water truly 'renewable'? Can it ever 'run out'?

Water is renewable in the sense that the total amount of water on Earth stays roughly constant — the hydrological cycle keeps circulating it. However, usable freshwater CAN run out locally. If we pump groundwater faster than it is recharged by rain, aquifers dry up. If rivers are heavily polluted, the water becomes unusable. So while water doesn't disappear from the planet, clean and accessible freshwater can absolutely run out for a region or community.

Q3. What exactly is the 'hydrological cycle' and why does it matter?

The hydrological cycle is the continuous natural movement of water on, above and below Earth's surface. It works like this: the sun heats water in oceans, rivers and lakes → water evaporates → rises and cools to form clouds → falls as rain or snow → flows into rivers or soaks into the ground → eventually returns to the ocean. This endless loop is what makes freshwater available on land. Without it, all freshwater would be gone within a few thousand years.

Q4. Why are multi-purpose projects called 'multi-purpose'? Can't a dam just do one thing?

A dam built purely for one purpose (say, only flood control) would be a waste of a massive investment. Modern multi-purpose dams are designed to do several jobs at once: store water for irrigation, generate hydroelectric power, control floods, supply drinking water, support navigation and fishing, and even provide recreational facilities. The Bhakra-Nangal Project, for example, simultaneously irrigates millions of hectares and generates gigawatts of electricity. This multi-tasking approach justifies the enormous cost and environmental impact.

Q5. If dams cause so many problems, why do we keep building them?

The debate is real and ongoing. Dams do cause displacement, ecological damage and inter-state disputes. But they also provide electricity and irrigation that millions of people depend on. India cannot simply abandon them. The modern approach is to: design dams more carefully with proper environmental impact assessments, ensure genuine rehabilitation of displaced people, build smaller projects where possible, and combine large dam projects with decentralised traditional methods like rainwater harvesting.

Q6. What is the difference between a 'reservoir' and a 'dam'?

A dam is the physical structure — the barrier built across the river. A reservoir is the artificial lake or body of water that forms behind the dam when the river is blocked. Think of the dam as the wall and the reservoir as the room behind it. Most people use the terms loosely, but technically the dam creates the reservoir. The size of the reservoir determines how much water can be stored for irrigation, drinking and power generation.

Q7. Why can't we simply pipe water from flood-affected areas to drought-affected areas?

This is exactly what inter-linking of rivers proposes! But it's far more complex than it sounds. First, the engineering is enormously expensive. Second, political disputes arise — states that 'give' water don't want to lose it. Third, ecological damage to donor rivers can be severe. Fourth, cultural and social ties to rivers make communities resist change. While interlinking has been discussed for decades, it has been implemented only in small ways. Meanwhile, local harvesting and conservation remain more practical immediate solutions.

Q8. What are the 'Do You Know' facts about Atal Bhujal Yojana?

Atal Bhujal Yojana (Atal Jal) is being implemented in 8,220 Gram Panchayats in 229 administrative blocks of 80 districts in seven states: Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh. These states account for about 37% of the total number of over-exploited, critical and semi-critical groundwater blocks in India. The key aim is not just to provide water but to change community behaviour — from over-consumption to conservation.

Q9. What makes traditional water harvesting systems better than modern dams in some ways?

Traditional systems are: (1) Cost-effective — built with local materials at little expense. (2) Community-owned — people who built them maintain them proudly. (3) Ecologically gentle — no displacement, no flooding of forests. (4) Decentralised — each village is water-independent. (5) Resilient — if one system fails, others still work. Modern dams, by contrast, are expensive, centralised, and when they fail or are mismanaged, the impact is catastrophic. Traditional wisdom, updated with modern science, offers the best future.

Q10. Why did the Narmada Bachao Andolan become so famous?

The Narmada Bachao Andolan (Save Narmada Movement), led by Medha Patkar and others, became famous because it powerfully raised the question: Who pays the price of 'development'? The Sardar Sarovar Dam on the Narmada would benefit drought-prone Gujarat and Rajasthan — but it submerged the homes, farms and sacred places of thousands of Adivasi, Dalit and farming families in Madhya Pradesh and Maharashtra. The movement demanded proper rehabilitation before submergence, drawing international attention to the human cost of large dams.

