

Unit-I
ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY
PART – A (2 MARKS - QUESTIONS & ANSWERS)

1. Write the definition of environmental science and engineering.

Environmental science is the study of nature and the facts about environment. Basically environment can be defined as “all the social, economical, physical & chemical factors that surrounds man” (or) “all abiotic and biotic components around man-all living and non living things surrounds man”.

2. Write the principles of environmental education.

1. Examine the major env. issues
2. discover the root cause
3. develop problem solving skills
4. promote co-operation in solving problems
5. emphasis active participation in prevention and solution to problems.

3. Write the scope of environmental science.

1. Studying the interrelationship between the components of env.
2. Carrying out impact analysis and env. Audit
3. Preventing pollution from existing and new industries
4. Stopping the use of biological and nuclear weapons
- 5.. Managing unpredictable disasters etc.

4. What are the reasons for environmental ignorance.

1. science, technology and economics failed to integrate the knowledge on environmental aspects in curriculum
2. the decision makers do not process environmental angle of decision making
3. consideration of economic growth, poverty eradication has lead to environmental degradation
4. only few developmental activities are made considering the environmental aspects.

5. Why there is need for public awareness?

The United Nations Conference on Environment and Development held at Rio de Janeiro in 1992 (popularly known as ‘Earth Summit’) and world summit on sustainable development at Johannesburg in 2002, have highlighted the key issues of global environmental concern. They have attracted the attention of people.

Any government at its own cannot achieve the goals of clear environment until the public participate in action. Public participation is possible only when the public is aware about the ecological and environmental issues. Eg. Ban- the littering of polythene.

6. Write role of NGOs in public awareness.

1. Advise the government in interacting with ground level people
2. Organize public meetings to create environmental awareness

Eg: Recent report of 'centre for science and environment' on permissible limits of pesticides in cola drinks.

7. Define ecosystem.

An ecosystem is defined as a natural functional ecological unit comprising of living organisms and their non-living environment that interact to form a stable self supporting system .

Eg: Pond, lake, desert, grassland, forest, etc.

8. Write notes on energy flow in ecosystem.

The flow of energy in an ecosystem is unidirectional. It flows from producer level to consumer level and never in the reverse direction. The process of energy flow involves transfer of energy from autotrophs to various components of heterotrophs and help in maintaining bio diversity. The main source of energy in the ecosystem is sunlight. About 80% of energy is lost during flow of energy from one trophic level to the next one.

Sun → Producer → Herbivores → Carnivores → Top carnivores → Decomposers

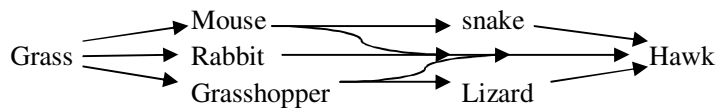
8. Define food chain.

Plants by photosynthesis convert solar energy into protoplasm. Small herbivores consume the vegetable matter and convert into animal matter which in turn eaten by large carnivores. This sequence of eaten and being eaten , produces transfer of food energy known as food chain.

Producers → Consumer I order → Consumer II order → Decomposers
(Plants) (Deer) (Tiger, Lion) (Bacteria, fungi)

9. Define food web.

The food relationship between various organisms is being depicted by linking all the possible prey and predators of different food level. In an ecosystem linking of feeding habit relations will provide a food web.



10. Define ecological pyramids.

The energy biomass and number of organisms gradually decreases from the producer level to the consumer level. The total mass of herbivores in an ecosystem will generally be less than the total mass of plants. Similarly the total mass of carnivores will be less than the total mass of herbivores. The graphical representation of the number, biomass and energy of various energy levels is called ecological pyramid. In any ecological pyramid the producer forms the base and the successive levels form the tiers which can make the apex.

Types of ecological pyramids:

- a) pyramid of numbers
- b) pyramid of biomass
- c) pyramid of energy

Eg: Grassland ecosystem – pyramid of number – upright pyramid

11. Define biodiversity.

Biodiversity is the abbreviated word for “biological diversity” (bio-life or living organisms, diversity-variety). Thus biodiversity is the total variety of life on our planet, the total number of races, varieties and species. The sum of total of various types of microbes, plants and animals (producers, consumers and decomposers) in a system.

The concept of biodiversity may be analyzed in 3 different levels. They are

- 1 ecosystem diversity
- 2 species diversity
- 3 genetic diversity

12. Define species diversity.

Species diversity describes the number of kinds of organisms within individual communities or ecosystems.

13. Define genetic diversity.

Genetic diversity is a measure of the variety of versions of same gene within individual species.

14. Define Biodiversity Hotspots:

Most of the world's biodiversity are near the equator especially tropical rain forest and coral reefs. Of all the world's species, only 10-15% live in North America and Europe.

The Malaysian Peninsula, for instance, has at least 8000 species of flowering plants, while Britain, with an area twice as large, has only 1400 species. South America has 200 000 species of plants.

15. Define significance of biodiversity:

- Biosphere is a life supporting system to the human race. Each species in the biosphere has its own significance.
- It is the combination of different organisms that enables the biosphere to sustain human race.
- Biodiversity is vital for a healthy biosphere.
- Biodiversity is must for the stability and proper functioning of the biosphere.

16. Define endangered species.

The species which are under immediate danger of extinction.

17. Write notes on in-situ conservation.

- Conservation of species in its natural habitat, in place where the species normally occurs
- The strategy involves establishing small or large protected areas, called protected areas
- Today in world, there are 9800 protected areas and 1500 national parks

Methods:

1. Nature or biosphere reserves (Eg) Nilgiri Bio reserve
2. national parks and sanctuaries (Eg) Mudumalai, vedanthangal
3. on farm and home garden conservation for plants, vegetables and fruits to maintain traditional crop varieties.

18. Write notes on ex-situ conservation.

It involves maintenance and breeding of endangered plant and animal species under partially or wholly controlled conditions in zoos, gardens and laboratories

19. Write the importance features of Indian law for conservation of biodiversity.

The wild life (protection) Act 1972:

Enacted

1. to protect wild animals and birds which are in the verge of extinction
2. to protect biological diversity in particular and environmental protection in general.
3. for the protection of wild animals and birds and for all other matters connected there of or ancillary and incidental there to.

20. What are the threats to biodiversity?

- (i) Habitat loss (ii) Hunting (iii) Fragmentation (iv) Over harvesting

UNIT - II
ENVIRONMENTAL POLLUTION
PART – A (2 MARKS - QUESTIONS & ANSWERS)

1. Define Air pollution.

Air pollution may be defined as the presence of impurities in excessive quantity and duration to cause adverse effects on plants, animals, human beings and materials.

2. What are the different sources of air pollution?

The two main sources of air pollution are

- a. Natural Sources
- b. Man made or anthropogenic sources

Natural sources include dust storms, volcanoes, lightening sea salt, smoke, forest fires, etc. The man made sources are agricultural activities, industrial growth, domestic wastes, automobile exhausts, etc.

3. What do you know about particulate?

In general the term 'particulate' refers to all atmospheric substances that are not gases. They can be suspended droplets or solid particles or mixtures of the two. Particulates can be composed of materials ranging in size from 100mm down 0.1 mm and less. The chemical composition of particulate pollutants is very much dependent upon the origin of the particulate.

4. Define suspended particulate matter?

Suspended Particulate Matter (SPM) is a complex mixture of small and large particles with size less than 100u varying origin and chemical composition.

5. Differentiate between Mist and Fog.

Mist

Mist is made up of liquid droplets generally smaller than 10um which are formed by condensation in the atmosphere or are released from industrial operations.

Fog

Fog is similar to mist but the droplet size bigger (> 10u) and water is the liquid. Fog is sufficiently dense to incomprehensible vision.

6. What are gaseous pollutants?

These are toxic and poisonous gases such as carbonmonoxide, chlorine, ammonia, hydrogen sulphate, sulphur dioxide, nitrogen oxides and carbon dioxide.

7. *What are the major sources of air pollution from automobiles?*

The major sources of air pollution from automobiles are

Exhaust pipe ->70%

Crank case emission ->20%

Evaporations from fuel tank and Carburettor ->10%

8. *What are effects of air pollution on animals?*

Animals take up fluorides of air through plants. Their milk production falls and their teeth and bones are affected. They are also prone to lead poisoning and paralysis.

9. *List some of the effects of air pollution on physical properties of atmosphere.*

- Decrease in the visibility
- Reduction of Solar radiation
- Effects on weather conditions
- Effects on atmospheric constituents

10. *Briefly describe about the impacts of carbon monoxide on human health.*

At lower doses, they can impair concentration and neurobehavioral function whereas in higher doses they can cause heart pain and even death. When inhaled it has the ability to combine with haemoglobin of blood and reduce its ability in transfer of oxygen to the brain, heart, and other important organs. But carboxyaemoglobin contents of blood depend on the CO contents of the air inhaled, time of exposure and the activity of the person inhaling. It is particularly dangerous to babies and people with heart disease.

11. *How air pollution can be controlled at source?*

- Proper use of the existing equipment
- Change in process
- Modification or Replacement of equipments
- Installation of controlling equipments

12. What are the particulate control equipment?

- Gravitational settling chambers
- Cyclone separators
- Fabric filters (or) Bag filters
- Electrostatic precipitators
- Wet scrubbers (or) Wet collectors

13. Define water pollution.

Water pollution is defined as any physical, chemical or biological change in quality of water that has a harmful effect on living organisms or makes the water unsuitable for needs.

14. How can you differentiate point? Source from non-point source of pollution.

Point sources discharge pollutant at a specific place through pipe lines, sewer lines, or ditches into water bodies. Non point sources discharge pollutants from large and scattered area. These sources have no specific location.

15. What are the effects of inorganic substances in water?

- Makes the water unfit for drinking and other purposes.
- Corrosion of metals exposed to such waters.
- Causes skin cancers, damages to spinal, CNS, liver and kidneys.
- Reduces crop yield.

16. Define soil pollution.

Soil pollution is defined as the introduction of substances, biological organisms, or energy into the soil, resulting in a change of the soil quality, which is likely to affect the normal use of the soil or endangering public health and the living environment.

17. What is the cause of noise pollution?

- Road traffic noise
- Air traffic noise
- Rail traffic noise
- Domestic noise
- Industrial noise

- Incompatible land use

18. Define a) Decibel b) COD

- a) Decibel:-Decibel (dB) is defined as the one tenth of the longest unit Bel.
- b) COD:-COD (Chemical Oxygen Demand) is the amount oxygen required for chemical oxidation of organic matter using some oxidizing agent like $K_2Cr_2O_7$ and $KmnO_4$.

19. What are solid wastes? How solid wastes are disposed ultimately?

The wastes generated and discarded from human and animal activities that are normally solid are called as solid wastes. Solid wastes are disposed by landfill, incineration, composting methods

20. Differentiate between primary and secondary air pollutants with examples:

Primary pollutants	Secondary pollutants
<p>These are emitted directly in the atmosphere in harmful form.</p> <p>Examples: CO, NO, SO₂</p>	<p>These are pollutants in which some of the primary air pollutants may react with one another to form new pollutants</p> <p>Examples:</p> <p>NO, NO₂ ----- \rightarrow HNO₃/NO₃</p>

UNIT - III
NATURAL RESOURCES
PART – A (2 MARKS - QUESTIONS & ANSWERS)

1. *State the environmental effects of extracting and using mineral resources.*

- (i) Devegetation and defacing of landscape.
- (ii) Ground water contamination.
- (iii) Surface water pollution
- (iv) Air pollution.
- (v) Subsidence of land.

2. *Define sustainable forestry?*

Sustainable forestry is the optimum use of forest resources, which meet the needs of the present without compromising the ability of future generations to meet their own needs.

3. *Define overgrazing (or) Explain overgrazing.*

Overgrazing is a process of, “eating away the forest vegetation without giving it a chance to regenerate”.

4. *What are the renewable and non-renewable energy resources> Give examples.*

Renewable energy resources are natural resources which can be regenerated continuously and are inexhaustible. They can be used again and again in an endless manner.

Examples:

Renewable energy sources: wood, solar energy, wind energy.

Non-renewable energy resources: coal, petroleum.

5. *State the problems caused by the construction of Dam.*

- (a) Displacement of tribal people.
- (b) Loss of non-forest land.
- (c) Loss of forests, flora and fauna.

- (d) Landslips. Sedimentation and siltation occurs.
- (e) Stagnation and waterlogging around reservoirs retards plant growth.
- (f) Breeding of vectors and spread of vector-borne diseases.
- (g) Reservoir induced seismicity (RIS) causes earthquakes.
- (h) Navigation and aquaculture activities can be developed in the dam area.

6. What are the conventional sources of energy for the mankind?

Non – renewable energy resources are natural resources, which cannot be regenerated once they are exhausted. They cannot be used again.

7. What is desertification? Give two reasons for it.

It is a progressive destruction or degradation of arid or semi-arid lands to desert.

Reasons: 1. Desertification 2. Overgrazing 3. Mining 4. Quarrying

8. What is water logging?

Water logging is the land where water stands for most of the year.

9. What do you mean by environmental impact? (Or) Define environmental impact statement.

Environmental impact is nothing but the effect on the natural environment caused by various human actions. (or) It is defined as an analysis of the expected effects of a development on the surrounding environment. It describes the environmental effects and solutions. It includes two types

- (i) Indirect effects **Example:** Pollution.
- (ii) Direct effects **Example:** Cutting down trees.

10. Explain soil leaching.

The process in which materials in or on the soil gradually dissolve and are carried by water seeping through the soil.

Effect of soil leaching:

- 1. It removes valuable nutrients from the soil.
- 2. It may carry buried wastes into ground water and contaminates it.

11. Write any two functions of forests.

1. Forests perform very important functions both to humans and to nature.
2. They are habitats to millions of plants, animals and wildlife.
3. They recycle rainwater and remove pollutants from air.
4. They control water quality and quantity.

12. What are the causes of deforestation?

- (i) Developmental projects.
- (ii) Mining operations.
- (iii) Raw-materials for industries.
- (iv) Fuel requirements.
- (v) Shifting cultivation.
- (vi) Forest fires.

13. What are the advantages in conjunctive use of water?

- (i) Control of water logging.
- (ii) Use of saline water, especially for cooling purpose.
- (iii) Control of salt intrusion in coastal aquifers.
- (iv) Controlled withdrawal of water from ground water aquifer.

14. What is meant by soil erosion?

Soil erosion is the process of removal of superficial layer of the soil from one place to another. Soil erosion also removes the soil components and surface litter.

15. Differentiate between deforestation and forest degradation.

Sl. No	Forest Degradation	Deforestation
1.	It is the process of deterioration of forest materials.	It is the process of destruction of forest materials.
2.	Slow process	Rapid process
3.	Can be recovered	Cannot be recovered.

16. Write any two adverse effects caused by overgrazing.

- (i) Land degradation.
- (ii) Soil erosion.
- (iii) Loss of useful species.

17. Define the term deforestation.

Deforestation is the process of removal (or) elimination of forest resources due to many natural or man-made activities. In general deforestation means destruction of forests.

18. Differentiate renewable and non-renewable sources of energy.

Sl. No.	Renewable energy	Non-renewable energy
1.	It is regenerated continuously.	Cannot be regenerated.
2.	In exhaustible.	Exhausted.
3.	It can be used again and again	Cannot be used again.
4.	It is pollution free.	It pollutes the atmosphere.
5.	Available in limited amount in nature	Available in unlimited amount in nature.
6.	It is developed in a long period.	It is developed in a short period.
7.	Example: Wood, Solar energy, Wind energy.	Example: Coal, petroleum, Nuclear fuel.

19. Mention the various causes of desertification.

1. Deforestation
2. Over grazing
3. Water management
4. Mining and quarrying
5. Climate change
6. Pollution.

20. What is eutrophication?

A large proportion of N and P fertilizers used in crop fields is washed off by the runoff water and reaches the water bodies causing over nourishment of the lakes. The process of accumulation of nutrients in the water bodies is called eutrophication.

UNIT - IV
SOCIAL ISSUES AND THE ENVIRONMENT
PART – A (2 MARKS - QUESTIONS & ANSWERS)

1. State the declaration about the sustainable development.

The Rio declaration states that, “human beings are at the center or concern for sustainable development. They are entitled to a health and productive life in harmony with the nature. Every generation should leave air, water and soil resources without any pollution as pure as it came to the Earth.”

2. Write the objectives of consumerisation:

1. Improves rights and power of the buyers
2. Making the manufacturer liable
3. Reuse and recycle the product
4. Reclaiming useful parts
5. Reusable packing materials
6. health and happiness

3. What are the three important components of sustainable development?

The three important components of sustainable development are

- i. Economic development (like industrial development, creating job opportunities, utilization of natural resources for developing the quality of life)
- ii. Community development (providing food, shelter, cloth, education, and other essentials for the human beings).
- iii. Environmental protection (providing clear air, water and environment for the present and future generations and utilization of resources in a *sustainable manner*).

4. List some of the characteristics of a sustainable society.

- i. All the material processes will be designed to be of cyclic nature.
- ii. There will not be any waste material or pollution of air, water, land and environment.
- iii. The output from one system will be used as input to other systems.
- iv. Only renewable energy will be used in the society, either directly or in the forms of hydro-power, wind power solar power and biomass.
- v. The human population will be either stable stable in size or gradually Declining.

5. Define urbanisation .

Urbanisation is defined as ‘the process movement of human population from rural areas to urban areas in search in search of better economic interests with better education, communication, health, civic facilities and other day to *day needs*.’

6. What are problems or discomforts faced by rural people?

- . Lack of modernization of agricultural sector:
- . Lack of job opportunities;

- . Poor life style;
- . Poor health facilities;
- . Poor education facilities;
- . Poor transportation facilities;
- . Poor availability of energy.

7. What are the uses of energy in an urban areas?

Energy is used in an urban area for the following.

- (a) For industrial activities
- (b) For transportation
- (c) For water apply
- (d) For building & commercial use
- (e) For cleaning of pollutants
- (f) For essential services.

8. Define water conservation. Also indicate some of the water conservation techniques.

The production, development and efficient management of water resources for beneficial use is called as water conservation. The following are some of the techniques for water conservation.

- Rain water harvesting
- Watershed management
- Construction of storage reservoirs
- Reuse of industrial wastewater
- Better agricultural practices

9. What do you know about watershed?

A watershed is defined as the geographic area from which water in a particular stream, lake or estuary originates. It includes entire area of land that drains into the water body. It is separate from other system by high points in the area such as hills or slopes.

10. What is watershed management ?

Watershed management is a process aimed at protecting and restoring the habitat and water resources of a watershed, incorporating the needs of multiple stakeholders.

11. What are the impacts of human activities on watershed?

- (a) Alteration of water course
- b) Addition of pollution sources
- (c) Urbanisation
- (d) Securing of channels.

12. What are the two important principles of watershed management?

The two important principles of watershed management are:

- 1) To preserve the environment, and
- 2) To use the most cost-effective means to achieve this goal.

13. Name some of the factors causing relocation of people.

- (a) Development activities
- (b) Natural and man-made disasters

(c) Conservation initiatives.

14. Define resettlement and rehabilitation.

Resettlement is defined as the process of simple relocation or displacement of human population without considering their individual, community or societal needs. Rehabilitation is defined as the process of replacing the lost economic assets, rebuilding the community system that have been weakened by displacement, attending to the psychological trauma of forced separation from livelihood.

15. How do you define term 'Environmental Ethics'?

Environment Ethics is the branch of ethics which is analyzing about human use or Earth's limited resources.

16. What are the factors that influence climate change on the earth?

Climate change on the earth is influenced by the following factors.

Variations in the Earth's orbital characteristics.

Atmospheric carbon dioxide variations.

Volcanic eruptions

Variations in solar output.

17. List out any four effects of climate change.

Mean sea level is increased on an average of around 1.8mm per year.

Many ecosystems of the world have to adapt to the rapid change in global temperature. The rate of species extinction will be increased.

Human agriculture, forestry, water resources and health will be affected.

18. Define Global warming.

Global warming is defined as the increase in temperature of the earth, which causes more changes in climate.

19. How can global warming be controlled?

- i. Reduction in consumption of fossil fuel such as coal and petroleum.
- ii. Use of biogas plants.
- iii. Use of nuclear power plants.
- iv. Increasing forest cover.
- v. Use of unleaded petrol in automobiles.
- vi. Installation of pollution controlling devices in automobiles and industries.

20. What are the two principal acids present in acid rain?

Sulphuric acid (H_2SO_4) and Nitric acid (HNO_3).

UNIT V
HUMAN POPULATION AND ENVIRONMENT
PART – A (2 MARKS - QUESTIONS & ANSWERS)

1. *How the population problem in India is analysed?*

India's population problem may be viewed from three aspects

- (1) The absolute size of population
- (2) The rate of growth of the population
- (3) The age structure of the population.

2. *What is population explosion?*

Population explosion means the rapid population growth which is unexpected and unimaginable.

3. *What are the major precautions to avoid AIDS?*

1. education 2. prevention of blood borne HIV transmission 3. drug treatment

4. *Name some health related fitness components.*

1. Muscular strength and endurance
2. Flexibility
3. Body composition
- 4 Cardio-vascular endurance

7. *Define Demography.*

It refers to the science of dealing with the study of size, composition and territorial distribution of population; it includes study of natality, fertility, mortality, migration, and social mobility.

8. *What is vital statistics?*

Vital statistics are referred to systematically collected and compiled data relating to vital events of life such as birth, death, marriage, divorce, adoption, etc. Vital statistics are an indication of the given situation and help us in answering many health-related queries

9. *Name the fundamental rights of an Indian citizen.*

1. Right to equality
2. Right to freedom of Speech and Activity
3. Right against Exploitation
4. Right to Freedom of Religion
5. Cultural and Educational Rights
6. Right to Constitutional Remedies.

10. *What is zero growth curve?*

It indicates the slow and steady growth in population .

11. Differentiate between HIV and AIDS.

HIV-Human immunodeficiency virus causes AIDS disease. Virus is passed through infected blood, semen.

AIDS-Acquired Immune Deficiency Syndrome

Acquired means disease is not hereditary but develops after birth from contact with a disease-causing agent. Immune deficiency means that the disease is characterized by a weakening of the immune system.

12. What is opportunistic infection?

Infection with HIV can weaken the immune system to the point that it has difficulty fighting off certain infections. These types of infections are known as “opportunistic infections” because they take the opportunity to weaken the immune system which causes illness of the body.

13. List the means of HIV transmission.

There are four main ways in which HIV can be passed on:

1. By having vaginal, anal or oral sex without a condom with someone who has HIV.
2. By using needles, syringes or other drug-injecting equipment that is infected with HIV.
3. From a woman with HIV to her baby (before or during birth) and by Breast feeding.
4. By receiving infected blood, blood products or donated organs as part of medical treatment.

14. Name some tests available to find HIV infection.

In addition to the EIA or ELISA and Western blot, other tests now available include:

- _ Radio Immuno Precipitation Assay (RIPA)
- _ Dot –blot immuno binding assay
- _ Immuno fluorescence assay
- _ Nucleic acid testing
- _ Polymerase Chain Reaction (PCR)

15. List the special features of Comprehensive programme on women and child welfare.

1. Personality
2. Reduction of Deprivation
3. Co-ordination Effectivity
4. Maternity and Motherhood

16. What are the reasons responsible for population explosion?

- Invention of modern medical facilities reduces the death rate and increases the birth rate
- Increase of life expectancy
- Illiteracy

17. Name Some applications of IT in health.

- Most of the ICU's (Intensive Care Units) are now using computers to monitor the progress and condition of the patient, undergoing treatments.
- expert opinions from doctors away from the place can be sought with help of IT tools like video conferencing etc.
- can be used in the analysis and research on various potential medicines /drugs to be used in medical treatments.

18. List the applications of IT in environment.

- a. Remote Sensing
- b. Geographic Information System (GIS)
- c. Global Positioning System (GPS)
- d. Meteorology

19. Write about the value of education to the society.

1. Improve the integral growth of human being
2. create attitude and improvement towards sustainable lifestyle
3. to understand about natural environment.

20. What are the major objectives of family welfare programme in India?

1. reduce infant mortality rate to below 30/100 infants
2. achieves 100% registration of birth, death and marriage
3. encourage late marriage and later child birth
4. constrain the spread of AIDS/HIV

Unit-I
ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY
PART – B (16 MARKS - QUESTIONS & ANSWERS)

1. Explain conservation of biodiversity and National Environmental law.

Conservation of biodiversity.

In general biodiversity is generally disturbed by human activities. To solve the problems, it is essential to protect our bio diversity by two ways.

2. In-situ or on-site conversion
3. Ex-situ conservation

In-situ conservation:

- Conservation of species in its natural habitat, in place where the species normally occurs
- The strategy involves establishing small or large protected areas, called protected areas
- Today in world, there are 9800 protected areas and 1500 national parks

Methods:

- Nature or biosphere reserves (Eg) Nilgiri Bio reserve
- national parks and sanctuaries (Eg) Mudumalai, vedanthangal
- on farm and home garden conservation for plants, vegetables and fruits to maintain traditional crop varieties.

Ex- situ conservation:

- It involves maintenance and breeding of endangered plant and animal species under partially or wholly controlled conditions in zoos, gardens and laboratories
- The crucial issue for conservation is to identify those species which are more at risk of extinction.

