

1. Define **natural resources** and **artificial resources** with examples.
2. Differentiate between **renewable** and **non-renewable** sources of energy with suitable examples.
3. Explain the **ecological and economic importance of soil**.
4. What are the **causes and effects of deforestation**? Suggest **preventive measures**.
5. Discuss the **impact of land use changes** on the environment and human life.
6. Write short notes on:
  - a) Agricultural land
  - b) Forest land
  - c) Wetlands
7. Explain the **causes of soil degradation** and its **impact on agriculture and food security**.
8. Describe any **five methods of soil conservation**.
9. What is meant by **conservation of landforms**? Explain any **three methods** of landform conservation.
10. Write a note on **sustainable land use planning**. Why is it important?

## Q1. Define natural resources and artificial resources with examples. (10 Marks)

**Answer:**

A **resource** is defined as *any natural or artificial substance, energy, or organism which is used by human beings for their welfare*. Resources can be broadly classified into **Natural Resources** and **Artificial (Man-made) Resources**.

### 1. Natural Resources (5 Marks)

- **Definition:** Resources which are obtained directly from nature are called *natural resources*.
- **Examples:** Soil, air, water, minerals, coal, sunshine, plants, and animals.
- **Explanation:**
  - They exist freely in the environment and are used by humans for survival and development.
  - They may be **renewable** (e.g., wind, water, forests, solar energy) or **non-renewable** (e.g., coal, petroleum, natural gas, minerals).
- **Importance:**
  - Provide food, fuel, shelter, and raw materials.
  - Maintain ecological balance and biodiversity.

### 2. Artificial (Man-made) Resources (5 Marks)

- **Definition:** The resources which are developed by human beings using natural resources during the growth of civilization are called *artificial resources*.
- **Examples:** Biogas, plastics (from petroleum), thermal electricity, machines, buildings.
- **Explanation:**
  - These resources are derived from natural resources but modified through human skill and technology.
  - For example, **plastic** is derived from petroleum, **biogas** from animal waste, **thermal electricity** from coal.
- **Importance:**
  - Fulfil human needs for comfort, industrial growth, and technological development.

- Support modern lifestyle and economic progress.

**Q2. Differentiate between renewable and non-renewable sources of energy with suitable examples. (10 Marks)**

**Answer:**

Energy resources are broadly classified into **Renewable** and **Non-renewable** resources. Their differences are as follows:

**1. Renewable Sources of Energy (5 Marks)**

- **Definition:** Resources that can be naturally replenished or renewed within a short time are called renewable resources.
- **Features:**
  - Inexhaustible in nature.
  - Do not cause much pollution.
  - Environment-friendly with low carbon emissions.
  - Maintenance cost is high (e.g., solar panels, wind turbines).
- **Examples:** Solar energy, wind energy, hydropower, biomass, geothermal energy.
- **Importance:** Provide sustainable energy for future generations without exhausting the resource base.

**2. Non-renewable Sources of Energy (5 Marks)**

- **Definition:** Resources that cannot be replenished once consumed, or take millions of years to form, are called non-renewable resources.
- **Features:**
  - Exhaustible in nature and available in limited quantity.
  - Cause pollution and emit greenhouse gases.
  - Environmentally harmful due to high carbon emissions.
  - Maintenance cost is low, but extraction and usage cost is high.

- **Examples:** Coal, petroleum, natural gas, minerals.
- **Importance:** Widely used for industrialization, transportation, and economic development, but unsustainable in the long run.

### Comparison Table

Aspect	Renewable Energy	Non-renewable Energy
Availability	Unlimited / inexhaustible	Limited / exhaustible
Pollution	Little or no pollution	High pollution
Carbon Emission	Low	High
Cost	Low running cost, high setup cost	High extraction cost, low maintenance
Sustainability	Sustainable for future generations	Unsustainable, depletes over time
Examples	Sun, wind, water, biomass	Coal, oil, natural gas, minerals

### Q3. Explain the ecological and economic importance of soil. (10 Marks)

**Answer:**

Soil is the **uppermost layer of the Earth's crust**, made up of minerals, organic matter, water, air, and living organisms. It is essential for the survival of plants, animals, and humans. Its importance can be studied under two aspects: **ecological** and **economic**.

