

EnvironmentalStudies

(Th-05)



ThirdSemester

Subject-Environmental studies(TH-5)

3rd semester(common for all branches)

TOPICWISE DISTRIBUTION OF MARKS

Slno	Name of the topic
01	The Multidisciplinary nature of environmental studies
02	Natural Resources
03	Systems
04	Biodiversity and its Conservation
05	Environmental Pollution.
06	Social issues and the Environment
07	Human population and the environment

COURSE OBJECTIVE

After completion of study of environmental studies, the student will be able to:

1. Gather adequate knowledge of different pollutants, their sources and shall be aware of solid waste management systems and hazardous waste and their effects.
2. Develop awareness towards preservation of environment.

CHAPTER-1

THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:

Learning objectives

1.1 Definition, scope and importance, 1.1.DEFINITION:
1.2 Need for public awareness.

ENVIRONMENT-

The surrounding in which a person or plant lives. [OR]

Environment consists of Physical, chemical and biological conditions of a region in which an organism lives.

(i) Physical conditions that environmental study deals with are the atmosphere, the land, the rivers and the oceans.

(ii) The biological condition includes all living organisms beginning from lowest micro-organisms (like bacteria, virus, fungus etc.) to plants and animals including man.

(iii) Chemical condition includes the great chemical cycles that flow through the physical and biological systems' - (Respiratory system, nervous system). Therefore, environment is the sum total of all the conditions and influences the development of life of all organisms on the planet earth.

1.1 SCOPE & IMPORTANCE

SCOPE OF ENVIRONMENTAL STUDIES

*The planet earth provided the right environment for the origin of life. Pure air and natural cycles like water cycles, nitrogen cycles, oxygen cycles etc., helped in the evolution of plants, animals and man in this planet.

*The early man lived in harmony with nature. Man tried to improve his life style with development of science and technology.

*Population explosions beyond control and man's greed led to overexploitation of nature and natural resources.

*The history of human civilization has now reached a stage of crisis, where every survival of human race is under threat. All the above problems have occurred in last century.

*A perusal of the development history of environmental studies made during last century is based upon three principal aspects. Such as

(1) Taxonomic affinities

(2) Habitat

(3) Level of organisation

BASED ON TAXONOMIC AFFINITIES

In the early days of 20th century study of environmental science was confined to Botanists and Zoologists who studied the ecology of plants and animals respectively. This led to the development of sub-division like (i) Plant ecology and (ii) Animal ecology. Modern ecologists feel that, these two groups of organisms (plants and animals) are very much inseparably interrelated with each other. Thus, modern prefers not to make distinction between plant ecology and animal ecology. Rather, the term ecology includes inter-relationship among all kinds of organisms (including microorganisms) with their environment.

BASED ON HABITAT

The habitat influences the morphology, anatomy and physiology of living organisms. The biotic and the abiotic components interact in a system called ecosystems such as

FRESHWATER ECOSYSTEM..

Where the biotic and the abiotic components of ponds, lakes, rivers, streams interact.

MARINE ECOSYSTEM..

Where the biotic and the abiotic components of sea, ocean interact.

ESTUARINE ECOSYSTEM.

Where biotic and the abiotic components interact at estuarine (mouth of rivers) points.

TERRESTRIAL ECOSYSTEM..

Includes forest ecosystem, cropland (man-made) ecosystem, grassland ecosystem, desert ecosystem etc. Where biotic and abiotic components of the respective habitat interact. The producers synthesize carbohydrate type of food in the presence of sun light. The consumers grow, flourish and reproduce by getting the energy from the producers. The decomposers break the dead bodies of producers and consumers and increase the nutrient pool of the ecosystem.

.There is continuous food chain, food web, energy flow and nutrient cycle in all ecosystem. The ecosystems are in a state of dynamic equilibrium.

BASED ON LEVELS OF ORGANIZATION..

Scope of environmental studies may either be limited to (a) individual organism (Autecology) or (b) group of organisms (synecology).

AUTECOLOGY..

Includes the study of relation of individual species to its environment. Here individual species are the units of study. The studies include effect of different environmental factors on the geography, distribution, morphology, taxonomic position and life cycle of the individual species.

SYNECOLOGY..

Includes the study of relation of group of organisms (known as community) to their environment. It is an interrelationship between plants, animals, microbes etc.

Depending upon the conditions synecology may deal with

(a) Population ecology.

Where the unit of study includes a group of individuals of any one kind of organisms and their interaction with their respective environment.

(b) community ecology.

Where the unit of study includes a population of given area and their interaction with the environment.

IMPORTANCE OF ENVIRONMENTAL STUDIES..

Some of the importance points are given

below. (1). Having a "positive impact" on quality of life

.

(2). Knowledge about various types of environments and different environmental hazards.

(3). It helps maintain ecological balance by providing a basic operating knowledge of environmental system and process.

(4). This discipline helps to educate people regarding their duties towards environmental protection.

(5). It provides us with basic knowledge of environment and various environmental issues. It examines the scientific basis for environmental and social concerns about our present energy need, global climate changes, toxic emission and waste disposal.

(6). It also provide knowledge about the development and utilisation of energy resources and the role of public policy therein.

(7). Need for wise planning of development.

(8). To aware and educate people regarding environmental issues and problems at local, national, and international levels.

(9). It plays an important role in healthy living of human being. (10). I

tpays an important role in regulating air and water etc.

1.2 NEED FOR PUBLIC AWARENESS

Public awareness

- Environment is a serious issue not only for India but for the world as well.
- This matter needs to be imparted to the ignorant and illiterate people.
- The gradual degradation of environment and its necessary restitution must have got wider circulation.
- Due to faulty planning and policy of government the environment is affected. Importance should be given for the restoration of environment.
- Individuals must be aware of the importance of environment.
- Individuals must plant trees on the basis of principle “each one plant one”.
- Follow and waste respect environment protection laws.
- Minimize waste production.
- Take care of soil and land.
- Prevent and control all kinds of pollution.
- Clean the surrounding near the habitation.
- Educate others to develop awareness about the environment. Support govt. Policies and systems for protection of environment

QUESTION ON THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Short Questions

Q.1. What is the Environment? (2016-w, 2017-w, New)

Ans : Environment is the Physical, chemical and biological condition of the region in which Organism lives. Therefore Environment is the sum total of all condition and influences the development and life of all Organisms on the Planet earth.

Q.2. What is Ecology ?

Ans. The term ecology is defined as an interrelationship among all kinds of organisms with their environment.

Q.3. What is Synecology?

Ans. Synecology is defined as the study and relation of a group of organisms to their environment. It is an interrelationship between plants, animals, microbes etc.

LONG QUESTION

Q1. Write down the concept of environmental studies and its necessity for public awareness? (2016-w, New)

Q2. What is the nature and scope of environmental study?

Q3. How is public awareness necessary to protect our environment? Describe briefly. (2019-w)

Learning objectives

C H A P T E R - 2

Natural R esources

Renewable and non-renewable resources:

2.1A. Natural resources and associated problems.
2.1.1 Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects on forests and tribal people.
2.1.2 Water resources: Use and over-utilization of surface and ground water, floods, drought, conflict over water, dam's benefits and problems.
2.1.3 Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
2.1.4 Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers-pesticides problems, water logging, salinity,.
2.1.5 Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
2.1.6 Land Resources: Land as a resource, land degradation, man induces landslides, soil erosion, and desertification.
2.1.7 Role of individual in conservation of natural resources.
2.1.8 Equitable use of resources for sustainable lifestyles.

2.1 Natural Resources, Renewable and Non-Renewable Resources:

NATURAL RESOURCES.

.The raw materials which are derived from the nature is called natural resources.

. Otherwisetheresourceswhichonederivedfromthenatureiscallednaturalresources.

OR

. Naturalresourcesaresubstancesfoundnaturallyintheenvironment.

.Ex-Forest,forests'products, soil, water, sunlight, mineralstreatedasnaturalresources.

. Mankind utilises the resources to get energy and for benefits.

IT IS OF TWO TYPES..

- (a) Non- renewable resources
- (b) Renewable resources

NON-RENEWABLE RESOURCES:

. It is otherwise called as stock resources. Because these resources are available to us as a stock of material and that is likely to be depleted completely and can not be regenerated or can not be refilled and it cannot be available in indefinite period of time.

. It is otherwise called as exhaustible resource because after some years it will be depleted completely.

. Ex- Petrol, coal, natural gas, metals (such as iron, copper, nickel etc) and non-metals such as potassium, phosphates etc.

. These resources are non-eco friendly for the environment because they are polluting the atmosphere.

RENEWABLE RESOURCES.

. Renewable resources do not exhaust when it is used up. They are produced by themselves in nature and they are harvested continuously through proper planning. So it is reproducible or regenerate and has an endless supply and can be used repeatedly.

. Ex- Solar energy, hydro energy, tidal energy, wind energy etc.

. They are eco friendly for the environment. Because these are pollution free resources.

2.1.1 FOREST RESOURCES AND THEIR USE, OVEREXPLOITATION:

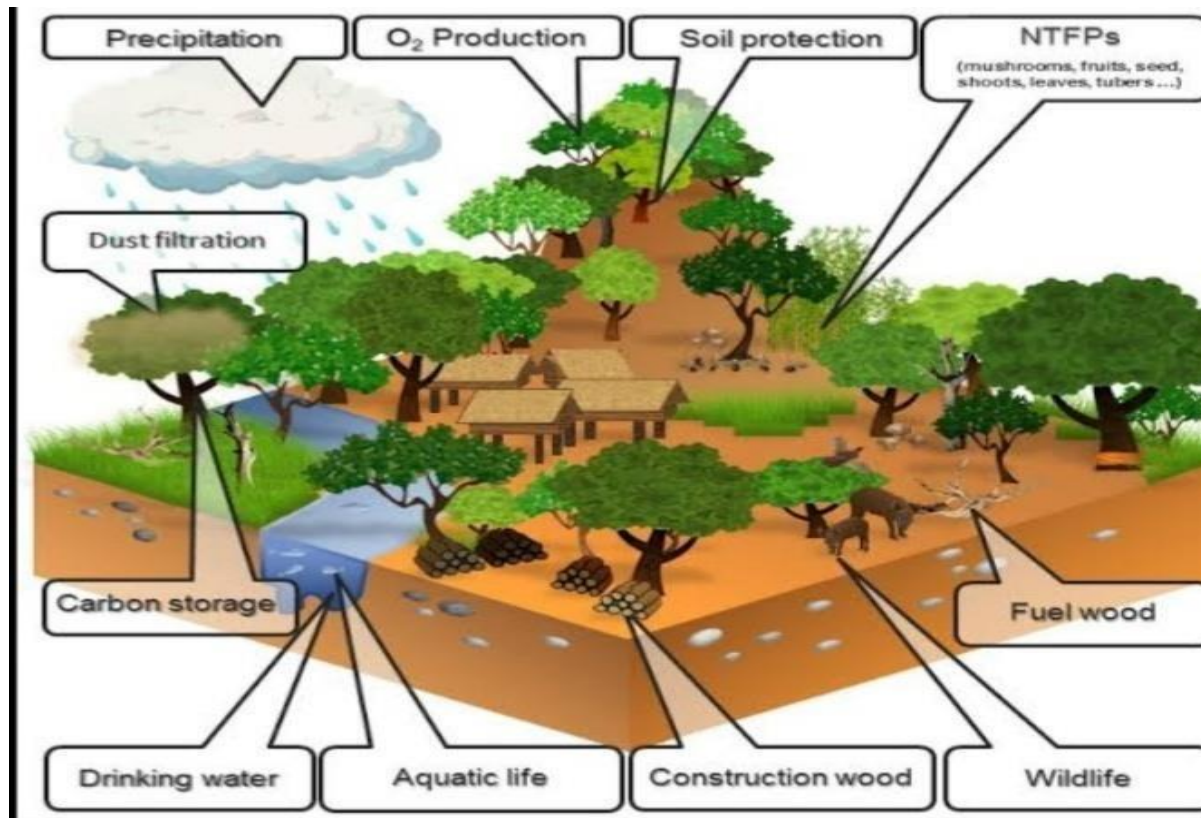
Forest Resources :

The collection of trees and shrubs is known as forest resources.

Use and overexploitation:

Scientists estimate that India should ideally have 33 percent of its land under forests. Today we have only about 12 percent.

However, the rest of us also derive great benefits from the forests which we are rarely aware of. The water we use depends on the existence of forests on the watersheds around river valleys. Our homes, furniture and paper are made from wood from forest. We use many medicines that are based on forest produce. And we depend on oxygen that plants give out and removal of carbon dioxide we breathe out from the air.



Forests once extended over large tracts of our country. People have used forests in our country for thousands of years. As agriculture spread the forests were left in patches which were controlled mostly by tribal people. They hunted animals and gathered plants and lived entirely on forest resources.

Another period of overutilization and forest degradation occurred in the early period following independence as people felt that the British had gone they had a right to using our forests in any way we pleased.

The following years saw India's residual forest wealth dwindle sharply. Timber extraction continued to remain the forest Department's main concern up to the 1970s. The fact that forest degradation and deforestation was creating a serious loss of the important functions of the forest began to override its utilisation as a source of revenue from timber.

Some important functions of Forest:

- All the forests play a vital role in the country's economy.

- The major products of forest are- Timber and fire wood. And minor products are- herbs, lacs, gums, canes etc.
- Further our people get employment opportunities in the forest based industries such as kashan industries, sports goods industries, paper industries and matches industries, furniture industries etc.
- Many cottage industries depend on the raw materials obtained from the forests such as gums, cane, fibres, spices etc.
- It helps in checking floods and soil erosion.
- Forest exerts a great influence on the climate of a region. They moderate the hot climate of a place.
- Forest also helps in causing rains. The clouds passing over forest area get cooled, thus results in condensation and rainfall.
- It is the source of recreation scenic beauty of the land scape as well as home of precious wild animals. All the above forest resources are to be carefully conserved.
- Plants maintain the balance of CO₂ gas it can take CO₂ gas at the time of photosynthesis and release O₂ gas which is important for every living organism and it is the rapport of tribal peoples and also abode of wild animals. Thus we should conserve our forest resources.
- The greater value of the forest are to be realized as protectors of the environment and abode of wild animals rather than as sources of timber, so deforestation will bear its consequences.

Overutilization

- Day by day man's interventions with nature drastically increase. To meet his basic requirements. He is using for shelter, cultivation, industries, dam, commercial purpose, roads, towns, and different projects.
- Due to this reason the forest resources gradually decreased as a result of deforestation occurs for that soil erosion, land degradation, nutrition loss and disruption of delicate equilibrium of soil, plant and atmosphere.
- That can be seen in the vast tracts of barren land which are on the verge of becoming deserts and loss of wildlife, they are by imbalance occurred in the forest ecosystem.

2.1.1 Deforestation and Case studies timber extraction

mining: Deforestation:

The meaning of deforestation is destroying forest, which means random cutting of trees

.Or

Deforestation is the permanent destruction of forest .In order to make the land available for other uses such as:-Roads,Dams,Towns,Homes,Cultivation ,Farmland,Building materials ,Firewood,Industrial purpose etc.

Causes:-

Some of the following causes are:-

- Development of projects
- Shifting of cultivation
- Demand for firewood
- Demand for industries and commercial purposes

Development of projects:-

In the name of Development the first to be destroyed is forest , next comes wild animals and some extent tribal people the worst suffer is the environment as a whole .

