**ENVIRONMENTAL STUDIES**

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**Ecology:-**

 Ecology is defined as the scientific study of living organisms with each other and with their environment. This word comes from two Greek words oaks (home) and logy (study) [Mean ecology is the study of living organisms in their natural home interacting with their Surroundings] in other words Ecology is defined as the study of interaction of living organisms with their surroundings

**Classification of Ecology:-**

**Ecology**

On the basis of

 Taxonomic features On the basis of habitat On the basis of organization level

Plant Ecology Animal Ecology Aquatic Ecology Terrestrial Ecology Autecology Synecology

 Avian ecology Fresh water ecology Grassland ecology Population ecology

 Insert ecology Marine ecology Forest ecology Community ecology

Bacterial ecology Stream ecology Desert ecology Biome ecology

 Fungal ecology Ecosystem ecology

 Behavioral ecology

**Ecosystem: -** An ecosystem is defined as a natural ecological unit comprising of living organisms and non-living environment that interact to from a stable of supporting system e.g. Pond, desert, grassland, forest, garden etc.

**Types of Ecosystem:-**

**Ecosystems are of two types:-**

1. **Natural Ecosystems:** - Their ecosystem are self-operated under natural condition. These are further classified as
2. Terrestrial ecosystem e.g. desert, forest, grassland etc.
3. Aquatic ecosystem e.g. river, lake, pond, ocean etc.
4. **Artificial ecosystem: -** These ecosystem are made by human actives (by modification and converted condition in natural ecosystem). These are also further classified as.
5. Terrestrial ecosystem e.g. crop field, garden etc.
6. Aquatic ecosystem e. g. aquarium, dam etc.

**Structure of on ecosystem. Or**

**Components of on ecosystem**

Basically an ecosystem consists of two main components

1. Biotic component (Living beings)
2. Abiotic component (Non-living components, physical and climate factors)

 Eco System

 Biotic Component Abiotic Component

Producers Consumers Decomposers Physical component Chemical component

 Herbivore Carnivores Omnivores Detirivores

(iv)**Detritivores:.** Detritivores food on wastes of the living organisms, part of dead organisms and partially decomposed water e.g.

Ants, beetles termites

**Biotic component**:

1. **Predecesso**r: These are the generally the green plants, which on synthesize their food with the help of carbon dioxide and water in the presence of sunlight through the process of photo synthesis . These are also called autotrophs.
2. **Consumers:** These are the organisms which depend upon other living organisms for their food. Their also called heterotrophs. Consumers are further divided as follows :
3. **Herbivores:** These are the organism which directly food on plants. They are also known as primary consumers e.g. rabbit, goat, dear, cattle, etc.
4. **Carnivores:** .These are the organisms which good on other consumers. The Carnivores which food on herbivores (primary Consumers) are called secondary consumers e.g. frog, cat etc. The converses which food on other carnivores are called tertiary consumers e.g. tiger, Lion etc.
5. **Omnivores:** These are the organisms which food on both plants and animals e.g. man fox crone bear many birds etc.
6. **DE components**: these are the organisms which obtain their feed from dead bodies of producers (plants) and consumer (animals) and their organic wastes. These organisms are also called reducers because they and remove the dead bodies of the organisms. DE components are often called micro-consumers
7. **Abiotic Components**:
8. **Physical Components:** The rainfall temperature, sunlight wind, humidity, soil, water, availability etc. are some of the important Physical component which influence the ecosystem strongly.
9. **Chemical component:.** The major essential like carbon , hydrogen , nitrogen, phosphors, Sulphur, potassium, various salt and organic substances presents in the water or soil influence the ecosystem to a large extant.
10. **Importance of Ecosystem**: Ecosystem are important to human life because they provide a lot of valuable service which include everything from clean air and water to food and fuel ecosystem clean and store fresh water, maintain productivity , store and recycle nutrients ,about noise , maintain biological and genetic diversity , provide recreational opportunities , provide medicine etc.

