CBSE CLASS X

Social Science (087)

QUESTION PAPER

AI-generated question paper

Code: JAUIEB	Questions: 26	Maximum Marks: 76	Generated: 2026-06-26 09:59

SELECTIONS USED

Subject	Social Science
Lessons	3 Water Resources
Level of understanding	Thorough understanding
Question selection	Curated chapter coverage (~5 questions per section + 8 synthesis)
Model	claude-sonnet-4-6

Composition — Difficulty: 1 straightforward · 14 medium · 11 deep | Types: 18 Short · 4 MCQ · 4 Long

Q1. medium · thorough-understanding · § Introduction **[3]**

Despite being a renewable resource with three-fourths of the Earth's surface covered by water, many regions still face water scarcity. Explain how a city receiving adequate rainfall can still suffer from water scarcity, identifying at least two distinct causes.

◆ **Water Resources**

Q2. medium · thorough-understanding · § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[3]**

A region receives abundant rainfall every year, yet its residents frequently face water shortages. Give TWO distinct reasons that could explain this apparent paradox.

◆ **Water Resources**

Q3. straightforward · thorough-understanding · § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[1]**

Which of the following is the LARGEST consumer of water resources in India?
(A) Domestic households in urban areas
(B) Hydroelectric power generation
(C) Irrigated agriculture
(D) Industrial units and MNCs

A Domestic households in urban areas
B Hydroelectric power generation
C Irrigated agriculture
D Industrial units and MNCs

◆ **Water Resources**

Q4. medium · thorough-understanding · § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[3]**

Explain the chain of consequences that links rapid population growth to the depletion of groundwater resources in agricultural regions of India.

◆ **Water Resources**

Q5. medium | thorough-understanding | § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[3]**

A city has a plentiful supply of water from a nearby river, but health authorities warn residents not to use it for drinking or cooking. In what way does this situation represent water scarcity, and what human activities typically cause it?

◆ **Water Resources**

Q6. medium | thorough-understanding | § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[2]**

How do industries contribute to water scarcity? Explain with reference to both the quantity and quality of available water resources.

◆ **Water Resources**

Q7. deep | thorough-understanding | § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[5]**

"Over-exploitation of water is ultimately a threat to food security, livelihoods, and natural ecosystems alike." Justify this statement by connecting the mismanagement of water resources to consequences across each of these three areas.

◆ **Water Resources**

Q8. medium | thorough-understanding | § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[3]**

Jawaharlal Nehru famously referred to large dams as the 'temples of modern India.' What vision of development did this statement reflect, and how did multi-purpose river projects align with the priorities of newly independent India?

◆ **Water Resources**

Q9. medium | thorough-understanding | § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[3]**

The Bhakra-Nangal project is located in a semi-arid region while the Hirakud project is located in a flood-prone river basin. How does the geographical and hydrological context of a river basin determine the primary purpose for which a multi-purpose project is designed? Illustrate with reference to these two projects.

◆ **Water Resources**

Q10. medium | thorough-understanding | § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[1]**

Which of the following is a direct ecological consequence of excessive sedimentation caused by a large dam?

(A) Increased downstream water flow, benefiting agriculture
(B) Rockier stream beds that reduce suitable habitats for aquatic life
(C) Improved soil fertility on the flood plains due to deposited silt
(D) Easier migration of fish to their spawning grounds

A Increased downstream water flow, benefiting agriculture
B Rockier stream beds that reduce suitable habitats for aquatic life
C Improved soil fertility on the flood plains due to deposited silt
D Easier migration of fish to their spawning grounds

◆ **Water Resources**

Q11. medium | thorough-understanding | § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[3]**

Large dams were originally built to control flooding, yet they have sometimes triggered floods themselves. Explain the mechanism by which this happens.

◆ **Water Resources**

Q12. deep thorough-understanding § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[3]**

A dam constructed on a river creates a large reservoir on what was previously a floodplain. Identify TWO distinct environmental problems that arise specifically because of this submergence, and explain the long-term consequence of each.

◆ **Water Resources**

Q13. deep thorough-understanding § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[3]**

The Sardar Sarovar Dam is built on the Narmada River, which flows through multiple states. Explain why large river projects built on shared rivers often become a source of inter-state disputes. What makes it difficult to resolve such conflicts equitably?

◆ **Water Resources**

Q14. deep thorough-understanding § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[5]**

Irrigation from multi-purpose projects has led to salinisation of soil in some agricultural regions. Trace the chain of decisions and processes — from a farmer's choice of crops to the degradation of land — that produces this outcome.

◆ **Water Resources**

Q15. deep thorough-understanding § RAINWATER HARVESTING **[3]**

Rooftop rainwater harvesting was once widespread in the semi-arid districts of Rajasthan but has declined significantly in recent decades. Identify the development that led to this decline and analyse how this trend illustrates the tension between short-term convenience and long-term water security.

◆ **Water Resources**

Q16. deep thorough-understanding § RAINWATER HARVESTING **[3]**

Shillong faces acute water shortage even though Cherrapunjee and Mawsynram — located only 55 km away — receive the highest rainfall in the world. Using this contrast, explain what water scarcity really means and why high rainfall alone does not guarantee water security.

◆ **Water Resources**

Q17. medium thorough-understanding § RAINWATER HARVESTING **[2]**

The bamboo drip irrigation system of Meghalaya channels spring water over long distances directly to the base of plants. What is the key advantage of this method of water delivery over conventional surface irrigation, and why is it particularly suited to the region's terrain and crops?

◆ **Water Resources**

Q18. medium | thorough-understanding | § RAINWATER HARVESTING **[1]**

Which of the following best explains why Tamil Nadu made rooftop rainwater harvesting structures compulsory for all houses?

(A) It is the state with the highest annual rainfall in India, making collection easy.

(B) Groundwater levels in Tamil Nadu have never been a concern, so rooftop harvesting supplements surface water.

(C) Mandating the structure ensures recharge of groundwater and secured household water supply as a matter of legal obligation rather than individual choice.

