ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, TIRUPATI,

(AUTONOMOUS)

SUBJECT NAME; -ENVIRONMENTAL STUDIES-20AMC9903

UNIT-I
MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES AND NATURAL RESOURCES

ESSAY TYPE QUSTION AND ANSWERS

1. Explain scope and importance of environmental studies?

A. **SCOPE OF ENVIRONMENTAL STUDIES**

1. This study crates awareness among the people to know about various renewable and non renewable resources of a region. The endowment or potential, pattern of utilization and the balance of various resources available for future use in the state or a country are analyzed in the study.
2. It provides the knowledge about ecological system causes, effects and relationships between the components.
3. It provides necessary information about biodiversity richness and the potential dangers to the species of plants, animals and microorganism in the environment
4. This study enables one to understand the causes and consequences of natural and man induced disasters, pollutions and measures to minimize theses effects.
5. It enables one to evaluate alternative responses to environmental issues before deciding an alternative course of action.
6. This study enables environmentally literate citizens to make appropriate judgment and decisions for the protection and improvement of the earth.
7. This study exposes the problems of over pollution, health, hygiene etc and the role of arts, science and technology in eliminating the evils from the society.
8. This study tries to identify and develop appropriate and indigenous eco friendly skills and technologies to various environmental issues.

IMPORTANCE OF ENVIRONMENTAL STUDY

1. World population is increasing at an alarming rate especially in developing countries.
2. The natural resources endowment in the earth is limited.
3. The methods and techniques of exploiting natural resources and advanced.
4. The resources are over-exploited and there is no foresight of leaving the resources of the future generations.
5. The unplanned exploitation of natural resources lead to pollution of all types and at all levels.
6. The people should take a combined responsibility for the deteriorating environment and begin to take appropriate actions to save the earth.
7. Education and training are needed to save the biodiversity and species extinction.
8. The urban areas, coupled with industries, are the major sources of pollution.
9. The number and area of the protected area should be increased so as to protect the wild life.

NEED FOR PUBLIC AWARENESS

1. Individuals of school, colleges, industries, service centers, village, urban centers etc. should realize the importance of day to day environmental issues.
2. The individuals should practice environmental conservation principles and create awareness among family members.
3. The individuals could expose the problems by writing in the newspapers/discuss about the environmental evils in forums and make the people to become aware of the same.
4. There is a need to meet the people and discuss again and again, so that the problem is alive till it is eliminated.
5. The Nongovernmental organizations, in India and abroad, are doing tremendous efforts in conserving the environment.

Types of public participation;

1. Pressure group
2. Watch dog
3. Advisory council

4. Enforcing the environmental laws.

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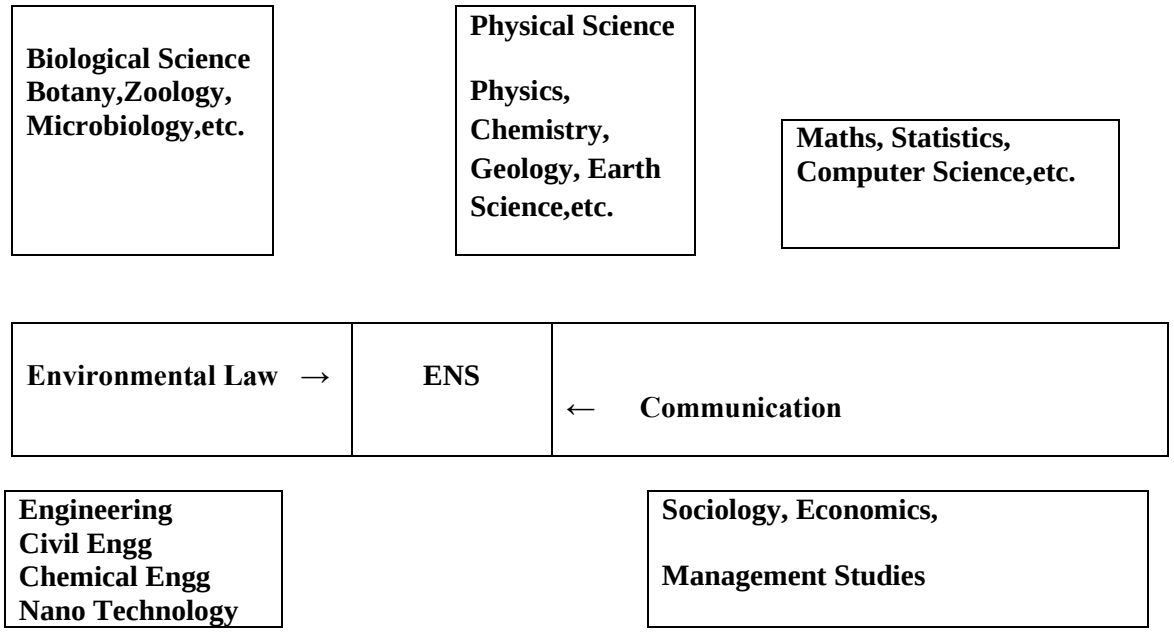
2. Explain multidisciplinary nature of environmental studies

A. The Environment studies is a multi-disciplinary science because it comprises various branches of studies like chemistry, physics, medical science, life science, agriculture, public health, sanitary engineering etc.

- It is the science of physical phenomena in the environment. It studies about the sources, reactions, transport, effect and fate of physical and biological species in the air, water, soil and the effect of from human activity upon these.
- As the environment is complex and actually made up of many different environments like natural, constructed and cultural environments, environmental studies is inter disciplinary in nature including the study of biology, geology, politics, policy studies, law, religion engineering, chemistry and economics to understand the humanity's effects on the natural world.
- This subject educates the students to appreciate the complexity of environmental issues and citizens and experts in many fields.
- By studying environmental science, students may develop a breadth of the interdisciplinary and methodological knowledge in the environmental fields that enables them to facilitate the definition and solution of environmental problems.



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3. What are the major causes and consequences of deforestation? Discuss with the help of case studies?

A. **Deforestation:** It is process of removal of forest resources due to natural or manmade activities (i.e.) destruction of forests.

Deforestation in India: In India 1.3 hectare of forest land has been lost.
Causes of deforestation:

1. Developmental projects: Developmental projects causes deforestation through two ways.

- Through submergence of forest area.
- Destruction of forest area.

Ex- big dams, hydro electric projects, road construction etc.

2. Mining operations: It reduces forest areas.
Ex-Mica, coal, Manganese and lime stone.

3. Raw materials for industries: Wood is an important raw material for various purposes.
Ex-making boxes, furniture and paper etc.

4. Fuel requirement: Wood is the important fuel for rural and tribal population.

5. Shifting cultivation: Replacement of natural forest ecosystem for mono specific tree plantation.
Ex- teak

6. Forest fires: Forest fire destructs thousands of forest.

7. Over grazing: Over grazing by cattle reduces the cultivation land.

Consequences Of Deforestation (Or) Impact Of Deforestation

1. Economic loss
2. Loss of biodiversity
3. Destructs the habitats of various species
4. Reduction in stream flow
5. Increases the rate of global warming
6. Disruption of weather patterns and global climate
7. Degradation of soil and acceleration of the rate of soil erosion.
8. Induces and accelerates mass movement / landslides.
9. Increases flood frequency, magnitude / severity.
10. Breaks the water cycle
11. Breaks the nutrient cycle
12. Loss of forests put additional pressure on the pristine forests.

Methods Of Consevation Of Forests

1. New plants of more or less of the same variety should be planted to replace the trees cut down for timber
2. Use of wood for fuel should be discouraged.
3. Forest pests can be controlled by spraying pesticides by using aero planes
4. Forest fire must be controlled by modern techniques.
5. Over grazing by cattle must be controlled.
6. Steps should be taken by the government to discourage the migration of people into the islands from mainland.
7. Education and awareness programmers must be conducted.
8. Strict implementation of law of Forest conservation Act.

Case study:
Deforestation in the Himalayan region, involves clearing of natural forests and plantation of monoculture like eucalyptus. Nutrient in the soil is poor, therefore soil losing their fertility. Hence Himalayan area facing the serious problem of deforestation.

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4. What are the major causes for conflicts over water? Discuss one international and one interstate water conflict. Should we build big dams? Give arguments in favor your answer?
A. Water claims to be an important resource. An important use of water in our country is for irrigation. Besides, water is also required in large amounts for industrial and domestic consumption.

Uses

- Is essential for all forms of life.
- Many uses of water include agricultural, industrial, household and environmental activities. all of these human being uses require fresh water.
- No plant or animal species can survive without water.

HYDROLOGICAL CYCLE:

Water from various water bodies

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Evaporated by solar energy

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Enters in to the atmosphere as clouds

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Falls again on earth as rain or snow

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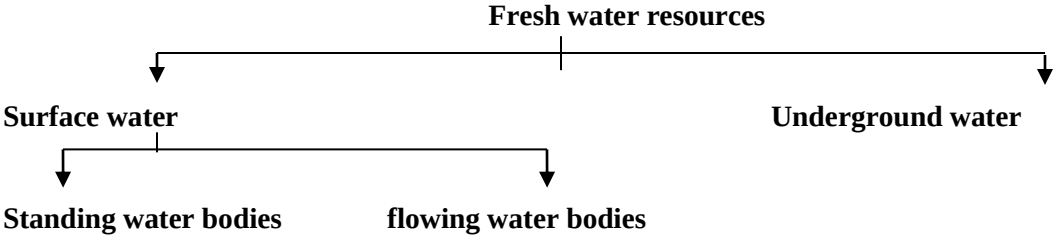
Ultimately returns to the ocean.

DISTRIBUTION OF WATER RESOURCES



International and one interstate water conflict:-
A. Conflicts over water:

Causes of water conflict:

1. Conflict through use:

Unequal distribution of water led to interstate and international disputes.

1. National conflicts:

a. Sharing of Cauvery water between Karnataka and TamilNadu.

b. Sharing of Krishna water between Karnataka and Andrapradesh

c. Siruvani – TamilNadu and Kerala

2. International conflicts:

a. Indus – India and Pakistan

b. Colorado river – Mexico and USA

C. Brahmaputra – India and Bangladesh

2. Construction of dams or power stations:-For hydro electric power generation, dams are built across the river. It creates the conflicts between the states.

3. Conflicts through pollution: - Water reservoirs like lakes and rivers are also used for industrial purposes, therefore removal industrial wastes creates conflicts.

Management of conflicts over water:

1. Efforts to implement laws to check these practices to control water pollution.

2. Conflicts over sharing of river water in the country are studied by many organization and

Several solutions are suggested.(The inter linking of rivers has been one such Solution) **Case study:**

Conflicts on Indian River:

According to UN report, fresh water is a serious problem 1 billion people – no fresh drinking water

2 billion people – no water for proper sanitation. (Ex) Damodhar River.Most polluted river from 45 major industries

Water resource management

S.No	Organization	Source
1	Central water commission	Surface water
2	Central ground water board	Ground water
3	Indian meteorological department	Precipitation
4	Central pollution control board	Water quality
5	Ministry of agriculture	Water for irrigation
6	Ministry of environment and forest	Environmental impact assessment
7	Central public health and env.engg	Water supply, sanitation and sewage disposal

8	Department of power	Hydro electric power
9	Department of forest	Watershed management

Discuss the merits and demerits regarding the construction of dams

Merits		Demerits	
1.	Reduces consumption of fossil fuels for electricity production	1.	Dirt can built up at dams, decreasing their effectiveness.
2.	Reduces production of green house gases as CO_2	2.	Large scale wild life habitual destruction due to river valley flooding.
3.	Reduces production of pollution, such as particulate matter.	3.	Interferes with natural wildlife migration patterns, such as salmon.
4.	Can prevent uncontrolled flooding.	4.	Dam construction forces people to leave their homes if they live in or near the flooded river valley.
5.	Provides water for irrigation.	5.	Very expensive to build.
6.	It is a renewable energy source.	6.	Interferes with natural flow of water through environment.

Advantages:

1. Once a dam is constructed, electricity can be produced at a constant rate.

2. Dams are designed to best many decades and so can contribute to the generation of electricity for many years/ decades.

3. The lake that forms behind the dam can be used for water sports and leisure/ pleasure activities, often large dams become tourist attractions in their own right.

Disadvantages:

1. Dams are extremely expensive to build and must be built to a very high standard.

2. The high cost of dam construction means that they must operate for many decades to become for profitable.

3. The flooding of large areas of land means that the natural environment is destroyed.

4. People living in villages and towns that are in the valley to be flooded, must move out. This means that they lose their farms and businesses. In some countries, people are forcibly removed so that hydro-power schemes can go ahead.

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5. What is flood and drought? Which causes, effects and management?

A.FLOOD:- It is an over flow of water. It happens when the magnitude of flow of water exceeds the carrying capacity of the channel within its bank.

Causes of Flood

1. Heavy rainfall, melting of snow and sudden release of water from dams. (Flash floods)
2. Reduction in the carrying capacity of the channel.
3. Deforestation, mining and over grazing increase the runoff from rains and the level of flood raises.

Effect of Flood

1. Water spreads in the surrounding area and submerges them.
2. Cultivated land gets affected.
3. Extinction of civilization.

Flood Management

1. Floods can be controlled by dams.
2. Channel management control flood.
3. Flood hazards reduced by forecasting or flood warning.

DROUGHT :- Drought is nothing but scarcity of water, which occurs due to

1. Inadequate rain fall
2. Late arrival of rain fall
3. Excessive withdrawal of ground water.

Lack of water for the needs of agriculture, livestock, industry or human population may be termed as a drought. Drought causes serious damages to plants, animals and human life.

Causes Of Drought

1. When annual rain fall is below normal and less than evaporation, drought is created.
2. High population.
3. Intensive cropping pattern

Ex: Maharashtra - There has been no recovery from drought for the last 30 years due to over exploitation of water by sugarcane crop.

Effects Of Drought

1. Drought causes hunger, malnutrition and scarcity of drinking water an also changes the quality of water.
2. Drought causes widespread crop failure leading to acute shortage of food and adversely affects human and live stock population.
3. Worst situation of drought causes desertification.

4. Raw materials of agro based industries are critically affected during drought time, hence industrial and commercial growth decreases.

5. Drought increases the degradation of natural resources.

6. Drought causes large migration of people and urbanization.

Drought Management

1. Indigenous knowledge is essential.

2. Rain water harvesting system.

3. Construction of reservoirs to improve ground water level.

4. Modern irrigation technology (drip irrigation) very useful to conserve water.

5. Afforestration activities also improve the potential of water in the drought area.

6. Crop mixing and dry forming are the suitable methods which minimize the risk of crop failures in dry area.

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6. Discuss the environmental effects of extracting and using mineral resources?

A. Mineral resources: Naturally occurring substances with different physical and chemical properties.

Ores: These are mineral or combination of minerals from which metal can be extracted. Concentration of minerals at one particular spot is called mineral deposit.

Classification of mineral resources: U.S geological survey divides non renewable mineral resources into 3 categories.

1. **Identified resources:** Location, existence, quality and quantity known by direct geological evidence and measurement.
2. **Undiscovered resources:** Assumed to exist on the basic of geological knowledge, but their specific location, quality and quantity are unknown.
3. **Reserves:** Minerals are identified. Usable materials can be extracted profitably.

Uses and exploitation of minerals:

1. Development of industrial plants and machinery. - Fe, Al & Cu
2. Construction work – Fe, Al &Ni
3. Generation of energy - coal, lignite, uranium
4. Designing defense equipments like weapons and ornaments
5. Agricultural purposes – fertilizers and fungicides – Zn & Mn
6. Jeweler –Au, Ag & Pt
7. Making alloys for various purposes – phosphoresces
8. Communication purposes – telephone, wires, cables and electronic devices
9. Medicinal purposes, particularly in ayurvedic system – sulphur pyrites

Classification of minerals:

Metallic minerals:- From which metals can be extracted. e.g Fe, Al & Cu

Non metallic minerals:-Non metallic compounds can be extracted.e.g Quartz and feldspar

Mineral wealth of India

S.No	Mineral	Available state
1	Iron	Tamil nadu
2	Coal	Orissa, west bangal
3	Manganese	M.P
4	Copper	Bihar
5	Gold	Karnataka
6	Aluminum	Tamilnadu
7	Lime stone	M.P
8	Mica	Bihar
9	Monazite	Kerala
10	Lead and zinc	Gujarat & Rajasthan
11	Precious stones	Rajasthan
12	Magnetite	Tamil nadu
13	Petroleum	Assam
14	Magnetite	Tamilnadu, Sikkim
15	Gypsum	Rajasthan

Mining: The process of extraction of minerals from the earth.

Types of mining:

1. Surface mining
2. Underground mining Types of underground mining

a. Open pit mining: Machines dig holes and remove the ores.

b. Dredging: Chained buckets are used to extract minerals.

c. Strip mining: Bulldozers are used to extract minerals.

Environmental damages caused by mining activities:

1. Devegetation :

- Topsoil and vegetation are removed
- Deforestation leads to several ecological losses
- Land scape badly affected

2. Ground water contamination: Mining pollutes ground water; sulphur is converted into sulphuric acid which enters into the soil.

3. Surface water pollution: Radioactive wastes and other acidic impurities affect the surface water, which kills many aquatic animals.

4. Air pollution: Smelting and roasting are done to purify the metal which emits air pollutants and damage the nearby vegetation. It causes many health problems.

5. Subsidence of land: Mainly underground mining results in cracks in houses, tilting of buildings and bending of rail tracks.

Effects of over exploitation of minerals:

1. Rapid depletion of mineral deposits
2. Wastage
3. Environmental pollution
4. Needs heavy energy requirements.

Management of mineral resources:

1. The efficient use and protection of mineral resources.
2. Modernization of mining industries
3. Search for new deposit
4. Reuse and recycling of the metals.
5. Environmental impacts can be minimized by adopting eco friendly mining technology.

Case studies;

Mining and quarrying in Udaipur:

200 open cast mining and quarrying in Udaipur. But 100 mining's are illegal. 150 tones of explosives are used per month. It pollutes air, soil and water. It affects irrigation and wild life.

