

# **BALASORE SCHOOL OF ENGINEERING**

**6<sup>TH</sup> SEMESTER**

**ELECTRICAL/CIVIL**

**ENVIRONMENTAL STUDIES**

**CODE-BST 501**

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## CHAPTER-I

### **1.What is green technology. [2015,2016] [2 marks]**

Ans : Green technology refers to the technological advancement devised to invent new industrial processes for manufacturing goods and chemicals using the least amounts of resources and energy and as to produce minimum waste products.

### **2.Define environment.write importance of environmental study and need for public awareness. [2012,2014,2017] [7 marks]**

Ans:The word environment is derived from the French word 'environ' meaning surroundings. Hence, everything surrounding us is called "ENVIRONMENT".

#### Importance of environmental study:

It is required to enlighten us about the importance of protection and conservation of the environment.

- (I) Environmental issues of international
  - (a) Global warming.
  - (b) Ozone depletion.
  - (c) Biodiversity .
  - (d) Marine pollution.
- (II) Problem arised due to development.
  - (a) Development leads to urbanisation,industrial growth,transportation,housing,agriculture.
- (III) Explosively increase in pollution.
- (IV) Need of alternative solution.
  - (a) Over goal is to achieve healthy environment with sustainable development.
  - (b) Creation of developed society, reducing wastage.
- (V) Need to save humanity from extinction.
- (VI) Need for wise planning of development.

#### Need of public awareness:

It is essential to make public aware of consequence of environmental degradation which would result in extinction of life.

- (I) Growing population.
- (II) Poverty.
- (III) Agricultural growth.( excessive agriculture leads to reduction of fertility of soil)
- (IV) Development and extinction of forest.(due to deforestation)
- (V) Need of ground water.(excessive industries and factories have polluted surface water and ground water which hamper safe drinking)
- (VI) Degradation of land by erosion.(due to agriculture)
- (VII) Evil consequence of urbanisation.

(VIII) Air and water pollution.

## CHAPTER-II

### **1. What are sources of energy. [2014,2016] [2 marks]**

Ans: The sources of energy are solar, wind, water, geothermal, biomass, fossil fuel etc. (coal, oil, natural gas etc)

### **2. What is the role of an individual in conservation of natural resources. [7 marks]**

Ans: Already we know that natural resources are exhausting rapidly, we must conserve for future generation. so its duty of individual to conserve natural resources.

### MEASURES CONSERVATION OF NATURAL RESOURCES:

#### **1. Conservation of energy:**

- switch off lights, fans and other appliances when not in use.
- Use solar heater for cooking your food on sunny days, which will cut down your LPG expenses.
- grow trees near the houses and get a cool breeze and shade .this will cut off your electricity charges on A/C and coolers.
- Use always pressure cooker.

#### **2. Conservation of water:**

- use minimum amount of water for all domestic purposes.
- check for water leaks in pipes and toilets and repair them promptly.
- reuse the soapy water, after washing clothes, for washing off the courtyards, drive ways, etc.,
- built rainwater harvesting system in your house.

#### **3. conservation of soil:**

- grow different types of plants, trees and grass in your garden and open areas, which bind the soil and prevent erosion.
- don't use more fertilizer and pesticides.
- use nature manure to the crops..

#### **4. conservation of food resources:**

- don't waste the food instead give it to someone before getting spoiled.
- cook only required amount of the food.
- store the food resources for the future use.

#### **5. conservation of forest:**

- use non-timber products.
- plant more trees and protect them.
- over grassing must be controlled.
- minimise the use of papers and fuel wood.
- avoid of executing developmental works like dam, road and industrial constructions in forest areas.

### **CHAPTER-III**

**1.What is aquatic ecosystem. [ 2015,2016,2017] [2marks]**

Ans: An aquatic ecosystem is an ecosystem in a body of water. Communities of organisms that are dependent on each other and on their environment live in aquatic ecosystems. The two main types of aquatic ecosystems are marine ecosystems and freshwater ecosystems.

**2. Explain biotic and abiotic ecosystem. [2014,2015] [ 5marks]**

Ans: Abiotic ecosystem:

- Abiotic ecosystem refers to non-living physical and chemical elements in the ecosystem. Abiotic resources are usually obtained from the lithosphere, atmosphere, and hydrosphere.
- Examples of abiotic factors are water, air, soil, sunlight, and minerals.