(D) The state government wanted to reduce dependence on the Indira Gandhi Canal.

A It is the state with the highest annual rainfall in India, making collection easy.

B Groundwater levels in Tamil Nadu have never been a concern, so rooftop harvesting supplements surface water.

C Mandating the structure ensures recharge of groundwater and secured household water supply as a matter of legal obligation rather than individual choice.

D The state government wanted to reduce dependence on the Indira Gandhi Canal.

◆ **Water Resources**

Q19. deep | thorough-understanding | § RAINWATER HARVESTING **[5]**

Communities across India — from the Western Himalayas to Rajasthan, Bengal, and the semi-arid peninsular region — have developed distinct rainwater harvesting techniques such as guls and kuls, khadins and johads, inundation channels, and rooftop tankas. (a) Identify the common underlying principle that links all these diverse techniques. (b) What does this diversity of practices reveal about the relationship between local ecology and water management? Support your answer with specific examples.

◆ **Water Resources**

Q20. deep | thorough-understanding | § BAMBOO DRIP IRRIGATION SYSTEM **[3]**

The bamboo drip irrigation system in Meghalaya transports water over hundreds of metres, eventually reducing the flow to just 20–80 drops per minute at the plant site. Why is this drastic reduction in flow rate at the final stage an advantage rather than a drawback for the crops being irrigated?

◆ **Water Resources**

Q21. medium | thorough-understanding | § (whole-chapter synthesis) **[3]**

Water is technically a renewable resource, yet billions of people face water scarcity. Explain the TWO fundamentally different reasons — one quantitative and one qualitative — that can cause water scarcity even in regions where water is physically available.

◆ **Water Resources**

Q22. deep | thorough-understanding | § (whole-chapter synthesis) **[5]**

Multi-purpose dams were envisioned as solutions to water scarcity, yet they have themselves become sources of new environmental and social problems. Justify this statement by discussing at least FOUR specific problems caused by large dams, and explain how each problem contradicts one of the original purposes for which dams were built.

◆ **Water Resources**

Q23. deep | thorough-understanding | § (whole-chapter synthesis) **[3]**

Rajasthan's Thar Desert and the highlands of Meghalaya represent two contrasting environments, yet both have developed traditional water harvesting systems that are celebrated examples of local ingenuity. Compare the rooftop rainwater harvesting system (tanka) of Rajasthan with the bamboo drip irrigation system of Meghalaya: (i) What specific local water problem does each system address? (ii) What is the core engineering or ecological principle underlying each system?

◆ **Water Resources**

Q24. deep | thorough-understanding | § (whole-chapter synthesis) **[3]**

In western Rajasthan, the expansion of canal irrigation in the latter half of the twentieth century coincided with the gradual abandonment of traditional rooftop rainwater harvesting. Elsewhere in India, rapid industrialisation and urbanisation have led to a steep rise in groundwater extraction through tube-wells. Analysing BOTH trends together, explain how solutions introduced to solve an immediate water problem can themselves generate a long-term water crisis.

◆ **Water Resources**

Q25. medium | thorough-understanding | § (whole-chapter synthesis) **[1]**

Which of the following BEST explains why irrigated agriculture, even when it expands food production, can contribute to long-term water scarcity and land degradation?

(A) It reduces the amount of annual precipitation over agricultural regions.
(B) It over-exploits groundwater, encourages water-intensive crops and can cause salinisation of soil.
(C) It fragments rivers and prevents aquatic fauna from spawning.
(D) It increases sedimentation in river channels, depriving flood plains of natural fertiliser.

A It reduces the amount of annual precipitation over agricultural regions.
B It over-exploits groundwater, encourages water-intensive crops and can cause salinisation of soil.
C It fragments rivers and prevents aquatic fauna from spawning.
D It increases sedimentation in river channels, depriving flood plains of natural fertiliser.

◆ **Water Resources**

Q26. medium | thorough-understanding | § (whole-chapter synthesis) **[3]**

Traditional water harvesting structures — such as kuls in the Himalayas, johads in Rajasthan, and tank systems in peninsular India — and post-Independence multi-purpose river valley projects were both intended to address water and agricultural needs. In what ways were their purposes similar? In what ONE critical respect did the scale and centralised nature of modern large dam projects create environmental and social problems that traditional local systems generally avoided?

◆ **Water Resources**

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CBSE CLASS X

Social Science (087)

ANSWER KEY

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Q1. medium | thorough-understanding | § Introduction **[3]**

Despite being a renewable resource with three-fourths of the Earth's surface covered by water, many regions still face water scarcity. Explain how a city receiving adequate rainfall can still suffer from water scarcity, identifying at least two distinct causes.

◆ Water Resources

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Model Answer

A city receiving adequate rainfall can still face water scarcity due to the following reasons:

1. **Over-exploitation of groundwater:** Large and dense urban populations, housing societies, and industries install their own groundwater pumping devices, causing falling groundwater levels and depletion of freshwater resources.
1. **Water pollution:** Domestic and industrial wastes, chemicals, pesticides, and fertilisers pollute available water, making it hazardous for human use even when quantity is sufficient.
1. **Unequal access:** Growing population leads to greater demand, and water may not be equally distributed among all social groups.

Thus, water scarcity is not always about low rainfall but also about mismanagement and pollution.

Source: Water Resources, Chapter 3 — Water Scarcity and the Need for Water Conservation and Management

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Explanation

- Examiners expect students to go **beyond** the obvious cause (low rainfall) and identify demand-side and quality-side causes.
- Two causes are the minimum required; three makes the answer stronger for 3 marks.
- Key terms to use: **over-exploitation**, **groundwater depletion**, **water pollution**, **unequal access** — these are directly from the textbook.
- Do not write a long essay; 3–4 crisp points with brief explanation is ideal for 3 marks.

Q2. medium | thorough-understanding | § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[3]**

A region receives abundant rainfall every year, yet its residents frequently face water shortages. Give TWO distinct reasons that could explain this apparent paradox.