#### 1. Ecological Importance of Soil (5 Marks)

- **Supports Plant Growth:** Provides nutrients, water, and anchorage for plants.
- **Habitat for Organisms:** Acts as home to microorganisms, insects, and burrowing animals.
- **Nutrient Cycling:** Recycles nutrients like nitrogen, phosphorus, and potassium essential for plants.
- **Water Regulation:** Absorbs, filters, and stores rainwater; prevents floods and droughts.

- **Climate Regulation:** Stores carbon dioxide in soil organic matter and helps control greenhouse gases.
- **Erosion Control:** Vegetation rooted in soil prevents soil erosion and desertification.

## 2. Economic Importance of Soil (5 Marks)

- **Agriculture:** Basis for crop production, ensuring food security.
- **Forestry & Grazing:** Provides raw materials like timber, fodder, and fuel wood.
- **Raw Material Source:** Supplies clay, sand, and minerals used in construction and industry.
- **Infrastructure Support:** Provides foundation for roads, dams, buildings, and other structures.
- **Waste Disposal:** Filters wastewater and absorbs solid waste.
- **Medicinal Value:** Certain soils are sources of antibiotics and minerals used in medicines.
- **Livelihoods:** Millions depend on soil-related activities (farming, pottery, brick making).

## Q4. What are the causes and effects of deforestation? Suggest preventive measures. (10 Marks)

**Answer:**

**Deforestation** is the large-scale clearing or removal of forest cover, often to meet agricultural, industrial, and developmental needs. It is a major environmental issue as forests are vital for biodiversity, climate regulation, and ecological balance.

### 1. Causes of Deforestation (3 Marks)

- **Population Growth** – Expansion of agriculture, grazing land, and settlements.
- **Industrialization & Urbanization** – Need for timber, fuelwood, paper, and land for industries and cities.

- **Infrastructure Development** – Construction of roads, railways, dams, and power projects.
- **Mining Activities** – Extraction of minerals leads to destruction of forest land.
- **Agricultural Expansion** – Shifting cultivation, commercial farming, and cash crops.
- **Forest Fires** – Both natural and man-made fires destroy vast forest areas.

## 2. Effects of Deforestation (4 Marks)

- **Climate Change:** Increases carbon dioxide levels → global warming.
- **Soil Erosion:** Loss of fertile topsoil → reduced agricultural productivity.
- **Disturbance in Water Cycle:** Reduced rainfall, water scarcity, and droughts.
- **Biodiversity Loss:** Loss of habitat → extinction of plant and animal species.
- **Floods & Desertification:** Land becomes unproductive; increased floods and wastelands.
- **Human Impact:** Affects tribal communities and people dependent on forests.

## 3. Preventive Measures of Deforestation (3 Marks)

- **Afforestation & Reforestation** – Planting more trees and regenerating degraded forests.
- **Strict Forest Laws** – Enforcing laws to prevent illegal logging and overexploitation.
- **Social Forestry & Joint Forest Management (JFM)** – Community participation in forest protection.
- **Sustainable Agriculture** – Reducing shifting cultivation and promoting agroforestry.
- **Awareness & Education** – Educating people about the importance of forests.
- **Alternative Resources** – Using renewable energy and recycled materials to reduce dependence on timber.

**Q5. Discuss the impact of land use changes on the environment and human life. (10 Marks)**

**Answer:**

**Land use change** refers to the conversion of natural landscapes such as forests, wetlands, and grasslands into agricultural, industrial, or urban areas. It is a major global environmental issue because land is finite and overuse affects both nature and society.

### 1. Impacts on the Environment (5 Marks)

- **Loss of Biodiversity** – Conversion of forests and wetlands destroys habitats, leading to extinction of species.
- **Soil Degradation** – Continuous farming, overgrazing, and construction cause soil erosion, salinity, and infertility.
- **Water Pollution** – Urbanization and agriculture increase runoff containing fertilizers, pesticides, and pollutants.
- **Climate Change** – Replacement of vegetation reduces carbon absorption, contributing to global warming.
- **Floods & Landslides** – Removal of vegetation increases runoff, landslides, and flash floods.
- **Heat Island Effect** – Urban areas absorb more heat, raising local temperatures.

### 2. Impacts on Human Life (4 Marks)

- **Food Security Threats** – Soil degradation and reduced fertility lead to decline in crop yields.
- **Water Scarcity** – Reduced groundwater recharge and polluted water sources affect drinking water.
- **Health Issues** – Pollution from urban and industrial activities causes respiratory and water-borne diseases.
- **Livelihood Loss** – Farmers, fishermen, and forest-dependent communities lose income sources.
- **Increased Natural Disasters** – Greater vulnerability to floods, droughts, and epidemics.

