NCERT EXEMPLAR

Class 10 Science

CHAPTER 16

Sustainable Management of Natural Resources

Complete Solved Study Guide

MCQ * Short Answer * Long Answer * Key Terms * Revision Tables

KEY TERMS / GLOSSARY

Natural Resource	Any material or substance found in nature that humans can use for their survival and well-being (e.g., air, water, soil, forests, minerals).
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Biodiversity	The variety of living organisms (plants, animals, microbes) found in a given area or habitat.
Three Rs	Reduce, Reuse, Recycle -- the three principles of resource conservation to minimise waste and consumption.
Chipko Movement	A grassroots environmental conservation movement in India where villagers (mainly women) hugged trees to prevent deforestation by contractors.
Ganga Action Plan (GAP)	A government programme launched in 1985 to reduce pollution levels in the river Ganga and restore water quality.
Coliform Bacteria	A group of bacteria found in the intestines of humans and animals; their presence in water indicates faecal contamination.
Eutrophication	Excessive growth of algae/aquatic plants in a water body due to nutrient (fertiliser) run-off, causing depletion of dissolved oxygen and death of aquatic life.
Water Harvesting	The process of collecting and storing rainwater for future use; includes traditional structures like Khadins, Johads, Ahars, Bandharas, Kattas.
Monoculture	Cultivation of a single crop species over a large area, replacing diverse natural vegetation, reducing biodiversity.
Arabari Forest	A sal-dominated forest in West Bengal conserved through community participation, known as a success story of joint forest management.
Fossil Fuels	Non-renewable energy sources (coal, petroleum, natural gas) formed from the remains of ancient organisms over millions of years.
Stakeholders	All people or groups who have an interest in and are affected by a resource -- including local communities, government, industry, and future generations.

Afforestation	Planting of trees on land that was previously without forest cover, helping to restore ecosystems and conserve water.
Check Dam	A small dam built across a water channel/gully to slow water flow, prevent soil erosion, and recharge groundwater.

SUMMARY TABLES

Table 1: Types of Natural Resources

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Renewable	Can be replenished naturally within a human lifetime	Water, air, forests, sunlight, wind
Non-Renewable	Formed over millions of years; cannot be replenished quickly	Coal, petroleum, natural gas, minerals
Inexhaustible	Cannot be used up regardless of human activity	Solar energy, wind, ocean tides
Biotic	Living components of the environment	Plants, animals, microorganisms
Abiotic	Non-living components of the environment	Soil, water, air, sunlight

Table 2: The Three Rs of Conservation

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Reduce	Use fewer resources; decrease consumption and waste	Turn off lights when not needed; use less plastic; take shorter showers
Reuse	Use items again instead of discarding them	Reuse glass bottles, cloth bags, envelopes; donate old books/clothes
Recycle	Process used materials into new products	Recycle paper, metals, plastics, glass; compost organic waste

Table 3: Traditional Water Harvesting Structures in India

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Khadins / Johads	Rajasthan	Earthen embankments to collect rainwater; used for irrigation and groundwater recharge
Baolis	Rajasthan / Delhi	Step-wells for storing and accessing groundwater
Ahars and Pynes	Bihar	Floodwater harvesting systems; Ahars are reservoirs, Pynes are canals
Bandharas and Tals	Maharashtra	Check dams and ponds to store water for irrigation
Kattas	Karnataka	Small earthen check dams built across streams
Surangams	Kerala / Karnataka	Horizontal tunnels dug into hillsides to access spring water

SUMMARY TABLES (continued)

Table 4: Large Dams -- Advantages and Disadvantages

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Irrigation over large agricultural areas	Displacement of local people and communities
Generation of hydroelectric power	Loss of valuable agricultural and forest land
Flood control in downstream regions	Loss of biodiversity and terrestrial ecosystems
Water supply for urban areas	Siltation reduces the lifespan of the reservoir
Regulation of river water flow	Social inequity -- benefits often do not reach local people

Table 5: Stakeholders of Forests and Their Interests

Local / Tribal Communities	Depend on forests for food, fuel wood, fodder, medicinal plants; live in or near forests
Forest Department (Govt.)	Controls and administers forest land; may focus on revenue generation from timber
Industries	Use forest produce as raw material (timber, paper pulp, bamboo, medicinal plants)
Wildlife Enthusiasts / Tourists	Interested in biodiversity conservation and ecotourism
Future Generations	Stand to inherit a conserved or degraded environment based on present decisions

SECTION A: MULTIPLE CHOICE QUESTIONS (MCQs) WITH SOLUTIONS

Q1. From the list given below pick the item that is not a natural resource.

(a) Soil
(b) Water
(c) Electricity
(d) Air

ANSWER

Correct Answer: (c) Electricity

Explanation: Electricity is a man-made/converted form of energy, not directly obtained from nature. Soil, water, and air are directly available natural resources. Electricity is generated by converting other forms of energy (coal, water, wind) using machines.