Methods:

1. long term captive breeding
2. shortage term propagation and release
3. animal translocation and re introductions
4. seed bank
5. reproductive technology
 - (i) embryo transfer technology
 - (ii) cloning

All environmental problems are regional in nature but their effects are global. Hence environmental problems can be resolved only by extensive co operation among nations. Laws serve to achieve global objective of environmental protection.

Indian law for conservation of biodiversity:

The wild species of the group and other related species constitute a rich gene pool in India. The government of India has enacted laws for the conservation of biological diversity.

The habitat protection laws:

This includes species protection laws and habitat protection laws which indirectly protect and conserve the biological diversity and its components.

The wild life (protection) Act 1972:

Enacted

- ✚ to protect wild animals and birds which are in the verge of extinction
- ✚ to protect biological diversity in particular and environmental protection in general.
- ✚ for the protection of wild animals and birds and for all other matters connected there of or ancillary and incidental there to.

Biosphere Reserve and the wild life (protection) Act 1972:

Biosphere reserves are complementary to the existing network of national parks and sanctuaries, this act is enacted to protect biosphere.

2. Explain energy flow in ecosystem.

Energy is defined as the capacity to do work. For living organisms, it is the basic force responsible for running all the metabolic activities. The flow of energy from producer level to top consumer level is called energy flow.

The flow of energy in an ecosystem is unidirectional. It flows from producer level to consumer level and never in the reverse direction.

The process of energy flow involves transfer of energy from autotrophs to various components of heterotrophs and help in maintaining bio diversity. The main source of energy in the ecosystem is sunlight. About 80% of energy is lost during flow of energy from one trophic level to the next one.

Sun → Producer → Herbivores → Carnivores → Top carnivores → Decomposers

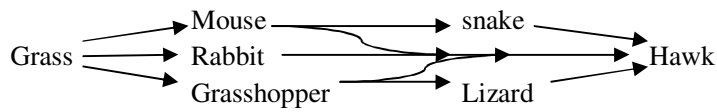
FOOD CHAIN

Plants by photosynthesis convert solar energy into protoplasm. Small herbivores consume the vegetable matter and convert into animal matter which in turn eaten by large carnivores. This sequence of eaten and being eaten, produces transfer of food energy known as food chain.

Producers → Consumer I order → Consumer II order → Decomposers
(Plants) (Deer) (Tiger, Lion) (Bacteria, fungi)

FOOD WEB:

The food relationship between various organisms is being depicted by linking all the possible prey and predators of different food level. In an ecosystem linking of feeding habit relations will provide a food web.



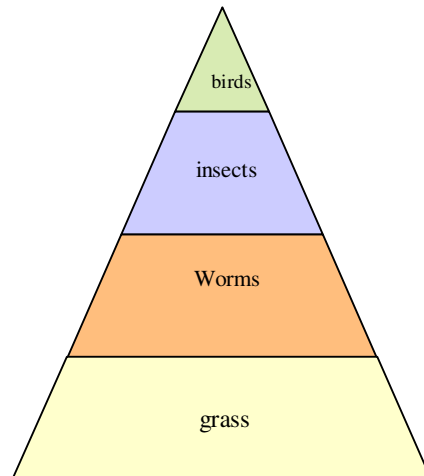
ECOLOGICAL PYRAMIDS:

The energy biomass and number of organisms gradually decreases from the producer level to the consumer level. The total mass of herbivores in an ecosystem will generally be less than the total mass of plants. Similarly the total mass of carnivores will be less than the total mass of herbivores. The graphical representation of the number, biomass and energy of various energy levels is called ecological pyramid. In any ecological pyramid the producer forms the base and the successive levels form the tiers which can make the apex.

Types of ecological pyramids:

- a) pyramid of numbers
- b) pyramid of biomass
- c) pyramid of energy

Eg. Grassland ecosystem – pyramid of number – upright pyramid



3.Explain forest ecosystem and grassland ecosystem:

Definition: It is a natural ecosystem consisting of dense growth of trees and wild animals

Types: tropical – deciduous, evergreen, wet green
Littoral and swamps
Sub tropical

Characteristics:

Abiotic: soil, sun light, temperature etc

Biotic : forest trees, shrubs and animals

Structure:

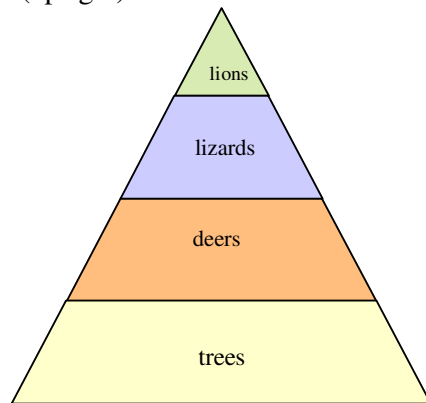
Producer : trees and shrubs

Consumer : Primary – elephants, deer etc.
Secondary – snakes, birds, lizards etc
Tertiary – lions, tigers etc

Decomposers : fungi, bacteria

Functional components:

Ecological pyramids (upright)



GRASSLAND ECOSYSTEM:

dominated by grass – few shrubs and trees are also found – rainfall average but erratic
– overgrazing leads to desertification.

Three types – depending on the climate

1. Tropical grass lands – found near the borders of tropical rain forests. Eg. Savannas in Africa. Animals – Zebra, giraffes etc. – fires are common in dry seasons – termite

- mounds produce methane – leads to fire – high in photosynthesis – deliberate burning leads to release of high CO₂ – global warming.
2. Temperate grasslands – flat and gentle slopes of hills. Very cold winter and very hot summer - dry summer fires do not allow shrubs and trees to grow – soil is quite fertile – cleaned for agriculture.
 3. Polar grasslands – found in arctic polar region – organism – arctic wolf, fox, etc. – A thick layer of ice remains frozen under the soil surface throughout the year – known as permafrost – summer insects and birds appear.

Components:

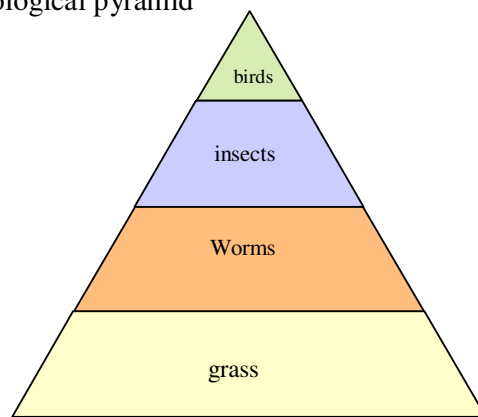
Structural Components:

Abiotic: soil pH, nutrients, soil moisture, temp, climatic conditions, etc.

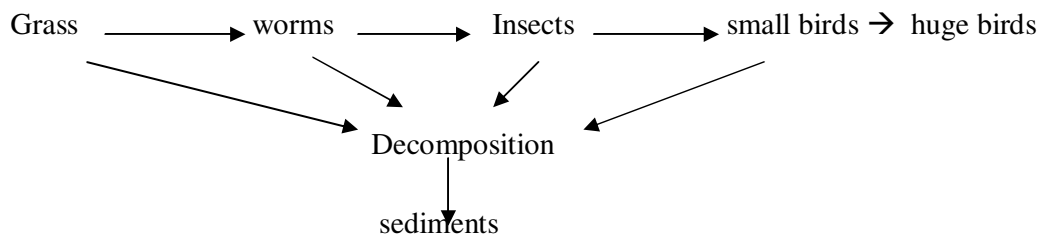
Biotic: grass, caterpillar, butterfly, worms, insects, birds, etc.

Functional components:

Ecological pyramid



Energy flow:



4.Explain aquatic ecosystem in detail.

Definition:

Deals with water bodies and biotic communities present in them-Classified as fresh water and marine ecosystems. Fresh water systems are classified as lentic and lotic ecosystems.

Types:

1. Pond ecosystem: Small fresh water ecosystem – seasonal in nature – organisms: algae, aquatic plants, insects, fishes etc. Ponds are very often exposed to anthropogenic pressure like cloth washing, bathing, cattle bathing, swimming etc.
2. Lake ecosystem: Big fresh water ecosystem – Zonation or stratification, especially during summer is a common one.

Top layer – shallow, warm, prone to anthropogenic activities – Littoral zone

Second layer – enough sunlight, high primary productivity – Limnetic zone

Third layer – very poor or no sunlight – Profundal zone

Eg. Dal lake in Srinagar, Naini lake in Nainital

Organisms: planktons – phytoplankton eg. Algae – zooplankton eg. Rotifers

Nektons – that swims in water eg. Fishes

Neustons – that float on the surface of water

Benthos – that attached to sediments eg. Snails

Types of lakes : Many types- oligotrophic lakes – with less nutrient content – eutrophic lakes – with very high nutrient content due to fertilizer contamination – desert salt lakes – that contains high saline water due to over evaporation – volcanic lakes – formed by water emitted from magma due to volcanic eruptions – dystrophic lakes – that contains highly acidic water (low pH) – endemic lakes – lakes that contain many endemic species – etc.

3. Streams: fresh water ecosystem where water current plays a major role. Oxygen and nutrient content are uniform. Stream organisms have to face extreme difference in climatic conditions but they do not suffer from oxygen deficiency as pond and lake organisms. This is because large surface area of running water provides more oxygen supply. The animals have very narrow range of tolerance towards oxygen deficiency. Thus stream are worst victims of industrial pollution.

River ecosystem: large streams flowing from mountain highlands are rivers.

Three phases: 1. mountain highlands – rushing down water fall of water – large quantity of dissolved oxygen – plants attached to rocks and fishes that require more oxygen are found. 2. Second phase – gentle slopes of hills – warmer – supports the growth of plants and fishes that require less oxygen are seen. 3. Third phase: river shapes the land – lots of silts, nutrients are brought – deposited in plains and delta – very rich in biodiversity.

4. Oceans: Gigantic reservoirs of water covering >70% of earth surface – 2,50,000 species – huge variety of sea products, drugs etc. – provide Fe, Mg, oils, natural gas, sand etc. – major sinks of carbon di oxide – regulate biochemical cycles.

Two zones: coastal zone – warm, nutrient rich, shallow – high sunlight – high primary productivity. Open sea – away from continental shelf – vertically divided in to 3 zones. 1. euphotic zone – abundant sunlight 2. bathyal zone – dim sunlight 3. abyssal zone – dark zone – world's largest ecological unit.

Estuary: coastal area where river meet ocean – strongly affected by tidal actions – very rich in nutrients – very rich in biodiversity also – organisms are highly tolerant – many species are endemic – high food productivity – however to be protected from pollution.

Characteristics:

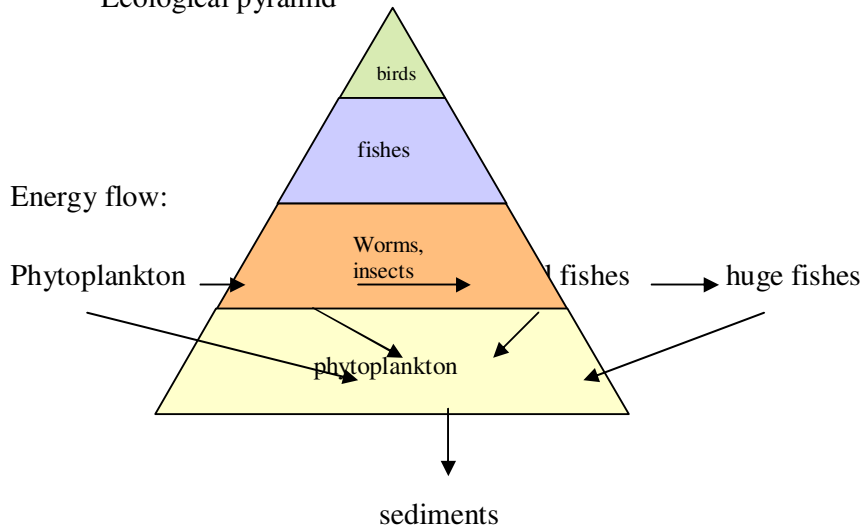
Structural Components:

Abiotic: pH, nutrients, D.O, temp, climatic conditions, etc.

Biotic: Phytoplankton, fishes, snails insects, birds, etc.

Functional components:

Ecological pyramid



5.Explain the values of biodiversity and threats to biodiversity.

Significance of Biodiversity:

Biosphere is a life supporting system to the human race. Each species in the biosphere has its own significance.

It is the combination of different organisms that enables the biosphere to sustain human race.

Biodiversity is vital for a healthy biosphere.

Biodiversity is must for the stability and proper functioning of the biosphere.

Besides these biodiversity is so important due to having consumptive use values, productive use values, social values, ethical values and aesthetic values.

BENEFITS OF BIODIVERSITY:

We benefit from other organism in many ways. Even insignificant organisms can play irreplaceable roles in ecological systems or the source of genes or drugs that someday become indispensable.

Food: Many wild plant species could make important contributions to human food suppliers either as they are or as a source of material to improve domestic crops. About 80,000 edible plants could be used by human.

Drugs and medicine: Living organisms provides many useful drugs and medicines. The United Nations Development Programme derived from developing world plants, animals and microbes to be more than \$30 billion per year.

Eg. For natural medicinal products

Penicillin – fungus is the source – Antibiotic

Quinine – chincona bark - Malaria treatment

Morphine – poppy bark – Analgesic

Twenty years before, once the drugs were not introduced, childhood leukemia was fatal.

Now the remission rate for childhood leukemia is 99%.

Ecological benefits:

Human life is inextricably linked to ecological services provided by other organisms. Soil formation, waste disposal, air and water purification, solar energy absorption, nutrient cycling and food production all depend on biodiversity.

In many environments, high diversity may help biological communities to withstand environmental stress better and to recover more quickly than those with fewer species.

THREATS TO BIODIVERSITY:

Due to

Habitat loss

- ✚ Deforestation activities (cutting trees for timber, removal of medicinal plants)
- ✚ Production of hybrid seeds requires wild plants as raw material, farmers prefer hybrid seeds, many plant species become extinct
- ✚ Increase in the production of pharmaceutical companies made several number of medicinal plants and species on the verge of extinction.
- ✚ Removal of forest-cover for road laying and also due to soil erosion
- ✚ Illegal trade of wild life
- ✚ Population explosion, construction of dam, discharge of industrial effluents use of pesticides.

Poaching of wild life

Due to poaching, illegal trade and smuggling activities most of our valuable fauna are under threat organised crime has moved into illegal wild life smuggling because of huge profit Eg. Tiger, Deer – for hides, Rhinoceros – for horns, Elephant – for ivory tusk, Sea Horse, Star turtle – sold to foreign market.

(Extinction, the elimination of species, is a normal process of the natural world. Species die and are replaced by others as part of evolutionary change.

Human caused reduction: The climate change caused by our release of green house gases in the atm. could have catastrophic effects. Human disturbance of natural habitat is the largest single cause of loss of biological diversity. Woodlands and grasslands are

converted now use about 10% of the world's land surface for crop production and about twice the amount for pasture and grasslands.)

Hunting: Over harvesting is responsible for depletion or extinction of many species.

Eg. The American passenger pigeon was the world's most abundant bird. In spite of this vast population, market hunting and habitat destruction caused the entire population to crash within 20 years.

Fragmentation

Habitat fragmentation reduces the biodiversity because many animals like bears and large cats require large territories to subsist. Some forest birds reproduce only in deep forest or habitat far from human settlement. A large island for example, can support more individuals of given species and therefore less likely to suffer extinction due to genetic problems and natural catastrophes.

Commercial products:

Smuggling of furs, hides, horns and folk medicines also affect the biodiversity in an abrupt manner.

6. Discuss about pond ecosystem.

A pond ecosystem refers to the freshwater ecosystem where there are communities of organisms that are dependent on each other and with the prevailing water environment for their nutrients and survival. Usually, ponds are shallow (hardly 12 - 15 feet) water bodies in which sunlight can reach to its bottom, permitting the growth of the plants that grow there.

Habitats in a Pond Ecosystem

There are mainly four habitats, namely, shore, surface film, open water and bottom water habitats.

Shore Habitat

The organisms inhabiting this habitat vary depending upon whether the shore is rocky, sandy, or muddy. In case of rocky shores, plants might not be able to grow, whereas in muddy or sandy or mixed type, plants like grasses, algae and rushes can be present along with organisms such as earthworms, protozoa, snails, insects, small fish and microorganisms.

Surface Film Habitat

Surface film habitat, as the name suggests, implies to the surface of the pond. In general, insects like water striders and marsh traders, organisms that are free-floating and those that can walk on the surface of water inhabit the surface habitat. They feed on the floating plants, dead insects and sometimes, feed on each other.

Open Water Habitat

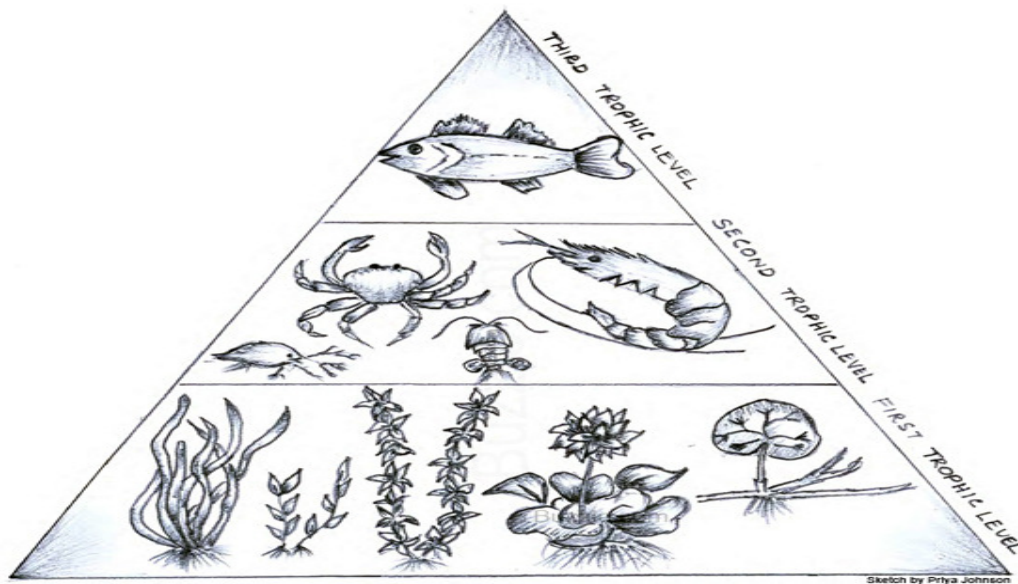
Open water habitat is inhabited by fish and the plankton or tiny organisms. Both phytoplankton (such as algae) and zooplankton (such as insect larvae, rotifers, tiny crustaceans and invertebrates) are present in this habitat. The fish feed on the plankton and plants.

Bottom Water Habitat

Depending upon whether the pond is shallow or deep, the bottom habitat varies. For example, if a pond is shallow and has a sandy bottom, organisms like earthworms, snails and insects inhabit the bottom. On the other hand, if the pond is deep and has a muddy bottom, microorganisms, flatworm, rat-tailed maggot and nymphs of dragonflies mostly inhabit the bottom habitat.

Food Chain in a Pond Ecosystem

The food chain is divided into **three basic trophic levels** - the *first*, *second* and *third trophic levels*. A sample of pond water food chain is, Algae (producer) → Insect (herbivore / primary consumer) → Fish (carnivore / secondary consumer).



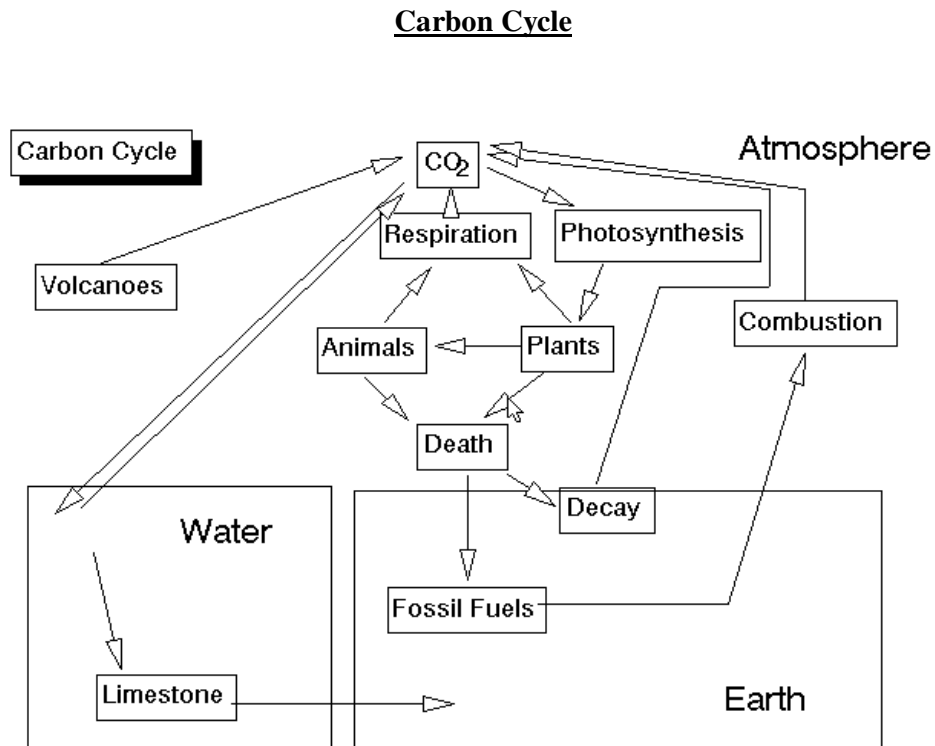
For better understanding, the three trophic levels are explained below.

- The first level is represented by the producers or the autotrophs; for example, phytoplankton and plants. They prepare their own food with the help of energy from sunlight through the process of photosynthesis.
- The second trophic level is characterized by presence of herbivores such as insects, crustaceans and invertebrates inhabiting the pond. Organisms in this level consume the plants or producers.

- The third and the topmost trophic level comprises the carnivores, especially the fish species, which can feed on both plants and the herbivores of the first trophic level and second trophic level respectively.

In addition to the three trophic levels, there are saprotrophic organisms, commonly known as decomposers, which are located at the bottom of the food chain. Decomposers, mostly the bacteria and fungi, are very important in the nutrient cycle. They convert all the organic matter from the dead and decayed organisms into carbon dioxide and nutrients such as nitrogen, phosphorus and magnesium. These nutrients are generated in such a way that they can be readily used by algae and plants for production of food, which is again consumed by the herbivores. Furthermore, the carnivores feed on the producers and herbivores. Thus, the flow of energy is maintained in an ecosystem.

5.Explain the different nutrient cycles in the environment.



*** Carbon exists in abiotic environment as:**

1. Carbon dioxide [CO₂ (gas)] in the atmosphere dissolves in H₂O to form HCO₃⁻
2. Carbonate rocks (limestone & coral = CaCO₃)
3. Deposits of coal, petroleum, and natural gas derived from once living things
4. Dead organic matter (humus in the soil)

*** Carbon enters biotic environment through:**

1. Photosynthesis: changes light energy to chemical energy

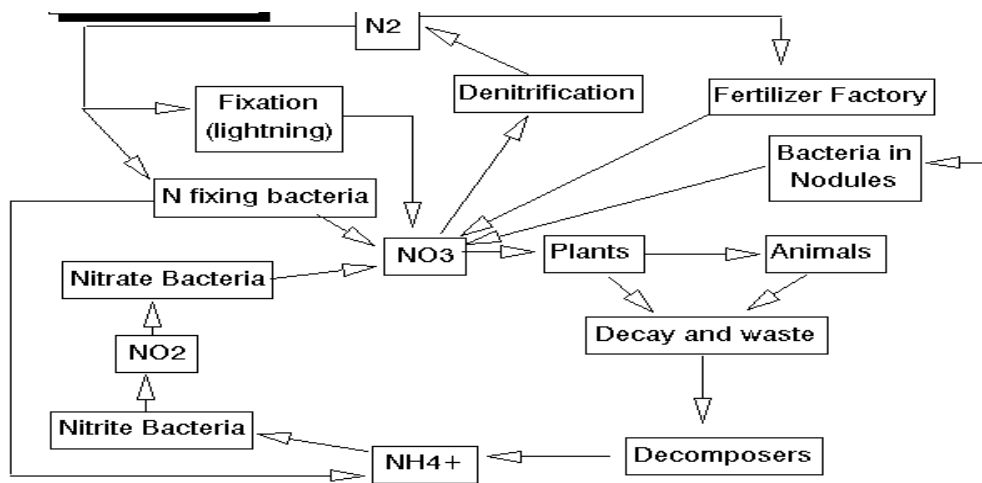
* **Carbon returns to atmosphere by:**

1. Respiration gives CO_2
2. Decomposition / Decay
3. Burning

* **Carbon Cycle and Humans:**

1. Removal of photosynthesizing plants
2. Combustion of fossil fuels

Nitrogen Cycle



* ~79% of air is N_2 gas

* N is essential to plants and animals

* Plants and animals can't use N_2 gas

* Usable N: ammonia (NH_3) or nitrate (NO_3^-)

* **Conversion of atmospheric N_2 to NH_3 and NO_3^- :**

Nitrogen fixation

1. Aquatic ecosystems: blue-green algae
2. Terrestrial ecosystems: bacteria on root nodules of legumes (peas, beans, alfalfa, clover)
3. Lightening

* **Nitrogen returns to soil by:**

1. decomposition of once living things
ammonifying bacteria + fungi
2. exists in soil as nitrate (NO_3^-), nitrite (NO_2^-), and ammonia (NH_3)

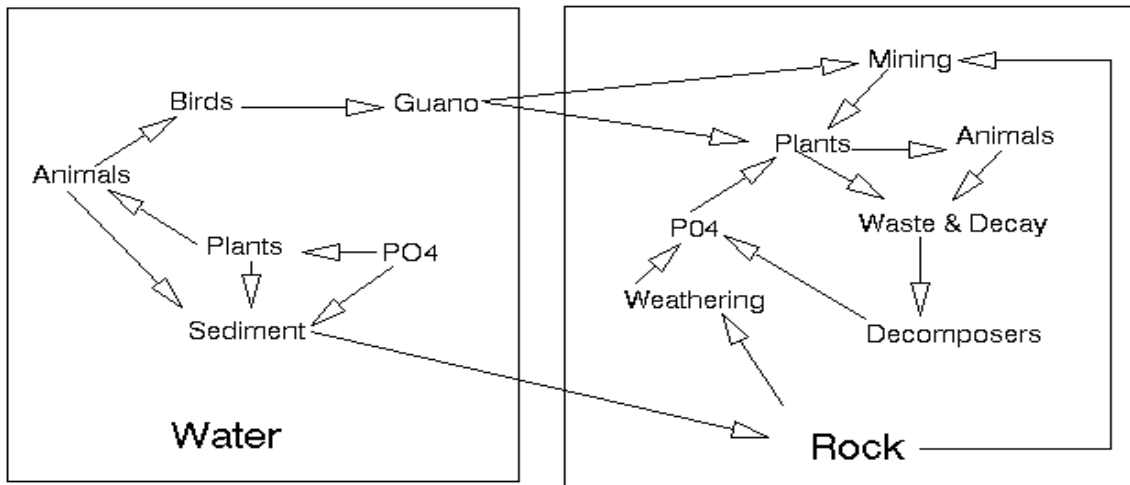
* **Nitrogen returns to atmosphere by:**

1. denitrifying bacteria

Nitrogen Cycle and Humans:

1. Nitrogen required for genetic materials (DNA, RNA, amino acids)

Phosphorus Cycle



* Major environmental reservoir: rocks

1. Leaching: water dissolves phosphates in rocks and carries to lake, stream, etc.
2. Dissolved phosphate: used by plants and passed through food chain
3. Animals return phosphorus to environment by:
 - * excretion
 - * death and decay

Phosphorus Cycle and Humans:

1. Phosphates mined for fertilizers returns P to soil
2. Erosion: P in soil and rocks washed away into water systems

8. What is ecosystem ? Write the importance of ecosystem. Explain the characteristics and functions of grassland ecosystem. Name the fundamental trophic levels and describe the general makeup of each.