- After independent a number of multipurpose river valley projects has worked
- A huge single dam or series of small dams are built on a river and its tributaries
- These dams collect vast amount of water forming man made lakes.
- The dam controls flood and protects the soil from being washed away during flood
- .The water i.e., collected is used in irrigating farms in command areas during the dry seasons.
- When water is made to fall from a high speed, it helps in generating power. It is known as hydro power and it is eco friendly to the environment.
- The lakes that are formed due to storage of water offers ideal conditions for development of fisheries and that water provides for domestic uses.
- The huge water bodies become centers of tourist attraction and large water resources is used for industrial purposes.

Shifting of Cultivation:-

- Shifting cultivation is an old age practice with some water resources the land is cultivated for 2 to 3 seasons.
- More and more forests are slashed, burned and converted into agricultural land.
- This method of cultivation causes extreme deforestation . Shifting of cultivation seen in Assam , Manipur , Mizoram , Nagaland and Odisha .It is otherwise called as Jhum cultivation.

Demand for industries & commercial purposes:-

Establishing of industries purposes of commercial the forest resources also destroyed .Due to construction of building , construction of roads , construction of railways also destroy the forest plants .Accept that mining activities also destroy the forest resources and that are the cause of deforestation.

Effects:-

1. Globalwarming

Deforestation has a direct impact on natural climate change . Their by increasing the globaltemperature with decreasing the area of forest .The rain is also becoming irregular . Thiscontributiontoglobalwarmingwhichhasindirectimpactonindustry.

Green plants uses co2 gas for the manufacture of food by photo synthesis .That take co2 gasand give out o2 gases with helps us for respiration .Exceptit ,it controls hydrogen sulphiteand chlorinethesetwogasesarepolluted gas.Plant controlthisgasesfromatmosphere.

2. Endangering Tribals

- Forestisessentialfor
- thesurvivaloftribals.Forestistheirlivelihood.
- The tribals take as much as needfrom the forest and in exchange and they fulfill theirneed.
- The thinking of modern society has made use an object of profit for that the tribals aresufferedindifferentways.Suchas
 1. Resettlemen
 - t2.Land
 - slide3.Diseses

3. DEFORESTATIONDECREASE THE WATERSUSTAINFROMSOMESOIL

Increasingevaporation,increaseinsurfacerrunnerincreaseintheincomingradiationreachingtothesoilsurfaceandheatwillbe produced.

4. Greenplant

Theconsequenceof deforestationinterms of soil erosion ,landdegradation ,Nutritionlossand disruption in the soil .Plant and atmosphere that seen in the vast tracks of barren landwhichbecomesadesert.

5. Deforestationcanhavenegativeimpactonenvironment

,The most impact is a loss of habitat , for million of species ,80% of earths land animal andplants live in forest andmany cannot survived due to destroy their home and gradually theyare becomingdistinction.

2.1.1 Damstheirbenefits&theirproblemseffectonTribalPeople:

Damisaartificialbarrierwhichisconstructedacrossa waterstreamwhicharrestedwaterforacertaindepth.

Benefits:-

Someofthefollowingpointsare :-

- Irrigation
- Power
- generationPiscic
- ultureFoodcontro
l
- Checking soil
- erosionDomestical
- usesEmployment
- opportunitiesProvide
- drinking waterNavigation
- Tourist attraction
- Developingcountriseconomyetc.

Problems:-

- Sedimentation
- Flash
- floodDiseases
- SubmergedofplantsandanimalsthatreasonforextinctionHabi
- tatloss
- Resettlement problems and
- rehabilitationLandslides
- Waterpollution
- Lossofmedicalplants
- Exceptthatitcreates ecological destruction itcan beseen disruption itcan be
seendisruptionamongthe plant,soil,animalandatmosphere.

.Timberextraction,mininganddamsareinvariablypartsoftheneedsofdevelopingcountry
.If timberis overharvested theecological functions of theforestarelost.Unfortunatelyforests are
located inareas where there are rich mineral resources.Forests alsocover
thesteepembankmentsof rivervalleys,whichareideallysuitedtodevelopedhydelandirrigation
projects .Thus
thereisconstantconflictinterestsbetweentheconservationinterestsofenvironmentalscientistsan
dtheminelandirrigationdepartment.

What needs to be understood is that long –term ecological gains cannot be sacrificed for short-term economic gains that unfortunately lead to deforestation. These forests where development projects are planned , can displace thousands of tribal people who lose their homes when these plans are executed. This leads to high levels of suffering for which there is rarely a satisfactory answer.

2.1.2 Water Resources use and over utilization of surface and ground water, flood, drought, Conflicts Over water Dam Benefit and Problems:

Water resources

Water is precious natural resources because all living organism depends upon water for their surviving . Except that it can be used for irrigation , power generation , pisciculture and development of country economy etc.

Water is categorized into two types:

- a) Surface water
Available to use in the forms of river, lakes, pond etc.
- b) Groundwater
Water that is available in the deeper layer of earth.

The world depends on a limited quantity of fresh water. Water covers 70% of the earth's surface but only 3% of this is fresh water. Of this , 2% is in polar ice caps and only 1% is usable water in rivers, lakes and subsoil aquifers.

One of the greatest challenges facing the world in this century is the need to rethink the overall management of water resources . The world population has passed the 6 billion mark . Based on the proportion of young people in developing countries , this will continue to increase significantly during the next few decades . This places enormous demands on the world's limited fresh water supply.

India is expected to face critical levels of water stress by 2025.

Overutilization and pollution of surface and groundwater:

With the growth of human population there is an increasing need for larger amounts of water to fulfil a variety of basic needs. Today in many areas this requirement cannot be met . Overutilization of water occurs at various levels . Most people use more water than they really need.

- Most of us waste water during a bath by using a shower or during washing of clothes.

- Agriculture also pollutes surface water and underground water stores by the excessive use of chemical fertilizers and pesticides
- Industry tends to maximise short-term economic gains by not bothering about its liquid waste and releasing it into streams, rivers and the sea.

As people begin to learn about the serious health hazards caused by pesticides in their food, public awareness can begin putting pressure on farmers to reduce the use of chemicals that are injurious to health.

Global climate change:

Changes in climate at a global level caused by increasing air pollution have now begun to affect our climate. In some regions global warming and the **El Nino** winds have created unprecedented storms. In other areas, they lead to long droughts. Everywhere the “greenhouse effect” due to atmospheric pollution is leading to increasingly erratic and unpredictable climatic effects. This has seriously affected regional hydrological conditions.

Uses of water

- Domestic
- use Industrial
- use Agricultural
- uses Fishing
- Source
- off food Transportation
- Hydroelectric power

Overexploitation of water

- Depletion of water resources and biodiversity. Resources of water.
- Subsidence
- water logging
- Loss of integrity of freshwater ecosystems

Flood

- This is the natural disaster.
- Excess rainfall of heavy rainfall is the common cause of flood. The banks of the river break down and water rushes to the heavily cultivated land.
- Due to the heavy rain bank of rivers break down and water rushes into fields and human habitats causing severe damage to live stocks and human population besides various vegetation.
- Water is categorized into two types:

- c) Surface water
Available to use in the forms of river, lakes, pond etc.
- d) Groundwater
Water that is available in the deeper layer of earth.

Drought

- Drought refers to a period of acute shortage of water severe atmospheric
- dryness. Lack of rainfall of less rainfall of sufficient duration is the common cause of drought.
- Less than 75% of normal rainfall is officially declared as drought.
- A severe drought causes
 - a. Widespread damage to crops
 - b. Loss of aquatic life

loss of wildlife.

Dams:

Today there are more than 45,000 large dams around the world, which play an important role in communities and economies that harness these water resources for their economic development. Current estimates suggest some 30-40% of irrigated land worldwide relies on dams. Hydropower, another contender for the use of stored water, currently supplies 19% of the world's total electric power supply and is used in over 150 countries.

Dams problems:-

- Fragmentation and
- physical transformation of rivers. Serious impacts on riverine ecosystems.
- Social consequences of large dams due to displacement
- of people. Water logging and salinisation of surrounding lands.
- Dislodging animal populations, damaging their habitat and cutting off their migration routes.
- Fishing and travel by boat disrupted.
- The emission of greenhouse gases from reservoirs due to rotting vegetation and carbon inflows from the catchment is a recently identified impact.

Conflict of water

1. Karnataka and Tamil Nadu:-

There was wide spread violence when Karnataka rejected interim order of handed down by the Cauvery water tribunals , set up by the Indian supreme court to settle decade of water dispute between the two states over irrigation rights to the Cauvery river water.

2. Conflict between Kerala and Tamil Nadu:-

Another controversial river is Periyar river which is situated in Kerala which is flowing towards the western part of this state . The Mullaperiyar dam which is there in the originated place and the river bank favours the inhabitants of Tamil Nadu. But the Idukki hydroelectricity project which is in Kerala cannot be materialized due to scarcity of water which creates conflict between the two states.

3. Conflict between India and Pakistan:-

Before partition the water of Sindhu, Jhelum, Chenab were given to Pakistan and the water of Beas, Sutlej were given to India fully . Later a barrage was constructed over the Jhelum river named as Wullar barrage . This controversy arises out of this but in 1960 through an interwater treaty India only got the rights to establish the production of hydroelectricity but not for irrigation.

4. West Bengal and Bangladesh:-

Like that another water problem is Farakka barrage which is situated in West Bengal . For this barrage conflict arises in Bangladesh because the river Ganges is a main stream of Bangladesh . Due to this barrage Bangladesh did not provide sufficient of water due to this so vigorous protest was made by Bangladesh.

5. Some of the following examples are

- (a) Conflict between Odisha and Jharkhand for Subarnarekha river
- (b) Conflict between Odisha and Chhattisgarh for Mahanadi and Indravati
- (c) Conflict between Odisha and Andhra Pradesh for Sileru river
- (d) Conflict between Bihar and Madhya Pradesh for Son river
- (e) Conflict between Haryana and Punjab for canals arising at the confluence point of Sutlej and Yamuna.
- (f) Conflict between Maharashtra and Andhra Pradesh for Dhyanir river etc.

6. Conflict between Odisha and Andhra Pradesh:-

Polavaram project is a multipurpose irrigation project the dam across the “Godavari” river is under construction and its reservoir spreads in part of Chhattisgarh and Odisha. It is a

multipurpose project of state Andhra Pradesh state . But some parts of reservoir spreads to Chhattisgarh and Odisha.

Chhattisgarh and Odisha contract to a agreement to establish a hydroelectricity power project at a place just upstream of Sileru tributary Sabar river . Due to the reservoirs backwater this project cannot be materialised fully.

2.1.3 Mineral Resources- Use and Exploitation, Environmental Effect on Extracting and using Mineral Resources:

Mineral Resources

A mineral is a naturally occurring substance of definite chemical composition and identifiable physical properties.

Many of the resources are hidden under the earth's surface on which we live in.

An ore is a mineral or combination of minerals from which a useful substance, such as a metal, can be extracted and used to manufacture a useful product.

The mineral resources are classified into two categories.

1. Metallic
2. Non-Metallic

Metal		Non-Metal
➤ Iron, gold, silver, copper, chromium etc. are known as metal because it is a special group of chemical elements from which new product can be generated. The new product usually occurs through a process of melting, mixing, and cooling. ➤ The Nature of these materials are:- ■ It is hard in nature ■ It is good electrical conductivity ■ Malleable ■ Fusible ■ Ductile ■ It is good thermal conductivity		➤ Coal, Natural gases, various minerals, salts are taken to be non-metallic mineral resources because it is a special group of chemical elements from which no new product can be generated. ➤ The Nature of these materials are:- ■ They are poor conductor of electricity ■ Not malleable ■ Not ductile ■ They are brittle in nature etc.

Minerals and their ores need to be extracted from the earth's interior so that they can be used. This process is known as mining. Mining operations generally progress through four stages:

- (1) Prospecting: Searching for minerals.
- (2) Exploration: Assessing the size, shape, location, and economic value of the deposit.
- (3) Development: Work of preparing access to the deposit so that the minerals can be extracted from it.
- (4) Exploitation: Extracting the minerals from the mines.

Uses of mineral Resources:-

- Manganese and chromium are used in the production of steel.
- Copper and Aluminium are used in electrical industries as conducting wire and Aluminium is used in aircraft industries.
- Lead and Zinc are used in various batteries.
- Mica is used as an insulator in electrical industries.
- Thorium, Uranium have applications in atomic reactor for production of electricity.
- Phosphate, Nitrate, Potassium, Sulphur have wide application of agricultural and medicine industries.
- Aluminium is used for lightweight vehicles and roofing materials. Lime stones are used in cement industries.
- Coal is used as a major fuel in thermal power plant for the production of electricity.
- Tin is used for packaging industries.
- Diamond, Gold & Silver are used for ornaments industries.
- Aluminium is a good conductor of heat. So it is very useful for boiler, cookers and cookwares.
- Aluminium is a good conductor of electricity so used for overhead power cables etc.

Impact on the environment when the mineral resources are extracted and their use in the Industry:-

- In open mines where coal is extracted near the surface, the removal of coal is followed by damage to the soil and live cover. That causing living behind barren.
- In coal mines some garbage comes to be earth surface among them core element named as sulphur comes to the surface of the earth. When it mixing with the rainwater it turns into sulphuric acid which destroys aquatic life in that nearby stream.
- Industrial utility creates smoke containing carbon monoxide, Sulphur dioxide, Sulphur trioxide when these gases mix in the water vapour in the atmosphere it causes acid rain.

- Similarly SO₂ is injurious to human health and reduces plant growth . It causes asthma and bronchitis in human etc.

2.1.4 Food Resources –World Food Problems, Changes Causes By Agriculture, Fertilizer-Pesticides Problems, Water Logging salinity:

Food Resources

- In recent years world food supply have been rising unprecedented rate and have grown faster than population in every continent except Africa .
- There is enough food to supply everyone in the world with more than the minimum daily food requirement.
- The three major crops that are the main source of calories and nutrients for most of the world's people are rice, wheat, and maize.
- Over the past thirty years the total amount of food in the world has increased faster than the average rate of population growth.

Changes caused by agriculture and overgrazing:-

- Man depends on plants or on other animals for his food.
- Agriculture includes all productive efforts which are undertaken by man to expedite and improve the growth of vegetable and animal product.
- The main aim of agriculture is to raise crops and plants, domestic animals and earn maximum benefit out of it in the form of food.
- With the variation in the distribution of temperature, rainfall and soil conditions the quality and quantity of agricultural production differ.
- Physical environment plays a major role in the crop production.
- Similarly man cannot regulate quality and quantity of agricultural production which depends fairly on natural phenomena.

Pesticides Problems:-

- To protect plants from insects, rats and fungi, toxic chemicals like insecticides, fungicides are generally used. These chemicals are collectively called
- “biocides” Another problem related to excessive utilization of plant protection chemicals is that the target organisms (pests, weeds, and fungi) are gradually becoming immune to the pesticides.
- The major problem of application of plant protection chemicals is contamination of food items.

Waterlogging:-

- Water logging can be described as stagnation of water on top of the soil surface and the presence of a high water table inside the soil. Water logging of the soil or deep submergence occurs when water enters soil faster than it can drain away under gravity.
- To provide more water to agriculture fields man has developed different methods.
- Canal irrigation use of deep tubewell for drawing water from deep core of the earth are two common methods employed.
- In these two methods when water is available in agricultural fields are irrigated excessively without proper drainage system.
- The solid-liquid-air ratio is distributed
- The soil becomes drenched and remains soaked with water, This is called waterlogging.
- Waterlogged soil cannot support plant growth because the lack of air which is essential for root respiration.