**Q6. Write short notes on: (a) Agricultural Land (b) Forest Land (c) Wetlands (10 Marks)**

**Answer:**

#### a) Agricultural Land (3 Marks)

- Agricultural land (farmland) is used for growing crops and rearing livestock.
- It is the primary source of food production and ensures **food security**.
- Categories:
  1. **Arable land** – for seasonal crops.
  2. **Permanent crops** – orchards, plantations.
  3. **Pastures & hayfields** – grazing land.
- Importance:
  1. Provides food, fodder, and raw materials.
  2. Supports livelihoods of farmers (nearly 50% of global population).
- Conservation: Crop rotation, organic farming, and sustainable irrigation.

#### b) Forest Land (3 Marks)

- Forest land is covered with trees and vegetation, producing timber, wood products, and biodiversity.
- Forests cover about **25% of India's area**.
- Functions:
  - Prevent soil erosion and floods.
  - Increase rainfall and regulate climate.
  - Provide fuel wood, medicinal plants, and raw materials.
  - Habitat for wildlife and biodiversity.
- Threats: Deforestation, mining, and urbanization.
- Conservation: Afforestation, social forestry, and Joint Forest Management (JFM).

#### c) Wetlands (4 Marks)

- Wetlands are areas where water covers soil either permanently or seasonally (e.g., lakes, ponds, rivers, bays, estuaries).
- Ecological Importance:



- Improve water quality by filtering pollutants.
- Store floodwater and maintain groundwater recharge.
- Provide habitat for migratory birds, fish, and wildlife.
- Buffer coastal areas from cyclones and storm surges.
- Economic Importance:
  - Support fisheries, tourism, and recreation.
  - Provide resources like reeds and medicinal plants.
- Conservation: Protection through **Ramsar Convention**, creating awareness, and regulating human activities.

**Q7. Explain the causes of soil degradation and its impact on agriculture and food security. (10 Marks)**

**Answer:**

**Soil degradation** is the decline in soil quality and productivity due to physical, chemical, biological, and human factors. It reduces the soil's ability to support agriculture and affects food security.

### **1. Causes of Soil Degradation (5 Marks)**

#### **a) Physical Factors**

- Rainfall, floods, and wind cause erosion of fertile topsoil.
- Overgrazing and deforestation expose soil to erosion.

#### **b) Chemical Factors**

- Excessive use of fertilizers and pesticides kills beneficial soil organisms.
- Changes in soil pH (alkalinity/acidity) reduce fertility.
- Salinization and waterlogging due to poor irrigation practices.

#### **c) Biological Factors**

- Overgrowth of harmful microbes and fungi affects soil health.
- Loss of soil biodiversity due to continuous cropping.

#### **d) Human Activities**

- Deforestation, mining, and industrial effluents pollute the soil.
- Urbanization destroys fertile agricultural land.
- Improper cultivation practices like mono-cropping and tillage.

#### **2. Impacts on Agriculture and Food Security (4 Marks)**

- **Decline in Soil Fertility** → Reduced crop yields.
- **Loss of Soil Structure & Biodiversity** → Poor water retention and nutrient cycling.
- **Soil Erosion** → Loss of fertile topsoil and increase in wastelands.
- **Food Insecurity** → Decline in global food production, reduced nutritious food availability.
- **Economic Impact** → Loss of farmer income and increased poverty.
- **Climate Impact** → Reduced resilience to climate change, leading to droughts and floods.

#### **Q8. Describe any five methods of soil conservation. (10 Marks)**

**Answer:**

**Soil conservation** refers to practices used to prevent soil erosion, maintain fertility, and protect soil health for sustainable agriculture and ecosystem balance. The following are important methods:

##### **1. Crop Rotation**

- Growing different crops in successive seasons on the same land.
- Prevents depletion of specific nutrients, improves fertility, and increases yield.
- Example: Alternating legumes (nitrogen-fixing) with cereals.

## **2. Contour Ploughing**

- Ploughing along the natural contours of a slope instead of up and down.
- Reduces surface runoff and soil erosion in hilly regions.
- Helps conserve water for crops.