◆ Water Resources

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Model Answer

A region with abundant rainfall can still face water shortages due to the following reasons:

1. **Over-exploitation and large population:** A large and growing population demands more water for domestic use and irrigated agriculture. Excessive extraction of groundwater through tube-wells and pumps leads to falling water tables, causing scarcity despite high rainfall.
1. **Water pollution:** Even if water is available in sufficient quantity, it may be rendered unusable due to pollution by domestic and industrial wastes, chemicals, pesticides, and fertilisers, making it hazardous for human consumption.

(Example: Shillong, Meghalaya, receives among the highest rainfall in the world yet faces acute water shortage.)

Source: Water Resources, Chapter 3, Section — Water Scarcity and the Need for Water Conservation and Management

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Explanation

- Examiners expect **two distinct, developed points** — not just names. Each reason must have a cause-and-effect link.
- The key insight is that scarcity = **quantity problem** (over-exploitation/large population) OR **quality problem** (pollution) — both are valid even with high rainfall.
- The Shillong example from the textbook is a bonus; include it if you remember it, as it directly illustrates the paradox stated in the question.
- Do not write in bullet fragments — brief explanatory sentences score better than one-liners.

Q3. straightforward thorough-understanding § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[1]**

Which of the following is the LARGEST consumer of water resources in India?
(A) Domestic households in urban areas
(B) Hydroelectric power generation
(C) Irrigated agriculture
(D) Industrial units and MNCs

A Domestic households in urban areas
B Hydroelectric power generation
C Irrigated agriculture
D Industrial units and MNCs

◆ Water Resources

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Model Answer

(C) Irrigated agriculture

Irrigated agriculture is the largest consumer of water in India, as stated in the textbook.
Source: Water Scarcity and the Need for Water Conservation and Management, Chapter 3

Explanation

The textbook explicitly states: *"Irrigated agriculture is the largest consumer of water."* This is a direct, factual line — memorise it. Do not confuse it with industries or urban households, which are mentioned as additional pressure points but are NOT the largest consumers.

Q4. medium | thorough-understanding | § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[3]**

Explain the chain of consequences that links rapid population growth to the depletion of groundwater resources in agricultural regions of India.

◆ Water Resources

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Model Answer

Rapid population growth increases demand for food, which pushes farmers to expand irrigated agriculture, especially during dry seasons. To meet irrigation needs, farmers dig more wells and tube-wells, leading to over-exploitation of groundwater. As more water is extracted than is recharged, groundwater levels fall steadily. This depletes underground aquifers, reducing water availability for future use and threatening food security. Thus, growing population → greater food demand → expanded irrigation → over-extraction of groundwater → falling water table → water scarcity.

Source: Water Scarcity and the Need for Water Conservation and Management, Chapter 3

Explanation

- The examiner expects a **cause-and-effect chain**, not just isolated facts.
- Key link: population growth → food demand → irrigated agriculture → groundwater over-exploitation → depletion.
- Mention "tube-wells/wells," "dry-season agriculture," and "falling groundwater levels" — these are textbook terms that fetch marks.
- A chain/flow format (even in prose) clearly shows logical progression, which is what a 3-mark chain-of-consequences question rewards.

Q5. medium | thorough-understanding | § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[3]**

A city has a plentiful supply of water from a nearby river, but health authorities warn residents not to use it for drinking or cooking. In what way does this situation represent water scarcity, and what human activities typically cause it?

◆ Water Resources

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Model Answer

The city has abundant water from the river, yet it cannot be used for drinking or cooking. This represents **qualitative water scarcity** — water is available in quantity but is unfit for use due to pollution.

Human activities that cause this:

1. **Industrial waste** — factories discharge chemicals and effluents into rivers.
2. **Domestic waste** — sewage and untreated wastewater are released into water bodies.
3. **Agricultural chemicals** — excessive use of pesticides and fertilisers seeps into and pollutes river water.

Thus, water scarcity is not always about quantity; polluted water makes even plentiful supplies hazardous for human use.

Source: Water Resources, Chapter 3 — "Water Scarcity and the Need for Water Conservation and Management"

Explanation

- The key concept here is **qualitative water scarcity** (as opposed to quantitative). The textbook explicitly states: *"water is sufficiently available… but the area still suffers from water scarcity… due to bad quality of water… polluted by domestic and industrial wastes, chemicals, pesticides and fertilisers."*
- Examiners award marks for: (1) correctly identifying this as qualitative/pollution-based scarcity, and (2) naming at least two or three human activities responsible.
- Avoid writing about drought or lack of rainfall — that is a different kind of scarcity and does not apply here.

Q6. medium | thorough-understanding | § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[2]**

How do industries contribute to water scarcity? Explain with reference to both the quantity and quality of available water resources.

◆ Water Resources

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Model Answer

Industries contribute to water scarcity in two ways:

Quantity: The ever-increasing number of industries exerts heavy pressure on existing freshwater resources. Industries are heavy users of water and also require hydroelectric power, further straining water resources.

Quality: Industries pollute available water by discharging domestic and industrial wastes and chemicals into water bodies, making water hazardous for human use even where it is sufficiently available.

Source: Water Resources, Chapter 3

Explanation

- This question has two clear parts — quantity and quality — so address both explicitly. Examiners expect both aspects to be covered for full marks.
- Key phrases to use: "heavy users of water," "exert pressure on freshwater resources," "industrial wastes," "hazardous for human use."
- Avoid writing about agriculture or population here; focus specifically on **industries** as asked.

Q7. deep | thorough-understanding | § WATER SCARCITY AND THE NEED FOR WATER CONSERVATION AND MANAGEMENT **[5]**

"Over-exploitation of water is ultimately a threat to food security, livelihoods, and natural ecosystems alike." Justify this statement by connecting the mismanagement of water resources to consequences across each of these three areas.

◆ Water Resources

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Model Answer

Over-exploitation of water threatens food security, livelihoods, and natural ecosystems in interconnected ways:

Food Security: Irrigated agriculture is the largest consumer of water. Over-exploitation of groundwater through wells and tube-wells leads to falling water tables, reducing water availability for crops. This directly threatens food grain production and food security of the people.

