**Natural Resources**

**[Natural Resources:**

**a) Natural resources and associated problems: Forest resources:** Use & Over-exploitation, case study, timber extraction, mining, dams and their effects on forests and tribal people.; **water Resources:** use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam’s benefits and problems; **Mineral Resources:** Use and exploitation**,** changes caused by agriculture & overgrazing, effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity, case studies**. Energy Resources:** Growing energy needs, renewable &non-renewable energy sources, use of alternate energy sources, case studies**;** **Land Resources:** Land as a resource, land degredation, man induces land slides, soil erosion, and desertification.

**b) Role of individual in conservation of natural resources.**

**c) Equitable use of resources of sustainable life style.]**

**Natural Resources:-**

Which Resources obtained from nature, i.e. from the earth are called natural resources.

or

Natural resources are materials from the Earth that are used to support life and meet people’s needs.

*Natural resources are materials available on the planet that can be used to keep people alive and meet their needs. They include****oil, coal, natural gas, metals, stone, sand, air, sunlight, soil, and water****. Natural resources may also include animals, birds, fish, and vegetation.*

**types of natural resources:**

Based on the availability are two types of natural resources:

**1) Renewable** **resources:** Which resources that are available in infinite quantity and can be used repeatedly are called renewable resources & despite being consumed or can replenish themselves over a period of time Example: Forest, wind, water, etc.

**2) Non-Renewable resources:** resources that are limited in abundance due to their non-renewable nature and whose availability may run out in the future are called non-renewable resources. Examples include fossil fuels, minerals, etc.

**3) Perpetual resource:- Perpetual resources are**[**renewable resources**](https://economicpoint.com/renewable-resources)**that cannot be exhausted, regardless of their rate of use.**

**For eg:- Sun, wind, tidal, geothermal etc.**

**Difference between Renewable and Non-Renewable Resources:-**

|  |  |  |
| --- | --- | --- |
| **S. No.** | **Renewable resource** | **Non-renewable resource** |
| **1.** | It can be renewed as it is available in infinite quantity. | Once completely consumed, it cannot be renewed due to limited stock |
| **2.** | Sustainable in nature. | Exhaustible in nature. |
| **3.** | Low cost and environment-friendly | High cost and less environment-friendly |
| **4.** | Replenish quickly. | Replenish slowly or do not replenish naturally at all |

* The 5 Most Important Natural Resources are:

**1. Air:** Clean air is important for all the plants, animals, humans to survive on this planet. So it is necessary to take measures to reduce air pollution.

**2. Water:** 70% of the Earth is covered in water and only 2 % of that is freshwater. Initiative to educate and regulate the use of water should be taken.

**3. Soil:** Soil is composed of various particles and nutrients. It helps plants grow.

4. **Iron:** It is made from silica and is used to build strong weapons, transportation, and buildings

5. **Forests:** As the population increases, the demand for housing and construction projects also increases. Forests provide clean air and preserve the ecology of the world.

### *Stage of Development*

* ***Potential resources****: Resources that are known to exist, but have not been utilized yet. These may be used in the future. For example,*[*petroleum*](https://en.wikipedia.org/wiki/Petroleum)*in sedimentary rocks that, until pulled out and put to use remains a potential resource.*
* ***Actual resources****: Resources that have been surveyed, quantified and qualified, and are currently used in development. These are typically dependent on technology and level of their feasibility. E.g.:*[*Wood processing*](https://en.wikipedia.org/wiki/Wood_processing)
* ***Reserves****: The part of an actual resource that can be developed profitably in the future.*
* ***Stocks****: Resources that have been surveyed, but cannot be used due to lack of technology. E.g.:*[*Hydrogen vehicles*](https://en.wikipedia.org/wiki/Hydrogen_vehicle)*.*

What is associated with natural resources?

**Oil, coal, natural gas, metals, stone and sand** are natural resources. Other natural resources are air, sunlight, soil and water. Animals, birds, fish and plants are natural resources as well. Natural resources are used to make food, fuel and raw materials for the production of goods.

**Forest Resources**

Forest is important renewable resources. Forest vary in composition and diversity and can contribute substantially to the economic development of any country. Plants along with trees cover large areas, produce variety of products and provide food for living organisms, and also important to save the environment.

It is estimated that about 30% of world area is covered by forest whereas 26% by pastures (Grassland). India’s Forest Cover accounts for 20.6% of the total geographical area of the country as of 2005.

Forests are the dominant terrestrial ecosystem of Earth, and are distributed across the globe. Forests account for 75% of the gross primary productivity of the Earth's biosphere, and contains 80% of the Earth's plant biomass.

A forest constitutes many components that can be broadly divided into two categories that are biotic (living) and abiotic (non-living) components. Forest is made up of many layers such as forest floor, understory, canopy, and emergent layer.

Forests can be classified in various ways such as Boreal, Temperate, Tropical types with their numerous subtypes. Due to increasing population and consequential expansion of modern civilization, there has been continuous depletion of natural forests over the centuries.

Over the past 25 years, global carbon stocks in forest biomass have decreased by almost 11 gigatonnes (Gt). This reduction has been mainly driven by conversion to other land uses and to a lesser extent by forest degradation.

**Usefulness (Uses) of Forest Resources:-**

1. Forest is an important natural resource. Forests are vital for the ecological balance and play an important role in temperature regulation in the atmosphere.

2. Forests are natural and vast reservoir of food and shelter for animals. They provide natural habitats for numerous species of plants, animals and micro-organisms.

3. Forests provide timber, bamboo, canes, leaves, grass, oil, resins, gums, shellac, tanning materials, dyes, hides, fur, fruits, nuts, roots, tubers and other useful things for human beings.

4. Forests provide raw materials for forest-based industries.

5. Forests are the natural home to medicinal herbs and plants.

6. Forest directly or indirectly affects the climate (temperature, precipitation, moisture, underground water-table).

7. Forests prevent floods and soil erosion, land degradation and improve the quality of air and water.

8. Forests help in purifying air, water, and soil pollution.

**Significance/ Importance/ values of forests:-**

Forest can provide prosperity of human being and to the nations. Important uses of forest can be classified as under

1. Commercial values

2. Ecological significance

3. Aesthetic values and Beauty

4. Life and economy of tribal

**1. Commercial values:-**

i) Forests are main source of many commercial products such as wood, timber, pulpwood etc. About 1.5 billion people depend upon fuel wood as an energy source. Timber obtained from the forest can used to make plywood, board, doors and windows, furniture, and agriculture implements and sports goods. Timber is also a raw material for preparation of paper, rayon and film.

ii) Forest can provide food , fibre, edible oils and drugs.

iii) Forest lands are also used for agriculture and grazing.

iv) Forest is important source of development of dams, recreation and mining.

**2. Life and economy of tribal:-**

Forest provide food, medicine and other products needed for tribal people and play a vital role in the life and economy of tribes living in the forest.

**3. Ecological uses:-**

Forests are habitat to all wild animals, plants and support millions of species. They help in reducing global warming caused by green house gases and produces oxygen upon photosynthesis.

Forest can act as pollution purifier by absorbing toxic gases. Forest not only helps in soil conservation but also helps to regulate the hydrological cycle.

**4. Aesthetic values:-**

All over the world people appreciate the beauty and tranquillity of the forest because forests have a greatest aesthetic value. Forest provides opportunity for recreation and ecosystem research.

**Over exploitation of forests:**

Forests contribute substantially to the national economy. With increasing population increased demand of fuel wood, expansion of area under urban development and industries has lead to over exploitation of forest .At present international level we are losing forest at the rate of 1.7 crore hectares annually. Overexploitation also occurs due to overgrazing and conversion of forest to pastures for domestic use.

* Deforestation
* Soil/ land extinction
* Soil erosion
* Desertification
* Lack of ground water table
* Irregulation of climate
* Flood/ drought

**Deforestation:-**

* Forest are burned or cut for clearing of land for agriculture ,harvesting for wood and timber , development and expansion of cities .These economic gains are short term where as long term effects of deforestation are irreversible
* Deforestation rate is relatively low in temperate countries than in tropics If present rate of deforestation continues we may losses 90% tropical forest in coming six decades
* For ecological balance 33% area should be under forest cover but our nation has only 20.6% forest cover.

**1. Causes of deforestation:-**

Forest area in some developed area has expanded. However in developing countries area under forest is showing declining trend particularly in tropical region. Main causes of deforestation are---

**a) Shifting cultivation or jhum cultivation:-**

This practise is prevalent in tribal areas where forest lands are cleared to grow subsistence crops. It is estimated that principle cause of deforestation in tropics in Africa, Asia and tropical America is estimated to be 70, 50, and 35% respectively. Shifting cultivation which is a practice of slash and burn agriculture are posses to clear more than 5 lakh hectares of land annually. In India, shifting cultivation is prevalent in northeast and to limited extent in M.P, Bihar, Jharkhand and Andhra Pradesh and is contributing significantly to deforestation.

**b) Commercial logging:-**

It is a important deforestation agent. It may not be the primary cause but definitely it acts as secondary cause, because new logging lots permits shifting cultivation and fuel wood gatherers access to new logged areas.

**c) Need for fuel wood:-**

Increased population has lead to increasing demand for fuel wood which is also acting as an important deforestation agent, particularly in dry forest.

**d) Expansion for agribusiness:-**

With the addition of cash crops such as oil palm, rubber, fruits and ornamental plants, there is stress to expand the area for agribusiness products which results in deforestation.

**e) Development projects and growing need for food:-**

The growing demand for electricity, irrigation, construction, mining, etc. has lead to destruction of forest. Increased population needs more food which has compelled for increasing area under agriculture crops compelling for deforestation.

**f) Raw materials for industrial use:-**

Forest provides raw material for industry and it has exerted tremendous pressure on forest. Increasing demand for plywood for backing has exerted pressure on cutting of other species such as fir to be used as backing material for apple in J&K and tea in northeast states.

**2. Major effects of deforestation**

Deforestation adversely and directly affects and damages the environment and living beings .Major causes of deforestation are

* Soil erosion and loss of soil fertility.
* Decrease of rain fall due to affect of hydrological cycle.
* Expansion of deserts.
* Climate change and depletion of water table.
* Loss of biodiversity ,flora and fauna.
* Environmental changes and disturbance in forest ecosystems.

