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## Natural Resources (Land, Water and Soil)

### Lesson Plan

#### Contents

- ▶ An overview of the Earth's basic natural resources – land, water and soil
- ▶ Understanding the use of land, water and soil resources and how to conserve them

#### Objectives

- ▶ To understand the distribution and usage of natural resources: land, water, soil
- ▶ To learn about the different uses of each of the natural resources
- ▶ To know how we can protect and conserve the natural resources
- ▶ To appreciate the use, abuse and conservation of natural resources

#### Teacher's Aids

- ▶ Globe
- ▶ Pictures, charts, atlas and wall maps of India
- ▶ Blackboard
- ▶ Internet

#### Tips for Teacher

- ▶ Explain the distribution, development and usage of the natural resources of land, water and soil.
- ▶ Discuss the tables and the maps as you read the lesson.
- ▶ Students should be encouraged to know places, locations and their placement on the maps.

#### Background and Reading

- ▶ Read the lesson aloud and explain, sharing the aids, etc., pausing to examine and explain the data in the boxes.
- ▶ Particularly focus on the distribution and usage of land, water and soil on Earth.

## Land and Water

- ▶ Earth—the only body in space known to have suitable environment for sustaining living organisms.
- ▶ Surface: 29% land and 71% water.
- ▶ Elements of environment—importance based on needs of people living in that environment.
- ▶ Needs vary—depending on cultural and technological development of people.
- ▶ Natural resources acquired greater value through technology—as human beings moved and began to use them.
- ▶ Example: River—irrigation, navigation, power generation, etc.
- ▶ Land, water and soil—influenced by natural environmental conditions such as different elements of weather, climate, hydrological cycle, weathering, etc.

## Land Resources

- ▶ Land—most important natural resource—human beings live on it and obtain their needs from it.
- ▶ Landforms—Wide variety: Mountains, hills, plateaus, plains, river, valleys, deserts, marshlands, etc.
- ▶ All parts not equally habitable—uneven distribution of population on Earth due to varied relief features and climatic conditions.
- ▶ 90% of population occupies 30% of total land area—rest not suitable conditions for human habitation.
- ▶ Thickly populated areas—river valleys, coastal plains, plateaus rich in mineral resources and industrial centres.
- ▶ Sparsely populated areas—hot and cold deserts, grasslands, rainforests and mountainous regions.
- ▶ Land uses—farming, grazing, mining, settlement, roads, railways, industries, etc. –proportion of land put to different uses varies from region to region and time to time in the same region—example: Forests cleared for farming, mining, or other uses resulting in reduction of total land under forests.
- ▶ **Land use influenced by:**
  1. Slope of land
  2. Presence/absence of soil cover
  3. Availability of surface or underground water
  4. Prevailing climatic conditions
  5. Nature of rocks and minerals present in them
  6. Level of technology available
  7. Quantity and quality of manpower
  8. Economic value of the available land

- ▶ Extent of land in any region limited–demand on available land–cultivation, construction, setting up factory, mining, airport, recreation, etc.–planning of land use based on nature of land and needs of people to provide maximum returns–improper use such as clearance of forests for cultivation causes soil erosion.
- ▶ Ownership varies–some places individual private ownership–others collective by group–some place owned by community–use decided by owner–individual, community use etc.–latter called common property resources.
- ▶ Population increasing rapidly–demands increasing too–total land fixed–quality varies from place to place–people and organisations encroach on community lands–used it for economic and commercial purposes–change in land use affects economic and cultural status of people–unplanned utilisation causes land degradation, landslides, soil erosion, desertification, etc.
- ▶ Increasing demand of population–reduction in total area under forest cover and arable land–danger of loss which should be checked immediately–different governments individually and collectively should take initiatives towards afforestation, land reclamation, limited use of pesticides and fertilisers and overgrazing–conserve land.

### **Water Resources**

- ▶ Earth – unique – abundance of water and oceans – moderates temperature conditions – oceans reduce extremes of temperature between summer and winter and day and night.
- ▶ Precipitation – from atmosphere – results in water falling on land and ocean surface – runs off land surfaces, slopes as streams and rivers.
- ▶ Ice sheets – thick and extensive in Antarctica, Greenland, Poles, less extensive in mountains.
- ▶ Fresh water – two-thirds of the total on land is as ice sheets – surface water on land most easily accessible source for human need – quantity of surface water in a region depends on total precipitation, seasonal distribution, nature of rocks and soil.
- ▶ Ocean water – contains comparatively large quantity of dissolved salts – not fit for human consumption – provides ideal conditions for origin of different life forms – belief that life originated in sea and spread to land later – variety of organic life – plankton to whale.
- ▶ Use of fresh water – only 2.7% of total water – 70% as ice sheets and glaciers – 1% available and fit for human use – mostly found as groundwater – and surface water in rivers, lakes, also water vapour in atmosphere – most valuable natural resource – total quantity fixed and distribution varied due to its constant movement through the water/hydrological cycle – human beings need it for drinking, cooking, washing [domestic needs] – also economic activities like cultivation, pastoral, industry, mining, manufacturing, also hydroelectricity.
- ▶ Shortage of fresh water – increasing demand of increasing population – more food, urbanisation, higher standard of living affecting water supply – drying up of water sources and large scale pollution of river water by industrial waste and city waste.
- ▶ Distribution – uneven – rainy season – excessive flow causes floods – dry season – surface water dries – seasonal contrasts regulated by dams across rivers and reservoirs created by them – stored water used in dry season.