Livelihoods: Excessive and unequal use of water, combined with water pollution from industrial wastes, chemicals, pesticides and fertilisers, makes water hazardous and unusable. Industries and urban centres further deplete freshwater resources, disrupting productive activities and the livelihoods of millions who depend on agriculture and water-based occupations.

Natural Ecosystems: Mismanagement causes poor sediment flow, sedimentation in riverbeds, and degradation of aquatic habitats. It fragments rivers, restricts fish migration for spawning, submerges vegetation, and causes salinisation of soil — leading to ecological crisis with profound impact on natural ecosystems.

Thus, water mismanagement creates a dangerous cycle threatening all three areas simultaneously.

Source: Chapter 3 — Water Resources, "Water Scarcity and the Need for Water Conservation and Management"

Explanation

- This is a **justify/connect** type question — examiners expect you to link over-exploitation clearly to **each of the three areas** mentioned.
- Use textbook terms: "irrigated agriculture," "falling groundwater levels," "salinisation," "aquatic fauna migration," "sediment flow" — these fetch marks.
- Do **not** write generally about water scarcity; every point must show a **consequence** in one of the three areas.
- A brief conclusion tying all three together shows analytical thinking and is rewarded.

Q8. medium thorough-understanding § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[3]**

Jawaharlal Nehru famously referred to large dams as the 'temples of modern India.' What vision of development did this statement reflect, and how did multi-purpose river projects align with the priorities of newly independent India?

◆ Water Resources

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Model Answer

Nehru's declaration of dams as the 'temples of modern India' reflected a vision of rapid modernisation and overcoming the handicaps of colonial underdevelopment. Multi-purpose river projects aligned with newly independent India's priorities in three ways:

1. **Agricultural development:** They provided irrigation to increase food production and support the village economy.
2. **Industrialisation:** They generated hydroelectric power to fuel rapid industrial growth.
3. **Integrated development:** They combined irrigation, flood control, electricity generation, and water supply, linking rural and urban economic growth under one project.

Thus, these projects were seen as engines of integrated national progress.

Source: Chapter 3, Multi-Purpose River Projects and Integrated Water Resources Management

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Explanation

The key phrase from the source is: dams would "integrate development of agriculture and the village economy with rapid industrialisation and growth of the urban economy." Examiners expect you to (1) explain what the 'temples' metaphor signifies — national pride and modernisation — and (2) link multi-purpose projects to India's post-independence development goals. Avoid listing too many points; 2–3 well-explained points are sufficient for 3 marks.

Q9. medium | thorough-understanding | § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[3]**

The Bhakra-Nangal project is located in a semi-arid region while the Hirakud project is located in a flood-prone river basin. How does the geographical and hydrological context of a river basin determine the primary purpose for which a multi-purpose project is designed? Illustrate with reference to these two projects.

◆ Water Resources

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Model Answer

The geographical and hydrological context of a river basin directly shapes the primary purpose of a multi-purpose project.

The **Bhakra-Nangal project** is located in the semi-arid Sutlej-Beas river basin, where water scarcity and the need for irrigation are the dominant concerns. Hence, its water is primarily used for **hydel power production and irrigation** to support agriculture in water-deficient areas.

The **Hirakud project** is located in the Mahanadi basin, which is flood-prone. Therefore, its primary focus is on **integrating conservation of water with flood control**, protecting the floodplain from recurring inundation.

Thus, water scarcity drives irrigation-focused design, while flood-prone geography demands flood regulation as the priority function.

Source: Multi-Purpose River Projects and Integrated Water Resources Management, Chapter 3

Explanation

- The textbook explicitly states: *"in the Sutlej-Beas river basin, the Bhakra–Nangal project water is being used both for hydel power production and irrigation"* and *"the Hirakud project in the Mahanadi basin integrates conservation of water with flood control."*
- The examiner expects you to **link geography/hydrology → problem → project purpose** for both projects.
- Avoid just listing features; the question asks you to *illustrate the principle* — so state the principle first, then apply it to each project.
- 3 marks = ~3 clear points: the principle + one project + the other project.

Q10. medium thorough-understanding § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[1]**

Which of the following is a direct ecological consequence of excessive sedimentation caused by a large dam?

(A) Increased downstream water flow, benefiting agriculture
(B) Rockier stream beds that reduce suitable habitats for aquatic life
(C) Improved soil fertility on the flood plains due to deposited silt
(D) Easier migration of fish to their spawning grounds

A Increased downstream water flow, benefiting agriculture
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◆ Water Resources

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Model Answer

(B) Rockier stream beds that reduce suitable habitats for aquatic life

Excessive sedimentation causes poor sediment flow, resulting in rockier stream beds and poorer habitats for aquatic life.

Explanation

The source passage directly states: *"Regulating and damming of rivers affect their natural flow causing poor sediment flow and excessive sedimentation at the bottom of the reservoir, resulting in rockier stream beds and poorer habitats for the rivers' aquatic life."* Options C and D are the **opposite** of what dams cause — silt is actually **deprived** from flood plains, and fish migration becomes **more difficult**, not easier. Option A is also incorrect as downstream flow is reduced, not increased.

Q11. medium thorough-understanding § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[3]**

Large dams were originally built to control flooding, yet they have sometimes triggered floods themselves. Explain the mechanism by which this happens.

◆ Water Resources

Generated by claude-sonnet-4-6 · 2026-06-26 13:31 · grounding rag

Model Answer

Large dams are built to control floods by storing excess river water in reservoirs. However, **sedimentation** causes this mechanism to backfire. Over time, silt and sediment accumulate at the bottom of the reservoir, reducing its water-holding capacity. When excessive rainfall occurs, the reduced reservoir cannot hold the surplus water. Dam operators are then forced to release large volumes of water suddenly, which floods the downstream areas. Additionally, big dams have mostly been unsuccessful in controlling floods during periods of excessive rainfall.