**Case studies:-**

**Case Study-1. Jhum/ Sifting cultivation**

Jhum Agriculture or shifting agriculture has destroyed large number of hectare of forest tracts in North-Eastern states and Orissa. Jhum agriculture is subsidence agriculture in which tract of forest land is cleared by cutting trees and it is used for cultivation. After few years, when productivity of the land decreases, cultivators abandon the land and clear next tract. As a result of this practise, combined with increasing population there is rapid deforestation as more and more cultivators clear forest to cultivate land. Also, with increase in population there is cultivators are forced to return to previous tracts of land in relatively shorter durations, not allowing the land to regain its productivity.

**Case Study-2. Chipko movement (Aapiko movement)**

The Chipko movement or Chipko Andolan is a social-ecological movement that practised the Gandhian methods of satyagraha and non-violent resistance, through the act of hugging trees to protect them from being felled. The modern Chipko movement started in the early 1970s in the Garhwal Himalayas of Uttarakhand,with growing awareness towards rapid deforestation. The landmark event in this struggle took place on March 26, 1974, when a group of peasant women in Reni village, Hemwalghati, in Chamoli district, Uttarakhand, India, acted to prevent the cutting of trees and reclaim their traditional forest rights that were threatened by the contractor system of the state Forest Department. Their actions inspired hundreds of such actions at the grassroots level throughout the region. By the 1980s the movement had spread throughout India and led to formulation of people-sensitive forest policies, which put a stop to the open felling of trees in regions as far reaching as Vindhyas and the Western Ghats.

**Case Study-3. Western himalayan region.**

Over the last decade, there has been widespread destruction and degradation of forest resources in Himalayas, especially western Himalayas. This has resulted in various problems such as erosion of top soil, irregular rainfall, changing weather patterns and floods. Construction of roads on hilly slopes, have not only undermined their stability, but also damaged protective vegetation and forest cover. Tribes in these areas are increasingly facing shortage of firewood and timber, due large scale tree cutting. Increased traffic volumes on these roads leads to increased pollution in the area.

**Timber extraction**

There has been unlimited exploitation of timber for commercial use. Due to increased industrial demand; timber extraction has significant effect on forest and tribal people.

Logging(लकड़ी का लट्रठा):

* Poor logging results in degraded forest and may lead to soil erosion especially on slopes.
* New logging roads permit shifting cultivators and fuel wood gatherers to gain access to the logging area.
* Loss of long term forest productivity.
* Species of plants and animals may be eliminated.
* Exploitation of tribal people by contractor.

**Mining:-**

Major effects of mining operations on forest and tribal people are:

* Mining from shallow deposits is done by surface mining while that from deep deposits is done by sub-surface mining. It leads to degradation of lands and loss of top soil. It is estimated that about eighty thousands hectare land is under stress of mining activities in India
* Mining leads to drying up perennial sources of water sources like spring and streams in mountainous area.
* Mining and other associated activities remove vegetation along with underlying soil mantle, which results in destruction of topography and landscape in the area. Large scale deforestation has been reported in Mussorie and Dehradun valley due to indiscriminating mining.
* The forested area has declined at an average rate of 33% and the increase in non-forest area due to mining activities has resulted in relatively unstable zones leading to landslides.
* Indiscriminate mining in forests of Goa since 1961 has destroyed more than 50000 ha of forest land. Coal mining in Jharia, Raniganj and Singrauli areas has caused extensive deforestation in Jharkhand.
* Mining of magnetite and soapstone have destroyed 14 ha of forest in hilly slopes of Khirakot, Kosi valley and Almora.
* Mining of radioactive minerals in Kerala, Tamilnadu and Karnataka are posing similar threats of deforestation.
* The rich forests of Western Ghats are also facing the same threat due to mining projects for excavation of copper, chromites, bauxite and magnetite.

**Effects of dams on forests and tribal people:**

Pandit Jawaharlal Nehru referred dam and valley projects as “Temples of modern India”. These big dams and rivers valley projects have multi-purpose uses. However, these dams are also responsible for the destruction of forests. They are responsible for degradation of catchment areas, loss of flora and fauna, increase of water borne diseases, disturbance in forest ecosystems, rehabilitation and resettlement of tribal peoples.

* India has more than 1550 large dams, the maximum being in the state of Maharashtra (more than 600), followed by Gujarat (more than 250) and Madhya Pradesh (130).
* The highest one is Tehri dam, on river Bhagirathi in Uttaranchal and the largest in terms of capacity is Bhakra dam on river Satluj in Himachal Pradesh. Big dams have been in sharp focus of various environmental groups all over the world, which is mainly because of several ecological problems including deforestation and socio-economic problems related to tribal or native people associated with them.
* The Silent valley hydroelectric project was one of the first such projects situated in the tropical rain forest area of Western Ghats which attracted much concern of the people.
* The crusade against the ecological damage and deforestation caused due to Tehri dam was led by Shri. Sunder Lal Bahaguna, the leader of Chipko Movement.
* The cause of Sardar Sarovar Dam related issues have been taken up by the environmental activitist Medha Patkar, joined by Arundhati Ray and Baba Amte. For building big dams, large scale devastation of forests takes place which breaks the natural ecological balance of the region.
* Floods, droughts and landslides become more prevalent in such areas. Forests are the repositories of invaluable gifts of nature in the form of biodiversity and by destroying them (particularly, the tropical rain forests), we are going to lose these species even before knowing them. These species could be having marvellous economic or medicinal value and deforestation results in loss of this storehouse of species which have evolved over millions of years in a single stroke.

**Forest conservation and management:-**

Forest is one of the most valuable resources and thus needs to be conserved. To conserve forest, following steps should be taken.

1. Conservation of forest is a national problem, thus it should be tackled with perfect coordination between concerned government departments.

2. People should be made aware of importance of forest and involved in forest conservation activities.

3. The cutting of trees in the forests for timber should be stopped.

4. A forestation programmes should be launched

5. Grasslands should be regenerated.

6. Forest conservation Act should be strictly implemented to check deforestation.

7. Awards should be instituted for the deserving.

**Forest conservation and management act-----------?**

**Water Resources**

Water is a vital elixir (अमृत) for all living beings. Although it is a renewable resource, scarcity of quality water is felt in many parts of the world. We need water to grow food, keep clean, generate electricity, control fire, and last but not the least, we need it to stay alive.

Water is an indispensable resource for life on earth. Approximately 75 % surface of earth is covered with water in the form of oceans.Ocean water is saline and not fit for human consumption. Out of this, about 97% is not fit for human consumption, about 2% is locked as a glacier and only less than 1% available as fresh water that can be used for human consumption and other uses. As a result, water is very scarce.

Steps need to be taken to conserve water. Water is renewable, but its overuse and pollution make it unfit for use. Sewage, industrial use, chemicals, etc. pollute water with nitrates, metals, and pesticides.

**Water is a very important source and essential for life because it has very unique characteristic** such as---

1. Water exists as liquid over a wide range of temperature 0-1000C with highest specific heat and latent heat of vaporization.

2. Water is excellent solvent and act as carrier of nutrient and helps to distribute them to the cells in the body, regulates the body temperature and support structure and can dissolve various pollutant and can act as carrier of large number of microorganisms

3. It is responsible for hydrological cycle which acts as resource of water to the earth. It is estimated that about 1.4 inch thick layer of water evaporates and majority of water returns to earth through hydrological cycle.

**Applications/ Merits/ Use of Water Resources:-**

Water resources are used for agricultural, industrial, commercial, domestic, recreational, and environmental activities. Majority of the uses require fresh water.

However, about 97 percent of water found on the earth is salt water and only three percent is fresh water. A little over two-thirds of the available fresh water is frozen in glaciers and polar ice caps. The remaining freshwater is found mainly as groundwater and a negligible portion of it is present on the ground or in the air.

Following is a brief account of how water is used in different sectors:-

**Agricultural Use**

Agriculture accounts for 69 percent of all water consumption basically in agricultural economies like India. Agriculture, therefore, is the largest consumer of the Earth’s available freshwater.

By 2050, the global water demand of agriculture is estimated to increase by a further 19% due to irrigational needs. Expanding irrigation needs are likely to put undue pressure on water storage. It is still inconclusive whether further expansion of irrigation, as well as additional water withdrawals from rivers and groundwater, will be possible in future.

**Industrial Use**

Water is the lifeblood of the industry. It is used as a raw material coolant, a solvent, a transport agent, and as a source of energy. Manufacturing industries account for a considerable share in the total industrial water consumption. Besides, paper and allied products, chemicals and primary metals are major industrial users of water.

Worldwide, the industry accounts for 19 percent of total consumption. In industrialized countries, however, industries use more than half of the water available for human use.

**Domestic Use**

It includes drinking, cleaning, personal hygiene, garden care, cooking, washing of clothes, dishes, vehicles, etc. Since the end of World War II there has been a trend of people moving out of the countryside to the ever-expanding cities. This trend has important implications on our water resources.

Government and communities have had to start building large water-supply systems to deliver water to new populations and industries. Of all water consumption in the world, domestic use accounts for about 12 percent.

**Use for Hydropower Generation**

Electricity produced from water is hydropower. Hydropower is the leading renewable source of electricity in the world. It accounts for about 16 percent of total electricity generation globally. There are many opportunities for hydropower development throughout the world.

Today, the leading hydropower generating countries are China, the US, Brazil, Canada, India, and Russia.

**Use for Navigation and Recreation**

Navigable waterways are defined as watercourses that have been or may be used for transport of interstate or foreign commerce. Agricultural and commercial goods are moved on water on a large scale in a number of regions in the world.

Water is also used for recreational purposes such as boating, swimming, and sporting activities. These uses affect the quality of water and pollute it. Highest priority should be given to public health and drinking water quality while permitting such activities in reservoirs, lakes, and rivers.