Ecosystem:

A stable, self-supporting ecological unit resulting from an interaction between biotic community (living organisms) and its abiotic environment is called ecosystem.

An ecosystem comprises two main components :

- i. biotic including plants, animals and microorganisms

- ii. (ii) abiotic mainly including substratum, water, minerals, carbon dioxide and oxygen. It must also receive a constant supply of energy (light).

Importance

1. Ecosystem study gives information about the amount of available solar energy in an area.
2. It gives data about the availability of mineral elements, their utilisation and recycling in the environment.
3. Inter-relationships between various types of organisms as well as between organisms and abiotic environment can be determined.
4. Productivity of producers and consumers is known.
5. The maximum number of producers and consumers of various categories which can be supported in the ecosystem is known.
6. Information can be gathered about ways to increase productivity, shortage of
•inputs if any, effect of pollution, degree of exploitation alongwith conservation of resources.

Grassland ecosystem:

Components of Grassland ecosystem

A. Abiotic component.

This includes nutrients present in soil and aerial environment. The essential elements like C, H, O, N, P, S, K, Mg, Ca, Fe, etc. are supplied by CO₂, H₂O, nitrates, phosphates, sulphates, etc. present in air and soil. Other essential elements are mostly provided by soil.

B. Biotic component. (a) Producers. They are mainly grasses, e.g. species of *Dichanthium*, *Cynodon*, *Desmodium*, *Digitaria*, *Dactyloctenium*, *Brachiaria*, *Setaria*, *Sporobolus*, etc. Few shrubs and herbs (especially legumes) also contribute to primary production.

(b) Consumers. (i) Primary consumers. Important herbivores are grazing animals like cows, buffaloes, deer, sheep, goats, rabbit, mouse, etc. Others are insects like *Leptocorisa*, *Oxyrhachis*, *Dysdercus*, *Cicincella*, *Cocci nella*, termites, millipedes that feed on leaves of grasses.

(ii) Secondary Consumers. Carnivores include jackals, frogs, lizards, snakes, birds, etc. Sometimes the hawks feed on secondary consumers, thus, completing the food chains as tertiary consumers.

C. Decomposers. Important decomposers are fungi like species of Mucor, Aspergillus, Penicillium, Rhizopus, Cladosporium, Fusarium, etc., and some bacteria and actinomycetes. They recycle the minerals and make them available to producers.

The two fundamental trophic levels include the following:

1. Producers (Autotrophic organism):

The green plants are the producers in any ecosystem. They also include photosynthetic bacteria. The producers use radiant energy of the sun during photosynthesis whereby carbon dioxide is assimilated and the light energy is converted into chemical energy. This energy is locked up into the energy rich carbon compounds i.e. carbohydrates. The energy contained in the organic compounds is in the chemical form. Only producers are able to change radiant energy into chemical form. They are, therefore, also called converters or transducers. About 99% of the living matter of the earth is made up of producers, the rest being: consumers, parasites, scavengers, etc. The oxygen that is evolved as a by-product in photosynthesis is used in respiration by all living organisms.

All other organisms depend upon the producers for getting their food and the energy contained in it.

2. Consumers (Heterotrophic organisms):

They are the living members of the ecosystem which consume the food synthesized by the producers. All living animals are thought to be consumers. The consumers may be of the following types:

(i) Primary consumers (also called first order consumers) which are purely herbivorous and depend upon green plants i.e. on producers for their food e.g.,

Cow, Goat, Rabbit, Deer, Grasshopper and other insects.

(ii) Secondary consumers (also called second order consumers) which are carnivorous animals and eat flesh of herbivorous animals e.g., Dog, Cat, Frog etc.

(iii) Tertiary consumers are the carnivorous animals that eat other carnivores e.g. Snake eats a frog, birds a fish.

(iv) Top consumers are carnivores of an ecosystem which are not killed and eaten by other animals e.g. Lions, Vultures etc.

3. Detrivores and Scavengers:

Scavengers are animals which feed on dead bodies, e.g., Vulture, Carrion Beetle. Detrivores feed on organic fragments, e.g., termites, earthworms, woodlice, millipedes, etc. Scavengers and detrivores seem to be essential for quick breakdown of dead bodies of organisms. It was found that in their presence a carrion of baby pig required only 6 days for 90% decomposition while in their absence 70% decomposition occurred in 50 days.

4. Decomposers. They include bacteria, actinomycetes and fungi. In their feeding habit, the decomposers are saprotrophs or osmotrophs. They have been named saprophages. Decomposers excrete digestive enzymes in the surrounding decaying organic matter. The enzymes convert the complex organic substances into simple and soluble compounds. A number of minerals and raw materials are released during the process. The phenomenon is called mineralisation. Some of the simple and soluble compounds are absorbed by the decomposers for their body building and energy liberation.

UNIT - II
ENVIRONMENTAL POLLUTION
PART – B (16 MARKS - QUESTIONS & ANSWERS)

1.Explain the causes, effects, and control measures of air pollution and water pollution?

Air pollution:

It may be defined as “ the presence of one or more contaminants like dust, smoke, mist and odour in the atmosphere which are injurious to human beings , plants and animals

Sources of air pollution:

- a) Natural pollution - volcanic eruptions, forest fires, biological decay, etc.
- b) Man – made activities – Thermal power plants, agricultural activities etc.

Classification:

- 1. Primary pollutant – these are those emitted directly in the atmosphere in harmful form like CO, NO etc
- 2. Secondary pollutant – these may react with one another or with the basic components of air to form new pollutants.

Control Measures:

1. Source control:

- a) Use only unleaded petrol
- b) Use petroleum products and other fuels that have low sulphur and ash content
- c) Plant trees along busy streets because they remove particulates and carbon monoxide and absorb noise.
- d) Industries and waste disposal sites should be situated outside the city centre .
- e) Use catalytic converters to help control the emissions of carbon monoxide and hydrocarbons.

2. Control measures in Industrial centers :

- a) Emission rates should be restricted to permissible levels
- b) Incorporation of air pollution control equipments in the design of the plant lay out .

3. Source control:

- f) Use only unleaded petrol
- g) Use petroleum products and other fuels that have low sulphur and ash content
- h) Plant trees along busy streets because they remove particulates and carbon monoxide and absorb noise.

- i) Industries and waste disposal sites should be situated outside the city centre .
- j) Use catalytic converters to help control the emissions of carbon monoxide and hydrocarbons.
- 4. **Control measures in Industrial centers :**
 - c) Emission rates should be restricted to permissible levels
 - d) Incorporation of air pollution control equipments in the design of the plant lay out .

Water pollution

Presence of foreign impurities (organic, inorganic, biological) in such quantities so as to constitute a health hazard by lowering the water quality and making it unfit for use. Causes:
 Point source Ex: flow of water pollutants from sewerage system, industrial effluent etc. Non-point source Ex: agricultural land (pesticides, fertilizers, mining, construction sites)

Classification of water pollutants:

1. suspended matter
2. thermal discharge
3. pathogens (bacteria, fungi, protozoa fungi)
4. natural organic pollutants
5. synthetic organic pollutants
6. inorganic chemicals
7. radioactive waste, oil, sediments

Effects of water pollution

1. Objectionable colour and odour is unacceptable and unsuitable for drinking and other purposes.
2. highly turbid and very hard water is unpleasant to drink, food processing
3. acid and alkaline water cause serious health problem
4. water borne infectious enteric disease like typhoid, cholera, dysentery, are the predominant health hazard arising from drinking contaminated water
5. radioactive pollution enter human body through food and get accumulated in thyroid gland, liver, bones and muscles
6. biodegradable waste deplete D O in the receiving stream, affect the flora cause creates anaerobic conditions
7. non biodegradable waste and pesticides travel the food chain and ultimately reach human where they accumulate in fatty tissues
8. thermal discharge in stream depletes D O
9. phosphate, nitrate, promote the growth of algae and encourage eutrophication
10. Industrial effluents result in addition of poisonous chemicals such as arsenic, mercury, lead may reach human body through contaminated food.

Control measures of water pollution

1. lay down standard for
 - a. drinking water
 - b. disposal of waste water into water course/sewer/land

2. monitoring
3. treatment
 - a. domestic treatment
 - screening
 - sedimentation
 - filtration, pH adjustment
 - disinfection
 - b. waste water treatment
 - preliminary treatment
 - primary treatment
 - secondary treatment
 - advanced treatment

2. What are the effects of improper municipal solid wastes management? State the measures recommended for proper management of the solid wastes. Discuss the role of individual in preventing Pollution?

Management of solid waste is very important in order to minimize the adverse effects of solid wastes.

Types of solid wastes:

1. Urban wastes
 - Sources – a) Domestic wastes – Food waste, Cloth, Waste paper etc
 - B) Commercial wastes – Packing material, cans, bottles , polythene etc.
 - C) Construction Wastes – Wood, concrete debris etc.
 - D) Bio medical wastes – Anatomical wastes , infectious wastes etc.,
2. Industrial wastes
 - Sources – a) Nuclear power plants – generates radioactive wastes
 - B Thermal power plants – produces fly ash in large quantities
3. Chemical industries
 - Produces large quantities of hazardous and toxic materials

Steps involved in solid waste management :

1. Reduce , Reuse and Recycle of materials – raw materials re usage should be reduced , reuse of waste materials should be reduced and recycling of the discarded materials into new useful products should also be reduced.
2. Discarding wastes
 - a) Land fill : Solid wastes are placed in sanitary landfill system in alternate layers of 80 cm thick refuse, covered with selected earth fill of 20cm thickness
 - b) Incineration: It is a hygienic way of disposing the solid waste. It is a thermal process and is very effective for detoxification of all combustible pathogens

- c) Composting: It is another popular method practiced in many cities in our country. In this method, bulk organic waste is converted into a fertilizing manure by biological action.

Role of an individual in prevention of pollution:

1. Plant more trees
2. Help more in pollution prevention than pollution control
3. Use water, energy and other resources efficiently
4. Purchase recyclable, recycled and environmentally safe products
5. reduce deforestation
6. Remove NO from motor vehicular exhaust
7. Use of eco friendly products.

3. Write short notes on disaster management?

Disaster

It is defined as the geological process and it is an event concentrated in time and space in which a society or subdivision of a society undergoes severe danger and causes loss of its members and physical property.

Types

1. Natural disasters – refers to those disasters that are generated by natural phenomena
2. Manmade disasters – refers to the disasters resulting from manmade hazards.

Floods

Whenever the magnitude of water flow exceeds the carrying capacity of the channel within its banks the excess of water overflows on the surroundings causes floods.

Causes of floods

1. Heavy rain, rainfall during cyclone causes floods
2. sudden snow melt also raises the quantity of water in streams and causes flood
3. sudden and excess release of impounded water behind dams
4. clearing of forests for agriculture has also increased severity of floods.

Flood management

1. Encroachment of flood ways should be banned
2. Building walls prevent spilling out the flood water over flood plains
3. Diverting excess water through channels or canals to areas like lake, rivers etc., where water is not sufficient,
4. Optical and microwave data from IRS is also used for flood management
5. Flood forecasts and flood warning are also given by the central water commission

Cyclones:

It is a meteorological process, intense depressions forming over the open oceans and moving towards the land.

Effect:

1. The damage depends on the intensity of cyclone the damage to human life, crops, roads, transport, could be heavy
2. Cyclone occurrence slow down the developmental activities of the area

Cyclone management:

1. Satellite images are used by meteorological departments for forecasting the weather conditions which reveal the strength and intensity of the storm.
2. Radar system is used to detect the cyclone and is being used for cyclone warning

Case studies

Cyclone in Orissa – 1999

Land slides:

The movement of earthy materials like coherent rock, mud, soil and debris from higher to lower region to gravitational pull is called landslides

Causes:

1. Movement of heavy vehicles on the unstable sloppy regions create landslides
2. Earthquake, shocks, vibrations and cyclone create landslide

Earth quakes:

An earthquake is a sudden vibration caused on earth surface with the sudden release of tremendous energy stored in rocks under the earth's crust.

Causes:

1. Disequilibrium in any part of the earth crust
2. Underground Nuclear testing
3. Decrease of underground water level.

Effect:

Damage the settlements and transport systems
Collapses houses and their structures
Deformation of ground surface
Tsunami

Earthquake management:

Constructing earthquake resistant building
Wooden houses are preferred
Seismic hazard map should give the information about the magnitude of intensity of anticipated earthquakes.

Tsunami:

A tsunami is a large wave that is generated in a water body when the seafloor is deformed by seismic activity. This activity displaces the overlying water in the ocean.

Causes of tsunami

1. Seismic activities like earthquakes, landslides, volcanic eruptions, explosions, can generate tsunami.
2. Deformation of the sea floor due to the movement of plates.

Concept of Tsunami

A tsunami is not a single wave but a series of waves like the ordinary waves which we see on a sea.

Effects on Tsunami

1. Tsunami attacks mostly the coastlines, causing devastating property, damage and loss of life
2. Tsunami can kill lot of human beings, livestock's, etc

3. Tsunami may also spread lot of water borne diseases.

Tsunami Management

Earthquakes under the water are monitored by sensors on the floor of the sea.

The sensors send the information of floating buoys on the surface, whenever they detect any changes in pressure of the sea

The information is then relayed to satellites, which passes it on to the earth stations.

Finally the country make the people alert through the media to take all necessary precautions.

Case studies:

Tsunami in India

Field study of local polluted site

Tirupur in Tamilnadu

Pallavaram in chennai

4. Discuss the causes ,effects, and control of marine pollution.

The discharge of waste substances into the sea resulting in harm to living resources, hazards to human health, hindrance to fishery and impairment of quality for use of sea water.

Causes:-

- Rivers
- Catchment area
- Oil drilling and shipment.

Sources:

- waste disposal
- oil spill :
 - Oil spilling causes abnormally low body temperature in birds resulting in hypothermia.
 - Oil films are able to retard significantly the rate of oxygen uptake by water.
- thermal pollution (plants located nearby coastal areas)
- ship breaking activities
- aquaculture practices
- nuclear test conducted in seas and oceans

Effects:

- disturb entire aquatic or marine ecosystem
- oil has suffocation effect on most aquatic animals
- smaller animals can be caught in oil envelope and die
- thermal
- Pollution may increase the temp. of water and DO may be depleted which causes danger.

- There may be chances for bioaccumulation and bio magnification in the food chain due to the disposal of non-degradable wastes
- Oil promotes anaerobic conditions by preventing diffusion of oxygen from air
- Disposal of radio active wastes cause chronic, acute and genetic damage
- Affects the recreational activity along the beaches
- Affect sensitive flora and fauna
- Loss of buoyancy
- Affect phytoplankton, zooplankton, algal species, coral reefs, fish, birds and mammals.

Control measures of marine pollution

- Ban to dump the toxic, hazards waste and sewage sludge.
- Prevent sewer overflows
- Minimize coastal developmental activities
- Oil ballast should not be dumped into sea.
- Plants for conserving marine biodiversity must be taken into account of human needs.
- People should be educated about marine ecosystems and the benefits offered by them.
- Local communities must be involved in protecting and managing their coastal resources
- Social and economic incentives must be offered for conserving and sustainable use of marine resources.

5.Discuss the causes, effects, and control measures of soil pollution and noise pollution .

Soil Pollution:

It may be defined as “the contamination of soul by human and natural activities which may cause harmful effects on living beings”.

Types:

1.Industrial wastes

Sources and effects:- pulp and paper mills, chemical industries, oil refineries , sugar factories etc., These pollutants affect and alter the chemical and biological properties of soil. As a result , hazardous chemicals can enter into human food chain from the soil, disturb the bio chemical process an d finally lead to serious effects.

2.Urban wastes

Sources and effects:- Plastics, Glasses, metallic cans, fibers, papers , rubbers , street sweepings, and other discarded manufactured products. These are also dangerous.

3.Agricultural practices

Sources and effects:- Huge quantities of fertilizers, pesticides, herbicides , weedicides are added to increase the crop yield. Apart from these farm wastes, manure, slurry , are reported to cause soil pollution.

4.Radioactive pollutants

Sources and effects: These are resulting from explosions of nuclear dust and radio active wastes penetrate the soil and accumulate there by creating land pollution.

5. Biological agents.

Sources and effects: Soil gets large quantities of human, animal and birds excreta which constitute the major source of land pollution by biological agents.

Control measures of soil pollution

The pressure on intensification of farm activities increases for two reasons

1. population growth
2. Decrease of the available farm land due to urbanization

The soil pollution can be controlled by

1. forestry and farm practices
2. Proper dumping of unwanted materials
3. Production of natural fertilizers
4. Proper Hygienic condition
5. Public awareness
6. Recycling and Reuse of wastes
7. Ban on Toxic chemicals.

Noise pollution:

It may be defined as “ the unwanted, unpleasant or disagreeable sound that causes discomfort for all living beings”

Types of noise:

1. Industrial noise
2. Transport noise
3. Neighborhood noise

Effects of Noise pollution

1. This affects human health, comfort and efficiency.
2. It causes muscles to contract leading to nervous breakdown, tension
3. It affects health efficiency and behavior.
4. In addition to serious loss of hearing due to excessive noise, impulsive noise also causes psychological and pathological disorders.
5. Brain is also adversely affected by loud and sudden noise as that of jet and aero plane noise etc.

Control and preventing measures

1. Source control – acoustic treatment to machine surface , design changes , limiting the operational timings
2. Transmission path intervention- the source inside a sound insulating enclosure, construction of a noise barrier or provision of sound absorbing materials
3. Oiling – Proper oiling will reduce the noise from the machines.

6. Discuss the causes, effects, and control measures of thermal pollution and nuclear hazards.

Thermal pollution (Heat):

Example : Excessive heat.

Human source : Water cooling of electric power plants and some types of industrial plants . Almost all of all water withdrawn in United states for cooling electric power plants.

Effects:

1. Lowers dissolved oxygen levels and makes aquatic organisms more vulnerable to disease and toxic chemicals
2. When a power plant first opens or shuts down for repair, fish and other organisms adapted to a particular temperature range can be killed b the abrupt change in water temperature known as thermal shock

Control measures:

1. The administration of water pollution should be in the hands of state or central government.
2. Industrial plants should be based on recycling operations, because it will not only stop the discharge of industrial wastes into natural water sources but by products can be extracted from the wastes.
3. Plants, trees and forests control pollution and they acts as natural air conditioners.
4. Highly qualified and experienced persons should be consulted from time to time for effective control of water pollution.
5. Basic and applied research in pubic health engineering should be encouraged.

Nuclear Hazards:

The radiation hazard in the environment comes from ultraviolet, visible, cosmic rays and micro wave radiation which produces genetic mutation in man.

Sources of Nuclear Hazards:

1. Natural Sources – which is in space which emit cosmic rays
2. Man made sources (Anthropogenic sources) These are nuclear power plants, X-rays , nuclear accidents, nuclear bombs, diagnostic kits etc

Effects of Nuclear Hazards:

1. Exposure of the brain and central nervous system ot high doses of radiation causes delirium, convulsions and death within hours or days.

2. The use of eye is vulnerable to radiation. As its cell die, they become opaque forming cataracts that impair sight.
3. Acute radiation sickness is marked by vomiting , bleeding of gums and in severe cases mouth ulcers.
4. Nausea and vomiting often begin a few hours after the gastrointestinal tract is exposed . Infection of the intestinal wall can kill weeks afterwards.
5. Unborn children are vulnerable to brain damage or mental retardation , especially if irradiation occurs during formation of the central nervous system in early pregnancy.

Control measures:

1. Nuclear devices should never be exploded in air.
2. In nuclear reactors, closed cycle coolant system with gaseous coolant may be used to prevent extraneous activation products.
3. Containments may also be employed to decrease the radio active emissions.
4. Extreme care should be exercised in the disposal of industrial wastes contaminated with radio nuclides.
5. Use of high chimneys and ventilations at the working place where radioactive contamination is high. It seems to be an effective way for dispersing pollutants.

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Unit-III
NATURAL RESOURCES
PART – B (16 MARKS - QUESTIONS & ANSWERS)

1. What are natural resources available in India and discuss any two of them.

Natural resources (economically referred to as land or raw materials) occur naturally within environments that exist relatively undisturbed by mankind, in a natural form.

FOREST RESOURCES

Commercial uses

- ✓ Man depends heavily on a larger number of plant and animal products from forests for his daily needs.
- ✓ The chief product that forests supply is wood, which is used as fuel, raw material for various industries as pulp, paper, newsprint, board, timber for furniture items, other uses as in packing articles, matches, sports goods etc.
- ✓ Indian forests also supply minor products like gums, resins, dyes, tannins, fibers, etc.
- ✓ Many of the plants are utilized in preparing medicines and drugs; Total worth of which is estimated to be more than \$300 billion per year.
- ✓ Many forests lands are used for mining, agriculture, grazing, and recreation and for development of dams.

Depending upon the climate conditions, forest may be classified as:

- ✓ **Tropical Rain Forests:** They are evergreen broadleaf forests found near the equator. They are characterized by high temperature, high humidity and high rainfall, all of which favor the growth of trees.
- ✓ **Tropical deciduous forests:** They are found a little away from the equator and are characterized by a warm climate the year round. Rain occurs only during monsoon.
- ✓ **Tropical scrub forests:** They are found in areas where the day season is even longer.
- ✓ **Temperate rain forests:** They are found in temperate areas with adequate rainfall. These are dominated by trees like pines, firs, redwoods etc.
- ✓ **Temperate deciduous forests:** They are found in areas with moderate temperatures.
- ✓ **Evergreen coniferous forests (Boreal Forests):** They are found just south of arctic tundra. Here winters are long, cold and dry. Sunlight is available for a few hours only.

Ecological uses

The ecological services provided by our forests may be summed up as follows:

- ✓ **Production of Oxygen:** The main green house gas carbon dioxide is absorbed by the forests as a raw material for photo synthesis. Thus forest canopy acts as a sink for carbon dioxide thereby reducing the problem of global warming caused by green house gas CO₂
- ✓ **Wild life habitat:** Forests are the homes of millions of wild animals and plants. About 7 million species are found in the tropical forests alone.
- ✓ **Regulation of hydrological Cycle:** Forested watersheds act like giant sponges, absorbing the rainfall, slowing down the runoff. They control climate through transpiration of water and seed clouding.
- ✓ **Soil Conservation:** Forests bind the soil particles tightly in their roots and prevent soil erosion. They also act as wind breakers.
- ✓ **Pollution moderators:** Forests can absorb many toxic gases and can help in keeping the air pure and in preventing noise pollution.

over Exploitation of Forests

- ✓ Man depends heavily on forests for food, medicine, shelter, wood and fuel.
- ✓ With growing civilization the demands for raw material like timber, pulp, minerals, fuel wood etc. shot up resulting in large scale logging, mining, road-building and clearing of forests.
- ✓ Our forests contribute substantially to the national economy.

