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CHAPTER NOTES

Sustainable Management of Natural Resources Class 10 Notes | CBSE Chapter 14 Science

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Sustainable Management of Natural Resources Class 10 Notes | CBSE Chapter 14 Science

Sustainable Management of Natural Resources is Chapter 14 of CBSE Class 10 Science. This chapter discusses why we need to manage our natural resources wisely, the importance of the three R's (Reduce, Reuse, Recycle), and how forests, water, coal, and petroleum should be conserved. It also covers stakeholder roles, water harvesting, and the environmental impact of dams and mining.

This chapter carries 3–5 marks in board exams. The three R's, water harvesting, forest conservation (Chipko movement), and advantages/disadvantages of dams are commonly tested.

Key Concepts

1. Why Do We Need to Manage Our Resources?

Natural resources like forests, water, coal, petroleum, and wildlife are limited. If we use them carelessly, they will run out. Sustainable management means using resources in a way that meets present needs without compromising the ability of future generations to meet their needs.

Reasons for Resource Management

- **Resources are finite:** Coal, petroleum, minerals will eventually run out
- **Equitable distribution:** Resources should be available to all people, not just the rich or powerful
- **Environmental damage:** Overuse causes pollution, habitat destruction, climate change
- **Future generations:** We must preserve resources for people who come after us

The Three R's

R	Meaning	Examples
Reduce	Use less	Switch off lights when not needed, use less water, avoid unnecessary purchases
Reuse	Use again without processing	Use cloth bags instead of plastic, refill water bottles, donate old clothes
Recycle	Process used materials into new products	Recycle paper, glass, metals, plastic (where possible)

Reduce is the most effective of the three — it prevents waste from being created in the first place.

2. Forests and Wildlife

Forests are a **biodiversity hotspot** — they support a vast number of plant and animal species. They also provide timber, medicines, clean air, water regulation, and prevent soil erosion.

Stakeholders in Forest Management

Stakeholder	Interest/Role
Local people	Depend on forests for food, firewood, medicinal plants, and livelihood
Forest Department (Government)	Manages forests, controls logging, creates reserves
Industrialists	Want timber, paper, minerals — often exploit forests for profit
Wildlife and nature enthusiasts	Want to conserve biodiversity and protect habitats

People's Participation in Conservation

Chipko Movement (1970s, Uttarakhand):

- Started in Reni village, Garhwal (1974)
- Led by local women, inspired by Sunderlal Bahuguna
- Villagers hugged trees to prevent contractors from cutting them
- "Chipko" means "to hug" in Hindi
- This movement led to a government ban on tree felling in the region

Bishnoi Community (Rajasthan):

- The Bishnoi community has protected trees and wildlife for centuries as part of their religious beliefs
- Amrita Devi Bishnoi sacrificed her life to protect Khejri trees from being felled by the king's soldiers
- The Amrita Devi Bishnoi National Award is given for wildlife conservation

Arabari Forest (West Bengal):

- A degraded Sal forest was restored through a participatory forest management programme
- Local villagers were involved in protecting the forest in exchange for employment and a share of the profits
- Within 10 years, the forest recovered remarkably — showing that involving local communities is key to conservation

3. Water Resources

Water is essential for life, agriculture, and industry. Though the Earth has plenty of water, only a tiny fraction (~0.006%) is available as fresh water for human use.

Dams

Dams are large structures built across rivers to store water for irrigation, drinking, and hydroelectric power generation.

Advantages of Dams

- Store water for irrigation during dry seasons
- Generate hydroelectric power (clean energy)
- Control floods
- Supply drinking water to cities

Disadvantages of Dams

- **Social problems:** Displacement of large numbers of people (mostly tribal and poor communities) who lose their homes and farmland
- **Environmental problems:** Submerging large areas of forest → loss of biodiversity; disrupting aquatic ecosystems; preventing fish migration
- **Economic problems:** Huge construction costs; benefits often go to cities and industries, not to local people
- Unequal water distribution — areas near the dam may get flooded while distant areas remain dry

The **Narmada Bachao Andolan (Save Narmada Movement)** led by Medha Patkar protested against the Sardar Sarovar Dam on the Narmada River, highlighting the displacement of hundreds of thousands of people.

