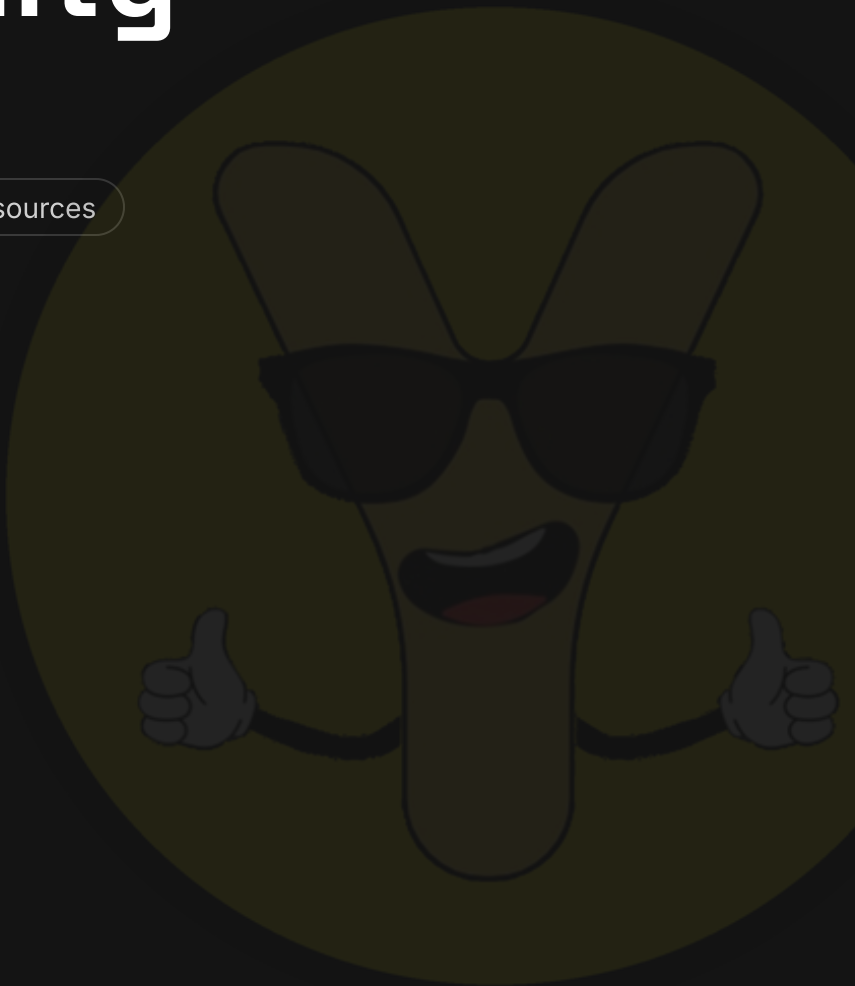
AKTU · 1ST YEAR · AAC101 / AAC201

Environment & Sustainability

Unit 2 — Natural Resources and their Conservation

- Renewable and non-renewable resources
- Water resources: scarcity and conservation
- Forest and land resources
- Energy resources (brief)
- Over-exploitation of resources
- Concept of the 3 R's: Reduce, Reuse, Recycle
- Rainwater harvesting concept
- Simple resource-saving practices in daily life



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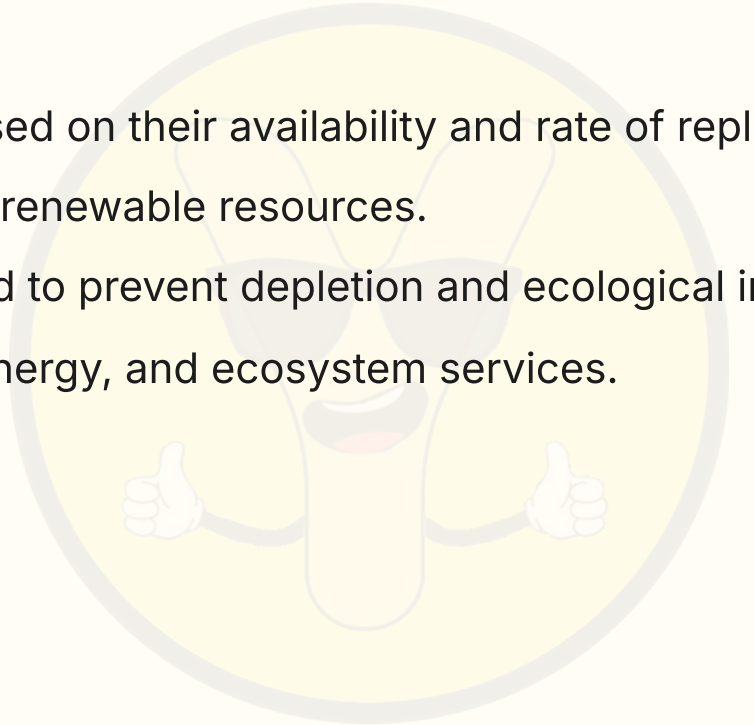
Chirag Jain