**Characteristics of an Ecosystem:**

1. It is a major structural & functional units of ecology
2. The structure of an ecosystem is related to its species diversity. The more compels ecosystem has high species diversity.
3. The relative amount of energy required to maintain an ecosystem depends upon its structure.
4. Ecosystem mature lay passing from less compels to more compete stares.
5. Ecosystem vary size location, weather pattern and types.
6. The boundary of an ecosystem is not fixed because animals may wander from are place to another or seeds may be shifted by wind from our place to another.
7. There is a reciprocity between the living components of the ecosystem.

 **Carbon Cycle**:. Carbon cycle is form of the carbon dioxide is taken up by producers (plants) as a raw material for photosynthesis through which a variety of carbohydrates and organic substances are produced. These organic components are than passed to consumers i.e. herbivores & carnivores during respiration, human and animal released carbon dioxide back to the surrounding medium. Further the dead bodies of plants and animals as well as body wastes are DE components by micro- organisms to release carbon dioxide back to the surrounding medium. Carbon is also recycled by burning of fossils fuels. The carbon cycle is show in fig.

Combustion

 Cool, oilers

 Death and excretion

CARBON CYCLE

**Sulphur cycle:** The decomposition of the organic, sulphurous matter forms hydrogen sulphide. Oxidation of hydrogen sulphide forms sulphates plants consumers the sulphates forming proteins animal’s consumers the plants forming proteins. The dead animals and wastes products from sulphurous matter and complete the cycle.

Fig. **Atmosphere**

So4

H2 s

So2

 **Outgoing**

 **Land Ocean**

 **So2**

Plants Animal

Plants Animal

 **S**

 **Fossil fuel burning S H2S**

Dead Organic

Dead Organic

 **H2S**

Sedimentation

 **SULPHUR CYCLE**

**Sustainable Development:** Sustainable development may be defined or the successful management of resources for development to satisfy the cleaning human needs, while maintaining or enhancing the ability of environment and conserving natural resources

Sustainable development can also be defined as the development that meets the needs of the present without comprising the ability of further generation to meet their own weds this definition lays these upon two important things.

1. That nature resource are very important to every one of us, but the unborn future generation.
2. That is does not focus only on the present economic growth but take into account the future economic growth stores that we have no right to deny the right to life to future generation. Sustainable development is therefore, a type of development that takes into account the needs of the economic and the environment without compromising either of the aspects.

 **Nitrogen cycle**:. Nitrogen is presents in the atmosphere in large amount (78%) as N2 It cannot be used as such by living organisms. It has to be fixed to because, usable for green plants. It is fixed either by physical process of lighting or biologically by some bacteria. The decomposition of organic with genius matter forms ammonia and nitrogen. This of process called nitrification. Plants consume these products forming proteins. The wastes product and dead animals also form organic nitrogenous matter in short, this cycle consists of **(a)** Death of plants forms organic nitrogenous matters**. (b)** Nitrite Nitrogen may be converted to ammonia and nitrogen by denitrification.

 Fig. Nitrogen in atmosphere N2

Nitrogen in atmosphere (N2)

Atmospheric fixation by plants main or lighting

Plants

Animal water

Plants

Decomposers

Nitrogen fixation by plants

NH3/NH4

NO2

Nitrates No3

Denitrifying Bactria

**Nitrogen cycle**

**SOLID WASTE MANAGEMENT**

Solid waste in the broader sense includes all the discorded solid materials from residences, industries, medical establishments, business Houser, agrichttner sector etc.