Q11. How does rainwater harvesting help solve the problem of water scarcity?

Rainwater harvesting catches precipitation at source — before it runs off into rivers or evaporates. This local collection: (1) Recharges groundwater, preventing aquifer depletion. (2) Provides a reliable source of clean drinking water in dry seasons. (3) Reduces dependence on large centralised systems. (4) Helps maintain green cover by providing water for local agriculture. Best of all, it works even in cities — every rooftop can be a water catchment. Tamil Nadu has made this compulsory, and the results have been significant.

Q12. What is meant by 'water quality scarcity' and how is it different from 'water quantity scarcity'?

Water quantity scarcity means there is simply not enough water — rainfall is low, rivers are dry, groundwater is depleted. This affects arid regions like Rajasthan. Water quality scarcity means there is physically enough water, but it is too polluted (by industrial chemicals, pesticides, sewage) to be safely used for drinking, cooking or irrigation. Many urban areas in India have plenty of water in rivers nearby, but it is dangerously contaminated. Quality scarcity is often invisible and more difficult to address than quantity scarcity.

Q13. What is the role of agriculture in causing water scarcity?

Agriculture is the single largest consumer of freshwater globally — in India, it uses around 70% of all freshwater. Multi-purpose dam projects encouraged farmers to shift to water-intensive crops (like sugarcane and paddy) even in dry areas, dramatically increasing demand. Tube wells pumped groundwater far faster than it could be recharged. The result: falling water tables, drying wells and seasonal rivers. Sustainable agriculture — using drip irrigation, crop rotation, drought-resistant varieties — is essential to reduce this burden.

Q14. What is meant by 'integrated water resources management'?

Integrated Water Resources Management (IWRM) means planning and managing water resources in a holistic way — considering all uses (agriculture, industry, domestic), all sources (rivers, groundwater, rainwater), and all stakeholders (farmers, cities, industries, ecosystems) together. Rather than building a dam and only thinking about power generation, IWRM asks: how does this dam affect groundwater? downstream farmers? the ecosystem? fishing communities? It is the modern scientific approach that India's National Water Policy now promotes.

Q15. Why do historians and geographers say India has always been a 'water-wise' civilisation?

From the Indus Valley Civilisation's sophisticated drainage systems to the step-wells (baolis) of Rajasthan, the kunds of Gujarat, the tanks of Tamil Nadu, the kuls of the Himalayas and the bamboo drip systems of Meghalaya — India has a rich 4,000+ year tradition of managing water cleverly. Ancient rulers like Chandragupta Maurya invested heavily in irrigation. Archaeological sites at Sringaverapura, Kolhapur and Nagarjunakonda show engineering that was centuries ahead of its time.

Q16. What practical steps can a student or family take to conserve water?

Excellent question! Here are some real, practical steps: (1) Fix leaking taps immediately — a dripping tap wastes thousands of litres yearly. (2) Install a rooftop rainwater harvesting system. (3) Use a bucket instead of a hosepipe for washing vehicles. (4) Water plants in the evening to reduce evaporation. (5) Use water-efficient appliances. (6) Recycle 'grey water' (washing water) for plants. (7) Spread awareness in your colony or school. (8) Participate in local Jal Shakti activities. Conservation starts at home!

Q17. What is the Pradhan Mantri Krishi Sinchayee Yojana and what does 'Har Khet Ko Pani' mean?

PMKSY is a government programme with the broad aim of ensuring that every farm in India has access to reliable irrigation water — expressed in the slogan 'Har Khet Ko Pani' (Water to Every Farm). It focuses on: enhancing physical access to water on farms, expanding cultivable area under assured irrigation, improving on-farm water use efficiency, reducing wastage, introducing modern technologies like drip and sprinkler irrigation, and promoting sustainable water conservation practices. It directly targets food security and rural prosperity.

Q18. Why is the Damodar River called the 'River of Sorrow'?

The Damodar River in the Jharkhand-West Bengal region was historically called the 'River of Sorrow' because it flooded catastrophically nearly every monsoon season, destroying crops, homes and lives in the Damodar valley. The famous Bhadu folk song captures the dread: 'Floods have swollen the Damodar, the sailing boats cannot sail...' The Damodar Valley Corporation (DVC) dams were built after Independence partly to tame these floods — though with mixed success, as siltation has reduced reservoir capacity over decades.