**Problems associated with water resources:-**

These are some problems associated with use of water—

* Water Scarcity (precipitation/ evapotranspiration balance, temporal availability, per capita availability)
* Floods and droughts (spatio-temporal distribution; regular floods related to heavy winter or spring rains, increasing damage level due to shifting land use (settlements in flood zones) recurrent summer droughts coinciding with peak demand periods for agriculture and tourism).
* Groundwater availability and quality (aquifer size and access, yield, saltwater intrusion, pollution of shallow aquifers).
* Watershed degradation (deforestation, land use, increasing impervious (sealed) areas due to urbanization the main concern here is land use change (primarily deforestation and urbanization) and its effects on runoff patterns (flooding) and water quality including erosion/sediments with subsequent problems such as reservoir siltation/capacity loss).
* Coastal interaction (salinity intrusion in groundwater and estuaries, coastal pollution due to pollution runoff).

**Over-Exploitation of Water:-**

**Groundwater:-**

About 9.86% of the total fresh water resources are in the form of groundwater and it is about 35-50 times that of surface water supplies.

Effects of extensive and reckless groundwater usage:

1. Subsidence

2. Lowering of water table

3. Water logging

**Surface water:-**

Surface water mainly comes directly from rain or snow covers. The various surface sources are natural lakes and ponds, rivers and streams, artificial reservoirs. Availability of surface water decides the economy of the country. On one side surface water availability affects the productivity, but on the other side water sources may cause floods and drought. Due to unequal distribution, water may lead to national (interstate) or international disputes. Sharing of surface water due to these disputes is affecting productivity of different agro eco-zone and creating problems for government.

Recently many water conflicts at national and international levels relating to sharing of surface water are catching the headlines of newspaper.

**Floods & Draughts:-**

Floods and droughts are two well-known natural hazards in the world. The former is due to excess in water flow and the latter is due to scarcity of water.

**Floods:-**

The amount of rainfall received by an area varies from one place to another depending on the location of the place. In some places it rains almost throughout the year whereas in other places it might rain for only few days. India records most of its rainfall in the monsoon season.

Heavy rains lead to rise in the water level of rivers, seas, and oceans. Water gets accumulated in the coastal areas, which results in floods. Floods bring in extensive damage to crops, domestic animals, property and human life. During floods, many animals get carried away by the force of water and eventually die.

**Draughts:-**

On the other hand, droughts set in when a particular region goes without rain for a long period of time. In the meantime, the soil will continuously lose groundwater by the process of evaporation and transpiration. Since this water is not brought back to earth in the form of rains, the soil becomes very dry.

The level of water in the ponds and rivers goes down and in some cases water bodies get dried up completely. Ground water becomes scarce and this leads to droughts. In drought conditions, it is very difficult to get food and fodder for the survival. Life gets difficult and many animals perish in such conditions.

Frequent floods and droughts are mostly due to climate change and global warming. Various environmental organizations world over are of the view that climate change is a long-term change in weather patterns, either in average weather conditions or in the distribution of extreme weather events.

**Major Conflicts over water:-**

Some of the major water conflicts that have become thorn in relations between states and countries are---

**1. Water conflict in the middle east:** Countries involved are Sudan, Egypt and Turkey. It also affects countries which are water starved viz. Saudi Arabia, Kuwait, Syria, Israel and Jordan.

**2. The Indus water treaty:** This Indus water treaty dispute between India and Pakistan is lingering since long.

**3. The Cauvery water dispute:-** It involves two major states of India viz. Tamilnadu and Karnataka.

**4. The Satluj-Yamuna link canal dispute:-** The dispute is between two Northern states viz. Punjab and Haryana and UP, Rajasthan as well as Delhi has also interest in it .

**The Satluj-Yamuna link canal Dispute (Courtesy-DEEP):-** In traditional water management, innovative arrangements ensure equitable distribution of water, which are democratically implemented. These disputes can be solved amicably through ‘Gram Panchayats”, if transparency is maintained. But disputes between countries or states sometimes attain war like situation and are difficult to solve.

**5. Dams - Benefits and Problems:**

Water is a precious resource and its scarcity is increasing at global level. There is a pressure to utilise surface water resources efficiently for different purposes. According to World Commission on Dam Report -2001 there are 45000 large dams spread over 140 countries.

**Major benefits of dams:-**

The major benefits of dams are---

1. Hydroelectricity generation.

2. Year round water supply to ensure higher productivity.

3. Equal water distribution by transferring water from area of excess to area of deficit.

4. Helps flood control and protects soil.

5. Assure irrigation during dry periods.

6. River valley projects provide inland water navigation, employment opportunities and can be used to develop fish hatcheries and nurseries.

7. River valley projects have tremendous potential for economic upliftment and will help to raise the standard of living and can help to improve the quality of life.

**Disadvantages/problems of Dams:-**

Although dams have proved very useful over the centuries but recent past big dams has created lot of human as well as environmental issues ---

1. Submergence of large areas may lead to loss of fertile soil and displacement of tribal people.

2. Salt left behind due to evaporation increase the salinity of river water and makes it unusable when reaches downstream.

3. Siltation and sedimentation of reservoirs not only makes dams use less but also is responsible for loss of valuable nutrients.

4. Loss of non-forest land leads to loss of flora and fauna.

5. Changes in fisheries and the spawning grounds.

6. Stagnation and water logging near reservoir leads to breeding of vectors and spread of vector-borne diseases.

7. Growth of aquatic weeds may lead to microclimatic changes.

**MINERAL RESOURESES**

Minerals Resourses:

“Mineral are naturally occurring elements or compounds that have been formed through slow inorganic processes. Modern civilization is based on the use and exploitation of mineral resources. Minerals can be metallic and non-metallic”.

A mineral is a pure inorganic substance that occurs naturally in the earth’s crust. They have a clear structure and chemical composition. More than three-thousand minerals have been identified and most of these are inorganic, which are formed by the various combination of elements. However, a small proportion of the earth’s crust contains organic materials, consist of single elements such as gold, silver, diamond, and sulfur.

Minerals are not evenly distributed in the Earth. Some countries are rich in mineral deposits whereas others are devoid of it.

More than three-thousand minerals have been identified and most of these contain inorganic compounds formed by various combinations of the eight elements (O, Si, Al, Fe, Ca, Na, K, and Mg) that make up 98.5% of the Earth’s crust. Industry depends on about 80 of the known minerals.

Mineral resources are the key material basis for socio-economic development. Statistical results show that more than 95% of energy used by mankind, 80% industrial raw materials and 70% raw materials for agricultural production are from mineral resources.

Mineral resources can be divided into two major categories -

**Metallic and Non-Metallic**. Metallic resources are things like Gold, Silver, Tin, Copper, Lead, Zinc, Iron, Nickel, Chromium, and Aluminum.

Non-metallic resources are things like sand, gravel, gypsum, halide, Uranium, dimension stone.

**For example of Mineral:**

* Iron is the found in abundance in minerals, but the process of extracting iron from different minerals varies in cost depending on the mineral. It is least costly to extract the iron from oxide minerals like hematite (Fe2O3), magnetite (Fe3O4), or limonite [Fe(OH)3]. Although iron also occurs in olivines, pyroxenes, amphiboles, and biotite, the concentration of iron in these minerals is less, and cost of extraction is increased because strong bonds between iron, silicon, and oxygen must be broken.
* Aluminum is the third most abundant mineral in the Earth's crust. It occurs in the most common minerals of the crust - the feldspars (NaAlSi3O8, KAlSi3O8, & CaAl2Si2O8, but the cost of extracting the Aluminum from these minerals is high. Thus, deposits containing the mineral gibbsite [Al(OH)3], are usually sought.

**Characteristics of Metallic Minerals:-**

1) Metallic Minerals show a metallic shine in their appearance.

2) The potential source of the metal that can be got through mining.

3) Contains metals in their chemical composition.

4) Metallic minerals contain metal in raw form.

**A) Classification of metallic minerals:**

**1) Ferrous metallic minerals:-**

Minerals that contain iron are called ferrous minerals. Example of ferrous minerals is Chromites, Iron ore, and manganese.

**2) Non-ferrous metallic minerals:-**

Minerals that do not contain iron are called non- ferrous minerals. Examples of nonferrous minerals is lead, silver, gold, and copper.

Ore Lead (Pb)- Pyrite- PbS,

Pb2O3

There is a group of chemical elements which when melted do not generate a new product. Such special groups are called Non-metallic minerals. Example: Dimension stone, halite, sand, gypsum, uranium metal, gravel.

**2. Characteristics of Non-metallic Mineral Resources**

i) Minerals appear with a non-metallic shine or lustre

ii) Do not contain extractable metals in their chemical composition

**Uses of Minerals:-**

Use of mineral resources is an integral part and one of the key premises of development worldwide. With rapid increase in population and a more rapid increase in society’s development needs, the requirements for minerals have grown and diversified manifold.

* The use of minerals depends upon its deposits. Some countries are rich in mineral deposits, while others have no deposits. The greatest use of minerals depends on its properties. For instance, Aluminum is light, strong and durable in nature, so it is used for aircraft, shipping, and car industries etc..
* Minerals are used in almost all industries. Gold, silver, and platinum metal are used in the jewellery industry. Copper is used in the coin industry and for making pipes and wire. Silicon obtained from quartz is used in the computer industry.
* Mineral elements give fireworks colour. Barium produces glossy greens; strontium yields dark reds; copper yields blues; and zinc yields sodium. Mixing elements can make many colours: strontium and sodium create bright orange; titanium, zirconium, and magnesium alloys create silvery white; copper and strontium make lavender blue.
* Extraction of minerals is carried out through mining. Minerals are extracted from beneath the surface, processed, and used for different purposes.

Mineral resources, however, are exhaustible and finite, which means excessive use may affect their availability in the future.

**Characteristics of minerals:-**

Minerals are identified with eight main properties:

i) Crystal habit, lustre, hardness, cleavage, break, colour, line, and specific gravity. T

ii) Here is usually no specific diagnostic property that can be used to classify a mineral sample on its own.

**Conservation of Mineral Resources:-**

The total volume of consumable mineral resources is just 1% of all the minerals present in the earth’s crust. However, the consumption rate is so high that these mineral resources which are non-renewable will get exhausted very soon. Here are some measures to conserve minerals:

1) Use of minerals in a planned and sustainable manner.

2) Recycling of metals

3) Use of alternative renewable substitutes.

4) Technology should be improved to use the low-grade ores profitably.

5) Calcium provides bones and teeth with stability and endurance. It also aids in blood coagulation, enzyme regulation, nervous system processing of signals, etc. In transporting oxygen from the lungs to other parts of the body, iron is needed.