4. Water Harvesting

Water harvesting is the collection and storage of rainwater for later use, instead of letting it run off.

Traditional Water Harvesting Systems in India

Region	System	Description
Rajasthan	Khadin, Tanks, Nadis	Underground tanks to collect rainwater in arid areas
Maharashtra	Bandharas, Tals	Small dams and lakes for water storage
Madhya Pradesh & UP	Bhundhis, Bundhis	Earthen dams to hold water
Bihar	Ahars, Pynes	Traditional irrigation channels
Himachal Pradesh	Kulhs	Diversion channels from natural streams
Karnataka	Kattas	Stone barriers across streams
Tamil Nadu	Eris (tanks)	Large community water tanks
Kerala	Surangams	Horizontal well-like tunnels dug into hillsides

Advantages of Water Harvesting

- Recharges groundwater (increases water table)
- Provides water during dry months
- Reduces flooding and soil erosion
- Water stored underground does not evaporate
- Does not provide a breeding ground for mosquitoes (unlike open tanks)
- Relatively low cost — can be done at individual, community, or city level

5. Coal and Petroleum

Coal and petroleum are **fossil fuels** — formed from the remains of ancient organisms over millions of years. They are **non-renewable** resources.

Why Conserve Fossil Fuels?

- **Limited supply:** They take millions of years to form and are being consumed much faster than they can be replaced
- **Pollution:** Burning fossil fuels releases CO₂ (greenhouse gas → global warming), SO₂ and NO₂ (cause acid rain), and particulate matter (air pollution)
- **Climate change:** Excessive CO₂ emissions are causing global temperatures to rise → melting glaciers, rising sea levels, extreme weather

Ways to Conserve

- Use public transport, cycle, or walk instead of private vehicles
- Switch to renewable energy sources (solar, wind, hydroelectric)

- Use energy-efficient appliances (LED bulbs, 5-star rated devices)
 - Turn off electrical devices when not in use
 - Use CNG (Compressed Natural Gas) instead of petrol/diesel — it burns cleaner
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6. The Five R's (Extended)

Beyond the basic three R's, two more can be added for a comprehensive approach:

R	Meaning
Refuse	Say no to things you don't need (single-use plastic, freebies)
Reduce	Minimise consumption and waste
Reuse	Use items again in their original form
Repurpose	Use items for a different purpose than intended
Recycle	Process waste materials into new products

Important Definitions

Term	Definition
Natural resources	Materials obtained from nature that are useful to humans (forests, water, minerals, fossil fuels)
Sustainable development	Using resources to meet present needs without compromising the ability of future generations
Biodiversity	Variety of living organisms in a given area
Water harvesting	Collection and storage of rainwater for future use
Fossil fuels	Fuels formed from ancient organisms over millions of years (coal, petroleum, natural gas)
Chipko Movement	People's movement in 1970s Uttarakhand where villagers hugged trees to prevent logging
Stakeholder	A person or group that has an interest in the management of a resource
Recharge of groundwater	Replenishment of underground water through rainwater percolation
Acid rain	Rain with dissolved SO_2 and NO_2 from fossil fuel burning that damages ecosystems and buildings
Greenhouse effect	Trapping of heat by CO_2 and other gases in the atmosphere, leading to global warming

Solved Examples (NCERT-Based)

Example 1

Why should we conserve forests and wildlife?

Answer: Forests are a rich source of biodiversity — they provide habitat for thousands of species. They also give us timber, medicines, clean air (absorb CO_2 , release O_2), and regulate the water cycle. Forests prevent soil erosion and floods. Wildlife maintains ecological balance — each species has a role in the food chain. Losing forests and wildlife can lead to ecological collapse, loss of genetic resources, and disruption of services that nature provides free of cost (clean air, water, pollination).