Q2. The most rapidly dwindling natural resource in the world is

(a) water
(b) forests
(c) wind
(d) sunlight

ANSWER

Correct Answer: (b) Forests

Explanation: Forests are being destroyed at an alarming rate due to deforestation for agriculture, urbanisation, and commercial use. Wind and sunlight are inexhaustible; fresh water is scarce but forests represent the most rapidly disappearing major ecosystem.

Q3. The most appropriate definition of a natural resource is that it is a substance/commodity that is

(a) present only on land
(b) a gift of nature which is very useful to mankind
(c) a man-made substance placed in nature
(d) available only in the forest

ANSWER

Correct Answer: (b) A gift of nature which is very useful to mankind

Explanation: Natural resources are substances or forms of energy naturally available in the environment (on land, in water, air, or underground) that are useful to human beings. They are not man-made.

Q4. The main cause for abundant coliform bacteria in the river Ganga is

(a) disposal of unburnt corpses into water
(b) discharge of effluents from electroplating industries
(c) washing of clothes
(d) immersion of ashes

ANSWER

Correct Answer: (a) Disposal of unburnt corpses into water

Explanation: Coliform bacteria are found in the intestines of warm-blooded animals. Disposal of unburnt or partially burnt human and animal corpses introduces coliform bacteria directly into the river. Electroplating industries add heavy metals, not coliform.

Q5. The pH of water sample collected from a river was found to be acidic in the range of 3.5-4.5. The effluents of which factory is the most likely cause?

(a) Soap and detergent factory
(b) Lead battery manufacturing factory
(c) Plastic cup manufacturing factory
(d) Alcohol distillery

ANSWER

Correct Answer: (b) Lead battery manufacturing factory

Explanation: Lead battery manufacturing involves sulfuric acid (H_2SO_4). Discharge of sulfuric acid effluents causes the river water pH to drop drastically (become strongly acidic, pH 3.5-4.5). Soap factories produce alkaline effluents; plastic and distillery effluents do not typically cause such extreme acidity.

Q6. The pH range most conducive for life of fresh water plants and animals is

(a) 6.5 - 7.5
(b) 2.0 - 3.5
(c) 3.5 - 5.0
(d) 9.0 - 10.5

ANSWER

Correct Answer: (a) 6.5 - 7.5

Explanation: Most aquatic organisms (plants and animals) thrive in near-neutral water with pH between 6.5 and 7.5. Highly acidic (below 5) or highly alkaline (above 9) water is toxic to most aquatic life.

Q7. The three R's that will help us to conserve natural resources for long term use are

(a) recycle, regenerate, reuse
(b) reduce, regenerate, reuse
(c) reduce, reuse, redistribute
(d) reduce, recycle, reuse

ANSWER

Correct Answer: (d) Reduce, Recycle, Reuse

Explanation: The three Rs of resource conservation are Reduce (use less), Reuse (use again without processing), and Recycle (convert waste into usable material). Regenerate and redistribute are not part of the standard framework.

Q8. Given below are a few statements related to biodiversity. Pick those that correctly describe the concept of biodiversity.

(i) Biodiversity refers to the different species of flora and fauna present in an area
(ii) Biodiversity refers to only the flora of a given area
(iii) Biodiversity is greater in a forest
(iv) Biodiversity refers to the total number of individuals of a particular species
(a) (i) and (ii) (b) (ii) and (iv)
(c) (i) and (iii) (d) (ii) and (iii)

ANSWER

Correct Answer: (c) (i) and (iii)

Explanation: Biodiversity refers to ALL species of flora AND fauna (not just plants). It is greater in a forest ecosystem than in monoculture areas. Statement (iv) describes population, not biodiversity.

Q9. Among the statements given below select the ones that correctly describe the concept of sustainable development.

(i) Planned growth with minimum damage to the environment
(ii) Growth irrespective of the extent of damage caused
(iii) Stopping all developmental work to conserve environment
(iv) Growth that is acceptable to all the stakeholders
(a) (i) and (iv) (b) (ii) and (iii)
(c) (ii) and (iv) (d) (iii) only

ANSWER

Correct Answer: (a) (i) and (iv)

Explanation: Sustainable development means growth that minimises environmental damage (i) while meeting the needs of all stakeholders including future generations (iv). Simply stopping all development (iii) or growing without concern for damage (ii) are incorrect.

Q10. In our country, vast tracts of forests are cleared and a single species of plant is cultivated. This practice promotes

(a) biodiversity in the area
(b) monoculture in the area
(c) growth of natural forest
(d) preserves the natural ecosystem in the area

ANSWER

Correct Answer: (b) Monoculture in the area

Explanation: When a single crop replaces diverse natural vegetation, it creates monoculture -- the opposite of biodiversity. This destroys natural habitats, reduces biodiversity, and makes the ecosystem fragile and vulnerable to disease and pests.