Any minerals usually occur as well-developed crystals and are treated in their crystal types. A detailed nomenclature has emerged to classify crystal types, and may be familiar with some common names. Different properties aid in the detection of other minerals. For certain minerals these properties may not be distinguishable enough to aid for their detection. And, they can only be found in some minerals

**Importance of mineral resources:-**

Mineral resources are among the most important natural resources that determine a country’s industrial and economic growth by supplying raw materials to the economy’s primary, secondary and tertiary sectors.

**Exploitation of Mineral Resources:-**

Exploitation of mineral refers to the use of mineral resources for economic growth. Exploitation of mineral resources at a mindless speed to meet the growing needs of modern civilization has resulted in many environmental problems.

Although, the exploitation of minerals began at a slow pace during the industrial revolution in Western countries, during the 20th century, the exploitation of some minerals, especially the fossil fuels increased exponentially to meet the growing energy need. Today, about 80% of the world’s energy consumption is sustained by the extraction of fossil fuels, which consists of oil, coal, and gas.

Mineral resources can be divided into several broad categories such as elements for metal production and technology, building materials, minerals for the chemical industry and minerals for agriculture. When usually we think about mineral resources we often think of metals but the predominant mineral resources are not metallic. The picture of annual world consumption of some elements is as under:

1. Sodium and iron are used at a rate of about 0.1 to 1.0 billion metric tons per year.
2. Nitrogen, sulphur, potassium and calcium are primarily used as fertilizers at a rate of about 10 to 100 million metric tons per year.
3. Zinc, copper, aluminium and lead are used at a rate of about 3 to 10 million metric tons per year;
4. Gold and silver are used at a rate of about 10 thousand metric tons per year.
5. Out of all the metallic minerals, iron consumption is 95% of the metals consumed

**Consequences of Exploitation of Mineral Resources.**

Extracting and use of mineral resources can affect the environment adversely. Environmental affect may depend on factors such as mining procedures, ore quality, climate, size of operation, topography, etc. Some of major environmental impacts (severe problems) of mining and processing operations are as under----

* Deforestation and desertification
* Deforestation affects flora and fauna.
* Degradation of land.
* Extinction of species
* Rapid depletion of high grade minerals
* Forced migration
* Wastage of upper soil layer and vegetation
* Soil erosion and oil depletion
* Ozone depletion
* Greenhouse gas(CFC, CO, CO2 etc.) increase
* Environmental pollution.
* Surface water pollution and groundwater contamination lead to occupational health hazards etc.
* Natural hazards, etc.
* Rehabilitation of affected population.

**Changes caused by agriculture and overgrazing:-**

* Poor environmental agriculture practices such as slash and burn, shifting cultivation degrade the forests.
* The loss of nutrients and overuse of agriculture chemicals are major factors in land degradation.
* The loss of genetic diversity in crop plants is leading to a fall in agriculture produce.
* Modern agriculture practices have resulted in a serious loss of genetic variability of crops. Most of the rice varieties (30 -50,000) in India have been lost.
* Intensive agriculture operations, fossil fuel combustion and widespread cultivation of leguminous crops have led to huge additional quantities of nitrogen. This has increased a variety of ill effects ranging from reduced soil fertility and overfeeding of lakes, rivers and coastal waters.
* Due to increase in population, there is an increase in demand for higher production, which led to increase in agriculture land over the last four decades by converting forest area, marginal and hill areas.

**Modern Agriculture and its impact on the environment**

Agriculture is an important source of livelihood. However, modern irrigation techniques are largely impacting the environment. In this article, we shed some light on modern agriculture and its impact on the environment.

Agriculture is an important source of livelihood because it is the process of producing food, feed, fiber, and many other desired products by the cultivation of plants and the raising of domesticated animals (livestock). It is an art of managing the growth of plants and animals for human use.

**Modern agriculture:-**

Modern agriculture is an evolving approach to agricultural innovations and farming practices that help farmers increase efficiency and reduce the number of natural resources like water, land, and energy necessary to meet the world’s food, fuel, and fiber needs. The agribusiness, intensive farming, organic farming, and sustainable agriculture are other names of modern agriculture.

**Impact of Modern Agriculture on the Environment:-**

modern agriculture improved our affordability of food, increases the food supply, ensured the food safety, increases sustainability, and also produces more biofuels. But at the same time, it also leads to environmental problems because it is based on high input–high output technique using hybrid seeds of high-yielding variety and abundant irrigation water, fertilizers, and pesticides. The impacts of modern agriculture on the Environment are discussed below:

**1) Soil Erosion:-**

The top fertile soil of the farmland is removed due to the excessive water supply. This leads to the loss of nutrient-rich soil that hampered productivity. It also causes global warming because the silt of water bodies induces the release of soil carbon from the particulate organic material.

**2) Contamination of groundwater:-**

The groundwater is one of the important sources of water for irrigation. From agricultural fields, nitrogenous fertilizers leach into the soil and finally contaminate groundwater. When the nitrate level of groundwater exceeds 25 mg/l, they can cause a serious health hazard known as “Blue Baby Syndrome”, which affects mostly infants even leading to their death.

**3) Water-logging and salinity**

The salinity of the soil is one of the reasons of low productivity just because of the improper management of farm drainage. In this situation, the roots of plants do not get enough air to respiration then it leads to low crop yield as well as low mechanical strength.

**4) Eutrophication(सुपोषण)**

It refers to the addition of artificial or non-artificial substances such as nitrates and phosphate, through fertilizers or sewage, to a freshwater system. It leads to an increase in the primary productivity of the water body or the 'bloom' of phytoplankton.

Excessive use of fertilizers that consists of nitrogen and phosphorus leads to over nourishment of the lakes/water bodies and gives rise to the phenomenon of eutrophication (EU = more, trophication= nutrition).

**Excessive use of Pesticide(Pesticides Problems):-**

There are many pesticides that are used for destroying pests and boosting crop production. Earlier arsenic, sulfur, lead, and mercury was used to kill pests. For Example- Dichloro Diphenyl Trichloroethane (DDT) content pesticides were used, but unfortunately, it also targeted the beneficial pests. Most importantly, many pesticides are non-biodegradable, which also linked to the food chains which are harmful to the human being.

The relative significance of farming has dropped steadily since the beginning of industrialization, and in 2006 – for the first time in history – the services sector overtook agriculture as the economic sector employing the most people worldwide. But we forget that if we need food to survive then we need agriculture.

**Case Study**

Case Study-1

Ara villi mountains which covers about 10% of geographical area is rich source of minerals wealth .This mountain range play important role in control of climate and act as mini water shed. On the request of environmentalist, Honourable Supreme Court has passed the order to stop these mines in Rajasthan

Case Study-2

Marble mining near Rajsamant Lake has lead to drying up of lake. Marble mining was stopped on December 2002.

Case Study-3

Recently, mining in Goa has attained the attention of the press and media and ultimately government has to take the decision to stop this mining.

**Energy resources**

**Energy:-**

Energy is defined by physicists as the capacity to do work. Energy is found on our planet in a variety of forms, some of which are immediately useful to do work, while others require a process of transformation. The sun is the primary energy source in our lives. Besides, water, fossil fuels such as coal, petroleum products, water, nuclear power plants are sources of energy.

"Energy is the capacity of a physical system to perform work. Energy exists in several forms such as heat, kinetic or mechanical energy, light, potential energy , electrical, or other forms. Energy is the ability to do work. Energy sources could be classified as Renewable and Non-renewable".

**Energy resources:-**

Energy resources including hydrocarbons, hydropower, bio-energy, solar, wind, etc., where relevant including depth/height information on the extent of the resource.

**Fundamental sources of energy:**

There are 5 fundamental sources of energy:

1. Nuclear fusion in the Sun (solar energy)
2. Gravity generated by the Earth & Moon.
3. Nuclear fission reactions.
4. Energy in the interior of the Earth.
5. Energy stored in chemical bonds.

**Growing Energy Needs:-**

Energy has always been closely linked to man’s economic growth and development. Present strategies for development that have focused on rapid economic growth have used energy utilization as an index of economic development. This index, however, does not take into account the long-term ill effects on society of excessive energy utilization.

For almost 200 years, coal was the primary energy source fueling the industrial revolution in the 19th century. At the close of the 20th century, oil accounted for 39% of the world’s commercial energy consumption, followed by coal (24%) and natural gas (24%), while nuclear (7%) and hydro/renewable (6%) accounted for the rest.

Industrialization, urbanization, and unbelievable rise in human settlements have multiplied the energy requirement by several times. Modern lifestyle and man’s growing dependence on machines and equipment for his personal and professional work has added to the energy demand. Global oil demand continues to grow until 2040, mostly because of the lack of easy alternatives to oil in road freight, aviation and petrochemicals, according to WEO-2016, published by International Energy Agency.

**Classification of Energy resources:-**

They are classified into two category----

**1) Renewable Energy Source**

**2) Non - Renewable Energy Source**

**1) Renewable Clean/ Green) Energy (Source:-**

Renewable energy is derived from natural processes that are replaced constantly such as solar, wind, ocean, hydropower, biomass, geothermal resources, and biofuels and hydrogen.

**i) Solar Energy:-**

Sun is the primary source of energy. Sunlight is a clean, renewable source of energy. It is a sustainable resource, meaning it doesn't run out, but can be maintained because the sun shines almost every day. Coal or gas are not sustainable or renewable: once they are gone, there is none left. More and more people are wanting to use clean, renewable energy such as solar, wind, geothermal steam and others. It is called 'Green Power'. It lights our houses by day, dries our clothes and agricultural produce, keeps us warm and lots more. Its potential is however much larger

**Advantages:-**

* It is a perennial, natural source and free
* It is available in plenty
* It is non-polluting
* It does not emit any green house gases.
* Solar energy offers decentralization in most (sunny) locations, meaning self-reliant societies.
* One of the biggest advantages of solar energy is the ability to avoid the politics and price volatility that is increasingly characterizing fossil fuel markets.
* It doesn’t result in the destruction of forests and eco-systems that occurs with most fossil fuel operations.

