



St. Charles College of Education, Madurai - 625006
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BD2EE: Environmental Education
Unit II: Natural Resources

Mr. P. Nedumaran
Physical Director,
St. Charles College of Education,
Thirunagar, Madurai - 625006

Introduction to Natural Resources

- Resources naturally available in the environment.
- Include air, water, sunlight, land, forests, animals, and minerals.
- Essential for human survival and development.
- Source of food, shelter, energy, and raw materials.
- Support agriculture, industries, and transportation.
- Fundamental to economic growth.
- Unevenly distributed across different regions.
- Overexploitation leads to environmental degradation.

Importance of Natural Resources

- Meet basic human needs.
- Support agricultural activities.
- Provide industrial raw materials.
- Generate employment opportunities.
- Contribute to national income.
- Maintain ecological balance.
- Support biodiversity conservation.
- Essential for sustainable development.

Classification of Natural Resources

- Natural resources are classified into:
- Perennial Resources
- Perishable Resources
- Perishable resources are further divided into:
- Renewable Resources
- Non-Renewable Resources
- Reusable Resources
- Non-Reusable Resources
- Classification helps in proper utilization and conservation.

Perennial Resources

- Available continuously in nature.
- Found almost everywhere on Earth.
- Not easily exhausted.
- Essential for sustaining life.
- Support natural ecological processes.
- Available throughout the year.
- Examples:
 - Air
 - Water
 - Sunlight

Perishable Resources

- Limited in quantity and quality.
- Decrease due to excessive use.
- Require proper conservation.
- Important for economic activities.
- Can become scarce if misused.
- Examples:
 - Fossil fuels
 - Groundwater
 - Minerals
- Divided into four categories.

Renewable Resources

- Can be replenished naturally.
- Available again after use.
- Environmentally sustainable.
- Support future generations.
- Need proper management.
- Examples:
 - Water
 - Forests
 - Wildlife
 - Fish
 - Soil
- Important for sustainable development.

Non-Renewable Resources

- Cannot be regenerated quickly.
- Formed over millions of years.
- Limited in quantity.
- Exhausted through continuous use.
- Essential for industries and energy.
- Examples:
 - Coal
 - Petroleum
 - Natural Gas
 - Minerals
- Must be used carefully.

Reusable Resources

- Can be processed and reused.
- Reduce resource wastage.
- Encourage recycling practices.
- Economically beneficial.
- Conserve natural reserves.
- Examples:
 - Iron
 - Gold
 - Copper
 - Glass
- Promote sustainable utilization.

Non-Reusable Resources

- Cannot be reused after consumption.
- Continuously decrease with use.
- Difficult to replace.
- Excessive use causes scarcity.
- Require careful management.
- Examples:
 - Sand
 - Porcelain
 - Conservation is necessary.

Major Types of Natural Resources

- Land Resources
- Forest Resources
- Water Resources
- Mineral Resources
- Food Resources
- Energy Resources
- Essential for human development.
- Excessive exploitation creates environmental problems.

- One of the most valuable natural resources.
- Supports agriculture and settlements.
- Used for industries and transportation.
- Includes plains, mountains, deserts, and valleys.
- India has only 2.4% of the world's land area.
- Supports economic development.
- Foundation of human civilization.

Composition of Soil

- Soil is the upper layer of land.
- Contains minerals, water, air, and organic matter.
- Composition:
 - Minerals – 45%
 - Organic Matter – 5%
 - Water – 25%
 - Air – 25%
- Essential for plant growth.
- Determines agricultural productivity.

Importance of Soil

- Supports crop production.
- Supplies nutrients to plants.
- Stores water and minerals.
- Supports microorganisms.
- Maintains ecological balance.
- Essential for agriculture.
- Important for food security.
- Valuable natural resource.

Soil Erosion

- Removal of fertile topsoil by wind or water.
- Major environmental problem.
- Reduces soil fertility.
- Decreases agricultural productivity.
- Causes nutrient loss.
- Affects groundwater recharge.
- Leads to land degradation.
- Threatens food security.

Causes of Soil Erosion

- Strong winds and storms.
- Heavy rainfall and floods.
- Overgrazing by livestock.
- Deforestation.
- Mining activities.
- Construction of dams.
- Improper farming practices.
- Human interference with ecosystems.

