**Nalanda Open University**

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**E-CONTENT9**

for

Part-I Examination, 2020

**SHORT DESCRIPTION OF THE SUGGESTED TOPICS**

**THEORY PAPER**

**PAPER – V**

**(NATURAL RESOURCE & THEIR CONSERVATION)**

1. **Natural resources – Introduction and Definition. Salient features of Natural Resources.**

**Natural Resources:**

Life on the earth is possible because it has all the essential resources that are needed for the life and growth of different life forms. Everything from the nature which organisms use to fulfill their needs is called a Natural Resource. Air, water and land are the three basic natural resources which all creatures use for life and sustenance. Forests, rocks, minerals, sunshine, rain, coal and petroleum are other important natural resources. From them we obtain energy and various raw materials used in producing commodities that help us to lead a comfortable and secured life. Every man made product is composed of natural resources (at its fundamental level). A natural resource may exist as a separate entity such as fresh water, air as well as any living organism such as fish or it may exist in alternate form that must be processed to obtain the resource such as metal ores, rare earth elements, petroleum and most forms of energy. “Natural resources are the resources that exist without actions of human kind”. In other words humans cannot make natural resources distend. Instead they use and modify natural resources in ways that are beneficial to them.

**Note:** For salient features of Natural Resources it is a suggested to consult Study Learning Material (SLM) of Environmental Science, Part I, Paper III. Other resource materials may also be consulted if so felt necessary.

1. **Forest Resources: Type of Forest in India and their spatial pattern.**

**Forest Resources:**

**Forest – our Natural Treasure:**

A forest is an extensive area of land with a thick growth of trees and bushes. It contains a wide variety of organisms. Thus, forests represent a well-organized community of flora and fauna on the earth. Forests are natural treasures (i.e. resources) providing us with a wide variety of essential communities for our use. Forests are the natural habitats of a wide variety of plants and animals, protecting them against the weather and the sun. They play a vital role in maintaining the oxygen supply in the air we breathe, in regulating the climate, controlling floods and preventing soil erosion, silting and landslides. Moreover, a forest is a beautiful place and adds aesthetic value to the environment.

**Types of Forest in India and their spatial pattern:**

Owing to adequate rainfall in most part of our country which supports the growth of trees and shrubs, the natural vegetation of India consists largely of forests. Based on variations in rainfall, temperature and nature of vegetation (trees and shrubs) there are five types of forests in our country. They are:

1. Tropical rainforests
2. Tropical deciduous forests
3. Thorn forests
4. Tidal forests, and
5. Coniferous forests
6. **Tropical rainforests:** Tropical rainforests, also called evergreen forests are found in regions of heavy rainfall (more than 200 cm per annum) where the climate is warm and wet throughout the year. The trees in these forests do not shed all their leaves and so the forest is green throughout the year. In these forests trees grow fast and may reach heights up to 60 meters. The commercially useful trees of these forests are bamboo, mahogany, rosewood, cinchona and wild rubber. The Western Ghats, plains of Odisha, West Bengal, the Northeastern states and the Andaman and Nicobar Islands have these forests.
7. **Tropical deciduous forests:** These forests also called monsoons forests, cover a large part of the country which has an annual rainfall between 75 cm and 200 cm per annum. They are called deciduous because the trees shed their leaves regularly for 6-8 weeks in the summer and regain their leaf cover in the rainy season. Among the commercially important trees of these forests are teak, sal, shisham and sandal wood. These forests are found in the Western Ghats and the Chota Nagpur Plateau covering Madhya Pradesh, Uttar Pradesh, Jharkhand and Odisha. These trees shed their leaves once a year.
8. **Thorn Forests:** These forests are found in the arid regions of Rajasthan, Gujarat, Maharashtra, Karnataka, Andhra Pradesh, Madhya Pradesh, Punjab and Western Uttar Pradesh where the annual rainfall is low (less than 75 cm per annum). Vegetation in these forests is of short trees which include babul, khair, date, palm and Kikar which can survive in dry conditions. These forests merge into area of scrubs and thorny bushes.
9. **Tidal Forests:**These forests grow in deltas (tidal swamps) along the sea coasts where rivers meet the seas. These forests have the special types of trees which grow in saline water and swampy places. These forests are found in the coastal regions of Tamilnadu, Odisha and Andhra Pradesh where rivers meet the seas. The Sundarbans are the best known Tidal Forests in the Ganga – Brahmaputra delta. The name has been given after Sundari, a well-known mangrove tree which grows abundantly in this dalta.
10. **Coniferous Forest:** These forests also called Mountain Forests are found on the slopes of the Himalayan region and on the higher hills of Peninsular India. They are tall-tree forests. The leaves of these trees are narrow in shape like needles. The wood is soft and is used for making paper and matchsticks.