Q19. How does population growth directly lead to water scarcity?

More people means more demand across all fronts. A larger population needs: more food → more irrigated agriculture → more water. More homes → more daily domestic use. More industries to produce goods → more industrial water. More cities → more urban water infrastructure. At the same time, each additional person generates more wastewater and pollution, reducing the usable water supply. This is why scarcity is projected to affect 2 billion people by 2025 — population growth is the multiplier that makes every other water problem worse.

Q20. What is the significance of the 'first spell of rain' rule in tanka/rooftop harvesting?

In rooftop rainwater harvesting using tankas, the very first spell of rain each monsoon season is deliberately NOT collected. This is a clever practical rule: the first rain washes the dust, bird droppings, debris and pollutants off the roof and out of the pipes. If collected, this 'first-flush' water would contaminate the stored supply. By letting it drain away, the subsequent rains collected in the tanka are genuinely clean. This simple principle makes the difference between safe drinking water and contaminated water.

SECTION F: LONG ANSWER / ESSAY TYPE QUESTIONS

Q1. What is water scarcity? Explain in detail the causes of water scarcity in India, with suitable examples. [CBSE Board — 5 marks]

Water scarcity refers to a situation where the demand for freshwater exceeds the available supply, or where available water is of such poor quality that it cannot be used safely.

CAUSES OF WATER SCARCITY IN INDIA:

1. Growing Population: India's massive and growing population creates enormous demand — for drinking water, food (which requires irrigation), and sanitation. The same amount of water must serve far more people every decade.

2. Over-Exploitation of Groundwater: Farmers, industries and urban housing societies sink tube wells and bore wells to access groundwater. When extraction exceeds natural recharge rates, water tables fall sharply. Many parts of Punjab, Haryana and Uttar Pradesh now face alarmingly low groundwater levels due to over-irrigating wheat and rice.

3. Unequal Access and Unequal Use: Water is not distributed fairly. A wealthy city colony with swimming pools, car-washing facilities and multiple bathrooms uses hundreds of litres per person per day. A drought-affected village may struggle to collect 20 litres. This inequality itself constitutes a form of scarcity.

4. Industrialisation: Post-Independence industrialisation created vast numbers of factories that consume enormous volumes of water. Many industries also discharge untreated effluents — chemicals, heavy metals, dyes — into rivers, poisoning the water and making large stretches unusable.

5. Pollution: Agricultural use of chemical fertilisers, pesticides and herbicides causes run-off that contaminates rivers and groundwater. In many areas, water is physically present but chemically unsafe — this is 'quality scarcity'. The River Yamuna passing through Delhi is a stark example.

6. Erratic Rainfall and Climate Change: Annual and seasonal variation in precipitation means some regions flood while others go dry. Climate change is making these extremes more severe and less predictable.

EXAMPLE: Rajasthan receives very little rain and historically managed through ingenious tankas, johads and khadins. Yet today, with groundwater overuse and declining traditional systems, communities struggle for water. In contrast, Cherrapunji records the world's highest rainfall but faces water shortages due to rapid run-off and lack of storage. Both cases illustrate that scarcity is about management, not just rainfall.

CONCLUSION: Addressing water scarcity requires a combination of policy (Jal Jeevan Mission, PMKSY), technology (drip irrigation, rainwater harvesting) and behaviour change (conservation at household level).

Q2. Describe the advantages and disadvantages of multi-purpose river projects. Do you think the benefits outweigh the costs? Give reasons. [CBSE Board — 5 marks]

Multi-purpose river projects (MPPs) are large dams built to serve several purposes simultaneously — irrigation, power generation, flood control, water supply, navigation and fish breeding. After Independence, India built hundreds of such projects. Nehru famously called them the 'temples of modern India'.