Example 2

What are the advantages of storing water underground (water harvesting) rather than in dams?

Answer: Underground water storage has several advantages: (1) Water does not evaporate (unlike open dams), so there is no loss. (2) It does not provide a breeding ground for mosquitoes. (3) There is no risk of floods or dam failure. (4) No displacement of people or submergence of land/forests. (5) It recharges the groundwater table, benefiting wells and tube wells in the area. (6) It is much cheaper than building large dams.

Example 3

Why is the use of fossil fuels considered a double-edged sword?

Answer: Fossil fuels are incredibly useful — they power our vehicles, generate electricity, and produce raw materials for plastics and chemicals. However, they cause severe environmental problems: burning them releases CO₂ (leading to global warming and climate change), SO₂ and NO_x (causing acid rain), and particulate matter (causing air pollution and respiratory diseases). They are also non-renewable — once used up, they cannot be replaced for millions of years. So while they drive modern civilisation, they are also destroying the environment.

Example 4

What was the Chipko Movement? What was its significance?

Answer: The Chipko Movement began in the 1970s in the Garhwal Himalayas (Uttarakhand) when local women hugged trees to prevent commercial logging. The word "Chipko" means "to hug" in Hindi. Sunderlal Bahuguna was a key figure in spreading the movement. Its significance was enormous: it led to a 15-year ban on tree felling in the Himalayan region, raised awareness about deforestation, and demonstrated that local communities — especially women — play a crucial role in environmental conservation. It inspired similar movements worldwide.

Important Questions for Board Exams

1-Mark Questions

1. What are the three R's of resource management?
2. Name one traditional water harvesting system of Rajasthan.
3. What are fossil fuels? Give two examples.
4. What is the Chipko Movement?
5. Why should we prefer reuse over recycling?

2-Mark Questions

1. List two advantages and two disadvantages of dams.
2. What is sustainable development? Why is it important?
3. Why should we conserve coal and petroleum? Give two reasons.
4. What is water harvesting? State two advantages.
5. Name the four stakeholders of forests and state their interests.

3-Mark Questions

1. Explain the three R's with examples. Which is the most effective and why?
2. Describe the Chipko Movement. What was its impact on forest conservation?
3. What are the disadvantages of building large dams? Mention the social, environmental, and economic problems.
4. Why is water harvesting a better alternative to large dams? Give three reasons with examples of traditional systems.
5. How does burning fossil fuels affect the environment? Suggest three ways to reduce our dependence on fossil fuels.

5-Mark Questions

1. Why do we need to manage our natural resources? Discuss with reference to forests, water, and fossil fuels. Mention the role of local communities in conservation.
 2. What is water harvesting? Explain its advantages. List traditional water harvesting methods from any four Indian states.
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Quick Revision Points

- Sustainable development: use resources wisely so future generations can also use them
 - Three R's: Reduce (best) > Reuse > Recycle
 - Forest stakeholders: local people, government (Forest Dept), industrialists, conservationists
 - Chipko Movement (1970s, Uttarakhand): villagers hugged trees to stop logging; led by Sunderlal Bahuguna
 - Bishnoi community (Rajasthan): traditional tree and wildlife protectors
 - Arabari (West Bengal): successful participatory forest management
 - Dams: store water, generate power, but cause displacement, deforestation, and unequal distribution
 - Water harvesting: collect rainwater → store underground → recharges groundwater, no evaporation, no mosquitoes, cheap
 - Traditional systems: Khadin (Rajasthan), Kulhs (HP), Eris (TN), Bandharas (Maharashtra)
 - Fossil fuels (coal, petroleum): non-renewable, cause CO₂ emissions → global warming, SO₂ → acid rain
 - Conserve: public transport, solar energy, LED bulbs, CNG vehicles, switch off when not in use
 - Narmada Bachao Andolan: protest against Sardar Sarovar Dam's impact on displaced people
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Previous Chapter: Chapter 13 — Our Environment

First Chapter: Chapter 1 — Chemical Reactions and Equations



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