Salinity:-

- Excessive in high temperature zone causes salt accumulation in soils.
- Due to high temperature water evaporates very fast, leaving behind traces of salt on the soil.
- Gradually the general concentration of salt on the upper layer of the soil increases.
- In salt affected soil plants fail to absorb nutrients and face water stress.

Effect of Modern Agriculture:-

- During the evolution of human civilization the mode of resources and pattern of energy flow in agriculture practice took various shapes.
- The transformation from traditional to modern mechanised agricultural practice took some years.
- The aim of such was to sustain a bigger population and to meet the ever increasing need of man.
- Agriculture has evolved from being a less productive to more productive.

2.1.5 Energy Resources-Growing Energy Need Renewable & Non-Renewable Energy Resources. Use of Alternate Energy sources studies:

Energy Resources

Energy is the major index to develop the country economy .We are getting energy from theseresourcesandusingourhomepurposes,industrialpurposes,forotherdevelopmentalactivities.

On the basis of the pattern and nature of use and it 's contribution energy may be sub-dividedintotwogroups.

Traditional/ConventionalEnergy

Thistypeofenergysourcesareknowntomansincelongwhichmayberenewableornon–renewabletype.

Mostofthetraditionaltypeofenergyarederivedfromfossilfuellikecoal,petrol,dieseletc

.

NontraditionalEnergy:

Thistypeofenergysourcesarenewtomankind,Whichmayberenewable ornon renewable .It is otherwise called as non conventional energy .The non traditional energy sourcesareWindenergy,Solarenergy,Tidalenergy,Hydropowerenergyetc.

Theseareallecofriendlyenergyresources.

Furtheronthebasisofthenatureofavailabilityenergymaybe classified asfollows.

- (1) InexhaustibleenergyorRenewable sourcesofenergy
- (2) ExhaustibleenergyorNonrenewablesourcesofenergy

Inexhaustibleenergy orRenewablesourcesofenergy:

Fossil fuels ,Nuclear energy are non eco friendly and are responsible for different types ofpollution but pollution free energy are environment friendly and future development of theworkedliesintheuseofrenewableenergysources.

Some of the renewable energy sources are :-

- Solarenergy
- Geothermal
- energyTidalenergy
- Windenergy
- Biomassenergyetc

Solarenergy:-

Sun rays are tapped in photo voltaic cells which are then converted into energy this is knownassolarenergy.

It is the conversion of energy from sunlight to electricity. Some

of the important uses are:-

- To generate electricity
- Now it is being more and more used just like water
- heater Crop dryers
- Lighting lamps in remote areas.
- It is used by plants for the process of photosynthesis. It is used
- for cooking purposes
- It is used for drying clothes

Geothermal energy:-

Below the earth's crust temperature increases with depth. Temperature at the core of the earth may go up to 4800 degree centigrade where all the heavy metals are in molten lava state. If cracks develop in the crust, then the magma from metal comes out vigorously. The tremendous heat can successfully be tapped and can be converted into electrical energy i.e. popularly known as geothermal energy.

This possible areas are from where geothermal energy can be tapped are geysers, volcanoes etc.

Wind Energy:-

The moving air has huge amount of Kinetic energy and this can be transferred into electrical energy.

Wind turbines convert the Kinetic energy into mechanical power and a generator can convert this mechanical power into electricity.

Tidal Energy:-

Tidal power is called tidal energy. It is a form of hydropower energy and i.e. useful forms of power mainly electricity.

Tidal energies produced through use of tidal energy generator. These large underwater turbines are placed in areas with high tidal moment and are designed to capture the kinetic energy of ocean tides in order to produce electricity. It has great potential for future power of electricity generation because of massive size.

Biomass Energy:-

Biomass can be both animal and crop waste. Biomass is a renewable source of fuel to produce energy. Waste residues always exist in terms of scrap wood. Biomass contains stored

energy, That's because plant absorbs energy from sun through the process of photosynthesis. When biomass is burned the stored energy is released as heat and that heat energy converted into electric energy.

NonRenewablesourceofEnergy:

1. **Petroleum:-** Petro means mines oleum means oil so petroleum means mining oil. Otherwise called as rock oil. It is a complex composition of carbon and hydrogen. Basically it is used in motor fuel, lubricants and produced different kinds of synthetic products known as petrochemicals.
2. **Natural gas:-** Gas reservoirs are generally found in association with oil field. It is a tremendous heating power. It is used both industrial raw material and petrochemical industry and source of energy.
3. **COAL :-** It is sedimentary deposit formed by the slow action and heat and pressure on forest buried under the earth crust. Basically it is used in industries and thermal power plant.

2.1.6 LandResources–LandasaResources, Land Degradation, man includes Landslides, soil erosion & Desertification:

Land

Resources:Land

- The part of the earth's surface that is not covered by water.
- Earth is the only known habitat for living organism with land and water that supports myriad forms of life.
- Land is an important base and medium for the origin and evolution of life, including humans.
- Land constitutes about 29.22% of the total surface area of the earth and India shares only 2.4% of the total land area of the world. About 40% of the earth's land area (14.78 million) square kilometre.
- Ever growing world population puts pressure for higher production of food grown and other crops. Thus has put heavy demand on land.
- In addition land is required for other developmental activities like housing, construction of roads, entertainment parks, industries, dam etc.
- Due to effective use of labour and technology, productivity per unit of land has increased.
- Through expansion of crop lands has been done by clearing forest, now the crop lands are used for non agriculture purpose in the name of industrialization and urbanization.
- The upper surface layer of the earth is known as soil. Soils are derived from parent rock material through the process of breakup or wear and tear.

Soil

The upper surface layer of the earth's is known as soil.

Soil Erosion:

Loss of top soil is known as soil erosion.

Or

In other words soil erosion is the displacement of the upper layer of soil. It is one form of the solid degradation. Soil degradation brings slow death of the soil. So that the reproductive capacity will decrease.

Agents of Soil Erosion:-

The following are

1. Deforestation
2. Erosion of water
3. Erosion of wind
4. Stream bank erosion
5. Landslide erosion etc.

Deforestation:-

The process of Deforestation includes clearing of land through felling of trees. Due to purpose of development and shifting of cultivation. For this reason vegetative lands turn into barren lands and that barren land is easily washed up during heavy rain.

Erosion of water:-

Action of water removes top soil. The water flowing during heavy rain fall. At that time the top soil is lost.

The top soil may be removed as sheet. Sheet erosion causes loss of thin layer of top soil is known as sheet erosion.

In the second stage the figure like rills appear on the land surface is known as rill erosion.

Stream Bank Erosion:-

The rivers during floods splash their water against the banks and cut through them particularly at curves. Water strikes the bank with great speed causing of land which gets washed away.

Erosion by wind:-

Soil erosion by wind is common in dry regions where soil is sandy and vegetation may be poor or even absent. Due to heavy wind fine loose soil particles are from the surface of land and are transported to far off places.

Soil transported in a series of short bounces is called saltation.

Slip erosion:-

Heavy rain increases the weight of the rocks at the cliff which come under gravitation force and finally slipped. Sometimes entire hill or rock may slide down due to heavy rainfall.

Land Degradation:-

Soil erosion is the one of the phenomena of land degradation.

Land degradation means loss of the quality of the soil and decrease the level of nutrition.

Land degradation means slow death of the soil because the productivity may decrease. The land turns into barren and that land gradually turns into deserts.

Causes of land Degradation :-

Causes of land degradation

is of two types

1. Human Activities

2. Natural Activities

Human Activities:-

The intervention of humans are as follows

- Deforestation
- Farming
- Mining Activities
- Developmental Activities just like new settlement, transport, communication, development of projects, constructional work etc.

Deforestation:-

Increased demand for food, demand for firewood, development of project, other development works have a direct effect on deforestation.

The consequences of deforestation in terms of soil erosion, land degradation, loss of nutrition, disruption of delicate equilibrium among soil, plant, animal and environment and that can be seen in the first tracts of barren land which become a verge of desert.

Increase in the evaporation increase in the incoming radiation reaching soil surface. All these changes together cause serious changes in the environment.

Farming:-

In an old age practice the field was cultivated once a time in a year. That time the field was cultivated by manual labour and cattle. The civilization of man was developed by agriculture. At that time the field was left idle because the soil can get sufficient time to replenish the moisturizing capacity. But the recent time modern agricultural activities, mechanical support, using of fertilizers, spraying of insecticides, and pesticides enhance the production capacity of the agricultural land.

Now-a-days farmers cultivate their land no. of times in a year. That for production capacity also increases but reduces the soil quality. After using no. of times the field does not replenish the moisture and goes to be degraded.

Mining Activities:-

Natural resources play a vital role for a country's economy development. Mining activity also reduces the quality of the soil. At a mining area, different types of tunnels and shafts where the minerals are extracted. At the time of extraction debris also comes out and mixing with soil day by day it is stored on the top soil and reduces the quality of the soil and also destroys the live cover.

In the mining activities due to shaft and tunnels the particles of the soil can be lost due to frequent use and also reduce the soil quality and sometimes it causes landslide erosion.

Developmental Activities:-

Other constructional works such as road, rail, industrial settlement etc. lose the quality of the soil.

Another thing is that development of dam transport communication work also destroys the topsoil and erodes the nutrition.

Natural Activities:-

Change in temperature, irregularity in rainfall also causes the degradation of soil.

2.1.7 Role of individual in conservation of Natural Resources

- Man and mankind are integral parts of nature. Man can be considered in isolation from his environment.

- Components of environment like Water, Land, Minerals, Forest, Wind energy etc. Human the
- mselves also resources of nature

The role of man, as an individual is listed below:-

- **Environmental Awareness** : Individual must be aware the importance of environment
- **Afforestation** : They must plant trees on the basis of principle “each one plants one”
- Make rational use of natural resources. Recycle waste to generate wealth
- Minimise waste production
- Educate others to develop awareness about environment. Use biofertiliser in place of inorganic fertiliser.
- Take steps to conserve forest and wildlife
- Follow and respect environment protection laws. Prevent and control all kinds of pollution
- Take care of land and soil
- Clean the surrounding near habitation
- Adopt biogas technology
- Ensure safe disposal of domestic wastes.

2.1.8 Equitable use of Resources for sustainable lifestyles:

- Natural resources are rare materials obtained from nature
- If we expect to have a bright future on earth then we must utilise these resources
- Wise management of resources will ensure a continuous supply. This involves renewable recovering and recycling of resources.
- Man's living condition and lifestyle is fully dependent on growth, development and recycling of resources.
- The basic elements of a good quality of life include safe drinking water, food security, safe shelter and proper sanitation.
- We must change our approach to life and developments. There should be social equity that deals with the provision of minimum requirements of food, clothing and shelter.
- Natural planetary resources should be conserved to keep the natural life and sustaining cycles after etc.

Natural Resources Questions and Answers

Q.1 Why conservation of Natural Resources is necessary? [2016-w, New]

- Ans- The natural resources should be conserved to keep intact the natural life-supports areas and take steps to avoid further ecological disaster by adopting low energy, non-polluting process based on renewable resources.

Q.2 Define Renewable and Non-Renewable Resources? [2016-w new, 2019-w]

- Ans- Renewable resources do not exhaust non is used up . These are produced by themselves in nature and they are harvested continuously through proper planning and Management. In fact the source is permanent.
- Non-Renewable resources on the other hand are available to us as a stock of material that is likely to be depleted completely . Since non renewable resources gradually deplete and can not be available for infinite period . They are also known as stock resources.

Q.3 What is Drought ? [2016-w, New]

- Ans- Drought refers to a period of acute shortage of water , and severe atmospheric dryness. Lack of rain fall or less rain fall of sufficient duration is the common cause of drought. Less than 75% of normal rain fall is officially declared as drought.

Q.4 What is Jhum Cultivation? [2018-S new]

- Ans- Jhum (Shifting) cultivation is a primitive practice of cultivation in states of North eastern region of India and people involved in such cultivation are called Jhumia . The practice involves clearing forest cover land of hills , drying and burning it before onset of Monsoon and cropping in it thereafter.

Q.5 What do you mean by wasteland reclamation? [2018-w new]

- Ans- It is the process of turning barren, sterile wasteland into something that is fertile and suitable for habitation and cultivation.

Q.6 What is deforestation ? [2019-w]

- Ans- Deforestation means destroying forest. Destroying forest is a term which means random cutting of trees including felling and removal of forest. The main causes are

—
(1) Shifting cultivation (2) Development projects (3) Demand for firewood (4) Demand for industry and commercial purpose.

Q.7 What are Renewable and Non-Renewable energy sources? [2019-w]

- Ans-Non-Renewable energy sources-
This type of energy is known as exhaustible energy. After use, such type of energy is lost forever and cannot be regained again.
- Renewable Energy—This type of energy is known as Non-exhaustible energy sources.
This type of energy may be ubiquitous like solar energy and may be self-renewable type like flow of river water which produces hydro power.

Long questions:-

Q.1 What is the need of land Resources? Write the main reason of degradation of land? [2016-w, 2019-w]

Q.2 Write the uses and over-exploitation of forest resources and discuss deforestation? [2016-w, new]

Q.3 Explain world food problem? [2016-w, new]

Q.4 What are the causes and effects of deforestation? [2017-w, 2019-w]

Q.5 What are the effects of overgrazing? [2017-w, new]

Q.6 State and explain the renewable and non-renewable natural resources? [2017-w, new]

Q.7 Describe the impact of modern agricultural practices on environment? [2017-w, new]

Q.8 Briefly explain about water logging?

Q.9 Write the role of an individual in conservation of natural resources? [2018-s, new]

Q.10 Write the causes and consequences of deforestation? [2018-s, new]

Q.11 Give a case study of conflict for water? [2018-s, new]

Q.12 Write the basic principles of methods of soil conservation? [2018-s, new]

Q.13 Show that, equitable use of natural resources is the need for sustainable life-style?
[2018-w, new]

Q.14 What are the effects of modern agriculture on world food resources? [2018-w, new]

Q.15 What are mineral resources? Write the various adverse effects of mining? [2018-w, new]

Q.16 What are significant contributions and effects of dams? [2018-w, new]

Q.17 Briefly, explain about the causes and consequences of drought? [2018-w, new]

Q.18 Give a detailed description about the mineral resources of India? [2019-w]

Q.19 Describe the role of Individual in conservation of natural resources?[2019–w]

Q.20 What is World food problem? Explain in detail[2019-w]

Chapter-3

-.SYSTEMS:-

Learning objectives

3.1	Concept of an ecosystem.
3.2	Structure and function of an ecosystem.
3.3	Producers, consumers, decomposers
3.4	Energy flow in the ecosystems.
3.5	Ecological succession
3.6	Food chains, food webs and ecological pyramids.
3.7	Introduction, types, characteristic features, structure and function of the following ecosystem:
3.8	Aquatic ecosystem □ Forest ecosystem: systems (ponds, streams, lakes, rivers, oceans, estuaries).

3.1 Concept of an ecosystem:-

The ecosystem may be defined as a system in which the living and non-living things of environment function together is called ecosystem and the living organisms and non-living things in environment interact by means of food chain and chemical cycles resulting in energy flow.

Like our home, an ecosystem is any community of living and non-living things that work together. The living things are biotic features, and the non-living things are abiotic features.