ADVANTAGES:

1. Irrigation: MPPs provide regulated water supply to farms even in dry seasons. The Bhakra-Nangal Project irrigates vast tracts of Punjab and Haryana, making them India's 'grain bowl'.
2. Hydroelectric Power: Dams generate clean, renewable hydroelectricity. The Hirakud Project supplies power to Odisha's industries and homes.
3. Flood Control: Reservoirs absorb excess monsoon runoff, reducing downstream flooding. The Damodar Valley Corporation was specifically designed to tame the flood-prone Damodar.
4. Drinking Water Supply: Reservoirs supply filtered water to cities and rural areas — especially valuable in dry regions.
5. Navigation: Large reservoirs and regulated rivers support inland water transport.
6. Fish Breeding: Reservoirs and regulated canals support fisheries, providing livelihoods.

DISADVANTAGES:

1. Large-Scale Displacement: Reservoirs submerge villages, forests and farmland. Millions have been displaced — mostly poor, Adivasi and Dalit communities — often without adequate rehabilitation. The Narmada Bachao Andolan highlighted this injustice.
2. Ecological Damage: Dams disrupt the river's natural sediment flow, damage aquatic habitats, prevent fish migration and cause biodiversity loss. Reservoirs submerge existing vegetation, causing soil decomposition and methane emission.
3. Seismic Risk: Heavy reservoirs can trigger earthquakes in geologically sensitive zones.
4. Inter-State Disputes: Shared rivers create political conflict. The Cauvery dispute (Karnataka vs Tamil Nadu) and Krishna-Godavari dispute are ongoing examples.
5. Failed Flood Control: Heavy siltation reduces reservoir capacity over decades, meaning dams often cannot control floods during extreme rainfall events.
6. Soil Salinisation: Over-irrigation from dam projects has led to waterlogging and salinisation, turning fertile land barren.

CONCLUSION: The benefits of MPPs are real and significant — India's food security and industrial growth owe much to them. However, the social and ecological costs have too often been borne by the most vulnerable communities. The answer is not to abandon large projects but to design them responsibly, ensure full rehabilitation of affected people, and combine them with decentralised traditional water harvesting. A balanced approach is the need of the hour.

Q3. Explain how rainwater harvesting is carried out in semi-arid regions of Rajasthan. Why is this traditional method still relevant today? [CBSE Board — 5 marks]

Rajasthan is India's largest state and among its driest. Annual rainfall is low, erratic and concentrated in just a few weeks of monsoon. For centuries, Rajasthan's people developed sophisticated methods to collect, store and use every drop of precious rainwater.

TRADITIONAL METHODS IN RAJASTHAN:

1. Tankas (Underground Cisterns): In the semi-arid districts of Bikaner, Phalodi and Barmer, almost every household traditionally had a tanka — a large underground cylindrical cistern built inside the main house or courtyard. The sloping roof channelled rainwater through a pipe into the tanka. First-flush rain was discarded to clean the roof and pipes. Subsequent rain filled the tanka. One tanka could be 6.1 m deep, 4.27 m long and 2.44 m wide — enough to store hundreds of litres. The stored water, called 'palar pani', was considered the purest form of natural water. Underground storage also kept it cool through summer.

2. Johads: These are traditional small earthen reservoirs or embankments built across seasonal streams and gullies to capture and store monsoon runoff. The stored water slowly percolates into the ground, recharging the water table. Johads are community-owned and maintained collectively.

3. Khadins: Found around Jaisalmer, a khadin is an agricultural field into which monsoon water is deliberately channelled and stored. The water stands in the field, soaks into the soil, and the moisture then supports the next crop. It is essentially a combined water harvesting and farming system.

4. Baoris / Step Wells: Large decorative step wells that held community water throughout the year.

WHY STILL RELEVANT TODAY:

- Many parts of Rajasthan still face acute groundwater depletion. Tankas and johads help recharge aquifers locally.

- They require no electricity, no pumps and very low maintenance.

- They keep communities water-independent, reducing dependence on canals that may fail in drought years.

- Palar pani is still preferred for taste and purity over canal or tap water by many local people.

- Climate change is making monsoons less reliable, making local storage more important than ever.

CONCLUSION: The Indira Gandhi Canal brought tap water to parts of Rajasthan and led to a decline in traditional practices. But as groundwater levels fall and rainfall becomes erratic, reviving these time-tested traditional systems alongside modern approaches is both wise and necessary.

Q4. Describe any two traditional water harvesting systems practised in different regions of India. What does this tell us about India's ancient engineering wisdom? [5 marks]

India's ancient inhabitants developed ingenious water management systems tailored to the specific geography and climate of each region. Far from being 'backward', these were sophisticated engineering solutions.