Q11. A successful forest conservation strategy should involve

(a) protection of animals at the highest trophic level
(b) protection of only consumers
(c) protection of only herbivores
(d) comprehensive programme to protect all the physical and biological components

ANSWER

Correct Answer: (d) Comprehensive programme to protect all the physical and biological components

Explanation: Forests are complex ecosystems involving plants, animals, microbes, soil, water, and climate. Protecting only one component (top predators or herbivores) is insufficient. A holistic approach protecting all biotic and abiotic components is necessary.

Q12. The important message conveyed by the 'Chipko Movement' is

(a) to involve the community in forest conservation efforts
(b) to ignore the community in forest conservation efforts
(c) to cut down forest trees for developmental activities
(d) government agencies have the unquestionable right to order destruction of trees

ANSWER

Correct Answer: (a) To involve the community in forest conservation efforts

Explanation: The Chipko Movement (1970s, Uttarakhand) showed that local communities are the most effective guardians of forests. Women hugged trees to stop contractors from cutting them, demonstrating that community participation is essential for successful conservation.

Q13. Choose the correct statements that are a consequence of raising the height of dams.

(i) Terrestrial flora and fauna of the area is destroyed completely
(ii) Dislocation of people and domestic animals living in the area
(iii) Valuable agricultural land may be permanently lost
(iv) It will generate permanent employment for people
(a) (i) and (ii) (b) (i), (ii) and (iii)
(c) (ii) and (iv) (d) (i), (iii) and (iv)

ANSWER

Correct Answer: (b) (i), (ii) and (iii)

Explanation: Raising dam height floods more land, destroying ecosystems (i), displacing communities (ii), and submerging agricultural land permanently (iii). Construction does not generate permanent employment (iv) -- it is temporary and most benefits go elsewhere.

Q14. Expand the abbreviation GAP

(a) Governmental Agency for Pollution Control
(b) Gross Assimilation by Photosynthesis
(c) Ganga Action Plan
(d) Governmental Agency for Animal Protection

ANSWER

Correct Answer: (c) Ganga Action Plan

Explanation: GAP -- Ganga Action Plan -- was launched by the Indian government in 1985 to reduce pollution in the Ganga river. It aimed to intercept, divert, and treat domestic sewage and industrial effluents before they entered the river.

Q15. Select the incorrect statement

(a) Economic development is linked to environmental conservation
(b) Sustainable development encourages development for current generation and conservation of resources for future generations
(c) Sustainable development does not consider the view points of stakeholders
(d) Sustainable development is a long planned and persistent development

ANSWER

Correct Answer: (c) Sustainable development does not consider the view points of stakeholders

Explanation: This statement is INCORRECT. Sustainable development DOES consider the viewpoints of all stakeholders -- present generation, future generations, local communities, and the environment. That is a core principle of the concept.

Q16. Which of the following is not a natural resource?

(a) Mango tree
(b) Snake
(c) Wind
(d) Wooden house

ANSWER

Correct Answer: (d) Wooden house

Explanation: A wooden house is a man-made structure constructed from natural resources (wood), but it itself is not a natural resource. Mango tree, snake, and wind are all directly present in nature.

Q17. Select the wrong statement

(a) Forests provide variety of products
(b) Forests have greater plant diversity
(c) Forests do not conserve soil
(d) Forests conserve water

ANSWER

Correct Answer: (c) Forests do not conserve soil

Explanation: This is the WRONG statement. Forests DO conserve soil -- tree roots bind the soil, leaf litter adds organic matter, and forest canopy reduces the impact of rainfall (preventing erosion). Forests provide products, have high diversity, and conserve water -- all correct.

Q18. Arabari forests of Bengal is dominated by

(a) Teak
(b) Sal
(c) Bamboo
(d) Mangrove

ANSWER

Correct Answer: (b) Sal

Explanation: The Arabari forests in the Midnapore district of West Bengal are dominated by Sal (Shorea robusta) trees. This forest became a model of community-based conservation in the 1970s under the joint forest management programme.

Q19. Ground water will not be depleted due to

(a) afforestation
(b) thermal power plants
(c) loss of forest, and decreased rainfall
(d) cropping of high water demanding crops

ANSWER

Correct Answer: (a) Afforestation

Explanation: Afforestation (planting trees) helps CONSERVE groundwater by increasing infiltration, reducing runoff, and improving the water cycle. Thermal power plants, loss of forests, and water-intensive crops all lead to groundwater depletion.

Q20. Opposition to the construction of large dams is due to

(a) social reasons
(b) economic reasons
(c) environmental reasons
(d) all the above

ANSWER

Correct Answer: (d) All the above

Explanation: Large dams face opposition for social reasons (displacement of communities), economic reasons (cost vs. benefit, inequitable distribution), and environmental reasons (loss of biodiversity, ecosystem destruction, methane from submerged vegetation).