- ✓ The international timber trade alone is worth over US \$ 40 billion per year.
- ✓ The devastating effects of deforestation in India include soil, water and wind erosion, estimated to cost over 16,400 cores every year.

Deforestation

- ✓ Deforestation means destruction of forests.
- ✓ The total forests area of the world in 1900 was estimated to be 7,000 million hectares which was reduced to 2890 million ha in 1975 fell down to just 2,300 million ha by 2000.
- ✓ Deforestation rate is relatively less in temperate countries, but it is very alarming in tropical countries.
- ✓ Deforestation is a continuous process in India where about 1.3 hectares of forest land has been lost.
- ✓ The per capita availability of forest in India is 0.08 hectares per person which is much lower than the world average of 0.8 hectares.
- ✓ The presence of waste land is a sign of deforestation in India.

Causes of Deforestation

Major causes of deforestation are listed below:

- Development projects
- Shifting cultivation
- Fuel requirements cutting and burning
- Construction of dams
- Growing food needs.



Consequences of deforestation

Some of the effects of deforestation are listed below:

a) Effect on climate

Global warming

Less rainfall
Hot climate.

b) Effect on biodiversity

Loss of medicinal plants.
Loss of timber, fuel wood.

c) Effect on resources

Loss of land resource
Loss of soil fertility
Soil erosion
Drastic changes in biogeochemical cycles

d) Effect on economy

Increase in medicinal values
Demand of industrial products.

e) Effect on food

Loss of fruit production
Loss of root based foods.

Case Studies

Desertification in hilly regions of the Himalayas:

- Desertification in Himalayas, involving clearance of natural forests and plantation of monocultures like *Pinus roxburghi*, *Eucalyptus camadulensis* etc., have upset the ecosystem by changing various soil and biological properties.
- The area is invaded by exotic weeds. These areas are not able to recover and are losing their fertility.

Disappearing Tea gardens in Chhota Nagpur

Following the destruction of forest rain fall declined in Chhota Nagpur to such an extent that tea-gardens also disappeared from the region.

Waning rain fall in Udhagamandalam

The rainfall pattern was found to fluctuate with wooded land area in the hills. When the Nilgiri mountains had luxuriant forest cover annual rainfall used to be much higher.

TIMBER EXTRACTION

- ✓ Logging for valuable timber such as teak and mahogany not only involves a few large trees per hectare but about a dozen more trees since they are strongly interlocked with each other by vines etc.
- ✓ Also road construction for making approach to the trees causes further damage to the forests.
- ✓ In India, firewood demand would continue to rise in future mostly consumed in rural areas, where alternative sources of energy, are yet to reach.



MINING

- ❖ Mining is the process of removing deposits of ores from substantially very well below the ground level.
- ❖ Mining is carried out to remove several minerals including coal.
- ❖ These mineral deposits invariably found in the forest region, and any operation of mining will naturally affect the forests.
- ❖ Mining from shallow deposits is done by surface mining while that from deep deposits is done by sub-surface mining.
- ❖ More than 80,000 ha of land of the country are presently under the stress of mining activities.

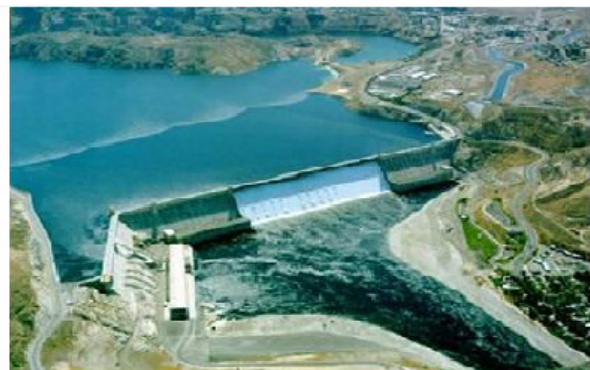


Effects of mining resources

- Mining operation require removal of vegetation along with underlying soil mantle and overlying rock masses. This results in destruction of landscape in the area.
- Large scale of deforestation has been reported in Mussorie and Dehradun valley due to mining of various areas.
- Indiscriminate mining in Goa since 1961 has destroyed more than 50,000 ha of forest land.
- Mining of radioactive mineral in Kerala, Tamilnadu and Karnataka are posing similar threats of deforestation.

DAMS AND THEIR EFFECTS ON FORESTS AND TRIBAL PEOPLE

- Big dams and river valley projects have multi-purpose uses and have been referred to as "Temples of modern India".
- India has more than 1550 large dams, the maximum being in the state of Maharashtra (more than 600) followed by Gujarat (more than 250) and Madhya Pradesh (130).
- The highest one is Tehri dam, on river Bhagirathi in Uttaranchal and the largest in terms of capacity is Bhakra dam on river Sutlej.



Effects on Tribal people

- The greatest social cost of big dam is the widespread displacement of local people.
- It is estimated that the number of people affected directly or indirectly by all big irrigation projects in India over the past 50 years can be as high as 20 millions.
- The Hirakud dam, one of the largest dams executed in fifties, has displaced more than 20,000 people residing in 250 villages.

Effects on forests

Thousands of hectares of forests have been cleared for executing river valley projects which breaks the natural ecological balance of the region. Floods, landslides become more prevalent in such areas.

Eg:

The Narmada sagar project alone has submerged 3.5 lakh hectares of best forest comprising of rich teak and bamboo forests.

The Tehri dam submerged 1000 hectares of forest affecting about 430 species of plants according to the survey carried out by the botanical survey of India.

2.Discuss the world food problems in detail and how does it affect other resouces.

World Food Problems

- During the last 50 years world grain production has increased almost three times.
- The per capita production is increased by about 50%.
- At the same time population growth increased at such a rate in less developed countries.
- Every 40 million people die of undernourishment and malnutrition.
- This means that every year our food problem is killing as many people as were killed by the atomic bomb dropped on Hiroshima during World War II.
- This statistics emphasize the need to increase our food production, and also to control population growth.
- It is estimated that 300 millions are still undernourished.

Impacts of overgrazing and agriculture

Overgrazing

Overgrazing can limit livestock production. Over grazing occurs when too many animals graze for too long and exceed the carrying capacity of a grass land area.

Impact of overgrazing

- ✓ **Land degradation:** Overgrazing removes the grass cover. The humus content of the soil is decreased and it leads to poor, dry, compacted soil.
- ✓ **Soil erosion:** The soil roots are very good binders of soil. When the grasses are removed, the soil becomes loose and susceptible to the action of wind and water.

- ✓ **Loss of useful species:** Due to overgrazing the nutritious species like cenchrus, panicum etc. are replaced by thorny plants like Parthenium, Xanthium etc. These species do not have a good capacity of binding the soil particles and, therefore, the soil becomes more prone to soil erosion.

Agriculture

Traditional Agriculture and its impacts

- ✓ Usually involves a small plot
- ✓ Simple tools
- ✓ Naturally available water
- ✓ Organic fertilizer and a mix of crops

Main impacts

- Deforestation
- Soil erosion
- Depletion of nutrients

Modern Agriculture and its impacts

- It makes use of hybrid seeds of selected and single crop variety.
- High-tech equipments, lots of energy subsidies in the form of fertilizers and, pesticides
- Irrigation water

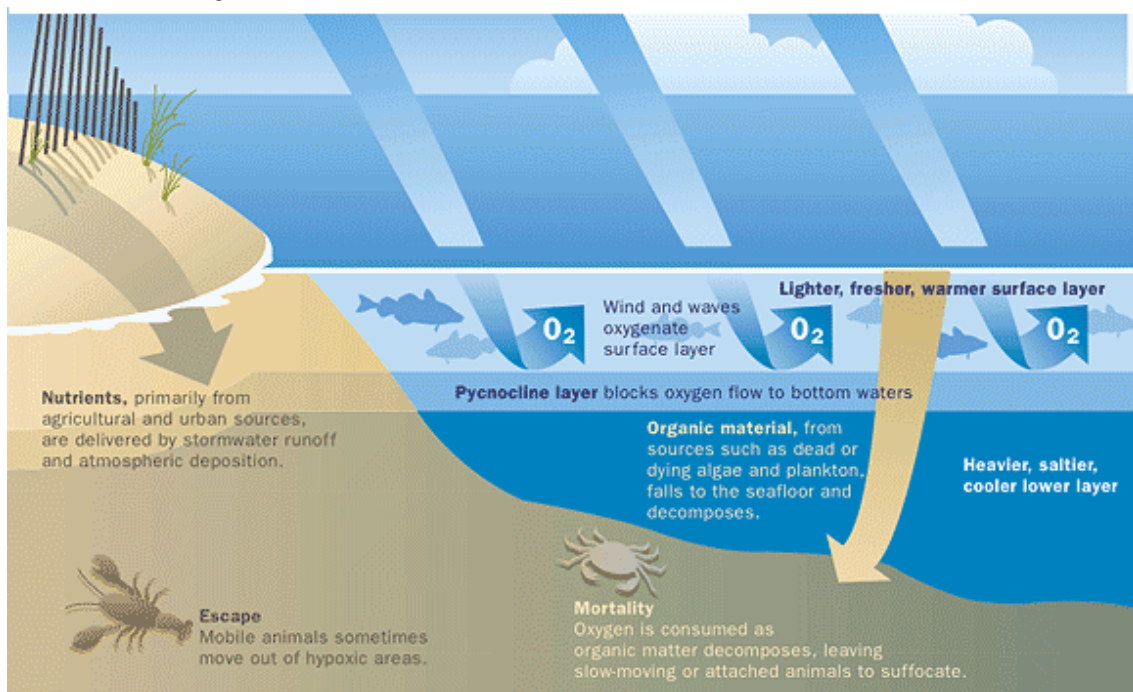
Main impacts

- ✓ **Impacts related to high yielding varieties (HYV):** The uses of HYVs encourage monoculture i.e. the same genotype is grown over vast areas. In case of an attack by some pathogen, there is total devastation of the crop by the disease due to exactly uniform conditions, which help in rapid spread of the disease.

Fertilizer related problems

- ✓ **Micronutrient imbalance:** Chemical fertilizers have nitrogen, phosphorus and potassium (N, P and K) which are essential macronutrients. Excessive use of fertilizers cause micronutrient imbalance. For example, excessive fertilizer use in Punjab and Haryana has caused deficiency of the micronutrient Zinc in the soils, which is affecting productivity of the soil.
- ✓ **Nitrate Pollution:** Nitrogenous fertilizers applied in the fields often leach deep into the soil and ultimately contaminate the ground water. The nitrates get concentrated in the water and when their concentration exceeds 25 mg/L, they become the cause of a serious health hazard called "**Blue Baby Syndrome**" or methaemoglobinemia. This disease affects the infants to the maximum extent causing even death.

- ✓ **Eutrophication:** A large proportion of nitrogen and phosphorus used in crop fields is washed off along with runoff water and reach the water bodies causing over nourishment of the lakes, a process known as **Eutrophication**. (Eu=more, tropic=nutrition). Due to Eutrophication the lakes get invaded by algal blooms. These algal species grow very fast by rapidly using up the nutrients. The algal species quickly complete their life cycle and die thereby adding a lot of dead matter. The fishes are also killed and there is lot of dead matter that starts getting decomposed. Oxygen is consumed in the process of decomposition and very soon the water gets depleted of dissolved oxygen. This further affects aquatic fauna and ultimately anaerobic conditions are created where only pathogenic anaerobic bacteria can survive. Thus, due to excessive use of fertilizers in the agricultural fields the lake ecosystem gets degraded.



Eutrophication

- ✓ **Pesticide related problems:** Thousands of types of pesticides are used in agriculture. The first generation pesticides include chemicals like sulphur, arsenic, lead or mercury to kill the pests. They have number of side effects as discussed below:
- ✓ **Creating resistance in pests and producing new pests:** About 20 species of pests are now known which have become immune to all types of pesticides and are known as "Super pests".
- ✓ **Death of non-target organisms:** Many insecticides not only kill the target species but also several non-target species that are useful to us.

- ✓ **Biological magnification:** Many of the pesticides are non-biodegradable and keep on accumulating in the food chain, a process called biological magnification. This is very harmful.

Biomagnification

- ✓ **Water Logging:** Over irrigation of croplands by farmers for good growth of their crop usually leads to water logging. Inadequate drainage caused excess water to accumulate underground and gradually forms a continuous column with the water table. Under water-logged conditions, pore-spaces in the soil get fully drenched with water and the soil- air gets depleted. The water table rises while the roots of plants do not get adequate air for respiration, Mechanical strength of the soil declines, the crop plants get lodged and crop yield falls. In Punjab and Haryana, extensive areas have become water-logged due to adequate canal water supply or tube-well water. Preventing excessive irrigation, sub-surface drainage technology and bio-drainage with trees like Eucalyptus are some of the remedial measures to prevent water-logging.
- ✓ **Salinity Problem:** At present one third of the total cultivable land area of the world is affected by salts. Saline soils are characterized by the accumulation of soluble salts like sodium chloride, sodium sulphate, calcium chloride, magnesium chloride etc. in the soil profile. Their electrical conductivity is more than 4 ds/m. So dic soils have carbonates and bicarbonates of sodium, the pH usually exceed 8.0 and the exchangeable sodium percentage (ESP) is more than 15%.

Remedy

- (i) The most common method for getting rid of salts is to flush them out by applying more good quality water to such soils.
- (ii) Another method is laying underground network of perforated drainage pipes for flushing out the salts slowly.

Case studies

- Salinity and water logging in Punjab, Haryana and Rajasthan:
- The first alarming report of salt-affected wasteland formation due to irrigation practices came from Haryana in 1858.
- Several villages in Panipat, and Delhi lying in Western Yamuna Canal were suffering from salinity problems.
- The floods of 1947, 1950, 1952, 1954-55 in Punjab resulted in aggravated water logging with serious drainage problems.
- Introduction to canal irrigation in 1.3 m ha in Haryana resulted in raise in water table followed by water-logging and salinity in many irrigated areas as a result of fall in crop productivity.

Rajasthan too has suffered badly in this regard following the biggest irrigation project "Indhra Gandhi Canal Project".

3. Explain the following in detail (16 marks)

(a) Mineral Resources.

(b) Food Resources

MINERAL RESOURCES

Minerals are naturally occurring substances with definite chemical and physical properties.

Uses of minerals

Mineral is an element or inorganic compound that occurs naturally. The main uses of minerals are as follows:

- ✓ Development of industrial plants and machinery
- ✓ Generation of energy e.g. coal, lignite, uranium
- ✓ Construction, housing, settlements
- ✓ Defense equipments- weapons, settlement
- ✓ Transportation
- ✓ Communication-telephone wires, cables, electronic devices
- ✓ Medical system- particularly in Ayurvedic System
- ✓ Formation of alloys for various purposes
- ✓ Agriculture- as fertilizers, seed dressings and fungicides
- ✓ Jewellery- e.g. Gold, silver, platinum, diamond

Distribution and uses of major reserves and metals

Metals	Major world reserves	Major uses
Aluminum	Australia, Jamaica	Packing food items, transportation, utensils, electronics
Chromium	CIS(The common wealth of Independent states), South Africa	For making high strength steel alloys, in textiles and tanning industries
Copper	U.S.A, Canada, CIS	Electronic and electrical goods, building, construction, vessels
Iron	CIS, Canada, U.S.A	Heavy machinery, steel production transportation means.
Manganese	South Africa, CIS	For making high strength heat resistant steel alloys

Platinum	South Africa, CIS	Use in automobiles, catalytic converters, electronics, medical uses.
Gold	South Africa, CIS, Canada	Ornaments, medical use, electronic use, in aerospace
Silver	Canada, South Africa	Photography, electronic jewellery.
Nickel	CIS, Canada	Chemical industry, steel alloys
Major uses of some of the non metallic minerals		
Non-metal mineral	Major uses	
Silicate minerals	Sand and gravel for construction, bricks, paving etc.	
Limestone	Used for concrete, building stone, used in agriculture for neutralizing acid soils, used in cement industry	
Gypsum	Used in plaster wall-board, in agriculture	
Potash, phosphorite	Used as fertilizers	
Sulphur pyrites	Used in medicine, car battery, industry	

Environmental impacts of mineral extraction

Major mines which are known for causing severe problems are given below:

- Jaduguda Uranium Mine, Jharkhand- exposing local people to radioactive hazards.
- Jharia coal mines, Jharkhand- underground fire leading to land subsidence and forced displacement of people.
- Sukinda chromite mines, Orissa- Seeping of hexavalent chromium into river posing serious health hazard, Cr^{6+} being highly toxic and carcinogenic.
- Kudremukh iron ore mine, Karnataka- causing river pollution and threat to biodiversity.
- East coast Bauxite mine, Orissa-Land encroachment and issue of rehabilitation unsettled.
- North-Eastern Coal Fields, Assam-Very high sulphur contamination of groundwater.

Impacts of mining: Mining is done to extract minerals from deep deposits in soil.

Environmental damages caused by mining activities are as follows:

- ❖ **Devegetation and defacing of lands:** Mining requires removal of vegetation along with underlying soil mantle and overlying rock masses. This results in destruction of landscape in the area.
- ❖ **Subsidence of land:** Subsidence of mining areas results in tilting of buildings, cracks in houses, buckling of roads, bending of rail tracks and leaking of gas from cracked pipe lines leading to serious disasters.

- ❖ **Groundwater contamination:** Mining pollutes the groundwater. Sulphur, usually present as an impurity in many ores is known to get converted into sulphuric acid through microbial action, thereby making the water acidic.
- ❖ **Surface water pollution:** The acid mine drainage often contaminates the nearby streams and lakes. The acidic water, radioactive substances like uranium, heavy metals also contaminate the water bodies and kill aquatic animals.
- ❖ **Air pollution:** In order to separate and purify the metal from other impurities in the ore, smelting is done which emits enormous quantities of air pollutants. Oxides of sulphur, arsenic, cadmium and lead etc. shoot up in the atmosphere near the smelters and the public suffers from several health problems.
- ❖ **Occupational Health Hazards:** Miners working in different type of mines suffer from asbestosis, silicosis, black lung disease.

Remedial measures

- ✓ Adopting eco-friendly mining technology
- ✓ Utilization of low grade ores by using microbial – leaching technique. In this method, the ores are inoculated with the desired strains of bacteria like *Thiobacillus ferrooxidans*, which remove the impurities and leave the pure mineral.
- ✓ Re-vegetating mined areas with appropriate plants
- ✓ Gradual restoration of flora
- ✓ Prevention of toxic drainage discharge.

Case studies

1. Mining and quarrying in Udaipur

- Soap stones, building stone, and dolomite mines spread over 15,000 hectares in Udaipur have caused many adverse impacts on environment.
- About 150 tons of explosives are used per month in blasting.
- The Maton mines have badly polluted the Ahar river.
- The hills around the mines are suffering from acute soil erosion.
- The waste water flows towards a big tank of “Bag Dara”.
- Due to scarcity of water people are compelled to use this effluent for irrigation purpose.
- The animals like tiger, lion, deer, and birds have disappeared from the mining area.

2. Mining in Sariska and Tiger Reserve in Aravallis

- ✓ The Aravalli range is spread over about 692 Km in the North-west India covering Gujrat, Rajasthan, Haryana, and Delhi.
- ✓ The hill is rich in mineral resources.
- ✓ Mining operations within and around the Sariska Tiger reserve has left many areas permanently infertile and barren.

- ✓ The precious wild life is under serious threat.

FOOD RESOURCES

World Food Problems

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- ✓ **Death of non-target organisms:** Many insecticides not only kill the target species but also several non-target species that are useful to us.
- ✓ **Biological magnification:** Many of the pesticides are non-biodegradable and keep on accumulating in the food chain, a process called biological magnification. This is very harmful.

- ✓ **Water Logging:** Over irrigation of croplands by farmers for good growth of their crop usually leads to water logging. Inadequate drainage caused excess water to accumulate underground and gradually forms a continuous column with the water table. Under water-logged conditions, pore-spaces in the soil get fully drenched with water and the soil- air gets depleted. The water table rises while the roots of plants do not get adequate air for respiration, Mechanical strength of the soil declines, the crop plants get lodged and crop yield falls. In Punjab and Haryana, extensive areas have become water-logged due to adequate canal water supply or tube-well water. Preventing excessive irrigation, sub-surface drainage technology and bio-drainage with trees like Eucalyptus are some of the remedial measures to prevent water-logging.
- ✓ **Salinity Problem:** At present one third of the total cultivable land area of the world is affected by salts. Saline soils are characterized by the accumulation of soluble salts like sodium chloride, sodium sulphate, calcium chloride, magnesium chloride etc. in the soil profile. Their electrical conductivity is more than 4 ds/m. So dic soils have carbonates and bicarbonates of sodium, the pH usually exceed 8.0 and the exchangeable sodium percentage (ESP) is more than 15%.

Remedy

- (i) The most common method for getting rid of salts is to flush them out by applying more good quality water to such soils.
- (ii) Another method is laying underground network of perforated drainage pipes for flushing out the salts slowly.

Case studies

- Salinity and water logging in Punjab, Haryana and Rajasthan:
- The first alarming report of salt-affected wasteland formation due to irrigation practices came from Haryana in 1858.
- Several villages in Panipat, and Delhi lying in Western Yamuna Canal were suffering from salinity problems.
- The floods of 1947, 1950, 1952, 1954-55 in Punjab resulted in aggravated water logging with serious drainage problems.
- Introduction to canal irrigation in 1.3 m ha in Haryana resulted in raise in water table followed by water-logging and salinity in many irrigated areas as a result of fall in crop productivity.
- Rajasthan too has suffered badly in this regard following the biggest irrigation project "Indhra Gandhi Canal Project".

4.Explain the following in detail about land degradation.

LAND DEGRADATION

Process of degradation of soil or loss of fertility of the soil.

Harmful effects of land degradation

- The soil texture and soil structure are deteriorated
- Loss of soil fertility, due to loss of invaluable nutrients
- Increase in water logging, salinity, and alkalinity and acidity problems.
- Loss of economic social and biodiversity.

Causes of land degradation

1. Population

Land resources degraded by over population & over exploitation.

2. Urbanization

Urbanization leads to deforestation, reduces the land

3. Fertilizers and pesticides

Increased applications of fertilizers and pesticides leads to pollution of land and water and soil degradation.

4. Damage of top soil

Increase in food production generally leads to damage to top soil through nutrient depletion.

5. Water-logging

Soil erosion, salination and contamination of the soil with industrial wastes all cause land degradation.

6. Soil erosion

Soil erosion is the process of removal of superficial layer of the soil from one place to another.

Harmful effects of soil erosion

- 1) Soil fertility is lost because of loss of top soil layer.
- 2) Loss of its ability to hold water and sediment.
- 3) Sediment runoff can pollute water and kill aquatic life.

Types of soil erosion

(i) Normal erosion

Gradual removal of top soil by the **natural process**.

The rate of erosion is slower.

(ii) Accelerated erosion

Caused by man-made activities

The rate of erosion is much faster than the rate of formation of soil.

Man induced landslides

- ✚ Various anthropogenic activities like hydroelectric projects, large dams, reservoirs, construction of roads and railway lines, construction of buildings, mining etc are responsible for clearing of large forested areas.
- ✚ Earlier there were few reports of landslides between Rishikesh and Byasi on Badrinath Highway area. But, after the highway was constructed, 15 landslides occurred in a single year.
- ✚ During the construction of roads, mining activities etc. huge portions of fragile mountainous areas are cut or destroyed by dynamite and thrown into adjacent valleys and streams.
- ✚ These land masses weaken the already fragile mountain slopes and lead to landslides.
- ✚ They also increase the turbidity of various nearby streams, thereby reducing their productivity.

Causes of soil erosion

(i) Water

- Affects soil erosion in the form of rain, run-off, rapid flow, wave action.
- **Sheet erosion:** When there is uniform removal of a thin layer of soil from a large surface area, it is called sheet erosion.
- **Rill erosion:** when there is rainfall and rapidly running water produces finger-shaped grooves or rills over the area, it is called rill erosion.
- **Gully erosion:** When the rainfall is very heavy, deeper cavities or gullies are formed, which may be U or V shaped.
- **Slip erosion:** This occurs due to heavy rainfall on slopes of hills and mountains.
- **Stream bank erosion:** During the rainy season, when fast running streams take a turn in some other direction, they cut the soil and make caves in the bank.

(ii) Wind

- Wind is the important climatic agent, who carry away the fine particles of soil and creates soil erosion.
- **Saltation:** This occurs under the influence of direct pressure of stormy wind and the soil particles of 1-1.5 mm diameter move up in vertical direction.
- **Suspension:** Here fine soil particles (less than 1mm diameter) which are suspended on the air are kicked up and taken away to distant places.
- **Surface creep:** Here the large particles (5-10 mm diameter) creep over the soil surface along with wind.

(iii) Biotic agents

- Overgrazing, mining and deforestation are the major biotic agents, cause soil erosion.
- Deforestation without reforestation, overgrazing by cattle, surface mining without land reclamation, irrigation techniques that lead to salt build- up, water logged soil, make the top soil vulnerable to erosion.
- .
- 35% of world soil erosion is due to overgrazing.
- 30% of world soil erosion is due to deforestation.

(iv) Landslides

- Causes soil erosion.

(v) Construction

- Construction of dams, buildings, roads removes the protective vegetal cover and leads to soil erosion.