Biotic ecosystem:

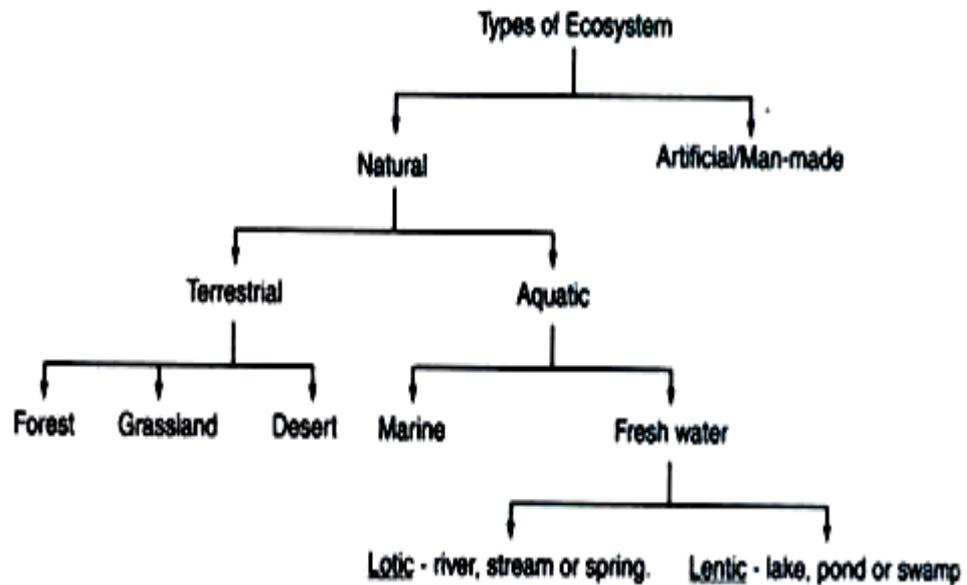
- Biotic ecosystem refers to living or once-living organisms in the ecosystem. These are obtained from the biosphere and are capable of reproduction.
- Examples of biotic factors are animals, birds, plants, fungi, and other similar organisms.

**3.What is ecosystem.Classify it and what are the function of ecosystem. [2016,2017] [ 7 marks]**

Ans: Ecosystem:

An ecosystem is a natural system consisting of all plants, animals and microorganisms (biotic factors) in an area functioning together with all the non-living physical (abiotic) factors of the environment.

## Types of ecosystem:



### (a) Natural Ecosystems:

These ecosystems are capable of operating and maintaining themselves without any major interference by man.

A classification based on their habitat can further be made:

1. Terrestrial ecosystems: forest, grassland and desert.
2. Aquatic ecosystems: fresh water ecosystem, viz. pond, lake, river and marine ecosystems, viz. ocean, sea or estuary.

### (b) Artificial Ecosystem:

These are maintained by man. These are manipulated by man for different purposes, e.g., croplands, artificial lakes and reservoirs, townships and cities.

## Function and structure of ecosystem:

Each ecosystem has two main components:

- (1) Abiotic
- (2) Biotic

### (1) Abiotic Components:

The non living factors or the physical environment prevailing in an ecosystem form the abiotic components. They have a strong influence on the structure, distribution,

behaviour and inter-relationship of organisms. Abiotic components are mainly of two types:

(a) Climatic Factors:

Which include rain, temperature, light, wind, humidity etc.

(b) Edaphic Factors:

Which include soil, pH, topography minerals etc.?

**(2) Biotic Components:**

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

On the basis of their role in the ecosystem the biotic components can be classified into three main groups:

(A) Producers

(B) Consumers

(C) Decomposers or Reducers.

**4. What is the function of food chain and food web in an ecosystem. [2012,2013,2015,2017] [ 7marks]**

Ans: Food Chain :

- For an ecosystem to work there has to be a flow of energy within it. The organisms of the ecosystem need energy in the form of food.
- The ultimate source of this energy is the sun. Producers like green plants trap solar energy and convert it into the chemical energy of food. When a primary consumer eats the producer, a part of this energy is passed on to it.
- The primary consumer is then eaten by a secondary consumer. And the secondary consumer may be eaten by a tertiary consumer, and so on. In this way energy gets transferred from one consumer to the next higher level of consumer. A series of organisms through which food energy flows in an ecosystem is called a food chain.
- A food chain in an ecosystem is a series of organisms in which each organism feeds on the one below it in the series.
- In a forest ecosystem, grass is eaten by a deer, which in turn is eaten by a tiger. The grass, deer and tiger form a food chain . In this food chain, energy flows from the grass (producer) to the deer (primary consumer) to the tiger (secondary consumer).