Founder, Ycotes · Gold Medalist in Artificial Intelligence, IIT Madras · taught 10,000+ students

Natural Resources: Introduction

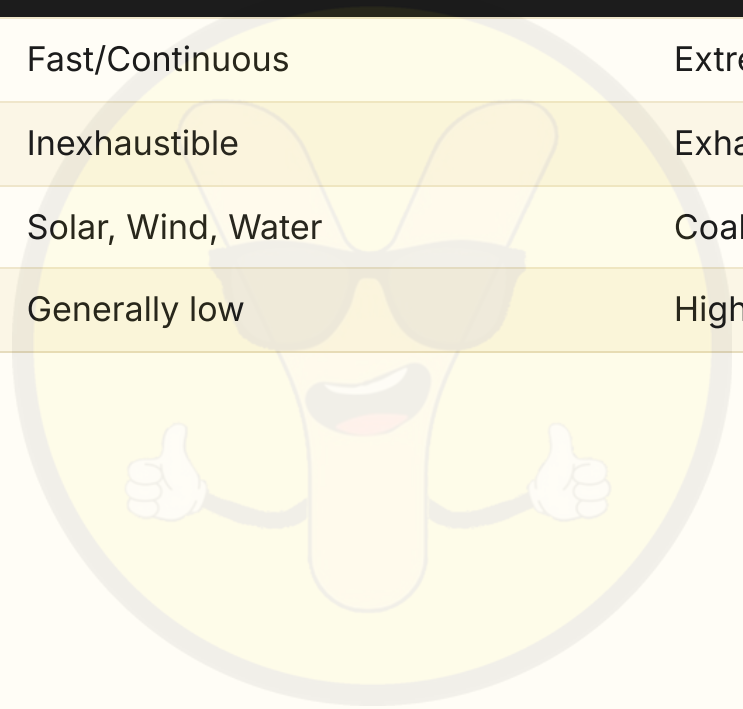
Natural resources are materials provided by nature that are essential for human survival and economic development.

- Natural resources are classified based on their availability and rate of replenishment.
- Classification: Renewable and Non-renewable resources.
- Sustainable management is required to prevent depletion and ecological imbalance.
- Resources provide raw materials, energy, and ecosystem services.



Renewable vs. Non-renewable Resources

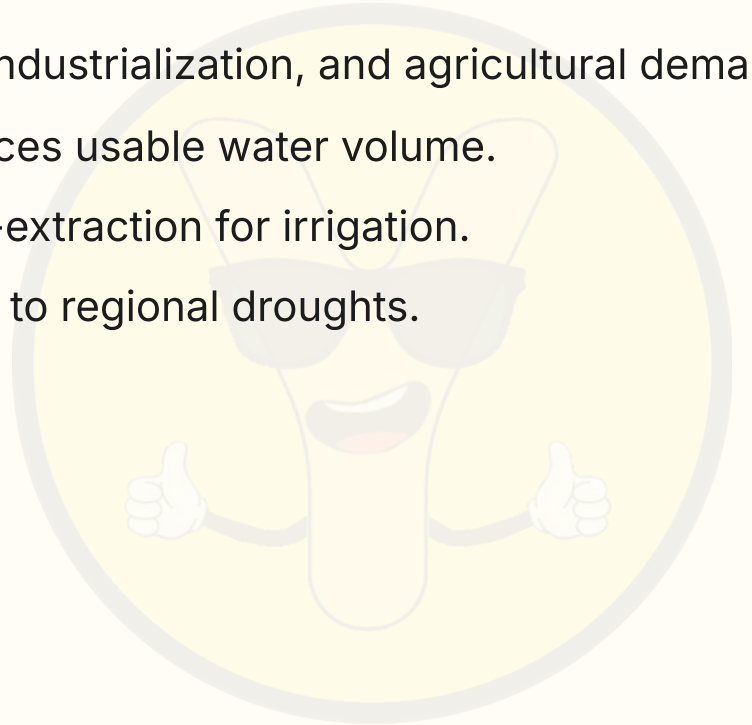
Feature	Renewable	Non-renewable
Replenishment	Fast/Continuous	Extremely slow
Depletion	Inexhaustible	Exhaustible
Examples	Solar, Wind, Water	Coal, Petroleum, Minerals
Environmental Impact	Generally low	High (Pollution)