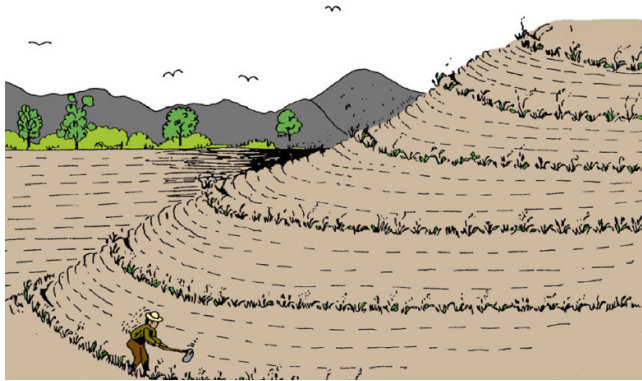
Control of soil erosion (or) soil conservation practices

1. Conservational till farming (or) no-till-farming

- In tradition method, the land is ploughed and soil is broken up and leveled to make a planting surface.
- This disturbs the soil and makes it susceptible to erosion
- However, no-till-farming causes minimum disturbance to the top soil
- Here the tilling machines make slits in the unploughed soil and inject seeds, fertilizers and water in the slit. So the seed germinates and the crop grows.

2. Contour farming

- It involves **planting crops** in rows across the contour of **gently sloped land**.
- Each row acts as a small dam to hold soil and to slow water runoff.



Contour farming

3. Terracing

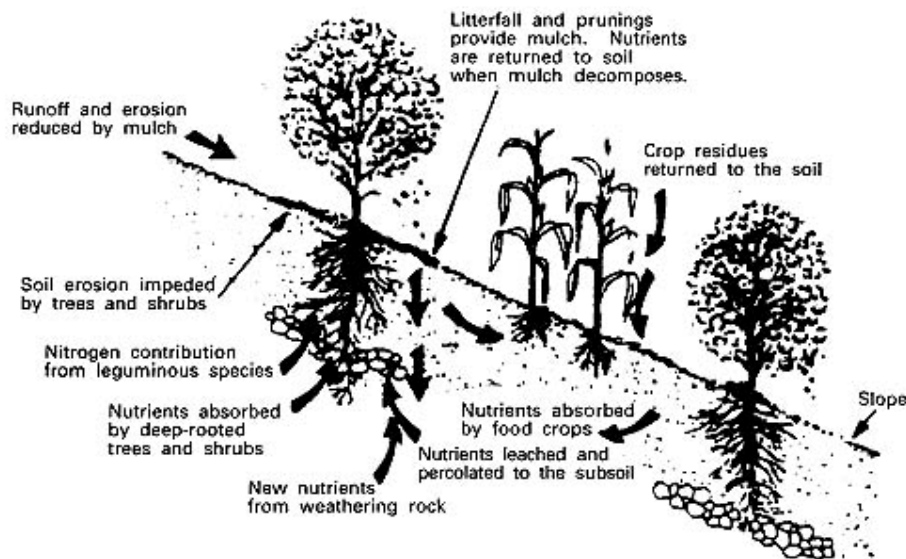
- It involves conversion of **steep slopes into broad terraces**, which run across the contour.
- This retains water for crops and reduces soil erosion by controlling runoff.



Terracing

4. Alley cropping (or) Agro forestry

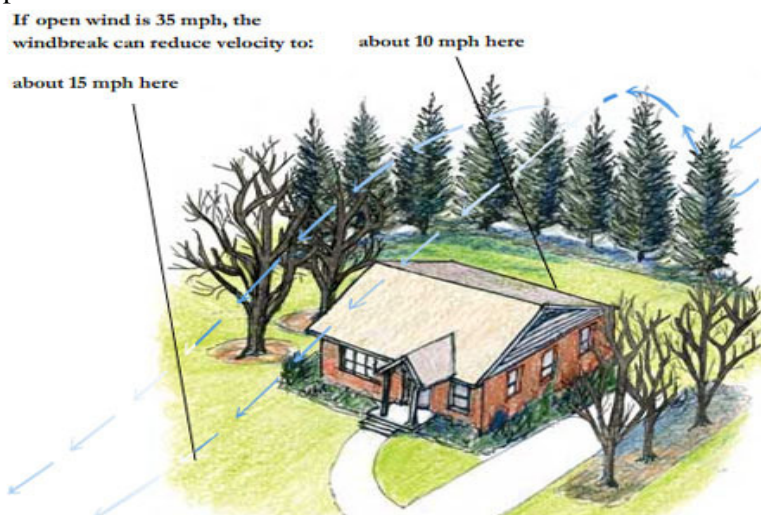
- It involves **planting crops in strips** or **alleys between rows of trees of shrubs** that can provide fruits and fuel wood.
- Even when the crop is harvested, the soil will not be eroded because trees and shrubs still remain on the soil and hold the soil particles.



Alley cropping

5. Wind breaks or shelter belts

- The **trees** are planted in long rows along the boundary of cultivated lands, which **block the wind** and **reduce soil erosion**.
- Wind breaks help in retaining soil moisture, supply of some wood for fuel and provide habitats for birds.



Wind breaks

4.(i) Explain the various conventional energy resources. Discuss in detail the over-exploitation of forests (8)

NON-RENEABLE ENERGY SOURCES (CONVENTIONAL ENERGY SOURCES)

Coal

Coal is a solid fossil fuel formed in several stages as buried remains of land plants that lived 300-400 million years ago were subjected to intense heat and pressure over millions of years.

Various stages of coal

Wood → Peat → Lignite → Bituminous coal → Anthracite

1. The carbon content of Anthracite is 90% and its calorific value is 8700 k.cal.
2. The carbon content of bituminous, lignite and peat are 80, 70 and 60% respectively
3. India has about 5% of world's coal. Indian coal is not good because of poor heat capacity.

Disadvantages

1. When coal is burnt it produces CO_2 causes global warming
2. Since coal contains impurities like S and N, it produces toxic gases during burning.

Petroleum

Petroleum or crude oil = hydrocarbons + small amount S, O, N.

Occurrence

The fossil fuel formed by the decomposition of dead animals and plants that were buried under lake and ocean at high temperature and pressure for million years

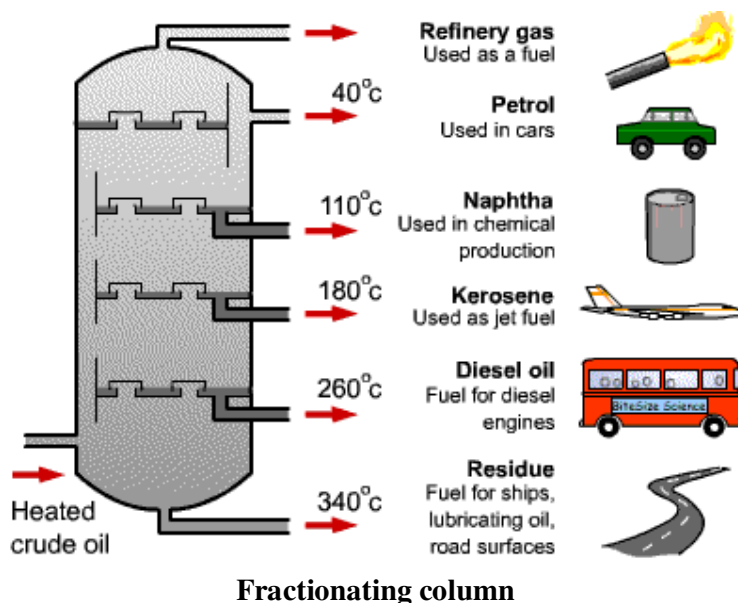
Fractional distillation

Hydrocarbons are separated by fractioning the crude oil.

Petroleum World Scenario

1. 67% oil reserves.
2. 25% of the oil reserves in Saudi Arabia.

At the present rate of usage, the world's crude oil reserves are expected to get exhausted in just 40 years.



LPG (Liquefied Petroleum Gas)

1. The petroleum gas, **converted into liquid** under high pressure as LPG
2. LPG is colorless and odorless gas.
3. During bottling some **mercaptans** is added, to detect leakage of LPG from the cylinder.

Natural Gas

1. Mixture of **50-90% methane** and small amount of other **hydrocarbons**.
2. Its calorific value ranges from 12,000-14,000 k-cal/m³.

(i) Dry gas

If the natural gas contains lower hydrocarbons like methane and ethane, it is called dry gas.

(ii) Wet gas

If the natural gas contains higher hydrocarbons like propane, butane along with methane it is called wet gas.

Occurrence

Formed by the decomposition of dead animals and plants, those were buried under lake and ocean, at high temperature and pressure for millions of years.

NUCLEAR ENERGY

Dr. H. Bhabha –father. India has 10 nuclear reactors, which produce 2% of India's electricity.

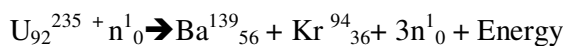
Nuclear Fission

Heavier nucleus is split into lighter nuclei, on bombardment by fast moving neutrons, and a large amount of energy is released.

Eg:

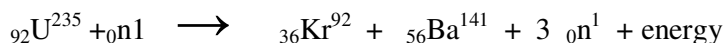
Fission of U²³⁵

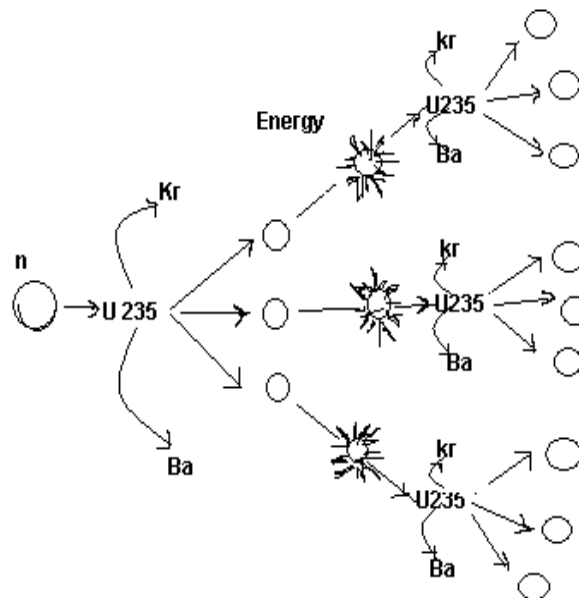
When U²³⁵ nucleus is hit by a thermal neutron, it undergoes the following reaction with the release of 3 neutrons.



- ✓ Each of the above 3 neutrons strikes another U²³⁵ nucleus causing (3x3) 9 subsequent reactions.
- ✓ These 9 reactions further give rise to (3x9) 27 reactions.
- ✓ This process of propagation of the reaction by multiplication in threes at each fission is called **chain reaction**.

Fission reaction of U²³⁵ is given below.





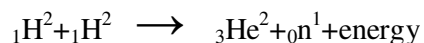
Nuclear fission-chain reaction

Nuclear fusion:

Lighter nucleuses are combined together at extremely high temperatures to form heavier nucleus and a large amount of energy is released.

Eg:

Fusion of H_1^2 . Two hydrogen-2 (Deuterium) atoms may fuse to form helium at 1 billion $^\circ\text{C}$ with the release of large amount of energy



Nuclear power of India

- ✓ Tarapur (Maharashtra),
- ✓ Ranapratap Sagar (Rajasthan)
- ✓ Kalpakkam (Tamilnadu)
- ✓ Narora (U.P).

over Exploitation of Forests

- ✓ Man depends heavily on forests for food, medicine, shelter, wood and fuel.
- ✓ With growing civilization the demands for raw material like timber, pulp, minerals, fuel wood etc. shot up resulting in large scale logging, mining, road-building and clearing of forests.
- ✓ Our forests contribute substantially to the national economy.
- ✓ The international timber trade alone is worth over US \$ 40 billion per year.

- ✓ The devastating effects of deforestation in India include soil, water and wind erosion, estimated to cost over 16,400 cores every year.

Deforestation

- ✓ Deforestation means destruction of forests.
- ✓ The total forests area of the world in 1900 was estimated to be 7,000 million hectares which was reduced to 2890 million ha in 1975 fell down to just 2,300 million ha by 2000.
- ✓ Deforestation rate is relatively less in temperate countries, but it is very alarming in tropical countries.
- ✓ Deforestation is a continuous process in India where about 1.3 hectares of forest land has been lost.
- ✓ The per capita availability of forest in India is 0.08 hectares per person which is much lower than the world average of 0.8 hectares.
- ✓ The presence of waste land is a sign of deforestation in India.

Causes of Deforestation

Major causes of deforestation are listed below:

- Development projects
- Shifting cultivation
- Fuel requirements cutting and burning
- Construction of dams
- Growing food needs.

Consequences of deforestation

Some of the effects of deforestation are listed below:

a) Effect on climate

Global warming
Less rainfall
Hot climate.

b) Effect on biodiversity

Loss of medicinal plants.
Loss of timber, fuel wood.

c) Effect on resources

Loss of land resource

Loss of soil fertility
Soil erosion
Drastic changes in biogeochemical cycles

d) Effect on economy

Increase in medicinal values
Demand of industrial products.

e) Effect on food

Loss of fruit production
Loss of root based foods.

5.(i) What are the ecological services rendered by forests? Discuss.

(ii) Discuss the different ways of harnessing solar energy

Ecological uses

The ecological services provided by our forests may be summed up as follows:

- ✓ **Production of Oxygen:** The main green house gas carbon dioxide is absorbed by the forests as a raw material for photo synthesis. Thus forest canopy acts as a sink for carbon dioxide thereby reducing the problem of global warming caused by green house gas CO₂
- ✓ **Wild life habitat:** Forests are the homes of millions of wild animals and plants. About 7 million species are found in the tropical forests alone.
- ✓ **Regulation of hydrological Cycle:** Forested watersheds act like giant sponges, absorbing the rainfall, slowing down the runoff. They control climate through transpiration of water and seed clouding.
- ✓ **Soil Conservation:** Forests bind the soil particles tightly in their roots and prevent soil erosion. They also act as wind breakers.
- ✓ **Pollution moderators:** Forests can absorb many toxic gases and can help in keeping the air pure and in preventing noise pollution.

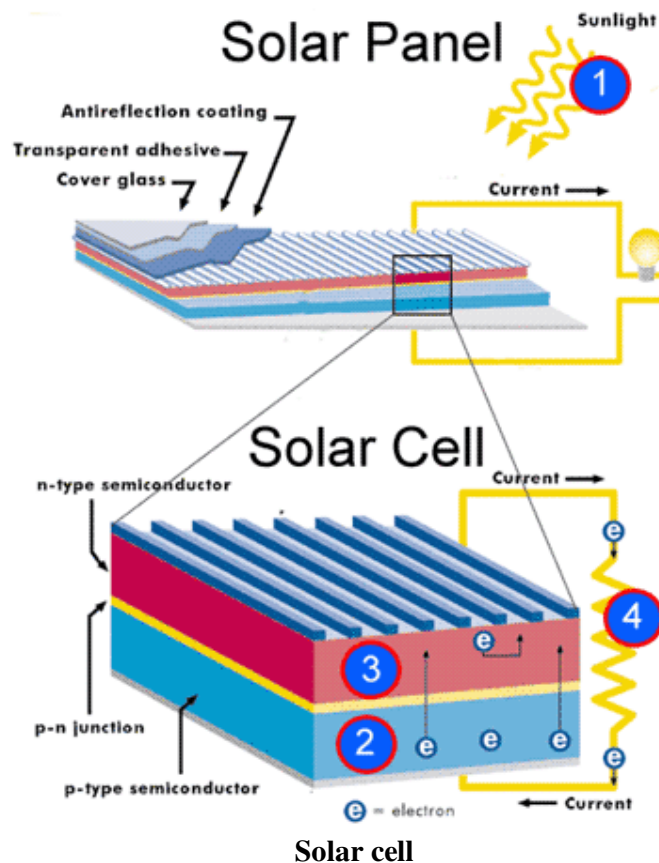
SOLAR ENERGY

- The energy that we get directly from the sun is called solar energy.
- The nuclear fusion reactions occurring inside the sun release enormous amount of energy in the form of heat and light.
- The solar energy received by the near earth space is approximately 1.4 kJ/s/m² known as solar constant.

Methods of Harvesting Solar Energy

1. Solar cells (or) photovoltaic cells (or) PV cells

- ✓ Solar cells consist of a p-type semiconductor (such as Si doped with B) and n-type semi-conductor (Si doped with P).
- ✓ They are in close contact with each other.
- ✓ When the solar rays fall on the top layer of p-type semi-conductor, the electrons from the valence band get promoted to the conduction band and cross the p-n junction into n-type semi-conductor.
- ✓ There by potential difference between two layers is created, which causes flow of electrons (ie.,an electric current)



Uses

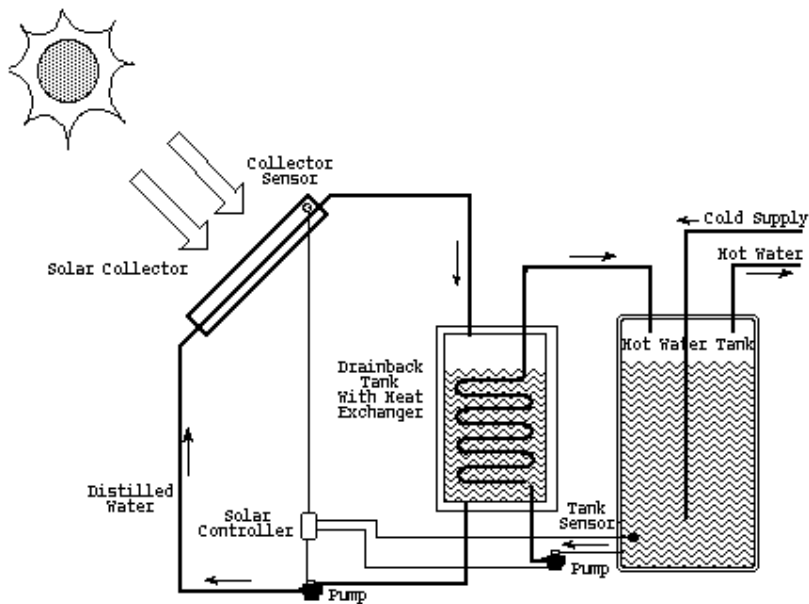
- Used in calculators, electronic watches. Street lights, water pumps to run radios and TVs.

Solar Battery

- ✓ When a large number of solar cells are connected in series it form a solar battery.
- ✓ Solar battery produce more electricity which is enough to run water pump, to run street-light, etc.,
- ✓ They are used in remote areas where conventional electricity supply is a problem.

2. Solar heat collectors

Solar heat collectors consists of natural materials like stones, bricks, (or) materials like glass, which can absorb heat during the day time and release it slowly at night.



Solar heat collector

Uses

Used in cold places, where houses are kept in hot condition using solar heat collectors.

3. Solar water heater

It consists of

- ❖ An insulated box inside of which is painted with black paint.
- ❖ Provided with a glass lid to receive and store solar heat.
- ❖ Inside the box it has black painted copper coil, through which cold water is allowed to flow in, which gets heated up and flows out into a storage tank.

From the storage tank water is then supplied through pipes.

6.Explain the various renewable energy sources in the earth.

RENEWABLE ENERGY RESOURCES

- Renewable resources are parts of our natural environment and form our eco-system

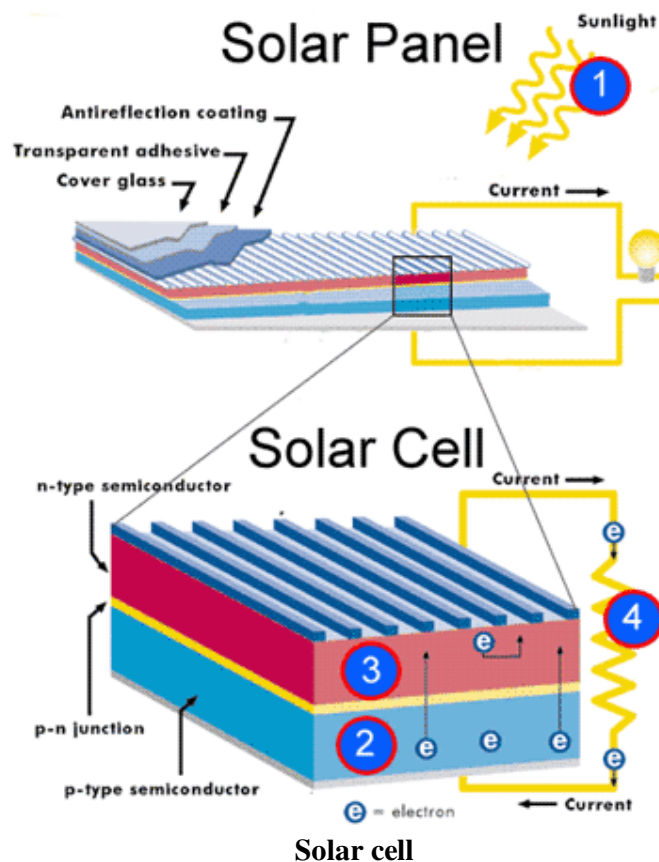
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Uses

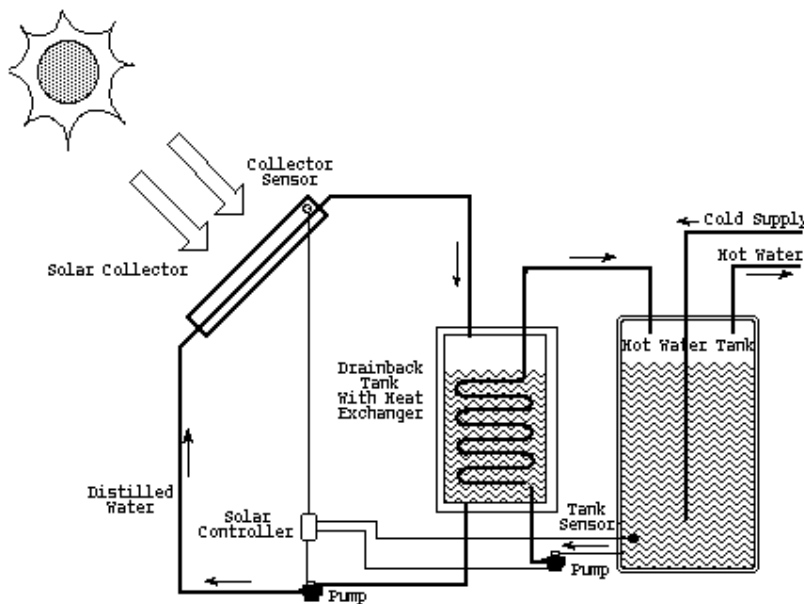
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WIND ENERGY

Definition

Moving air is called wind.

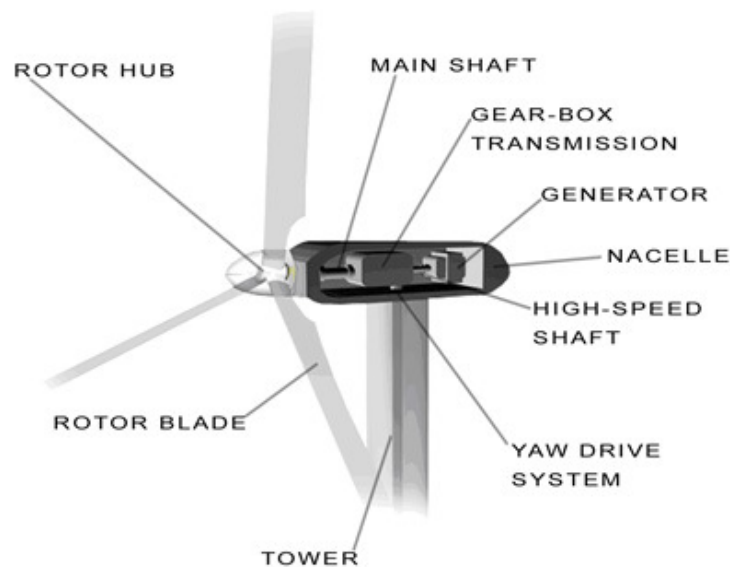
- ✓ Energy recovered from the force of the wind is called wind energy.
- ✓ The energy possessed by wind is because of its high speed.
- ✓ The wind energy is harnessed by making use of wind mills.

Harvesting of wind energy

1. Wind Mills

The strike of blowing wind on the blades of the wind mill makes it rotating continuously.

The rotational motion of the blade drives a number of machines like water pump, flour mills and electric generators.



Wind mill

2. Wind farms

When a large number of wind mills are installed and joined together in a definite pattern it forms a wind farm.

The wind farms produce a large amount of electricity.

Conditions

The minimum speed required for satisfactory working of a wind generator is 15 km/hr.

Advantages

- It does not cause any air pollution
- It is very cheap.

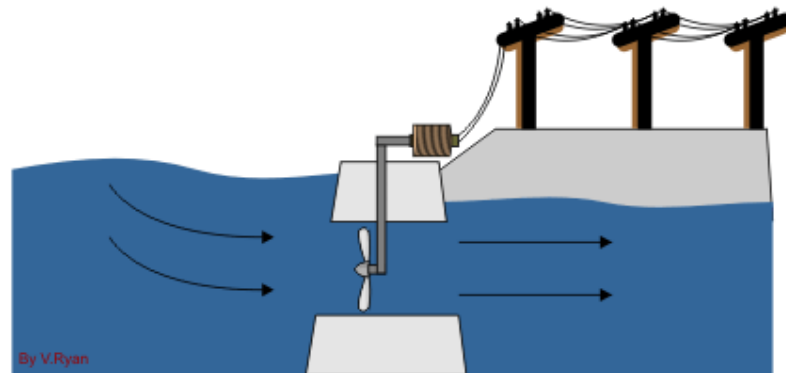
OCEAN ENERGY

It can be generated by following ways.