Source: Water Resources, Chapter 3, Multi-purpose River Projects and Integrated Water Resources Management

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Explanation

- The key term examiners expect is **sedimentation** — always use it.
- The two-step logic is essential: sedimentation → reduced capacity → forced sudden release → floods downstream.
- The textbook directly states: *"dams constructed to control floods have triggered floods due to sedimentation in the reservoir"* — paraphrase this directly.
- Avoid writing about other dam disadvantages (displacement, earthquakes, etc.) — they are off-topic for this specific question.

Q12. deep thorough-understanding § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[3]**

A dam constructed on a river creates a large reservoir on what was previously a floodplain. Identify TWO distinct environmental problems that arise specifically because of this submergence, and explain the long-term consequence of each.

◆ Water Resources

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Model Answer

Two environmental problems caused by submergence of floodplains due to dam construction:

1. **Loss of vegetation and soil decomposition:** The reservoir submerges existing vegetation and soil. Over time, this organic matter decomposes, releasing greenhouse gases and depleting soil fertility permanently in that region.
1. **Deprivation of silt on floodplains:** Sedimentation collects at the reservoir bottom, preventing nutrient-rich silt from reaching downstream floodplains. Long-term consequence is land degradation and reduced agricultural fertility of downstream areas.

Source: Multi-Purpose River Projects and Integrated Water Resources Management, Chapter 3

Explanation

The question asks for problems *specifically from submergence* — not general dam problems. The textbook directly mentions (a) submerged vegetation decomposing and (b) silt being trapped in reservoirs, depriving floodplains of natural fertiliser. Examiners expect you to name the problem clearly and then state its long-term consequence — two distinct parts per point. Avoid vague answers like "harms nature"; be specific as the textbook is.

Q13. deep thorough-understanding § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[3]**

The Sardar Sarovar Dam is built on the Narmada River, which flows through multiple states. Explain why large river projects built on shared rivers often become a source of inter-state disputes. What makes it difficult to resolve such conflicts equitably?

◆ Water Resources

Generated by claude-sonnet-4-6 · 2026-06-26 13:31 · grounding rag

Model Answer

Large river projects on shared rivers like the Narmada (flowing through Maharashtra, Madhya Pradesh, Gujarat, and Rajasthan) trigger inter-state disputes because each state wants maximum share of water for its own irrigation, industry, and domestic use.

Such conflicts are difficult to resolve equitably because:

- **Competing interests:** Upper riparian states control flow, disadvantaging downstream states.
- **Unequal benefits:** One state may gain irrigation/power benefits while another bears displacement/reduced downstream flow.
- **Example:** The Krishna-Godavari dispute arose because Maharashtra's diversion at Koyna reduced downstream flow, harming Karnataka and Andhra Pradesh's agriculture and industry.

Agreeing on fair water-sharing formulas among states with different needs and geographies remains politically and technically complex.

Source: Water Resources, Chapter 3 (Multi-Purpose River Projects and Integrated Water Resources Management)

Explanation

- The examiner expects you to link the Sardar Sarovar/Narmada example to the general problem of shared rivers, then explain **why** resolution is hard (competing needs, unequal costs/benefits, upstream-downstream conflict).
- The Krishna-Godavari dispute box from the textbook is the direct evidence CBSE expects you to cite as an example.
- Avoid writing a long essay — 3 marks = 3 clear points concisely stated.
- Use terms like "riparian states," "downstream flow," and "equitable sharing" to show command of the topic.

Q14. deep thorough-understanding § MULTI-PURPOSE RIVER PROJECTS AND INTEGRATED WATER RESOURCES MANAGEMENT **[5]**

Irrigation from multi-purpose projects has led to salinisation of soil in some agricultural regions. Trace the chain of decisions and processes — from a farmer's choice of crops to the degradation of land — that produces this outcome.

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Model Answer

Multi-purpose irrigation projects provide abundant water, encouraging farmers to shift from traditional dry crops to water-intensive and commercial crops (e.g., rice, sugarcane) that fetch higher market returns.

To maximise yield, farmers over-irrigate their fields. Excess water seeps into the soil and raises the water table. As this water table rises to the root zone, it brings dissolved salts upward through capillary action.

When the waterlogged soil is exposed to sun, surface water evaporates, leaving behind a white crust of salts on the topsoil. This process is called **salinisation**.

Over time, salt accumulation makes the soil hard, alkaline, and infertile, rendering agricultural land unproductive. Thus, a decision driven by profit — choosing water-intensive commercial crops — sets off a chain (canal irrigation → over-watering → rising water table → evaporation → salt deposition) that permanently degrades the land.

Source: Chapter 3 — Water Resources, Multi-Purpose River Projects and Integrated Water Resources Management

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Explanation

- The key phrase from the textbook is: *"Irrigation has also changed the cropping pattern of many regions with farmers shifting to water-intensive and commercial crops. This has great ecological consequences like salinisation of the soil."*
- Examiners want the **chain/process**: crops chosen → over-irrigation → waterlogging → rising water table → evaporation → salt deposition → land degradation. Award marks are split across these logical steps.
- Use the term **salinisation** explicitly — it is the textbook term.
- Do not mix this up with soil erosion or sedimentation — those are separate problems of dams.

Q15. deep thorough-understanding § RAINWATER HARVESTING **[3]**

Rooftop rainwater harvesting was once widespread in the semi-arid districts of Rajasthan but has declined significantly in recent decades. Identify the development that led to this decline and analyse how this trend illustrates the tension between short-term convenience and long-term water security.

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Model Answer

The arrival of the **Indira Gandhi Canal** brought perennial water supply to western Rajasthan, causing rooftop rainwater harvesting (and the traditional *tanka* system) to decline sharply in districts like Bikaner, Phalodi, and Barmer.

This illustrates a key tension: canal water offered immediate, effortless convenience, so people abandoned a reliable, self-sufficient, cost-free system. However, canal supply can be disrupted, while *tankas* store *palar pani* (considered the purest water) until the next rainfall — a dependable backup during dry summers. Sacrificing this long-term water security for short-term ease leaves communities vulnerable if canal supply fails.