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7. What are the food resources and its types and effects of Modern Agriculture?

A. Food Resources:- Food is an essential requirement for survival of life. Main components are carbohydrates, fats, proteins, minerals and vitamins.

Types Of Food Supply

1. Crop plants: Grains mostly **c**onstitute about 76% of the world's food.

Ex: Rice, Wheat and Maize

2. Range lands: Produces 17% of world's food from trees and grazing animals.

Ex: Fruits, milk and meat

3. Ocean: Fisheries – 7% of world's food

World Food Problem

1. In the earth's surface, 79% is water out of total area. 21% land (forest, desert, mountain and barren land) . Less % cultivated land, at the same time population explosion is high therefore world food problem arises.
2. Environmental degradation like soil erosion, water logging, water pollution, salinity affects agricultural land.
3. Urbanization affects agricultural land. Hence production of rice, wheat, corn and other vegetable is difficult.

Types Of Nutrition

1. Nutritious nutrition: To maintain good health and disease resistance, we need large amount of carbohydrate, proteins, fats and smaller amount of micronutrients such as vitamins and minerals such as Fe, Ca and iodine. Food and agricultural organization (FAO) of United Nations estimated that on an average, the minimum calorie intake on a global state is 2500 calories/day.

2. Under nutrition: People who cannot buy enough food to meet their basic energy needs suffer from under nutrition. They receive less than 90% of this minimum dietary calorie.

Effect of under nutrition: Suffer from mental retardation and infectious diseases.

3. Mal nutrition: Besides minimum calorie intake we also need proteins, minerals, vitamins, iron and iodine. Deficiency leads to malnutrition resulting in several diseases.

Effect of mal nutrition:

India 3rd largest producer of crops, nearly 300 million Indians are still under nourished.

World food summit 1996: The world food summit, 1996 has set the goal to reduce the number of under nourished and mal nourished people to just half by 2015.

Over Grazing:- It is a process of eating the forest vegetation without giving a chance to Regenerate.

Effects Of Over Grazing

1. Land degradation

- Over grazing removing the cover of vegetation
- Exposed soil gets compacted
- SOIL moisture reduces.
- Desertification - OG leads to poor, dry and compacted soil.
- Land cannot be used for further cultivation.

2. Soil erosion: When the grasses are removed the soil becomes loose and gets eroded by the action of wind and rain fall.

3. Loss of useful species: OG affects the plant population and their regenerating capacity. OG replaces the plant of high nutritive value with plant of low nutritive value.

AGRICULTURE:-

Agriculture is an art, science and industry of managing the growth of plants animals for human use. It includes cultivation of the soil, growing and harvesting crops, breeding and raising livestock, dairying and forestry.

TYPES OF AGRICULTURE

1. Traditional agriculture
2. Modern (or) industrialized agriculture

1. Traditional agriculture

Small plot, simple tools, surface water, organic fertilizer and a mixture of crops constitute traditional agriculture. They produce enough food to feed their family and to sell it for their income.

2. Modern agriculture

Hybrid seeds of single crop variety, high tech equipments, lot of fertilizers, pesticides and water to produce large amount of single crops.

EFFECTS OF MODERN AGRICULTURE

1. Problems in using fertilizers

a. **Excess of fertilizers causes micronutrient imbalance**. (e.g) Punjab and Haryana deficiency of nutrient zinc in the soil affect the productivity of the soil.

b. **Blue baby syndrome** (nitrate pollution): Nitrate present in the fertilizer causes blue baby syndrome, when the amount exceeds the limit leads to death.

c. **Eutrophication:** Nitrogen and phosphorus in the crop fields washed out by runoff water in the water bodies, which increases the nourishment of the lakes called Eutrophication. Hence algal species increases rapidly. Life time of the species is less and they decompose easily and pollute the water which affects the aquatic life.

2. Problems in using pesticides

1. Death of non target organism.
2. Producing new pest – super pest
3. Bio magnification – Most of the pesticides are non bio degradable, keep on concentrating in the food chain and it is harmful to human beings.
4. **Risk of cancer:**

a. It directly acts as carcinogen
b. It indirectly supports immune system.

3. Water logging: Land where water stand for most of the year.

Fertilizer related problems are

1. Mono nutrient imbalance
2. Blue baby syndrome/ nitrate pollution
3. Eutrophication

Pesticides related problems are

Improved the crop yield, lot of pesticides are used in the Agriculture

1. First generation of pesticides
2. Second generation of pesticides

These pesticides protect our crops from huge losses due to pests; they produce number of side effects.

a) death of non target organisms
b) pest resistance problems
c) biological magnification

Causes of water logging:

1. Excessive water supply
2. Heavy rain
3. Poor drainage

Remedy:

1. Preventing excessive irrigation
2. Subsurface drainage technology
3. Bio drainage like trees like Eucalyptus

Case Study- Pesticides In India

In Delhi the accumulation of pesticide in the body of mother causes premature delivery and low birth weight infant.

Pesticides in Pepsi and Coca Cola India has reported that Pepsi and coca cola companies are selling soft drinks with pesticide content 30-40 times higher than EU limits. This damages the nervous system,.

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8. Discuss the renewable and non renewable energy resources and with suitable examples?

A. Energy Resources

Energy Distribution In The World

- Developed countries like USA and Canada constitute only 5% of the world's population but consume 25% of the world's available energy.
- Energy consumed by a person in a developed country for a single day is equal to energy consumed by a single person in a poor country for one year.
- Developed country GNP increases and energy consumption increases. In the poor country GNP and energy consumption are less.

Types of Energy Resources:

1. Renewable energy resource (or)Non conventional energy resources
2. Non renewable energy resources (or) Conventional energy resources

Renewable Energy Sources: Energy which can be regenerated.

Merits of renewable energy resources

1. Unlimited supply
2. Provides energy security.
3. Fits into sustainable development concept.
4. Reliable and the devices are modular in size.
5. Decentralized energy production.

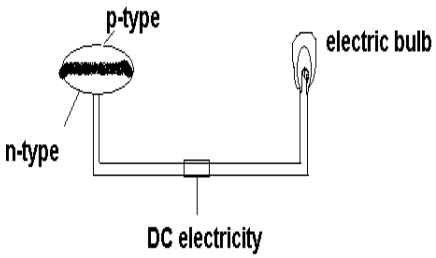
Types of renewable energy resources

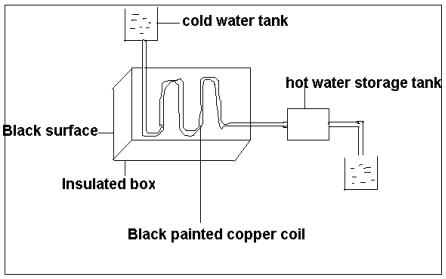
1. **Solar energy:** Nuclear fusion reaction of sun produces enormous amount of energy. Several techniques are available for collecting, storing and using solar energy.

a. **Solar cell (or) Photovoltaic cell (or) PV cell:**

- Solar cell consists of p- type semi conductor (Si doped with B) and n-type semi conductor (Si doped with P). P-type forms top layer and n-type forms bottom layer.
- Solar rays fall on the top layer, the electrons from valence band promoted to the conduction band which crosses the p-n junction into n-type semi conductor. Potential difference between the two layers is created which causes flow of electrons.

Uses: It is used in calculators, electronic watches, street light, water pumps etc.





b. **Solar battery:** Large number of solar cells connected in series is called solar battery. It is used in remote areas where continuous power supply is a problem.

c. **Solar water heater:** It consists of insulated box painted with black paint with glass lid. Inside the box black painted copper coil is present. Cold water is allowed to flow, it is heated up and flows out into a storage tank from which water is supplied through pipes.

2. **Wind energy:** Moving air is called wind. The energy recovered from the force of the wind is called wind energy It's speed is high.

a. **Wind mills:** When a blowing wind strikes the blade of the wind mill, it rotates continuously. And rotational motion of the blade drives number of machines like water pump, flour mills and electric generators.

b. **Wind farms:** When a large number of mills are installed and joined together in a definite pattern – it forms wind farm. It produces large amount of electricity.

Condition: Minimum speed for wind generator is 15 Km/hr

Advantages:

1. It does not cause air pollution
2. Very cheap

3. Ocean energy:

1. Tidal energy (or) Tidal power: Ocean tides are due to gravitational force of sun and moon which produce enormous amount of energy. High tides – rise of water in the ocean. Low tides – fall of water in the ocean. Tidal energy can be used by constructing a tidal barrage. During high tides sea water enters into the reservoirs and rotates the turbine, produce electricity. During low tides water from reservoir enters into the sea rotate the turbine produce electricity.

2. Ocean thermal energy:

Temperature difference between surface water and deeper level water in ocean generates electricity. The energy available due to the difference in temperature of water is called ocean thermal energy.

Condition: Temperature difference should be 200C.

Process: Ammonia is converted into vapors on the surface of warm water; it increases the vapor pressure which rotates the turbine and generates electricity. Deeper level cold water is pumped to cool and condense the vapor in to liquid.

3. Geo thermal energy: Temperature of the earth increases at a 20 –750C per/km when we move down the earth. The energy utilized from the high temperature present inside the earth is called geothermal energy.

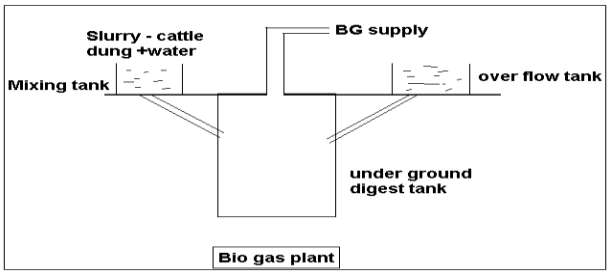
Natural geysers: Hot water or steam comes out of the ground through cracks naturally is called natural geysers.

Artificial geysers: Artificially a drill hole up to the hot region and by sending a pipe into it. The hot water or steam is used to rotate the turbine and generate electricity.

4. Bio mass energy:

Bio mass: Organic matter produced by plants or animals used as source of energy

Bio gas: Mixture of methane, carbon dioxide and hydrogen sulphide. Methane is the major constituent. It is obtained by anaerobic fermentation of animal dung (or) plant wastes in the presence of water.



Bio fuels: Fuels obtained by the fermentation of biomass.

Ex: Ethanol, methanol

Ethanol: Produced from sugar cane. Calorific value is less.

Methanol: Obtained from ethanol Calorific value too less.

Gasohol: Mixture of ethanol and gasoline India trial is going on to use gasohol in cars and buses.

Hydrogen fuel: Hydrogen produced by pyrolysis, photolysis and electrolysis of water. It has high calorific value. Non polluting one because the combustion product is water.

Disadvantages:

1. Hydrogen is highly inflammable and explosive.
2. Safe handling is required.
3. Difficult to store and transport.

Non Renewable Energy Sources:

Energy which cannot be regenerated is called as non-renewable.

1. Coal: It is a solid fossil fuel.

Disadvantages:

1. When coal is burnt large amount of CO2 is released which causes global warming.

2. S, N produces toxic gases during burning.

2. Petroleum: Crude oil is a liquid consists of more than hundreds of hydrocarbons and small amount of impurities. The petroleum can be refined by fractional distillation. In the world level 25% of oil reserves are in Saudi Arabia. At present rate of usage, the world crude oil reserves are expected to get exhausted in just 40 years.

3. Liquefied petroleum gas (LPG): Petroleum gases obtained during FD and cracking can be easily converted into liquid under high pressure as LPG. It is colorless and odorless gas, but during cylindering mercaptans are added to detect leakage.

4. Natural gas: These are found above oil in oil wells. It is a mixture of methane and other hydrocarbons. Calorific value is high. There are two types. Dry gas and wet gas.

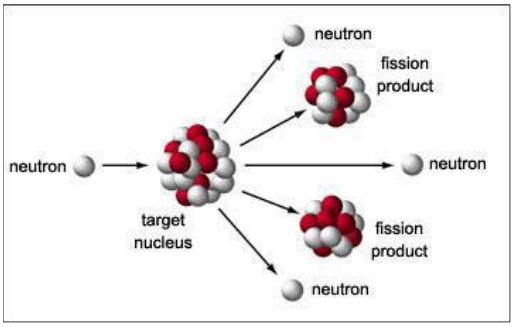
5. Nuclear energy: Dr.H.Bhabha is a father of nuclear power development in India. 10 nuclear reactors are present in India. It produces 2% of India's electricity. Nuclear energy can be produced by two types of reactions. Nuclear fission and nuclear fusion.

A. Nuclear fission; It is a nuclear change in which heavier nucleus split into lighter nuclei on bombardment of fast moving neutrons. Large amount of energy is released through chain reaction.

Ex: Uranium with fast moving neutron gives barium and krypton in addition to three neutrons; in the second stage it gives nine neutrons and so on. This process of propagation of the reaction by multiplication is called chain reaction.

B. Nuclear fission: It is a nuclear change in which lighter nucleus is combined together at extremely high temperature (1 billion 0C) to form heavier nucleus and a large amount of energy is released.

Ex: Isotopes of hydrogen combine to form helium molecule.



CASE STUDY

Wind energy in India: India generating 1200 MW electricity using the wind energy. Largest wind farm situated near Kanyakumari in Tamilnadu. It produces 380 MW electricity.

Hydrogen fuel car: General motor company of china discovered a experimental car (fuel H2) can produce no emission only water droplets and vapors come out of the exhaust pipe. This car will be commercially available by 2010.

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9. Role of an individual conservation of natural resources?

A. Conservation of energy:

1. Switch off light, fan and other appliances when not in use.
2. Use solar heater for cooking.
3. Dry the cloth in the sun light instead of driers.
4. Use always pressure cookers
5. Grow trees near the house to get cool breeze instead of using AC and ai cooler.
6. Ride bicycle or just walk instead of using scooter for ashort distance.

Conservation of water:

1. Use minimum water for all domestic purposes.
2. Check the water leaks in pipes and repair them properly.
3. Reuse the soapy water, after washing clothes for washing courtyard, carpets etc.
4. Use drip irrigation.
5. Rain water harvesting system should be installed in all the houses.
6. Sewage treatment plant may be installed in all industries and institution.
7. Continuous running of water taps should be avoided.
8. Watering of plants should be done in the evening..

Conservation of soil:

1. Grow different type plants i.e trees, herbs and shrubs.
2. In the irrigation process, using strong flow of water should be avoided.
3. Soil erosion can be prevented by sprinkling irrigation.
4. Use green manures in the garden.
5. Use mixed cropping.

Conservation of food resources:

1. Cook required amount of food.
2. Don’t waste the food, give it to some one before spoiling.
3. Don’t store large amount of food grains and protect them from damaging insects.

Conservation of forest:

1. Use non timber product.

2. Plant more trees.
3. Grassing must be controlled
4. Minimize the use of paper and fuel.
5. Avoid the construction of dam, road in the forest areas.

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, TIRUPATI,

(AUTONOMOUS)

SUBJECT NAME; -ENVIRONMENTAL STUDIES-20AMC9903

UNIT-II
ECOSYSTEMS AND BIODIVERSITY

ESSAY TYPE QUSTION AND ANSWERS

1.Define and explain food chain, food web and energy pyramids with suitable examples and their significance in the ecosystem?

A. Food chain: In any ecosystem, producers and consumers are arranged in a linear sequence with respect to their food habits.

- The energy rich food material passes from producers to primary consumers from primary to secondary and from secondary to primary consumers and so on.
- This transfer of energy from producers to a series of organisms with repeated eating and being eaten is known as food chain.

Some of the common examples are

a) A Food chain in grass land ecosystem. Starts with grasses. It passes through grasshopper, frogs, snakes and then hawks in an orderly manner.

Grass → Grasshopper → Frog → Snakes → Hawks

Phytoplankton's → Water fleas → Small fish → Tuna

- Each stage in the food chain is referred
- At each tropic level the energy levels will decrease.
- Based on the starting point of Food chain.

They are

i) Grazing food chain: This chain of food starts from green grass plants and passes through herbivores and then carnivores.

Green grass plants → Grazing herbivores → Grazing carnivores

ii) Parasitic food chain: This type of food chain starts town larger organism to smaller organism. This food chain gives inverted pyramid.

Trees → Insects → Birds → Parasites → Hyper parasites

iii) Detritus Food Chain:

- It starts with dead organic matter started and obtained from grazing food chain is called debris or waste material.

- The energy in the detritus is consumed by Detrivores. It includes earthworms, dung beetles, millipedes etc.
- These Detrivores ingest the dead organic matter and digest them; these Detrivores are eaten by carnivore's fishes later by large carnivores.

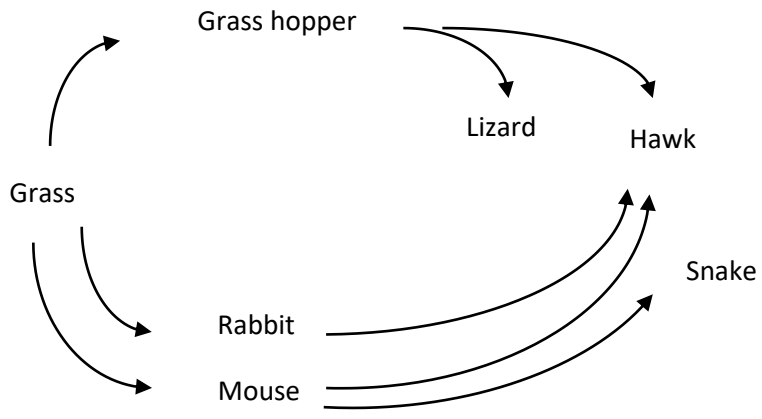
Leaf litter → Algae → Crabs → Small carnivore's fish → big carnivore's fish

Significance:

- Food chains help in maintaining ecological balance.

Food web: In Natural conditions food chain never operates as isolated sequences. They are inter connected to each other forming some sort of interlocking pattern known as "Food web".

- Food chains are found to be interconnected and usually form a complex network with several linkages.
- Thus food web is a network of food chains, where different types of organisms are connected at different trophic levels.
- Food web gives no. of options of eating and being eaten at each trophic level.
- Food web maintains the stability of an ecosystem.
- Food web must be complex. The complexity depends upon biodiversity of the system.
- The grassland ecosystem gives a scope for several types of food chains operate at the sometime.