1. Tidal energy (or) Tidal power

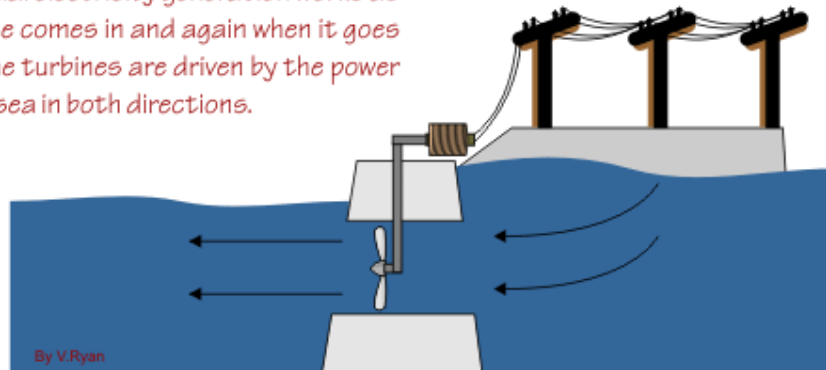
Ocean tides, produced by gravitational forces of sun and moon, contain enormous amount of energy.

- ✓ The “high tide” and “low tide” refer to the rise and fall of water in the oceans.
- ✓ The tidal energy can be harnessed by constructing a tidal barrage.
- ✓ During high tide, the sea-water is allowed to flow into the reservoir of the barrage and rotates the turbine, which intern produces electricity by rotating the generators.
- ✓ During low tide, when the sea level is low, the sea water stored in the barrage reservoir is allowed to flow into the sea and again rotates the turbine.



TIDE COMING IN

This tidal electricity generation works as the tide comes in and again when it goes out. The turbines are driven by the power of the sea in both directions.



TIDE GOING OUT

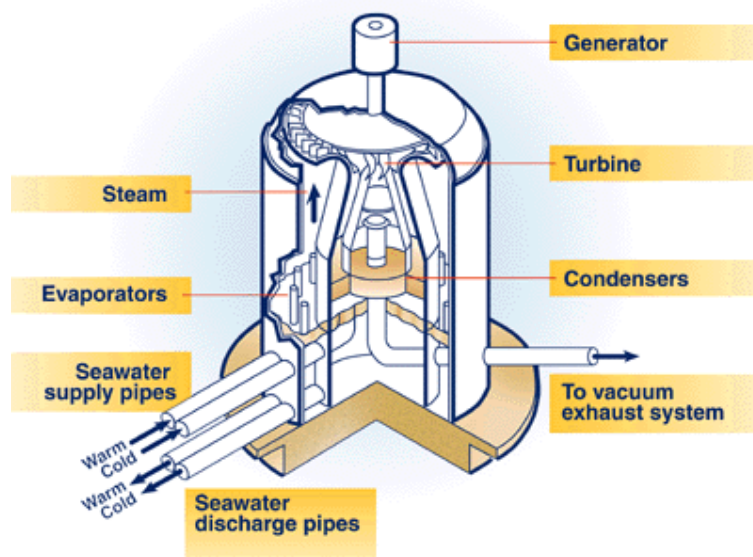
Tidal energy

2. Ocean thermal energy (OTE)

There is often large temperature difference between the surface level and deeper level of the tropical oceans.

- ✓ This temperature difference can be utilized to generate electricity.

- ✓ The energy available due to the difference in temperature of water is called ocean thermal energy.



Ocean thermal energy

Condition

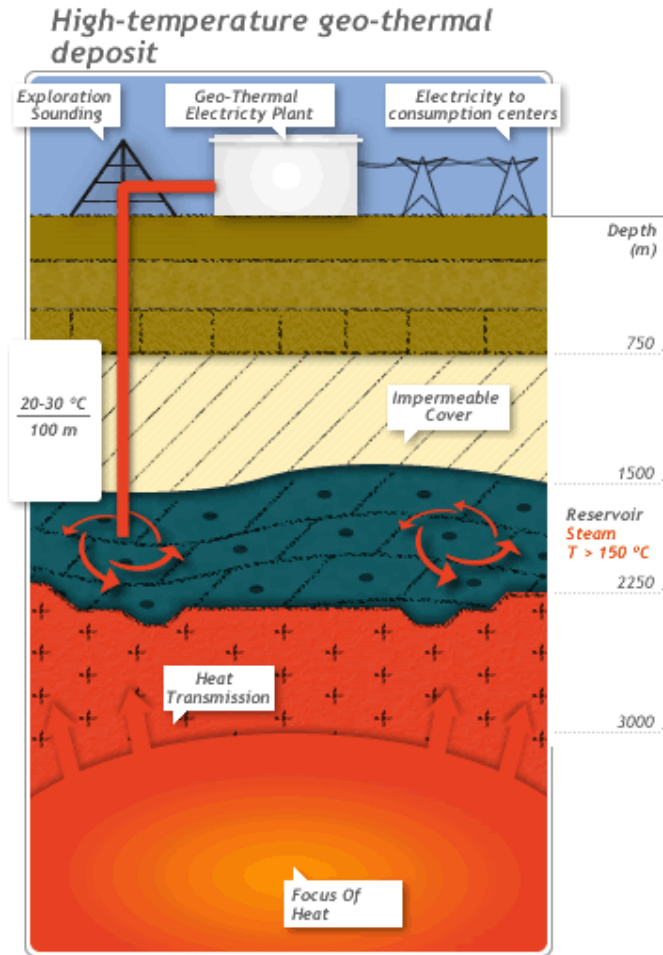
The temperature difference should be of 20°C or more is required between surface water and deeper water.

Process

- ✓ The warm surface water of ocean is used to boil a low boiling liquid like ammonia.
- ✓ The high vapour pressure of the liquid, formed by boiling is then to turn the turbine of the generator and generates electricity.
- ✓ The cold water from the deeper ocean is pumped to cool and condense the vapour into liquid.

3. Geo-thermal Energy

1. Temperature of the earth increases at a rate of $20\text{-}75^{\circ}\text{C}$ per km, when we move down the earth surface.
2. High temperature and high pressure steam fields exists below the earth's surface in many places.
3. The energy harnessed from the high temperature present inside the earth is called geothermal energy.



Geothermal energy

1. Natural geysers

In some places, the hot water (or) steam comes out of the ground through cracks naturally in the form

2. Artificial geysers

In some places, we can artificially drill a hole up to the hot region and by sending a pipe in it, we can make the hot water or steam to rush out through the pipe with very high pressure.

Thus, the hot water (or) steam coming out from the natural (or) artificial geysers is allowed to rotate the turbine of a generator to produce electricity.

BIOMASS ENERGY

Biomass is the organic matter, produced by plants or animals, used as sources of energy.

Most of the biomass is burned directly for heating, cooling and industrial purposes.

Eg: Wood, crop residues, seeds, cattle dung, sewage, agricultural

wastes.

1. Biogas

- ✓ Mixture of methane, carbon dioxide, hydrogen sulphide, etc.
- ✓ It contains about 65% of methane gas as a major constituent
- ✓ Biogas is obtained by the **anaerobic fermentation** of animal dung or plant wastes in the presence of water.

2. Bio fuels

Biofuels are the fuels, obtained by the **fermentation** of biomass.

Eg: Ethanol, Methanol

(a) Ethanol

Ethanol can be easily produced from the **sugarcane**. Its calorific value is less when compared to petrol, and produces much less heat than petrol.

(b) Methanol

Methanol can be easily obtained from **ethanol or sugar**-containing plants.

Its calorific value is also too low when compared to gasoline and diesel.

(c) Gasohol

Gasohol is a mixture of **ethanol+gasoline**.

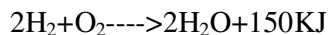
- ✓ In India trial is being carried out to use Gasohol in cars and buses.
- ✓ Gasohol is common fuel in Brazil and Zimbabwe for running cars and buses.
- ✓ Methanol is very useful since it burns at a lower temperature than gasoline or diesel. Due to its high calorific value, hydrogen can serve as an excellent fuel.
- ✓ Moreover it is non-polluting and can be easily produced.
- ✓ Presently H₂ is used in the form of liquid hydrogen as a fuel in spaceships.

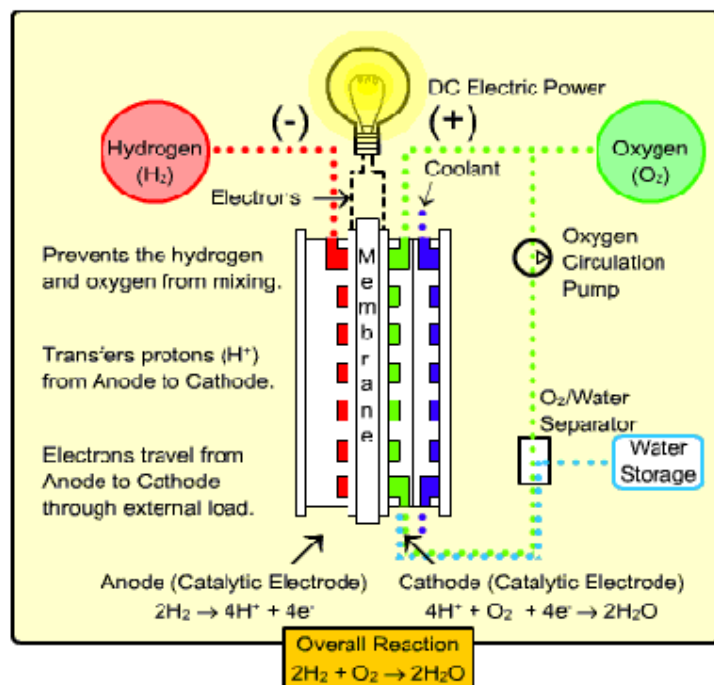
3. Hydrogen Fuel

Hydrogen can be produced by **thermal dissociation** or **photolysis** or **electrolysis** of water.

It possesses high calorific value.

It is non polluting, because the combustion product is water.





Hydrogen fuel cell

Disadvantages of hydrogen fuel

1. Hydrogen is highly inflammable and explosive in nature
2. Safe handling is required
3. It is difficult to store and transport.

7.(i) Write in detail on the role of an individual in conservation of natural resources. (ii) Discuss any four factors responsible for land degradation

CONSERVATION OF NATURAL RESOURCES - ROLE OF AN INDIVIDUAL

Different natural resources like forests, water, soil, food, mineral and energy resources play a vital role in the development of a nation. While conservation efforts are underway at National as well as International level, the individual efforts for conservation of natural resources can go a long way.

I. Conserve Water

- Don't keep water taps running while brushing, shaving, washing or bathing.
- Check for water leaks in pipes and toilets and repair them promptly. A small pin-hole sized leak will lead to the wastage of 640 liters of water in a month.

- Use drip irrigation and sprinkling irrigation to improve irrigation efficiency and reduce evaporation.
- Install a small system to capture rain water and collect normally wasted used water from sinks, cloth-washers, bathtubs etc. which can be used for watering the plants
- Build rain water harvesting system in your house. Even the President of India is doing this.

II. Conserve energy

- Turn off lights, fans and other appliances when not in use.
- Obtain as much heat as possible from natural sources. Dry the clothes in sun instead of drier if it is a sunny day.
- Use solar cooker for cooking your food on sunny days which will be more nutritious and will cut down on your LPG expenses.
- Grow deciduous trees and climbers at proper places outside your home to cut off intense heat of summers and get a cool breeze and shade. This will cut off your electricity charges on coolers and air-conditioners.
- Try riding bicycle or just walk down small distances instead of using your car or scooter.

III. Protect the soil

- While constructing your house, don't uproot the trees as far as possible. Plant the disturbed areas with a fast growing native ground cover.
- Make compost from your kitchen waste and use it for your kitchen-garden or flower-pots.
- Do not irrigate the plants using a strong flow of water, as it would wash off the soil.
- If you own agricultural fields, do not over-irrigate your fields without proper drainage to prevent water logging and salinisation.
- Use mixed cropping so that some specific soil nutrients do not get depleted.

IV. Promote Sustainable Agriculture

- Do not waste food. Take as much as you can eat
- Reduce the use of pesticides.
- Fertilize your crop primarily with organic fertilizers.
- Eat local and seasonal vegetables. This saves lot of energy on transport, storage and preservation.

Control pests by a combination of cultivation and biological control methods.

Process of degradation of soil or loss of fertility of the soil.

Harmful effects of land degradation

- The soil texture and soil structure are deteriorated
- Loss of soil fertility, due to loss of invaluable nutrients
- Increase in water logging, salinity, and alkalinity and acidity problems.
- Loss of economic social and biodiversity.

Causes of land degradation

1. Population

Land resources degraded by over population & over exploitation.

2. Urbanization

Urbanization leads to deforestation, reduces the land

3. Fertilizers and pesticides

Increased applications of fertilizers and pesticides leads to pollution of land and water and soil degradation.

4. Damage of top soil

Increase in food production generally leads to damage to top soil through nutrient depletion.

5. Water-logging

Soil erosion, salination and contamination of the soil with industrial wastes all cause land degradation.

6. Soil erosion

Soil erosion is the process of removal of superficial layer of the soil from one place to another.

Harmful effects of soil erosion

- 4) Soil fertility is lost because of loss of top soil layer.
- 5) Loss of its ability to hold water and sediment.
- 6) Sediment runoff can pollute water and kill aquatic life.

Types of soil erosion

(i) Normal erosion

Gradual removal of top soil by the **natural process**.

The rate of erosion is slower.

(ii) Accelerated erosion

Caused by man-made activities

The rate of erosion is much faster than the rate of formation of soil.

Man induced landslides

- ✚ Various anthropogenic activities like hydroelectric projects, large dams, reservoirs, construction of roads and railway lines, construction of buildings, mining etc are responsible for clearing of large forested areas.
- ✚ Earlier there were few reports of landslides between Rishikesh and Byasi on Badrinath Highway area. But, after the highway was constructed, 15 landslides occurred in a single year.
- ✚ During the construction of roads, mining activities etc. huge portions of fragile mountainous areas are cut or destroyed by dynamite and thrown into adjacent valleys and streams.
- ✚ These land masses weaken the already fragile mountain slopes and lead to landslides.
- ✚ They also increase the turbidity of various nearby streams, thereby reducing their productivity.

Causes of soil erosion

(i)Water

- Affects soil erosion in the form of rain, run-off, rapid flow, wave action.
- **Sheet erosion:** When there is uniform removal of a thin layer of soil from a large surface area, it is called sheet erosion.
- **Rill erosion:** when there is rainfall and rapidly running water produces finger-shaped grooves or rills over the area, it is called rill erosion.
- **Gully erosion:** When the rainfall is very heavy, deeper cavities or gullies are formed, which may be U or V shaped.
- **Slip erosion:** This occurs due to heavy rainfall on slopes of hills and mountains.
- **Stream bank erosion:** During the rainy season, when fast running streams take a turn in some other direction, they cut the soil and make caves in the bank.

(ii)Wind

- Wind is the important climatic agent, who carry away the fine particles of soil and creates soil erosion.
- **Saltation:** This occurs under the influence of direct pressure of stormy wind and the soil particles of 1-1.5 mm diameter move up in vertical direction.
- **Suspension:** Here fine soil particles (less than 1mm diameter) which are suspended on the air are kicked up and taken away to distant places.
- **Surface creep:** Here the large particles (5-10 mm diameter) creep over the soil surface along with wind.

(iii)Biotic agents

- Overgrazing, mining and deforestation are the major biotic agents, cause soil erosion.
- Deforestation without reforestation, overgrazing by cattle, surface mining without land reclamation, irrigation techniques that lead to salt build-up, water logged soil, make the top soil vulnerable to erosion.

- .
- 35% of world soil erosion is due to overgrazing.
- 30% of world soil erosion is due to deforestation.

(iv) Landslides

- Causes soil erosion.

(v) Construction

▪ Construction of dams, buildings, roads removes the protective vegetal cover and leads to soil erosion.

Control of soil erosion (or) soil conservation practices

1. Conservational till farming (or) no-till-farming

- In tradition method, the land is ploughed and soil is broken up and leveled to make a planting surface.
- This disturbs the soil and makes it susceptible to erosion
- However, no-till-farming causes minimum disturbance to the top soil
- Here the tilling machines make slits in the unploughed soil and inject seeds, fertilizers and water in the slit. So the seed germinates and the crop grows.

2. Contour farming

- It involves **planting crops** in rows across the contour of **gently sloped land**.
- Each row acts as a small dam to hold soil and to slow water runoff.

3. Terracing

- It involves conversion of **steep slopes into broad terraces**, which run across the contour.
- This retains water for crops and reduces soil erosion by controlling runoff.

4. Alley cropping (or) Agro forestry

- It involves **planting crops in strips** or **alleys between rows of trees of shrubs** that can provide fruits and fuel wood.
- Even when the crop is harvested, the soil will not be eroded because trees and shrubs still remain on the soil and hold the soil particles.

5. Wind breaks or shelter belts

- The **trees** are planted in long rows along the boundary of cultivated lands, which **block the wind** and **reduce soil erosion**.
- Wind breaks help in retaining soil moisture, supply of some wood for fuel and provide habitats for birds.

8. Write essay about water resources and desertification

Water is an important component of all living beings. Nearly 80 % of earth's surface is covered by water.

Uses of Water

- Due to its unique properties, water is of multiple uses for all living organisms.
- Water is absolutely essential for life.
- Most of the life processes take place in water contained in the body.
- Uptake of nutrients, their distribution in the body, regulation of temperature, and removal of wastes are all mediated through water.
- Human beings depend on water for almost every developmental activity.
- Water is used for drinking, irrigation, and transportation, washing and waste disposal for industries and used as a coolant for thermal power plants.
- Water shaped the earth's surface and regulates our climate.

Hydrological cycle

1. Evaporation
2. Precipitation
3. Transpiration

Evaporation

The transformation of water from liquid to gas phases as it moves from the ground or bodies of water into the overlying atmosphere. The source of energy for evaporation is primarily **solar radiation**. Evaporation often implicitly includes **transpiration** from plants, though together they are specifically referred to as **evapotranspiration**. Total annual evaporation amounts to approximately 505,000 km³ (121,000 cu mi) of water, 434,000 km³ (104,000 cu mi) of which evaporates from the oceans.

Precipitation

Condensed water vapor that falls to the Earth's surface. Most precipitation occurs as rain, but also includes snow, hail, fog drip, graupel, and sleet. Approximately 505,000 km³ (121,000 cu mi) of water falls as precipitation each year, 398,000 km³ (95,000 cu mi) of it over the oceans.

Condensation

The transformation of water vapor to liquid water droplets in the air, creating clouds and fog.

Transpiration

The release of water vapor from plants and soil into the air. Water vapor is a gas that cannot be seen.

Snowmelt

The runoff produced by melting snow.

Runoff

The variety of ways by which water moves across the land. This includes both surface runoff and channel runoff. As it flows, the water may seep into the ground, evaporate into the air, become stored in lakes or reservoirs, or be extracted for agricultural or other human uses.

Infiltration

The flow of water from the ground surface into the ground. Once infiltrated, the water becomes soil moisture or groundwater.

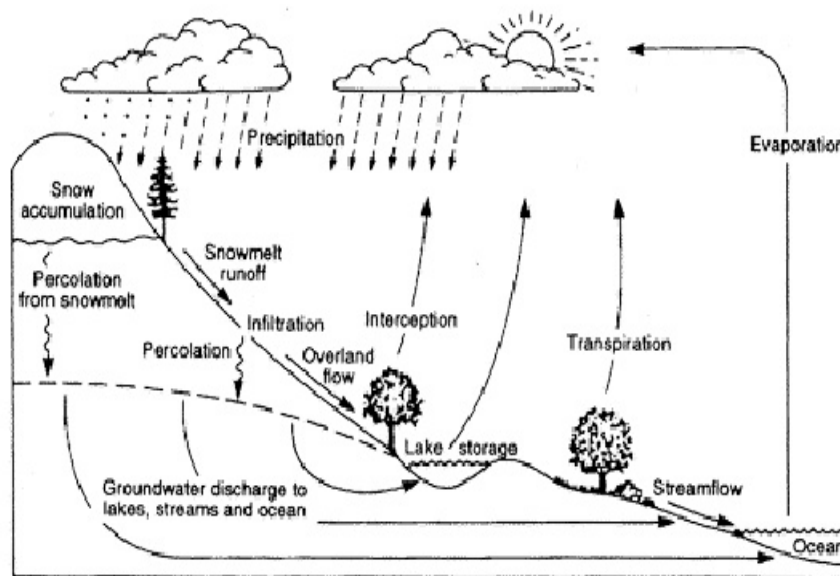
Subsurface Flow

The flow of water underground, in the vadose zone and aquifers. Subsurface water may return to the surface (e.g. as a spring or by being pumped) or eventually seep into the oceans. Water returns to the land surface at lower elevation than where it infiltrated, under the force of gravity or gravity induced pressures. Groundwater tends to move slowly, and is replenished slowly, so it can remain in aquifers for thousands of years.

Sublimation

The state change directly from solid water (snow or ice) to water vapor.

Flow chart



Water Cycle

OVER UTILIZATION OF SURFACE AND GROUND WATER

- ❖ With increasing human population and rapid development, the world water withdrawal demands have increased many folds and a large proportion of the water withdrawn is polluted due to anthropogenic activities.
- ❖ Out of the total water reserves of the world, about 97% is salty water and only 3% is fresh water.
- ❖ Even this small fraction of fresh water is not available to us as most of it is locked up in polar ice caps and just 0.003% is readily available to us in the form of ground water and surface water.

Effects of over exploitation of water

- **Subsidence:** When ground water withdrawal is more than its recharge rate, the sediments in the aquifer (a layer of rock that is highly permeable and contains water) get compacted, a phenomenon known as ground subsidence. It results in sinking of overlying land surface. Due to this structural damage in buildings, fracture in pipes etc., occurs.
- **Lowering of water table:** Mining of groundwater is done extensively for irrigating crop fields. However, excessive mining would cause lowering of water table.
- **Water logging:** When excessive irrigation is done with brackish water it raises the water table gradually leading to water-logging and salinity problems.

FLOODS AND DROUGHT

- ✓ Heavy rainfall often causes floods in the low-lying coastal areas.
- ✓ Prolonged downpour can also cause the over-flowing of lakes and rivers resulting into floods.
- ✓ When annual rainfall is below normal and less than evaporation, drought conditions are created.

Causes of flood and drought

- ❖ Deforestation, overgrazing, mining, rapid industrialization, global warming etc., have contributed largely to a sharp rise in the incidence of floods.
- ❖ Deforestation leads to desertification and drought too. When the trees are cut, the soil is subject to erosion by heavy rains, winds and sun.
- ❖ The removal of thin top layer of soil takes away the nutrients and the soil becomes useless.
- ❖ The eroded soils exhibit droughty tendency.

Preventive measures

- Clear knowledge in control of drought and desertification can be very useful for dealing with the problem.
- Carefully selected mixed cropping helps to optimize production and minimize the risks of crop failures.
- Social forestry and Wasteland development can prove quite effective to fight the problem, but it should be based on proper understanding of ecological requirement and natural process.

CONFLICTS OVER WATER

- ✚ Indispensability of water and its unequal distribution has often led to inter-state or international disputes. Issues related to sharing of river water have been largely affecting our farmers and also shaking our governments. Many countries are engaged in bitter rivalries over this precious resource.
- ✚ For instance,
- ✚ Argentina and Brazil, dispute each other's claims to the La Plata river,
- ✚ India and Pakistan fight over the rights to water from the Indus,
- ✚ Mexico and USA have come in conflict over the Colorado river,
- ✚ India and Bangladesh are fighting for Bhrahmaputra river, and
- ✚ Iran and Iraq contest for the water from Shatt-Al- Arab River.

Within India, water conflicts are still being continues between the states.

For Eg.,

- Sharing of Krishna water between Karnataka and Andhra Pradesh,
- Sharing of Siruvani water between Tamilnadu and Kerala, and others.
- Sharing of Cauvery between Karnataka and Tamilnadu
- On June 2,1990, the Cauvery Water dispute Tribunal was set up which through an interim award directed Karnataka to ensure that 205 TMCF of water was made available in Tamil Nadu's Mettur dam every year, till a settlement was reached.
- In 1991-1992 due to good monsoon, there was no dispute. In 1995, the situation turned into a crisis due to delayed rains and an expert Committee was set up to look into the matter which found that there was a complex cropping pattern in Cauvery basin.
- Samba paddy in winter, Kuravai paddy in summer and some cash crops demanded intensive water; thus aggravating the water crisis.
- Proper selection of crop varieties, optimum use of water, better rationing are suggested as some measures to solve the problem.

DESERTIFICATION

- ✚ Progressive destruction or degradation of arid or semiarid lands to desert.
- ✚ Desertification leads to the conversion of range lands or irrigated croplands to desert.
- ✚ Desertification is characterized by devegetation, depletion of ground water, salination and soil erosion.

Harmful effect of desertification

- Around 80% of the **productive land** in the arid and semi-regions are **converted into desert**.
- Around 600 million people are threatened by desertification.

Causes of Desertification

(a)Deforestation

- The process of denuding and degrading a forest land initiates a desert.
- If there is no vegetation to hold back the rain water, soil cannot soak and groundwater level do not increases.
- This also increases, soil erosion, loss of fertility.