About 100 years ago, there were plenty of dense forests in our country. But to meet the food and shelter requirements of the fast increasing population, and to satisfy the greed to have more and more forest produce, trees have been cut down recklessly without any parallel plantation drive. The result is that only 24.5 percent of the geographical area of our country (as of 2019) is under forests, which is much below the world standard of 33 percent.

1. **Meaning of Deforestation, main causes behind the large scale destruction of forest areas in modern times, Afforestation as an essential measure to conserve forests.**

**Meaning and Main causes of Deforestation:**

Deforestation is the removal of forest or stand of trees from land which is then converted to a non-forest use. Deforestation can involve conversion of forest land to farms, ranches or urban use.

In recent years, there has been unprecedented depletion of forest and grassland resources all over the globe. According to an estimate, four-fifth (i.e. about 80%) of the earth’s forests has already been cleared, fragmented or otherwise degraded. On an average, 16 million hectare of forests is felled every year. India’s forest cover was about 40% of the total land area only a century ago. This has declined to about 24.5 percent (as of 2019) due to various environmentally hostile human activities. India is losing forest cover at the ratio of more than 1.5 million hectare each year. This means that about 1 percent of the surface area of the country is turning barren every year.

**Main causes of Deforestation:**

Causes of deforestation can be natural as well as anthropogenic. Natural causes include hurricanes, forest fire, parasites and floods. But the major causes behind large scale destruction of forests have been human activities. Main causes of deforestation due to human activities can be put under the following headings:

1. Food and dwelling space for fast growing population.
2. Urbanization and industrialization.
3. Livestock ranching.

Let us elaboration them in some detail:

1. **Fast Growing Population:** The world now sustains a whopping population of 7 billion and counting. For a fast growing population the demand for more food and more dwelling space has increased enormously. To meet the demands more land is needed for agriculture and for houses for which forests have been cut ruthlessly.
2. **Urbanization and Industrialization:** urbanization and industrialization have led to the construction of roads, rail tracks, bridges, dams, factories, industrial establishments and mining activities. All such activities and excessive use of timber, firewood and other forest products have led to rapid shrinking of the world’s forest cover i.e. deforestation and desertification on an unprecedented scale.
3. **Livestock Ranching:**  Forests cleaning for livestock ranching is another contributor of deforestation. A strong global demand for beef and meat of other animals, supported by the governments of many countries is a contributory factor to expanding this kind of deforestation.

Among some other indirect causes of deforestation include insufficient political actions and governance failure as inadequate land tenure system, corruption in public life, wrong public administration so also military conflicts and climate changes.

**Afforestation: An essential measure to conserve forests:**

Afforestation is the process of planting trees, or sowing seeds in a barren land devoid of any trees and shrubs to create a forest. By planting trees and creating forests, many of the commercial needs of human beings are fulfilled. Thus while not destroying further the existing forests, afforestation aims at increasing forest cover and thus help stop overexploitation of the existing forest resources.

In today’s scenario, afforestation which is being propagated by the Government and Non-Government agencies of many countries is mainly done for commercial purposes. In a natural forest, the trees are heterogeneous. Owing to the sensitivity to over usage and slow growths, these forests cannot be used continuously for commercial purposes like wood products. The process of planting in empty lands helps promote the fast propagation of specific types of trees for the wood industry. With the increasing demand for wood fuels and building materials this process helps to meet these demands without cutting down the natural forests. Deforestation can lead to the depletion of trees in water catchments and riverside zones. Afforestation ensures trees and plants that holds the soil in these sensitive areas remain protected.

In many countries the practice of planting trees along with agricultural crops in croplands, called Agroforestry, is being promoted and practiced.