Effects of Soil Erosion

- Causes flooding.
- Reduces groundwater levels.
- Leads to drought conditions.
- Removes soil nutrients.
- Makes land infertile.
- Decreases crop yield.
- Causes siltation in lakes and ponds.
- Reduces water absorption capacity.

Measures to Prevent Soil Erosion

- Plant long-rooted crops.
- Practice terrace farming.
- Avoid excessive grazing.
- Promote reforestation.
- Improve drainage systems.
- Maintain vegetation cover.
- Protect watersheds.
- Encourage sustainable farming practices.

Planting Crops

- Long-rooted crops bind soil particles.
- Prevent removal of topsoil.
- Improve soil stability.
- Reduce erosion by wind and water.
- Increase water retention.
- Improve agricultural productivity.
- Suitable for erosion-prone regions.

Terrace Farming

- Practiced on hilly slopes.
- Slopes converted into step-like fields.
- Reduces water runoff.
- Prevents soil loss.
- Increases water infiltration.
- Enhances crop cultivation.
- Common in Ooty and Kodaikanal.

Controlled Grazing

- Prevents overgrazing by livestock.
- Protects vegetation cover.
- Maintains soil structure.
- Reduces land degradation.
- Promotes grassland recovery.
- Conserves soil fertility.
- Supports sustainable livestock management.

Reforestation

- Reforestation means planting trees in deforested areas.
- Restores lost forest cover.
- Prevents soil erosion.
- Improves groundwater recharge.
- Maintains ecological balance.
- Increases biodiversity.
- Helps regulate climate.
- Essential for sustainable environmental management.

Forest Resources

- Forests are densely covered with trees and vegetation.
- Considered the wealth of a nation.
- Rich in flora and fauna.
- Provide numerous natural resources.
- Support human survival and livelihoods.
- Help maintain environmental balance.
- India has about 20% forest cover.
- Afforestation programs aim to increase forest area.

Importance of Forest Resources

- Support biodiversity conservation.
- Protect soil and water resources.
- Regulate climate conditions.
- Provide economic benefits.
- Support tribal communities.
- Act as carbon sinks.
- Improve air quality.
- Essential for ecological sustainability.

Economic Benefits of Forests

- Supply firewood for domestic use.
- Provide timber for furniture and construction.
- Supply raw materials for paper industries.
- Support match and plywood industries.
- Provide rubber, gum, and resins.
- Generate employment opportunities.
- Contribute to national economy.
- Support rural livelihoods.

Environmental Benefits of Forests

- Prevent soil erosion.
- Increase rainfall.
- Absorb carbon dioxide.
- Release oxygen into the atmosphere.
- Reduce global warming.
- Maintain ecological balance.
- Reduce environmental pollution.
- Moderate Earth's temperature.

Social Benefits of Forests

- Provide food and shelter for wildlife.
- Support tribal livelihoods.
- Supply medicinal plants and herbs.
- Offer recreational opportunities.
- Preserve cultural heritage.
- Improve quality of life.
- Promote environmental awareness.
- Support sustainable communities.

Forest Products

- Timber and firewood.
- Rubber and latex.
- Gum and resin.
- Medicinal plants.
- Bamboo products.
- Honey and wax.
- Essential oils.
- Paper and pulp materials.

Deforestation

- Cutting and clearing of forest vegetation.
- Major environmental problem worldwide.
- Caused by human activities.
- Reduces forest cover.
- Threatens biodiversity.
- Disturbs ecological balance.
- Increases environmental degradation.
- Requires immediate conservation measures.

Causes of Deforestation

- Expansion of agriculture.
- Industrial development.
- Urbanization.
- Construction of roads and dams.
- Fuelwood collection.
- Timber extraction.
- Population growth.
- Government development projects.

Timber Extraction

- Trees cut for commercial purposes.
- Used in furniture manufacturing.
- Supplies construction materials.
- Meets industrial demands.
- Includes teak, sal, bamboo, and sandalwood.
- Excessive extraction reduces forest cover.
- Encourages illegal logging.
- Leads to habitat destruction.

Overexploitation of Forests

- Excessive use for human needs.
- Reduces forest resources rapidly.
- Causes biodiversity loss.
- Increases environmental degradation.
- Leads to habitat destruction.
- Disturbs ecological balance.
- Affects future resource availability.
- Requires sustainable forest management.