## **3. Mulching**

- Covering soil with organic residues like straw, leaves, or husks.
- Protects soil from erosion, conserves moisture, and adds nutrients as mulch decomposes.

## **4. Terrace Farming**

- Converting steep slopes into step-like terraces.
- Reduces surface runoff and prevents landslides.
- Commonly practiced in hilly regions (e.g., Himalayas).

## **5. Agroforestry (Alley Cropping)**

- Growing crops between rows of trees or shrubs.
- Trees prevent soil erosion, improve soil structure, and provide additional resources (fuel wood, fruits).

## **Other Methods (Optional if needed in exam)**

- **Strip Cropping** – Alternating strips of erosion-prone crops with erosion-resistant crops.
- **Wind Breaks** – Planting trees along field boundaries to reduce wind erosion.
- **Buffer Strips** – Planting grass or vegetation between fields to filter runoff.

**Q9. What is meant by conservation of landforms? Explain any three methods of landform conservation. (10 Marks)**

**Answer:**

**Landforms** are natural physical features of the Earth's surface such as hills, mountains, valleys, rivers, plateaus, and plains. They are shaped by natural forces like wind, water, ice, and tectonic movements.

**Conservation of landforms** means protecting these natural features from degradation caused by deforestation, soil erosion, mining, pollution, and unplanned development. It ensures ecological balance and prevents disasters like landslides and floods.

### **Methods of Landform Conservation**

#### **1. Deforestation Prevention**

- Cutting of forests makes land vulnerable to erosion, landslides, and soil loss.
- Preventing large-scale deforestation and promoting **afforestation & social forestry** helps stabilize slopes and protect hills, valleys, and river basins.

#### **2. Slope Protection**

- Slopes are prone to erosion and landslides.
- Planting vegetation, terracing, and using engineering structures like retaining walls help prevent soil movement.
- Enhances sustainability of mountain and hill landforms.

#### **3. Riverbank and Wetland Protection**

- Riverbanks and wetlands are highly important for ecosystems and biodiversity.
- Planting grasses, shrubs, and trees along riverbanks prevents erosion.
- Protecting wetlands helps in flood control, water filtration, and wildlife conservation.

#### **Other Methods (for additional explanation if needed)**

- **Glacier Protection** – Slowing down melting by addressing climate change.
- **Cave Protection** – Preventing littering and pollution in caves.
- **Climate Change Mitigation** – Reducing fossil fuel emissions to protect all types of landforms.

**Q10. Write a note on Sustainable Land Use Planning. Why is it important? (10 Marks)**

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**Answer:**

**Definition (2 Marks):**

Sustainable land use planning is the **scientific and rational allocation of land** for agriculture, forestry, industries, settlements, transport, and conservation in such a way that present human needs are met **without degrading land resources** and future generations can also use them.

👉 Example: Using land for farming with **crop rotation** and **organic farming** instead of excessive chemical fertilizers.

**Importance (6 Marks):**

1. **Prevents land degradation** – avoids soil erosion, desertification, and wasteland formation.
  - *Example:* Terrace farming in hilly regions like Himachal Pradesh prevents soil erosion.
2. **Ensures food security** – protects fertile soils for continuous agricultural productivity.
  - *Example:* Green Revolution areas in Punjab face soil problems; sustainable planning helps maintain yields.
3. **Maintains ecological balance** – protects forests, wetlands, and grasslands that regulate climate and biodiversity.
  - *Example:* Preserving Sundarbans mangroves helps reduce cyclone impact and protect wildlife.
4. **Reduces conflicts in land use** – balances needs of agriculture, housing, industries, and infrastructure.
  - *Example:* Urban planning in smart cities reserves land for green belts, housing, and industries separately.
5. **Controls deforestation and urban sprawl** – prevents over-conversion of forests into farmlands or towns.

- *Example:* Amazon rainforest degradation is a warning of poor land-use planning.
6. **Supports socio-economic development** – provides livelihood to farmers, industries, and ensures equity.
- *Example:* Eco-tourism in Kerala uses land for both economy and environmental conservation.
7. **Ensures intergenerational equity** – resources are saved for future generations.
- *Example:* If fertile land is overused with chemicals, future generations cannot farm on it.

**Conclusion (2 Marks):**

Sustainable land use planning is **essential for balanced growth**. By protecting soil, forests, and biodiversity while supporting agriculture and industry, it ensures **development without destruction**. It is the key to achieving **long-term environmental security and human welfare**.