Q21. Khadins, Bundhis, Ahars and Kattas are ancient structures that are examples for

(a) grain storage
(b) wood storage
(c) water harvesting
(d) soil conservation

ANSWER

Correct Answer: (c) Water harvesting

Explanation: Khadins (Rajasthan), Bundhis (Madhya Pradesh/Rajasthan), Ahars (Bihar), and Kattas (Karnataka) are traditional Indian water harvesting structures. They collected rainwater for irrigation and groundwater recharge.

Q22. Pick the right combination of terms which has no fossil fuel.

(a) Wind, ocean and coal
(b) Kerosene, wind and tide
(c) Wind, wood, sun
(d) Petroleum, wood, sun

ANSWER

Correct Answer: (c) Wind, wood, sun

Explanation: Coal (a), kerosene (b -- derived from petroleum), and petroleum (d) are all fossil fuels. Wind, wood (biomass), and sun (solar) are all renewable/non-fossil energy sources. Hence (c) is the only combination with NO fossil fuel.

Q23. Select the eco-friendly activity among the following

(a) Using car for transportation
(b) Using polybags for shopping
(c) Using dyes for colouring clothes
(d) Using windmills to generate power for irrigation

ANSWER

Correct Answer: (d) Using windmills to generate power for irrigation

Explanation: Windmills convert wind energy (renewable, non-polluting) to electricity for irrigation without burning fossil fuels. Cars emit CO2, polybags cause plastic pollution, and synthetic dyes release toxic chemicals into water bodies.

Q24. It is important to make small check dams across the flooded gullies because they

(i) hold water for irrigation
(ii) hold water and prevent soil erosion
(iii) recharge ground water
(iv) hold water permanently
(a) (i) and (iv) (b) (ii) and (iii)
(c) (iii) and (iv) (d) (ii) and (iv)

ANSWER

Correct Answer: (b) (ii) and (iii)

Explanation: Small check dams slow water flow in gullies, preventing soil erosion (ii) and allowing water to percolate and recharge groundwater (iii). They do not hold water permanently (iv) -- they are seasonal. They may help with irrigation but the primary stated benefits are erosion prevention and groundwater recharge.

SECTION B: SHORT ANSWER QUESTIONS WITH SOLUTIONS

Q25. Prepare a list of five items that you use daily in the school. Identify from the list such items that can be recycled.

ANSWER

Five items used daily in school:

1. **Notebook/Paper** -- Can be recycled. Waste paper can be pulped and made into new paper products.

2. **Plastic water bottle** -- Can be recycled. Plastic bottles are collected and processed into new plastic goods.

3. **Pencil** -- Wood casing partially recyclable; graphite tip is not recyclable but pencil stubs can be reused creatively.

4. **Metal lunch box (tiffin)** -- Can be recycled. Metals like steel/aluminium are 100% recyclable without loss of quality.

5. **Pen (ballpoint)** -- The metal nib and some plastic parts can be recycled. Many companies offer refill cartridges (reuse).

Items that can be recycled: Paper/notebook, plastic bottle, metal lunch box.

Q26. List two advantages associated with water harvesting at the community level.

ANSWER

Two advantages of community-level water harvesting:

1. **Local water security and independence:** Harvested water from ponds, tanks, and check dams provides a reliable local supply of water for drinking and irrigation, reducing dependence on distant, centralised sources (like large dams). The community controls its own water resource.

2. **Groundwater recharge:** Water stored in community structures percolates slowly into the soil, recharging groundwater tables in the surrounding area. This benefits wells and bore-wells in the vicinity and prevents drought conditions during summer months.

Additional advantage: It reduces flooding and soil erosion during heavy rains by capturing runoff before it flows away.

Q27. In a village in Karnataka, people cultivated crops around a lake and added fertilisers. Soon the lake was covered with green floating plants and fishes started dying. Analyse and give reasons.

ANSWER

Phenomenon: Eutrophication

Cause of excessive plant growth: Fertilisers added to fields contain nitrates and phosphates. These nutrients ran off into the lake through rainwater/irrigation. The excess nutrients acted as food for algae and floating aquatic plants (like water hyacinth), causing them to multiply rapidly -- covering the entire lake surface. This is called an "algal bloom."

Cause of fish death: The dense layer of floating plants blocks sunlight from reaching underwater plants, stopping their photosynthesis. As a result, the dissolved oxygen level in the water drops drastically. Additionally, when the excessive algae die, decomposing bacteria consume even more oxygen. The severe oxygen depletion (hypoxia) causes fish and other aquatic animals to suffocate and die in large numbers.

Summary: Fertiliser run-off -> eutrophication -> algal bloom -> oxygen depletion -> fish death.

TIP

*This process is called **eutrophication**. Remember: it is caused by EXCESS nutrients, not toxins. The death of fish is due to oxygen depletion, not direct poisoning.*

Q28. What measures would you take to conserve electricity in your house?