(b)Over grazing

- The increase in cattle population heavily grazes the grass land or forests and as a result denudes the land area.
- The denuded land becomes dry, loose and more prone to soil erosion and leads to desert.

(c)Water management

Over utilization of ground water, particularly in the coastal regions, is resulting in saline water intrusion into aquifers which is unfit for irrigation.

(d)Mining and quarrying

These activities are also responsible for loss of vegetal cover and denudation of extensive land area leading to desertification.

(e)Climate change

Formation of deserts may also take place due to climate change, ie., failure of monsoon, frequent droughts.

(f)Pollution

Excessive use of fertilizers and pesticides and disposal of toxic water into the land also leads to desertification.

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UNIT - IV
SOCIAL ISSUES AND THE ENVIRONMENT
PART – B (16 MARKS - QUESTIONS & ANSWERS)

1. Discuss wasteland reclamation and sustainable development

Waste land reclamation

Waste land:- The land which is not in use – unproductive , unfit for cultivation another economic uses.

Types of waste land:

Uncultivable waste land – Barren rocky areas, hilly slopes, sandy desserts.

Cultivable waste land- degraded forest lands, gullied lands. Marsh lands, saline land etc.,

Causes for waste land formation:

1. Soil Erosion, Deforestation, Water logging, Salinity
2. Excessive use of pesticides
3. Construction of dams
4. Over-exploitation of natural resources
5. Sewage and industrial wastes
6. Mining
7. Growing demands for fuel, fodder wood and food causes degradation and loss of soil productivity.

Objectives of waste land reclamation

1. To improve the physical structure and quality of the soil
2. To prevent soil erosion
3. To avoid over – exploitation of natural resources
4. To conserve the biological resources

Methods of waste land reclamation

1. Drainage
2. Leaching
3. Irrigation practices
4. Green manures and bio fertilizers
5. Application of Gypsum
6. Afforestation programmes
7. Social forestry programmes

Sustainable development

Meeting the needs of the present, without compromising the ability of future generations, to meet their own needs.

True sustainable development

Optimum use of natural resources with high degree of reusability, minimum wastage, least generation of toxic by products and maximum productivity.

Dimensions of sustainable development

Multi dimensional concept – derived from interactions between society, economy and environment.

Aspects of sustainable development

- i. Inter-generational equity
- ii. Intra-generational equity

Approaches for sustainable development

1. Developing appropriate technology - locally adaptable, eco-friendly, resource efficient and culturally suitable.
2. Reduce, reuse, recycle [3R] approach – reduces waste generation and pollution
3. Providing environmental education and awareness – changing attitude of the people
4. Consumption of renewable resources – attain sustainability
5. Conservation of non renewable resources – conserved by recycling and reusing
6. Population control

2. Write notes on water conservation. What is meant by rain water harvesting? Add notes on any one method of rain water harvesting.

Water conservation

The process of saving water for future utilization

Need for water conservation

1. changes in environmental factors
2. better lifestyles
3. increase in population
4. deforestation
5. over exploitation of ground water
6. agricultural and industrial activities

Strategies of water conservation

1. Reducing evaporation losses
2. reducing irrigation losses

3. re use of water
4. preventing of wastage of water
5. decreasing run-off losses
6. avoid discharge of sewage

Methods of water conservation

1. Rain water harvesting- A technique of capturing and storing of rain water for further utilization.

Objectives of rain water harvesting

1. increasing demands
2. recharging the ground water
3. reducing the ground water
4. increase in hydro static pressure

2. Water shed management – The management of rainfall and resultant run-off

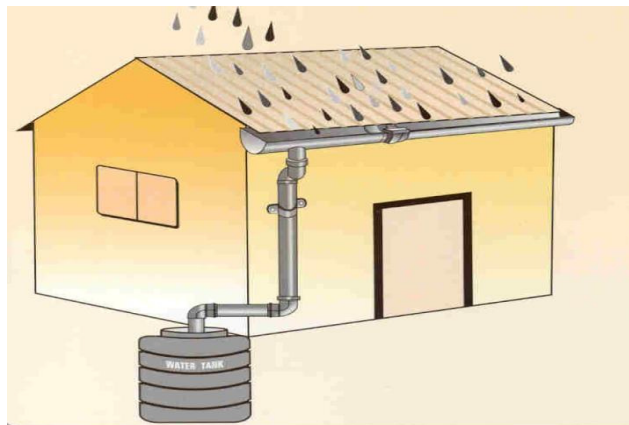
Factors affecting watershed

1. Unplanned land use]
2. deforestation
3. droughtly climates

Objectives

1. To minimize of risk of floods
2. For improving the economy
3. for developmental activities
4. To generate huge employment opportunities
5. To promote forestry
6. To protect soil from erosion

Roof top rain water harvesting:



It is a system of catching rainwater where it falls. In rooftop harvesting, the roof becomes the catchments, and the rainwater is collected from the roof of the house/building. It can either be stored in a tank or diverted to artificial recharge system. This method is less

expensive and very effective and if implemented properly helps in augmenting the ground water level of the area.

Components:

The illustrative design of the basic components of roof top rainwater harvesting system is given in the following typical schematic diagram/

The system mainly constitutes of following sub components:

Catchment

Transportation

First flush

Filter

The surface that receives rainfall directly is the catchment of rainwater harvesting system. It may be terrace, courtyard, or paved or unpaved open ground. The terrace may be flat RCC/stone roof or sloping roof. Therefore the catchment is the area, which actually contributes rainwater to the harvesting system.

3. Explain various environmental problems and solutions.

Climate change

The average weather of an area

Causes of climate change:

1. Presence of green house gases
2. Depletion of ozone gases

Effect of climate change

1. Migration of animals
2. upsetting the hydrological cycles results in floods and droughts
3. changes in global pattern of winds.

Green house effect:

The progressive warming of earth surface due to blanketing effect of man made CO₂ in the atmosphere.

Green house gases- causing global warming

CO₂, CH₄, N₂O, CFCs

Effect on global warming- effects on

1. sea level
2. agriculture and forestry

3. water resources
4. terrestrial ecosystems
5. human health

Measures

1. reducing CO₂ emission
2. utilizing renewable resources
3. Plant more trees
4. Adopt sustainable agriculture

ACID RAIN:

The precipitation of CO₂, SO₂, and NO₂ gases as pollutants in water.

Effects of acid rain

1. Human beings
Destroy life – nervous, respiratory and digestive system
Causes premature death from heart and lung disorders
2. On Buildings
Corrosion - Taj Mahal, houses, statues, bridges, metals
3. On terrestrial and lake ecosystem
Reduces rate of photosynthesis, growth of crops, Fish population
And bio mass production

Control measures

1. Clean combustion technologies
2. using pollution control equipments
3. Replacement of coal by natural gas
4. Liming of lakes and soils

Ozone layer depletion:

Ozone is formed in the stratosphere by photo-chemical reaction

Ozone depleting chemicals:

Chloro Fluoro carbon, Hydro chloro fluoro carbon, Bromo fluoroCarbon.

Effects

1. On human health – Skin cancer, cataracts, allergies etc.
2. On aquatic systems- phyto plankton, fish
3. On materials- paints, plastics
4. On climate – increasing the average temperature of the earth surface.

Control Measures

1. Replacing CFCs
2. Use of methyl bromide – crop fumigant

Nuclear accidents and Holocaust

The release of large amounts of nuclear energy and radioactive products into the atmosphere.

4. What are the salient features of water act?

Water (Prevention and Control of Pollution) Act, 1974 is an appropriate step for the management of water pollution; the maintenance or restoration of wholesomeness of water; the establishment, with a view to carrying out the purposes aforementioned, of Boards for the prevention and control of water pollution; conferring on and assigning to such Boards powers and functions relating thereto and for matters connected therewith.

The Act deals with a particular type of pollution and presents an integrated approach to tackle the problem..

The Water (Prevention and Control of Pollution) Act, 1974 has 64 Sections and has been divided into eight chapters relating to i) Preliminary, ii) Central and State Boards for the Prevention and Control of Water Pollution, iii) Joint Boards, iv) Powers and Functions of Boards, v) Prevention and Control of Water Pollution, vi) Funds, Accounts and Audit, vii) Penalties and Procedures, and viii) Miscellaneous.

The Act provides for the creation of the Central Pollution Control Board and State Pollution Control Boards. It authorises the establishment of the Joint Boards. The main function of the Central Board, under Section 16(1) of the Act, is to promote cleanliness of streams and wells in the States. Section 16(2) provides certain functions in the nature of advice, planning, co-ordination, publications, education and programmes for preventing, controlling and abating water pollution.

The State Boards (under Section 17) of the Act are expected not only to plan comprehensive programmes for the prevention and control of water pollution in the State but also to inspect sewage or trade effluents, works and plants for their treatment, to lay down standards for such effluents, their treatment and for the quality of receiving waters, and to make orders for waste disposal and the like. Under the Water (Prevention and Control of Pollution) Act, 1974, power to give “directions” is conferred on-

- The Central Government (which can give directions to the Central Boards),
- The Central Board (which can give directions to the State Boards),
- The State Government (which can give directions to State Boards).
- In case of conflict between directions given by the Central Government, that matter shall be referred to the Central Government for decision. If the Central Board’s directions are not complied with by the State Board, the Central Board can order the former to perform the functions of the latter for a specified period.

The Act provides that the State Government in consultation with the State Board is empowered to declare any area or areas within the jurisdiction of the concerned State as “Water Pollution Prevention and Control Area”.

Apart from the general powers of the State Boards (Section 17), a State Board has statutory powers to obtain information (Section 20), to take samples of effluents and have them analysed (Sections 21-22) and enter and inspect premises and vessels (Section 23). Violation is punishable under Section 40.

The punishment under the Act may

- be imprisonment for a term varying from three months to seven years and / with a fine which may extend to ten thousand rupees, with an additional fine which may extend to five thousand rupees for every day during which such failure continues after the conviction for the first such failure.

- If the failure continues beyond a period of one year after the date of conviction, the offender shall, on conviction, be punishable with imprisonment for a term which shall not be less than two years but which may extend to seven years and with

The Act provides for enhanced penalty if any person who has been convicted of any offence under Section 24 (Prohibition on use of stream or well for disposal of polluting matter, etc.) or Section 25 (Restrictions on new outlets and new discharges) or Section 26 (Provision regarding existing discharge of sewage or trade effluent) is again found guilty of an offence involving a contravention of the same provision, he shall, on the second and on every subsequent conviction, be punishable with imprisonment for a term which shall not be less than one and half years but which may extend to six years and with fine. No cognisance shall be taken of any conviction made more than two years before the commission of the offence which is being punished.

The Act provides penalty, for the contravention / failure of compliance of any order or direction given under certain provisions of this Act, for which no penalty has been elsewhere provided in this Act, of an imprisonment for a term which may extend to three months or with fine which may extend to ten thousand rupees or both and in the case of a continuing contravention or failure, with an additional fine which may extend to five thousand rupees for every day during which such contravention or failure continues after conviction for the first such contravention or failure.

5. What are the salient features of Environment (Protection) Act?

The Environment (Protection) Act, 1986 has 26 Sections and it has been divided into four chapters relating to i) Preliminary, ii) General Powers of the Central Government, iii) Prevention, Control, and Abatement of Environmental Pollution, iv) Miscellaneous.

The Act consists of and deals with more stringent penal provisions. The minimum penalty for contravention or violation of any provision of the law is an imprisonment for a term which may extend to five years or fine up to one lakh rupees, or both. The Act also provides for the further penalty if the failure or contravention continues after the date of conviction. It is Rs. 5000/- per day. If the failure of contravention continues beyond the period of one year, then the offender is punished with imprisonment for a term which may extend to seven years.

The Act empowers the Central Government to take all appropriate measures to prevent and control pollution and to establish effective machinery for the purpose of

protecting and improving the quality of the environment and protecting controlling and abating environmental pollution.

The Central Government or any other person duly authorised is empowered to collect the samples of air, water, soil or other substances as evidence of the offences under the Environment (Protection) Act, 1986.

The Act prescribes a special procedure for handling hazardous substances and the concerned person has to handle the hazardous substances according to the procedure of the Act.

The Environment (Protection) Act, 1986 has relaxed the rule of “Locus Standi” and because of such relaxation even a common citizen can approach the Court provided he has given a notice of sixty days of the alleged offence and his intention to make a complaint to the Central Government or any other competent authority.

In the commission of the offence under this Act by Government Department, the Act holds the Head of the Department as guilty of the offence unless the head of the Department proves that the offence was committed without his knowledge or that he exercised all due diligence to prevent the commission of such offence.

This Act also empowers and authorises the Central Government to issue directions for the operation or process, prohibition, closure, or regulation of any industry. The Central Government is also authorised to stop, regulate the supply of electricity or water or any other service directly without obtaining the order of the Court in this regard.

The Environment (Protection) Act, 1986 grants immunity to the officers of the Government for any act done under the provisions of this Act or under the powers vested in them or functions assigned to them under this Act.

The Central Government is also empowered to enter and inspect any place through any person or through any agency authorised by Central Government.

6. Explain the air act.

Air (Prevention and Control of Pollution) Act 1981 is an appropriate step for the preservation of the natural environment on the Earth which includes the preservation of the quality of air and control of air pollution. In other words, this is an Act to provide for the prevention, control and abatement of air pollution.

The Air (Prevention and Control of Pollution) Act 1981 has 54 Sections and is divided into seven Chapters relating to i) Preliminary, ii) Central and State Boards for the Prevention and Control of Air Pollution, iii) Powers and Functions of Boards, iv) Prevention and Control of Air Pollution, v) Funds, Accounts and Audit, vi) Penalties and Procedures, and vii) Miscellaneous.

The Act provides that the State Government, in consultation with the State Board, is empowered to declare any area or areas within the jurisdiction of the concerned State an “Air Pollution Control Area”. The Act provides that the Central and State Boards established under the Water (Prevention and Control of Pollution) Act, 1974 will also exercise and perform powers and functions respectively under the Air (Prevention and Control of Pollution) Act, 1981. In other words, the Air Act, 1981 provides that the Central or State Board for prevention, control and abatement of water pollution shall exercise the powers and perform the functions of the Central or State Board for the prevention, control and abatement of air

pollution.

The Act provides that the State Government in consultation with the State board has a power to give instructions to the registration authority under the Motor Vehicle Act, 1939 (Act 4 of 1939) for ensuring standard for emission from automobiles driven with the help of petrol or diesel.

The Act provides for the imposition of restriction on the use of certain industrial plant in any pollution control area without the previous permission and consent of the State Board.

The Act provides that the Board has the power to make an application to the Court for restraining persons from causing air pollution.

The Act provides that whoever:

operates or establishes any industrial plant in an pollution control area without the consent of the State Board or allows emission of an air pollutant in excess on the standard laid down by the State Board, or violates any direction issued by the Board, in the above situation, is punished with imprisonment for a term which shall not be less than one year and six months but which may extend to six years and with fine. If this fails or contravention continues, the guilty person is punished with the additional fine which may extend to five thousand rupees for every day during which such failure or contravention continues even after the conviction for the first such failure or contravention.

7.Explain the wildlifet protection act in detail.

Wildlife Protection Act, 1972

Wild Life, which is a part and parcel of the environment, constitutes wealth of the nation. it included wild animals, birds, plants etc. However, man, in the process of progress and development and also for his selfish ends, is causing much damage to the forests and wild life. Wild life is nature's gift and its decline has an adverse effect of ecology and hence there is an urgent need to protect the wild life. Therefore, in order to protect the wild life from destruction, the Indian Parliament passed the Wild Life (Protection) Act in the year 1972.

Object

The main object of the Act is to proved protection to the wild animals birds and plants. The Act empowers the Central Govt. to declare certain areas as Sanctuaries or National Parks. The Act prohibits hunting of wild animals; birds etc. and impose punishment for violating the same.

Salient Features

The Act contains 66 Sections divided into seven chapters and six schedules. Chapter- I (Secs. 1 and 2) contains short title and definitions. Chapter - II deals with Authorities under the Act. Chapter - III deals with the protection of Specified Plants. Chapter - IV provides for declaration of sanctuaries, National Parks and Closed Areas. Chapter - IV - A deals with Central Zoo Authority and Recognition of Zoos. Chapter- V deals with Trade or Commerce in Wild Animals, Animal Articles and Trophies. Chapter - V- A deals with prohibition of Trade or Commerce in Trophies, Animal Articles etc. Chapter- VI relates to Prevention and

Detection of offences and finally Chapter- VII contains Miscellaneous Provisions.

Authorities

Sec. 3 of the Act empowers the Central Govt. to appoint the Director and Asst. Director Wild Life Preservation and other officials and employees. Further, Sec. 4 empowers, the State Govt. to appoint Chief Wild Life Warden, Wild Life Wardens and on Honorary Wild Life Warden in each District and other officers and employees as may be necessary.

Wild Life Advisory Board

It is constituted in each State or Union Territory to advise the State govt. in selection and declaration of Sanctuaries, National Parks, Closed Areas etc. for protection and conservation of wild life.

Hunting of Wild Animals

The Act prohibits hunting of wild animals. No person shall hunt any wild animals as specified in the Schedules. However, there are certain exceptions. The State Govt. may order to kill or wound in good faith any wild animal for self-defense or to protect or save another. Any animal so killed or wounded is not an offence and shall be govt. property. The Govt. may permit killing of certain wild animals for academic purpose.

Sanctuaries

The State govt. by notification, may declare any area within the reserved forest or territorial waters as a sanctuary if it considers fit the area for protection and conservation of wild life.

National Parks

The State govt. by notification, may declare an area whether within a sanctuary or not, is by reason of its ecological or other technical grounds needed to be constituted as a national park for the purpose of protection, propagating or developing wild life.

Recognition of Zoos

Zoo shall be operated without being recognized by the authority. The person intends to operate a Zoo shall apply to the Authority in such form and pay such fee prescribed. The applicant should fulfill all the conditions. Then only the Authority shall grant permission. No recognition to a Zoo shall be granted unless the Authority having due regard to interest of protection and conservation of wild life and such standards, norms and other matters as may be prescribed, is satisfied that recognition may be granted. Such Zoo shall acquire or transfer any wild animal specified in this Act with the previous permission of the Authority. No person shall tease, molest, injure or feed any animal or cause disturbance to the animals by noise, or otherwise or litter the grounds in a zoo.

Trade or Commerce in wild animals, animal articles and trophies

All the wild animals, animal articles and trophies shall be the property to the State Government. No person is entitled to hunt any wild animals. No person, without the previous permission in the writing of the Chief Wild Life Warden or the Authorized Officer, acquire or

keep in his possession, custody, or control, or transfer to any person whether by a way of gift, sale or otherwise or destroy or damage. At the commencement of this Act, If any person possesses any animal specified in this Act or any uncured trophy derived from such animal or salted or dried skins of such animal or the musk or a musk deer or horn of a rhinoceros shall declare and obtain the permission from the Chief Wild Life Warden or the authorized person. After the commencement of this Act no person shall acquire, receive, keep in his control, custody or possession sell, offer for sale or otherwise transfer or transport any animal specified in the Act or any uncured trophy or meat derived from such animal or the skins or musk or horn without the previous permission in writing of the Chief Wild Life Warden or the Authorized person. Dealings in trophies and animal articles without license is prohibited.

Purchase of animal:

The person who obtains wild animals with the previous permission of the Authorities shall not sell it. He shall keep it in a habitat and healthy conditions.

Power of entry, search, arrest, and detention:

Any authorized person under this Act is entitled and has power of entry, search, arrest and detention of any premises. He can stop vehicle or vessel. He can enter any premises. He can seize any captive animal - wild animal, animal article, meat, trophy or uncured trophy or any specified plant or part of derivative thereof from the possessor.

Penalties: (Section 51 of Wild Life Protection Act)

Any person who contravenes any provision of the act [except chapter V-A (prohibition of trade or commerce in trophies or Animal articles) and section 38 J (prohibition of teasing of animals)] or any rule made there under, or who commits a breach of any conditions of any licence or permit granted under this act shall be punishable with imprisonment for a term which may extend to Three years or with fine may extend to Twenty Five Thousand rupees or both .

If any offence committed in relation to any animal specified in Schedule-I or Part-II of Schedule-II on where offence relates to hunting in a Sanctuary or National Park or altering the boundaries of Sanctuary or National Park such offence shall be punishable with imprisonment for a term which shall not be less than Three years but may extend to seven years and also with fine which shall not be less than Ten Thousand rupees.

For second & subsequent offence, the term of imprisonment shall not be less than Three years & may extend to Seven years and also fine which shall not be less than Five Thousand rupees.

Any person who contravenes any provisions of chapter V-A i.e. Prohibition of trade or commerce in trophies or animal articles, shall be punishable with imprisonment for a term which shall not be less than Three years and also fine should not less than Ten Thousand rupees.

Any person who contravenes any provisions of section 38 J [prohibition of teasing of animals] shall be punishable for a term which may extend to Six Months or with fine may extend to Two Thousand rupees or both.

8. Write about resettlement and rehabilitation of people.

Resettlement programmes have predominantly focused on the process of physical relocation rather than on the economic and social development of the displaced and other negatively affected people.

. Most projects have long planning horizons and the actual physical relocation comes a long time after the initial notifications.

Institutional weaknesses, marked by confusions between various departments and the lack of capacity as well as continuity, have been major problems in ensuring effective resettlement.

. Generally, participation of the affected people has been superficial or treated as unimportant by those responsible for the project. More often they have been manipulated, co-opted, or directly excluded.

Evidence suggests that for a vast majority of the indigenous/tribal peoples displaced by big projects the experience has been extremely negative in cultural, economic, and health terms. The outcomes have included assetlessness, unemployment, debt-bondage, hunger, and cultural disintegration. For both indigenous and non-indigenous communities studies, show that displacement has disproportionately impacted on women and children.

. Resettlement sites are invariably selected without reference to availability of livelihood opportunities, or the preferences of displaced persons themselves. Sometimes even temporary shelters are unavailable, and the first few months in the new site are spent in the monsoon rains under the open sky. House-sites are often much smaller than those in which the resettled people lived in the village, and temporary structures where they exist are made of tin or other inappropriate material and design.

The question of livelihoods is a major issue in resettlement and rehabilitation policy. There is a reluctance on the part of governments and lending agencies to adopt and make operational policies requiring that the loss of agricultural land be compensated with alternative land, especially in the face of increasing pressure on land and the limited availability of arable land as well as its high price. This is despite the fact that most non-land-for-land programmes have failed to foster successful self-employment and other non-land-based livelihood strategies, especially in the critical areas of employment, skills, and capacity building.

. Communities of displaced people are invariably fragmented and randomly atomized, tearing asunder kinship and social networks and traditional support systems. Communities and often even large families are broken up and resettled over a wide area. The outcomes are psychological pathologies and alcoholism etc, common among displaced populations. It has been documented that this greatly enhanced psychological and psycho-social stress caused by involuntary resettlement heightens immorality.

The special vulnerabilities and specific needs of indigenous and tribal peoples have been inadequately addressed.

. Resettlement sites have been under-prepared in terms of basic amenities and essential infrastructure such as health, schooling, and credit.

. The existence of nation-wide norms and legally approved resettlement and rehabilitation policy has played a role in improving outcomes for affected people. However, in the absence of these, the role of multilateral development institutions has assumed significance. In the 1980s, the World Bank played a significant role in influencing the development of resettlement and rehabilitation policies or institutional framework to manage displacement and resettlement.

. There is need for a comprehensive National Rehabilitation Policy. Different States are following different policies in this regard. There is need to raise public awareness on these issues to bring the resettlement and rehabilitation plans on a human footing and to honour the human rights for the ousters.

In case of Sardar Sarovar Projects, Gujarat Government is formulating its policy through various government resolutions. It has decided that each landed ouster shall be entitled to allotment of irrigable land in the state which he chooses for resettlement.

The area of land would be equal to that owned by him earlier and the minimum land given to ban would be 2 hectares. However, there are problems of landless and those natives who were cultivating forest land.

The cutoff date for identifying an adult son in a family has not been fixed. It is important since the adult son is to be treated as a separate family member. The people of 20 submerged villages in Gujarat have been resettled at different locations leading to disintegration of joint families.

The case of Pong Dam is different. The dam was constructed on Beas River in Himachal Pradesh in 1960, while it was a part of Punjab. The water is used to irrigate

Rajasthan and therefore it agreed to provide land to the oustees in the command area of Indra Gandhi Canal. However, to carry Beas Water to Rajasthan, another dam had to be built adding 20,722 more families that were displaced and had to be resettled by Rajasthan.

Out of 30,000 families uprooted due to Pong dam, only 16,000 were considered eligible for allotment, as only they were bonafide cultivators for whom 2.25 lakhs acre lands was earmarked. What happened to the rest of the 14,000 families is not answered.

Punjab which is one of the beneficiaries of the dam is totally out of the rehabilitation issue. Only Rajasthan and Himachal Pradesh are trying to settle the matter. Even those who have been settled, they are in resettlement sites in desert bordering Pakistan, more than thousand kilometers from their native place, thus breaking kinship ties.

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UNIT V
HUMAN POPULATION AND ENVIRONMENT
PART – B (16 MARKS - QUESTIONS & ANSWERS)

1. Discuss the characteristics of population, age structure and variation of population among nation.

Natality rate

- Birth rate usually expressed as number of birth for every 1000 people.

Mortality rate

- Death rate usually expressed as number of deaths for every 1000 people.

Population density

- expressed as number of people inhabiting in a square kilometer.