Water Resources: Scarcity

Water is a finite resource, and its availability is threatened by human activities and climate change.

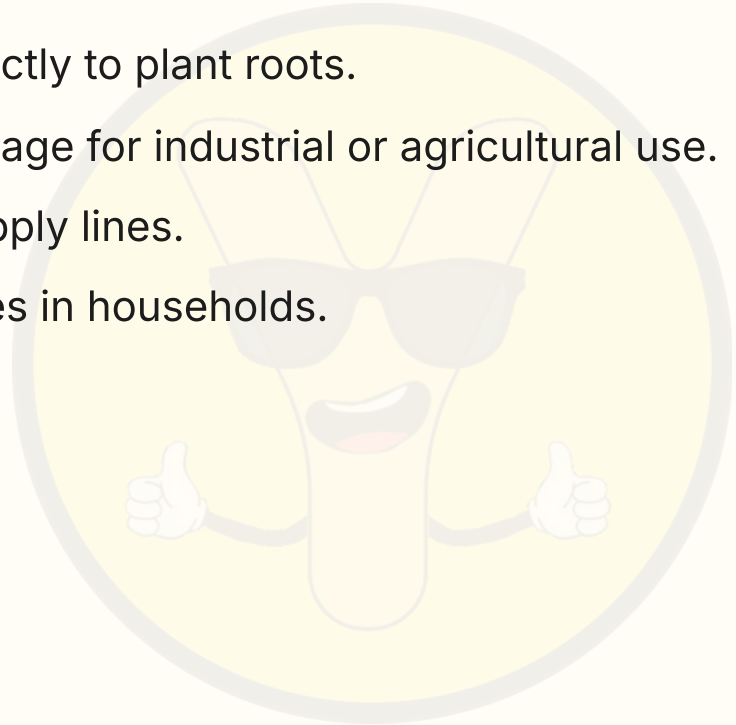
- Scarcity causes: Over-population, industrialization, and agricultural demand.
- Pollution of freshwater bodies reduces usable water volume.
- Groundwater depletion due to over-extraction for irrigation.
- Uneven distribution of rainfall leads to regional droughts.



Water Conservation Strategies

Conservation involves managing water resources sustainably to prevent wastage.

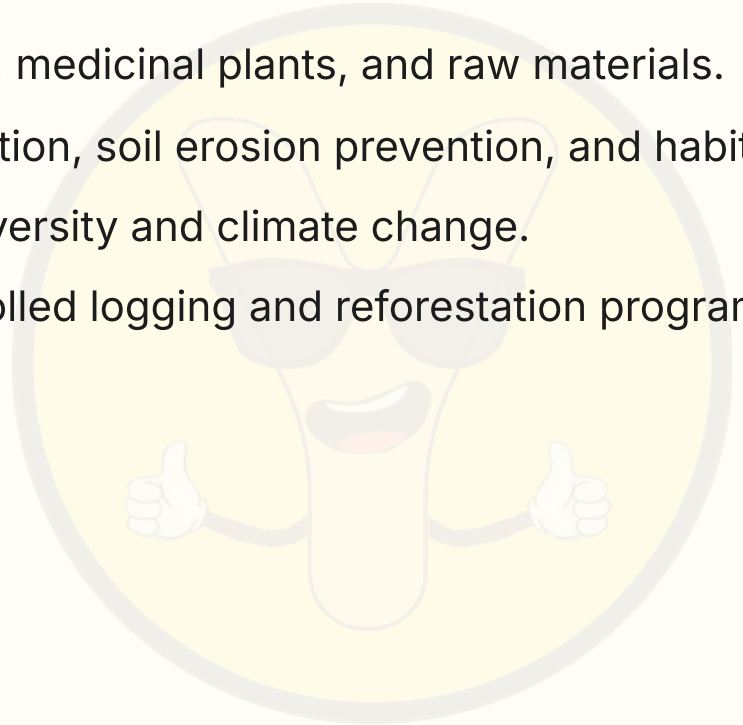
- Drip irrigation: Delivering water directly to plant roots.
- Wastewater recycling: Treating sewage for industrial or agricultural use.
- Preventing leakage in municipal supply lines.
- Promoting water-efficient appliances in households.