ANSWER

Measures to conserve electricity at home:

1. **Switch off lights, fans, and appliances** when not in use or when leaving a room.

2. **Use energy-efficient appliances** -- replace incandescent bulbs with LED/CFL bulbs which use 75-80% less electricity.

3. **Use solar energy** where possible -- solar water heaters, solar lamps, and solar panels for electricity generation.

4. **Avoid overuse of air conditioners** -- set AC to 24-26 deg C; use fans instead when possible.

5. **Unplug chargers and electronic devices** when not actively charging; standby/phantom power consumption is significant.

6. **Use natural light** during daytime; design homes to maximise ventilation and natural lighting.

7. **Run washing machines and dishwashers** with full loads only; use cold water wash settings.

Q29. Although coal and petroleum are produced by degradation of biomass, yet we need to conserve them. Why?

ANSWER

Coal and petroleum were formed from the remains of ancient plants, animals, and microorganisms buried under the earth over **millions of years** under high pressure and temperature. Although their origin is biological (biomass), they are considered **non-renewable resources** for the following reasons:

1. **Extremely long formation time:** The processes that formed coal and petroleum took 300-400 million years. On a human timescale, they cannot be replenished -- once used, they are gone forever.

2. **Limited reserves:** The total amount of coal and petroleum on Earth is finite. At current rates of consumption, petroleum reserves may last only a few decades.

3. **Industrial importance:** Fossil fuels are not only energy sources but also raw materials for plastics, medicines, fertilisers, and synthetic fibres. Conserving them preserves these industrial uses.

4. **Environmental impact:** Burning fossil fuels releases CO2, SO2, and other pollutants causing global warming, acid rain, and air pollution. Conserving them reduces these problems.

Conclusion: Despite their biological origin, the impossibly slow rate of their formation makes conservation essential.

Q30. Suggest a few measures for controlling carbon dioxide levels in the atmosphere.

ANSWER

Measures to control CO2 levels in the atmosphere:

1. **Reduce burning of fossil fuels:** Use renewable energy sources (solar, wind, hydro, geothermal) instead of coal, oil, and gas for electricity generation and transportation.

2. **Afforestation and reforestation:** Plant more trees; forests act as carbon sinks, absorbing CO2 during photosynthesis and storing carbon in wood and soil.

3. **Prevent deforestation:** Protect existing forests from being cleared, as deforestation releases stored carbon and eliminates CO2 absorption capacity.

4. **Improve energy efficiency:** Use energy-efficient vehicles, buildings, and appliances to reduce overall energy consumption and CO2 emissions.

5. **Carbon capture and storage (CCS):** Develop and deploy technologies that capture CO2 from industrial sources and store it underground.

6. **Reduce industrial emissions:** Adopt cleaner production technologies; shift to green hydrogen and electric processes in heavy industry.

Q31. (a) Locate and name the water reservoirs in Figures 16.1 (a) and (b). (b) Which has an advantage over the other and why?

ANSWER

(a) Identification of water reservoirs:

* **Figure 16.1 (a):** The water reservoir is located at the surface -- it shows a **surface water body (pond/lake/reservoir)** where water is stored above the soil level, next to vegetation.

* **Figure 16.1 (b):** The water is stored **underground (groundwater/subsurface reservoir)** -- the cross-section shows water beneath layers of soil and plant roots.

(b) Advantage of underground (groundwater) reservoir over surface reservoir:

The **underground (subsurface) water storage system** has several advantages:

1. Water stored underground does **NOT evaporate**, unlike surface reservoirs that lose large volumes through evaporation in hot climates.

2. Underground water is **naturally filtered** as it percolates through soil layers, making it cleaner and safer to drink.

3. Underground storage does **not promote mosquito breeding** and reduces waterborne disease risk.

4. It does **not displace people** or submerge land, unlike large surface reservoirs/dams.

5. Water is **available throughout the year** even in dry seasons, as groundwater fluctuates less than surface water.

SECTION C: LONG ANSWER QUESTIONS WITH SOLUTIONS

Q32. In the context of conservation of natural resources, explain the terms reduce, recycle and reuse. From among the materials that we use in daily life, identify two materials for each category.

ANSWER

The Three Rs of Resource Conservation:

1. REDUCE

Reduce means to **decrease the amount of resources consumed** and the quantity of waste generated. It is the most effective of the three Rs because preventing waste is better than managing it afterward.

How it works: By being mindful of our consumption -- buying only what we need, choosing products with less packaging, turning off lights and taps -- we reduce our ecological footprint.

Examples from daily life:

(i) **Electricity:** Switching off lights, fans, and AC when not needed reduces electricity consumption and thus reduces burning of coal at power plants.

(ii) **Water:** Closing the tap while brushing teeth, using a bucket instead of a shower, reduces daily water consumption significantly.

2. REUSE

Reuse means to **use an item again** -- either for the same purpose or a different one -- instead of discarding it after single use. Reuse saves the energy and materials that would be needed to make a new product or recycle the old one.