Chipko Movement

- Started in Uttar Pradesh in 1973.
- People hugged trees to stop cutting.
- Community-based conservation movement.
- Promoted forest protection.
- Inspired environmental awareness.
- Reduced large-scale tree felling.
- Strengthened conservation efforts.
- Became a symbol of environmental activism.

Forest Conservation Act, 1980

- Enacted to protect forests.
- Regulates forest land use.
- Restricts deforestation activities.
- Promotes conservation measures.
- Ensures government control.
- Supports afforestation programs.
- Protects biodiversity.
- Helps maintain ecological balance.

Consequences of Deforestation

- Air pollution increases.
- Water pollution becomes severe.
- Climate change accelerates.
- Soil erosion increases.
- Biodiversity declines.
- Wildlife habitats disappear.
- Desertification expands.
- Environmental imbalance develops.

Deforestation and Climate Change

- Trees absorb carbon dioxide.
- Reduced forests increase greenhouse gases.
- Global temperatures rise.
- Rainfall patterns change.
- Extreme weather events increase.
- Climate stability is affected.
- Global warming intensifies.
- Environmental sustainability declines.

Impact on Biodiversity

- Loss of plant species.
- Extinction of animal species.
- Destruction of natural habitats.
- Reduction in ecological diversity.
- Disruption of food chains.
- Loss of genetic resources.
- Increased vulnerability of ecosystems.
- Threatens ecological stability.

Impact on Wildlife

- Habitat destruction occurs.
- Food availability decreases.
- Migration patterns change.
- Species become endangered.
- Breeding grounds disappear.
- Human-wildlife conflicts increase.
- Ecosystem balance is disturbed.
- Wildlife populations decline.

Socio-Economic Effects of Deforestation

- Loss of forest-based livelihoods.
- Reduced availability of forest products.
- Economic hardship for tribal communities.
- Fuelwood scarcity.
- Decline in medicinal resources.
- Increased poverty in forest regions.
- Reduced employment opportunities.
- Affects rural development.

Desertification

- Conversion of fertile land into desert.
- Caused by deforestation and erosion.
- Reduces agricultural productivity.
- Increases drought conditions.
- Leads to food insecurity.
- Affects rural populations.
- Causes ecological degradation.
- Requires restoration measures.

Measures to Prevent Deforestation

- Enforce forest protection laws.
- Reduce illegal logging.
- Promote afforestation programs.
- Create public awareness.
- Protect wildlife habitats.
- Encourage sustainable resource use.
- Monitor forest activities.
- Strengthen environmental policies.

Legal Measures for Forest Protection

- Strict enforcement of forest laws.
- Punishment for illegal tree cutting.
- Environmental clearance for projects.
- Monitoring of forest resources.
- Protection of reserved forests.
- Regulation of industrial activities.
- Sustainable forest management.
- Conservation of biodiversity.

Public Awareness and Participation

- Educate people on forest conservation.
- Encourage community participation.
- Promote environmental education.
- Organize tree planting programs.
- Support conservation campaigns.
- Involve local communities.
- Foster environmental responsibility.
- Build sustainable practices.

Protected Forest Areas

- Establish wildlife sanctuaries.
- Create national parks.
- Restrict human interference.
- Protect endangered species.
- Preserve natural ecosystems.
- Promote biodiversity conservation.
- Reduce habitat destruction.
- Support ecological balance.

Water Resources

- Water is essential for all living organisms.
- Covers nearly two-thirds of the Earth's surface.
- Supports agriculture, industries, and domestic activities.
- Vital for ecological balance.
- Freshwater resources are limited.
- Increasing demand causes water scarcity.
- Proper management is essential.
- Conservation ensures future availability.

Distribution of Water on Earth

- 97.5% of water is seawater.
- About 2% exists as glaciers and ice.
- Only 0.5% is available as usable freshwater.
- Freshwater is found in rivers, lakes, and groundwater.
- Human activities depend on this limited supply.
- Unequal distribution causes shortages.
- Conservation is necessary for sustainability.

Water Cycle

- Continuous movement of water in nature.
- Water evaporates from oceans and land.
- Water vapor forms clouds through condensation.
- Rainfall returns water to the Earth.
- Water flows into rivers and oceans.
- Some water infiltrates as groundwater.
- Maintains natural water balance.
- Supports life on Earth.