Source: Water Resources, Chapter 3

Explanation

- The textbook explicitly states: "the practice of rooftop rainwater harvesting is on the decline as plenty of water is available due to the perennial Indira Gandhi Canal."
- For 3 marks, examiners expect: (1) identification of the development (Indira Gandhi Canal) — 1 mark; (2) explanation of short-term convenience — 1 mark; (3) analysis of long-term water security risk — 1 mark.
- Use textbook terms like *tanka*, *palar pani*, and name specific districts to show precise knowledge.

Q16. deep thorough-understanding § RAINWATER HARVESTING **[3]**

Shillong faces acute water shortage even though Cherrapunjee and Mawsynram — located only 55 km away — receive the highest rainfall in the world. Using this contrast, explain what water scarcity really means and why high rainfall alone does not guarantee water security.

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Model Answer

Water scarcity means the lack of access to safe, usable freshwater — it is not always caused by low rainfall. It can result from **over-exploitation, growing population, pollution, or unequal access**.

Shillong's case illustrates this clearly. Cherrapunji and Mawsynram, just 55 km away, receive the world's highest rainfall, yet Shillong faces acute water shortage. This is because high rainfall alone does not ensure water **availability** or **accessibility** to people. Due to this, nearly every household in Shillong has adopted **rooftop rainwater harvesting**, which meets 15–25% of their water needs.

Thus, water scarcity is more about management and distribution than mere precipitation.

Source: Chapter 3 — Water Resources, Rainwater Harvesting section

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Explanation

- Examiners expect you to **define water scarcity correctly** (not just "less water") and link it to causes beyond rainfall.
- The Shillong–Cherrapunji contrast is **directly from the textbook** — always cite the 55 km distance and the rooftop harvesting detail for full marks.
- Avoid vague phrases like "water is important." Be specific: over-exploitation, unequal access, pollution are the key causes the textbook lists.
- 3 marks = definition + cause(s) + example — one clear point per mark.

Q17. medium | thorough-understanding | § RAINWATER HARVESTING **[2]**

The bamboo drip irrigation system of Meghalaya channels spring water over long distances directly to the base of plants. What is the key advantage of this method of water delivery over conventional surface irrigation, and why is it particularly suited to the region's terrain and crops?

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Model Answer

The key advantage is that water is delivered directly to the roots of plants (20–80 drops per minute), minimising wastage through evaporation or runoff compared to surface irrigation.

It suits Meghalaya because the hilly terrain allows gravity to transport spring water through bamboo pipes over hundreds of metres without any external energy, making it ideal for crops grown on slopes.

Source: Chapter 3, Bamboo Drip Irrigation System

Explanation

- Two points are expected for 2 marks: (1) the advantage — targeted/drip delivery reduces water loss; (2) why suited to Meghalaya — gravity-fed hills + perennial springs.
- Quote specific details from the passage (e.g., "20–80 drops per minute," "hundreds of metres") to show you've read the source.
- Keep it concise; no need for extra background on drip irrigation in general.

Q18. medium | thorough-understanding | § RAINWATER HARVESTING **[1]**

Which of the following best explains why Tamil Nadu made rooftop rainwater harvesting structures compulsory for all houses?

(A) It is the state with the highest annual rainfall in India, making collection easy.

(B) Groundwater levels in Tamil Nadu have never been a concern, so rooftop harvesting supplements surface water.

(C) Mandating the structure ensures recharge of groundwater and secured household water supply as a matter of legal obligation rather than individual choice.

(D) The state government wanted to reduce dependence on the Indira Gandhi Canal.

A It is the state with the highest annual rainfall in India, making collection easy.

B Groundwater levels in Tamil Nadu have never been a concern, so rooftop harvesting supplements surface water.

C Mandating the structure ensures recharge of groundwater and secured household water supply as a matter of legal obligation rather than individual choice.

D The state government wanted to reduce dependence on the Indira Gandhi Canal.

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Model Answer

(C) Mandating the structure ensures recharge of groundwater and secured household water supply as a matter of legal obligation rather than individual choice.

Source: Water Resources, Chapter 3 — Rainwater Harvesting section

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Explanation

The textbook states: *"Tamil Nadu is the first state in India which has made rooftop rainwater harvesting structure compulsory to all the houses across the state. There are legal provisions to punish the defaulters."* This points to **legal compulsion** as the key reason — making conservation obligatory rather than voluntary. Options A and B are factually incorrect; Option D confuses Tamil Nadu with Rajasthan (Indira Gandhi Canal is in Rajasthan).

Q19. deep | thorough-understanding | § RAINWATER HARVESTING **[5]**

Communities across India — from the Western Himalayas to Rajasthan, Bengal, and the semi-arid peninsular region — have developed distinct rainwater harvesting techniques such as guls and kuls, khadins and johads, inundation channels, and rooftop tankas. (a) Identify the common underlying principle that links all these diverse techniques. (b) What does this diversity of practices reveal about the relationship between local ecology and water management? Support your answer with specific examples.

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Model Answer

(a) Common Underlying Principle:

All these techniques share one common principle: **harvesting and storing water locally according to local ecological conditions and water needs**. People used in-depth knowledge of local rainfall regimes and soil types to collect and conserve rainwater, groundwater, river water, or floodwater before it was lost.

(b) Relationship Between Local Ecology and Water Management:

The diversity of practices shows that water management is directly shaped by local geography, climate, and soil. Each technique is an ecological adaptation:

- In the **Western Himalayas** (hilly terrain, glacier-fed streams), *guls* and *kuls* are diversion channels that redirect river water for agriculture.
- In **Rajasthan's arid zones**, underground *tankas* and rooftop harvesting capture scarce rainfall as drinking water (*palar pani*), while *khadins* and *johads* retain rainwater to moisten agricultural soil.
- In the **flood plains of Bengal**, inundation channels use seasonal flooding to irrigate fields.