Ecological pyramids: A ecological pyramid is a graphic representation of an ecological parameters such as number, quantity or biomass and energy to make a systematic stepwise manner in an ecosystem.

- Ecological pyramids were first developed by "Charles Elton" in the year 1927. Hence they are called as Ecological pyramids.

There are three types of ecological pyramids.

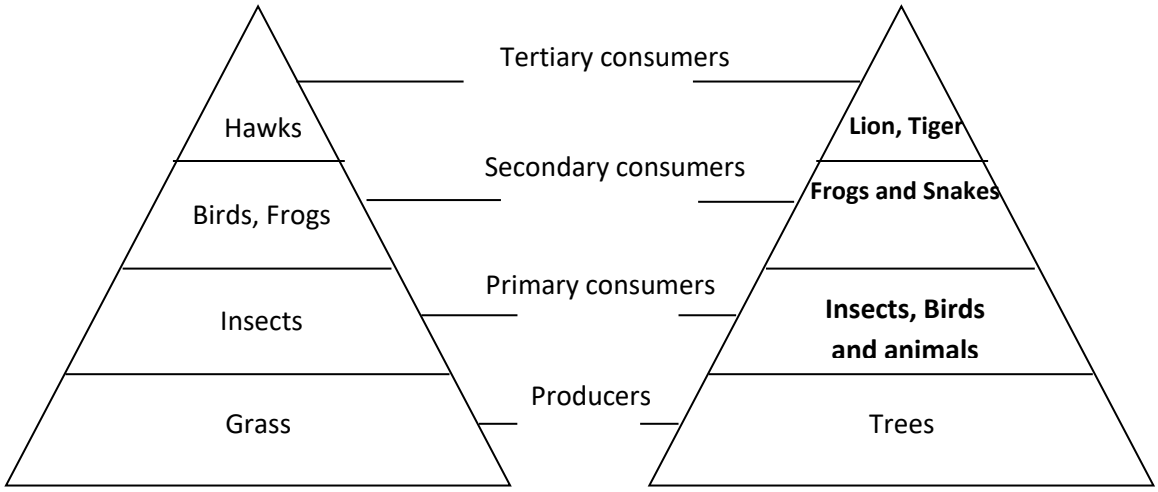
They are: 1. Pyramid of Number

2. Pyramid of Biomass

3. Pyramid of Energy

Pyramid of Number: It can be understood that the base of the pyramid shows a large number of autotrophy i.e. plants and trees which are produced the food materials not only themselves but also for other heterotrophy.

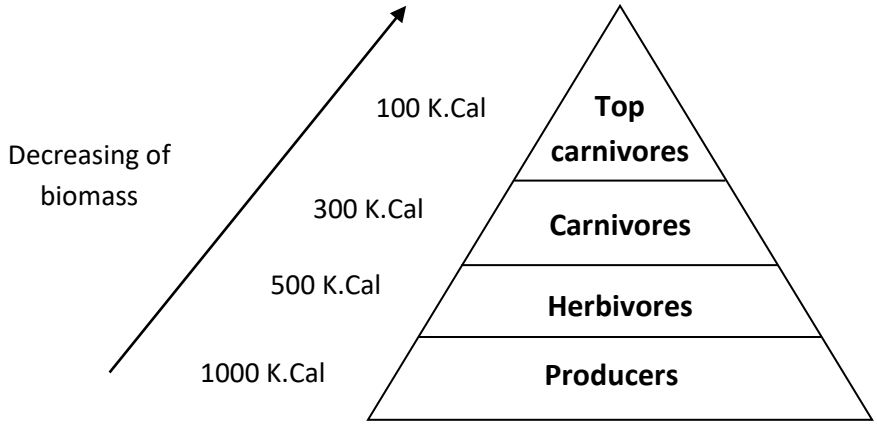
- The next step, showing the animals that feed on plants for food are called herbivores, next is represents lower carnivores such as birds and snails feed on the low herbivores for food.
- The next step shows true carnivores, such as lions, tigers etc. They feed on animals only by hunt, kill and eat their food material.
- Thus pyramid of number shows the increase in number from top to bottom.



(a) Green land Ecosystem **(b) Forest Ecosystem**

Pyramid of biomass: - The amount of energy present at each trophic level is given by pyramid of energy it gives the best representation of the trophic relationship. It is always upright.

- At every successive level of trophic, there is a huge loss of energy (about 90%) in the form of heat, respiration etc. Thus at each next higher level contain only 10% of energy passes on.
- Hence there is a sharp decline in energy level of each successive trophic level as we move from producers to top carnivores.



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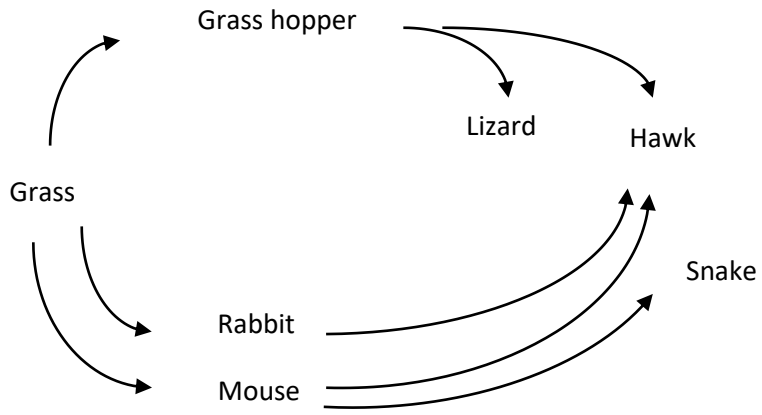

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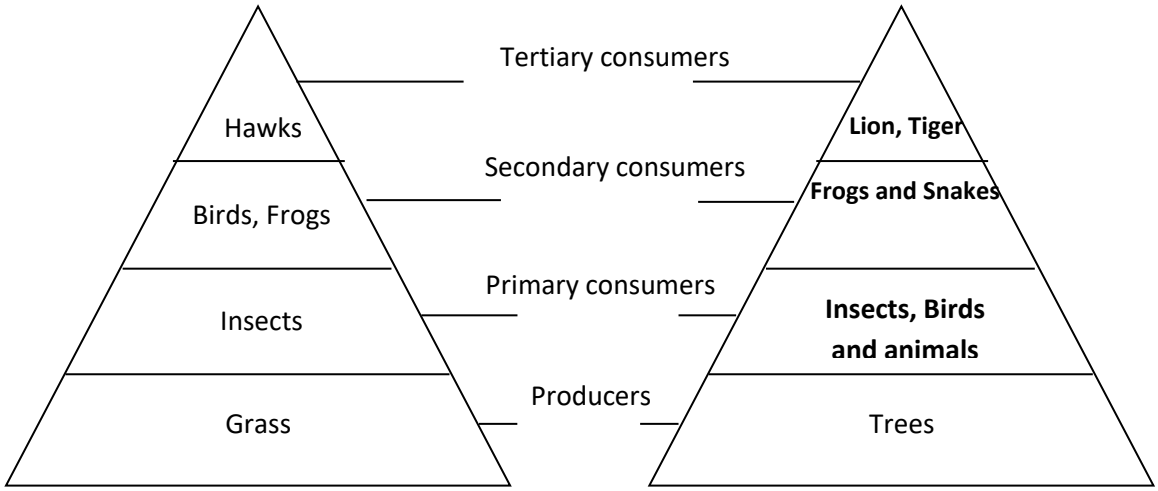

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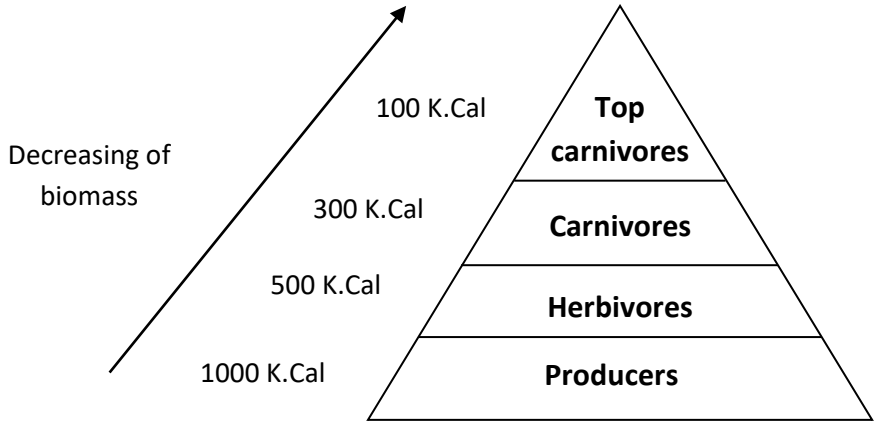

2. Explain aquatic ecosystem structure and its function whith suitable example?

A. 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:

A. 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.

B. 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:

1. Planktons – phytoplankton eg. Algae – zooplankton eg. Rotifers
2. Nektons – that swims in water eg. Fishes
3. Neutrons – that float on the surface of water Benthos – that attached to sediments eg. Snails

Types of lakes: Many types

1. Oligotrophic lakes – with less nutrient content
2. Eutrophic lakes – with very high nutrient content due to fertilizer contamination
3. Desert salt lakes – that contains high saline water due to over evaporation
4. Volcanic lakes – formed by water emitted from magma due to volcanic eruptions
5. Dystrophic lakes – that contains highly acidic water (low pH)
6. Endemic lakes – lakes that contain many endemic species, etc.

C. 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.

D. 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.

E. 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:

1. coastal zone – warm, nutrient rich, shallow – high sunlight – high primary productivity.
2. Open sea – away from continental shelf – vertically divided in to 3 zones.

- Euphotic zone – abundant sunlight
- Bathyal zone – dim sunlight
- Abyssal zone – dark zone – world's largest ecological unit.

F. 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.

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3. What are the hot-sports of biodiversity in our country and give the necessity of preserving these areas?

A. Areas which exhibit high species richness as well as high species endernic are termed as hot spots of biodiversity.

- The term was introduced by 'Myers' (1988).
- In the world total 34 hot spots are present. In India 3 hotspots are identified.

- The Indian hot spots are not only rich in floral wealth and endemic species of plants but also reptiles, amphibians, butterflies and mammals.

1. Indo Burma hot spot
2. Western Ghats hot spot
3. Eastern Himalayas hot spot

Indo Burma hot spot

It comprises more than 2 million km^2 of tropical cast of Ganges, Brahmaputra river low lands.

- It only covers Indo China sub region.
- It covers Mekong catchment, eastern Bangladesh, South of Brahmaputra, part of South West China, Cambodia, Vietnam, small parts of Malaysia and several off shore islands.
- It is categorized by wet evergreen, dry every green, deciduous, patches of shrub lands, wood plants, lands, grass lands etc.
- Six large mammal species such as large out alerted manta, Annamite munjao, grey shared done, Annamite stripped rabbit, last deer and saola.
- Almost 1300 different bird species are found.

Western ghat hot spot:

It extends along a 17000 km^2 strip of forests in Maharashtra, Karnataka, Tamilnadu and Kerala.

- In 2012 western ghat included in world heritage site.
- It has 40% of total endemic plants.
- 62% of amphibians and 50% lizards are endemic.
- 20% of forests are evergreen while those in 500-1500 m range from semi-evergreen.
- The major centers of diversity are silent valley, Agastyamalai hills and Amanbalam Reserve basin.

Eastern Himalayas hot spots:

There are numerous deep and semi isolated valleys in Sikkim, which are extremely rich in endemic plant species, particularly orchids.

- It covers 7298 km^2 of Sikkim.
- 4250 plant species are found. 60% are endemic.
- Certain species like Saparia Himalayas; a parasite angiosperm was seen only twice in this region for last 10 years.
- This hot spot is an active centre of organic evolution and is considered to be cradle of flowering plants.
- Out of 30% endemic flora of world, 35,000 species are seen in Himalayas.

4. Explain in- situ and ex-situ conservation of biodiversity?

A. Conservation Of Biodiversity

The following measures should be taken to conserve biodiversity

1. Illegal hunting and trade of animals and animal products should be stopped immediately
2. People-at-large should boycott purchasing coats, purse or bags made of animal skin
3. Bio-diversity laws should be strengthened.
4. Adequate crop and cattle compensation schemes must be started
5. Solar powered fencing must be provided with electric current proof trenches to prevent animals from entering fields.
6. Cropping pattern should be changed near the forest borders
7. Adequate food and water should be made available for wild animals within forest zones.
8. Development and construction work in and around forest region must be stopped.

Biodiversity is one of the important tools for sustainable development. The commercial, medical, genetic, aesthetic, and ecological importance of biodiversity emphasizes the need for its conservation.

Factors affecting biodiversity:

1. Biodiversity is disturbed by human activity
2. Poaching of animals, over-exploitation of natural sources and degradation of habitats affect biodiversity.
3. Marine ecosystems are disturbed due to oil spills and discharge of effluents
4. Climatic factors like global warming, ozone depletion and acid rain also affect biodiversity

Need for biodiversity

1. It provides recreation and tourism
2. Drugs, herbs, food and other important raw materials are derived from plants and animals
3. It preserves the genetic diversity of plants and animals
4. It ensures sustainable utilization of life supporting systems on earth.

5. It needs to conservation of essential ecological diversity and life supporting systems
6. Loss of biodiversity leads to ecological and environmental deterioration

Types of conservation

There are two types of biodiversity conservation:

1. In-situ conservation and
2. Ex-situ conservation

1. In-Situ Conservation:-In-situ conservation involves protection of flora and fauna within its natural habitat. The natural habitats or ecosystems under in-situ conservation are called "protected areas".

1. Biosphere reserves
2. National parks
3. Wildlife sanctuaries
4. Gene sanctuaries

a. Biosphere reserves: They cover large areas (>5000 sq.km.) They are normally used to protect species for a long time. The roles of biosphere reserves are listed below:

1. Protect endangered species
2. Protect maximum number of species and communities
3. Serve as site of recreation and tourism
4. May also be used for educational and research purposes

Biosphere reserves function as an open system and changes in land use are not allowed. No tourism and explosive activities are allowed in biosphere reserves.

b. A national park: It is an area dedicated for the conservation of wildlife along with its environment. It covers an area ranging from 100 to 500 sq.km. One or more national parks may exist within a biosphere reserve. A national park is used for enjoyment through tourism, without affecting the environment. It is used to protect, propagate and develop wildlife. Grazing domestic animals inside national parks is prohibited All private rights and forestry activities are prohibited inside a national park

c. Wildlife sanctuary is an area that is reserved for the conservation of animals only.

1.It protects animals only

2.It allows operations such as harvesting of timber, collection of forest products, private ownership rights and forestry operations, provided it does not affect animals adversely

d. Gene sanctuary is an area where plants are conserved.

Other projects for the conservation of animals are *Project Tiger, Gir Lion Project, Crocodile breeding project, project elephant etc*

Advantages of in-situ conservation

1. It is cheap and convenient
2. Species get adjusted to natural disasters like drought, floods, forest fires etc.

Disadvantages of in-situ conservation

1. A large surface area of earth is required to preserve biodiversity
2. Maintenance is not proper due to shortage of staff and pollution

EX-SITU CONSERVATION:- Ex-situ conservation involves protection of flora and fauna outside their natural habitats. This type of conservation is mainly done for conservation of crop varieties and wild relatives of crops.

1. Ex-situ conservation involves maintenance and breeding of endangered plant and animal species under controlled conditions
2. It identifies those species that are at a high risk of extinction
3. It prefers species that are important for man in the near future among the endangered species.

Important centers of ex-situ conservation:

1. Botanical gardens
2. Seed banks
3. Microbial culture collections
4. Tissue and cell cultures
5. Museums and
6. Zoological gardens

Methods of ex-situ conservation

1.National Bureau of Plant Genetic Resources (NPBGR) It is located in New Delhi and uses the Cryopreservation Technique to preserve agricultural and horticultural crops. Cryopreservation technique involves using liquid nitrogen at -196 C. Varieties of rice, turnip, radish, tomato, onion, carrot, chili, tobacco have been successfully preserved for years using this technique.

2.National Bureau of Animal Genetic Resources (NPAGR) It is located in Karnal, Haryana and preserves the semen of domesticated bovine animals.

3.National Facility for Plant Tissue Culture Repository (NFPTCR) In this facility, conservation of varieties of crop plants or trees is done using tissue culture. This facility has been created within the NPBGR.

Advantages of Ex-situ conservation

1. Survival of endangered species is increasing due to special care and attention
2. In captive breeding the animals are assured of food, water, shelter and security thereby have a longer life span

3. It is carried-out in cases of endangered species that do not have any chance of survival in the wild

Disadvantages of Ex-situ conservation

1. It is an expensive method
2. Freedom of wildlife is lost
3. Animals cannot survive in the natural environment

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5. Explain value of biodiversity?

A. Value Of Biodiversity:-Definition and estimation of the value of biodiversity is not easy. The value of biodiversity is classified into:

1. Direct Value and
2. Indirect Value

1. Direct value of biodiversity: It is of two types

a. Consumptive use value and

b. Productive use value

a. Consumptive use value:

- The consumptive use value is the value placed on nature's products that are consumed directly, without passing through a market. Some of them are firewood, food, and game meat.
- When direct consumption requires recreation, as in sport fishing and game viewing, the consumptive value is the whole recreational experience. Consumptive value seldom appears in national income accounts, but could be easily included in measures such as GDP. It is valued from the cost if resource was sold at market value, rather than being consumed.
- High consumptive use values on resources may lead to the following problems:
- Over-exploitation of wildlife in developing countries
- Loss of traditional controls on hunting and
- Loss of wildlife populations at productive levels.
- Consumptive use value benefits the communities closest to the resource if harvested sustainably and managed efficiently.

b. Productive use value:

- Productive use value refers to products that are commercially harvested (sold in a market).
- Its value is estimated at the production end rather than retail end by adding an inflated cost to the finished product.
- Productive use value is often the only value of biological resource reflected in national income accounts and may have a major impact on the national economy.