3.2 Structures and function of an ecosystem:-

The different natural ecosystems are pond, lakes, oceans, forests, deserts etc. An ecosystem, be it a forest, desert, has the following component

1. Abiotic components
2. Biotic components which include
 - a) Producers
 - b) Consumers

c) Decomposers

Abiotic components:

- The nonliving environments such as air, water, soil, basic elements and compounds are the abiotic components of an ecosystem. These non-living substances enter the body of living organisms. The abiotic components of an ecosystem are divided into three parts.
- The climatic condition and physical factors, temperature, humidity etc.
- Inorganic substances such as water, carbon, nitrogen, phosphorus etc. which are involved in cycling of materials in an ecosystem.
- Organic substances such as proteins, carbohydrate, lipid etc. which form the living body and link abiotic and biotic components.

3.3 Producers, Consumers, Decomposers:

Biotic components:

Producers:

Producers are green plants such as trees, grasses etc. they possess green pigments called chlorophyll. They can convert light energy from sunlight to chemical energy (carbohydrate). In the presence of carbon dioxide and water. Hence they are known as autotrophs. All the other biotic components of the ecosystem depend directly or indirectly on the producers for their food.

Examples: plants, algae and bacteria.

Consumers:

- Consumers are animals, they are also known as heterotrophs, they are not capable of producing their own food.
- They feed directly or indirectly on producers for their food.
- Examples : animals, protozoa

etc. Decomposers:

- Decomposers are also heterotrophs. They depend upon dead organic matter for their food. They include micro-organisms like bacteria and fungi.
- Some protozoa and earthworms use dead organic matter as their food. They are also classified as decomposers.

3.4 Energy flow in the eco-systems:

- Energy is the capacity to do work. All the energy ultimately comes in to the sun, solar energy is transformed to chemical energy in the process of photosynthesis in the green plants.
- Primary production energy is available to the herbivores. Herbivores use a sizeable amount of this energy for their own metabolism such as respiration, reproduction etc.

3.5 Ecological succession:

- A community is made up of many populations. Population of a community interacts between themselves and influences the development of new community over time.
- Ecological succession includes systematic, directional. Orderly occurring in the physical environment of a community to the establishment of a stable community.
- A community is the product of an environment in which it develops. The community changes simultaneously as the environment changes, thus the community always remains in a dynamic state.
- Now new organisms that are better developed for life in the changed environment replace the old. Gradually the whole community is replaced till a relatively stable community is formed.
- There are two types of succession found.
 1. Primary succession
 2. Secondary

succession Primary succession:

Succession on sterile areas like newly exposed sea, rock surface, etc is called primary succession. It takes more than 1000 years to develop a stable community by primary succession. Secondary

succession:

- The succession on a site from which a well-established community was destroyed and again the succession starts is called secondary succession.
- It takes less time than primary succession.

3.6 Food Chains, Food web, ecological pyramids:

Food chains:-

- The living world sustains on food and therefore it depends on food organisms. Food not only contains energy but also materials needed by the organisms. In an ecosystem, there is flow of energy and circulation of materials among its members.

Therefore the different plants and animals in an ecosystem are linked to each other for food. A food chain consists of a group of organisms in which there is transfer of food energy through a series of repeated eating and being eaten up. Food is obtained by the producers (green plants) from the solar energy and consumed by different groups of consumers.

- Thus transfer of food energy from the source through a series of organisms that are consumers with repeated stages of eating and being eaten is termed as food chain.

Depending on the types of food the consumer takes up there are three types of food chain

- i. Grazing food chain
- ii. Saprophytic food chain
- iii. Parasitic

Grazing food chain:-

The name of the food chain is given because the green plants, grasses etc. are being grazed by herbivores and on to the carnivores. Grassland, forest, ponds etc. follow this food chain depending on autotrophic energy capture.

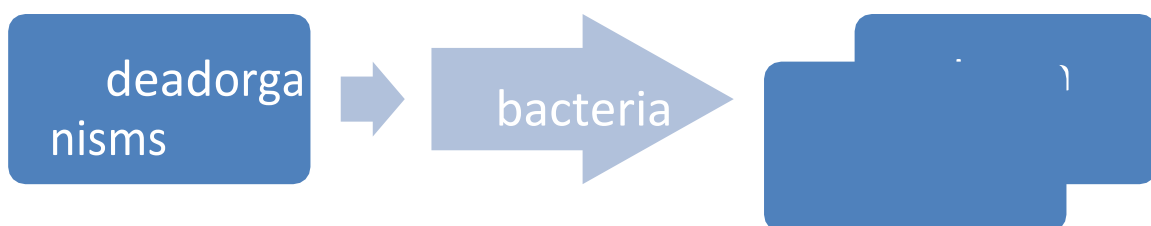
Example:-



Saprophytic food chain:-

It starts from dead organic matters (dead animals, plants etc). Bacteria, worms, fungi etc. the ecosystem follows this food chain which depends on the solar energy but depends on the organic matter produced in other systems.

Example:



Parasitic food chain:-

It is a food chain in which a parasite like one on the whole body to get energy. This food chain also starts from the green plants and animals to parasitic microbes.

Foodweb:-

- Web means network such as spiders web. The inter connection of different individuals food chain through different types of organism is called a food web.
- In other word, a food web consists of a number of linear food chains.
- In a food web, it is seen that some consumers feed on a single species and most consumers have also multiple food sources.
- Food web shows the pattern of energy flow among biotic community and abiotic community of the eco-system.
- Deserts occupy 1/5th of the earth surface important deserts are great western desert of USA Kalahari and Sahara of Africa. The climate is extremely hot in day time and then nights are very cold.

Ecological pyramids:-

- The various modes of nutrients of animals occupied different trophic levels which can be shown by means of an ecological pyramid.
- In such a pyramid it can be marked that the number of individuals which are producer are individually more numbers than the consumers and these in turn are associated with further secondary consumers.

The ecological food pyramids are of three types such as

- a) Pyramid of number
 - b) Pyramid of energy
 - c) Pyramid of bio-mass
- a. Pyramid of number

In the pyramid of number, the number of individuals decreases at each trophic level.

- b. Pyramid of energy

In the pyramid of energy there is a decrease of energy availability at successive trophic level.

- c. Pyramid of bio-mass

The pyramid of biomass indicates a decrease in total amount of living organisms from lower to higher trophic level.

3.7 Introduction, types, characteristic features, structure and function of the following ecosystem:

An ecosystem, a term very often used in biology, is a community of plants and animals interacting with each other in a given area, and also with their non-living environments. The non-living environments include weather, earth, sun, soil, climate and atmosphere.

Ecosystem Structure

Each ecosystem has two main components:

1. Abiotic Components

The non-living factors or the physical environment prevailing in an ecosystem form the abiotic components. These are Climatic Factors that include rain, temperature, light, wind, humidity etc. and Edaphic Factors including soil, pH, topography, mineral etc.

2. Biotic Components

The living organisms such as plants, animals and micro-organisms (Bacteria and Fungi) that are present in an ecosystem form the biotic components.

The biotic components can be further grouped into two basic components from the nutrition point of view:

(i) Autotrophic components, and

(ii) Heterotrophic components

The autotrophic components include all green plants which fix the radiant energy of the sun and manufacture food from inorganic substances. The heterotrophic components include non-green plants and all animals which take food from autotrophs.

Producers: Among biotic components, at a basic functional level, ecosystem generally contains primary producers (plants) capable of harvesting energy from the sun through the process called photosynthesis. This energy then flows through the food chain.

Consumers: After producers, next come consumers in the ecosystem. There are different classes or categories of consumers; these consumers feed on the captured energy.

(a) Consumers of the first order or primary consumers (herbivores): herbivorous are animals that are purely dependent for their food on producers or green plants. Insects, rodents, rabbit, deer, cow, buffalo, goat are some of the common herbivores in the terrestrial ecosystem and small crustaceans, mollusks, etc. in the aquatic habitat.

(b) Consumers of the second order or secondary consumers (carnivores): These are carnivores and omnivores. Carnivores are flesh-eating animals, and the omnivores are the animals that are adapted to consume herbivores as well as plants as their food. Secondary consumers are sparrow, crow, fox, wolves, dogs, cats, snakes, etc.

(c) Consumers of the third order or tertiary consumers: These are the top carnivores that prey upon other carnivores, omnivores and herbivores. Lions, tigers, hawk, vulture, etc. are considered as tertiary or top consumers.

(d) Parasites, scavengers and saprobes are also included in the consumers that utilize living tissues or dead remains of animals and plants as their food.

Decomposers: Decomposers work at the bottom of the food chain. Dead tissues and waste products are produced at all levels. Scavengers, detritivores (animals that live on the detritus of ecosystems) and decomposers not only feed on this energy but also break organic matter back into its organic constituents. It is the microbes that finish the job of decomposition and produce organic constituents that can again be used by producers.

The energy that flows through the food chain, i.e., from producers to consumers to decomposers is always inefficient. That means less energy is available at secondary consumers level than at primary producers level. It's not surprising, but the amount of energy produced from place to place varies a lot due to the amount of solar radiation and the availability of nutrients and water.

Types of Ecosystem

There are very many types of ecosystems out there, but the three major classes of ecosystems, sometimes referred to as 'biomes', which are relatively contained, are the following:

- **Freshwater**
- **Ecosystems Terrestrial**
- **Ecosystems Ocean**
- **Ecosystems**

Function of Ecosystem

An ecosystem is a discrete structural, functional and life-sustaining environmental system. The functional components in any ecosystem are:

- (i) **Inorganic constituents** (air, water and minerals salts)
- (ii) **Organisms** (plants, animals and microbes), and
- (iii) **Energy** which other components receive from outside (the sun).

These three form an environmental system and interact with each other. Inorganic constituents are synthesized into organic structures by the green plants (primary producers) through photosynthesis utilizing the solar energy in the process. Green plants become the source of energy for renewals (herbivores), which, in turn, become a source of energy for the flesh-eating animals (carnivores).

All types of animals grow by adding organic matter to their body weight, and complex organic compounds taken as food is their source of energy. They are known as secondary producers.

All the living organisms in an ecosystem have a definite life span, after which they die. The dead organic remains of plants and animals provide food for saprophytic microbes like bacteria, fungi and many other animals. The saprobes finally decompose the organic structure and break the complex molecules and liberate the inorganic components into the environment.

3.8 Forest ecosystem:-

Forest ecosystem is one of the greatest ecosystem of terrestrial ecosystem whose boundary of the habitat may be as large as a sub-continent or even a continent. The ecosystem may be as follows.

i. Tropical rainforest:-

The forest area is thick with maximum diversity and about 200 species of trees are found per hectare. It contains more than half of the earth's flora and fauna. The tallest trees may reach a height up to 50m and form the upper canopy.

ii. Temperate grassland:-

These are located in USA, Canada, South America, Asia and Africa. The annual rainfall ranges between 25-75 cm. Various types of grasses extending from 15 cm to 250 cm in height grow in these areas. These grasslands provide natural habitats for grazing animals like zebra, horse, rabbit etc.

iii. Desert ecosystem:-

Regions with less than 25 cm of annual rainfall are deserts. The rains are uncertain and may not occur even for years.

3.9 Aquatic Ecosystem (Ponds, stream, Lakes, Rivers, Ocean, Estuaries):

Aquatic ecosystem:-

Aquatic ecosystem deals with biotic community present in water bodies. In terrestrial ecosystem carbon dioxide and oxygen are present in gaseous form whereas in aquatic ecosystem these are available in dissolved state. Depending upon the aquatic nature of water, the aquatic ecosystem is of two types.

Freshwater ecosystem.
Marine ecosystem

Short Questions with Answer

Q.1. What is Ecosystem? [2016-w, New], [2019-w]

Ans. The living Organisms of an area (habitat) and their non-living environment function together as one unit is called the ecological system or ecosystem.

Q.2. Define the term ecology? [2017–w, new]

Ans. The term ecology has been derived from two Greek words. Oikos & logos. Oikos means house & logos means study. Broadly speaking ecology is the study of the house hold of the Planet earth. The household consists of non-living (abiotic) and living (biotic) Organisms.

Q.3. What is the synecology? [2018–s, New]

Ans. The branch of ecology dealing with the relation communities and their environments.

Q.4. Define Food Chain & Food web? [2018–S, New] [2019–W]

Ans. The transfer of food energy from plant sources through a series of organisms in an ecosystem is known as Food Chain.

Food web: In nature the food chain relationship is very complex. Each Organisation feed on two or more kinds and in turn eaten up by several other kinds of organisation. When this is represented through a diagram the relationship appear as a branching lines, other than single lines. This is called Food web.

Q.5. Define Autoecology? [2018 –w, New]

Ans. The branch of ecology that deals with the biological relationship between an individual Organisms or an individual species and its environment.

Long Questions

Q.1 Explain the function of food chain & food web. [2016 –w, New]

Q.2. Explain the different components of an ecosystem. [2016–w, new]

Q.3. Describe the Ponds as an ecosystem. [2016–w, new]

Q.4. Explain three general types of ecological Pyramids. [2017–w, new], [2019–w]

Q.5. Explain the structure of an ecosystem. [2017–w, new]

Q.6. How food chain is different from food web. [2017–w, new]

CHAPTER-4

BIODIVERSITY AND ITS CONSERVATION

Learning objective

4.1	Introduction-Definition:genetics,speciesandecosystemdiversity
4.2	BiogeographicallyclassificationofIndia.
4.3	Valueofbiodiversity:consumptiveuse,productive use,socialethical,aestheticandoptin values.
4.4	Biodiversityatglobal,nationalandlocallevel.
4.5	Threatstobiodiversity:Habitatsloss,poachingofwild life,manwildlifeconflicts.

4.1 Introduction- Definition: Genetic, Species EcosystemDiversity:

DefinitionofBiodiversity:

Biological diversityor biodiversity is that part of nature whichincludes the differences ingenes amongthe individuals of a species ,the variety and richness of all the plant and animalspecies at different scales in space ,locally ,in a region ,in thecountry and the world ,andvarioustypesofecosystems,bothterrestrialandaquaticwithinadefinedarea.

Whatisbiodiversity?

Biological diversity deals with the degree of nature’s variety in the biosphere . This variety can be observed at threelevels ; thegenetic variability within a species , the variety ofspecies within a community , and the organisation of species in an area into distinctive plantandanimalcommunitiesconstituteseecosystemdiversity.

Geneticdiversity:

Each member of any animal or plant species differs widelyfromotherindividuals in itsgenetic makeup because of the large number of combinations possible in the genes that giveevery individual specific characteristics .Thus ,for example , eachhuman beingis verydifferentfromallothers.Thisgeneticvariabilityisessentialforahealthybreedingpopulationofa species.Thediversityinwildspeciesformsthe“genepool”fromwhich

our crops and domestic animals have been developed over thousands of years. Modern biotechnology manipulates genes for developing better types of medicines and a variety of industrial products.

Species diversity:

The number of species of plants and animals that are present in a region constitutes its species diversity. This diversity is seen both in natural ecosystems and in agricultural ecosystems. Some areas are more rich in species than others. Natural undisturbed tropical forests have a much greater species richness than plantations developed by the forest department for timber production. A natural forest ecosystem provides a large number of non-wood products that local people depend on such as fruit, fuel wood, fiber, gum, resin and medicines. Modern intensive agricultural ecosystems have a relatively lower diversity of crops than traditional agro-pastoral farming systems where multiple crops were planted. At present conservation scientists have been able to identify and categorise about 1.8 million species on earth. Areas that are rich in species diversity are called "hotspots" of diversity. India is among the world's 15 nations that are exceptionally rich in species diversity.

Ecosystem diversity:

There are a large variety of different ecosystems on earth, which have their own complement of distinctive inter-linked species based on the differences in the habitat. Ecosystem diversity can be described for a specific geographical region, or political entity such as a country, a state or a taluka. Distinctive ecosystems include land spaces such as forests, grasslands, deserts, mountains, etc., as well as aquatic ecosystems such as rivers, lakes, and the sea. Each region also has a man-modified area such as farmland or grazing pastures.