EXAMPLE 1: BAMBOO DRIP IRRIGATION — MEGHALAYA

This 200-year-old system in the hilly terrain of Meghalaya uses nothing more than bamboo pipes and gravity to deliver water from hilltop springs directly to plant roots. About 18–20 litres of water per minute enters the bamboo pipe system, travels hundreds of metres through channels, is divided into branches,

and finally reduced to 20–80 drops per minute at each plant through progressively narrower pipe sections. No electricity, no pumps, no motors — just the natural slope of the hill and the flexibility of bamboo. This is true drip irrigation, developed two centuries before the modern technology became popular.

EXAMPLE 2: SRINGAVERAPURA FLOOD WATER HARVESTING — NEAR ALLAHABAD

Dating back to the 1st century BC, this sophisticated system near Allahabad was designed to harvest the seasonal floodwaters of the Ganga. A series of channels and reservoirs captured the floodwater as the river rose, stored it, and made it available after the floods receded — effectively converting a destructive force into a resource. The engineering design showed a deep understanding of river behaviour, hydrology and seasonal cycles.

OTHER NOTABLE EXAMPLES:

- Bhopal Lake (11th century) — one of the largest artificial lakes of its time.

- Hauz Khas, Delhi (13th–14th century) — a large community water tank serving the Siri Fort area.

- Chandragupta Maurya's era — dams, lakes and irrigation systems were built across the Maurya Empire.

WHAT THIS TELLS US:

India has always been a water-civilisation. Our ancestors understood hydrology, seasonal rainfall patterns, soil types and local needs intimately. They built structures that lasted centuries — and many are still functional today. This tells us that the wisdom to solve our modern water crisis may already lie in our own past. Reviving and adapting these traditional methods is not nostalgia — it is engineering intelligence.

Q5. What is the importance of water conservation and water management? Discuss any three modern methods of rainwater harvesting. [5 marks]

IMPORTANCE OF WATER CONSERVATION:

Water is the foundation of all life. Agriculture, industry, energy production and daily survival all depend on it. Yet freshwater represents less than 3% of all water on Earth, and a tiny fraction of that is accessible. India faces a dual crisis: some areas face devastating floods while others suffer chronic drought. Population growth, industrialisation and climate change are worsening both. Without conscious conservation and management, the next wars could be fought over water, not oil.

Conservation ensures: food security (farming needs irrigation), public health (clean drinking water), energy security (hydroelectric power), ecological balance (rivers and wetlands must survive), and economic security (industries need water).

THREE MODERN RAINWATER HARVESTING METHODS:

1. ROOFTOP RAINWATER HARVESTING:

The most widespread modern method — rain falls on the roof, flows through a pipe, is filtered through sand and gravel, and stored in an underground tanka. First-flush is discarded to clean the system. Tamil

Nadu has made this mandatory by law for all buildings. In Gendathur, Mysuru, 200 households collectively harvest 1,00,000 litres annually. Even urban apartments can contribute significantly.

2. RECHARGE THROUGH ABANDONED DUGWELLS:

Rooftop rainwater is collected through a PVC pipe, filtered using sand and bricks, and directed underground into an abandoned dug well. From there it percolates into the aquifer, recharging groundwater. This stored groundwater can be pumped for use later, effectively 'banking' rain underground.

3. RECHARGE THROUGH HAND PUMP:

A simpler variation where filtered rooftop water is channelled directly through a hand pump structure into the ground. The water enters the subsurface near the pump and is immediately available for use when the pump is operated.

CONCLUSION:

Conservation and smart harvesting are not optional extras — they are survival strategies. Traditional wisdom (tankas, kuls, johads) combined with modern technology (drip irrigation, solar pumps, water-efficient appliances) and strong government policy (JJM, PMKSY, Atal Bhujal Yojana) form the three pillars of India's water future.