Forest Resources

Forests are complex ecosystems providing biodiversity, timber, and climate regulation.

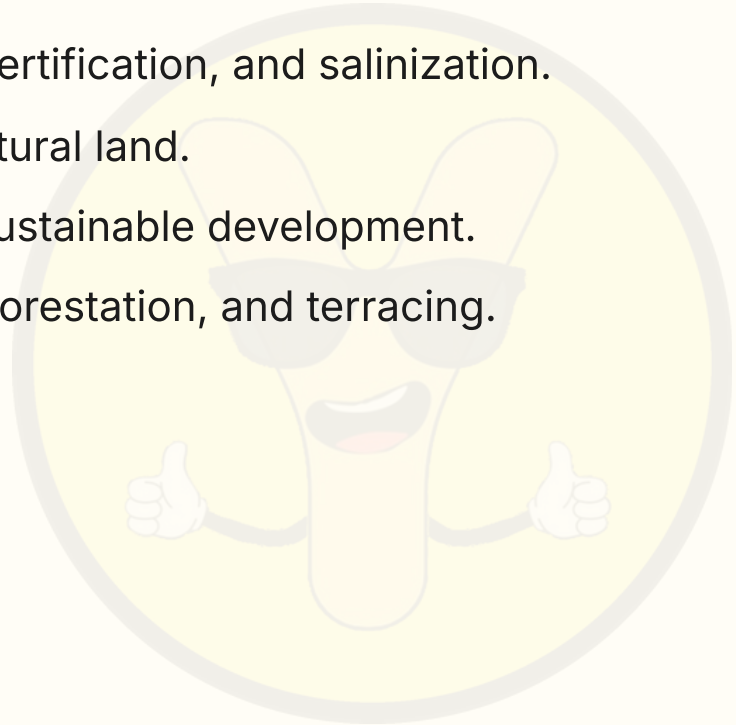
- Economic value: Timber, fuel wood, medicinal plants, and raw materials.
- Ecological value: Carbon sequestration, soil erosion prevention, and habitat.
- Deforestation leads to loss of biodiversity and climate change.
- Sustainable forestry involves controlled logging and reforestation programs.



Land Resources

Land is a limited resource used for agriculture, housing, and industrial infrastructure.

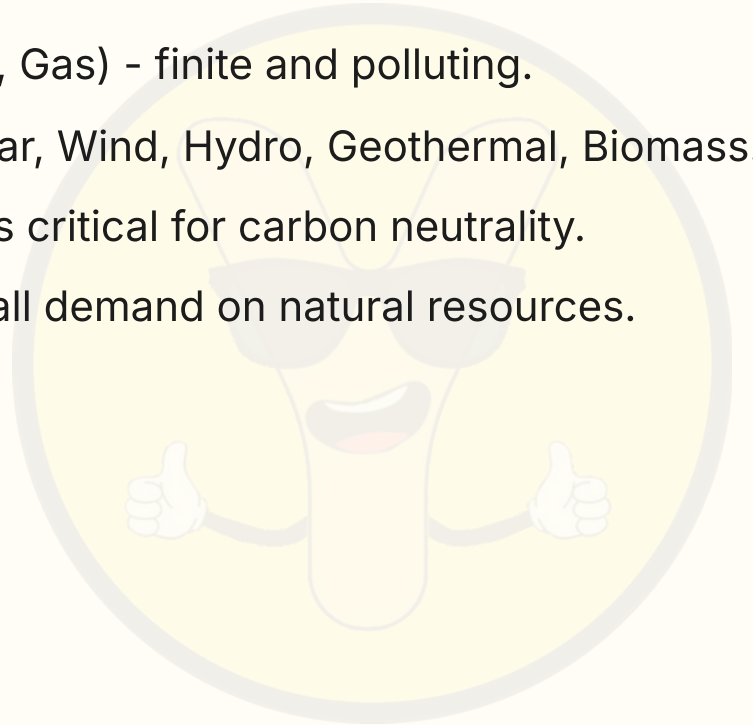
- Land degradation: Soil erosion, desertification, and salinization.
- Urbanization reduces fertile agricultural land.
- Land use planning is essential for sustainable development.
- Soil conservation: Crop rotation, afforestation, and terracing.