An ecosystem is referred to as "natural" when it is relatively undisturbed by human activities. Ecosystems are most natural in wilderness areas. If natural ecosystems are overused or misused, their productivity eventually decreases and they are then said to be degraded.

India is exceptionally rich in its ecosystem diversity.

4.2 Biogeographical classification of India:

Our country can be conveniently divided into ten major regions, based on the geography, climate and pattern of vegetation seen and the communities of mammals, birds, reptiles, amphibians, insects and other invertebrates that live in them. Each of these regions contains a variety of ecosystems such as forests, grasslands, lakes, rivers, wetlands, mountains and hills, which have specific plant and animal species.

India's Biogeographic Zones:

1. The cold mountainous snow-covered Trans-Himalayan region of Ladakh.
2. The Himalayan ranges and valleys of Kashmir, Himachal Pradesh, Uttarakhand, Assam and other North Eastern states.

3. The Terai, the lowland where the Himalayan rivers flow into the plains.
4. The Gangetic and Bhramaputra plains.
5. The Thar Desert of Rajasthan.
6. The semi-arid grassland region of the Deccan plateau Gujarat, Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu.
7. The Northeast states of India.
8. The Western Ghats in Maharashtra, Karnataka and Kerala.
9. The Andaman and Nicobar Islands.
10. The long western and eastern coastal belt with sandy beaches, forests and mangroves.

4.3 Values of Biodiversity: Consumptive use , Productive Use, social, ethical, Aesthetic & Option Values:

Value of Biodiversity:

Environmental service from species and ecosystems are essential at global , regional and local levels. production of oxygen, reducing carbon dioxide, maintaining the water cycle , protecting soil are important services. The world now acknowledges that the loss of biodiversity contributes to global climatic changes. The preservation of “biodiversity” is therefore integral to any strategy that aims at improving the quality of human life

➤ **Consumptive use value:-**

The direct utilisation of timber, food, fuel wood, fodder by local communities.

The biodiversity held in the ecosystem provides forest dwellers with all their daily needs , food , building material , fodder , medicines and variety of other products . They know the qualities and different uses of wood from different species of trees , and collect a large number of local fruits , roots and plant material that they use as food , construction material or medicines.

➤ **Productive use value:-**

Marketable goods

Value of MFP > Timber (which is part of sustainable use)

The biotechnologist uses bio-rich areas to “prospect” and search for potential genetic properties in plants or animals that can be used to develop better varieties of crops that are used in farming and plantation programs or to develop better livestock. To the pharmacist , biological diversity is the raw material from which new drugs can be identified from plant or animal products.

➤ **Social values :-**

While traditional societies which had a small population and required less resources had preserved their biodiversity as a life supporting resource, modern man has rapidly depleted it even to the extent of leading to the irrecoverable loss due to extinction of several species. Thus apart from the local use or sale of products of biodiversity there is the social aspect in which more and more resources are used by affluent societies. The biodiversity has to a great extent been preserved by traditional societies that valued it as a resource and appreciated that its depletion would be a great loss to their society.

➤ **Ethical and moral values :-**

Ethical values related to biodiversity conservation are based on the importance of protecting all forms of life. All forms of life have the right to exist on earth. Man is only a small part of the Earth's great family of species. Don't plants and animals have an equal right to live and exist on our planet which is like an inhabited spaceship? We do not know if life as we know it exists elsewhere in the universe. Do we have the right to destroy life forms or do we have a duty to protect them? Indian civilization has over several generations preserved nature through local traditions.

➤ **Aesthetic value:-**

Knowledge and an appreciation of the presence of biodiversity for its own sake is another reason to preserve it. Quite apart from killing wildlife for food, it is important as a tourist attraction. Biodiversity is a beautiful and wonderful aspect of nature. Sit in a forest and listen to the birds. Watch a spider weave its complex web. Observe a fish feeding. It is magnificent and fascinating.

Symbols from wild species such as the lion of Hinduism, the elephant of Buddhism, deities such as Lord Ganesha, and the vehicles of several deities that are animals, have been venerated for thousands of years.

➤ **Option value:-**

Keeping future possibilities open for their use is called option value. It is impossible to predict which of our species or traditional varieties of crops and domestic animals will be of great use in the future. To continue to improve cultivars and domestic livestock, we need to return to wild relatives of crop plants and animals. Thus the preservation of biodiversity must also include traditionally used strains already in existence in crops and domestic animals.

4.4. Biodiversity at Global, National and Local levels

There are at present 1.8 million species known and documented by scientists in the world. However, scientists have estimated that the number of species of plants and animals on earth could vary from 1.5 to 20 billion! Thus the majority of species are yet to be discovered.

Most of the world's bio-rich nations are in the South, which are the developing nations. In contrast, the majority of the countries capable of exploiting biodiversity are Northern nations, in the economically developed world. These nations however have low levels of biodiversity. Thus the developed world has come to support the concept that biodiversity

must be considered to be a “global resource “. However ,if biodiversity should form a “common property resource “ to be shared by all nations ,there is no reason to exclude oil ,or uranium, or even intellectual and technological expertise as global assets. India’s sovereignty over its biological diversity change in world thinking about sharing of all types of natural resources.

Countries with diversities higher than India are located in South America such as Brazil ,and South East Asian countries such as Malaysia and Indonesia . The species found in these countries, however are different from our own.

Throughout the world ,the value of biologically rich natural areas is now being increasingly appreciated as being of unimagined value.

India has also signed the convention in the trade of Endangered species (CITES) which is intended to reduce the utilization of endangered plants and animals by controlling trade in their products and in the pet trade.

4.5 Threats to biodiversity: Habitat loss, Poaching of Wildlife ,Man-Wild-Life conflicts:

Man has begun to overuse or misuse most of these natural ecosystems. Due to this “unsustainable” resource-use ,once productive forests and grasslands have been turned into deserts and wasteland have increased all over the world .Mangroves have been cleared for fuelwood and prawn farming ,which has led to decrease in the habitats essential for breeding of marine fish . Wetlands have been drained to increase agricultural land .These changes have grave economic implications in the longer term.

The current destruction of the remaining large areas of wilderness habitats ,especially in the super diverse tropical forests and coral reefs ,is the most important threat worldwide to biodiversity. Scientists have estimated that human activities are likely to eliminate approximately 10 million species by the year 2050.

There are about 1.8 million species of plants and animals, both large and microscopic ,known to science in the world at present .The number of species however is likely to be greater by a factor of at least 10 .plants and insects as well as other forms of life not known to science are continually being identified in the world’s “hotspots” of diversity .The loss of wild habitats due to rapid human population growth and short term economic development are major contributors to rapid global destruction of biodiversity.

Island flora and fauna having high endemism in small isolated areas surrounded by sea have so far been most seriously affected by human activity , which has already led to extinction of many island plants and animals (the dodo is a famous example) .Habitat loss also results from man’s introduction of species from one area into another ,disturbing the balance in existing communities. In the process, the purposely or accidentally introduced organisms (Eupatorium ,Lantana ,Hyacinth ,congress grass or Parthenium) have led to the extinction of many local species. Loss of species occurs due to the destruction of natural ecosystems

,either for conversion to agriculture or industry , or by over-extraction of their resources ,orthroughpollutionofair,waterandsoil.

InIndia,forestsandgrasslandsarecontinuouslybeingchangedtoagriculturaland .Encroachments have been legalized repeatedly .Similarly natural wetland systems have beendraindetoestablishcroplandsresultinginlossofaquatic species.

Our natural forests are being deforested for timber and replanted using teak ,salor othersingle species for their timber value .When excessive firewood is collected from the forest byloppingthebranchesoftreestheforestcanopyisopened upand thisalterslocalbiodiversity.

Increasinghumanpopulationonthefringesofourprotectedareasdegradeforestecosystems .Overharvestingoffishespeciallybytrawlingisleadingtoseriousdepletionoffishstocks .Turtlesarebeingmassacredoff

thecoastofOrissa.Therarewhaleshark,ahighlyendangered species,isbeingkilledoffthecoastofGujarat.

Poaching: Specific threats to certain animals are related to large economic benefits .Skin andbones from tigers ,ivory from elephants , horns from rhinos are extensively used abroad .Bearare killed for their gall bladders . Corals and Shells are also collected for export or sold on thebeaches.ThecommonlycollectedplantsincludeRauvolfia,NuxvomicaDatura,etc.Collectiono fgardenplantsincludesorchids,fernsandmoss

Shortquestionswithanswer

Q.(1)Definetheterm“Biodiversity”?[2017-wnew]

ANS-Biodiversity refers to the occurrence of diverse forms of plant and animal life in aparticular area under a set of environmental conditions .It denotes the variety, number and theway of living organisms .The totality of genes ,species and ecosystems of a region is calledbiodiversity.

Q.(2)Whatarehotspotsofbiodiversity?[2018(w)-new]

ANS-Hotspots are areas that are extremely rich in species ,have high endemism and are underconstantthreat.

Longquestion:-

Q.(1)Explainabout BiodiversityatGlobalNationaland

Locallevel?[2016,new]Q.(2)Whatarethemajorthreatstobiodiversity?[2017-(w)new]

Q.(3)Briefly explain about ex-situ conservation of biodiversity ?[2018(s)

new]Q.(4)Write notesonendangeredandendemicspecies?[2018-(w)new]

Q.(5)Giveacomparisonbetweenex-situandin-situconservationofbio-diversity?[2018(w) –new]

Chapter-

5Environmental

pollutionLearning

objectives

5.1	DefinitionCauses, effectsandcontrolmeasuresof:
5.1.1	Airpollution, WaterpollutionSoilpollution
5.1.2	Marinepollution, Noisepollution, Thermalpollution, Nuclear hazards.
5.2	SolidwasteManagement: Causes, effectsandcontrolmeasures ofurbanandindustrialwastes.
5.3	Role ofan individualinpreventionofpollution.
5.4	Disastermanagement: Floods, earthquake, cycloneand landslides.

5.1 DefinitionCauses, Effect& ControlMeasureof:

Definitionofpollution

- Whensomethingdestroyeditspurityandmakingfoilorfilthyisknownaspollution.
- Whensomethingdestroyeditspurityandthat isunusefulfor thepurposeof useisknow naspollution.

5.1.1 Airpollution

Definition

When the harmful substances mixing with the air it turn in to impurities and that impurities inairisknownasairpollution.

Contaminationofairisknownasairpollution.

Sourcesofairpollutant

It isoftware types.

- Natural
- Manmade

Natural pollutant

- The harmful gases substances produced during forest fire , volcanic eruption etc.
- Volcanic eruption release poisonous gases like SO_2 , H_2S , and CO etc. When these gases mixing with naturally with atmosphere and release to the air making foil and injurious to air health.
-

Manmade pollutant

1. These are the major causes of pollution. They are

- Increasing in population
- Deforestation
- Emission from vehicles
- Burning of fossil fuels
- Rapid industrialisation
- Agricultural activities
- Wars

1. Increasing in population

The reasons of population increasing are

- Increasing birth rate
- Decreasing death rate

Due to the development of science and technology today people are living longer, people don't die.

This is the main cause of pollutant in the air.

2. Deforestation

- Plant maintain balance of CO_2 and O_2 in nature , as they purify air by taking CO_2 gas for photosynthesis and liberating O_2 is to be utilized by animal for respiratory activities.
- The animal again liberated CO_2 gas which is used by plant.
- Deforestation and indiscriminate cutting of trees and clearing of forest by man for its own feed has disturbed the balance of CO_2 and O_2 in the nature.
- This has caused an increasing CO_2 and decrease in O_2 concentration of the atmosphere.

3. Emission from vehicles

Air pollutants such as carbon monoxide, nitrogen oxide, particulate matter and benzene are emitted into the environment by motor vehicles.

4. Burning of fossil fuel

- About 97% of the energy we use in our home and factories is generated by coal, oil, natural gases which are called fossil fuel. When it burns some poison gases such as CO, CH₄, SO₂, etc which known as polluted air.

5. Rapid industrialisation

- A large number of industries like chemical industries, paper mill, cotton mill, metallurgical industries, petroleum refineries etc are responsible for 20% of air pollutants are CO₂, CO, SO₂, H₂S, NO₂, CH₄ etc.

6. Agricultural activities

- Different types of pesticides, insecticides, herbicides, fungicides, and biocides are used in modern agricultural practices. Some amount of these toxic chemicals are carried by wind to different places during their spray thereby polluting air.

7. Wars

- Air pollution is caused by various types of sophisticated explosives used by modern warfare.
- Radioactive elements are released as freely by products during atomic explosion test in of nuclear and atomic reactors.
- These radioactive dust which fall on the earth after atomic explosion is called radioactive fallout.
- These include strontium-90, iodine-131, calcium-137, these elements enter to the food chain and get concentrated in human body causing hazards.

Effects of air

pollution Effect on plants

t

- Air pollution has serious effect on plants.
- SO₂ causes chlorosis resulting death of cell and tissues.
- H₂O Hydrocarbon causes premature fall of leaves and flower buds and discoloration of sepals or petals.
- Fluorides damage leaf, vegetables, lettuce, spinach, etc. Fluorides and oxides of nitrogen reduce crop yield.

Effectsonanimal

- Air pollution causes widespread damage to live stock. The effect of air livepollution on domestic animal living in our industrial areaingests calcification ofbonesandteeth.
- Itresultinlameloss,lossofweightfrequentdiarrheal.

Effectonman

- Sulphur trioxide , nitrogen oxide , carbon monoxide , diffuse in the bloods they combinewithhaemoglobinandreducesoxygen carrying capacity.
- Hydrocarbonshavebeenreportedcausecancerinman.
- Cadmiumcauseshighbloodpressureandnumberofheartdiseases.

Controlofairpollution

- Scrubersareused toremovegasesandvapours.
- Electrostaticprecipitatorisusedtopowerplanttocheckemissionofdustfromfuelgas es.
- Cyclonecollectorareusedtoremoveearly75%ofparticlesfromwastagegas.
- Trees shouldbeplantedon the roadsidesandintheopen placestokeepenvironmentfresh, cleanpuritytheair.
- Pollutioncontrol lawsincludingmotorvehiclesactsshouldbestrictlyenforced.
- Nuclearexplosionbanned.

5.1.2 Waterpollution

- Waterpollutionisthecontaminatedwater.
- Waterissaidtobepolluted,whenitiscontaminatedwithsomeharmfulsubstances that providehazardousforhumanlife.
- In simpleterm“contaminatedwaterunsuitableforhumanpurposeispolluted water.
- Waterpollutionoccursinwaterbodies suchasponds, rivers, lakes, seasetcanditis mostly,manmade.
- Waterpollutionoccursduetoadditionoftoxicchemicals, petrochemicals, pesticides ,hotsewage,radioactivesubstancesetc.
- Itmaybedefinedasadversechangeinthequalityofwatertosuchanextentthatitbecomesunsuitableforthepurposeofuses.
- Whenwaterbodiesarepollutedtheaquaticlivesareseriouslyaffectedandalsoterrestrialanimal.

There are two types of water pollution

- Point source pollution
- Non point source pollution

Point source pollution

This source of pollution can be readily identified because it has a definite source and place where it enters the water.

Ex-municipal sewage, industrial discharge pipes.

Non point source pollution

When a source of pollution can not be readily identified such as agricultural runoffs, acid rain etc.