Q6. What are the main causes of opposition to multi-purpose river projects in India? Discuss with examples. [CBSE / UPSC type — 5 marks]

While multi-purpose river projects have contributed enormously to India's development, they have also generated intense opposition from communities, environmentalists and scholars. Here are the main reasons for this opposition:

1. LARGE-SCALE DISPLACEMENT WITHOUT ADEQUATE REHABILITATION:

The most powerful cause of protest. When a dam creates a reservoir, everything in the flood zone is submerged — villages, farmland, forests, temples and ancestral burial sites. The people displaced are overwhelmingly the poorest — Adivasis, Dalits and small farmers — who have the least political power to negotiate fair compensation or resettlement. The Narmada Bachao Andolan, led by Medha Patkar, became globally famous for fighting the unjust displacement caused by the Sardar Sarovar Dam. Tens of thousands of families were moved without adequate land, housing or livelihood alternatives.

2. ECOLOGICAL DESTRUCTION:

Dams fragment rivers, destroying ecosystems. They block sediment that nourishes deltas and floodplains. They prevent fish from migrating to spawning grounds. Reservoirs flood forests, killing trees and releasing greenhouse gases as vegetation decomposes underwater. The overall biodiversity loss — of fish, birds, mammals and plants — has been severe around most large dam sites.

3. FAILED FLOOD CONTROL:

A cruel irony: dams built to control floods often trigger them. Over time, the reservoir silts up, reducing its capacity to store water. During extreme rainfall, operators must open floodgates to prevent the dam

from overflowing — releasing a sudden surge downstream. This has caused some of India's worst modern floods. In Odisha, Rajasthan and other states, dam releases have been more damaging than the natural floods would have been.

4. INTER-STATE WATER DISPUTES:

Rivers flow across state boundaries, but states jealously guard 'their' water. Dam projects upstream reduce the flow available to downstream states. The Cauvery Water Dispute (Karnataka vs Tamil Nadu) has been in courts and on streets for decades. The Krishna-Godavari case involves multiple states. These conflicts sometimes turn violent and create lasting political bitterness.

5. SOIL SALINISATION AND WATERLOGGING:

Uncontrolled canal irrigation from dams has led to waterlogging (soil permanently saturated) and salinisation (salt buildup as water evaporates) in many canal-irrigated districts, rendering previously fertile land barren.

CONCLUSION:

The opposition to large dams is not anti-development. It is a demand that development must be just — that those who benefit and those who bear the cost must not always be different groups. Modern planning now requires Environmental Impact Assessments and Social Impact Assessments before any large water project is approved.

Q7. Describe the role of ancient and traditional methods of water harvesting in India. Why is it important to revive these methods today? [UPSC/UPPSC type — 5 marks]

India has one of the world's richest traditions of water harvesting — going back at least 4,000 years. Long before modern engineering, our ancestors developed solutions perfectly adapted to their environment.

ANCIENT HYDRAULIC STRUCTURES:

The first century BC site at Sringaverapura (near Allahabad) had a sophisticated system of channels and reservoirs to harvest Ganga floodwaters. In the Mauryan period (3rd century BC), the state invested heavily in irrigation infrastructure — dams, lakes and channels are mentioned in Kautilya's Arthashastra. Archaeological evidence of sophisticated irrigation has been found in Kalinga (Odisha), Nagarjunakonda (Andhra Pradesh), Bennur (Karnataka) and Kolhapur (Maharashtra).

MEDIEVAL WATER ENGINEERING:

The 11th century Bhopal Lake was one of the largest artificial lakes of the medieval world. Alauddin Khilji built Hauz Khas (13th–14th century) to supply water to Delhi's Siri Fort. During the 16th–18th centuries, step-wells (baolis), tanks and kunds dotted every region.

REGIONAL TRADITIONAL METHODS:

— Western Himalayas: Kuls and Guls — diversion channels directing stream water to terraced fields.

— Rajasthan: Tankas (underground cisterns), Johads (earthen reservoirs), Khadins (agricultural water storage fields).

— Bengal: Inundation channels using monsoon floodwaters.

— Meghalaya: Bamboo Drip Irrigation — 200-year-old system using gravity and bamboo pipes.

— Tamil Nadu: Eris (tank systems) — community-managed irrigation tanks linking fields across villages.