How it works: Before throwing something away, ask if it can be used again. Repairing, refilling, or repurposing items extends their useful life.

Examples from daily life:

(i) **Glass bottles and jars:** Instead of discarding after use, glass bottles can be washed and reused for storing water, pickles, or other foods.

(ii) **Cloth bags:** Using cloth/jute bags repeatedly for shopping instead of taking a new plastic bag every time.

3. RECYCLE

Recycle means to **convert waste material into new, usable products** through physical or chemical processing. Recycling reduces the need for extracting fresh raw materials from nature.

How it works: Waste is collected, sorted, and processed -- e.g., paper is pulped and remanufactured, metals are melted down, plastics are chemically broken down.

Examples from daily life:

(i) **Paper:** Used notebooks, newspapers, and cardboard can be recycled into new paper, reducing deforestation.

(ii) **Metals (aluminium cans, steel tins):** Metal containers can be melted and recast into new metal products. Aluminium recycling saves 95% of the energy needed to produce it from ore (bauxite).

Summary Table:

Principle	Meaning	Daily Life Example 1	Daily Life Example 2
Reduce	Use less	Save electricity	Save water
Reuse	Use again	Glass bottles	Cloth bags
Recycle	Process into new product	Paper	Aluminium cans

Q33. Prepare a list of five activities that you perform daily in which natural resources can be conserved or energy utilisation can be minimised.

ANSWER

Five daily activities for conserving natural resources:

1. **Walking or cycling to school/market** instead of using a motorised vehicle. This conserves petroleum (a non-renewable fossil fuel) and reduces air pollution from CO2 and other exhaust gases.

2. **Turning off taps while brushing teeth or soaping hands,** and turning off lights when leaving a room. This conserves fresh water and electrical energy respectively -- both under increasing stress globally.

3. **Carrying a cloth bag for shopping** instead of accepting single-use plastic bags. This reduces plastic waste derived from petroleum, prevents environmental pollution, and conserves raw materials.

4. **Composting kitchen waste** (vegetable peels, fruit scraps, leftover food) instead of discarding it as landfill. Composting returns nutrients to the soil, reducing the need for chemical fertilisers (which require energy-intensive manufacturing).

5. **Using both sides of paper** for writing and printing, then placing used paper in a recycling bin. This reduces paper consumption, which directly reduces deforestation and the energy used in paper manufacturing.

Q34. Is water conservation necessary? Give reasons.

ANSWER

Yes, water conservation is absolutely necessary. Although Earth has abundant water, 97.5% of it is saline (oceans), and of the remaining 2.5% fresh water, most is locked in glaciers and ice caps. Only about 0.3% of Earth's water is accessible fresh water in rivers, lakes, and groundwater.

Reasons why water conservation is necessary:

1. **Limited freshwater supply:** Freshwater is a finite resource. As the global population grows, demand for water increases while supply remains constant or decreases due to pollution and climate change.

2. **Essential for all life:** Water is the universal solvent and medium for all biological processes. Without adequate freshwater, agriculture fails, ecosystems collapse, and human civilisation cannot survive.

3. **Groundwater depletion:** Excessive withdrawal of groundwater for agriculture and industry is depleting aquifers (underground water reserves) faster than they can be naturally recharged. Many regions face water table decline and eventual drying of wells.

4. **Pollution:** Industrial effluents, agricultural chemicals, sewage, and solid waste are contaminating freshwater bodies. Conserving water also means protecting water quality to keep it usable.

5. **Agriculture dependency:** Agriculture accounts for about 70% of global freshwater use. Water conservation in farming (drip irrigation, crop selection) is critical to food security.

6. **Climate change impact:** Changing rainfall patterns, increased evaporation, and glacial melt are altering water availability globally. Conservation builds resilience against these changes.

Methods of water conservation include: rainwater harvesting, drip irrigation, afforestation, recycling waste water, and building check dams.

Q35. Suggest a few useful ways of utilising waste water.

ANSWER

Useful ways of utilising waste water (after appropriate treatment):

1. **Agricultural irrigation:** Treated sewage water (tertiary treated) can safely be used for irrigating crops, gardens, and parks. This conserves freshwater and recycles nutrients (like nitrogen and phosphorus) from sewage back to soil.

2. **Industrial cooling and processing:** Many industries require large volumes of non-potable water for cooling machinery. Treated waste water can serve this purpose, reducing fresh water demand.

3. **Groundwater recharge:** Treated waste water can be released into percolation ponds or injection wells to recharge depleted aquifers.

4. **Toilet flushing and landscape irrigation:** Greywater (from sinks and showers) with minimal treatment can be reused for flushing toilets and watering non-edible plants, saving potable water.

5. **Fish farming and aquaculture:** Nutrient-rich treated waste water supports the growth of fish feed organisms. Waste water aquaculture (integrated pisciculture) is practised in several regions.