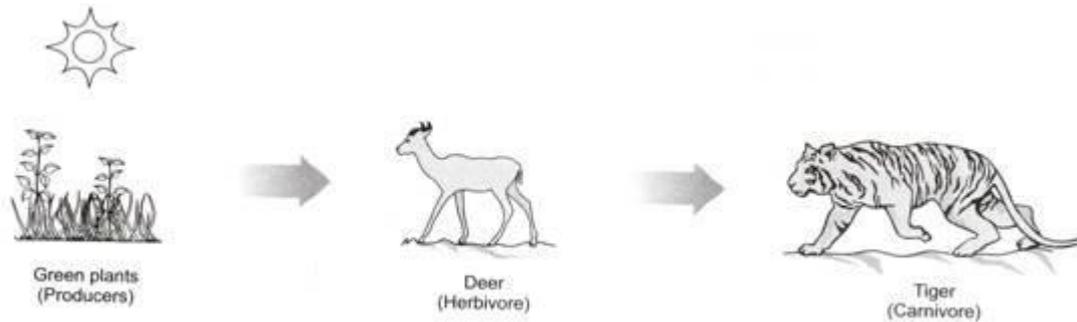


Fig. 8.2 A food chain in a forest ecosystem

Some common food chains are mentioned below:

Plants → Deer → Lion

Plants → Worm → Bird → Cat

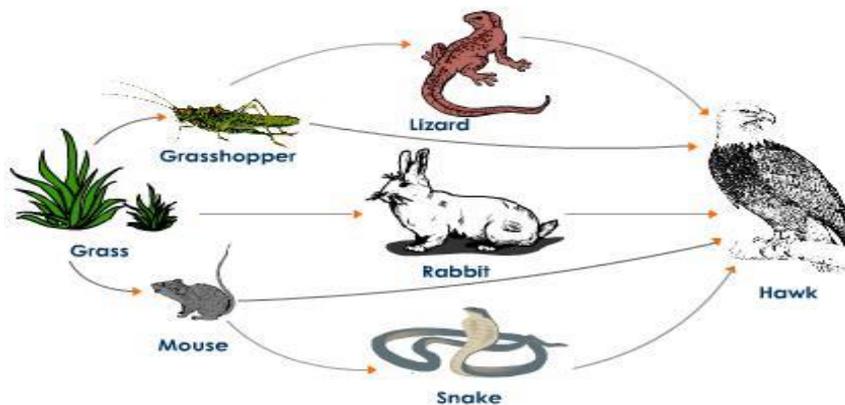
Plants → Grasshopper → Frog → Snake → Hawk

Algae → Small animal → Small fish → Big fish → Bird

### Food web:

- The sun is the ultimate source of energy for life on Earth. Without it, nothing would be able to survive. As a result, living things have evolved special ways to harness the energy of the sun and use it for their own well-being. They have also developed special relationships and interactions that allow energy to be transferred. Once the energy has been captured, it gets passed around through the various organisms in a particular area. This transfer of energy is called a food web.
- In their simplest form, food webs are made of food chains. Food chains show a direct transfer of energy between organisms.
- The inter-locking pattern of food chains in an ecosystem is also called as food web.

Example:



A Food Web in a Grassland Ecosystem With Five Possible Food Chains

### 5.Explain different component of ecosystem. [2015,2017] [ 7marks]

Ans: Components of ecosystem includes the following:  
 1. Inorganic substances: These are simpler materials which are build up to form

complex compounds that makes up the body of living organisms e.g C, N, CO<sub>2</sub>, H<sub>2</sub>O etc.

2. Organic substances: These are compounds of carbon that forms a link between living and non-living parts of an ecosystem. they are formed from inorganic compounds and passed into the body of living organisms through feeding.

3. Climatic factors: These includes physical factors such as temperature, light, relative humidity, rainfall etc., they determined abundance of organisms in their habitats and also determined which organism to survive, in which habitat and in what condition.

4. Producers: These are autotrophic organisms that manufacture foods from simple inorganic substances using CO<sub>2</sub> and H<sub>2</sub>O in the presence of sunlight. all other organisms depend either directly or indirectly on producers.