Energy Resources

Energy resources are categorized into conventional and non-conventional sources.

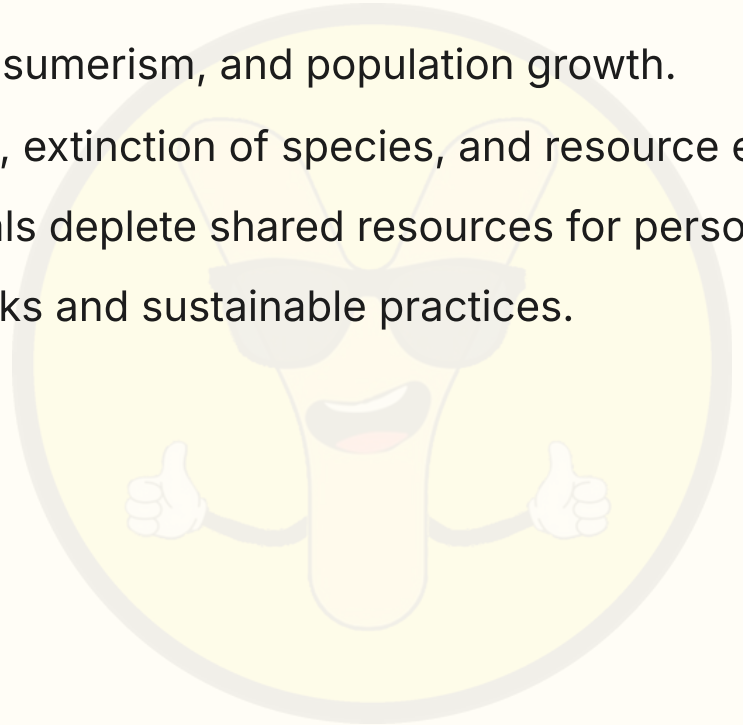
- Conventional: Fossil fuels (Coal, Oil, Gas) - finite and polluting.
- Non-conventional (Renewable): Solar, Wind, Hydro, Geothermal, Biomass.
- Transitioning to renewable energy is critical for carbon neutrality.
- Energy efficiency reduces the overall demand on natural resources.



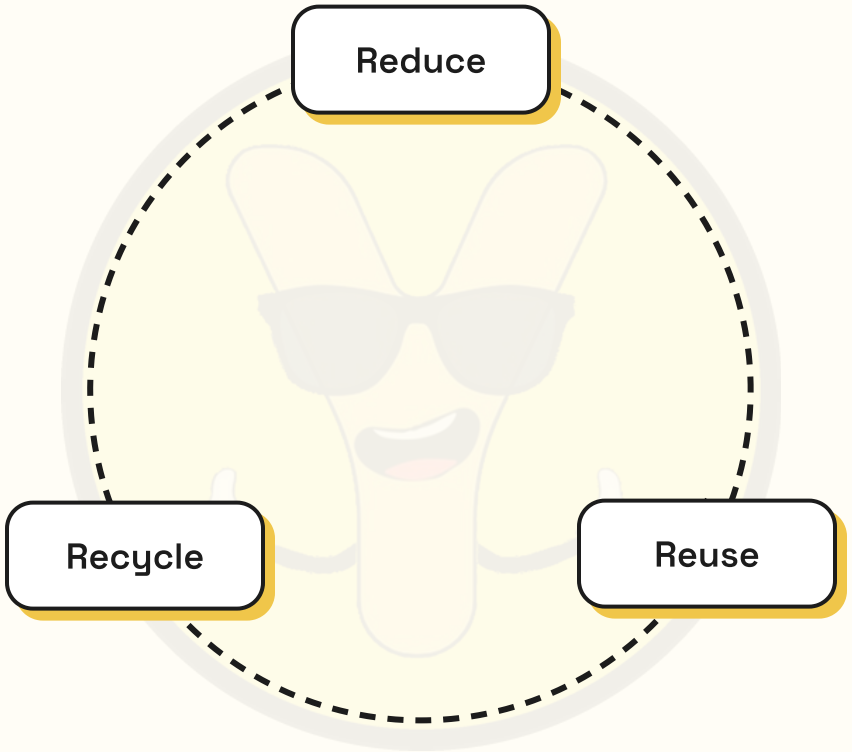
Over-exploitation of Resources

Over-exploitation occurs when the rate of extraction exceeds the rate of natural regeneration.