Infant mortality

- rate indicating number of child death per 1000 people.

Total fertility rate

- indicating percentage of female population who have produced children.

Sex ratio

- expressed as number of females present for every 1000 males or as number of females for every 100 males.

Literacy rate

- indicating % of population capable of reading and writing.

Life expectancy at birth

- expressed as number of children survived for every 100 births.

Percent adult population

- - adults of age above 15 years for every 100 people.

Adult literacy %

- - Percent of adults capable of reading and writing.

Immigration

- - indicating number of people who have been added to country from other countries permanently.

Life Expectancy

- Life expectancy is the average number of years a person can expect to live given the current mortality levels.

Average Age

- The average age of a population is determined by adding up the ages of each individual in a population and dividing that sum by the number of people in a population.

Population Size

1. Population size is number of individuals contributing to gene pool of the population.
2. At any one point in time, populations have a certain size.
3. Future population size depends on births and deaths, immigration and emigration (often immigration and emigration are presumed equal).
4. Birthrate and death rate are used to calculate the net reproductive rate.
5. **Net reproductive rate** is used to calculate the growth and size of a population per unit time.

Carrying Capacity

Carrying capacity (K) is maximum size population that can be supported by environment year after year.

Age Distribution

1. There are three major age groups in a population: prereproductive, reproductive and postreproductive.
2. An **age structure diagram** is a representation of the number of individuals in each age group in a population.
3. A **pyramid-shape** indicates the population has high birthrates; population is undergoing exponential growth.
4. A **bell-shape** indicates that prereproductive and reproductive age groups are more nearly equal, with the postreproductive group being smallest due to mortality; this is characteristic of stable populations.
5. An **urn-shaped** diagram indicates the postreproductive group is largest and the prereproductive group is smallest, a result of the birthrate falling below the death rate; this is characteristic of declining populations.

Human Population Growth

A. The Human Population Is Growing

1. The human population is now in an exponential part of a J-shaped growth curve.
2. World population increases equivalent of one medium-sized city (200,000) per day and 88 million per year.
3. Growth rate is the difference between birthrate and death rate per 1,000 persons.
4. **Doubling time** is the length of time for population size to double, now 47 years.
5. Zero population growth is when birthrate equals deathrate and population size remains steady.

B. More-Developed versus Less-Developed Countries

1. More developed countries underwent **demographic transition** 1950-1975; their growth rate is now 0.6%.
 - a. **More developed countries (MDCs)** were first industrialized (e.g., Europe, North America, Japan, etc.).
 - b. **Demographic transition** is decline in death rate followed by declining birthrate; results in slower growth.
2. Less developed countries (LDCs) are now undergoing demographic transition.
 - a. **Less developed countries (LDCs)** are fully industrialized (e.g., countries in Africa, Asia, Latin America).
 - b. LDC growth rate peaked at 2.5% between 1960-1965; it is declining slowly to about 1.8% at year 2000.

C. Comparing Age Distributions

1. *Replacement reproduction* will cause population growth to continue due to the age structure of the population.
2. Mere replacement does not produce zero population growth because more women enter reproductive years than leave them.
3. The MDCs have a low growth rate because of a stabilized age structure.
4. The LDCs have a higher growth rate because of a youthful age structure.

2. Write an essay on human rights.

- - Rate at which population is growing. It is expressed on annual or decimal basis. It is difference between birth rate and death rate.
- India is a signatory to the Universal Declaration of Human Rights of 1948. In 1979 India ratified 2 covenants: International Covenant of Economic, Social and Cultural Rights; and the International Covenant on Civil and Political Rights. The Constitution of India guarantees Human Rights in the Chapter on Fundamental Rights.
- The Directive Principles of State Policy supply the necessary guidelines for their effective implementation. Fostering respect for International Law is an obligation of the State under Article 51 of the Constitution.
- The human rights relevant to the administration of criminal justice derive sustenance from the Constitution and gain strength from the creative interpretations of the Supreme Court. In the country's human rights jurisprudence, Article 21 became the springboard for judicial activism. The Supreme Court mainly interpreted Article 5 of

the Universal Declaration of Human Rights and Article 10 of the International Covenant on Civil and Political Rights which provided respectively—

- "No one shall be subjected to torture or to cruel, inhuman or degrading treatment or punishment."
- "All persons deprived of their liberty shall be treated with humanity and with respect for the inherent dignity of the human person."
- Article 19 guarantees to all citizens of freedom i.e.
 - (i) Freedom of speech and expression (which includes freedom of press);
 - (ii) To assemble peaceably and without arms;
 - (iii) To form associations or unions;
 - (iv) To move freely throughout the territory of India;
 - (v) To reside and settle in any part of the territory of India;
 - (vi) To acquire, hold and dispose of property; and
 - (vii) To practise any profession or to carry on any occupation, trade or business.
- Article 20 protects every individual against ex-post facto (retrospective) criminal law, double jeopardy and testimonial compulsion. It declares that no person shall be deprived of life or personal liberty except according to the procedure established by law.
- Article 15 and 16 amplify specific aspects of equality before law by declaring that no citizen is discriminated on the ground of religion, race, caste, sex, birth-place, or be subject to any disability or restricted with regard to access to public place or equal opportunity to public office. Article 17 is directed towards abolition of untouchability, and Article 18 towards the abolition of titles.
- Articles 23 and 24 are rights against exploitation. They prohibit traffic in human beings and forced labour as well as employment of children in factories or hazardous work.
- Articles 25 to 28 are about right to freedom of religion. Article 31 guarantees right to property and permits deprivation only for public purpose and that too on payment of compensation.
- Under Article 22(1) the right to consult an advocate of his choice shall not be denied to one who is arrested. Article 20(1) (3) may be telescoped by making it prudent- for the police to permit the advocate of the accused to be present at the time he is examined. If the accused expresses his desire to have his lawyer by his side at the time of examination, the facility- shall not be denied.
- In keeping with the spirit of human rights movement all over the world, the National Human Rights Commission came in India in 1993 through an ordinance promulgated on 28 September 1993 by the President of India. Soon the ordinance was replaced by a statute called the Protection of Human Rights.
- Human Rights Act, 1993 came into force in 1994. The Act provides for setting up the National Human Rights Commission at the Centre as well as State Level Human Rights Commission.
- The National Human Rights Commission consists of a Chairman and 4 members, all of them being full-time members. The Chairperson may be no less than a former Chief Justice of the Supreme Court.

- Of the 5 members, including the Chairman, three are to possess high-level judicial background and the remaining two must have knowledge of or practical experience in matters relating to human rights. The serious areas of human rights violations in India are custodial deaths, custodial rapes, and misuse of Terrorist and Disruptive Activities (Prevention) Act.
- In order to further human rights, the Commission can intervene in any legal proceedings involving an allegation of violation of human rights. It can visit with prior approval of the state government any jail to study the living conditions of the inmates and make recommendations. It can review the Constitution or any law for the protection of human rights and recommend measures for their effective implementation.
- The Commission reviews the factor, including Acts of Terrorism, that inhibit the enjoyment of human rights and recommends measures. It also undertakes and promotes research in the field of human rights. It encourages NGOs working in the field of human rights.

3. Write about HIV and AIDS.

Introduction:

Acquired Immune-Deficiency Syndrome, popularly known by its abbreviation AIDS is a fatal disease as it attacks and destroys the immune system of the body.

It is caused by a virus called Human Immuno Deficiency Virus or HIV in short.

This virus is even invisible to a microscope and can remain in the body for years together without showing any visible symptoms.

AIDS is the last stage of infection of the virus.

It takes at least 10 years of period between getting infected with HIV and reaching the stage of developing AIDS.

The first ever case of a person with AIDS was detected in America in 1959 which later emerged as a dreadfully widespread disease in the 1980s in countries like France, Belgium, Uganda, Zambia, Tanzania, Zimbabwe etc. In India, it was first reported in 1986.

HIV is a fast spreading disease in the world which if—not controlled—can take an epidemic proportion. As per the reports of Indian Health Organization (IHO), women and children are found to be more prone to the disease. The highest numbers of AIDS cases are found in Mumbai in India which is known as the AIDS capital of the country and is closely followed by Chennai, Thiruvananthapuram, Nagpur, Aurangabad and Kolhapur. Mizoram, Manipur, Nagaland and Delhi too have a number of HIV cases being reported in the recent years.

Transmission :

As per the common myth, HIV infection is not contagious as is measles, chicken pox, tuberculosis, cholera, plague, smallpox etc.

The infection mainly spreads through a sexual route or blood to blood contact.

HIV spreads mainly through sexual relationship—whether heterosexual or homosexual—with an infected partner, transfusion of HIV infected blood and blood products, use of infected syringes or needles and is passed on by an infected mother to her unborn child.

It is therefore, foolish to believe that HIV spreads through mosquitoes, embracing, holding, touching or kissing each other, shaking hands, coughing, sneezing, spitting, sharing of public toilets or swimming pools, sharing meals or eating from the same plates, or sharing clothes, bedsheets or attending similar schools or working together.

Symptoms:

AIDS is in reality caused by a slow and gradual process.

Medically, four stages have been defined in its long process.

The initial HIV infection may show general symptoms like fever, bodyache or headache and then lie dormant for years together without showing any further signs.

Next, a person may develop enlarged glands in the neck or armpits without any pain or other symptoms. Other symptoms can be fatigue, weight-loss, chronic diarrhoea, prolonged fever, cough, night sweats etc. Gradually, the virus damages the immune system.

The last stage of the disease takes at least 10 years to culminate into a fully blown AIDS. By this time, the patient's immune system is totally destroyed and the person gets infected by various diseases and cancers. This stage is easily recognized and a man survives for about 3-4 years after entering this stage.

Tests:

Two tests are carried out in order to confirm HIV infection—ELISA and Western Blot. ELISA is simple and the results can be known within a few hours but Western Blot is difficult, expensive and time consuming. It is carried out to confirm the first test.

Conclusion:

Awareness about the disease, its causes and treatment should be created among the masses.

Schools and colleges can be a Very effective medium of creating awareness among the youth.

These youths in turn can be instrumental in spreading awareness among the other sections of the society.

HIV patients need to be cared with compassion and be allowed to live and die with dignity.

Voluntary organizations can help the government in accomplishing this task by various means of advertising, performing street plays, conducting seminars and involving the youth.

4.List various women Welfare programmes.

Programmes for Ensuring Equality In View Of Legal Rights

Amend-ment to Hindu Succession Act:

The responsibility of maintaining a marriage lies with both husband and wife and economic insecurity cannot be a reason for forcing a woman to live with a man in an unequal, unhappy and violent relationship. Therefore, women litigents have been exempted from paying court fees in cases relating to maintenance, property rights, violence, divorce etc. since October 1994.

The Hindu Succession (Maharashtra Amendment) Act 1994 has come into force on 22nd June 1994 in its application to the State of Maharashtra. According to this amendment women have been given co-partnership rights.

30 per cent Government jobs have been reserved for women. The ownership of any house or land, given by Government would vest in the joint name of husband and wife.

The State Government Plans to consider the following amendments:

Amendment to Section 125 of the Criminal Procedure Code Amend Section 125 of the Criminal Procedure Code (CRPC) to effect the following:

- (a) Remove the ceiling on maintenance.
- (b) the women who come under proviso (P) of section 125(3) and who abide to stay separate should be eligible for maintenance.

Amendment to Hindu Marriage Act:

Amend the Hindu Marriage Act in its applicability to the State of Maharashtra to provide that a woman on solemnisation of marriage will become a joint owner of the properties and assets earned by the husband. In consultations with responsible members from each community, similar amendments would be made to the Indian Christian Marriage Act, 1972, Indian Divorce Act, 1969. The Parsi Marriage and Divorce Act, 1936 and Muslim Women Rights on Divorce Act in their applicability to the State of Maharashtra.

Other Amendments:

Amend the Act for Prevention of Immoral Traffic to make the customer as culpable as the women and delete clauses making soliciting a crime. Amend the Guardianship Act to enable the mother to be a guardian also. It is also proposed to amend the Rent Act to provide that widows, destitutes and handicapped women are treated on par with personnel from the Armed Forces.

Programmes for increased Participation of Women in Local Self-Government

The 73rd Amendment to the Indian Constitution is a major step in the empowerment of women. The State has already set up Statutory Committees at the Zilla Parishad Level for women and children. These Committees have also been given funds to be used exclusively for the development of women and children in each district. The needed support would be provided to equip and train women to take on their role as decision makers in Local Self-Government.

Mahar Yojana

Under this Yojana, destitute women who come to the Government institutions are given shelter by Government. For one year they are paid an amount of Rs. 250.00 per month in cash. If a woman comes with her children, an amount of Rs. 150.00 per month and Rs. 100.00 per month are given for two children respectively. The shelter will give her boarding and lodging, and training in some vocation for a period of one year. It is expected that in future this scheme will be extended to shelter homes run by NGOs.

The Government has also increased maintenance grants for both aided and non-aided institutions for women and children from Rs. 250.00 per person to Rs. 500.00 per person per month.

Annapoorna Yojana

To encourage women to get involved in economic activities, the Government has also launched the Annapoorna Yojana where mahila mandals who are involved in preparing nutritious food for anganwadis are paid for their work at 15 ps. per beneficiary per day. This will encourage women to group together for this work in a field where very little formal training is required.

Kamdhenu Yojana

Under this scheme, Rs. 20 is provided as marginal subsidy to those voluntary organisations for providing work to one needy woman. The purpose of this scheme is to provide work at home to needy women and help them earn some money so as to enable them to become economically independent. Registered Mahila Organisations will provide school uniforms, bed sheets, pillow covers, clothes for patients, phinol, duster, brooms, soap as well as pickles, papad and seasoning ingredients for cooking food required in schools, hospitals and Institutes etc. run by Government, Semi Government and Local Bodies.

5. Write about child welfare programmes.

Child Welfare

Constitutional Provisions

There are several constitutional provisions for children. These include the following.

Article 14 provides that the State shall not deny to any person equality before the law or the equal protection of the laws within the territory of India.

Article 15(3) provides that, "Nothing in this article shall prevent the State for making any special provision for women and children."

Article 21 provide that no person shall be deprived of his life or personal liberty except according to procedure established by law.

Article 21A directs the State shall provide free and compulsory education to all children of the age of six to fourteen years in such manner as the State may, by law, determine.

Article 23 prohibits trafficking of human beings and forced labour.

Article 24 prohibits employment of children below the age of fourteen years in factories, mines or any other hazardous occupation.

Article 45 envisages that the State shall endeavor to provide early childhood care and education for all children until they complete the age of six years.

Legislations

There are several Legislations pertaining to children. These include the following.

1. The Child Marriage Restraint Act, 1929.
2. The Child Labour (Prohibition and Regulation) Act, 1986.
3. The Juvenile Justice (Care and Protection of Children) Act, 2000.
4. The Infant Milk Substitutes, Feeding Bottles and Infant Foods (Regulation of Production, Supply and Distribution) Act, 1992.
5. The Pre-Conception and Pre-natal Diagnostic Technique(Prohibition of SexSelection) Act, 1994.
6. The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995.
7. The Immoral Traffic (Prevention) Act, 1956.
8. The Guardian and Wards Act, 1890.
9. The Young Persons (Harmful Publications) Act, 1956.
10. The Commissions for Protection of Child Rights Act, 2005

The National Policy for Children

Was adopted on 22nd Aug., 1974.

This Policy lays down that the State shall provide adequate services towards children, both before and after birth and during the growing stages for their full physical, mental and social development.

The measures suggested include amongst others, a comprehensive health programme, supplementary nutrition for mothers and children, free and compulsory education for all children up to the age of 14 years, promotion of physical education and recreational activities, special consideration for children of weaker sections like SCs and STs, prevention of exploitation of children, etc.

National Plan of Action for Children 2005

The Prime Minister's Office is quarterly monitoring the National Plan of Action for Children 2005 on the basis of eight parameters. These are as under:

1. Reduce IMR to below 30 per 1000 live births by 2010.
2. reduce Child Mortality Rate to below 31 per 1000 live births by 2010.
3. to reduce Maternal Mortality Rate to below 100 per 100,000 live births by 2010.
4. universal equitable access and use of safe drinking water and improved access to sanitary means of excreta disposal by 2010.
5. 100% rural population to have access to basic sanitation by 2012.
6. to eliminate child marriages by 2010
7. to eliminate disability due to poliomyelitis by 2007
8. to reduce the proportion of infants infected with HIV by 20 percent by 2007 and by 50 percent by 2010, by ensuring that 80 per cent of pregnant women have access to ante natal care, and 95 per cent of men and women aged 15-24 have access to care, counseling and other HIV and prevention services.

Other programmes:

Integrated Child Development Services (ICDS) Scheme

Rajiv Gandhi National Creche Scheme for the children of working mothers

Integrated Programme for Juvenile Justice

National Child Award for Exceptional Achievement

6. Discuss population explosion in Indian context and family welfare programme.

Over-population is the most pressing problem of India.

Causes of Population growth

- i. There is a widening gap between birth and death rates.
- ii. Better medical facilities and application.
- iii. Improvement in transport facilities helps people to reach the medical and health facilities.
- iv. Social factors like child marriage and early marriage.
- v. Lack and adoption of family planning measures.
- vi. Illiteracy

Consequences of population explosion

- i. Heavy pressure on land.
- ii. Food shortage.
- iii. Housing problems.
- iv. Unemployment
- v. Illiteracy
- vi. Economic loss
- vii. Rate of economic development has been affected.
- viii. Law and order problems.
- ix. Emergence of slums and overburden of resources.
- x. Lower standard of living
- xi. Pollution problem
- xii Shrinking of national resources.

Suggestions to lower the population growth

- i. Emphasis on female literacy
- ii. Adoption of family planning measures.
- iii. Educating people through mass -media.
- iv. Improvement in the quality of health and family welfare services.
- v. Empowering women as decision makers.
- vi. Coordination between states and the centers for the implementation of the population control policies.

Family welfare programme

Realizing that the rapidly growing population posed a major challenge, the government of India adopted family welfare as an official programme in 1952. It was the first government in the world to do so and to include family welfare as part of its Five Year Plans. India's family welfare programme is thus almost as old as freedom itself and is now the largest of its kind in the world.

Raising the minimum age of marriage for boys to 21 and for girls to 18, the representation of the Lok Sabha and the State Legislative will be frozen on the basis of the 1971

census until 2001; and 1971 figures will continue to be followed in the allocation of Central assistance to State Plan, devaluation of taxes and grant-in-aid; special measures to be taken to raise the level of women's education, especially in the backward areas, where the family welfare performance have so far been unimpressive; introduction of population values in the education system; motivation of citizen to adopt "responsible reproductive behavior" in their own and in the national interest and a multimedia motivation strategy.

About 16 million couples in the reproductive age-group are currently practicing family welfare in one form or another. So the Government's effort have achieved some success. But considering the total population of 950 millions (at present), the number of those who are practicing family welfare is too small.

An elaborate organizational set up at the Centre and the State levels down to the villages has already been evolved. The various devices and methods used are contraceptives, sterilization, abortions and Nirodh which is available freely at subsidized rates, or almost free. A broad-based programme of education and motivation is in operation through the use of mass media and other channels. The causes of partial failure of the family welfare campaign and financial targets achieved involved much wastage; concentration on urban areas and general neglect of rural. Japan has achieved 50% fall in birth by high motivation and persistence of education. Now, that the programme has been launched with greater drive, better results are expected especially if the whole-hearted co-operation of people is assured.

Most population experts believe that less developed nations must initiate family planning or welfare program in order to check population growth. This program allows couples to determine the number and spacing of offspring's.

Huge amount of money is been spent by the Government of India because India is second populous country in the world. We have already crossed one hundred crores people by now.

Family welfare programme which is a need of the day stress the following recommendations.

1. One or two children to a family.
2. Child by choice and not by accident.
3. Having more children and not bringing them up in a proper standard is violence.
4. Having healthy children.
5. Using contraceptives at the time of male-female mating.
6. Sterilization both bisectomy and vasectomy.
7. Late marriage.
8. Fixing marriage age of both male and female. It is 18 years for female and 21 year for male. In urban areas this age is on the hire side.

9. Banning universal marriage.
10. Educating woman for having smaller size of family.
11. Spreading family planning programmes in rural areas of Indian society.
12. Disseminating education in rural areas in such a style that they prefer small size of family.
13. Children may not be considered gift of nature but result of mating either sex.
14. Spreading and advertising about the use of family planning measures.
15. Opening more and more family welfare centre in rural India because 70% population live in village.
16. Providing incentive to those who can have small size of family.

If above measures are adopted effectively then sufficient economic welfare can be exercised to Indian society.

7. Write short notes on value education. Write the role of IT in environment .

Value education:

Types:

1. Formal education
2. Value education
3. Value - based environmental education

Objectives

1. To improve the integral growth of human being
2. To create attitudes and improvement towards sustainable lifestyle.
3. To increase awareness about our national history our cultural heritage, constitutional rights, national integration, community development and environment.
4. To create and develop awareness about the values and their significance and role
5. To know about various living and non- living organisms and their interaction with environment.

Types of values:

1. Universal values
2. Cultural values
3. Individual values
4. global values
5. Spiritual values

Remote sensing:

Component- A platform, aircraft, A balloon, rocket, and satellite.

Functions:

1. Origin of electro magnetic energy
2. Transmission of energy
3. Interaction of energy
4. Detection of energy
5. Preprocessing of data
6. Data analysis and interpretation
7. Integration and other applications.

Applications:

In agriculture, forestry, land cover, water resources

Data Base- Collection of inter related data on various subjects.

Applications:

1. Ministry of environment and forest
2. National management information system
3. Environmental information system

Geographical information system:

Application:

Thematic maps are super imposed using soft wares.

Interpretation of polluted zones

To check unplanned growth and related environmental problems

Satellite data:

1. Helps in providing reliable information and data about forest cover
2. Provide information about forecasting weather
3. Reserves of oil , minerals can be discovered.

WORLD WIDE WEB: Current data.

Applications:

1. Online learning
2. Digital files or photos, animations on environmental studies.

Role of information technology in human health:

The health service technology involves three systems

1. Finance and accounting
2. Pathology
3. Patient Administration – clinical system.

Applications:

1. Data regarding birth and death rates
2. To monitor the health of the people effectively
3. The information regarding the outbreak of epidemic diseases.
4. Online Consultation
5. Drugs and its replacement..

Conclusion:

Gaining in-depth knowledge regarding human health, human rights and role
Played by modern technology to the environment.

8. Write an essay on environment and human health.

Environment and health are closely related. The physical environment, such as drinking water, sanitation, housing, and air, has considerable effects on the health status and well being of people, contributes to communicable diseases, and prolongs the epidemiological transition. The socio-cultural environment, such as changing lifestyles, modernization, occupational differentiation, and aspirations to improve the quality of life, not only results in new health problems but also places new demands on health systems. These socio-cultural and physical environmental factors cumulatively lead to a greater burden of disease. In the medical sense, the environment includes the surroundings, conditions or influences that affect an organism.

In general, environmental health risks are grouped into two broad categories:

Traditional hazards

are closely linked with poverty. They refer to health risks that are a consequence of lack of access to clean water, inadequate sanitation, poor waste disposal, indoor air pollution and vector-borne diseases such as malaria.

Modern hazards

are caused by development that lacks environmental safeguards, such as urban air pollution and exposure to agro-industrial chemicals and waste.

Better environment for better health:

Require the labeling of products containing carcinogens, mutagens, and reproductive toxics.

Establish funding and a technical support office to assist companies and workers in their efforts to reduce or eliminate the production and use of toxics, help citizens' groups monitor pollution prevention plans, and collect and report annually on use of toxics.

Support for these actions with a comprehensive community right-to-know legislation on environmental, occupational and household toxics.

Chronic conditions such as asthma, cancer, developmental disabilities, and birth defects have become the primary causes of illness and death in children in industrialized countries.

Children are exposed to more toxics per body weight, absorb ingested substances differently, have developed fewer protections against toxics, face additional risks while undergoing development, face higher exposures due to activity and behaviour; and have much more time to develop disease from toxics.

Ban the display and sale of pesticides for non-essential uses.

Ban the sale of pesticide-fertilizer mixes.

Only allow exemptions for public health.

Include effective mechanisms for enforcement.

. There are many epidemiological and laboratory studies linking a range of health problems to pesticide exposure.

The problems include: cancer, birth defects, reproductive damage, neurological and developmental toxicity, immunotoxicity, and endocrine disruption.

The risk to health comes not only from active ingredients, but also from so-called inert substances. Finally, synergistic and cumulative effects can heighten the health damage due to pesticides.

Increasing reliance on small and large scale renewable energy sources.

There is very strong agreement among most scientists that global warming is a reality, and that this warming is principally due to human activity.

A principal cause of this warming is the dramatic increase in the concentration of greenhouse gases (GHGs) in the atmosphere. Research from the prestigious Intergovernmental Panel on Climate Change (IPPC) has shown that carbon dioxide levels in the atmosphere are much higher today than at any point in the last 650,000 years.

While much of the focus is on environmental catastrophe, implicit is a huge associated health catastrophe. Health impacts arise in a variety of ways, with the marginalized and vulnerable most likely to be affected. In particular, those in Central America, Southeast and South Asia, and Africa will be most vulnerable to flooding, droughts, hurricanes, disease and other disasters.

Other risks associated with global warming include a rise in the number of extreme weather events and heat waves, poorer air quality, and increased rates of vector-, rodent-, food- and water-borne diseases.

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