Importance of Water Resources

- Essential for drinking purposes.
- Supports agriculture and irrigation.
- Required for industrial production.
- Maintains ecosystem functions.
- Helps in electricity generation.
- Supports sanitation and hygiene.
- Necessary for economic development.
- Vital for all forms of life.

Surface Water

- Water found on the Earth's surface.
- Formed mainly through rainfall.
- Includes rivers, lakes, ponds, and reservoirs.
- Used for domestic purposes.
- Supports agriculture and industries.
- Stored through dams and reservoirs.
- Easily affected by pollution.
- Important source of freshwater.

Sources of Surface Water

- Rivers
- Lakes
- Ponds
- Streams
- Reservoirs
- Rainwater collection systems
- Wetlands
- Artificial water storage structures

Problems of Surface Water

- Industrial waste contamination.
- Domestic sewage pollution.
- Encroachment of lakes and ponds.
- Excessive water extraction.
- Urban development pressures.
- Reduced storage capacity.
- Loss of natural water bodies.
- Declining water quality.

Groundwater

- Water stored beneath the Earth's surface.
- Recharged through rainfall infiltration.
- Major source of drinking water.
- Used for irrigation and industries.
- Available through wells and borewells.
- Depends largely on rainfall.
- Essential during drought periods.
- Important natural resource.

Importance of Groundwater

- Provides drinking water.
- Supports agricultural production.
- Supplies industries.
- Available throughout the year.
- Helps during water shortages.
- Supports rural communities.
- Maintains river flow in dry seasons.
- Critical for sustainable development.

Groundwater Depletion

- Excessive pumping lowers water levels.
- Reduced rainfall decreases recharge.
- Urbanization limits water infiltration.
- Overdependence causes scarcity.
- Borewell depth increases over time.
- Agricultural demand accelerates depletion.
- Long-term sustainability is threatened.
- Requires conservation measures.

Groundwater Pollution

- Industrial effluents contaminate aquifers.
- Agricultural chemicals seep underground.
- Domestic sewage affects water quality.
- Causes health-related diseases.
- Reduces availability of safe drinking water.
- Damages ecosystems.
- Difficult and costly to treat.
- Requires pollution control measures.

Water Scarcity

- Insufficient availability of usable water.
- Growing environmental challenge.
- Affects millions of people worldwide.
- Results from increasing demand.
- Causes social and economic problems.
- Impacts agriculture and industries.
- Threatens human well-being.
- Requires immediate action.

Causes of Water Scarcity

- Population growth.
- Industrial expansion.
- Reduced rainfall.
- Climate change.
- Groundwater overexploitation.
- Water pollution.
- Poor water management.
- Urbanization and encroachment.

Effects of Water Scarcity

- Reduced agricultural production.
- Drinking water shortages.
- Increased health problems.
- Economic losses.
- Environmental degradation.
- Migration of affected populations.
- Increased conflicts over water.
- Lower quality of life.

Water Conservation

- Use water efficiently.
- Avoid unnecessary wastage.
- Repair leaking pipelines.
- Promote water-saving technologies.
- Reuse treated wastewater.
- Protect water bodies.
- Encourage responsible consumption.
- Support sustainable development.

Rainwater Harvesting

- Collection and storage of rainwater.
- Recharges groundwater resources.
- Reduces dependence on external sources.
- Helps prevent water scarcity.
- Improves water availability.
- Reduces flooding.
- Environment-friendly technique.
- Cost-effective conservation method.

Advantages of Rainwater Harvesting

- Increases groundwater levels.
- Provides additional water supply.
- Reduces runoff losses.
- Conserves freshwater resources.
- Supports agriculture.
- Lowers water bills.
- Improves water security.
- Promotes sustainability.

Methods to Eliminate Water Scarcity

- Adopt rainwater harvesting.
- Increase groundwater recharge.
- Create awareness on water conservation.
- Use water sparingly.
- Construct reservoirs and storage structures.
- Protect rivers and lakes.
- Improve water management systems.
- Encourage community participation.

River Linking Projects

- Connect water-surplus and water-deficit regions.
- Improve water distribution.
- Support irrigation development.
- Reduce regional water shortages.
- Help control floods.
- Enhance agricultural productivity.
- Promote economic growth.
- Require careful environmental assessment.