WHY REVIVE THEM TODAY:

1. Groundwater crisis — over-exploitation has depleted aquifers. Local recharge through johads and tankas is urgently needed.
2. Climate unpredictability — erratic rainfall makes local storage more valuable.
3. Low cost — require no electricity, no expensive materials, no imported technology.
4. Community ownership — people care for systems they built and own.
5. Decentralisation — each village/farm becomes water-self-sufficient, reducing dependence on centralised systems that can fail or become politically contested.
6. Sustainability — these systems have proven themselves over centuries; they work in harmony with local ecology.

CONCLUSION: India's traditional water wisdom is not a museum relic — it is a living, practical resource. Gendathur village in Karnataka (200 households, 1,00,000 litres annually) and Tamil Nadu's mandatory rooftop harvesting law show that revival works. The future of India's water security lies in combining this ancient wisdom with modern science and strong policy.

Q8. What is the Jal Jeevan Mission? How does it aim to solve India's water crisis at the grassroots level? Also mention other government schemes related to water. [5 marks]

THE JAL JEEVAN MISSION (JJM):

The Jal Jeevan Mission, launched in 2019, is the Government of India's flagship programme to ensure 'Har Ghar Jal' — water to every household. Its specific, measurable goal is to provide every rural household in India with a functional tap water connection delivering 55 litres per capita per day of potable (safe to drink) piped water on a regular and long-term basis.

HOW IT ADDRESSES THE WATER CRISIS:

Before JJM, millions of rural women — particularly in states like Rajasthan, Uttar Pradesh, Jharkhand and Odisha — spent several hours daily walking to fetch water from distant sources, often contaminated. Children, especially girls, missed school. Water-borne diseases were rampant. JJM addresses this by:

- Building water supply infrastructure — pipes, treatment plants, storage tanks — in every village.

- Focusing especially on the poorest and most water-scarce regions.

- Aiming to improve quality of life and ease of living, particularly for women and children.

- Supporting local water quality testing and community monitoring.

The Economic Survey 2020–21 identified JJM as a top governmental priority for improving rural well-being.

OTHER GOVERNMENT SCHEMES:

1. PRADHAN MANTRI KRISHI SINCHAYEE YOJANA (PMKSY):

'Har Khet Ko Pani' — ensuring every farm has irrigation access. Promotes drip and sprinkler irrigation ('More Crop Per Drop'), expands irrigated area, and introduces sustainable water conservation practices on farms.

2. ATAL BHUJAL YOJANA (ATAL JAL):

Targeting 8,220 water-stressed Gram Panchayats across 7 states. Focuses on groundwater conservation and, uniquely, on changing community behaviour towards water — from extraction to conservation.

3. NATIONAL WATER POLICY:

Promotes Integrated Water Resources Management (IWRM) — a holistic approach that considers all water uses, all sources, and all stakeholders together.

CONCLUSION: India's water crisis is too large for any single solution. JJM, PMKSY, Atal Jal and traditional rainwater harvesting methods together form a comprehensive multi-level strategy — from the village hand pump to the national river management plan.

Q9. Explain how modern adaptations of traditional rainwater harvesting methods are being carried out in different parts of India. Give specific examples. [CBSE 5 marks]

India's traditional water harvesting methods are being modernised and adapted to contemporary needs across the country. Here are specific examples:

1. ROOFTOP RAINWATER HARVESTING — TAMIL NADU AND URBAN INDIA:

The ancient tanka concept has been modernised into rooftop harvesting. A PVC pipe collects rainwater from the roof, passes it through a sand and gravel filter to remove debris and contaminants, then directs it either to an underground sump for immediate use or to recharge a dug well or borewell for groundwater banking. Tamil Nadu became the first state to make this compulsory for all buildings by law — with strict penalties for non-compliance. The result has been a significant improvement in Chennai's groundwater levels.

2. GENDATHUR, MYSURU — COMMUNITY ROOFTOP HARVESTING:

This remote village in Karnataka installed rooftop rainwater harvesting systems in nearly 200 households. Collectively, they now harvest approximately 1,00,000 litres of water annually. The village has earned the distinction of being 'rich in rainwater'. This demonstrates that even villages in areas not traditionally associated with water conservation can become water-self-sufficient through this adaptation.

3. SHILLONG, MEGHALAYA — URBAN ROOFTOP HARVESTING:

Despite being close to the world's highest-rainfall areas (Cherrapunji and Mawsynram are just 55 km away), Shillong's growing urban population faced severe water shortage. Rooftop harvesting became the dominant response — nearly every household now has a system. This shows how traditional

rainwater harvesting principles have been urbanised.