Sources of water pollution

Some of the following sources of water pollution are mentioned below

- Thermal pollution
- Industrial effluents
- Agricultural practices
- Sewages
- Oil spills
- Silt pollution
- Radioactive wastes etc

Thermal pollution

Various industries processes utilized a lot of water for cooling purposes. The hot water discharge is runoff into near by water bodies and increase this temperature. This reduces dissolved oxygen content and adversely affects rate of metabolism of animal and plants and also microorganisms and it also loses the properties of water as a result the qualities of the water remain changed and turn into contaminated.

The suspended pollutants settle at the bottom to form sludge.

In the liquid part potassium, ammonium, magnesium, phosphates, carbonates, sulphates etc also present. Besides many micro organisms are also present that causes disease like typhoid, amoebic dysentery, hepatitis.

Agricultural practices

For increased agricultural productivity we use inorganic fertilizers, pesticides, insecticides, herbicides, are used.

Nitrates of inorganic fertilizers are carried to ground water by leaching and finally reach surface water. These compounds when consumed by animals combine with haemoglobin and reduce oxygen-carrying capacity.

Industrialeffluents

The wastewater of heavy industries such as petrochemicals, fertilizers, oil refineries, textiles, etc. are usually delivered into nearby rivers, springs, lakes etc.

The toxic pollutants expelled are metals like copper, lead, mercury, petroleum, acids, carbonates, cyanides, alcohols, chlorides etc.

Most of them are non-degradable and toxic wastes which may be lethal for aquatic animals.

Sometimes the effluents contain heated materials which raise the temperature of water causing drastic ecological change.

Oil spoils

After exploring the land, man has recently moved to coastal waters for drilling of fossil fuels.

This causes large amount of crude oils leaking into the sea water and floating on the water surface of the seas. Such oil spoils threaten marine life.

Radioactive wastes

Radioactive wastes dumped into oceans from nuclear installations, contaminate the marine lives. These radioisotopes finally reach man through food chain.

Sewages

Municipal sewage is a major source of water pollution. In the rise in population leads to rise in the production of wastes. Sewage contains sizable quantity of decomposable organic matter causing a change in the dissolved oxygen level of water to which it is drained.

Effects

- Water born epidemics like cholera, typhoid, dysentery, hepatitis, jaundice are due to bacterial, protozoan contamination.
- Some industries discharge effluents, sometimes effluents contain mercury. Mercury is a neurotoxin; it damages the brain and is also responsible for vision impairments.
- Oxygen depletion— the dissolved oxygen of water bodies reduces due to thermal pollution causing respiration failure in animals.
- Alkali- alkali is liberated from chemical factories, cotton factories, tannery factories etc.
- When alkali mixed with the water it raises the alkalinity of water causing the destruction of micro-organisms and affects the gills of fish.
- Acids- battery manufacturing, electroplating industries, leather and chemical industries produce several acids. These are corrosive in nature, and damage

the pumps and pipes. Acids when mixed with sludge and mud produce hydrogen sulphide gas (H_2S), which is an air pollutant.

Acidity destroyed micro-organisms who help for self-purification of water. Acid is dangerous for fish and other aquatic animals.

Control

- Proper sterilization of drinking water should be made before it is supplied.
- Industrial effluents should be properly treated and neutralized and after discharged

5.1.3 Soil Pollution:

Soil is one of the most precious natural resources, which provided habitat for all terrestrial animals and all land plants that thrive on the soil. The reckless human activity in polluting the soil of rural and urban areas is posing a serious threat to human existence.

Causes of soil pollution

a) Domestic waste

It mainly contains old paper, packing glass and plastic bottles, broken porcelain, polythene carry bags, vegetable wastes and garden wastes.

b) Municipal waste

Polythene, paper and sand donated from street scraping, plastic and organic wastes obtained from the cleaning of drains, waste metals and slaughter house wastes from the major part of municipal garbage.

c) Biomedical waste

Biomedical waste is defined as any solid or liquid or the container used for their storage, which are meant for diagnosis, treatment, immunisation and biological testing in hospitals, laboratories, diagnostic centres.

d) Agricultural waste

It includes mainly the fertilizers, pesticides, and fungicides used for the improvement of soil, nourishment of plants, control of insects and weeds.

e) Mining and quarrying

Earth's surface is dug open for lifting coal and minerals from the mines. There is serious damage to the topsoil as a result of such mining operation.

After the mining operation is over, empty mines are usually packed with sand and water. f) Industrial waste

Industries emit a number of gaseous wastes like sulphur dioxide and nitric oxide. These gaseous pollutants produce sulphuric acid and nitric acid in the atmosphere and reach the soil through acid rain. This makes the soil acidic.

g) Radioactive waste

Radioactive waste from nuclear power plants, laboratories and nuclear explosion are dumped in the soil that contaminates the nearby area.

Effect of soil pollution

- Domestic, municipal and biomedical waste poses a serious threat to human health besides polluting the soil. Such waste like polythene carry bags and bottles are not biodegradable.
- They are not destroyed by the soil micro organisms and present in soil for long periods.
- Dumping of domestic sewage and biomedical wastes pollute the environment and pose a serious threat to human health.
- Through mining operations the underground minerals get mixed up with the top soil and when these are oxidised by air and water the soil becomes toxic and unfit for cultivation.
- Acid rain changes the pH of the soil and soil becomes acidic. An acidic soil is most unproductive for agriculture.
- Radioactive wastes are capable of emitting radiation for a very long period. This emitted radiation causes great damage to the plants and animals.

Control of soil pollution

- There must be a drainage system for safe disposal of all the mentioned wastes polluting the soil.
- There should be planned urbanization and industrialisation keeping in mind the safe use of land.
- The solid wastes are to be stored out to isolate the materials like plastic, paper and metal etc.
- There should be judicious use of fungicide, pesticides and weedicides.
- Biological pest control method should be tried in lieu of chemical control.
- The gaseous pollutants from the industries could be absorbed in to suitable absorbents by absorbent technique. By combustion process the emission of gaseous pollutants could be controlled.
- Steps should be taken for safe disposal of radioactive waste.

5.1.4 Marine Pollution

- Ocean are polluted due to contaminants received from neighbouring inland and the settlements present along coast all lines.
- Major sources of marine pollution is the activities meant for development and maintenance of ports and harbours.
- Shipping activities are responsible for adding contaminants like cargo waste and human waste from ship board to ocean.
- Besides discharge from drains, effects from industries are added by marine water and get contaminated the marine water.
- These pollutants are gradually deposited in the sediments and get discharged from time to time by waves.

Sources of marine pollution

- Accidental flow of crude oil into the sea from the tanker during transport, storage, distribution extraction etc.
Plastic materials either intentionally disposed of or accidentally lost in the sea from sources like fishing nets, packing synthetic crooks, plastic bags, plastic bottles etc.
- Ash from fuels used in nuclear reactors are disposed off in the ocean which contains radioactive substances like uranium, thorium and plutonium.

Effects

- Most of the micro organisms added through sewage are harmful pathogens causing serious marine animals.
- Hot water discharged from industries raises the water temperature and causes depletion in the dissolved oxygen content of water oxygen depletion causes death of marine organisms.
- Various chemicals heavy metals radio active materials enter in to the body of marine organisms get biomagnified. And enter into human body through seafood.
- Toxic substances also kill marine

organisms. Ex – olive ridley turtles.

Control

- Pretreatment of sewage and industrial before their disposal into sea and that is the best method of prevention.
- Last but not least environmental awareness about all the sources of pollution and their control major is the best way to keep our ocean clean.

5.1.5. NoisePollution:

- Noise is “unwanted sound” or any undesired sound.
- When the sound becomes undesirable, unbearable or painful, it is termed as noise.
- Sound with an intensity of 0 to 100 DB (decibels) is pleasant to our ears but a sound with an intensity of more than 120 DB is irritating, causing discomfort to our ears and it is classified as noise.

Sources of noise pollution

- a. Natural
- b. Manmade

a. Natural

Natural sound is due to cyclonic storms with high wind velocity, volcanic eruption, rains, earthquakes etc.

b. Manmade

Manmade sources of noise pollution are transportation blowing horns from industries, blowing sirens from industry, blasting of dynamite, blasting of crackers, running of electric generator etc.

- When sound travels from one to another through a medium (air, water, gases) in the form of waves.
- No. of waves produced per second is known as pitch.
- The strength or magnitude of the wave is known as amplitude.
- The unit of amplitude is decibels.

Effects

- Excessive noise makes people neurotic and leads to mental disorder, annoyance etc.
- The most acute and immediate effect of noise pollution is hearing impairment leading to ordinary fatigue and may finally lead to deafness.
- Noise interferes with speech communication.
- Noise affects heart beat, blood pressure, breathing, headache, disturbs sleep.

Control of noise pollution

- Plantation of trees on both sides of roads and highways to reduce the sound intensity of automobiles.

- Person who working in noise environments should cover their ears with ear-muffs.
- Use of loud speakers used to banned near hospital, school and college, court and justice.
- Areas within a radius of 100m from the above mentioned spots should be declared as silent zone.
- Central pollution control board has stipulated the following area wise permissible noise level during day and night.

Area	Daytime(6am-9pm)	Nighttime(9pm-6am)
Residential areas	55db	45db
Commercial area	65db	55db
Industrial area	75db	70db
Silent zone	50db	40db

5.1.6 Thermal pollution

- Large quantity of cold water circulates in nuclear reactors, thermal power plants etc, for the purpose of cooling units.
- After absorbing heat from the plants, the temperature of the water becomes very high. This hot water is discharged to nearby water bodies such as ponds, lakes, rivers, springs etc.
- Many industries such as petroleum refinery, steel plants, petrochemicals also discharge to the nearby water bodies.
- This discharged hot water raises the water temperature by 8-10° c of heat. The water bodies also dissipate the water molecules.

Effects of thermal pollution

- High temperature reduces the level of dissolved oxygen in water. This affects the respiration of aquatic animals.
Hot water destroys the self-purification microorganisms. As a result, the water turns into pollution as a result, it promotes the growth of bacteria and other pathogens.
- Hot water affects the reproductive cycle rate of fertilization and enzymatic activities of aquatic animals.
- It changes the characteristic properties of water.
- Normal algal population is replaced by unwanted and harmful blue-green algae.

Control

There should be provision for cooling towers and spray ponds to cool the water coming out of the nuclear plant and thermal power plant and use it over and over again.

5.1.6 NUCLEAR HAZARDS

- i. In nature many radioactive substances do exist in soil and water emitting continuous radiation. Such radiation is known as background radiation.
- ii. The level of this radiation is low and the existing plants and animals are unharmed by this radiation, because they have been adapted to such radiations. This radiation rather helps for the flexibility of their gene for improvement.
- iii. Increased radiation from atomic bomb blast or radioactive wastes is hazardous, because such radiations are called ionizing radiation.
- iv. They remove electrons from atoms, joining with each other in a compound such ionizing radiations damage the DNA and the cells of the living body, as they are composed of different chemical compounds.

Sources of radioactive pollution

- a. Natural, occurring in nature.
- b. Manmade, generated out of human activities.

a. Natural

- Radioactive minerals uranium-235, uranium-238, thorium-232, plutonium-239 are the minerals naturally occurring in nature.
- Cosmic ray
High energy particles reach surface as a result of cosmic radiations. Maximum number is found in the poles and minimum number is found at the equator.
- Radionuclides
The radionuclides are in unstable state in the atmosphere. They are split up into smaller particles emitting energetic radiation.

b. Manmade sources.

- Nuclear power plants
Accidental leakage of radioactive fuels from reactors and power plants causes great harm to all living bodies including man. The best example is the leakage at Chernobyl in Soviet Russia.

Radioactive wastes

USA dumps large amount of radioactive wastes from its reactors into seas of other countries.

Nuclear explosion

Explosion of atom bombs generate large amount of radionuclides in the atmosphere. When it settles down on earth, contaminates soil and water. It also enters into the human food chain through fish and milk.

Radioisotopes

They are used for treatment of diseases like cancer. They are also used in the laboratory experiments.

- Television and all phones are also other sources of electromagnetic radiation.

Effect of radioactive pollution

- It causes mutation in DNA leading to genetic disorder. Mutation in the adults may cause cancer or other abnormalities. Mutation in the egg cell leads to the birth of defective babies.
- When bone marrow is exposed to radiation, it causes premature ageing and cancer. The person suffers from leukaemia (blood cancer).
- It burns the skin causing skin cancer.
- It damages the uterus when the pregnant mother is exposed to radiation.

Control measures against radioactive pollution

- Man-made radiation can be checked at source. Enough precaution and care should be taken while using and disposing of radioactive.
- Accident-proof nuclear reactors are to be designed.
- Nuclear weapons and nuclear tests should be banned.

5.2 SOLID WASTE MANAGEMENT- CAUSES, EFFECT, CONTROL, MEASURE of URBAN & INDUSTRIAL WASTE:

SOLID WASTE MANAGEMENT

- Virtually all waste arises from human activities. Waste is though it has no economic value, so it is thrown outside or discharged into water bodies.
- Due to population growth, urbanisation and development of industries, it has contributed to generate a voluminous and many kinds of waste.

- Solidwastemanagementiscategorised intotwo categories.
- Oneisurbanwaste(thewastearisefromurbanareas)anotherisindustrialwaste(thewaste arisefromindustrialarea)

Urbanwaste

The termurbanwasteappliesto allthosewastegeneratedinurbanareas.

It is a combination of household, commercial, industrial refuse, residential refuse, streetrefuse,officesrefuse,plasticmetalsetc.

Effectsofurbanwaste

In urban areas ,waste collection and disposal in the hand of civil bodies. But in certain part ofcity waste disposal is left to individual or local communities or waste may the street, whichturnintogarbage.

Controlofurbanwaste

Someofthefollowing stepsshould havetaken forcontrolofurbanpollution.

- a. Reuseofwastematerial.
- b. Materialrecoveryand recycling.

About10to15% urbanwastearesuitablefor recoveryandrecycling.

Ex- waste generatedby papers ,glass, cardboard, etc. Canbe recyclefor the samepurpose i.e waste paper intonew packing papers, card boards in to packing materials andbrokenglassescanbemeltedrecastintonewbottlesetc.

Industrialwaste

Industries generate a wide range of waste materials such as general factory rubies, packagingmaterials,organicwastesetc.

Sourcesofindustrialwaste

- Integratedironandsteelmills-blastfurnaceslag(refuseleftafterorehasbeenmelted)
- Coalbased power plant–flyash
- Cementfactory—kilndust
- Stonecrusher—dustparticles
- Aluminiumphosphateplant—phospogypsum

Effects

The dust particles remain suspended in the air and when we inhaled causes all kinds ofrespiratorydisorders.

Control

- Updatetechnologytogeneratelesswaste.
- Useofavailablequalitymaterials.
- Properdisposalintheindustrialwaste.
- Warningofharmfuleffectsofwastetopublic etc.
- The uncollected dumped garbage , leads to many problems when exposed to wind and rain garbage becomes broodingground for diseases carrying germs and patricides and it can cause serious health problems in individuals and the society.