**Disadvantages:-**

* Dependent on change in seasons / weather – hence they may not be used always.
* Requires high initial investments for productive use
* Solar systems doesn’t work at night directly but the battery bank, which stores energy during day-time can be used during night.
* Solar electricity storage technology has not reached its potential yet.
* Solar panels are bulky. This is particularly true of the higher-efficiency, traditional silicon crystalline wafer solar modules.

**Technologies for productive use of solar energy:-**

Solar energy can be used to generate electricity. Through Solar Photovoltaic (SPV) cells, solar radiation gets converted into DC electricity directly. The generated electricity can either be used as it is or can be stored in the battery. The stored electrical energy can be used when solar energy is not available. SPV is nowadays successfully used for home and street lighting and water pumping in villages. In hilly areas, solar water heating is also being used.

**Wind Energy:-**

Wind is the natural movement of air across the land or sea. The wind when used to turn the blades of a wind mill turns the shaft to which they are attached. This movement of shaft through a pump or generator produces electricity. The Potential for wind power generation for grid interaction has been estimated at about 1,02,788 MW taking sites having wind power density greater than 200 W/sq. m at 80 m hub-height with 2% land availability in potential areas for setting up wind farms @ 9 MW/sq. km. India now has the 4th largest wind power installed capacity in the world which has reached 37756.35 MWp (as on May, 2020). Private agencies own 95 % of the wind farms in India.

**Advantages (Merits)**

* It is environment friendly
* Its freely and abundantly available

**Disadvantages (Demerits):-**

* High investment requirement
* Wind speed is not uniform all the time which affects power generated
* **Biomass and Biofuels**

**Question: What is biomass?**

**Ans.:** The plants fix solar energy through the process of photosynthesis to produce biomass. This biomass passes through various cycles producing different forms of energy sources. For example, fodder for animals that in turn produce dung, agricultural waste for cooking, etc. The current availability of biomass in India is estimated at about 500 million MT per annum, with an estimated surplus biomass availability of about 120 – 150 million metric tones per annum covering agricultural and forestry residues. This corresponds to a potential of about 18,000 MW. An additional 9200.50 MWp power was generated through bagasse based cogeneration in the country’s Sugar mills.

**Usage:-**

Biomass is an important source of energy accounting for about one third of the total fuel used in our country and in about 40% of the rural households. The widespread use of biomass is for household cooking and heating. The types of biomass used are agricultural waste, wood, charcoal or dried dung.

**Advantages:-**

* Available locally and to some extent abundantly
* It is a relatively clean fuel when compared to fossil fuels. In a way biomass also cleans our environment by trapping carbon- di-oxide

**Disadvantages:-**

* Drudgery involved in collection of fuel
* During indoor cooking and in the absence of sufficient ventilation fuels such as dung cause air pollution which is a serious health hazard
* Unsustainable and inefficient use of biomass often leads to destruction of vegetation and hence environmental degradation.

**Technologies for productive use of biomass**

Technologies that enable efficient use of biomass are becoming prevalent in rural areas.The efficiency of fuel usage is increased by:

* Biofuels are predominantly produced from biomass feed stocks or as a by-product from the industrial processing of agricultural or food products, or from the recovery and reprocessing of products such as cooking and vegetable oil. Biofuel contains no petroleum, but it can be blended at any level with petroleum fuel to create a biofuel blend. It can be used in conventional healing equipment or diesel engine with no major modification. Biofuel is simple to use, biodegradable, non-toxic and essentially free of Sulphur and aroma.

**Water and geothermal**

**Water:-**

The flowing water and the tides in the sea are sources of energy. India is endowed with large hydropower potential of 1,45,320 MW. Heavy investments are made on large projects. In recent years, hydel energy (through mini and small hydel power plants) is also used to reach power to remote villages which are unelectrified. The estimated potential of Small Hydro Power is about 15,000 MW in the country. As on May 2020, the installed capacity of Small hydro projects (upto 3MW) amounts to 4683.16 MWp.

**Advantages of Small Hydro Power as an energy source**

* Reliable, eco-friendly, mature and proven technology.
* More suited for the sensitive mountain ecology.
* Can be exploited wherever sufficient water flows -along small streams, medium to small rivers and also harness abundant sun-shine, wind-energy and other bio-energy sources.
* Does not involve setting up of large dams or problems of deforestation, submergence or rehabilitation.
* Non-polluting, entails no waste or production of toxic gases, environment friendly.
* Small capital investment and short gestation period.
* Minimal transmission losses.
* With careful planning and adoption of simplified and standardized designs, SHP installations are becoming increasingly competitive with thermal, diesel or gas based power generation.

**Ocean energy:-**

Oceans cover 70 percent of the earth’s surface and represent an enormous amount of energy. Although currently under-utilised, Ocean energy is mostly exploited by just a few technologies: Wave, Tidal, Current Energy and Ocean Thermal Energy.

**1. Tidal Energy:** The tidal cycle occurs every 12 hours due to the gravitational force of the moon. The difference in water height from low tide and high tide is potential energy. Similar to traditional hydropower generated from dams, tidal water can be captured in a barrage across an estuary during high tide and forced through a hydro-turbine during low tide. The capital cost for tidal energy power plants is very high due to high civil construction and high power purchase tariff. To capture sufficient power from the tidal energy potential, the height of high tide must be at least five meters (16 feet) greater than low tide. Total identified potential of Tidal Energy is about 12455 MW, with potential locations identified at Khambat & Kutch regions, and large backwaters, where barrage technology could be used.

**2. Wave Energy:** Wave energy is generated by the movement of a device either floating on the surface of the ocean or moored to the ocean floor. Many different techniques for converting wave energy to electric power have been studied. Wave conversion devices that float on the surface have joints hinged together that bend with the waves. This kinetic energy pumps fluid through turbines and creates electric power. Stationary wave energy conversion devices use pressure fluctuations produced in long tubes from the waves swelling up and down. This bobbing motion drives a turbine when critical pressure is reached. Other stationary platforms capture water from waves on their platforms. This water is allowed to runoff through narrow pipes that flow through a typical hydraulic turbine. The total theoretical potential of wave energy in India along the country’s coast is estimated to be about 40,000 MW – these are preliminary estimates. This energy is however less intensive than what is available in more northern and southern latitudes.

**3. Current Energy:** Marine current is ocean water moving in one direction. This ocean current is known as the Gulf Stream. Tides also create currents that flow in two directions. Kinetic energy can be captured from the Gulf Stream and other tidal currents with submerged turbines that are very similar in appearance to miniature wind turbines. Similar to wind turbines, the movement of the marine current moves the rotor blades to generate electric power.

**4. Ocean Thermal Energy Conversion (OTEC):** Ocean thermal energy conversion, or OTEC, uses ocean temperature differences from the surface to depths lower than 1,000 meters, to extract energy. A temperature difference of only 20°C can yield usable energy. Research focuses on two types of OTEC technologies to extract thermal energy and convert it to electric power: closed cycle and open cycle. In the closed cycle method, a working fluid, such as ammonia, is pumped through a heat exchanger and vaporized. This vaporized steam runs a turbine. The cold water found at the depths of the ocean condenses the vapor back to a fluid where it returns to the heat exchanger. In the open cycle system, the warm surface water is pressurized in a vacuum chamber and converted to steam to run the turbine. The steam is then condensed using cold ocean water from lower depths. OTEC has a theoretical potential of 180,000 MW in India subject to suitable technological evolution.

**Geothermal energy:-**

Geothermal Energy is heat stored in earth crust and being used for electric generation and also for direct heat application. Geothermal literally means heat generated by earth. Various resource assessment carried out by agencies established the potential 10600 MWth /1000MWe spread over 340 hot springs across seven Geothermal provinces/11 states.

The availability of geothermal power is most environment-friendly power, round the year 24x7 basis, not affected by the severity of climate during 6 to 7 winter months like hydro and like dependence on sun in solar PV.

**2) Non Renewable energy:-**

A non-renewable energy source is a source with a limited supply that we can mine or extract from the earth, and it’ll eventually run out.

These are formed over thousands of years from the buried remains of ancient sea plants and animals that lived millions of years ago. Most of these energy sources are “dirty” fossil fuels, which are generally bad for the environment.

Coal, Oil and Natural gas are the non-renewable sources of energy. They are also called fossil fuels as they are products of plants that lived thousands of years ago. Fossil fuels are the predominantly used energy sources today. India is the third largest producer of coal in the world, with estimated reserves of around 3,19,020.33 million tonnes of Geological Resources of Coal (as of 1.4.2018). Coal supplies more than 70.87% of the country's total production of energy by commercial sources. India consumes about 245 MT of crude oil annually, and more than 70% of it is imported. Burning fossil fuels cause great amount of environmental pollution.

**The major types or sources of non-renewable energy are:**

1) Petroleum 2) Hydrocarbon gas liquids 3) Natural gas 4) Coal 5. Nuclear energy etc.

**Alternative energy sources:-**

Alternative energy sources are forecast to expand in every sector by 2023. The electricity sector has the biggest share of 30%, and on the path of decarbonisation, electrification will become the main energy carrier, the bulk of it being generated by renewable energy.

Heating is second with 12% and the transport sector comes last with only 3.8% of alternative energy sources with room for improvement.

Alternative energy sources are the types of renewable energy resources, here includes hydroelectric energy, solar energy, geothermal energy, wind energy, nuclear energy, and biomass energy etc.

In this way, it is not a completely non-polluting energy source. However, nuclear energy produces little to no greenhouse gases, unlike fossil fuels.

They are ecofriendly.

**Case study**

Case study

**Land Resources**

Land is a naturally occurring finite resource. It provides the base for survival of living beings. It holds everything that constitutes terrestrial ecosystems. Increased demand on land in modern times due to the rise in human population and resultant activities has resulted in degradation of land quality and quantity, decline in crop production, and competition for land.

Land and Land Resources refer to a delineable area of the earth's terrestrial surface, encompassing all attributes of the biosphere immediately above or below this surface, including those of the near-surface climate, the soil and terrain forms, the surface hydrology (including shallow lakes, rivers, marshes and swamps), the near-surface sedimentary layers and associated groundwater and geo-hydrological reserve, the plant and animal populations, the human settlement pattern and physical results of past and present human activity (terracing, water storage or drainage structures, roads, buildings, etc.)