This reveals that communities did not impose a uniform solution but instead developed site-specific systems, demonstrating a deep, sustainable harmony between local ecology and water management.

Source: Rainwater Harvesting, Chapter 3

Explanation

- **(a)** focuses on the ONE linking idea — local ecological adaptation. Use the textbook phrase "in keeping with the local ecological conditions and their water needs."
- **(b)** requires **specific examples** — name the region, name the technique, explain WHY it suits that ecology. Examiners look for at least 2–3 distinct examples to award full marks.
- Avoid vague statements like "people were smart." Be region-specific and technique-specific.

Q20. deep thorough-understanding § BAMBOO DRIP IRRIGATION SYSTEM **[3]**

The bamboo drip irrigation system in Meghalaya transports water over hundreds of metres, eventually reducing the flow to just 20–80 drops per minute at the plant site. Why is this drastic reduction in flow rate at the final stage an advantage rather than a drawback for the crops being irrigated?

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Model Answer

The drastic reduction in flow rate — from litres per minute to just 20–80 drops per minute — is an **advantage** because it delivers water **directly and slowly near the roots** of the plant. This ensures:

1. **Minimal wastage** — water is not lost to runoff, evaporation, or over-saturation of soil.
2. **Precise delivery** — reduced channel sections and diversion units at the last stage enable water to be dropped exactly near the roots, where it is needed most.
3. **Efficient use** — slow, steady dripping allows the soil to absorb water gradually, ensuring crops receive a continuous, controlled supply without waterlogging.

This makes the bamboo drip system an efficient, waste-free method of irrigation suited to the hilly terrain of Meghalaya.

Source: Water Resources, Chapter 3 (Bamboo Drip Irrigation System)

Explanation

- The examiner wants you to connect the **reduced flow rate** directly to the **benefit for crops** — not just describe the system.
- Key points: water reaches roots precisely, no wastage, continuous slow supply = better absorption.
- The passage states: *"The last channel section enables water to be dropped near the roots of the plant"* — quote or paraphrase this for full marks.
- Avoid just describing the system; you must explain **why** the slow drip is beneficial — that's what the question asks.

Q21. medium | thorough-understanding | § (whole-chapter synthesis) **[3]**

Water is technically a renewable resource, yet billions of people face water scarcity. Explain the TWO fundamentally different reasons — one quantitative and one qualitative — that can cause water scarcity even in regions where water is physically available.

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Model Answer

Quantitative Reason (Over-exploitation): Water scarcity can occur due to large and growing population creating excessive demand. Irrigated agriculture, industries, and dense urban centres over-exploit surface and groundwater, causing depletion. An area may receive adequate rainfall, yet scarcity arises because demand far exceeds available supply.

Qualitative Reason (Pollution): Even where water is sufficiently available, it may be polluted by domestic and industrial wastes, chemicals, pesticides, and fertilisers used in agriculture, making it hazardous for human use. Thus, physical presence of water does not guarantee its usability.

Source: Water Resources, Chapter 3 — *Water Scarcity and the Need for Water Conservation and Management*

Explanation

- The question specifically asks for **one quantitative** (amount/availability) and **one qualitative** (quality/usability) reason — examiners will check both are addressed.
- Quantitative = over-exploitation due to population pressure, agriculture, and industry reducing the *quantity* available.
- Qualitative = pollution making water *unfit for use* even when physically present.
- Both points are directly stated in the textbook passage; always tie answers back to these exact causes for full marks.

Q22. deep | thorough-understanding | § (whole-chapter synthesis) **[5]**

Multi-purpose dams were envisioned as solutions to water scarcity, yet they have themselves become sources of new environmental and social problems. Justify this statement by discussing at least FOUR specific problems caused by large dams, and explain how each problem contradicts one of the original purposes for which dams were built.

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Model Answer

Multi-purpose dams were built to solve problems like water scarcity, floods, and power shortage, but they have created new problems:

1. **Flood control defeated:** Dams were built to control floods, but sedimentation in reservoirs has *triggered* floods. Big dams have mostly been unsuccessful in controlling floods during excessive rainfall.
1. **Ecological damage:** Damming disrupts natural sediment flow, creating rockier stream beds and poor aquatic habitats. Dams fragment rivers, preventing aquatic fauna from migrating for spawning — contradicting the aim of supporting fish breeding.
1. **Soil degradation:** Flood plains are deprived of silt (natural fertiliser) due to sedimentation in reservoirs, causing land degradation — harming the very agriculture dams were meant to support.
1. **Displacement and social problems:** Large reservoirs submerge forests and existing settlements, displacing communities — contradicting the goal of improving livelihoods.
1. **Induced hazards:** Dams have caused water-borne diseases, earthquakes, and soil salinisation due to excessive irrigation, worsening health and ecological conditions.

Source: Multi-Purpose River Projects and Integrated Water Resources Management, Chapter 3

Explanation

- Examiners expect **four distinct problems**, each linked to a contradicted original purpose — this earns full marks.
- Use textbook vocabulary: "sedimentation," "sediment flow," "aquatic fauna," "salinisation," "spawning."
- The contrast structure ("built to… but caused…") directly addresses "justify the statement" phrasing.
- Avoid writing a general essay; crisp numbered points score better in 5-mark answers.

Q23. deep | thorough-understanding | § (whole-chapter synthesis) **[3]**

Rajasthan's Thar Desert and the highlands of Meghalaya represent two contrasting environments, yet both have developed traditional water harvesting systems that are celebrated examples of local ingenuity. Compare the rooftop rainwater harvesting system (tanka) of Rajasthan with the bamboo drip irrigation system of Meghalaya: (i) What specific local water problem does each system address? (ii) What is the core engineering or ecological principle underlying each system?

◆ Water Resources

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Model Answer

(i) Water problem addressed:

- **Tanka (Rajasthan):** Addresses acute drinking water scarcity in the arid Thar Desert, where rainfall is scarce and irregular, and all other sources dry up in summer.
- **Bamboo drip irrigation (Meghalaya):** Addresses the need to transport stream/spring water efficiently from hilltops to crops on lower slopes, ensuring precise delivery despite hilly terrain.