- Timber, fish, honey, construction materials, mushrooms, fruits, medicinal plants and game meat sold in a market have productive use value.

2. Indirect value of biodiversity

- Indirect values provide economic benefits without being harvested and do not appear in GDP. However, they are crucial to other natural products which influence the GDP.
- These values involve functions performed by biodiversity which are not of any use. Ex: Ecological Processes etc.
- Direct values are often derived from indirect values because plants and animals are supported by the services provided by their environments.
- Many classes of plant and animal species are consumed by tribal and non-tribal communities.

Ex:

1. Ecological functions
2. Flood and storm protection
3. Waste assimilation
4. Microclimatic functions
5. Nutrient cycles
6. Photosynthesis
7. Carbon stores
8. Soil protection, etc.

Indirect value of biodiversity is of the following types:

1. Non-consumptive use value
2. Optional value
3. Existence or ethical value and
4. Information value

1. Non-consumptive use value:

- This indirect value deals with nature's functions and services.
- It includes photosynthesis of plants which provides support system for other species by maintaining water cycle, regulating climate, production and protection of the soil, absorption and breakdown of pollutants, recreational, aesthetic, socio-cultural, scientific, educational, spiritual and historic values of natural environments.
- Recreational value is important with regard to tourism and helps the national GDP.

2. Optional value:

- This refers to the potential of biodiversity that is currently known and needs to be explored.

- This refers to the idea that there may be several existing species that may prove to be important in future and their usefulness needs to be studied with reference to a specific problem currently plaguing the society.

Ex:

1. The growing biotechnology field is searching for a the cure for diseases like cancer and AIDS.
2. Medicinal plants and herbs play a very important role in the economic growth of our country.

3. Existence value:

1. This is the value gained from continuous knowledge of existence. Also, this is the value that people are willing to pay to keep a species / community /ecosystem from going extinct. Examples of this are high amounts being spent for animals like pandas, whales, lions etc.

2.Our rich heritage teaches us to worship plants, animals, rivers and mountains. Examples being the Ganga river, trees like Banyan and Peepal and plants like the Vambu, Tulsi and Vengai are worshipped.

4. Information value: This relates to the educational, scientific and aesthetic and tourism values of biodiversity in an ecosystem

5. Aesthetic Values: Beautiful plants and animals inspire us to protect biodiversity. The most important aesthetic value of biodiversity is eco-tourism.

Ex:

1. People from distant places spend time and money to visit areas where they can enjoy aesthetic value of biodiversity. This is called eco-tourism.
2. The pleasant music of wild birds, beautifully coloured butterflies, colour of peacocks and colour of flowers are very important for their aesthetic value.

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6. Explain Threats To Biodiversity?

A. Threats To Biodiversity

- Any disturbance in a natural ecosystem tends to reduce its biodiversity.
- Waste generated due to increase in human population and industrialization spoils the environment and leads to decreased diversity in biological species.
- Any change in the system leads to a major imbalance and threatens the normal ecological cycle.
- Causes for loss of biodiversity are:

1. Habitat loss
2. Poaching of wildlife and

3. Man-wildlife conflicts

1. Habitat loss: The loss of populations of interbreeding organisms is caused by habitat loss. Factors influencing habitat loss are:

a. **Deforestation:** Loss of habitat is mainly caused by deforestation activities. Forests and grasslands are cleared for conversion into agriculture lands or settlement areas or developmental projects. Forests and grasslands are natural home to thousands of species which disintegrate due to loss of their natural habitat.

b. **Destruction of wetlands:** Wetlands, estuaries and mangroves are destroyed due to farming, filling and pollution that cause loss of biodiversity

c. **Habitat fragmentation:** When the habitat is divided into small and scattered patches the phenomenon is called habitat fragmentation. This leads to the disappearance of most wildlife

d. **Raw material:** To produce hybrid seeds, wild plants are used as raw materials leading to extinction of many wild plant species.

e. **Production of drugs:** Pharmaceutical companies collect wild plants for the production of drugs leading to extinction of several medicinal plant species.

f. **Illegal trade:** Illegal trade of wildlife reduces biodiversity leading to habitat loss

g. **Developmental activities:** Construction of dams in forest areas coupled with the discharge of industrial effluents kills birds and other aquatic life.

2. Poaching of wildlife: Poaching refers to killing animals or commercial hunting. It contributes to loss of biodiversity. Poaching can be of two types listed below:

1. **Subsistence poaching:** This refers to killing animals for survival.
2. **Commercial poaching:** This refers to hunting animals in order to sell their products.

Factors influencing poaching:

1. **Human population**: Increased human population in India has led to pressure on forest resources, leading to degradation of wildlife habitats

2. **Commercial activities**: Although a ban has been imposed internationally on the trade of products of endangered species, there is a continued smuggling of wildlife products. Since trading of such products is highly profitable, poachers continue to hunt endangered animals and smuggle their fur, skin and tusks to other countries. Wildlife products include *furs, horns, tusks, live specimens and herbal products*. *Richest source* of biodiversity lies in developing nations in *Asia, Africa and Latin America*. *Advanced countries* like *Europe, North America, Japan, Taiwan, Hong Kong* are the *major importers* of wildlife products.

3. Man-Wildlife Conflicts: Man-wildlife conflicts arise, when wildlife starts causing immense damage and danger to man. Under such conditions it is very difficult for the forest department officials to convince the affected villagers to gain the villagers support for wildlife conservation.

Ex:

1. In Jabalpur, Orissa, several people were killed by elephants. In retaliation, the villagers killed and injured several elephants.
2. In Mysore, elephants were killed by farmers in retaliation to the damage done by elephants to their cotton and sugarcane fields.
3. Villagers sometimes hide explosives in their fields to ward-off animals which explode when the elephants enter the fields
4. Several people were killed when leopards attacked them in Sanjay Gandhi National Park, Mumbai

Factors influencing man-animal conflicts

1. Shrinking forest cover compels wildlife to move outside the forest
2. Human encroachment into forest area induces a man-wildlife conflict
3. Injured animals have a tendency to attack man
4. Wild animals venture out of the forest area in search of food
5. Villagers set-up electric wiring around their fields. This injures animals (Elephants) who suffer pain and get violent.
6. Cash compensation paid by the government is not enough.
7. Garbage near human settlements or food crops attracts wild animals.

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7. What is bio-geographical classification of India?

A. Bio-Geographical classification of India

- India has different climate and topography in different parts and hence is termed as a mega diversity country.
- India occupies ***10th place among plant rich countries of the world.***
- It is essential to acquire knowledge about the distribution and environmental interaction of flora and fauna of India.
- Bio-geographers have classified India into ten bio-geographic zones with each zone having characteristic climate, soil and biodiversity.
- These zones are described below:

1. **Trans-Himalayas:** The trans-himalayas is an extension to the Tibetean plateau. This region harbors the high-altitude cold desert in ladakh (Jammu and Kashmir) and Lahaul Spiti (Himachal Pradesh). It accounts for 5.7% of the country's landmass.

2. **Himalayas:** The Himalayas are the northern boundaries of India. The entire mountain chain is running from Kashmir in the North-west to Assam in the north-east. The Himalayas comprise of a diverse range of biotic provinces and biomes. The himalayas cover 7.2% of the country's landmass

3. **Desert:** The extremely dry area west of the Aravalli hill range, is comprising both the salty desert of Gujarat and the sandy desert of Rajasthan. Deserts occupy around 6.9% of the country's land mass.

The kinds of deserts found in India are:

a. The desert of western Rajasthan

b. The desert ofGujarat

c. The high-altitude cold desert of Jammu & Kashmir and Himachal Pradesh. The Indian deserts have more diversified fauna.

4. **Semi-arid:** This zone lies between the desert and the Deccan plateau. It includes the Aravalli hill range. It overs approximately 15.6% of the country's landmass.

5. **Western Ghats:** The western ghats are a mountain range that runs along the western cost of India. They are a range extending north-south from southern tip of Gujarat in the north to Kanyakumari in the south.The mountains cover an area of about 160,000 sq. km. This ghat section covers an extremely diverse range of biotic provinces and biomes. It covers about 5.8% of the country's landmass.

6. **Deccan plateau:** It is a large triangular plateau south of the Narmada valley. Three sides of the plateau are covered by mountains slopes towards east. Satpura mountains cover the north while western ghats cover the west side and eastern ghats cover the eastern side of the plateau. It is the one of largest zones covering the southern and south-central plateau with mostly deciduous trees. It covers 4.3% of the country's land mass.

7. **Gangetic plain:** This plain covers the area between the south himalayas to the tropic of cancer. These plains were formed by the Ganges river system and are relatively homogeneous. This region experience 600 mm rainfall annually. *Sunderbans* forests are located in this region and it covers 11% of the country's land mass.

8. **North-east India** These are pains and non-himalayan ranges of northeastern India and have a wide variety of vegetation. It covers around 5.2% of the country's land mass.

9. **Islands** The Andaman and Nicobar Islands in the Bay of Bengal has almost 300 big and small islands. Among these, only five islands are inhabited. Only tribes are found in the island of Nicobar. These islands have a highly diverse set of biomes and occupy 0.03% of the country's biomass.

10. **Coasts** India has a large coastline distributed both to the east and west with distinct differences between the two. The Lakshadweep islands are included in this but the area of these islands is negligible.

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, TIRUPATI,

(AUTONOMOUS)

SUBJECT NAME; -ENVIRONMENTAL STUDIES-20AMC9903

UNIT-III
ENVIRONMENTAL POLLUTION

ESSAY TYPE QUSTION AND ANSWERS

1. What are the sources, effects and control of air pollution? Give an account on Bhopal gas tragedy

A. **AIR POLLUTION**

Air pollution is defined as the presence of one (or) more contaminants like dust, smoke, mist and odor in the atmosphere which causes damage to plants, animals and human beings.

Composition of air: N- 78%, O_2 – 21%, Argon <1%, CO_2, 0637%, Tracer of O_3, He, NH_3.

SOURCES:

(i) National Source: Volcanic eruption, forest fires, biological decay, radioactive materials.

(ii)Man-made: Thermal power plants, Automobile emission, forest fires , fuel burning, agricultural activities.

CLASSIFICATION OF AIR POLLUTANTS

Primary pollutions, secondary pollutions

Primary Pollutants: Pollutants emitted directly into the atmospheres in harmful form.
E.g.: CO, NO, SO_2 etc.

Secondary Pollutants: Some of primary pollutants react with one another (or) with basic Components of air to form new pollutants. **E.g.:** NO/No_2 Moist HNO_3/NO_3 etc.

Indoor Air Pollutants: These are primary air pollutants important indoor air pollutant is radon gas.

Sources of I.A. Pollutants: Radon gas in emitted by the building materials like bricks, concrete, tiles which are derived from soil containing radium. Burning fuel in the kitchens, cigarette smoke liberates pollutants like CO, SO_2.

Common Air pollutants sources and their effects

CO – formed by the incomplete combustion of carbon containing fuels.

2C + O2 ----------> 2CO

Human Sources – Cigarette smoking, burning fossil fuels. 77% Co comes from motor vehicle exhaust.

Health Effect- Reacts with hemoglobin and reduces the ability of to carry O_2 to body cells and tissues, which causes headaches and anemia.

NO_2 – It gives photochemical smog. In atmosphere it reacts with moisture to form HNO3. No_2 + Moisture ------> HNO_3

Human sources: Fossil fuel burning in motor vehicles and power industrial plants. Effect Health, Lung irritation and damage

Environment effect: HNO_3 corrode metals and eat away stone on buildings, statues, NO_2 damages fabrics.

SO_2- Formed mostly by the combustion of sulphur containing fossil fuels like coal and oil. It is converted to H_2SO_4 in the atmosphere. It is major component of acid deposition.

Human Source- Coal burning in power plants and industrial process.

Health effects- Breathing problems.

Environment effect – Reduce visibility, H_2So_4 damages trees, soil and aquatic life.

Suspended particulate Matter (SPM) -It includes varieties of particles and droplets.
Human Sources – Burning coal in power and industrial plants. Burning diesel and other fuels in vehicle, agriculture, unpaved roads construction.

Health Effect – Nose and throat irritation, lung damage, asthma, reproductive problems and cancer.

Environment effect – Reduce visibility, acid deposition & H_2SO_4 droplets damage trees.
O_3- Highly reactive irritating gas in the troposphere. It is major component of photo chemical smog.
Human Source- Chemical reactions with volatile organic compounds and nitrogen oxides.
Environment effect – Moderates the climate.
Photochemical smog: Any chemical reaction activated by light is called photochemical reaction. Photochemical smog is a mixture of more than 100 primary and secondary pollutants formed under the influence of sunlight. Its formation begins inside automobile engines and the boilers in coal burning power and industrial plants.

Health Effect – Breathing problems, cough, ENT irritation, heart diseases etc.,
Environment effect – Smog can reduce visibility.
7 Lead – Solid toxic metal and its components emitted into the atmosphere as a particulate matters.
Human Source- Paint, lead manufacture, storage batteries, leaded petrol.
Health Effect – Mental retardness (in children) digestive and other health problems. Some lead containing chemicals causes cancer in test animals.
Environment effect – Can harm wild life.
Controlling air Pollution
Controlling at the sources:

1. Use only unleaded petrol
2. Use fuels that have low sulphur and ash containing.
3. Plant trees along busy streets because they remove particulates and CO and absorb noise
4. Industries and waste disposal should be outside the city area.
5. Use catalytic converters to control the emission of CO and hydrocarbon.

Control Measures in industries:

1. Emission rates should be restricted to permissible levels in all industries.

Air pollution control equipment should be incorporated in plant layout

3. Monitoring of the atmosphere for the pollutants should be carried out continuously to know the emission levels.
4. Scrubber, cyclone separator, bag house filter and electrostatic precipitators must be used in manufacturing Process to retain harmful materials that must be disposed of safely.
5. The disposal of the collected air pollutants are equally important for controlling air pollution.

2. What are the sources, effects and control of water pollution?

A. The alternation in physical, chemical & biological characteristics of water which causes harmful effects on humans and aquatic life.

The major pollutants are sewage, effluents, and bacteria. Infections

Agents: Bacteria, viruses, protozoa, parasitic worms

Human Source- Human and animal works

Health Effect – Variety of diseases.

Oxygen demanding wastes: Organic wastes, such as animal manure & Plant debris that are decomposed by aerobic bacteria.

Human Source- Sewage, animal feedlots, paper mills, food processing facilities.

Health Effect – Depletion of dissolved O_2 in water. This causes death of aquatic life.

Inorganic Chemical water soluble chemicals like acids. Compounds of toxic metals like Lead, arsenic and selenium. Salts like NaCl in sea water and fluorides found in some soils

Human Source- Industrial effluents, street wash, household waste.

Health Effect – Causes skin cancer & neck damage. Damage nervous system, liver & Kidney. Harm fish and other aquatic life

Organic Chemical Plastics, pesticides, detergents

Human Source- Industrial effluents, household waste.

Health Effect – Damages nervous system, causes some cancers

Plant Nutrients- Water solublecompoundscontaining Nitrates, ($NO_4(PO_4^3)$ and NH_4^+ions

Human Source- Sewage, manure, runs off of agriculture, urban fertilizer.

Health Effect – Drinking water with high levels of nitrate lowers the O_2 carrying capacity of Blood and kills urban children and infants

Sediment – Soil, silt

Human Source- Land Erosion

Health Effect – Clouds water and reduces photosynthesis. Disturbs aquatic food web carry Pesticides, bacteria and other harmful substances.

Radio active materials – Radio isotopes of I_2, radon, uranium and thorium

Human Source- I^{131}, Co^{60}, Fe^{55} Nuclear power plants, mining and processing of thorium.

Health Effect – Genetic mutation, birth defects and certain cancers.

Thermal Pollution: Excessive heat

Human Source- Water cooling of electric power plants and some types of industrial plants. Hence the temperature of water increases. The rise in temperature decreases the dissolved O_2 and affects the aquatic organisms.

Controlling of water pollution:

1. All domestic and municipal effluents be drained to water bodies only after treatment
2. Use of pesticides in agriculture should be limited. Only standard quality pesticides should be used.
3. Chemicals like potassium permanganate should be sprayed regularly to protect water from Micro organisms.
4. Radioactive substances can be removed by Ion-exchange method.
5. Plants, trees and forests control pollution and they act as natural air conditions.
6. Bacteria are killed by passing chlorine gas into water bodies.
7. Highly qualified and experienced persons should be consulted from time to time for effective control of water pollution.
8. Inorganic wastes can be treated chemically.
9. Acids and bases are removed by neutralization
10. Sewage is treated by biochemical oxidation. The chemicals retard the growth of plants and retard reproduction process.

3. What are the majors to be taken to prevent soil pollution?

A. Contaminations of the soil by human and natural activities which may cause harmful effects on Living beings.

Effects on living beings

This may be due to the following factors.

(i) Industrial wastes: Industries are the major causes for soil pollution Textiles, steel, paper, Cement, oil, dyeing and other industries are responsible for soil pollution. Toxic organic compounds and phenol destroy the fertility of the soil.

(ii) Biological agents – Fungi, protozoa, bacteria are important Biological agents for soil pollution. The human and animal wastes, garbage, waste water generates heavy soil pollution.

(iii) Radioactive pollutants: Atomic reactor, nuclear radioactive devices releases radioactive pollutants. These pollutants enter the land and accumulate thereby causing soil pollution.

(iv) Pesticides: Pesticides pollute the soil. There are of two types (i) chlorinated hydrocarbon insecticide (2) Organic phosphorous pesticides. Common chlorinated hydrocarbon insecticides are DDT, BHC.

Organic phosphorous insecticides are synthetic chemicals like malt ion and parathion.

DDT reduces the activity of sex hormones of male and female. The land with fungicides insecticides causes diseases to human beings.

Fertilizers: These discharge N, Na, K, S, Nitrates etc., into the soil. The nitrate causes cancer.

Polymer, Plastics & other water: These materials appear as garbage. Solid wastes and their quantities increase day by day. They pollute the atmospheres, land and also water badly.