6. **Biogas generation:** Sewage sludge (solid component of waste water) can be anaerobically digested to produce biogas (methane) for cooking and electricity generation.

7. **Brick and construction use:** Water from certain industrial processes can be recycled for mixing concrete and bricks on construction sites.

Q36. What is the importance of forest as a resource?

ANSWER

Forests are among the most valuable natural resources on Earth. Their importance can be understood at multiple levels:

A. Economic Importance:

1. **Timber and wood:** Forests provide timber for construction, furniture, and paper manufacturing.

2. **Non-timber products:** Forests yield medicines, resins, gums, oils, honey, rubber, dyes, and food (fruits, nuts, mushrooms, herbs).

3. **Fuel wood:** Large populations in developing countries depend on forest wood for cooking and heating.

B. Ecological / Environmental Importance:

4. **Biodiversity reservoir:** Forests contain over 80% of terrestrial biodiversity -- they are home to millions of species of plants, animals, fungi, and microorganisms.

5. **Carbon sink:** Forests absorb CO2 through photosynthesis and store carbon in wood and soil, mitigating climate change and global warming.

6. **Water cycle regulation:** Forests promote rainfall through transpiration, regulate river flow, and prevent flash floods.

7. **Soil conservation:** Tree roots bind the soil, preventing erosion; leaf litter enriches soil with organic matter.

8. **Oxygen production:** Forests produce oxygen through photosynthesis, sustaining life on Earth.

C. Social and Cultural Importance:

9. **Livelihood for communities:** Millions of tribal and rural communities depend directly on forests for food, shelter, and income.

10. **Cultural and spiritual value:** Forests are sacred in many cultures and have deep cultural significance for indigenous communities.

Conclusion: Forests are not just a source of timber; they are the lungs of the Earth and the foundation of ecological stability.

Q37. Why are the Arabari forests of Bengal known to be a good example of conserved forest?

ANSWER

The Arabari forests in the Midnapore district of West Bengal are a celebrated **success story of community-based forest conservation**. Here is why:

Background: In the 1970s, the sal forests of Arabari were in a highly degraded state due to overexploitation -- excessive felling, grazing, and fuel wood collection.

The Conservation Initiative:

1. In 1972, **A.K. Banerjee**, a forest officer of the West Bengal Forest Department, involved the local villagers in the protection of 1,272 hectares of badly degraded sal forest.

2. Villagers were given **employment** in both silviculture and harvesting operations. They were allowed to collect firewood and dry leaves from the forest free of charge and were given 25% of the final timber harvest.

3. **Joint Forest Management (JFM):** This was one of the earliest and most successful examples of joint forest management -- a partnership between the government forest department and local communities.

Results of the Conservation Effort:

4. By 1983, the previously degraded forest **had become a dense, thriving sal forest.** The forest regenerated spectacularly because the community felt a sense of ownership and responsibility.

5. The timber value of the conserved forest was estimated at **Rs. 12.5 crore** within a decade -- demonstrating that conservation and economic benefit can go together.

6. The project proved that **community participation is the key** to successful forest conservation. When local people benefit from a forest, they protect it.

Lesson: The Arabari model shows that giving local communities a stake in forest resources leads to better conservation than top-down enforcement by government agencies alone.

COMMON MISTAKES AND MISCONCEPTIONS

COMMON MISTAKE

Confusing Renewable with Inexhaustible

Students often think all renewable resources are inexhaustible. WRONG. Forests and freshwater are renewable but can be depleted if overused faster than they regenerate. Only solar energy and wind are truly inexhaustible on human timescales.

COMMON MISTAKE

Electricity is a Natural Resource

Electricity is NOT a natural resource -- it is a converted/man-made form of energy. The sources used to generate it (coal, water, wind, sunlight) are natural resources.

COMMON MISTAKE

Eutrophication causes death by poisoning

Fish do not die because fertilisers are toxic to them. They die due to OXYGEN DEPLETION caused by the decomposition of dead algae consuming dissolved oxygen. The fertilisers cause excess plant growth, not direct toxicity.

COMMON MISTAKE

Reuse and Recycle are the same

Reuse means using an item again WITHOUT processing (e.g., refilling a water bottle). Recycle means PROCESSING the material into something new (e.g., melting aluminium cans). Recycling still requires energy; reuse is more efficient.

COMMON MISTAKE

Large dams only have advantages

Large dams are NOT purely beneficial. They cause displacement of communities, loss of biodiversity, destruction of agricultural land, and inequitable distribution of water benefits. Opposition to large dams is valid on social, economic, AND environmental grounds.

COMMON MISTAKE

Coliform bacteria come from industrial pollution

Coliform bacteria are NOT from industrial effluents. They come from human and animal intestinal waste (faecal matter). Their presence in Ganga is primarily due to disposal of corpses, open defecation, and untreated sewage -- NOT from factories like electroplating.