**Land as Resource:-**

Land area constitutes about 1/5 of the earth surface. To meet out the challenging demand of food, fibre and fuel for human population, fodder for animals and industrial raw material for agro based industries, efficient management of land resources will play critical role. Soil, water, vegetation and climate are basic natural resources for agricultural growth and development.

**Land Degradation:-**

Due to increasing population, the demands for arable land for producing food, fibre and fuel wood is also increasing. Hence there is more and more pressure on the limited land resources which are getting degraded due to over-exploitation. Nearly 56% of total geographical area of the country is suffering due to land resource degradation. Out of 17 million hectare canal irrigated area, 3.4 million hectare is suffering from water logging and salinity. Soil erosion, water logging, salinization and contamination of the soil with industrial wastes like fly-ash, press mud or heavy metals all cause degradation of land.

**Soil Erosion:-**

Soil erosion refers to loss or removal of superficial layer of soil due to the action of wind, water and human factors. In other words, it can be defined as the movement of soil components, especially surface-litter and top soil from one place to another. It has been estimated that more than 5000 million tonnes topsoil is being eroded annually and 30% of total eroded mass is getting loosed to the sea .It results in the loss of fertility. It basically is of two types, viz. geologic erosion and accelerated erosion. Various factors which affect soil erosions include soil type, vegetation cover, slope of ground, soil mismanagement and intensity and amount of rainfall. Wind is also responsible for the land erosion through saltation, suspension and surface creep.

* **In order to prevent soil erosion and conserve the soil the following-----**
* Conservation practices are employed.
* Conservational till farming, Contour farming and Terracing.
* Strip cropping and alley cropping.
* Wind breaks or shelterbelts.

**Salinization:-**

It refers to accumulation of soluble salts in the soil. Concentration of soluble salts increases due to poor drainage facilities. In dry land areas, salt concentration increases where poor drainage is accompanied by high temperature. High concentration of salts affects the process of water absorption hence affects the productivity.

**Water Logging:-**

Excessive utilization of irrigation may disturb the water balance which can lead to water logging due to rise of water table .Anaerobic condition due to poor availability of oxygen in water logged soils may affect respiration process in plants which will ultimately affect the productivity of water logged soil.

**Desertification:-**

Desertification is a process whereby the productive potential of arid or semiarid lands falls by ten percent or more. Desertification is characterized by devegetation and depletion of groundwater, salinization and severe soil erosion.

* **Causes of desertification**
* Deforestation
* Overgrazing
* Mining and quarrying
* Soil erosion

**Shifting Cultivation:-**

Shifting cultivation is a practice of slash and burn agriculture adopted by tribal communities and is a main cause for soil degradation particularly tropical and sub tropical regions. Shifting cultivation which is also popularly known as ‘Jhum Cultivation’ has lead to destruction of forest in hilly areas .It is responsible for soil erosion and other problems related to land degradation in mountainous areas.

**Man Induced Landslides:-**

Human race has exploited land resources for his own comfort by constructing roads, railway tracks, canals for irrigation, hydroelectric projects, large dams and reservoirs and mining in hilly areas. Moreover productive lands under crop production are decreasing because of development activities. These factors are affecting the stability of hill slopes and damage the protective vegetation cover. These activities are also responsible to upset the balance of nature and making such areas prone to landslides.

b) **Role of an individual in conservation of natural resources**

* **Conservation of energy:**
  + Switch off Electrical appliances like - light, fan and other appliances when not in use.
  + Using energy effiencient appliances like LED bulbs etc.
  + Use solar heater for cooking.
  + Dry the cloth in the sun light instead of driers.
  + Use always pressure cookers
  + Grow trees near the house to get cool breeze instead of using AC and air cooler.
  + Ride bicycle or just walk instead of using scooter for ashort distance.
  + Using Stairs instead of elevators.
  + Using Public transport wherever possible.

* **Conservation of water:**
  + Use minimum water for all domestic purposes.
  + Check the water leaks in pipes and repair them properly.
  + Reuse the soapy water, after washing clothes for washing courtyard, carpets etc.
  + Use drip irrigation.
  + Rain water harvesting system should be installed in all the houses.
  + Sewage treatment plant may be installed in all industries and institution.
  + Continuous running of water taps should be avoided.
  + Watering of plants should be done in the evening.
  + Making compost from kitchen waste.
* **Conservation of soil:**
  + Grow different types of plants, herbs, trees and grass in your garden and open areas, which bind the soil and prevent erosion.
  + In the irrigation process, using strong flow of water should be avoided.
  + Soil erosion can be prevented by sprinkling irrigation.
  + Don’t use more fertilizer and pesticides.
  + Use nature manure to the crops.
  + Use mixed cropping, so that some specific soil nutrients will not get depleted.
  + While constructing the house don’t uproot the trees as far as possible.
* **Conservation of food resources:**
  + Cook only required amount of food.
  + Don’t waste the food, give it to some one before spoiling.
  + Don’t store large amount of food grains and protect them from damaging insects.
* **Conservation of forest:**
  + Use non timber product.
  + Plant more trees and protect them.
  + Over grassing must be controlled
  + Minimise the use of paper and fuel wood.
  + Avoid the construction of dam, road in the forest areas.

**c) Equitable use of resources for sustainable life style:**

* **Sustainable development:**
* Development of healthy environment without damaging natural resources.
* **Unsustainable development;**
* Degradation of the environment due to over utilisation of natural resources.
* **Life style in more developed countries:**
* 22% of world population, 88% of it’s natural resources and 85% of total global income.
* Consumption is more and pollution is more.
* **Life style in less developed countries:**
  + 78% of world population, 12% of it’s natural resources and 15% of total global income.
  + Consumption is less and pollution is less.
* **Causes of unsustainability:**
* Main cause – difference between More developed countries (MDCs) and Less developed countries (LDCs).
* **Sustainable life style:**
* MDCs should have to reduce the utilisation of natural resources, that should have to be diverted to LDCs. This will reduce the gap between MDCs and LDCs, leads to sustainable development of the entire world.

Source: http;//nprcet.org/e%20content/eee/EVS.pdf

**From Unsustainable to Sustainable development:-**

Sustainable development is not a new concept. It means living in harmony with the nature in full recognition of the needs of all other species. It is no just “the survival of the fittest”, we must help even the weakest of the species to survive because each species has a role to play that is ultimately beneficial to the earth and all its human population. Our forefathers preached us the need to co-exist with the environment in a balanced manner. The needs of the people in different parts of the world may be different, but our dependence on the Nature is similar. The most important thing to remember is that we have only one earth and if we destroy it by our actions, our children will not have a place to live.

The first comprehensive definition of sustainable development was given by the Brundtland Commission in 1987:

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” [Brundtland, G (ed) (1987). Our Common Future: The World Commission on Environment and Development, Oxford: Oxford University Press].

Any development activity can be sustainable, if it is “a dynamic process which enables all people to realize their potential, and to improve their quality of life, in ways which simultaneously protect and enhance the Earth’s life support systems”. (Forum for the Future, Annual Report 2000).

In short, if we care for the comfort of the present generation only and do not think of the needs of the future generations, and we damage the environment by various development activities, these activities will be termed as unsustainable. In taking every action, small or big, the possible damages to the environment must be given full consideration and the action must not leave behind a degraded environment. Technically, sustainable development is defined as a path of development in which no permanent and irreparable damage is done to the environment and the resources are kept intact for the future generations. The earth has everything for each generation, but it depends on the proper use. The present generation can survive very well on the resources available, but they must also leave behind enough resources for the future generations. It is necessary that a sustainable development path do not have any negative factor that is responsible for causing adverse impacts on the environment. A sustainable development programme is friendly to the ecosystem in all respects and has the capacity to absorb abrupt changes of the present and the future. Sustainable development has also a strong element of socio-political development. Thus, sustainable development programme must have equal concern for all sections of the society with a balanced economic development and environmental protection. The programme should have a log-term view of future consequences of any action taken today. In short, sustainable development has become the cornerstone of development planning today and has also become a principal tool of negotiation in international aid packages to the countries.

The sustainable development can be broadly classified into three different kinds, viz., environmental sustainability (no permanent damage to the environment), economic sustainability (economy remains stable with equitable sharing of resources) and sociopolitical sustainability (maintaining social harmony and political stability).

**Historical milestones**

The Brundtland Commission, formally the World Commission on Environment and Development (WCED), known by the name of its Chair Gro Harlem Brundtland, was convened by the United Nations in 1983. The commission was created to address growing concern “about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development.”

To propose long-term environmental strategies for achieving sustainable development to the year 2000 and beyond;

To help to define shared perceptions of long-term environmental issues and of the appropriate efforts needed to deal successfully with the problems of protecting and enhancing the environment, and a long-term agenda for action during the coming decades.

The need to protect and enhance the human environment within a common framework and principles led to the Brundtland Report and subsequently, the United Nations Conference on Environment and Development (UNCED), more commonly known as the Earth Summit, took place in Rio de Janeiro, in 1992. This conference was designed to help governments to rethink economic development and find ways to stop pollution and the destruction of natural resources. The conference documents included:

* Rio Declaration on Environment and Development
* United Nations Framework Convention on Climate Change
* United Nations Convention on Biological Diversity
* Statement of Forest Principles
* Agenda 21

**Agenda 21 and Sustainable Development**

**At the Earth Summit in 1992, an agenda** on worldwide sustainable development was formulated. This agenda, known as the Agenda 21, is a blueprint on how to make development socially, economically and environmentally sustainable into the next century. It addresses economic and development issues and the conservation and management of the world’s resources. The implementation of Agenda 21 has been made the responsibility of Governments, non-governmental organizations (NGOs), industry and also the general public. Agenda 21 provides a global framework for tackling global environmental problems like climate change, ozone depletion, biodiversity loss, desertification and deforestation.

The Earth Summit was followed by a conference in Johannesburg, South Africa in 2002 where the stakeholders from international institutions and corporations to national, regional and local governments have accepted that the principle of sustainable development will be at the core of all policy making. A few of the areas highlighted by the Agenda 21 are:

**(i) Combating Poverty:** Poverty and environmental degradation are directly related to one another and it is imperative on the part of the governments that they should focus on poverty alleviation in order to protect the environment. The national programmes should aim at sustainable use of resources and should enable the poor to earn a living without destroying the environment. It is envisaged that the people should have a say in the development process and that local groups should be involved in the planning and execution of anti-poverty programmes. In this way, the people will become a party to sustainable development and environmental protection.