Agricultural practices: Modern agriculture practices pollute the soil to a large extent. Today huge quantities of fertilizers, pesticides, and weedicides are added to increase the crop field. Apart from these farm wastes, manure debris, soil erosion containing inorganic chemicals are causing soil pollution.

Effect of soil pollution

1. Organic wastes enter the soil pores and decompose. Pathogenic bacteria spread infection.
2. Compounds containing As, Hg, Cr, Ni, Zn and Fe are toxic to life.
3. Fluorides affect plant development
4. Water logging and salinity increase the dissolved salt content in the soil. Some plants are very sensitive to soil PH and salinity.

Thus land becomes unfit for irrigation.

Control of soil pollution

1. Treat the sewage before land disposal
2. Rotate the crop pattern to allow the soil replenish the nutrients.
3. Preserve and protect top fertile soil, control soil erosion by tree plantation.
4. Fertilizers may be applied only after estimating the soil and crop measures.
5. Production of natural fertilizers Excessive use of chemical fertilizers and insecticides should be Avoided. Bio pesticides should be used instead of toxic chemical pesticides.
6. **Proper hygienic condition-** People should be trained regarding the sanitary habits.
7. **Recycling and reuse of waster** – The wastes such as paper, plastic, metals, glasses should be recycled and used.

4. Explain any two case studies on nuclear pollution?

A. Radioactive pollution is the physical pollution of air water and soil by radioactive materials.

Sources:

Natural source:

The important natural source is space which emits cosmic rays. Soil rocks, air radioactive Rd

^{222}also contain one or more radioactive substances. Man
made resources:

Nuclear power plants X-rays, nuclear accidents, nuclear bombs. Mining and refining of plutonium, thorium and preparation of radioactive isotopes.

Effects:

1. Damages to enzymes, DNA, RNA through ionization, cross linking's within and between two affected molecules.

2 .Damage to cell membranes, chromosomes such as fragmentation mitochondria etc. 3.Disruption of central nervous system, loss of sight, inactivation of bone marrow activity resulting in blood cancer, malignance and ulcerisation in intestinal tract.

4. Death or shortening of life span due to radiation changes in chacteristics due to mutation.

5. Internal bleeding and blood vessel damage may show up as red spots on the skin.

6. Urban children are vulnerable to brain damage or mental retardation if radiation occurs in early pregnancy.

Control Measures:

1Nuclear devices should never be exploded in air. If necessary they may be explode underground.

2. Leakage of radioactive elements from reactors and labs processing or using them should be totally checked.

3. In nuclear and chemical industries the use of radio isotopes may be carried under a jet of soil or water instead of powder or gaseous form.

4. In nuclear mines wet drilling may be employed along with underground drainage.

5. Nuclear medicines and radiation therapy should be applied when absolutely necessary with minimum dose.

6. Minimum number of nuclear installations should be commissioned.

7. In nuclear reactors closed cycled coolant system with gaseous coolants may be used to prevent extraneous activation of products.

6. What are the sources, effects and control of marine pollution?

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

Sources:

1. Dumping the wastes: Dumping of untreated wastes and sewages in the oceans by coastal towns, cities and industries. Rivers on the way to sea carry huge amount of sewage garbage agricultural discharge pesticide heavy metals. Huge quantity of plastic dumped in to the sea.

Effects:

Many marine birds ingest plastic that causes gastrointestinal disorders.

2. Oil:

This is discharged in to the sea as crude oil and as separate fraction. Oil and it's fractions are used in houses automobiles and industries. This causes devastation of marine environment.

Effects:

Oil spills inhibit photosynthesis and the growth of planktons. All aquatic animals depend either directly or indirectly on planktons the basis of trophic chain.

3. Radioactive materials enter the ocean from nuclear weapon testing.

4. Toxics:

Toxic waste is the most harmful form of marine pollution. Once toxic wastes affects an organism it quickly passes along the food chain and as sea food which cause various problems.

5. Marine Debris:

Garbage like plastic bags, ropes helium balloons

Effects of marine pollution:

1. Heavy metals and organic pollutants damages birds by thinning of egg shells and tissue damage of egg.
2. Oil pollution causes damage to marine animals and plants including algae bird, fish etc.

3. Oil spilling in the sea causes abnormal low body temperature in birds resulting in hypothermia. During Exxon Valdez accident 150 rare species of bald eagles are affected by ingested oil.

4. Oil films are able to retard the rate of oxygen uptake by water.

5. Hydrocarbon and benzpyrene accumulate in food chain and consumption of fish by man may cause cancer.

Control of marine pollution:

Nature and world conservation union suggest the principles

1. The industrial unit on the coastal lines should be equipped with pollution control instrument.

2. Urban growth near the coast should be regulated.

Methods of removal of oil

Physical methods.

a) skimming the oil off the surface with suction device

b) Floating oil can be absorbed using absorbing materials like ploy urethane foam. Chopped straw and saw dust also used to absorbed oil from the sea water.

c) Chemical methods like dispersion , emulsification and using chemical additives are used to coagulated the oil

Protective method:

1. Municipal and industrial waste should be treated before disposing in to sea

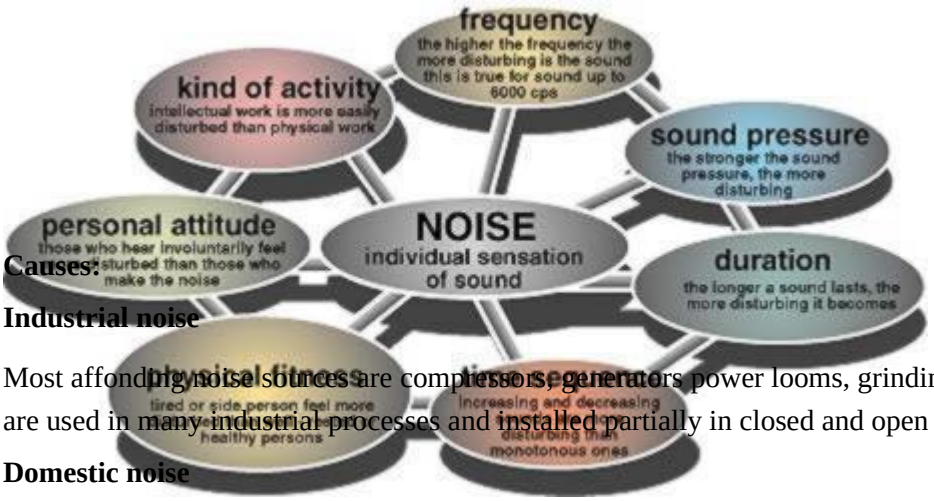
2. Coastal waste are periodically analyzed for detecting pollution level

3. Soil erosion in the coastal land should be arrested be suitable techniques

4. Recreation beaches should be maintained to meet hygienic and aesthetic standard.

7. What are the sources, effects and control of sound pollution?

A. It may be defined as unwanted sound which gets dumped in to the atmosphere without regarding to it' adverse effects.



Causes:

Industrial noise

Most affording noise sources are compressors, generators power looms, grinding mills, furnaces. These are used in many industrial processes and installed partially in closed and open sheds.

Domestic noise

Transistors radio, TV, other musical instruments, Air conditioners, washing machines. They affect users as well as the neighbors.

Traffic noise

Continuous movement of vehicles causes traffic noise. It affects not only those who are moving but also those who live near the roads, railway links, and airports

Effects of noise pollution

1. Physiological effects

Headache increase in the rate of heart beat, pain in heart, emotional disturbances, hearing loss. 2. Annoyance

A noise is said be annoying if the exposed individual or groups of individuals reduce the noise avoid or leave the noisy area if possible. Both loudness and annoyance increase with increasing sound levels

3. Recently it has been reported that the blood also thickened by excessive noise

4. Impulsive noise also causes psychological and pathological disorders.

5. Ultrasonic sound can affect digestive respiratory cardiovascular system and semi circular canals of internal ear.

6. It causes muscle to contract leading to nervous breakedown, tension etc.

Control measures:

Source Control

1. Modification of source such as acoustic treatment to machine surface designed changes limiting the operational timings.

2. Oiling: Proper oiling will reduce the noise from the machine.

3. Transmission path intervention: Containing the source inside a sound insulating enclosure, construction of noise barrier or provision of sound absorbing material along the path.

4. Planting of trees: Planting of trees like neem, tamarind, coconut etc near schools hospitals reduce the noise to the extent of 8 to 10 db.

5. Selection of machinery: Careful selection of machine tools and equipments to be used may help to lower the noise levels in machine shop.

8. What are the sources, effects and control of thermal pollution?

A. Pollution due to heat which changes the physical and chemical properties of the water that affects man, animals and the aquatic system.

Sources of thermal pollution

1. Industrial waste water

Industries generating electricity like coal powered and nuclear power plants need huge amount of cooling water for removing heat. Industries like textile, paper and pulp release heat in water to lesser extent. The discharged

water will have higher temperature of 6 to 9˚ C. than the receiving water.

2. Nuclear power plant

Nuclear explosion, nuclear experiments discharged large amount of heat with toxic radio nuclides in to receiving water sources. A leakage of radiation from nuclear power plant raises the temperature water bodies.

3. Domestic sewages

The domestic which contains high BOD, COD and low dissolved oxygen when discharged in to rivers and others water without treatment raises the temperature of water bodies.

4. Hydro electric power

An electric power industry with cooling arrangements also causes thermal pollution in receiving water bodies.

5. Coal fired power plants

These constitute the major sources of thermal pollution. Their condenser coil are cooled with water from nearby lake from river are discharged hot water back in to the stream. This increases the temperature by 15˚C. This decreases the dissolved oxygen and killing the aquatic life.

Effects of thermal pollution

1. Reduction in dissolved 0_2 as the temperature of water increases Increase in toxicity

Increase in temperature increases the toxicity of the poison present in water

Ex; a rise of 10˚ C doubles the toxic effect of KCN. A rise of 80˚ C triples toxic effects of orthoxylene causing massive death of fish.

Change in water properties

Rise in temperature changes physical and chemical properties of water Food shortage for fishes; Change in temperature alters the seasonal variation in type and abundance of lower organisms. Thus fish may lack right food at right time.

Interference with reproduction:

In fishes the activities like nest building, hatching, migration and reproduction depend upon optimum temperature. Change in temperature affects the above process.

Direct mortality:

The increase in the temperature exhausts the micro organisms and shortens their life span. Above a particular temperature a fish dye due to the failure in respiratory and nervous system.

Control of Thermal pollution:

Cooling towers:

Cooling towers transfers some of the heat from hot water to the surrounding atmosphere by the process of evaporation. Cooling towers are used to spread the recovered waste heat to eliminate the problems of

thermal pollution.

Types of cooling towers:

Wet cooling Towers:

Hot water coming from the reactor is allowed to spray over baffles .Cool air with high velocity is passed from the sides which takes away the heat and cools water.

Dry cooling tower:

Hot water is allowed to flow in long spiral pipes. With the help of fan cool air is possible over these hot pipes thereby cooling water.

Cooling Points:

Heated effluents on the surface of water in cooling points maximize dissipation of heat to the atmosphere and minimize water area and volume. Thus warm water wedge acts like cooling points.

Spray Points:

The water from the condenser is allowed to pass in to the ponds through sprayers. Water is sprayed through nozzles as fine droplets. heat from the fine droplets gets dissipated to the atmosphere.

Artificial lakes:

The heated effluents from the thermal power industries are discharged in to the artificial lakes at one end while cool water is transferred back from the other end. Heat is evaporated through dissipation in this method.

5. What are the sources, effects and control of solid wastes? How the salt wastes can be managed?

A. Management of solid waste is very important to minimize adverse effect of solid waste.

Types of solid waste

Urban waste and industrial waste.

Sources of urban and industrial wastes

Sources of urban waste: domestic waste like food waste, waste paper, glass bottles, polythene bags etc

.Commercial waste like packing materials cans, bottles, polythene bags etc

Construction wastes like concrete, wood, debris etc .Biomedical waste like Anatomical waste, infectious waste etc

Classification of urban waste:

1. **Biodegradable wastes** – urban solid waste materials that can be degraded by micro organisms are called biodegradable waste. E.g. food, vegetables, Tea leaves, dried leaves etc.

2. **Non biodegradable waste**.- Urban solid wastes that cannot be degraded by microorganisms are called non biodegradable wastes.

Types of solid waste

Urban waste and industrial waste.

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SOURCES OF INDUSTRIAL WASTES

The main source of industrial waste is chemical industries, metal and mineral processing industries. E.g.

1. Nuclear power plants generate radioactive wastes

2. Thermal power plants produce fly ash in large quantities

3. Chemical industries produce toxic and hazardous materials.

4. Other industries produce packing materials acid, alkalis, scrap metals, rubber, plastic, glass wood etc

EFFECT OF SOLID WASTE

1. Biodegradable materials in the disposed municipal waste undergo decomposition. This produces foul smell and breeds various types of insects which spoil land well.

2. Industrial waste containing toxic metals and hazardous waste affect soil characteristics.

3. Toxic substances name percolate into the ground and contaminates the ground water.

4. Burning of some industrial waste or domestic waste produces furan, dioxins and poly chlorinated biphenyls which are harmful to human beings.

STEPS INVOLVED IN SOLID WASTE MANAGEMENT

Reduce, reuse and recycle: if the usage of raw materials is reduced the generation of waste also gets reduced.

Reuse of waste materials: -discarded refillable containers can be reused. Waste generation during manufacture of rubber bands is reduced by making rubber bands from discarded cycle tubes.

Recycling of materials.- Recycling is the reprocessing of discarded materials into new useful products. Ex. Old aluminum cans glass bottles are melted into new cans and bottles.

Preparation of cellulose insulations from paper.
Preparation of fuel pallets from kitchen wastes.

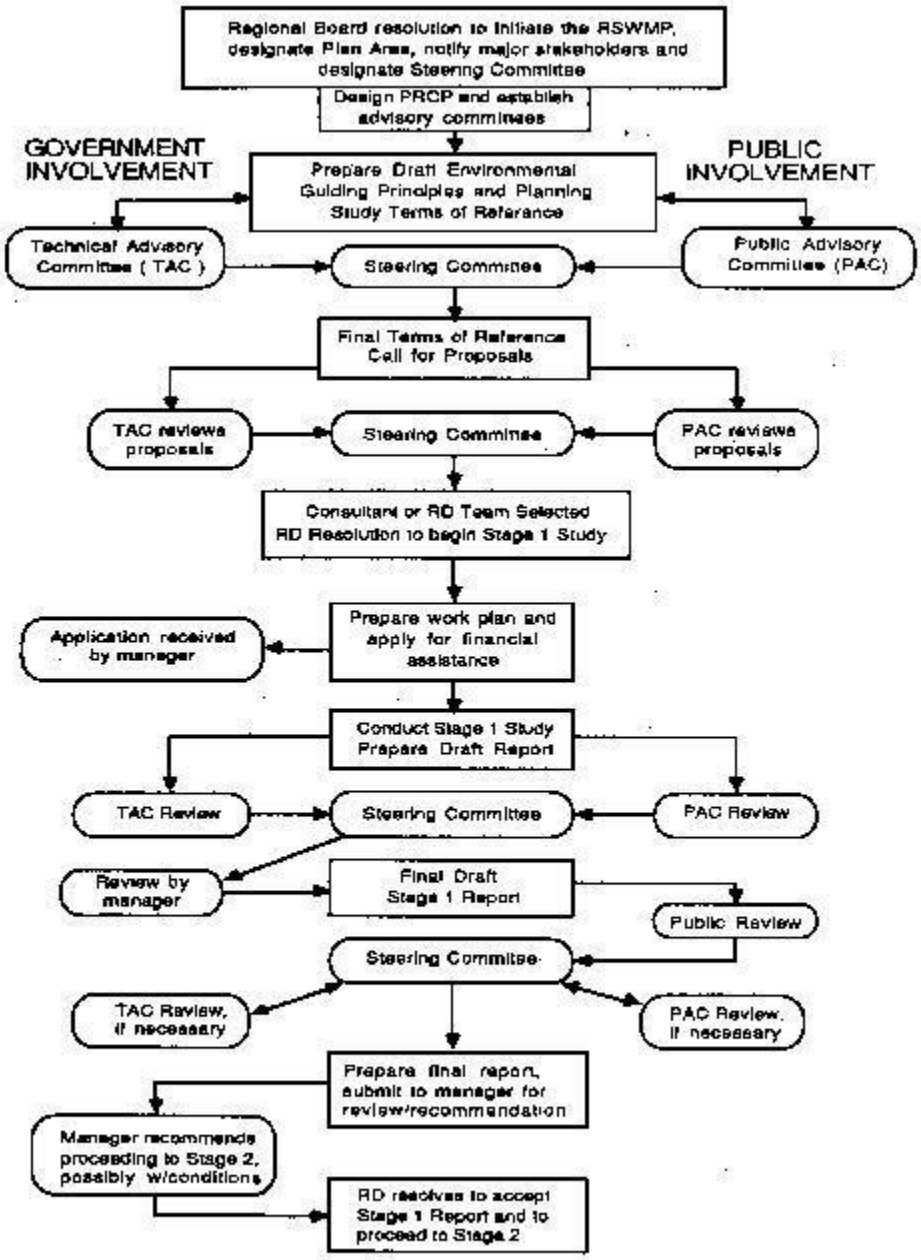

Figure 1
STAGE 1: WASTE MANAGEMENT SYSTEM / OPTIONS

METHODS OF DISPOSAL OF MUNICIPAL SOLID WASTES

1. Land Fill: Solid wastes are placed in sanitary land fill system in alternate layers of 80cm thick refuse covered with selected earth fill of 20cm thickness. After 2 or 3 years solid waste volume shrinks by 25-30% and the land is used for parks, roads and small buildings.Waste disposal is dumping in sanitary land fill which is employed in Indian cities. This method involves spreading the solid waste on the ground. Compacting it and then covering it with soil at suitable intervals.

Advantages: 1 Simple and economical. Segregation is not required. Natural resources are returned to

soil and reclined .Converts low lying, marshy waste land into useful areas.