5. Consumers: These are heterotrophic organisms mainly animals that ingest organic matter from other organisms.

6. Decomposers: They are also known as recyclers and mainly bacteria and fungi. they break down dead protoplasm of an organisms to release their products back to inorganic materials usable by producers.

#### **6. What is Ecological succession. [ 2016,2017] [5 marks]**

Ans: Ecological succession is the observed process of change in the species structure of an ecological community over time. The time scale can be decades (for example, after a wildfire), or even millions of years after a mass extinction.

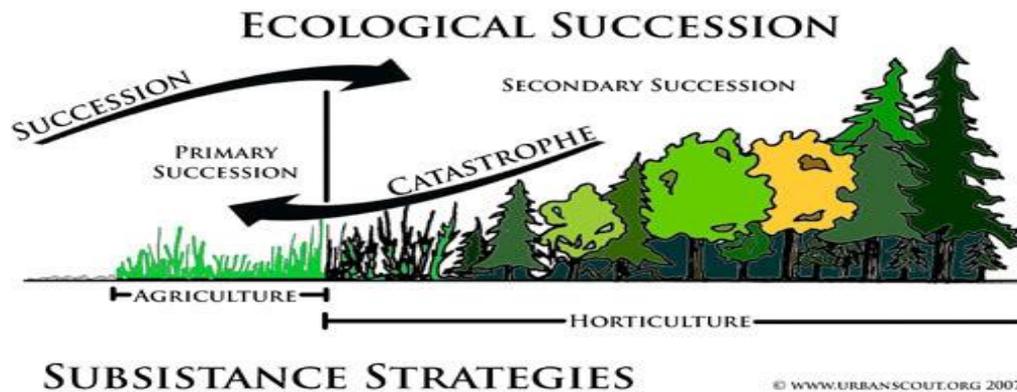
#### Different Types of Ecological Succession:

Ecological succession happens for a few different reasons:

Primary succession is initiated when a new area that has never previously supported an ecological community is colonized by plants and animals. This could be on newly exposed rock surfaces from landslides or lava flows.

Secondary succession occurs when an area that has previously had an ecological community is so disturbed or changed that the original community was destroyed, and a new community moves in. This is more common than primary succession and is often the result of natural disasters such as fires, floods, and winds, as well as human interference such as logging and clear-cutting.

Seasonal succession is another type of succession, but instead of being the result of a disastrous event, it is caused by cyclical changes in the environment or interactions between the species in a community.



## **CHAPTER-IV**

### **1.What is disaster management. How disaster management helps in case of floods.[2015,2016]**

ANS:Disaster Management can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies, in particular preparedness, response and recovery in order to lessen the impact of disasters.

#### **Preparing for a Flood:**

- Contact the local geologist or town planning department or meteorology department to find out if your home is located in a flash flood prone area or landslide prone area.
- Learn about your community's emergency plans, warning signals, evacuation routes, and locations of emergency shelters.
- Plan and practice a flood evacuation route with your family. Ask an out of state relative or friend to be the "family contact" in case your family is separated during a flood. Make sure everyone in your family knows the name, address, and phone number of this contact person.
- Post emergency phone numbers at every phone.
- Inform local authorities about any special needs, i.e., elderly or bedridden people, or anyone with a disability.
- Identify potential home hazards and know how to secure or protect them before the flood strikes. Be prepared to turn off electrical power when there is standing water, fallen power lines etc. Turn off gas and water supplies before you evacuate. Secure structurally unstable building materials.
- Buy a fire extinguisher and make sure your family knows where it is and how to use it.
- Buy and install sump pumps with backup power.
  
- Have a licensed electrician to raise electric components (switches, sockets, circuit breakers and wiring) at least 12" above your home's projected flood elevation.

- For drains, toilets, and other sewer connections, install backflow valves or plugs to prevent flood waters from entering.

Preparing to Evacuate:

- Fill your vehicle's gas tank and make sure the emergency kit for your car is ready.
- If no vehicle is available, make arrangements with friends or family for transportation.
- Fill your clean water containers.
- Review your emergency plans and supplies, checking to see if any items are missing.
- Tune in the radio or television for weather updates.
- Listen for disaster sirens and warning signals.

## **CHAPTER-V**

### **.1. What is secondary pollutants .[ 2015,2016]**

Ans: secondary pollutants are the ones that are formed in the atmosphere through chemical and photochemical reactions from the primary pollutants.

Examples-Sulphuric acid, Nitrogen dioxide, ozone etc.