**(ii) Changing Consumption Patterns:** Agenda 21 calls for a change in the existing patterns of production and consumption so that the damages to the environment may be minimized. For this purpose, the industrialized countries have been asked to play a leading role. National programmes should give more emphasis to more efficient production processes so that emissions and waste generation are brought down to minimum. All processes of production and consumption should conform to the principle of sustainable development – i.e. no harm to the environment. The Governments should discourage all production processes which are not environment-friendly and should levy taxes on goods that are produced through such processes. The use of eco-labels on appliances should be encouraged and efforts should be made to raise public awareness on energy efficiency and recycling of wastes.

**(iii) Population and Human Health:** The rapidly increasing population has created much pressure on natural resources, employment, social and health services. Sustainable development is not possible if the population is not appropriately controlled. Agenda 21 calls for the governments to adopt measures that take into account the links between population dynamics and sustainability, and identify carrying capacities. Poor health is often a result of poverty, especially in developing countries. Agenda 21 recommends that every national health programme should provide for the development of basic health care facilities with emphasis on training of doctors, nurses and other personnel, strengthen immunization programmes to control communicable diseases, and provide specific healthcare measures for the most vulnerable groups, including infants, women and indigenous peoples.

**(iv) Human Settlements:** Migration towards the urban centers has been continuously increasing and the towns and cities are overcrowded with people. Slums have expanded and basic facilities such as supply of clean drinking water, sanitation and sewerage facilities, healthy living conditions, etc., are becoming scarce. Traffic congestion, poor air quality, waste dumping and unhygienic conditions have multiplied in most cities. Agenda 21 calls for appropriate urban renewal projects and transportation strategies, the provision of access to land, and credit and low cost building materials for the poor. Migration to big cities can be reduced only by improving living conditions and employment opportunities in rural areas and Agenda 21 lays stress on the development of the rural areas.

**(v) Atmospheric Protection** The atmosphere can be protected by reducing emissions to it. For this purpose, Agenda 21 calls for action in the energy production sector, transport and industry, through the promotion and development of energy efficient programmes, regional energy plans, public-awareness campaigns of environmentally sound energy systems, and research into more fuel-efficient transport systems.

**(vi) Ecosystems:** Ecosystem conservation and protection is considered as a major item in sustainable development. For this purpose, Agenda 21 calls for governments, business houses and NGOs to introduce programmes of afforestation, reforestation, and sustainable land use and water resource management. The education programmes should be reoriented towards environmentally sustainable resource management.

**(vii) Sustainable Agriculture and Rural Development:** While agriculture should yield enough food for the rising population, the farming practices should not lead to land erosion, desertification and deforestation. Current methods of farming, particularly in developing countries, should be carefully examined and unhealthy practices should be discontinued. Agenda 21 urges the development of long-term land conservation and rehabilitation programmes, by encouraging people to invest for the future through land ownership.

**(viii) Conservation of Biodiversity and Management of Biotechnology:** Habitat destruction, over-harvesting, pollution and introduction of foreign species are recognized as the main factors behind loss of biodiversity. Agenda 21 calls for governments to undertake national biodiversity assessment programmes and formulate strategies to conserve the existing biological diversity without further damage.

**(ix) Protecting and Managing the Oceans and Fresh Water:** Agenda 21 calls for nations to develop policies, which address unsustainable fishing practices, the creation of marine protection zones, and the surveillance and enforcement of fisheries regulations. The agenda further requires that the National water management practices are integrated into economic and social policies. Agenda 21 sets 2025 as the realistic target date for ensuring universal water supplies, and to develop low-cost services, which can be built and maintained at the community level.

**(x) Managing Wastes:** Agenda 21 calls for an international strategy to manage the production and disposal of wastes, including hazardous waste, solid waste and sewage, and radioactive waste. Governments should encourage and assist industry in achieving cleaner production technologies, and promote changes in lifestyles, production and consumption, through recycling and fund public education initiatives. Countries, which generate nuclear waste, should adopt an integrated approach to the safe management, transportation, storage and disposal of radioactive wastes.

**(xi) Implementing Sustainable Development:** All nations will have to make political, social and economic commitments to ensure that the Agenda 21 can be properly implemented and that necessary resources are available for the same. The Agenda asks international funding organizations such as the International Development Association and the Global Environment Facility to help developing countries in meeting additional expenses in implementing all measures required for sustainable development. Developed countries should help promote the transfer of technology to developing countries.

It is necessary to monitor the implementation of Agenda 21. Laws should be enacted to secure a balance between the needs for development and environmental protection. The main objectives should include: international standards in environmental protection taking into account the different situations and abilities of individual countries; review of all environmental laws making them more effective; and measures to avoid or settle international disputes.

Meeting the aims and objectives of Agenda 21 within the time frame established by the 1992 Earth Summit will pose great social, economic and technological difficulties, both for developing and developed nations. The development that has been witnessed during the 20th century has brought unprecedented changes to biodiversity, the atmosphere and global climate. These are to be reversed. The new challenge for today’s society is to ensure that future development and the use of the Earth’s resources is managed in a sustainable way, and in every action, the quality of life is preserved for generations of the 21st century and beyond.

For sustainable development, human population growth has to be controlled. Otherwise, no invention and development in science and technology will be able to prevent irreversible degradation of the natural environment and to alleviate continued poverty in large parts of the world. The natural and social sciences will be crucial in developing new options for limiting population growth, protecting the natural environment, and improving the quality of human life. These should be the perspectives in all short and long term planning for all governments so that the challenges of the present and the future can be adequately addressed.

**Urban problems related to energy use**

With massive urbanization occurring on a global scale, the state of the environment and human health in the cities of the world has become a prime concern. It is estimated that by the year 2025, over five thousand million people will be living in the cities. In the developing countries of the world, already more than 200 cities have populations of one million or more. Living in cities has many positive benefits, such as increased job opportunities and better access to essential services and facilities. However, many environmental, health and development problems have reached near-crisis dimensions in cities all over the world. Urban growth has exposed populations to serious environmental hazards and has outstripped the capacity of municipal and local governments to provide even basic amenities (water, sanitation, power) and essential health services. Millions of people in the urban areas of developing countries are living under life- and health-threatening conditions. Cities have a significant impact on the broader hinterland and global environment and the fate of cities will have a major influence on the fate of nations and of the planet.

**Poverty and health**

Despite the unprecedented creation of wealth worldwide in the past two decades, the number of people living in absolute poverty is growing steadily. Poverty remains the number one killer, with the poor bearing a disproportionate share of the global burden of ill health. The poor live in unsafe and overcrowded housing, often in semi-urban and urban slums, with practically no access to safe water or to sewerage. These people are also exposed to pollution, traffic and industrial and other risks at home, at work or in their communities, much more than the wealthy people living in the same cities. They have insufficient food that too of poor quality from the point of nutrition.

Even in rich countries, the poor suffer worse health than do the better off. Children are particularly affected – in the poorest regions of the world, one in five children dies before his or her first birthday, mostly from environment-related diseases such as acute respiratory infections, diarrhea and malaria. Not only are children more heavily and frequently exposed to threats to their health in the environment, but also they are more vulnerable to the ill effects on health. For example, in the USA and parts of Europe, lead poisoning illustrates the unequal burden of risk borne by poor inner-city children, who are more heavily exposed to sources of lead in and around the home and are also more affected by the toxicity of lead.

**Energy consumption**

Compared to the rural areas, people in towns and cities consume large amount of energy. For example, the old type of Indian houses were made of wood, mud and unburnt bricks which required very little temperature adjustments and consequently very little energy was required for heating and cooling. The present buildings in towns and cities are mostly made of concrete, cement, steel, aluminium, marble, well-burnt bricks and glass. These materials are energy intensive and the houses made with them require a lot of power to keep them comfortable during the winter and the summer and also for lighting and decoration. The process of manufacture of these materials also consumes enormous amount of energy in different forms.

At earlier times, people used fuel wood or charcoal in kitchens for making food and also in the living rooms for heating. This did not create any environmental problem such as that of smoke because the houses had separate kitchens at a distance from the main living quarters and the houses were tall having provision of chimneys. This is no longer possible in today’s housing blocks where the living quarters are not separated from the kitchens; the RCC structure does not allow having tall roofs and also chimneys. Therefore the fuel type has to be changed as otherwise there will be serious smoke and associated health problems. Kerosene replaced firewood and charcoal as the favourite fuel for the urban homes. Later kerosene gave way to natural gas and electricity during the 1970s. The dependence on firewood has continued in the rural areas particularly for people living in the far-flung areas of the foothills and the forests. Newer tools of comfort came to be used in the urban centers. The use of electric fans during the summer has become a common practice but the effluent has gone for air-conditioning in their houses. As the houses have become almost like glass towers and since glass is a very bad conductor of heat, this has created problem of large temperature difference between outside and inside of a house requiring much energy to be spent on air-conditioning. Additional energy need has become necessary for running the lifts and operating a large number of other gadgets of modern life

The other major urban energy need is for transport. The towns and cities are roaming with buses, trucks, cars, two- and three-wheelers all of which depend on fossil fuels, namely petrol and diesel. The number of vehicles has increased at a very fast rate during the last few years despite the higher price of fuel. Small, narrow and improperly maintained roads and overcrowding have further aggravated the problem. Traffic congestion has become a serious problem in all urban areas. Slower moving vehicles burn more fuel and thereby the energy efficiency is further reduced. This has also given rise to problems of carbon monoxide pollution, smog and other environmental problems affecting people’s health particularly through various respiratory diseases. Time has come to design an efficient public transport system, which will lead to substantial energy saving, minimize congestion and reduce pollution problems.

**Water conservation:-**

Water conservation means using our limited water supply wisely and caring for it properly. Since each of us depends on water to sustain life, it is our responsibility to learn more about water conservation and how we can help keep our sources pure and safe for generations to come.

In other words, water conservation is not a job that is reserved for scientists, hydrologists, foresters, wildlife managers, city planners, farmers, or mine owners. Instead, it is up to each and every one of us to conserve water.