Disadvantages: Large area needed. Bad odor. High transportation cost. Sources of mosquito, flies. Insecticides and pesticides are to be applied at regular intervals. Causes fire hazard due to methane formation in wet weather

2. INCINERATION- In this method the municipal solid wastes are burnt in a furnace called incinerator. The combustible substances such as rubbish, garbage, and dead organisms and non combustible matter such as glass, metals are separated before feeding into incinerator. The non combustible can be left out for recycling and reuse. The left out ashes and clinkers from the incinerator may be about 10-20 % which is disposed by land fill or some other methods. The heat produced in the incinerator during burning is used as steam power for generation of electricity through turbines. The wet solid waste is dried in pre heaters and then taken into large incinerating furnaces called destructors which incinerate 100- 150tons per hour. The temperature maintained is about 700 ˚ C and increase to 1000˚ C when electricity is to be generated.

Advantages:

1. Requires little space

2 .Hygienic point of it is safest.

3. Incinerated plants of 300 tons per day capacity generate 3 MW of power.

Disadvantages:

1. Capital and operational cost is high.
2. Needs skilled persons.
3. Formations of smoke, dust and ash causes air pollution.

3. COMPOSTING:

In this method bulk organic waste is converted in to manure by biological action. Compost able waste is dumped in underground trenches in layer of 1.5 meters and is finally covered about 20cm and left for decomposition. Microorganism like actinomycetes is added for active decomposition.

Within two to three days biological action starts .The organic matter decomposed by actinomycetes and lot of heat is liberated. The temperature of the compost increases by 75˚C and finally the refuse is converted to a brown colored powder known as humus and is used in agricultural fields. The compost contain N,P and other minerals.

Advantages:

Recycling occurs.

Number of industrial solid wastes can also be treated by this method.

Role of an individual in the prevention of pollution:

A small effort made by each individual at his own place will have pronounced effect at the global level. It is aptly said ―Think globally; Act locally‖

Each individual change his life style in such a way has to reduce environment pollution.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, TIRUPATI,

(AUTONOMOUS)

SUBJECT NAME; -ENVIRONMENTAL STUDIES-20AMC9903

UNIT-IV
SOCIAL ISSUES AND THE ENVIRONMENT

ESSAY TYPE QUSTION AND ANSWERS

1. What is rain water harvesting? Give an account on the modern methods of rain water harvesting?

A. WATER CONSERVATION

The original source of water is precipitation from the atmosphere. The water available on the earth

May occur in all three stages as gas, liquid or solid. Temperature is the main factor in deciding the state of water. As a liquid, the water forms hydrosphere. About 75% of the Earth's surface is covered by the hydrosphere.

The process of saving water for future utilization is called conservation of water.

Need for water conservation.

1. Better life style requires more fresh water.
2. Agriculture and Industrial activities require more fresh water.
3. As the population increases the requirement of water is also more .

Strategies of water conservation

Reducing evaporation losses

Evaporation of water in humid regions can be reduced by placing horizontal

Barriers of asphalt below the soil surface.

Reducing irrigation losses

Sprinkling and irrigation conserves water by 30- 40%. Irrigation in early morning (or) later evening reduces evaporation losses.

Growing hybrid crop varieties also conserve water.

Reuse of water

Treated waste water can be reused for irrigation. Water from washings, bath rooms etc. can be used for washing cars, gardening.

Preventing of wastage of water

Closing the taps when not in use and repairing any leakage from pipes .

Decreasing run off losses

Run off, on most of the soils can be reduced by using contour cultivation (or) Terrace farming.

Avoid discharge of sewage

Disposal into natural water resources should be avoided

Methods of water conservation

Rain water Harvesting and Watershed management

WATER HARVESTING:
It means capturing rain where it falls or capturing the run off in your own village or town. And taking measures to keep that water clean by not allowing polluting activities to take place in the catchment.

Therefore, water harvesting can be undertaken through a variety of ways

- Capturing runoff from rooftops
- Capturing runoff from local catchments
- Capturing seasonal floodwaters from local streams
- Conserving water through watershed management

These techniques can serve the following the following purposes:

- Provide drinking water
- Provide irrigation water
- Increase groundwater recharge
- Reduce storm water discharges, urban floods and overloading of sewage treatment plants
- Reduce seawater ingress in coastal areas.

In general, water harvesting is the activity of direct collection of rainwater. The rainwater collected can be stored for direct use or can be recharged into the groundwater. Rain is the first form of water that we know in the hydrological cycle, hence is a primary source of water for us. Rivers, lakes and groundwater are all secondary sources of water. In present times, we depend entirely on such secondary sources of water. In the process, it is forgotten that rain is the ultimate source that feeds all these secondary sources and remain ignorant of its value. Water harvesting means to understand the value of rain, and to make optimum use of the rainwater at the place where it falls.

Rainwater harvesting : It is a technique of collecting and storing rain water for use in non-monsoon periods. In the present age, concrete houses, well-built roads, footpaths and well –concreted courtyards have left few open grounds. With the decrease in natural forest cover, increase in concern jungles and the decrease in exposed earth; very little open ground is left for water to soak in and thereby increase the ground water table. So, artificial recharging of the ground water is extremely essential. It is done through rain water harvesting. For the purpose, rain water is collected at the roof top or in an open well and then carried down for immediate use or it is directed into the aquifer.

Rain water harvesting techniques

There are two main techniques for rain water harvesting:

1. Storage of rain water on the surface for future use
2. Recharge of ground water

Recharge of ground water is a recent concept and the structures used for the purpose are:

- Pits
- Trenches
- Dug wells
- Hand pumps
- Recharge shaft
- Lateral shafts with bore wells
- Spreading technique

Objectives of rain water harvesting.

- To raise the water table by recharging the ground water.
- To minimize water crises and water conflicts
- To reduce rain water runoff and soil erosion.
- To reduce the ground water contamination from intrusion of saline water

Concept of rain water harvesting

Rain water harvesting involves collecting water that falls on roof of house during Rain and conveying water through pvc or Al pipe to a nearby covered storage tank.

Method of rain water harvesting

1. Roof top method: collecting rain water from roof of the building and storing in the ground. It is the low cost and effective technique for urban houses and buildings.

2. The rain water from roofs, road surfaces, play grounds is diverted into the surface tank or recharge pits. The pit base is filled with stones and sand which serves as a

3. Sand filter.

Advantages:

Rise in ground water level.

Minimizing the soil erosion and flood Hazards. Scarcity of water is reduced

Rainwater harvesting systems channel rainwater that falls on to a roof into storage via a system of gutters and pipes. The first flush of rainwater after a dry season should be allowed to run to waste as it will be contaminated with dust, bird droppings etc. Roof gutters should have sufficient incline to avoid standing water. They must be strong enough, and large enough to carry peak flows. Storage tanks should be covered to prevent mosquito breeding and to reduce evaporation losses, contamination and algal growth. Rainwater harvesting systems require regular maintenance and cleaning to keep the system hygienic.

WATERSHED MANAGEMENT

Water shed (or) drainage basin: It is defined as land area from which water drains

Under the influence of gravity into stream, lake, reservoir (or) other body of surface water.

Watershed management of rain fall and resultant run off is called watershed management.

Factors affecting watershed :

1. Overgrazing. Deforestation, mining, construction activities affect and degrade watershed.
2. Droughty climate also affects the water shed.

Need or objectives of watershed management

1. To rise the ground water level.
2. To protect the soil from erosion by runoff.
3. To minimize the risks of floods, drought and landslides.
4. To generate huge employment opportunities in backward rain fed areas to ensure security for livelihood.

Watershed management techniques

Trenches (pits) were dug at equal intervals to improve ground water storage.

Earthen dam or stone embankment must be constructed to check runoff water.

Farm pond can be built to improve water storage capacity of the catchment's area

Maintenance of watershed

Water harvesting: Proper storage of water in water shed can be used in dry season In low rainfall areas.

Afforestation and agro-forestry help to prevent soil erosion and retention of moisture in watershed areas

Reducing soil erosion: Terracing, contour cropping minimize soil erosion and run off on the slopes of water sheds/

Scientific mining and quarrying minimse the destructive effect of mining in water shed areas

Public participation is essential for water shed management. People should be motivated for maintaining water harvesting structures implemented by the government.

Livestock population should be reduced in surrounding villages of water shed.

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2. What is acid rain? What are the major impacts of acid rain? How can we control it? Give an account on the agents responsible for ozone depletion?

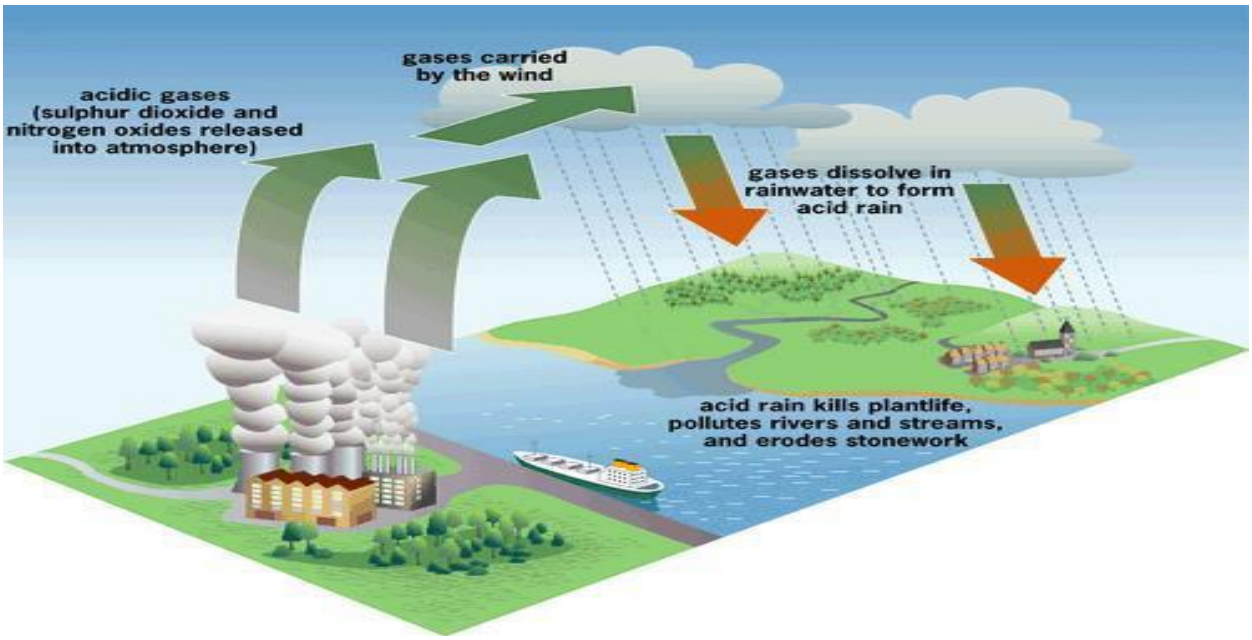
A. ACID RAIN:

Normal rain water is always slightly acidic (pH 5-5.6) because of Co2 present in the atmosphere gets dissolved in it. Because presence of SO2 and NO2 gases as pollutants in the atmosphere. The pH of the rain is further lowered. This type of precipitation of water is called acid rain.

Formation:

Acid rain means the presence of excessive acids in the rain water. The thermal power plants industries and vehicles release NO2 and SO2 in to the atmosphere due to the burning of coal and oil. These gases reacts with water vapor in the atmosphere and from acids like HNO3, H2SO4.These acids descends on to the earth as acid rain through rain water.

Sox +H2O
H2SO4 NOy
+H2O HNO3



EFFECTS:

Effect on human being:

Human nervous system respiratory system and digestive system are affected by acid rain. It cause premature death from heart and lung disorder like asthma, bronchitis.

On building:

At present TajMahal in Agra is suffering due to SO2 and H2SO4 fumes from Madura refinery. Acid rain corrodes houses, monuments, statues, bridges and fences.

Acid rain causes corrosion of metals.

Terrestrial and lake Ecosystem.

Reduce the rate of photosynthesis and growth in terrestrial vegetation.

Acid rain retards the growth of crops like beans potatoe, carrot, spinach. Acid rain reduces fish population, black flies, mosquitoes, deer flies occurs largely which cause's number of complications in Ponds Rivers and lakes.

Activity of bacteria and other microscopic animals is reduced in acidic water. The dead materials are not rapidly decomposed. Hence the nutrients like N, P are locked up in dead matter.

Control of acid rain:

Emission of No2 and SO2 from industries from power plants should be reduced by using pollution control equipments.

Liming of lakes and soils should be done to correct the adverse effect of acid rain.
In thermal points low sulphur content coal should be used.

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3.OZONE LAYER DEPLETION

A.Ozone gas is present in the atmosphere. It is highly concentrated at the
stratosphere Between10to 50 Km above the sea level and is called as ozone layer.

Importance: O_3 protects us from damaging UV radiation of the sunlit filters UV- B radiation. Now days certain parts of O_3 layer is becoming thinner and O_3 holes are formed. Because of this more UV–B radiation reaches the earth's surface. UV –B radiation affects DNA molecules, causes damages to the outer cell of plants and animals. It causes skin cancer and eye disease in human beings.

Formation of O_3: It is formed in the atmosphere by photochemical reaction

$O_2 + hv$ ----------) $O^* + O^*$

The atomic oxygen reacts with molecular O_2 to form O
$_3$ $O^* + O_2 + M$ ----------) $O_3 + M$

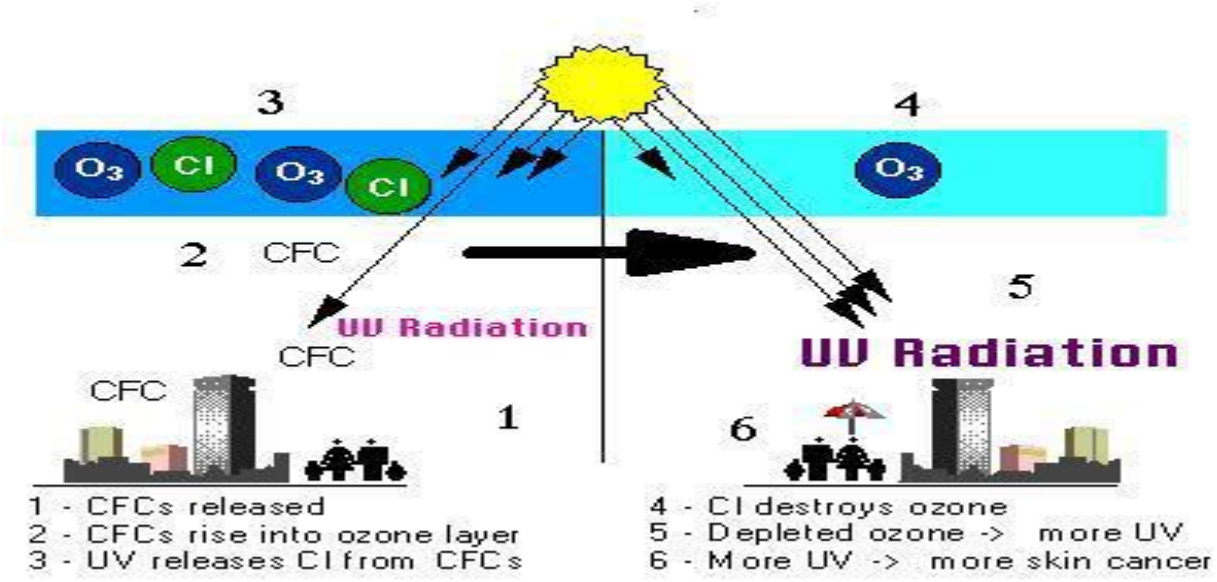
Where M = third body like nitrogen.

Causes of O_3 layer depletion: Refrigerators, air conditioners, aerosol sprays and cleaning solvents release CFC s into the atmosphere. CFCs releases chlorine which breaks O_3 to O_2

$Cl + O_3$ ----------) $Cl O + O_2$ (g) $Cl O + O$
* ----------) $Cl + O_2$

Each chlorine atom is capable of breaking several O_3 molecules. It is a chain reaction.
1% loss of O_3 results in 2% increase in UV rays reaching the earth surface.

Ozone depletion chemicals CFC, HCFC, BFC. Sometimes atmospheric sulfur dioxide is converted in to $H_2 S O_4$ which increases the rate of O_3 layer depletion.



Effects ozone layer depletion:

Effects on human beings 1.UV rays causes skin cancer. 2. Increases the rate of non melanin skin cancer in fair colored people.3.Prolonged expose to UV rays leads to actinia Fatalities (slow blindness) and cataracts.

Effects on aquatic system: 1.UV rays affect phytoplankton, fish, larval crabs
.2. Phytoplankton consumes large amounts of CO_2 .Decrease in phytoplankton results in
More amount of CO_2 in atmosphere. This contributes to global warming.
3. Ozone depleting chemicals can causes global warming.

Control measures: Manufacturing and using of O_3 depleting chemicals should be stopped. Use of methyl bromide .which is a crop fumigant should be controlled.

Replacing CFC s by other materials which are less damage

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4. a. writes a note on urban problems related energy?
b. Explain the concept of sustainable development?

A. Urban problems related to energy:

Urbanization –movement of human population from rural; areas to urban areas for want of better education, communication, health, employment etc.

Causes: Cities are the main centers of economic growth, trade transportation, medical facilities and employment.

Urban sprawl:

The phenomenon of spreading of the cities in to sub-urban or rural areas is called urban sprawl. Urban growth is so fast and is difficult to accommodate all commercial industrial residential and educational facilities within the limited area.

Energy demanding activities:

Urban people consume lot of energy and materials in comparison with rural people.This are because urban people have high standard of life and their life style demand more energy.

Examples for energy demands:

1. Residential and commercial lightings.
2. Industries using large proportion of energy.
3. Usage of fans fridge, A.C, washing machines.
4. Control and prevention of pollution technologies need more energy. Solution for urban energy problems:

1. Energy consumption must be minimized in all aspects.
2. Public transportation should be used instead of motor cycles and cars.
3. Using of solar energy and wind energy.
4. Production capacity must be increased.