5.3 Role of individual in prevention of pollution

- Individuals should minimize wastage of resources such as electricity. Every unit of electricity saved is equivalent unit of electricity produced as it not only saves the fuel that would be used to produce that electricity, but also help to prevent pollution that is accompanied by burning of that fuel. Therefore, person should always switch off appliances when not in use.
- Individuals should prefer walking or use cycles instead of using motor vehicles, especially when distance to be travelled are small.
- Individuals can make considerable contribution by using mass transport (buses, trains, etc) instead of using personal vehicles.
- When going to workplace, colleagues from nearby localities should pool vehicles instead of going in individual personal vehicles.
- Taking personal vehicles for periodic pollution checks at centres approved by authorities.
- Individuals should reuse items whenever possible.
- Products that are made of recycled materials should be given preference.
- Use gunny bags made of jute instead of plastic bags.
- Take part in environment conservation drives such as tree planting drives.
- Use water resources efficiently.
- Use renewable resources by installing equipments such as solar heaters and using solar cookers.
- Dispose potentially harmful products such as cells, batteries, pesticide containers, etc properly.
- Use of refrigerator should be minimised wherever possible as they are a source of CFC, which is responsible for Ozone layer depletion.
- Follow and promote family planning, as more population means more resources utilized and more resources utilized imply more pollution.
- Avoid making noise producing activities such as listening to loud music.
- Use handkerchiefs instead of paper tissues.
- Organized drives to clean streets and clean drains with help of other people of locality.

- Spread awareness and inspire other people to prevent pollution. Individual should be encouraged to acquire information and innovations from world over and implement them locally.

5.4 Disaster Management– Flood, Earthquake, Cyclone & Landslide:

Natural disasters

- Disasters often occur, all of a sudden and without warning. This results in a description of normal life.

The community gets affected in different ways. Causing damage to the life and properties of people.

- It disrupts essential services like water supply, sewage disposal and food supply.
- Basic infrastructural facilities like electricity, telecommunication transport by road and rail etc are also affected. People suffer from physical, mental and emotional stress.
- In the basis of origin disaster is identified by classifying in to three major groups.
 - a. Natural disaster
 - b. Manmade disaster
 - c. Ecological disaster

Natural disaster

Under this category the disasters are

- i. Wind related—cyclone, storm, tornado, tidal wave.
- ii. Water related—flood, draught.
- iii. Earth related—earthquake, tsunami, volcanic eruption, landslides etc.

Manmade disasters

- i. Fire household, industrial etc.
- ii. Accidents, aircrafts, train accidents, accidents of vehicles, sea collision etc.
- iii. Leakage—Gas cylinders leakage, leakage of ammonia.
- iv. Leakage of methane.

Ecological disaster

Ecological disaster includes air pollution, water pollution, soil erosion, deforestation, marine pollution, soil pollution etc.

Flood

- Floods are natural phenomena characteristics of all rivers, flood occurs due to heavy rainfall.
- Along with heavy rainfall, reduced capacity of river beds for drains of water, aggravate the flood situation.
- Due to heavy rain the banks of the rivers breakdown and water rushes into fields and human habits causing severe damage to livestock and human population and various vegetations.

Preparedness before the flood

- Flood forecasting and warning to public through mass media communication network like radio, tv, newspaper and public address system etc.
- Selecting safe and higher grounds nearby to move after breach of flood wall.
- Construction and repair of bankments by district administration.
- Diverting flood water to detention basins like lakes and swamps.
- Storage of emergency materials such as flashlight, first aid, medicines, home construction materials such as plastic sheets, bamboos and tarpaulin etc.
- Keeping farm animals, vehicles and movable goods at safe places.
- Turning off gas and electricity while leaving.

During flood situation

- Listen to the radio for advance information and advice from govt.
- Never wander around the flood area.
- Don't enter flooded water on foot.
- If you can avoid it (to avoid snake bite and water born skin disease).
- If you are outdoors and the flood water is rising, then stay on a high ground until flooded water recedes.

After flood

- Don't return home till authorities indicate it is safe to return.
- Stay out of the house if flooded water remains around.
- Help your neighbours with surplus food, clothing and construction materials.
- Learn from the calamity to remain fully for the next.

Earthquake

- i. An earthquake is a sudden shaking of ground caused by disturbances in earth's crust.
- ii. It is considered to be one of the most dangerous and destructive natural calamities, it occurs suddenly with little warning or nowarning.

- iii. Although it is not as frequent as other natural disasters.
- iv. It can cause diver station and loss of live for greater than any other natural disaster. It does not predict and can't be prevented.

Nature of earthquake

- It is insudden.
- Causes destruction of buildings, infrastructure and agriculture.
- The magnitude of an earthquake is measured on rector from 1-9.
- The exact under ground split at which earth quake originates is called the focus and at the point of line vertically above the focus of the surface of the earth is known as epicentre of earthquake.
- The intensity of the earth quake decrees as the distance from the epicentre decreases.
- When rock under ground suddenly breaks along a fault. This sudden release of energy is called seismic wave. That makes the ground shake.
- When two blocks of rocks or two plates are rubbing against each other they strike little. The spot under ground where the rock is breaks is called focus of the earthquake, the place right above the focus is called epicentre.

Landslide

Land slide is a general term for rapid down slope movement of soil or rock. There are sudden geomorphic events in sloping terrains. Gravity pulls downward on every material everywhere on earth, causing rapid to slow descent of soil, rocks or other geological materials. The resulting movement is often slow and subtle but some slope processes such as rock slides, avalanches and landslumping can be swift and dangerous.

They often occur in conjunction with natural hazard like flood, earthquake or volcanic eruptions.

Effects of landslides

- Landslides are more frequent and common in the Himalayan foothill regions, causing loss of life and property.
- Landslides pose a serious threat to human settlements.
- They often result in heavy damage to highway, railways and waterways.

Cyclones

- The location and geometrical features of India makes it vulnerable to natural disasters. Tropical cyclone tops the list of natural disasters because of its magnitude of devastation causing loss of life and property.
- Cyclonic storms develop over the warm ocean water of the bay of Bengal and the Arabian sea. Cyclones that form in the bay of Bengal move into the Indian coastal

line while those forming in the Arabian sea usually move away from Indian coastline and territory. However some of them may turn around to hit Gujarat and adjacent areas.

Short questions with answer

Q-1 what is environmental pollution? W-17,19

Ans : environmental pollution refers to any undesirable change in environment brought by chemical, physical and biological agencies. There are seven types of pollution which affect the environment desirable to undesirable such as air, water, thermal, noise, soil, nuclear hazards and solid wastes etc.

Q.2. what do you mean by rubbish and refuse? S-18,

Ans: Rubbish in the sense of crash waste is the same thing which comes from food waste.

And refuse means to reject items which comes from the bathrooms and kitchen of a house like organic waste, cloths, paper products etc.

Q-3 write four psychological effects of noise pollution? S-18

Ans: noise affects work efficiency

- That needs great deal of concentration
- Disturbs sleep and work performance
- Heart beat and headache.

4 Define BOD and COD? S-18

Ans: BOD stands for biological oxygen demand. BOD value means more polluted water. BOD is defined as the amount of oxygen required by bacteria to decompose the organic matters into carbon dioxide and water under an anaerobic condition.

COD: chemical oxygen demand. It measures to assess the amount of oxygen present in water for oxidation of organic matter present in water.

Q -5 What are hazardous wastes? 18-W-N

Ans : Hazardous waste is waste that has substantial or potential threats to public health or the environment.

Q-6 what is photochemical smog? 18-W-N

Ans: smoke and fog together from smog nitrogen oxide and hydrocarbons are the pollutants from the automobile exhausts. In the presence of sunlight, oxides of nitrogen and hydrocarbons react with one another to form ozone and peroxyacetyl nitrate. Nitrogen dioxide with ozone and PAN appear in the form of yellow brown smog, called photochemical smog.

Q-7 What is solid waste management? 19-W, 20-W

Ans : solid waste management is a term that is used to refer to the process of collecting and treating solid waste. It also affects solution for recycling items that do not belong to garbage or trash. Waste management is all about how solid waste can be changed and used as a valuable resource.

Q-8 Define greenhouse effects? 19-W, 20-W

Ans : carbon dioxide, methane, nitrous oxide, and CFC are together called greenhouse gases. These gases form an enveloping layer in the atmosphere above the earth. Like glass in a greenhouse, these gases allow sunlight to reach the earth's surface and heat the atmosphere. But they do not allow escape of heat from the earth into space. The greenhouse gases cause an increase of temperature in the lower atmosphere. The warming action caused due to greenhouse effect.

Long questions

Q-1 Discuss the effects of noise pollution? 16-W-N

Q-2 What is water pollution? Discuss the causes and its remedies of water pollution? 16-W - N

Q-3 Explain solid waste management? 16-W-

NQ-4 Write short notes on 17-W-N

- i. Effects of air pollution
- ii. Measures to check air pollution

Q-5 Write an essay on 'Global warming'? 17-W-N

Q-6 What are the impacts of industrialization on the human environment? 18-S-

NQ-7 What are the hindrances in the development of nuclear power? 18-S-N

Q-8 Explain the functions of cyclone separators and electrostatic precipitation with diagram? 18-S-N

Q-9 Explain the various steps employed for solid waste management? 18-S-N

Q-10 Write the hazards associated with radioactive pollution? 18-W-N

Q-11 Explain the methods employed for control of noise pollution? 18-W-

NQ-12 What are the effects of thermal pollution? 18-W-N

Q-13 Write the features of the Air pollution? 18-W-N

Q-14 What are the methods employed for control of water pollution? 18-W-

NQ-15 What is disaster management?, 19-W

Q-16 What is solid pollution? Define the effects and control measures of soil pollution in details? 20-W

Chapter-06

Social Issues and The Environment

Learning objectives

6.1	Form unsustainable to sustainable ☐ development.
6.2	Urban problems related to energy.
6.3	Water conservation, rainwater harvesting, watershed management
6.4	Resettlement and rehabilitation of people; its problems and concern
6.5	Environmental ethics: issue and possible solutions
6.6	Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies
6.7	Air (prevention and control of pollution) Act.
6.8	Water (prevention and control of pollution) Act.
6.9	Public awareness

6.1 Unsustainable to sustainable development

The process by which people meet their needs and improve their living conditions is called development. Not only the present generation but the future generation also benefit from economic, social, cultural and ecological sustainability. This is possible through conservation of natural resources and diversity of life.

Causes:

- The population explosion in recent years has put tremendous pressure on the environment. Mismanagement of environment and natural resources leads to unsustainable development.

- It is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional change are all in harmony and enhance both current and future potential to meet human needs.

6.2 Urban problems related to energy

- Energy is basic to development. Today life is unmanageable without energy. It provides not only comfort, but also the necessities.
- Energy consumption for electric transportation, cooking, heating, recreation and operating energy-based machines.
- The urban lifestyle consumes more energy and necessitates high utilization levels, for example, air conditioners are being used in place of electric fans, scooters, motorcycles, cars have replaced bicycles, charcoal heaters have been replaced by electric geysers.
- It was some two hundred years ago with the dawn of industrial area the cities showed rapid development. No about 50 % of the world population live in urban areas and there is increasing movement of rural area to cities in search of employment.
- In developing countries too urban growth is very fast and in most of the cases it is uncontrollable and unplanned growth. In contrast to the rural setup the urban is densely populated, consumes a lot of energy and materials and generates a lot of waste.

Energy problems in urban areas

- The pollutants released from vehicles reduce air quality. Burning of fossil fuels releases greenhouse gases, which contribute to global warming.
- Severe power cuts affect health care services and public health care facilities such as water supply, storage systems. The students appearing at examinations, patients in ICU are the most affected due to power cuts. Non availability of petrol and diesel severely affects public and private transport.

6.3 Water conservation, Rainwater Harvesting and Watershed Management.

- Water conservation is a key link between balancing current and future water needs. As pressure on this precious resource is growing day by day. The less water we withdraw, the less we upset the natural balance. We can make significant contribution to solving the water crises by identifying the areas in home, office, business, agriculture and industry where we waste water and then we can make appropriate changes in our water using habits.

Rainwater harvesting:

- In addition to traditional water harvesting structures like tanks, and village ponds, a number of schemes have been devised based on the availability of water resources. One such scheme is community based rainwater harvesting.

- The principle of collecting and using precipitation from a catchment surface is the basis of rainwater harvesting, which is enjoying of sorts in the world.

Advantages of watershed management:

- Present water storage
- Protects wildlife
- habitat
- Checks soil erosion
- Improve agriculture
- Minimize flooding
- Availability of water
- round the year
- Provide jobs for the local people
- Develop watershed for community use

6.4 Resettlement and rehabilitation of people: problem & concerns:

Its problems and concerns:

- It is a well known fact that both natural and human made disasters force people to move out of their land. For example Tsunami in south Asia in December 2004, Gujarat earthquake, the Odisha super cyclone and scores of floods and drought in other parts of our country have rendered thousands of people homeless and jobless.

People problems:

Strategies for rehabilitation of thus displaced people are in the first place by way of preventive action. For instance care is taken to build earthquake proof houses, gather advance information about cyclones and arrange for timely evacuation, build appropriate bunds in flood prone areas, maintain bridges that take regular up and down passing of trains or road transport vehicles on them in order to likely disasters. The primary necessity is that of building awareness among the people on general and among administrative personnel in particular.

People concerns:

- Development projects come into existence after a fairly long period of planning and awareness of displacement caused by such projects already exists among those who initiate the projects.
- Development projects instead focus on economic efficiency and not on the who stand to lose all that they have their land means of livelihood and stable patterns of social and cultural life.
- As far as our country's preparation for coping with the impact of natural and we have begun to feel a little aware of negative impacts of such events because they are now occurring at frequent intervals.

6.5 Environmental ethics: issues and possible solutions-

- Ethics is defined as a set of rules or principles that are followed by a broadly recognized race or group. The field of environment ethics concerns human being's ethical relationship with natural environment. While numerous philosophers have written on this topic throughout history, environmental ethics only developed in a specific philosophical discipline in the 1970s.
- Environmental ethics is a branch of applied philosophy that studies the conceptual foundations of environmental values as well as more concrete issues surrounding society's attitudes, actions and policies to protect and sustain biodiversity and ecological systems.

Environmental issues:

- There are many environmental issues in India, Air pollution, water pollution, garbage and pollution of the natural environment are all challenges for India. Nature is also causing some drastic effects on India. This situation was worse between 1947 through 1995.
- According to data collections and environment assessment studies of world bank experts between 1995 through 2010, India has made some of the fastest progress in addressing its environmental quality in the world.
- Pollution remains a major challenge and opportunity for India.
- Environmental issues are one of the primary causes of disease, health issues and long-term livelihood impact for India. Major environmental issues are use of resources, urban issue, vegetation, animal and birds, pollution and population etc.

Possible solutions:

The following are the possible solutions Co

- Conservation of natural resources:
 - Environmental goods are distributed in such a way that wealthy and otherwise privileged people enjoy the benefits of these environmental goods but poor or otherwise disadvantaged people bear their burden
 - Forestation: forests play an important role on carbon cycle, mainly greenhouse gas CO₂ is absorbed by the forests.
 - Forests can absorb many toxic gases and can help in keeping air cool. There is a need to grow more trees.
 - The natural forests must be protected as national parks, where all the plants and animals can be protected.
- Pollution control:
 - Forest cover should be protected.
 - Trees are the best controller of air pollution, noise pollution and soil pollution and soil erosion.
- Population control:
 - Increasing populations should be checked. It is our duty. One child concept should be adopted.

- Solidwastemanagement:
 - Reductioninuseofrawmaterialwillcorrespondinglydecreasetheproductionofwaste.
 - Water is more important in them refillable containers can be
 - reused.Otherthingslike paper,clothes,materialsetc.

6.6 ClimateChange,Globalwarming,AcidRain,OzoneLayerDepletion,NuclearAccident&Holocaust,Casestudies:

Climatechange:

- Climate change is defined as the weather conditions of an area, which are averagedover a period of about 30 yrs taking in to account the weather extremes that are likelytooccur.
- Weather is the atmospheric condition of an area during a particular time. The weatherchanges from year to year, season to season , day to day and even from hour to hour.The weathermaybe sunnyinthemorningandrainyduringevening.