COMMON MISTAKE

Biodiversity only refers to animals

Biodiversity includes ALL living organisms -- plants (flora), animals (fauna), fungi, and microorganisms. It is NOT limited to animals or to a single type of organism.

COMMON MISTAKE

Arabari forest is known for teak

The Arabari forest of Bengal is dominated by SAL (Shorea robusta), NOT teak. Teak is associated with forests of Madhya Pradesh, Maharashtra, and parts of South India.

COMMON MISTAKE

GAP successfully cleaned the Ganga

The Ganga Action Plan (GAP) launched in 1985 largely FAILED to achieve its goals due to inadequate implementation, lack of technology, and insufficient involvement of communities. The Ganga remains heavily polluted. Do not state GAP was successful.

COMMON MISTAKE

Sustainable development means stopping development

Sustainable development does NOT mean halting all development. It means planned, environmentally responsible development that meets present needs WITHOUT compromising the ability of future generations to meet their needs.

QUICK REVISION TABLE

Natural Resource Definition	Directly available from nature and useful to mankind. NOT man-made.
Non-natural resources	Electricity, wooden house -- man-made from natural materials.
3 Rs	Reduce (best) -> Reuse -> Recycle. All help conserve natural resources.
Ganga pollution -- coliform	Main cause: disposal of unburnt corpses. Coliform = faecal contamination indicator.
pH for aquatic life	Optimal: 6.5-7.5. Lead battery factories cause extreme acidity (pH 3.5-4.5).
Eutrophication	Fertiliser run-off -> excess nutrients -> algal bloom -> O2 depletion -> fish death.
Chipko Movement	1970s, Uttarakhand. Women hugged trees. Message: community participation in conservation.
Large Dams -- opposition	Social (displacement) + Economic (inequity) + Environmental (biodiversity loss) = ALL 3.
GAP	Ganga Action Plan (1985). Aim: reduce Ganga pollution. Largely unsuccessful.
Arabari Forest	Midnapore, West Bengal. Dominated by SAL. Community conservation success story (JFM).
Water Harvesting Structures	Khadins, Johads (Rajasthan); Ahars, Pynes (Bihar); Bandharas, Tals (Maharashtra); Kattas (Karnataka).
Check Dams -- benefits	Hold water + prevent soil erosion + recharge groundwater. NOT permanent storage.
Monoculture	Clearing forests for single crop = reduces biodiversity. Opposite of diverse natural ecosystem.
Biodiversity	All species (flora + fauna + microbes) in an area. Greater in forests than monocultures.
Sustainable Development	Meets present needs without compromising future generations. Considers ALL stakeholders.
Afforestation	Planting trees. Conserves groundwater, prevents erosion, increases biodiversity.
Groundwater depletion causes	Thermal power plants, loss of forests, high water-demanding crops, overuse of borewells.

Fossil fuels vs renewable	Wind+Wood+Sun = no fossil fuel. Coal, petroleum, kerosene = fossil fuels.
Eco-friendly activity	Windmills for irrigation. Cars, polybags, chemical dyes = NOT eco-friendly.
Underground vs surface water	Underground water: no evaporation, naturally filtered, no mosquito breeding -- BETTER.

MCQ ANSWER KEY GRID

Q	Ans	Q	Ans	Q	Ans
1	(c)	2	(b)	3	(b)
4	(a)	5	(b)	6	(a)
7	(d)	8	(c)	9	(a)
10	(b)	11	(d)	12	(a)
13	(b)	14	(c)	15	(c)
16	(d)	17	(c)	18	(b)
19	(a)	20	(d)	21	(c)
22	(c)	23	(d)	24	(b)

EXAM TIPS AND STRATEGIES

TIP

Remember the 3 Rs Order

Reduce is always the BEST option (prevents waste at source). Reuse is second. Recycle is last. In exams, if asked which is most preferred, answer: Reduce.

TIP

pH Values to Memorise

Normal river water pH: 6.5-7.5 (suitable for aquatic life). Lead battery factory effluent: drops pH to 3.5-4.5 (strongly acidic). Pure water pH = 7 (neutral).

TIP

Traditional Water Structures by State

Rajasthan: Khadins, Johads, Baolis. Bihar: Ahars and Pynes. Maharashtra: Bandharas and Tals. Karnataka: Kattas. Kerala/Karnataka: Surangams.

TIP

Arabari = Sal, NOT Teak

Always remember: Arabari (Bengal) = SAL forest. This is a very common MCQ trap. Teak is from central/south India forests.

TIP

Chipko = Community Conservation

Chipko Movement key message = community participation in forest conservation. Started in Uttarakhand (then UP) in the 1970s. Initiated by local women.

TIP

Check Dam Benefits: ii and iii only

Check dams: hold water (temporary, NOT permanent) AND prevent soil erosion AND recharge groundwater. They do NOT hold water permanently. Answer (b) = (ii) and (iii).