In facts agroforestry is a component of social forestry which is a kind of afforestation programme. First launched in1976 by the National Commission on Agriculture, Govt. of India, social forestry is an afforestation programme “By the people and for the people”. It aims at growing trees and shrubs on fallow, waste and degraded land to provide firewood, fodder, timber and minor forest products thus lessening pressure on natural forest destruction. Different components of social forestry are Farm Forestry, Community Forestry, Extension Forestry, Urban Forestry and Agro Forestry.

1. **Importance of water resources for human beings.**

Water – A precious natural resource after air, water is the next prime natural resource essential for sustenance of life on the earth. Life without water is beyond our imagination. This natural resource is available in abundance on the earth. About 71 percent of the earth’s surface is covered with water. Owing to the abundance of this natural resource on the earth our planet is called “The Blue Planet”. However, though the earth has a huge stock of water, only a small fraction (about 3 percent) consists of fresh water suitable for human consumption.

**Importance of water:**

1. Water is the basis of life. Be it for a unicellular microscopic organism such as bacteria, protozoa or fungi, or for a giant animal such as elephant, water is equally important for the continuation of life. All living organisms contain 70 – 90 percent of water. About 70 percent of the human body is water. Plant tissues also contain a large amount of water.

Water is a vital medium for regulating the human body mechanism.

1. It helps digest food in the stomach
2. It regulates body temperature by the process of sweating, and
3. It facilitates absorptions of nutrients in blood and their transportation to various parts of the body.

In fact, the metabolic reactions of all living beings occur in an aqueous medium.

1. Water is essential for vegetation. It helps in germination of seeds. Plants have their roots buried in soil. They suck water for their growth through their roots in the soil. Water is used by plants as a medium for movement of nutrients from the soil to different parts of the plant including their leaves.
2. Water helps plants prepare food for themselves and for all animals on the earth by a process known as Photosynthesis. All green plants contain chlorophyll in their leaves. In the presence of this pigment plants convert carbon dioxide, water and energy from the sun light into carbohydrate which is the food (energy source) of plants and animals.
3. The other uses of water in different activities of human beings are:
4. For drinking, cooking, bathing, washing clothes and gardening.
5. For agriculture and industries on a large scale.
6. For power generation in hydroelectric and thermal power stations.
7. For facilitating transport across big rivers and oceans.
8. Water plays an important role in the weathering of rocks which leads to soil formation.
9. Oceanic water influences the climate of coastal regions.
10. Water – a habitat of plants and animals:

Water provides the habitat for diverse range of flora and fauna.

1. **Life in fresh water:** From stagnant ponds to running streams and rivers fresh water areas everywhere are alive with life. Fresh water ponds provide a home for a wide variety of aquatic plants, insects and animals. Pond life includes unicellular organisms, insects, plants and algae, fish, snails and worms. Ponds are suitable water bodies for studying fresh water habitats because ponds are located everywhere and are usually small enough to study.

Different types of creatures can be found in streams and rivers. Organisms found in rivers and streams include green plants, microorganisms, benthos, periphyton and nektons.

1. Life in the seas and oceans: Wide stretches of the sea and oceanic water on the surface of the earth provide a vast habitat for various kinds of flora and fauna. Sea water contains an abundance of phytoplankton such as algae as well as fish, snakes, turtles and crabs, and marine mammals.
2. **Various types and sources of water resources.**

**Availability of water on the Earth:** After air, water is the next prime natural resource essential for sustenance of life on the earth. The totality of water on earth is called the Hydrosphere. It includes all the seas, oceans, rivers, lakes, ground water, glaciers and water vapour. Water (liquid H2O) is the main component of the hydrosphere. This natural resource is found in abundance on the earth. More than 70 percent of the earth’s surface is covered with water. But only a small fraction of water on the earth is fresh water suitable for human consumption. Of the total water on the earth 97 percent is present in oceans, 2 percent is locked in the polar ice caps and only 1 percent is available as fresh water in rivers, lakes, streams, reservoirs and as ground water which is suitable for human consumption. Thus if the entire water on the earth is put in sixteen cups, fresh water would equal just over a tablespoon

**Sources of Water:**

There are varieties of sources on the earth from which we get water for our use. Most of the water on earth comes from precipitations which fall on the earth in the form of rain, snow and dew.