- Causes: Rapid industrialization, consumerism, and population growth.
- Consequences: Ecological collapse, extinction of species, and resource exhaustion.
- Tragedy of the Commons: Individuals deplete shared resources for personal gain.
- Need for strict regulatory frameworks and sustainable practices.



The 3R Concept

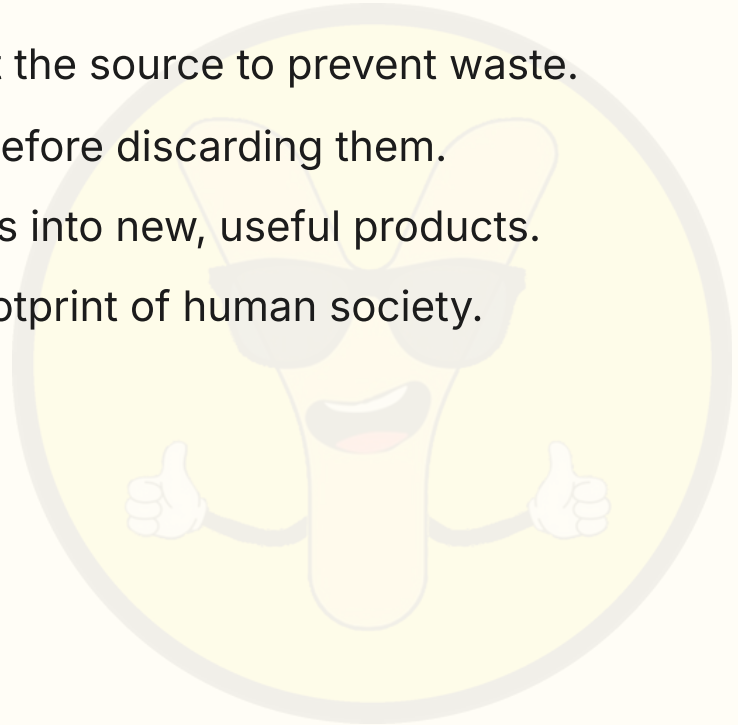


The 3R hierarchy minimizes waste generation and resource consumption.

The 3R Concept Explained

The 3R hierarchy is the foundation of waste management and sustainability.

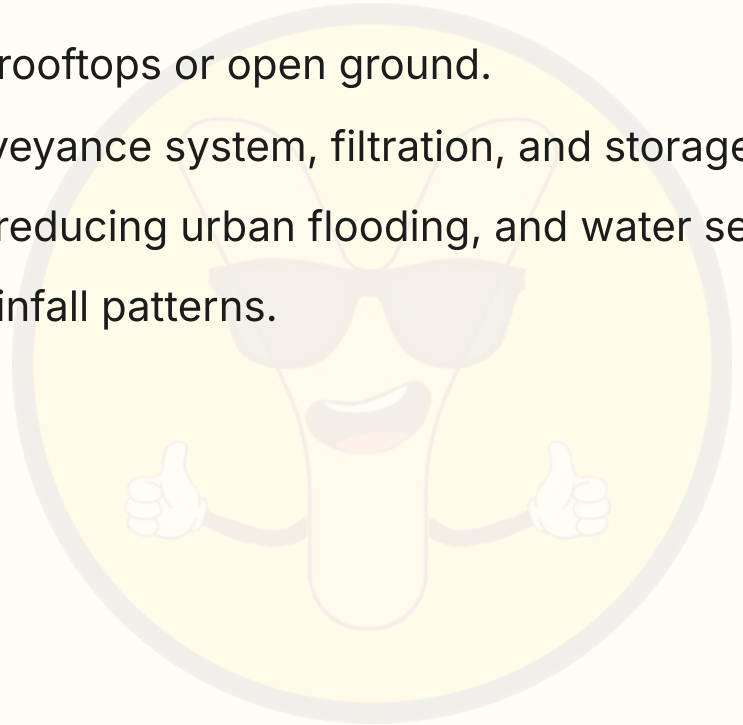
- Reduce: Minimizing consumption at the source to prevent waste.
- Reuse: Using items multiple times before discarding them.
- Recycle: Processing waste materials into new, useful products.
- Goal: To minimize the ecological footprint of human society.