**Reasons to Conserve Water**

Below are some of the main reasons it is important to conserve water:-

* It minimizes the effects of drought and water shortages.
* It guards against rising costs and political conflict.
* It makes water available for recreational purposes.
* It builds safe and beautiful communities.

Water conservation requires forethought and effort, but every little bit helps. Don't think that what you do does not matter. We can all make changes in our lifestyles to reduce our water usage. The trick is making water conservation a way of life—not just something we think about once in a while.

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**Millennium development goals (MDGS) to sustainable**

**Sustainable development goal (SDGs)**

What MDG means?

Nations Millennium Development Goals

The United Nations **Millennium Development Goals** (MDGs) are 8 goals that UN Member States have agreed to try to achieve by the year 2015.

What is difference between MDGs and SDGs?

**Unlike the MDGs, which only targets the developing countries, the SDGs apply to all countries whether rich, middle or poor countries**. The SDGs are also nationally-owned and country-led, wherein each country is given the freedom to establish a national framework in achieving the SDGs.

Which is the concepts of MDGs and SDGs?

The MDGs were particularly helpful in communicating a clear purpose of development aid to mobilise public support. In contrast, the SDGs are a global agenda for sustainable development.

Is MDG replaced by SDG?

Sustainable Development Goals:-

MDGs are predecessor of SDGs. **SDGs are successor to the MDGs**. – MDG targets for 2015 were set to get us “halfway” to the goal of ending hunger and poverty. – It had narrow focus on poverty reduction.

When did MDG change to SDG?

In **2015**, to continue spurring global collaboration towards a better world, the UN revamped the framework by introducing the SDGs

What are the similarities between MDG and SDG?

The SDGs follow on the heels of the Millennium Development Goals (MDGs), which have guided international development from 2000 to 2015. Like the SDG framework, **the MDG framework was composed of a nested hierarchy of goals, targets, and indicators**. The deadline for achieving many of the MDG targets is 2015.

**What are the 5 main elements of the 2030 Agenda?**

At the heart of the 2030 Agenda are five critical dimensions: **people, prosperity, planet, partnership and peace**, also known as the 5Ps.

What are the 8 goals of the Millennium development (MDG)?

**Millennium Development Goals**

In September 2000, leaders of 189 countries gathered at the United Nations headquarters and signed the historic Millennium Declaration, in which they committed to achieving a set of eight measurable goals that range from halving extreme poverty and hunger to promoting gender equality and reducing child mortality, by the target date of 2015.

The Millennium Development Goals (MDGs)

Goal 1 - Eradicate extreme poverty and hunger

Goal 2 - Achieve universal primary education.

Goal 3 - Promote gender equality and empower women.

Goal 4 – Reduce child mortality.

Goal 5 – Improve maternal health

Goal 6 – Combating HIV/AIDs, malaria, and other diseases

Goal 7 – Ensure environmental sustainability.

Goal 8 - Develop a global partnership for development.

 The MDGs were revolutionary in providing a common language to reach global agreement. The 8 goals were realistic and easy to communicate, with a clear measurement/monitoring mechanism.

Why did the MDGs fail?

**Weak governance and mismanagement** remain key concerns at all levels. The lack of a transparent performance-assessment system, limited efforts to harness the potential of the private sector and the weak regulation of healthcare delivery also contributed to the slow progress of the MDGs.

How many SDGs are there?

**17 Sustainable Development Goals –**

In September 2015, the General Assembly adopted the 2030 Agenda for Sustainable Development that includes **17** Sustainable Development Goals (SDGs).

**How can SDGs be achieved?**

Awareness, action and accountability.

To accelerate progress towards the SDGs for every child, UNICEF embraces a “3As” approach: raising awareness, taking action and holding decision makers accountable for progress.

What are the 5 main elements of the 2030 Agenda?

At the heart of the 2030 Agenda are five critical dimensions: **people, prosperity, planet, partnership and peace**, also known as the 5Ps.

What is the global pattern of energy consumption?

Ans. **Global pattern of energy consumption**

The availability of energy resources is unequal, and the consumption of energy varies hugely across the globe. According to the International Energy Agency, **the richest countries in the world of around 1 billion people consume 50% of the world's energy, while the poorest 20% consume only 4%**.

What are the types of energy consumption?

The total energy consumption includes that of **coal, crude oil and their products, natural gas and electricity**, However, it excludes the consumption of fuel of low calorific value, bio-energy and solar energy.

What is energy consumption patterns?

Consumption pattern of energy **shows the percentage use of different sources** (solar energy, wind energy, geothermal energy, biogas, and tidal power). The consumption pattern of energy changes over time. Commercial sources of energy: Commercial energy makes up about 65% of the total energy consumed in India.

What energy type is used most globally?

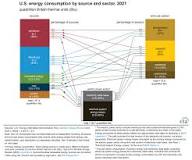
oil

Globally we get the largest amount of our energy from oil, followed by coal, gas, then hydroelectric power. As we look at in more detail below – “How much of global energy comes from low-carbon sources?” – the global energy mix is still dominated by **fossil fuels**. They account for more than 80% of energy consumption.

What is global primary energy consumption?

**Oil is the main primary energy fuel in the world, followed by other fossil fuels such as coal and natural gas**. Each of these three sources had consumption levels of more than 100 exajoules in 2021, while other fuel types were consumed considerably less.

What are the five major energy consuming sectors?

**The United States uses a mix of energy sources**

There are five energy-use sectors, and the amounts—in quadrillion Btu (or quads)—of their primary energy consumption in 2021 were:

* electric power36.75quads.
* transportation26.87quads.
* industrial22.55quads.
* residential6.58quads.
* commercial4.58quads.

What was one of the main causes of rapid urbanization and industrialization?

Industrialization and urbanization began long before the late 19th and early 20th centuries, but it accelerated greatly during this period because of **technological innovations**, social changes, and a political system increasingly apt to favor economic growth beyond any other concern.

Does urbanization affect industrialization?

**Industrialization is considered as most important element in the process of urbanization**. Due to industrialization and urbanization people migrate from rural to urban for better livelihood and facilities. Energy consumption depends on the stage of economic growth.

What are the causes of rapid urbanization?

Industrialization: More people have been attracted to move from rural to urban areas on account of improved employment opportunities. Commercialization: Better commercial opportunities and returns compared to rural areas.

How do you relate Equitable resources Utilization to sustainable development and environment?

Sustainable development basically means that **the process of development needs to be sustained or the development of a region should be planned in such a manner that it should go on for a quite long time**.

How can we contribute to sustainable development of resources?

**How can an individual contribute to sustainable development goals?**

1. Donate what you don't use.
2. Waste less food and support local farmers.
3. Get yourselves and your family vaccinated.
4. Help educate children in your community.
5. Empower women and girls around you and promote equality.
6. Avoid wasting water.

**What is the role of community in sustainable lifestyle?**

**Role of community in sustainable development**  
**Direct participation from the community fosters inclusive development of all its members**. Economic progress leads to social change, better access to education and healthcare, and infrastructural growth.

**How can a human person personally contribute to making the world sustainable and equitable?**

🡺 Reuse everything you can. 🡺Recycle.

🡺 Use technologies that respect the environment and people.

🡺Contribute to education and citizen action.

🡺Participate in socio-political actions for sustainability. 🡺Evaluate and Compensate.

What is an example of an ecological resource?

Biology, Earth Science, Ecology, Geography  
  
The Earth's natural resources include **air, water, soil, minerals, plants, and animals**.

What are the 5 environmental resources?

Environmental resources include: **subsoil resources (mineral and energy), soil resources, biological resources, water resources and land**.

How do I describe my ecological footprint?

Ecological Footprint | WWF. The simplest way to define ecological footprint would be to call it **the impact of human activities measured in terms of the area of biologically productive land and water required to produce the goods consumed and to assimilate the wastes generated**.

What is ecological footprint essay?

An ecological footprint is **a measurement of how much a person uses the environment around them to live their life**. This given measurement can help one to see their impact on the earth. It is an important tool to understand what actually a human does to change the habitat near them.

What are your everyday contributions for reducing your ecological footprint?

**Then, incorporate these suggestions to reduce your ecological footprint and make a positive impact!**

* Reduce Your Use of Single-Use, Disposable Plastics. ...
* Switch to Renewable Energy. ...
* Eat Less Meat. ...
* Reduce your Waste. ...
* Recycle Responsibly. ...
* Drive Less. ...
* Reduce Your Water Use. ...
* Support Local.

What are at least 5 ways humans can reduce the impact on the environment?

* Stop using plastic bags. When you think about it, we don't need plastic bags in our lives at all. ...
* Skip the disposable items. ...
* Know what to recycle. ...
* Go paperless. ...
* Reduce electronic usage. ...
* Veggie garden and compost. ...
* Read ebooks. ...
* Drive less.

What resource uses are most strongly represented in the ecological footprint What are the advantages and disadvantages of using this assessment?

Answer and Explanation: **The burning of fossil fuels** is arguably the most strongly represented form of releasing carbon into the atmosphere. Carbon is stored in fossil fuels that formed millions of years ago from the decay of ancient plants and animals.

**What are 5 things can you commit to changing in your lifestyle to reduce your ecological footprint and cut down on energy consumption?**

**Reduce Your Footprint at Home**

* Use energy efficient LED light bulbs.
* Make your garden or backyard pollinator friendly.
* Recycle what you can't reuse and compost organic waste.
* Create a green roof or go solar.
* Power your home with green energy.
* Use cold water for washing and rinsing your laundry.

How can students reduce their ecological footprint?

**10 Simple Ways To Reduce Your Carbon Footprint as a Student**

1. WALK OR USE PUBLIC TRANSPORTATION.
2. Get a big, cozy rug.
3. Wrap Yourself Up in a Warm Comforter.
4. Switch to a Laptop.
5. Reduce Waste by Avoiding Disposables.
6. REDUCE DAIRY AND MEAT INTAKE.
7. Purchase Sparingly.
8. Forget Fast Fashion.

**What are 5 ways you can reduce your footprint?**

**5 Ways To Reduce Your Footprint Significantly**

* Avoid Mass Market, Throw Away Fashion.
* Reduce your Meat and Diary Consumption.
* Refuse Single-Use Plastic.
* Reduce and Rethink your Transportation.
* Switch to Green Energy.