From Unsustainable to Sustainable Development

Man is part of the nature and he is bound to obey the laws of nature. He depends on his environment for basic things. More developmental activities are adopted in order to increase the quality of life. For that he uses the available resources. The Earth has limited supply of resources and renewable resources. These are to be managed in a scientific manner for availing the generations to come. Hence developmental activities are to be taken with more care about the environment and its protection. It brings benefits to all not only to the present generation but also for future generations.

Sustainable development: Meeting the needs of the present without compromising the ability of future generation to meet their own needs.

Important components of Sustainable development:

1. Economic development
2. Community development
3. Environmental protection

True sustainable development aims at optimum use of natural resources with high degree of reusability, minimum wastage, least generation of toxic by-products and maximum productivity.

Aspects of sustainable development:

Intergenerational equity-it states stat we should hand over a safe, healthy and resourceful environment to future generation.

Intergenerational equity: A technological development of rich countries should support the economic growth of poor countries and help in narrowing the wealth gap and lead to sustainability.

Approaches for sustainable development:

1. Developing appropriate technology-technology which is locally adoptable, ecofriendly, resource efficient and culturally suitable should be adopted. It uses local labor, less resources and produces minimum waste.

2.Reduce ,Reuse and Recycle (3Rapproach) –Optimum use of natural resources using it again and again instead of throwing it on wasteland or water and recycling the material in to further products. It reduces waste generation and pollution.

3. Providing environmental education and awareness-Thinking and attitude of people towards earth and environment should be changed by providing environmental awareness and education.

4. Consumption of renewable resources- It is very important to consume the natural resources in such a way that the consumption should not exceed the regeneration capacity.

5. Non-renewable resources should be conserved by recycling and reusing.

6. By population control we can make sustainable development.

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5. Write short notes on a) Environmental ethics b) wastes land reclamation?

A. Environmental Ethics

It refers to issues, principles and guidelines related to human interactions with their Environment.

(OR)

Ethics is a branch of philosophy. It deals with morals and values. An ethic is a principle or value that we use to decide whether an action is good or bad.

Ethics differs from country to country.

Functions of Environment:

1. It moderates climate conditions of the soil.
2. A healthy economy depends on healthy environment.
3. It is the life supporting medium for all organisms.
4. It provides food, air, water and other important natural resources to the human beings .

Solution to environmental problems:

Reduce- the waste matter and energy resources.

Recycle and Reuse- as many of our waste product and resources as Possible. Avoid over exploitation of natural resources. Minimse soil degradation. Protect the biodiversity of the earth. Reduce population and increase the economic growth our country.

Ethical guidelines on environmental protection:

1. The earth is the habitat of all living species and not of human beings alone.
2. Natural resources and energies are depleting fast. We must protect them.
3. Involve yourself in the care of the earth and experience nature.
4. Respect nature, you are a part of it.
5. Think of the global cause and act for local protection
6. Keep yourself informed about ecological changes and developments.
7. Observe austerity, reserve scarce resources for the future and the future generations.
8. We must be cooperative, honest, affectionate and polite to society and nature.

WASTE LAND RECLAMATION

Waste land: The land which is not in use is called waste land. Waste land is unproductive, unfit for cultivation

Grazing etc. 20% of the geographical area of India is waste land.

Types of waste land: 1.Uncultivable waste land .2. Cultivable waste land. **Uncultivable waste land**: Barren rocky areas, hilly slopes, sandy deserts.

Cultivable waste land: These are cultivable but not cultivated for more than 5 years.Ex Degraded forest land,

Gullied water logged, marsh lands, saline lands.

Causes of waste land formation: 1.Over exploitation of natural resources.

2. Industrial and sewage wastes.3. Due to soil erosion, deforestation, water logging, salinity etc. 4. Mining activities destroy the forest and cultivable land.

Objects of waste land reclamation:

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

Methods waste land reclamation:

Drainage: Excess water is removed by artificial drainage. This is for water logged soil Reclamation.

Leaching: Leaching is a process of removal of salt from the salt affected soil by applying excess amount of water. Leaching is done by dividing the field into small plots. In continuous leaching 0.5to 1.0cm.Water is required to remove 90% of soluble salts.

Irrigation practices: High frequency irrigation with controlled amount of water helps to maintain better availability of water in the land.

Application of green manure and bio fertilizers improves saline soil.

Application of gypsum: Soil sodality can be reduced with gypsum. Ca of gypsum replaces sodium from the exchangeable sites. This converts clay back into calcium clay.

Social Forestry programme: These programmes involve strip plantation on road ,canal sides, degraded forest land etc.

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6. Describe Resettlement and Rehabilitation of people? Write the importance issues and rehabilitation policy?

A. RESETTLEMENT & REHABILITATION

Based on the resettlement schemes proposed by each affected village and present policies, laws and regulations of different levels of governments and the resettlement requirements of ADB, the Resettlement Plan of Lauding Expressway Project was prepared by PPTA consulting team and the staff from NPAEC under GPCD assisted by design institute and Local County and township governments.

Target and Task

Resettlement

Target

The overall objective of resettlement and rehabilitation is to ensure that the affected production base will be restored, the affected labor force will be re-employed, and income and livelihood of affected people will be improved or at least restored to their previous levels before resettlement.

At present, the rural population of project impact area is mainly engaged in agricultural actives, with most of their income coming from planting, economic trees, and animal husbandry. According to the actual production and living standard among affected villages, and the approved economic and social development plans for the relevant counties, the target of

Resettlement and rehabilitation is set as follows:

(1) The resettle's grain production level will be self-sufficient after resettlement.

(2) The income per capita shall be recovered to the standard before resettlement.

(3) The affected public infrastructures, school, hospitals, social welfare level, natural environment and traffic condition etc. shall be improved after resettlement.

Resettlement Task

In 2005, there were 2,829 households with 13,149 persons to be resettled or rehabilitated, in which 520 households and 2,352 persons will need house relocation.

Resettlement Guideline and Principle

Resettlement Guideline

The basic resettlement policy of Lauding Expressway Project is to respect the wishes of affected People and maintain their current production and living traditions. Based on consultation of local Affected peoples, the economic rehabilitation will be based on developing replaced farming Resources within their own townships and villages. Planting will be the focus of economic Rehabilitation strategy by developing new farmland and improving the remaining farmland in the Affected villages, and supplemented by developing various other income generation opportunities in the project areas. In other words, the resettlement and rehabilitation strategy will first to reestablish the physical production bases for the affected persons, which will provide a long-term development potential by fully utilizing local land resources.

Resettlement Principle

Under such policy, a number of resettlement and rehabilitation principles have been developed for the Project.

(1) The resettlement plan will be based on detailed inventory for land acquisition and houses Demolition, and adopted compensation standards and subsidies.

(2) The resettlement shall be combined with the local development, resource utilization and Economic growth as well as environment protection. Considering the local conditions, a Practical and feasible resettlement plan should be developed to restore or improve their Economic production and create basic conditions for long-term development.

(3) The resettlement plan should be based on the principle ―Beneficial to the production and Convenient for living‖.

(4) The re-construction standard and scale shall be based with the principle of recovery to the original standard and original scale. Combining the local development, the cost for

Enlarging the scale, raising standard and future plan shall be solved independently by local government and relevant department.

(5) Making overall plans and taking all factors into consideration, correctly handling the relations between the state, collective and individual.

(6) Fully utilize local natural resource, build water conservancy facility, develop new farmland,

Improve land quality, and strengthen agricultural strength and make the resettle' living standard reach or exceed the original level step by step.

(7) Resettlement Plan will include measures to improve basic livelihood and assist relocation and rehabilitation for those vulnerable persons and extremely poor individuals affected by the Project.

Overall Scheme of Resettlement

Since the construction of Lauding Expressway Project will only acquire limited land acquisition and demolition along the road alignment line, it will not have significant negative impacts on production and livelihood for most affected villages. A series of consultation meetings were held among affected villages and townships. According to the resettle's opinion and suggestion, and combined with the actual condition of affected area, the basic rehabilitation scheme was determined as follows:

(1). Project affected persons will be resettled within their original villages and village groups, so That their way of production, living and social relationship can be maintained, which will be beneficial for them to restore or improve their production and income level after resettlement.

(2) .In order to reduce the impacts on the production and livelihood among resettle's, the demolished houses will be dismantled after the new houses built. The reconstruction of houses will adopt two approaches. For most relocated households, they will choose to rebuild their houses by Themselves, and all salvage materials will belong to them. The second approach is for those who live near towns, their rehabilitation will be carried out by local government in order to promote small town development and save farmland.

(3) The rural relocated households will be resettled in their original villages. For those who lose Some farmland, the land-based rehabilitation will be adopted with a combination of developing new farmland, redistributing remaining farmland and receiving their share of resettlement subsidy among affected village groups.

(4) For small number of urban relocated households in Kong dong District, they will be provided cash compensated based on replacement value and to purchase replacement housing in the urban areas.

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7. State the importance provision in environmental protection act
A) Air Act B) Water act C) forest act D) wild life Act

A. **Air Prevention Act 1981**
(Prevention And Contol Of Pollution)

This act was enacted in the conference held at Stock Holm. It envisages the establishments of central and State control boards to monitor air quality and pollution control.

Important features: 1.The central board may lay down the standards for quality of air.
2. The central board co-ordinates and settle the disputes between state boards.
3. The central board provides technical assistance and guidance to state boards.
4. The state boards are empowered to lay down the standards for emission of air pollutants from industries or other resources.
5. The state boards are to examine the manufacturing processes and control equipment for the prescribed standards.
6. The direction of central board is mandatory on state boards.
7. Without the consent of the central board operation of an industrial unit is prohibited in heavily polluted area.

8. Violation of law is punishable with imprisonment for three months or fine of Rs 10000 or both.

This act applies to all pollution industries. This act empowers the state board to order closure of any industrial unit or stoppage of water supply or stoppage of electricity.

Water (prevention and control of pollution) Act.1974.

This act provides for maintaining and restoring the sources of water. It also provide For preventing and controlling water pollution.

Features of water act.

1. This act aims to protect the water from all kind of pollution and to preserve the quality of water in all aquifers.
2. The act further provides for the establishment of central board and state boards

For prevention of water pollution.

3. The states are empowered to restrain any person from discharging a pollutant (or) sewage or) effluent into any water body with out the consent of the board.
4. The act is not clear about the definition of pollutant, discharge of pollutant Toxic pollutant.

The amendment act of 1988 requires permission to set up an industry Which may discharge effluent?

FOREST (COSERVATON) ACT 1980

This act is enacted in 1980. It aims to arrest deforestation. This act covers all types of Forests including reserved forests, protected forests and any forest land.

IMPORTANT Features of the act :

1. The reserved forests shall not be diverted or dereserved wit out the permission of central govt.
2. The forest land may not be used nonforest purposes.
3. This act stops illegal activities within forest area.

Features of amendment act of 1988

.1.Forest departments are departments are forbidden to assign any forest land by way of lease or to any private person or NG body for re- Afforestation.

2. For re-Afforestation clearance of any forest land is forbidden.
3. The division of forest land for non –forest uses is punishable.

WILD LIFE ACT 1972.

This act was amended in 1983, 1986, and 1991.

This act is aimed to protect and preserve all animals and plants that are not domesticated. India has 350 species of mammals, 1200 species of birds and about 20000

Known species of insects. Some of them are listed as endangered species in wild life protection act.

Wild life is declining due to human action. Wild life products like skins, firs, feathers, Ivory etc. have decimated the population of many species.

Wild life population monitored regularly and management strategies formulated to protect Them.

Important Features1The act covers the rights and non- rights of forest dwellers.

2. It allows restricted grazing in sanctuaries but prohibits in national parks.
3. I t also prohibits the collection of non timber forest.

4. The rights of forest dwellers recognized by forest policy of 1988 are taken away by Amended wild life act of 1991.

Environment (Protection) Act 1986

This act empowers the central govt. to fix the standards for quality of air, water, soil, and noise. The central govt. formulates procedures and safe guards for handling of hazard substances.

Important features: 1. this act empowers the govt. to lay down procedures and safe guards for The prevention of accidents which cause pollution and remedial measures if accidents occur.

2 The govt.has the authority to close or prohibit or regulate any industry or its operation if The violation of provisions of the act occurs.

3. Violation of the act is punishable with imprisonment for 5 years or fine of one lakh or both.

4. If violation continues an additional fine of Rs5000 per day may be imposed for entire period of Violation of rules.

5 The act empowers the officer of the central govt.to to inspect the sight or the plant or machinery for preventing pollution and to collect samples of air , water, soil and other materials from any factory Or its premises for testing.

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES, TIRUPATI,

(AUTONOMOUS)

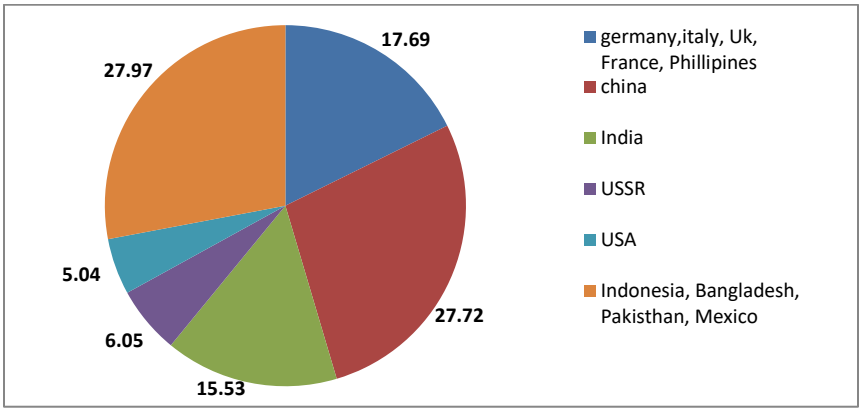
SUBJECT NAME; -ENVIRONMENTAL STUDIES-20AMC9903

UNIT-V
Human Population and the Environment

ESSAY TYPE QUSTION AND ANSWERS

1. Classify the population growth and characteristics and variations among nations?

A. Population Growth: - Results from the difference between the rate of birth and death. In 1980 the global population was about 1 billion people. In 1930 it reached 2 billion. In 1975 it reached 4 billion within 45 years. Now the population in 6 billion. It reaches 10 billion by 2050 as per the World Bank calculation.



Germany,Italy, Uk, France, Phillipines	China	India	USSR	USA	Indonesia, Bangladesh, Pakisthan, Mexico
17.69	27.72	15.53	6.05	5.04	27.97

Annually growth of population in Global at 75 millions

Causes of rapid population growth:- 1. Due to decrease in death rate and increase in birth rate.

2. Availability of antibiotics, immunization increased food production, clean water and air, decreases the famine related deaths and infant mortality.

3. The poverty and illiteracy lead controlled growth of population.

4. Child Marriages

5. People's superstitions. People believe that it is because of God's grace.

Characteristics of P.G.:-

1. Exponential growth:- Population growth occurs exponentially live 10, 10^2, 10^3, 10^4 etc., Which shows the dramatic increase in global population in the past 160 years.

2. Doubling Time:- Time required for the population to double its size at a constant annual rate. It is calculated as follows

$$Td = 70 / r \qquad \text{When } r = \text{annual growth rate}$$

If a ration has 2 % annual growth its population will double in 35 years.

3. Infant Mortality:- Percentage of infant died out of those born in one year. This rate is decreased in

the last 50 years. This pattern widely in developing and developed countries.

4. Total fertility rates (TFR): Average number of children delivered by a woman in her life time. The TFR varies from 2 in developed to 4.7 in developing countries.

This ratio should be fairly balance in the society.

5. Male – female ratio: - Has been upset in many countries including China - India. In china the ratio of girls and boys is 100 – 140.

6. Demographic transition: P.G. is redacted to economic development. The birth rate and death rate full due to improved living conditions. This results in low population growth. This pheromones in called demographic transition.

7. Zero population growth:-Birth rate &death rate immigration in a population is equal.

Variation of population among Nation: At present the world's population has crossed 6 billion. Less developed countries (Africa, Asia, S.A) have 80% population while developed countries have only 20%. In most developed countries like USA, Canada, Australia population increases by less than 1%. But is less developed countries the population increases by more than 1% / year. Kenya is the fastest population growing countries in the world. When 20 million are residing. China & India's populate on was above 1000 million in 2000 years. Its share is 1/3 of the world population. Europe and N.H. accounts for 14% of world population.

Variation of pollution based on Age structure

Age structure of population can be classified into 3 classes.

Pre- productive population (0 – 14 years)

Reproductive population (15 - 44 years)

Post reproductive population (Above 45 years)

Variation of population is now explained based on the above three classes.

Pyramid shaped Variation of population (increase)

Eg. In India, Bangladesh, Ethiopia, Algerian Reproductive population is more in companion to pre reproductive population and post productive population. Hence the population increases.

Bell shaped variation of population:

Eg: In France, USA, UK, Canada etc., pre reproductive population and reproductive population is more (OR) less equal. Hence population growth in stable.

Urn shaped variation of populations

Eg: In Germany, Italy, Sweden,

In Japan pre productive age group population in smaller than the reproductive age group population. In the next 10 years. The number of people in reproductive age group less than before resulting in decrease of population

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2. What is meant by population explosion? Discuss the India Scenario? How the population growth can slow down?

A. **Population Explosion:** The enormous increase in population due to low death rate and high birth rate is called as population expansion.

Doubling time: The number of years needed for a population to double in size. The doubling time varies from country to country.

Name of the country	Doubling time
India, Turkey	28 years
Nigeria	27
Pakistan	21
USA	87
UK	231
France	117

Population growth is higher in less developed countries like asia,Africa,south America.

Developed countries like usa, uk, , Italy, soviet union

Cause of population explosion:

1. Invention modern medical facilities, reduces the death rate and increases birth rate, which leads to population explosion.
2. Increase of life expectancy is another important reason for population explosion. Eg:- In 1956, the average life expectancy of the human beings was 40 years. But now it is 61 years.
3. Illiteracy is one of the reasons for the population explosion.