### **2.What is sound power level. [ 2014,2017]**

Ans: The total sound energy emitted by a source. per unit time is the sound power or sound power level.. All share as level the same unit of measure: the decibel (dB).

### **3.What is environmental pollution. [2014,2016,2017]**

Ans: Environmental pollution is the introduction of contaminants into the natural environment that causes adverse change. Pollution can take place the form of chemical substances or energy, such as noise, heat or light.

### **4. What are various types of pollutants.[ 2015,2017]**

Ans:

#### **(i)Soil Pollutants**

Soil pollution is the pollution of the Earth's land surfaces. The most common types of soil pollutants are heavy metals such as cadmium, chromium, copper, zinc or mercury, pesticides or herbicides, organic chemicals, oils and tars, explosive or toxic gases, combustible or radioactive materials, biologically active compounds and asbestos. These types of pollutants can enter the soil through poor agricultural practices, mining or the improper or illegal dumping of household or industrial waste materials.

#### **(ii)Air Pollutants**

Air pollution is the pollution of the Earth's atmosphere. The air pollutants include ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide and lead. These and other air pollutants typically enter the atmosphere through industrial processes related to the generation of heat and power, incineration of solid wastes and transportation.

#### **(iii)Water Pollutants**

Water pollution is the pollution of the Earth's oceans and other water sources. The common types of water pollutants include mercury, nitrates, phosphorous and bacterial pollution. These and other types of pollutants enter the water supply

through industrial waste runoff, sewage treatment plants, urban and agricultural runoff and the illegal dumping of solid waste.

(iv) **Noise Pollutants**

Noise pollution is a form of air pollution related specifically to the types of sound present in the atmosphere. The Environmental Protection Agency defines a noise pollutant as any sound that interferes with normal activities or disrupts or diminishes one's quality of life. Noise pollutants can be present in the home, school, work or the community at large. Different types of noise pollutants may include sounds generated by aircraft, trains, boats, automobile traffic, construction, industrial manufacturing, vehicle alarms or even loud music.

**5. Explain the term [2013,2016]**

**(i) pyrolysis (ii) Gasification (iii) combustion**

Ans :(i)Pyrolysis:

Pyrolysis is a thermo chemical decomposition of organic material at elevated temperatures in the absence of oxygen (or any halogen). It involves the simultaneous change of chemical composition and physical phase, and is irreversible. The word is coined from the Greek-derived elements pyro "fire" and lysis "separating".

(ii) ) Gasification :

Gasification is a process that converts organic or fossil fuel based carbonaceous materials into carbon monoxide, hydrogen and carbon dioxide. This is achieved by reacting the material at high temperatures (>700 °C), without combustion, with a controlled amount of oxygen and/or steam.

(iii) Combustion:

Combustion is the act or instance of burning some type of fuel such as gasoline to produce energy. Combustion is typically the process that powers automobile engines and power plant generators.

**6.Explain the drawbacks of nuclear power and environmental impacts.[2012,2015]**

Ans: The drawbacks of nuclear power and environmental impacts are as follows:

(I) Misuse of nuclear technology:

The technology used for generating nuclear power can also be used to produce nuclear weapons. Left in the wrong hands, such as terrorist or

extremist groups, nuclear technology could lay the foundations of global disaster.

(II) Radioactive waste:

Although gaseous exhausts from a nuclear reactor are environment-friendly, solid waste products generated in the same, which are radioactive, cause more long term problems than the waste material generated by conventional fuels. The radio-active by-products can pollute the environment beyond repair and cause diseases, such as cancer, in the human population .

(III) Tragic accidents:

Accidents in nuclear reactors are much more devastating than those in conventional energy plants. Despite being a much rarer occurrence, individual nuclear disasters are much more deadly than say fossil fuel disasters.

(IV) High costs:

- The construction cost of a nuclear reactor is high.
- Long time line.
- Building a nuclear power plant takes a no. of years.
- Contamination perils.
- Uranium mining operations can turn out to be hazardous for the health of miners as well as the surrounding population. If necessary safety precautions are not observed, radio-active contamination can spread, even to the next generation.

## **CHAPTER-VI**

**6. Write short notes on : [2014,2016,2017]**

**(i) Acid rain (ii) Greenhouse effect (iii) Ozone layer depletion.**

Ans: Acid rain

- Acid rain is a rain or any other form of precipitation that is unusually acidic, meaning that it possesses elevated levels of hydrogen ions (low pH).
- It can have harmful effects on plants, aquatic animals and infrastructure.
- Acid rain is caused by emissions of sulfur dioxide and nitrogen oxide, which react with the water molecules in the atmosphere to produce acids.