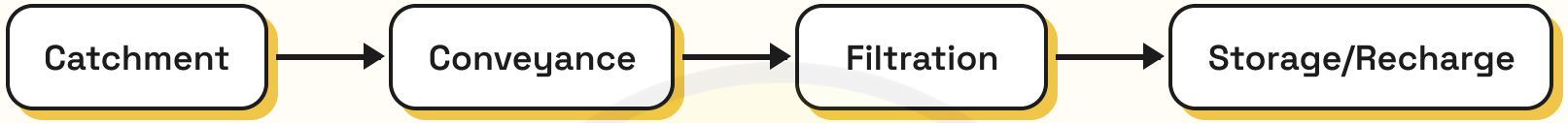
Rainwater Harvesting Concept

Rainwater harvesting is the collection and storage of rain for future use.

- Mechanism: Collecting runoff from rooftops or open ground.
- Components: Catchment area, conveyance system, filtration, and storage tank.
- Benefits: Recharging groundwater, reducing urban flooding, and water security.
- Essential for areas with seasonal rainfall patterns.



Rainwater Harvesting System

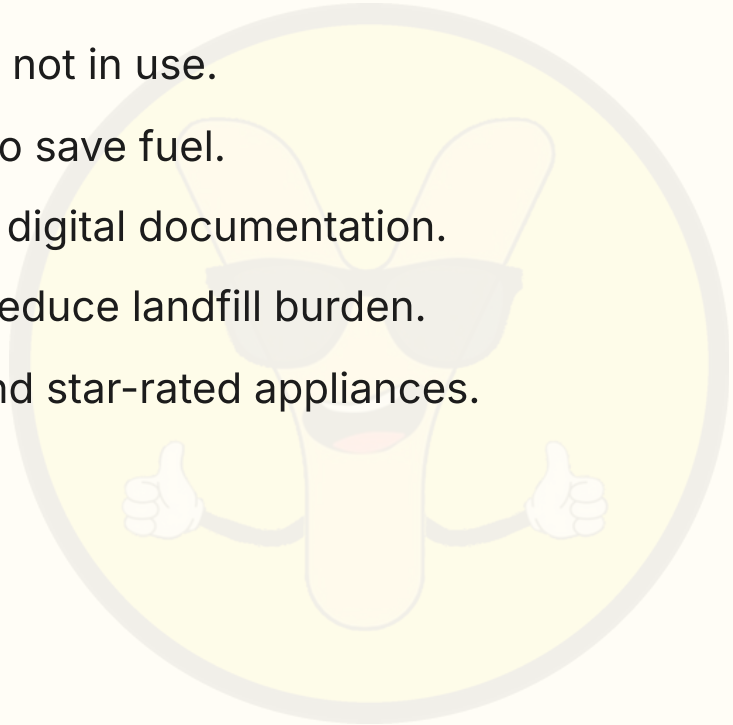


Basic flow of a rainwater harvesting system.

Resource-Saving Practices

Individual actions contribute significantly to large-scale resource conservation.

- Turn off lights and appliances when not in use.
- Use public transport or carpooling to save fuel.
- Minimize paper usage by opting for digital documentation.
- Compost organic kitchen waste to reduce landfill burden.
- Use energy-efficient LED lighting and star-rated appliances.



Exam corner

Q1 Differentiate between renewable and non-renewable resources with examples.

Q2 Explain the causes of water scarcity and suggest methods for conservation.

Q3 Discuss the ecological and economic importance of forest resources.

Q4 What is the 'Tragedy of the Commons'? Explain with reference to resource over-exploitation.

Q5 Explain the 3R principle in waste management with suitable examples.

Q6 Describe the components and benefits of a rainwater harvesting system.

Q7 How can individual daily habits contribute to sustainable resource management?

Unit 2 done. You are exam-ready.

Revise the Exam corner once more, then open Unit 3 on theycotes.com. Every AKTU subject, unit by unit, free. Notes by Chirag Jain, Ycotes.