Sources of Water

[I]. Fresh Water Sources [II]. Marine Water Sources

* 1. Surface Water Sources b. Ground Water Sources a. Seas
     1. Rain Water i. Wells and Tube wells b. Oceans
     2. Rivers and Streams ii. Springs
     3. Lakes and Ponds

1. **Fresh Water Sources:**
2. **Surface water Sources:** Water (mainly rain water) which flow over the earth’s surface and is easily available for direct consumption is called Surface water.

Different sources of surface water are as briefly described below:

1. **Rainwater:** One of the major sources of fresh water is rainwater. Rain water is the purest form of natural water and is tasteless. The first showers of rainwater are not so pure because they carry dust particles, germs, bacteria and some gases present in the atmosphere. A large part of agricultural land in our country depends upon rainwater for irrigation. Most of the rivers of our country and dams are rain fed. Although, we get most of the rainwater during the monsoon period (2-3 months in a year), this water gets stored in lakes, ponds, canals and rivers for our use for a long period of time. Though we have many natural lakes, a number of artificial lakes have also been dug to store rain water for supply to nearby areas.
2. **Streams and Rivers:**  Streams are small surface water bodies which have less water than rivers available for use. In hilly regions they are important sources of water.

Rivers are the most important source of surface water. It is known that in the past most civilizations developed and flourished along the banks of rivers. Even today, a number of cities of the modern world are situated along river banks or nearby rivers. In general, rivers are fed by rain during the rainy season and by melting snow during the summer season. Rivers such as Ganga and the Brahmputra have water flowing throughout the year because they originate from the Himalayas. Many Indian rivers that are only rain fed become dry or have very little water during the summer months.

Rivers are the source of our public drinking water supply and water for irrigation and industry. In some cases water from dams constructed at suitable places on various rivers is used for generating electricity.

1. **Lakes and Ponds:**  A pond may be defined as a standing water body in a natural depression formed on the earth’s surface. A pond may be man-made as well. The difference between a pond and a lake is of size. If the size of the depression is comparatively small it is called a Pond and if, large, it is called a Lake. Generally surface run off from rainwater is the source of water for ponds and lakes. In the still water of a lake or pond the presence of microorganisms and vegetation (algae, weed and other plants) cannot be ruled out. In some cases the water is muddy. Water from lakes and ponds can be supplied for consumption only after proper water treatment.
2. **Ground Water Sources:** Water found in the space between different soil layers and cracks in rocks located underground is called Groundwater. Rainwater is the main source of groundwater. When it rains, a part of the rainwater percolates into the soil and collects over the hard rock layer. Ground water undergoes natural filtration as it passes through the different layers of the soil. For this reason ground water is in general, free from impurities and is used for drinking purposes, in industry and for irrigation.
3. **Wells and Tube wells:** It has been a long standing practice to tap ground water by digging wells. The depth of wells varies from place to place. In conventional wells the mouth of the well is left open and water is drawn by bucket and rope arrangement. Well water may contain certain soluble and biological impurities. In recent year bore wells (tube wells) have become common both in urban as well as rural areas. Through bore wells one can pump out water from deeper layers of earth than ordinary wells. With technological advancements and due to overutilization of ground water for drinking, industrial and irrigation purposes, the water table (i.e. the level of ground water) is gradually falling, which is a matter of great concern.
4. **Springs:** The natural outflow of ground water at the earth’s surface through natural openings in the earth’s crust forms a spring. Spring water usually has salts and minerals dissolved in it. Certain springs discharge hot water. Water in the form of ice is also present in the Arctic and Antarctic regions. However these sources are usually not used for human consumption.
5. **Marine Water Sources**
   * + - 1. **Seas and Oceans:** These are the largest source of marine water. All rivers finally make their way to the seas and oceans, which are the largest natural reservoirs of water on earth. But sea water is not fit for drinking or for agricultural and industry because of its salinity. Sea water is saline due to the presence of dissolved common salt and the salts of potassium, magnesium, and calcium in it. Sea water contains about 3.5 percent of these dissolved salts by weight.

Sea water can be used for drinking or in agriculture or industry only after its desalination (that is, removal of salts from it). Similarly ice and snow can be used if the need arises for drinking purposes, after they are melted and then mixed with a few essential salts.