## Conservation of Water Resources

- ▶ Acute water shortage—many parts of the world—variation in amount of rainfall, over exploitation, pollution of water sources—although a renewable resource, overuse and pollution can make it unfit for human use.
- ▶ Pollution—untreated sewage dumped into it—germs cause diseases—pesticides and industrial waste pollute it with nitrates, metals, pesticides.
- ▶ Save water—must develop ways to treat sewage to save water—link rivers to divert surplus water—check lowering of water table due to excessive use of groundwater by increasing surface storage.
- ▶ Irrigation—by open channels from rivers ineffective as only 30% used by plants, rest lost—lesser water consumed by sprinkle or drip irrigation—check wastage in distribution and use by industries.
- ▶ Water harvesting—essential for water conservation.

## Soil Resources

- ▶ Soil—the loose material on Earth’s surface on which plants and roots grow—includes weathered rocks, organic materials, water and air.
- ▶ Mineral matter—sand and clay—Organic matter—decayed leaves, dead tissues of organisms, minute bacteria and earthworms.
- ▶ Rocks—agents of weathering—broken into smaller pieces—thin layer of broken rock fragments cover the underlying rock—upper layer may remain undisturbed for a long time—over time chemical and organic changes lead to soil formation.
- ▶ Bedrock—underlying rock and rocks from which soil formed is called parent rock.
- ▶ Process of soil formation—soils formed by physical, chemical and organic changes in the soil layer—process controlled by climatic conditions; nature of parent rock; topography of the area; type of vegetation; and time—climate most important factor—affects weathering, nature of vegetation and moisture in soils.
- ▶ Soil formation—slow process, may take thousands of years—forms layers called horizons as it develops—make up soil profile—in mature soil four distinct horizons A, B, C and D from top down:
  - Horizon A—topsoil—has most of the minerals and organic materials required for the growth of plants.
  - Horizon B—subsoil—enough minerals but less organic matter—may have some living organisms—Horizons A and B form the true soil.
  - Horizon C—partly weathered rocks—these rocks are actually producing new soil—this layer not affected by biological processes.
  - Horizon D—below Horizon—contains unbroken solid rocks.

## Soil Erosion and Conservation

- ▶ Soils usually classified as a renewable resource—but takes thousands of years to produce rich, fertile soils and just a few years for soil to lose fertility—unsound agricultural methods, like over-tilling, ploughing without considering contours of the land, erosion

by wind and running water, etc.–also erosion caused by deforestation, over-grazing, careless road building and urbanisation–soil exhausted without rotation and periodic fallow.

- ▶ Extensive soil loss and damage in many places–unable to produce crops–especially significant where population increased faster than food production–pattern of soil erosion and misuse found everywhere.
- ▶ Improvement–once eroded, almost impossible to restore fertility to former condition–depleted soil can be improved to some extent by following methods:
  - Mulching: Covering bare part of field with straw to prevent quick evaporation and blowing away of soil by wind.
  - Contour barrier: Barriers of stone and grass set along contours and trenches dug in front of barriers to collect water.
  - Rock dams: Building dams across gullies to check water flow. Can check flood water flow and fill gullies with silt.
  - Terrace farming: Developing a series of wide steps on steep slopes for growing crops. Reduces surface run-off of the water.
  - Inter-cropping: Different crops grown in alternate rows and also sown at different times–soil protected from rain-wash as field remains under some crop throughout the year.
  - Contour ploughing: Fields ploughed and sown along natural contours instead of up and down the hill–forms a natural barrier to water flow down the slope
  - Shelter belts: Rows of trees planted along margins of field to retard wind velocity and prevent soil from blowing away.

## Assessment Corner

### Oral Assignment

- A. Ask for answers at random from the students. Confirm the right answers. Let them write down the correct answers if they like in their books.

### Written Assignment

- B–E. The teacher has two options–(i) Either do these exercises orally first and then ask the students to write them down. OR (ii) Ask the students to write the answers on their own. Then the teacher can announce the correct answers from the students and they can ask their partners to cross-check them.

In either case, the answers can be written as homework and the teacher can check them in the class.

### Think Tank

- F. **HOTS questions:** Discuss the questions in the class and let the students write the answers to F and G as homework. Teacher should assess individual work.