Sustainable Water Management

- Balance demand and supply.
- Protect natural water sources.
- Reduce water pollution.
- Encourage efficient utilization.
- Strengthen conservation policies.
- Promote public participation.
- Ensure future water security.
- Support sustainable development.

Mineral Resources

- Naturally occurring substances found in the Earth's crust.
- Essential for industrial development.
- Support economic growth.
- Basis of modern technology.
- Found in limited locations.
- Extracted through mining activities.
- Mostly non-renewable resources.
- Require conservation and management.

Importance of Mineral Resources

- Support industrial production.
- Generate employment opportunities.
- Contribute to national income.
- Essential for infrastructure development.
- Provide raw materials for manufacturing.
- Support technological advancement.
- Strengthen economic growth.
- Improve living standards.

Characteristics of Mineral Resources

- Found in specific geological locations.
- Limited in quantity.
- Non-renewable in nature.
- Require extraction and processing.
- Valuable economic resources.
- Essential for industrialization.
- Unevenly distributed worldwide.
- Must be used judiciously.

Types of Mineral Resources

- Metallic Minerals
- Non-Metallic Minerals
- Fuel Minerals
- Each type serves different purposes.
- Important for economic development.
- Widely used in industries.
- Essential for modern civilization.
- Require conservation.

Metallic Minerals

- Contain metal elements.
- Found within solid rocks.
- Used in engineering industries.
- Important for manufacturing.
- High economic value.
- Examples:
 - Gold
 - Silver
 - Platinum
 - Iron
 - Aluminum
 - Nickel

Non-Metallic Minerals

- Do not contain metallic properties.
- Used in construction and industries.
- Important for manufacturing products.
- Examples:
 - Diamond
 - Mica
 - Gypsum
 - Limestone
 - Asbestos
- Widely distributed in India.
- Economically significant.

Fuel Minerals

- Used for energy production.
- Essential for transportation.
- Support electricity generation.
- Non-renewable resources.
- Examples:
 - Coal
 - Petroleum
 - Natural Gas
 - Uranium
- Important for economic activities.
- Major source of energy worldwide.

Mining Methods

- Minerals are extracted from the Earth's crust.
- Two major mining methods are used.
- Choice depends on mineral location.
- Mining supports industrial development.
- Provides raw materials for industries.
- Generates employment opportunities.
- Improper mining causes environmental damage.
- Sustainable mining practices are essential.

Open-Pit Mining

- Used for minerals near the surface.
- Large pits are excavated.
- Economical extraction method.
- Suitable for sand and salt deposits.
- Easier access to minerals.
- Requires heavy machinery.
- Causes land degradation.
- Alters natural landscapes.

Underground Mining

- Used for deep mineral deposits.
- Tunnels and shafts are constructed.
- Suitable for metal ores.
- Expensive extraction method.
- Requires skilled workers.
- Safer technologies are necessary.
- Can cause land subsidence.
- Environmental monitoring is important.

Utilization of Mineral Resources

- Used in industrial production.
- Essential for construction activities.
- Support transportation systems.
- Used in communication technologies.
- Important for electricity generation.
- Required in machinery manufacturing.
- Contribute to economic growth.
- Improve quality of life.

Minerals in Daily Life

- Gold used in jewellery.
- Iron used in construction.
- Aluminum used in transport.
- Copper used in electrical wiring.
- Limestone used in cement production.
- Coal used for power generation.
- Petroleum used as fuel.
- Minerals support modern lifestyles.

Environmental Impacts of Mining

- Causes land degradation.
- Leads to soil erosion.
- Pollutes water resources.
- Generates air pollution.
- Destroys natural habitats.
- Reduces biodiversity.
- Produces large amounts of waste.
- Affects human health.

Land Degradation Due to Mining

- Removal of topsoil.
- Destruction of vegetation cover.
- Formation of abandoned pits.
- Loss of agricultural land.
- Increased soil erosion.
- Reduced land productivity.
- Landscape alteration.
- Long-term environmental damage.

Water Pollution from Mining

- Mining waste enters water bodies.
- Chemicals contaminate groundwater.
- Rivers and lakes become polluted.
- Aquatic organisms are affected.
- Drinking water quality decreases.
- Health risks increase.
- Ecosystems become disturbed.
- Requires strict pollution control.