4. RAJASTHAN — REVIVAL OF TANKAS AND JOHADS:

NGOs and government programmes have been working to revive traditional tankas in Bikaner and Barmer. Old johads have been de-silted and repaired. Tarunda Bujurg in Alwar, Rajasthan, is famous for the revival of johads by the Tarun Bharat Sangh led by Rajendra Singh ('Waterman of India'), which brought dead rivers back to life.

5. ABANDONED DUGWELL RECHARGE:

In many parts of India, disused open wells have been converted into groundwater recharge structures. Filtered rooftop rainwater is directed into the well through a PVC pipe, seeps into the aquifer, and is drawn out as needed.

CONCLUSION:

The common thread in all these adaptations is wisdom + technology + community participation. Traditional principles (collect locally, store underground, use gravity) remain relevant — what changes is the material (PVC instead of clay, concrete tanks instead of earthen johads) and the scale. India's water future depends on scaling up these proven methods nationally.

Q10. Write a detailed note on water as a resource in India — its importance, distribution and the challenges of management. [UPSC/UPPSC Long Answer — 5 marks]

WATER AS A RESOURCE IN INDIA — IMPORTANCE, DISTRIBUTION AND MANAGEMENT CHALLENGES

IMPORTANCE:

Water is the most fundamental natural resource — without it, no life is possible. In the context of India, water is crucial for: (1) Agriculture — India feeds 1.4 billion people, largely through irrigated farming. (2) Industry — every factory, from steel to software, consumes water. (3) Energy — hydroelectric power contributes significantly to India's electricity grid. (4) Health — safe drinking water prevents the majority of water-borne diseases that still kill hundreds of thousands in India annually. (5) Culture and spirituality — Indian civilisation grew along rivers (Ganga, Indus, Yamuna), which remain central to religious life.

DISTRIBUTION — ABUNDANCE AND SCARCITY:

India's water distribution is deeply uneven. Cherrapunji (Meghalaya) records 11,000 mm of annual rainfall — the world's highest. Jaisalmer (Rajasthan) receives under 150 mm. The Ganga-Brahmaputra basin has enormous freshwater resources; the Thar Desert has almost none. Even within regions, variations are extreme: coastal Odisha floods regularly while its western districts face droughts. The seasonal nature of monsoon rainfall means rivers flood for three months then run low for nine.

Groundwater distribution is equally unequal. Punjab and Haryana have rich aquifers — but have overexploited them for decades. Hard-rock regions of Deccan, Rajasthan and parts of South India have very limited groundwater.

MANAGEMENT CHALLENGES:

1. Population pressure: 1.4 billion people create demand that strains every water source.
2. Pollution: Rivers like Yamuna, Ganga, Gomti are heavily polluted by industrial and municipal waste, rendering vast volumes of water unusable.
3. Over-exploitation: Groundwater is being extracted far faster than it is naturally recharged across large parts of India.
4. Irrigation inefficiency: Flood irrigation — still the most common method — wastes enormous quantities of water. Drip and sprinkler irrigation cover only a tiny fraction of irrigated area.
5. Weak governance: Water management involves multiple ministries, state governments and local bodies, creating coordination failures and political disputes.
6. Climate change: Erratic monsoons, accelerating glacier melt and rising temperatures are fundamentally altering India's water geography.

SOLUTIONS:

The path forward involves a combination of: large infrastructure (dams, canals, inter-basin transfer projects) managed responsibly; decentralised traditional harvesting (tankas, johads, kuls, rooftop systems); strong regulation of pollution and groundwater extraction; government schemes (JJM, PMKSY, Atal Jal); and education and behaviour change at household level.

Water security is national security. India's ability to feed, power and sustain itself in the 21st century depends directly on how wisely it manages this most precious of resources.

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This question bank is prepared with the highest care to cover every important concept, fact and question type for Class 10 Geography Chapter 3: Water Resources. Whether you are preparing for CBSE Board, your State Board, or building a foundation for UPSC/UPPSC — work through every section systematically. Remember: understanding water conservation is not just about marks. It is about the future of our planet. All the best!

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