Effect of population explosion (OR) environmental and social impacts of growing population

Poverty:

1. Population explosion leads to environmental degradation.
2. Population explosion causes over exploitation of natural resources. Hence there will be a shortage of resources for the future generation.
3. Increase in population will increases diseases, economic in equity and command wars.
4. Forests, grass lands are under threat.
5. The main reason for the growing unemployment in growing population.
6. Educating vast population is a very big task.
7. Population explosion is the main cause for pollution of air, land, water and noise.
8. Disposal of plastics and wastages is another problem of over population.
9. Scarcity of fuel is also due to population explosion.

Remedy: Fertility rate should be reduced by birth control programme.

Family welfare programme

Family welfare programme was implemented by Govt. of India as a voluntary programme. It is a policy of growth covering human health, family welfare children and women's right.

Objectives: 1.Slow down the population explosion by reducing fertility.

2. Pressure on the environment, due to over exploitation of natural resources is reduces.

Population stabilization Ratio:

The ratio is derived by dividing crude birth rate by crude death rate.

Developed countries: The stabilization ratio of developed countries is 1. Indicating zero population

growth.

1. Developed countries:-The stabilization ratio developed countries is 1,which is more or less stablzed,indicating zero population.

2. Developing countries:

The ratio of developing countries is rearing 3 which in expected to lower down by 2025.

Stabilization in developing countries is possible only through family welfare programmes.

Family planning Programme

If provides educational and clinical services that help couple to choose how many children to have and when to have them. Family planning programme provides information on birth spacing birth control and health care for pregnant woman and infants. It also reduced the number of legal and illegal abortions per year and decreased the risk of death from pregnancies.

Objectives:

1. Reduce infant mortality rate to below 30 / 1000 infants.

2. Achieve 100% registration of births, deaths marriage and pregnancies.

3. Encourages late marriages and late child bearing.

4. Encourages breast feeding.

5. Enables to improve woman's health education, employment.

6. Constrain the spread & Aids / HIV.

7. Prevent and control of communicable diseases.

Fertility control methods

a. Traditional methods

It includes taboos and folts medicine.

b. Modern methods

It includes birth control techniques like mechanical barriers, surgical methods, chemical pills and physical barriers to implantation. More than 100 contraceptive methods are on trial.

1. Permanent method:-sterilization is done by a minor surgery

a. Tubactomy:-It is female sterilization done by tying the tubes that carry ovum to uterus.

b.Vasectomy:-It Is Male Sterilization did by tying the tubes that carry the sperm.

2. Temporary method:-

a. Condoms:-Condoms are used by males to prevent sperm.

b. Copper Ts:-Small objects and can be placed by a doctor in fertilized. So that ovum cannot be implanted even if fertilized. They do not disturb any functions in the women's life.

C.orl pills injected drugs are available.

Family planning programme in India

1. In 1952 India started family planning programme.

2. In 1970 Indian govt. forced FP campaign all the over country.

3. In 1978 govt. legally raised the minimum age of marriage for men from 18 to 21 and for women 15 to 18 years.

4. In 1981 census report showed there is no drop in population. Hence funding for FP programme has been increased.

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3. What are the objectives and elements of value education? How can the same be achieved?

A. Value education:

Education is nothing but learning through which knowledge about a particular thing can be acquired with

the help of our knowledge and experience we can identify our value to understand ourselves and our relationship with other and their environment.

Types of Education:

1. Format Education:- (In this all leaning process are self related). All people will read write, will get good jobs and take with any problem with the help of formal education.

2. Value Education:- It is an instrument used to analyze our behavior and provide proper direction to our youth. It teacher the youth the distinction between right & wrong, to be helpful loving, generous and tolerant.

Eg:- If a person is highly, Qualified and well settled in life, something he does not know how to behave with his environment.

3. Value based environmental education:- The provides knowledge about the principle of ecology, fundamental of environment and biodiversity. It creates sense of duty to care for natural resources and to manage them in sustainable key.

Objectives:

1. Improve integral growth of human being.
2. To create altitudes and improvement towards sustainable life style.
3. To increase awareness about our national history, cultural heritage, constitutional rights, national integration.
4. To understand (about the) natural environment in which how land, air and water are interlinked.
5. To know about various living and non living organism and their interaction with the environment.

Types of values:

1. Universal values (or) social values:-These values tell about the importance of the human conditions. These are reflected in life, joy, love, tolerance, truth etc.

2. Cultural values:-These value various with respect to time and place. These are concerned with rights & wrong, good & bad true & false and behavior of human beings. It is reflected in language, education, law, economics, philosophy etc.

3. Individual values:-These are personal principles and the result of individual personality and experience parents & teachers are the main key to shape and individual values. I t is reflected in individual goods, relationship, commitments.

4. Global values:-Human civilization is a part of the planet. Nature and natural pheromone on the earth are interconnected and inter-linked with special bonds of harmony. If this harmony disturbed any where leads to catastrophic results due to ecological imbalance.

5. Spiritual values:-These promote conservationism and transform our consumerist approach. It is reflected in self restraint, self discipline, and contentement reduction of wants.

Methods of importing value education:-

1. Telling:-It is a process of developing value to enable a pupil to have a clear picture of a vale-laden situation by means of his own narration of situation.

2. Modeling:-It is a method in which a certain individual perceived as ideal values is presented to the learners as a model.

3. Role playing:- Acting out the true feeling of the actors by taking the role of another person but without the risk of reprisals.

4. Problem solving:-It is a method wherein a dilemma is presented to the learners asking them what decisions they are going to take.

5. Studying biographic of great man:- This method makes use of the lives of the great man as the subject matter for trying to elicit their good deeds and thoughts worthy for emulation.

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4. What is AIDS? What are the sources and mode of transmission of HIV infection?

A. AIDS:-Acquired immune deficiency syndrome
HIV:-Human immune deficiency virus

So everyone to know the facts about HIV/AIDS is spread importance.

Origin of HIV/AIDS:- Discover in 1983. Source of the virus is not beer identified spread through African monkey. Through vaccine programme – spread by small pox vaccine programme of Africa. Hepatitis – B Viral vaccine legmy and New York.

World scenario: 90% from developing countries. 13% of world's population live is Africa. Almost all states & African countries were affecters HIV.

India ranks 2nd in the world with 5 million affect people.

Scenario in India:

Large number of infected people is in Maharashtra & Tamil Nadu followed by Delhi, UP, Karnataka & Goa. Till sept-2003 a total of 24,667 cases are found in Tamil Nadu.

Factors influencing modes of transmission of HIV

1. HIV from infected person can pass to a normal person through blood contact, generally during unprotected sex with infected person.
2. Using needles or syringes, contaminated with small quantities of blood from HIV positive person also transmit HIV to others.
3. HIV can also pass from infected mothers to their bodies during pregnancy delivery or breast feeding.
4. Blood transfusion from the infected person at the time of the accidents or pregnancy also results in HIV AIDS.
5. Since the majority of HIV infections occur in women of child bearing age transmission of HIV to their new born babies happen easily.

Factors not influencing transmission of HIV

HIV is not spreading by the following activities – tears, food, air, cough, hand shake, mosquito, flies, insect bites, urine, normal kissing, cloths, toilet, bathroom etc.

Functions of HIV in human body

1. AIDS itself does not kill humans. The death occurred due to the attack of diseases of the weakening of immune system.
2. White blood cell (WBC) responsible in the formation of antibodies is called t-helper cells.
3. T-helper cells are the key infection fighters in the immune system.
4. The HIV enters in to the human body and destroys the T-cells as a result of which various types of infection diseases occur.

Symptoms or Diagnosis of HIV/AIDS

1. Many people have no symptoms, when they are first infected with HIV.some people get fever, headache, and fatigue.
2. During this time HIV is present in large amount in women and vaginal fluids and it is very easy to pass the infection to another portion.
3. Consumption of alcohol increases the HIV to infection of AIDS.

Major symptoms

1. Fever for more than one month.
2. Diarrhea for more one month.
3. Cough &TB for more than 6 month
4. Fall of hairs from the head
5. 10% of body weight get reduced within a short period

Minor Symptoms

1. Persistent cough for more than one month
2. General skin disease

3. Viral infection
4. Fungus infection in mouth and throat
5. Frequent fever, headache, fatigue (tide)

Control and Preventive Measures of AIDS

1. Education:

- Health education enables people to avoid indiscriminate sex and encourages the use of condoms.
- One should avoid the use sharing razors, needles and syringes.

2. Prevention of blood borne HIV Transmission:

- People on high risk groups should not donate blood.
- Blood should be screened for HIV before blood transmission and strict sterilization practices should be followed in hospitals.

3. Primary health care:

- AIDS awareness programmes should be encourages. Voluntary health agencies should participate in large.
- Training programmes to doctors and paramedical workers should be conducted.

4. Drug Treatment:

- Testing HIV positive does not mean the end.
- They can still stay healthy leading productive lives for many years.

5. Counseling Services:

- Services should be provided either in person or through telephone.

Effects of HIV/AIDS

- Large number of death occurs which affect environment and natural resource.
- More water is required for maintaining hygiene in AIDS affected locality.
- The people cannot perform work well due to lack of energy and frequent fever and sweating.
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5 Women and child welfare in India?

A. Women and child are usually soft, who suffer in a number of ways mainly because they are weak, helpless and economically dependent.

Women Welfare:

The main aim of women welfare is to improve the status of the women by providing opportunities in education, employment and economic independence.

Need of Women Welfare

Generally women face the following problems in the society. So there is an urgent need for policy

reforms and more stringent legislation, education and legal awareness among women for checking injustice towards her.

1. Generally women suffer gender discrimination and devaluation at home, at workplace, in matrimony, in public life and power.

2. High number of cases of dowry deaths, rape, domestic violence, criminal offences and mental torture to women.

3. The human rights of women are violated in the male dominated society.

4. Generally in policy making and decision making process, women are neglected.

Objectives of women welfare (or) Necessity of formation of women self help group

To overcome the above problems, a sound national strategy is needed with the following objectives.

1. To provide education.

2. To impart vocational training.

3. To generate awareness about the environment.

4. To improve the employment opportunities.

5. To aware problems of population.

6. To restore the dignity, status, equality and respect for women.

Objectives of A National Commission for Women

A National Commission for Women has been created by Government of India, its main objectives are

(i) To examine constitutional and legal rights for women.

(ii) To review existing legislations.

(iii) To sensitize the enforcement and administrative machinery to women's causes.

Environmental Degradation and women welfare

The developmental work not only affects the natural environment but also affects the traditional, social, cultural and family life of women.

Example -1

After losing the forest cover and getting rehabilitated from their native places, men usually migrate to towns for some job while the women are left behind to look after their family with little resources.

Example – 2

Mining projects play havoc with the life of rural women. Men can still work in the mines or migrate to towns for same job after getting compensation from the government. The displaced women are the worst affected as they do not get any compensation and depend on the men for wages.

Thus the issues related to their dignity and honor has not yet received any attention.

Measures (or) various schemes of various organizations towards women welfare

1. The National Network for women and Mining (NNWM):

It is fighting for a "gender audit" of India's mining companies.

2. United Nations Decade for women: It witnessed inclusion of several women welfare related issues on international agenda.

3. International Convention on the Elimination of All Forms of Discrimination against Women (CEDAW): It has created an international standard for the protection and promotion of women's human and socio-economic upliftment.

4. Non-Government Organizations (NGOs) as Mahila Mandals: It creates awareness among women of remote villages to empower them, train them, educate them and help them to become economically self-dependent.

5. Ministry for Women and Child Development: It aims to work for the upliftment of women by family planning, health care, education and awareness.

CHILD WELFARE:

Children occupy nearly 40% of total population. They are considered to be the assets of a society. Of 21 million children born every year in India, 20 million children in our country are estimated to be working as child labors in various hazardous industries like match industry, fire work industry, pottery industry.

Reasons for Child Labor:

1. Poverty: Poverty is the main reason to force these children to work in unhealthy conditions.

2. Want of Money: Parents require money for their family, so they are in a position to send their children for work.

Measures (or) various schemes of various organizations towards child welfare

1. UN Convention on Rights of Child (or) International Law:-It formulated a set of international standard and measures to promote and protect the well being of children in our society.

Rights of the Child: The international law defines right of the child to survival, participation, development and protection.

1. The right to survival: It emphasizes on good standards of living, good nutrition and health.

2. The right to development: It ensures access to education, childhood care and support, social security and recreation.

3. The right to participation: It means freedom of thought and appropriate information to the child.

4. The right to protection: It means freedom from exploitation, inhuman treatment and neglect.

2. World summit on children:-It had focused agenda for the well being of the children targeted to be achieved in the beginning of the new millennium.

3. Ministry of Human Resources Development (MHRD):-It concentrates on Childs health, education, nutrition, clean and safe drinking water, sanitation and environment.

Environmental degradation and child welfare: Children are most affected due to environmental pollution.

Water borne diseases are the biggest threat to children. Around 6 million children are affected by this disease in India. Even the child growing in the mother's womb, gets affected by environmental toxins.

Center for Science and Environment (CSE): Its scientific report says, "Children consume more water, food and air than adults, and hence more susceptible to any environmental contamination".

So, it is essential to keep the cleaner environment to our children for the better and healthy life.

6. Write short note on human rights?

A.Human Rights: - Human rights are the fundamental rights possessed by human beings irrespective caste, nationality, sex & language. The aim of Govt. is to ensure happiness to the entire citizen with equal rights.

Under the Indian constitution the following fundamental rights have been guaranteed to human beings.

1. Human right to freedom
2. Human right to property
3. Human right to freedom of religion.
4. Human right to culture and education.
5. Human right to constitutional remedies
6. Human right to Equality
7. Human right to against exploitation.
8. Human right to food and environmental
9. Human right to health

Human rights to freedom

1. Every citizen has the freedom to express his view freely.
2. Citizen can assemble at any place to express their views.
3. Freedom to form unions (or) associations.
4. Freedom to slant any profession.

Indian Constitution

Indian constitution provides for civil, social, cultural, educational and political rights.

Article -14 - equality before law.

Article -15- Prohibits discrimination on the ground of race, religion caste, sex (or) place of birth.

Article- 16- Provides equal opportunity for all citizens in regarding to employment.

Article -19- Provides for freedom of speech and expression, forming association and union.

Article -20- Protection from connection except in accordance with the law of the land.

Article -22- lays down the rights of a person in custody.

Article -24 -prohibits exploitation of labor children.

Article -25- grantees freedom to profess, practice and propagate a religion of one's choice.

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7. Discuss the role of information technology in environment and human health?

A. Role of IT in Environment: IT plays a vital role in the field of environment education. IT means collection, processing, storage and dissemination of information. The internet facilities, information through satellites, www and geographical information provides up to date information on various aspects of environment, weather.

Remote sensing: It refers to any method which can be used to gather information about an object without coming in contact with it. Gravity, magnetic, electromagnetic forces could be used for remote sensing. Remote sensing covers various disciplines from laboratory testing to astronomies. Now remote sensing is used to denote identification of earth feathers by detecting the characteristic electromagnetic radiation. That is reflected by the earth.

Components of a remote sensing system: The system consists of a **sensor** to collect radiation. Other important parts are a **platform**, an **aircraft**, a **balloon, rocket and satellite.**

The information received by the sensor is suitably manipulated and transported back to earth. The data's are reformed and processed on the ground to produce photographs, computer compatible magnetic tapes and digital storage medium.

Functions

1. Origin of electromagnetic energy.
2. Transmission of energy from the source to the surface of the earth and its interaction with the intervening atmosphere.
3. Interaction of energy with the earth surface.
4. Transmission of reflected or emitted energy to the remote sensor an a suitable platform through intervening atmosphere.
5. Transmission or recording of the sensor output.
6. Collection of ground truth and other information.
7. Data analysis and interpretation.

Applications

1 Agriculture: In India agriculture provides livelihood of 70% of population and contributes to about 35% of net nation product. We require optimal management of land and water resources along with high yielding variety seeds, fertilizer input.

Remote sensing can provide valuable information for land and water management.

2. Forests: Remote sensing provides information clearly on the type, density and extent of forest cover, wood volume and biomass, forest fire, encroachment etc.

3. **Land cover**: Spatial information on land is required at different scales depends upon use remote sensing data is converted to map. The spatial resolution plays a role on the scale of mapping.

4. **Water resources**: Remote sensing data has been used in many application related to surface water body mapping, ground water targeting, wet land, flood monitoring, reservoir sedimentation, water quality monitoring etc. One of the simplest applications is inventorying surface water body.

DATABASE:

It is the collection of inter related data on various objects. In the computer the information of database is arranged in a systematic manner.

Applications: I The ministry of environment and forest. They are compiling database on various biotic components. Database is also available for diseases likes HIV | AIDS. Malaria, Fluorosis.

National Management Information System (NMIS) : They compile database on R & D Projects along with information about research scientists and personnel involved.

Environmental Information System : It functions in 25 centers all over the country.

They generate net work of database in areas like pollution control, remote sensing, biodiversity, and desertification.

Geographical Information System (Gis)

It is **a** technique of superimposing various thematic maps using digital data on large
Number of inters related aspects.

Applications:1. Different thematic maps having digital information on water resources, Soil type, forest land, crop land, grass lands are superimposed on a layered form in computer using soft ware.

2. Interpretation of polluted zones, degraded lands can be made on GIS base.

3. GIS can be used to check unplanned growth and related environmental problems.

SATELLITE DATA:

It helps in providing correct and reliable information forest cover

Provides information of monsoon, ozone layer depletion Smog etc.

Helps in discovering reserves of oil, minerals.

WWW:

More current data is available on www on line learning centre.

Www .mhhe.com \ environmental science.

Multimedia Digital content manager (DCM) in the form of CD ROMS.

Application of computers in the field of Environment & human health:

1. Unknown parameters can be stimulated by computer techniques
2. EIA(Environmental Impact Assessment) problems can be analyzed
3. Inventories of emission sources are compiled and maintained
4. Net-work analysis, statistical analysis and the status of environmental pollutions can be high lighted
5. Comprehensive administrative system can be developed by using computer network techniques.
6. Remote sensing-Graphical Interface System are useful for coral reef mapping and ocean resources. They are also useful to access the loss of biodiversity/hot spots etc.

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