Greenhouse effect

- The greenhouse effect is a natural process that warms the Earth's surface. When the Sun's energy reaches the Earth's atmosphere, some of it is reflected back to space and the rest is absorbed and re-radiated by greenhouse gases.
- Greenhouse gases include water vapour, carbon dioxide, methane, nitrous oxide, ozone and some artificial chemicals such as chlorofluorocarbons (CFCs).
- The absorbed energy warms the atmosphere and the surface of the Earth. This process maintains the Earth's temperature at around 33 degrees Celsius warmer than it would otherwise be, allowing life on Earth to exist.

Ozone layer depletion

- The emission of ODS ("ozone-*depleting* substances" ) account for roughly 90% of total depletion of ozone layer in stratosphere. These gases are carried to the stratosphere layer of atmosphere where ultraviolet radiations from the sun break them to release chlorine (from CFCs) and bromine (from methyl bromide and halons).
- The Impacts of Ozone Depletion: Stratospheric ozone filters out most of the sun's potentially harmful shortwave ultraviolet (UV) radiation. If this ozone becomes depleted, then more UV rays will reach the earth.

## **2.What is global warming and its effects. [2014,2016,201]**

Ans:

- It is defined as the increase in temperature of the earth which causes more changes in climate.
- Mainly it creates by the green house gases.
- The green housegases absorb and hold heat from the sun, preventing it from escaping back into the space ,much like a green house absorbs and hold heat from the sun.

### Effects of global warming:

- More heat wave.
- Expansion of desert area.
- Natural fires in forest land.
- Changes in pattern of rain fall.
- Rise in sea level.
- More cloud formation in the atmosphere.
- More evaporation of water.
- Disruption in firming.
- More drought.

## CHAPTER-VII

### **7.What is population explosion. [ 2014,2017]**

Ans:

Population explosion refers to the rapid and dramatic rise in world population that has occurred over the last few hundred years.

Causes of Population explosion:

- Accelerating birth rate: Due to lack of awareness about the positive impact of using birth-control method, there has been a steady growth in birthrate.
- Decrease in infant mortality rate: An improvement in medical science and technology, wide usage of preventive drugs (vaccines), has reduced the infant mortality rate. There has been great improvement in medical and health-care facilities during the past few decades.
- Increase in life expectancy: Due to improved living conditions, better hygiene and sanitation habits, better nutrition, health education, etc. the average life expectancy of human population has improved significantly.

Effect of Population explosion:

- Over-population
- Unemployment
- Poverty
- Illiteracy
- Poor Health
- Economy
- Pollution and Global warming

### **2. What is the role of information technology in environment and human health. [2015,2016,2017]**

Ans: The important role of information technology in environment and human health are as follows:

1. Remote Sensing: Remote sensing and Geographical Information System (GIS) has proved to be very effective tool in environment management. Now, the ongoing changes in the environment can be assessed easily through satellites by remote sensing techniques. The occurrence of a number of natural calamities like droughts, floods, volcanic eruptions etc., can also be predicted well in advance. Such assessments help the environmentalists and planners to take effective measure to minimize the effects of these extreme natural events. The Ministry of Environment and Forests, Government of India has created an information system called Environmental Information System (ENVIS) with its headquarters in Delhi. It provides a network database

in environmental issues like pollution control, renewable energy, desertification, biodiversity etc.

2. Database: Database is the collection of interrelated data on various subjects in computerized form which can be retrieved whenever required. Now the data regarding birth and death rates, immunization and sanitation programs can be maintained more accurately than before in computers at health centres. Database is also available about the diseases like malaria, fluorosis, AIDS etc. The Ministry of Environment and Forests, Government of India has taken up the task of compiling a database on various environmental issues like wildlife, forests cover, wasteland etc.

3. Human health: Information technology also plays a key role in human health. It helps the doctors to monitor the health of people of that area. The information regarding outbreak of epidemic diseases from remote areas can be sent more quickly to the district administration to take corrective measures. Now, patients can seek help of a super specialist doctor placed at far off distance. Many hospitals now, take online help of experts to provide better treatment and services to their patients. This has become possible only because of advancement of IT in the recent times.

4. Online Information: It provides vast quantum of information on different subjects including human health and environment.