Air Pollution from Mining

- Dust released during excavation.
- Harmful gases emitted.
- Reduces air quality.
- Causes respiratory diseases.
- Affects nearby communities.
- Damages vegetation.
- Contributes to environmental pollution.
- Requires effective control measures.

Loss of Biodiversity

- Natural habitats are destroyed.
- Wildlife populations decline.
- Plant species disappear.
- Food chains are disrupted.
- Ecosystem balance is affected.
- Endangered species face threats.
- Ecological stability decreases.
- Conservation becomes necessary.

Conservation of Mineral Resources

- Use minerals efficiently.
- Reduce unnecessary wastage.
- Encourage recycling practices.
- Promote sustainable mining.
- Develop alternative materials.
- Improve extraction technologies.
- Increase public awareness.
- Ensure availability for future generations.

Recycling of Minerals

- Conserves natural reserves.
- Reduces mining activities.
- Saves energy and resources.
- Minimizes environmental damage.
- Lowers production costs.
- Reduces waste generation.
- Supports sustainable development.
- Important conservation strategy.

Sustainable Mining Practices

- Minimize environmental damage.
- Restore mined areas.
- Control pollution effectively.
- Follow environmental regulations.
- Protect local ecosystems.
- Use modern technologies.
- Ensure worker safety.
- Promote responsible resource use.

Food Resources

- Essential for human survival.
- Obtained from plants and animals.
- Support growth and development.
- Major source of nutrients.
- Agriculture is the primary source.
- Population growth increases demand.
- Proper management is necessary.
- Food security is a global concern.

Sources of Food

- Agricultural crops.
- Fruits and vegetables.
- Livestock products.
- Fisheries and aquaculture.
- Poultry products.
- Dairy products.
- Forest food resources.
- Food processing industries.

Problems Related to Food Resources

- Rapid population growth.
- Limited agricultural land.
- Soil degradation.
- Water scarcity.
- Climate change impacts.
- Unequal food distribution.
- Malnutrition issues.
- Increasing food demand.

Food Resource Conservation

- Improve agricultural productivity.
- Reduce food wastage.
- Adopt sustainable farming.
- Protect fertile soil.
- Conserve water resources.
- Promote organic farming.
- Improve storage facilities.
- Ensure food security.

Energy Resources

- Essential for economic development.
- Power industries and transportation.
- Support domestic activities.
- Drive technological progress.
- Available as renewable and non-renewable sources.
- Increasing demand worldwide.
- Require sustainable management.
- Important for national development.

Renewable Energy Resources

- Replenished naturally.
- Environment friendly.
- Reduce pollution levels.
- Sustainable energy source.
- Examples:
 - Solar energy
 - Wind energy
 - Hydropower
 - Biomass energy
- Support green development.

Non-Renewable Energy Resources

- Limited in availability.
- Formed over millions of years.
- Major source of energy today.
- Examples:
 - Coal
 - Petroleum
 - Natural Gas
- Cause environmental pollution.
- Require conservation measures.
- Alternative energy sources are needed.

Conservation of Energy Resources

- Use energy efficiently.
- Reduce unnecessary consumption.
- Promote renewable energy.
- Improve energy-saving technologies.
- Encourage public awareness.
- Reduce dependence on fossil fuels.
- Support sustainable development.
- Protect resources for future generations.

Sustainable Development

- Meets present needs without harming future generations.
- Balances economic growth and conservation.
- Promotes responsible resource use.
- Protects environmental quality.
- Conserves natural resources.
- Encourages social development.
- Ensures long-term sustainability.
- Essential for global progress.

Natural Resource Management

- Involves planning and conservation.
- Ensures efficient resource utilization.
- Reduces environmental degradation.
- Promotes sustainable practices.
- Protects biodiversity.
- Supports future generations.
- Encourages community participation.
- Essential for sustainable development.

Conclusion

- Natural resources are vital for life and development.
- Land, forests, water, minerals, food, and energy support human needs.
- Overexploitation causes environmental problems.
- Conservation is necessary for sustainability.
- Renewable resources should be promoted.
- Public awareness plays a key role.
- Sustainable development ensures future well-being.
- "Conserve Natural Resources Today for a Better Tomorrow."