Globalwarming:

Industrial dusts, dusts from mining and dusts from automobiles increase the particulate matterin the atmosphere. These particulate matters reflect back the incoming solar radiation in toouterspacebeforeitreachestheearthssurface.

During the past two centuries. The level of carbon dioxide has increased considerably in theatmosphere. This is due to the excessive combustion like burning of fossil fuel and burningforests.

Acidrain:

Nitrogenoxides,Sulphurdioxideandcarbondioxidereleasedformindustriesandautomobiles are present in the atmosphere. They react with water vaporin the atmosphere toproduce nitric acid, Sulphuric acid and carbonic acid which come down to earth along withrain.

Nitrogen+water → nitric

acidSulphur+ water

sulphuricacid

Carbondioxide +water → carbonicacid

Ozonelayerdepletion:

In the stratosphere ,about50 km above the earth,thereis alayerof ozone called ozoneshield. This layer of ozone absorbs the ultra violet rays of the sun so that the rays do not theeath.

The injurious ultraviolet rays cause skin cancer, the ultraviolet rays retard growth of plants. Therefore, without adequate ozone shield, our health and food sources will be under constant threat.

Nuclear accidents and holocaust:

The accident occurred in the year 1986. The Chernobyl nuclear power plant has four reactors. The safety procedure was not followed properly therefore, the accident occurred in one of the reactors.

The nuclear industries all over the world faced a crisis of accident. The accident has shaken the faith of even staunch supporters of nuclear energy.

6.7 Air (Prevention and control of pollution) act:

- The air (prevention and control of pollution) act was passed in 1981 to regulate and control the hazardous emissions from the automobiles and industrial units. The central board for prevention and control of water pollution is authorized to implement and enforce the act. The central board is also empowered to coordinate the activities of the state boards present in every state of India.
- The state Govt. can declare any area within the state as an air pollution control area and prohibit setting of industry causing air pollution.

6.8 Water (prevention and control of pollution) act:

- It defines water pollution.
- Describes penalties for those guilty of water pollution.
- Setting of an administrative machinery called water pollution level at central and state level in order to prevent and control water pollution.
- The act prohibits dumping of poisonous toxic matters into streams, wells, etc.
- It also prohibits activity that impedes the proper flow of the water in a stream. The
- board is authorized to take action against pollution.

6.9 Public awareness:

There is a Chinese proverb which says, 'if you plan for one year, plant rice, if you plan for 10 years, plant trees, if you plan for 100 years, educate people' the education in creating environmental awareness is essential for the young generation as well as the oldest generation. The awareness programs must reach both rural and urban people.

Short questions:

Q.1. What is the water logging? [2016–w, new]

Ans. Water logging refers to the saturation of soil with water. Oil may be regenerated as water logged when the water table of the ground water is too high to conveniently permit an anticipated activity like agriculture etc.

Q.2. What is Acid Rain? [2017-w, New]

Ans. Nitrogen Oxides, Sulphur Dioxide, Carbon dioxide, released from industries and automobiles are present in the atmosphere. They react with water vapour in the atmosphere to produce nitric acid, Sulphuric acid & Carbonic acid which come down to earth along with rain. This is known as acid rain.

Q.3. What do you mean by Sustainable development? [2017-w, new]

Ans. Sustainable development is the Organizing Principle for meeting human development goals. While as the sometime sustaining the ability of natural systems to provide the natural resources & ecosystem services upon which the economy & society depend.

Long Questions:

Q.1. Write the feasibility of Sustainable development seek to strike a balance between economic progress and environment Protection. [2016-w, New]

Q.2. What is Green House Effect? How does it cause global warming. [2016-w, New]

Q.3. Describe the effect of Urbanisation on the environment. [2016-W, New]

Q.4. Explain Acid Rain. [2016-W, New]

Q.5. Why Rain water harvesting is inevitable for conservation & management of water? [2016-w, New]

Q.6. What is rain water harvesting? Write its advantages. [2017- w, New]

Q.7. Write a short note on "Public Awareness to protect our Environment". [2017-w, New]

Chapter-07

Human Population and the environment Learning objectives

Learning objectives

7.1	Population growth and variation among nations.
7.2	Population explosion-family welfare program.
7.3	Environment and human health.
7.4	Human rights.
7.5	Value education
7.6	Role of information technology in environment and human health.

7.1 Population growth and variations among nations:

Populations:

Population can be defined as a group of organism of a particular species in a specific area at a particular time.

Ex-1

All the tiger of the same species living in a forest constitute tiger population. Ex-2

- All the teak wood trees in certain woodland constitute teak wood tree population.
- In biology, population is all the organism of the same group or same species which live in a particular geographical area.
- Overall population means no. Of people or no. Of animals on a particular place.

Characteristics of population

The characteristics of the population are mentioned below.

- ❖ Density



Density

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It is the number of individuals of a population per unit area at a given time.

Natality

- The birth rate of a population is called natality. The density of a population increases due to production of new individuals by germination of seeds, hatching of eggs, or birth of young ones.
- Natality does not remain constant. It varies with the rise in population and environmental conditions.
- Natality may be zero or positive but never negative.

Mortality

- The death rate of individuals in a population is called mortality. Mortality is a negative factor in population growth.
- The causes of mortality may be disease, flood, earthquake, and other natural calamities.

Dispersed

Movement of members of a population from a particular area is called dispersal. The three ways of population dispersal are

✚ Migration

It is the movement of individuals from an area and return to the same area afterwards. Ex-migration of people during flood.
--migration of Siberian cranes to chilling lakes during winter.

✚ Emigration

It is the outward movement of individuals of a population from an area. The members who leave the area do not return to the same area.
It is one-way movement.
Ex-migration of people during partition of India.

✚ Immigration

It is inward movement of individuals into an area from outside. Ex-people coming into a country to live permanently.

Distribution

Individuals of a population in an area are distributed in three ways.

✚ Uniform

Members are spread out throughout the area.

✚ Random

Uneven distribution occurs under favourable conditions and not tendency to compete.

☐ Clumping

When several individuals gather together at the same place of extended area, it leads to clumping. It increases the density in that particular area compared to other parts of the same area.

7.2 Population Explosion – Family Welfare Program:

Population explosion

The reasons of population explosion are

- Increase in birth rate
- Decrease in death rate

Though both of the above reasons contribute to population explosion, but the main problem has come from death rate.

Today people live longer, people don't die as they used 100 yrs back, diseases like smallpox, cholera, plague, diphtheria and measles which used to take life in 1000.

Epidemics, wars, which were common in those days, nowadays don't accrue in the same frequency.

With the development of science and technology, human population is now almost free from natural enemies and other environmental restraints.

The importance of nutrition, better sanitation, medicine have been reflected in the decline of death rate.

Consequences of overpopulation

- Poverty
- Food supply
- Unhygienic
- condition
- Unemployment

- Housing
- problemPollutionE
- ducationproblem

• **Poverty**

Ifthefamilysizeis moreandtheincomeis less,naturallyitbecomespoor,withtheadditionofevenchild,the povertyincreasesmoreandmore.

• **Foodsupply**

If the population increases but the production of food does not increases, this willleadtotheshortageoffoodsupply.

• **Hygieniccondition**

Morepeopleinasmallareagenerallycreateunhygienicconditions. Thereisanaccumulationofwaste materialasitisnotremovedsoon.

• **Unemployment**

Morenumberofpeoplemeanstheyaremorejobsandifsufficientnumberofjobsarenotavailable.Itwillleadtounemployment.

• **Housingproblem**

Formorepeople,morehousesarerequiredandthehousesarenottobebuiltathighcost.

• **Pollution**

There is one more problem of population explosion. As every is taken fromenvironmentisexcess,itwillnaturallyresultinpopulation.

- Educationproblem
Itbecomesdifficultforthegovernmenttoprovideeducationtoall.

Familywelfareprogramme

1. Education

People,particularlythoseinthereproductiveagegroup,shouldbeeducatedabouttheadvantagesofasmallfamily. Massmediaandeducationinstitutionscanplay an important role in this campaign. Ernakulum district of Kerala has earnedthedistinctionofbeingthefirstcentpercentliteracydistrictinthecountry.

2. Ageofmarriage

Raisingthemarriageableageisthemoreeffectivemeantocontrolpopulation.

3. Family planning

Family planning programmes provide educational and medical services which help couples to choose their family size and when to have the children.

7.3 Environment and human health:-

All living organism, including man, interact with environment. The surrounding where we live, eat, breathe, reproduce and die is our environment.

The soil, water, desert, lake, ocean, mountain etc. have effects such as temperature, moisture, type of soil etc. constitute the physical environment.

The living being constitute the biological environment. Natural environment includes a number of components, which fall under two categories such as biotic and abiotic. The abiotic components include energy, soil, water, temperature, radiation, wind, gases etc. The biotic components are plant, animal and microorganism.

- The environment in which man lives affects his health. But it is unfortunate that man has exploited and polluted his environment to satisfy his own needs and greed even satisfy his own whims and fancy.

- Health is the quality of life. According to WHO (World Health Organisation) health is a state of complete physical, mental and social well-being and not merely the absence of disease.

- **Due** to constant and gradual deterioration of environment and its effect on health man has realised the importance of clean environment as a result, a new discipline has emerged called public health. The aim of public health department is to prevent disease, prolong life, promote health and efficiency of people through community effort.

1- Pollution and health:-

Various types of pollution of different nature are a threat to the health of the public. The effects of pollution on the health of human are as follows:

Air pollution

- It reduces quality of air, the gases pollutants like carbon monoxide, sulphur dioxide, hydrogen sulphide, oxide of nitrogen, smokes, dust, fume etc. released into the atmosphere and contribute to serious health problems.
- The pollutants in air affect the respiratory system, irritation of eyes and nose, chronic cough, asthma, allergies, heart disease are due to exposure to polluted air.

Water pollution

- Change the quality of water to such an extent that it becomes unsuitable for human use.
- The industrial effluents sewage discharges of pesticides, dyes, acids, fertilizers, or toxic materials result in waterborne diseases.
- Several pathogens like bacteria, fungi, protozoa's, are causative agents for diseases like cholera, typhoid, hepatitis, gastroenteritis.

Noise pollution

- Which is a feature of human activities is irritating.
- If its intensity is much more than 120 dB it may become a problem, raises blood pressure, increases pulse rate, causes headache, impairing of hearing.

2-Occupation and health:-

Human health is also affected by the quality of the environment in the work place. As the choice of job is limited the underprivileged and poor people are compelled to do most risky and hazardous jobs; therefore suffering from physical illness and psychological stress.

People working in factories, textile mills, mines, stone centres suffer from many occupational diseases such as

1. Pneumoconiosis (dust diseases)
 2. Silicosis (silica dust)
 3. Asbestosis (asbestos dust)
 4. Anthracosis (coal dust)
-
- The textile workers who work in bale opening room suffer from allergic diseases. People who are working in plastics factory, paint factory, petroleum products suffer from throat, lung, chest, and cancer diseases.
 - Farmer and farm workers engaged in agricultural field work use various pesticides, they suffer from toxic poisoning, cancer, paralytic and neurological disorders.
 - Due to irregular timing (working in night shift by rotation) the biological clock and the psychological rhythm of the person undergoes changes leading to insomnia, headache, high blood pressure, irritation etc.

3- Stress and health:-

In day to day life people face many stress full situation. stress is responsible for many diseases high blood pressure, neurosis, allergies, heart diseases, and respiratory disorders.

4- Food and health:-

Food is essential for all us. But at the same time it is a source of many food related disease.

- food contaminated with harmful micro organism and warm, toxic released from microbes, pesticides metal which can cause food contaminated.

5- Ionising Radiation:-

Ionising Radiation have carcinogenic effects (cause cancer), mutagenic effect (cause changes in gene) in living organism.

- The alpha, beta and gamma particles are radiation of high energy the energy of these particles damages bones and lungs

7.4 Human Rights

- ❖ Human rights are the basic rights and freedoms that belong to every person in the world, from birth until death.
- ❖ They apply regardless of where you are from, what you believe or how you choose to live your life.
- ❖ They can never be taken away, although they can sometimes be restricted – for example if a person breaks the law, or in the interests of national security.
- ❖ These basic rights are based on shared values like dignity, fairness, equality, respect and independence.
- ❖ These values are defined and protected by law.

Human rights are relevant to all of us, not just

those who face repression or mistreatment. They protect you in many areas of your day-to-day life, including:

- ❖ your right to have and express your own opinions
- ❖ your right to an education
- ❖ your right to a private and family life
- ❖ your right not to be mistreated or wrongly punished by the state
- ❖ The Human Rights Act 1998 made the rights set out by the European Convention on Human Rights part of our domestic law.
- ❖ The Human Rights Act means that courts in the United Kingdom can hear human rights cases.

- ❖ Before it was passed, people had to take their complaints to the European Court of Human Rights in Strasbourg, France.
- ❖ Last updated: 19 Jun 2019

7.5 Value of education

- Environment value education is about empowerment or developing the capacity to access address environmental issues in their localities. So that they can leave sustainably.
- It is about caring for

earth. Some of the points are given below

ow

1. Knowledge about environment and population growth

Increase in population of the world requires more food, more homes, more clothes, more infrastructure development etc. Now it is time that humanity becomes aware of the negative impact of population growth and its implications for the present as well as future generation.

2. Knowledge about human environment relation

- Environmental adjuration is essential for environmental
- degradation. Rapid population growth, industrialization, urbanisation, heavy consumption of natural resources and high energy utilization.
- Hence humanity needs to be educated to understand the environment problem and find solution to prevent them for that the environment can be protected.

7.6 Role of information technology in healthcare

- Information technology is a process of recording, processing and interpreting about a no object without being in direct contact with the object.
- Computer, satellites, radar, internet services, television, remote sensing, radio etc, are the common instruments of Information technology.

Information technology in healthcare

It also provides networking health and giving prescriptions on the internet

- Information technology database for medicine
- Information technology kept computer based past and present
- record. It provides more effective research programme and design

- It provides computerised records and online textbooks on specialised medical topics

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Short questions with answer

Q-1 Define population and its types? 2016-w-n

Ans: population can be defined as a group of organisms of a particular species in a specific area at a particular time.

Types of population are 1-density, 2-natality, 3-mortality.

Q-2 What is population explosion? 2017-w-n

Ans: population explosion refers to a great and rapid increase in a population. Specific such an increase in the worldwide human population in modern times.

Q-3 What is value education? 18-s-N

Ans: value education is about empowerment or developing the capacity to access the address environmental issues in their localities. So that they can live sustainably. In a sense, it is about caring for the earth.

Q-4 What is gene pool? 18-W-N

Ans: The gene pool is the set of all genes or genetic information in any population, usually of a particular species.

Q-5 What are the various objectives of family welfare programme? 19-W

Ans: the main objective of the programme is to reduce growth rate so as to stabilize the population at a level consistent with the needs and potential of national economy.

To ensure adequate, qualitative, preventive and curative healthcare to people of the state.

Long questions

Q-1 Explain value of education? 16-W-N

Q-2 Write the role of information technology in environmental studies? 17-W-N, 18-W-

NQ-3 Describe the values included in value education? 17-W-N, 19-W

Q-4 What is population explosion? Briefly discuss it in Indian scenario? 18-S-NQ-

5 What do you mean by incineration and pyrolysis? 19-W

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