(ii) Core principle:

- **Tanka:** Rooftop collection and underground storage — rainwater from sloping roofs flows through pipes into sealed underground tanks, preventing evaporation and preserving purity (*palar pani*).
- **Bamboo drip irrigation:** Gravity-fed flow control — bamboo pipes carry 18–20 litres of water over hundreds of metres, progressively reducing flow to 20–80 drops per minute at the plant root.

Source: Water Resources, Chapter 3 — Rainwater Harvesting; Bamboo Drip Irrigation System

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Explanation

- The question has two clear sub-parts (i) and (ii); answer both separately with both systems addressed in each.
- Examiners look for **specific textbook details**: "palar pani," underground tanka, first-spell discarded; and the "18–20 litres → 20–80 drops" figure for bamboo drip.
- Contrast is the key analytical skill being tested — desert scarcity vs. hilly terrain distribution problem; storage principle vs. gravity/flow-control principle.
- Avoid padding; use parallel structure to show comparison clearly.

Q24. deep | thorough-understanding | § (whole-chapter synthesis) **[3]**

In western Rajasthan, the expansion of canal irrigation in the latter half of the twentieth century coincided with the gradual abandonment of traditional rooftop rainwater harvesting. Elsewhere in India, rapid industrialisation and urbanisation have led to a steep rise in groundwater extraction through tube-wells. Analysing BOTH trends together, explain how solutions introduced to solve an immediate water problem can themselves generate a long-term water crisis.

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Model Answer

When canal irrigation (Indira Gandhi Canal) became available in western Rajasthan, people abandoned traditional rooftop rainwater harvesting (tankas). This created **dependence on a single external source**, making communities vulnerable if canal supply fails or becomes unreliable.

Similarly, rapid industrialisation and urbanisation led to excessive groundwater extraction through tube-wells, causing **falling groundwater levels** and depletion of a resource that takes years to recharge.

In both cases, the immediate solution — canal water or tube-wells — addressed the current shortage but undermined long-term water security by destroying self-sufficient local systems and over-exploiting finite resources. Thus, short-term fixes, without sustainable management, generate a deeper, harder-to-reverse water crisis.

Source: Water Resources, Chapter 3 (Water Scarcity and Rainwater Harvesting sections)

Explanation

- The examiner wants you to **link both trends** (canal irrigation → abandonment of tankas; industrialisation → tube-well overuse) and draw a **common analytical conclusion**: short-term solutions create long-term dependence/depletion.
- Key terms to use: *dependence on a single source*, *groundwater depletion*, *sustainable management*, *self-sufficient local systems*.
- Don't just describe the two trends separately — the question says "analysing BOTH together," so your concluding sentence must synthesise them.
- At 3 marks, ~70–80 words is ideal; avoid writing more than 90 words.

Q25. medium | thorough-understanding | § (whole-chapter synthesis) **[1]**

Which of the following BEST explains why irrigated agriculture, even when it expands food production, can contribute to long-term water scarcity and land degradation?

(A) It reduces the amount of annual precipitation over agricultural regions.

(B) It over-exploits groundwater, encourages water-intensive crops and can cause salinisation of soil.

(C) It fragments rivers and prevents aquatic fauna from spawning.

(D) It increases sedimentation in river channels, depriving flood plains of natural fertiliser.

A It reduces the amount of annual precipitation over agricultural regions.

B It over-exploits groundwater, encourages water-intensive crops and can cause salinisation of soil.

C It fragments rivers and prevents aquatic fauna from spawning.

D It increases sedimentation in river channels, depriving flood plains of natural fertiliser.

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Model Answer

(B) It over-exploits groundwater, encourages water-intensive crops and can cause salinisation of soil.

Irrigated agriculture over-exploits groundwater, lowering its levels. It shifts cropping patterns to water-intensive crops and causes salinisation of soil, leading to land degradation.

Source: Water Resources, Chapter 3

Explanation

The passage explicitly states: "to expand irrigated areas for dry-season agriculture... may lead to falling groundwater levels" and "Irrigation has also changed the cropping pattern... with farmers shifting to water-intensive and commercial crops. This has great ecological consequences like salinisation of the soil." Options C and D describe problems of dams/multi-purpose projects, not irrigation specifically. Option A is scientifically incorrect and unsupported by the text.

Q26. medium | thorough-understanding | § (whole-chapter synthesis) **[3]**

Traditional water harvesting structures — such as kuls in the Himalayas, johads in Rajasthan, and tank systems in peninsular India — and post-Independence multi-purpose river valley projects were both intended to address water and agricultural needs. In what ways were their purposes similar? In what ONE critical respect did the scale and centralised nature of modern large dam projects create environmental and social problems that traditional local systems generally avoided?

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Model Answer

Similar Purposes: Both traditional systems (kuls, johads, tanks) and modern multi-purpose projects aimed to conserve and manage water for agricultural irrigation and to meet people's water needs. Both involved constructing hydraulic structures to store or direct water, continuing India's ancient tradition of water management.

Critical Difference: The large scale and centralised nature of modern dams caused serious environmental and social problems that local systems avoided. Large dams submerge vast floodplains, displace communities, fragment rivers harming aquatic life, cause sedimentation, and even induce earthquakes. Traditional local systems were small-scale and community-managed, working within local ecological conditions, so their impact was limited and reversible.

Source: Chapter 3 — Multi-purpose River Projects and Rainwater Harvesting

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Explanation

- Examiners expect **one similarity** and **one critical difference** — clearly labelled.
- The similarity is straightforward: both address irrigation/water storage needs.
- The key difference must focus on **scale and centralisation** causing displacement, ecological damage (sedimentation, aquatic fragmentation, submergence), and social problems — all explicitly mentioned in the passage.
- Do not list multiple differences; the question asks for **one critical respect** only.
- Keep the answer tight — 3 marks = ~60–90 words.

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