**Classification of solid wastes:-**

**Solid waste can be classified as follows:**

1. Depending upon type of solid wastes:
2. Biodegradable solid waste
3. Non-biodegradable solid waste
4. Depending upon sources of solid waste:
5. Municipal solid waste
6. Industrial solid waste
7. Biomedical solid waste
8. Depending upon toxic nature of solid wastes:
9. Toxic solid waste
10. Nontoxic solid waste
11. **Depending upon type of solid wastes:**
12. **Biodegradable solid waste:-** The waste material that can be degraded by micro-organisms to harmless or non-poisonous substances are called bio degradable solid waste e. g. vegetable peelings, discarded food, green waste, form residue, paper and cardboard etc. With proper treatment this waste can be used as manure, animal feed or converted into energy.
13. **Non-biodegradable solid waste: -** The wastes that cannot be degraded by micro-organisms are called non-biodegradable waste. These waste exists in the environment for a long time e. g. polythene bags, scrap metal, glass bottles, plastic, metal pieces, electronic components etc.
14. **Depending upon sources of solid wastes:**
15. **Municipal solid waste: -** Municipal solid waste consists of household waste, contraction and demolition debris, sanitation residue and wastes from streets.
16. **Industrial solid waste: -** Industrial solid waste consists of large number of material including factory rubbish, packaging material, organic waste, acids, alkali and metals etc. The main source of industrial waste are chemical industrials, metal and mineral processing industries.
17. **Biomedical solid waste; -** Biomedical waste or hospital waste consists of waste released by the hospitals, clinics, diagnostic centers etc. Biomedical waste include cotton, syringe, and glass plastic bottles, anatomical and can be a serious threat to human health if not managed in scientific manner.
18. **Depending upon the toxic nature of solid waste:**

( a**). Toxic solid waste:** the poisonous wastes are called toxic wastes. Such wastes include pesticides, acid, al kialias, ratio active substance.

1. **Non – toxic solid waste:** the non-poisonous wastes are called non-toxic wastes. Such wastes include glass, ceramics, paper, wood scrap, leather, rubber etc.

**Effects of solid waste accumulation or mismanagement:-**

1. **Spoilage of landscape:-** Municipal wastes help up on roads den to improper disposal system. People clean their own houses and litter their immediate surroundings, which affects the community including themselves. Every year several tow of solid waste is dumped along the high ways and other places, there by spoiling the landscape.
2. **Pollution:** - Dumping of solid waste on land may pollution ground water and also the water bodies present in surrounding. When the waste is burin open, a layer of defuse black smoke covers the sets and its position can be located from miles around discharge without dir.-cleaning equipment is more harmful. This discharge also contains dioxide, introns oxide and various gases.
3. **Effects on soil:-** Heaps of solid waste may spread on the soil and change physio-chemical and biological characteristics of the soil. It adversely affects the fertility of the soil.
4. **Effect on terrestrial and aquatic life:-** Urban & industrial wastes affine contain a variety of toxic chemicals. Such chemicals may enter into the food chain and affect bother terrestrial and aquatic organisms.
5. **Health hazards:-** Heaps of domestic and Industrial wastes are dumped on vacant & unused land in residential areas which causes unhygienic conditions and ultimately results in outbreak of diseases like cholera, gastrin termites, malaria, dengue etc.
6. **Insects:-** insects (e.g. flies) transmit diseases to man from food or water. Flies live on food waste and 90% of the housefly populations in cites breed in open garbage cons.
7. **Rats & Rodents:-** The main source of food for rats and other rodents is waste & in rubbish dumps. They proliferate and spread to neighboring houses. Rats are responsible for horrifying diseases like plague, ratite fever, murine, typhus etc.
8. **Fire:-** Hat ashes added to combustible waste are the greatest source of fire. Sometime fires are caved due to heat glen off by decomposition or by glass on open tip acting as a lens for sunlight flammable industrial waste increases the danger fire.

**Waste Minimization Techniques:-**

1. **Optimization of Resources:-** In order to reduce the quantity of waste produced by individuals or organizations optimization of rune materials used in production should be done.
2. **Reuse of scrap metal: -** In crop orating scraps into the initial stages of manufacturing ensnares that they do not end up in landfills as waste pollutes. A majority of industries use this process effectively.
3. **Orality central and process Monitoring: -** Measures can be but in place to reduce the no. of rejection to the minimum. This may be achieved throngs increased frequency of inspection as well as increasing the no. of inspection points.
4. **Exchange of waste:-** The waste production from one process are used as rune materials for other process. Exchange of waste is another menus of minimizing waste disposal especially for waste that may not be eliminated.
5. **Delivery at the point of use:-** Raw materials as well as other components are directly delivered at the point of assembly or manufacturing to minimize handling and use of enclosures and protective wrappings.
6. **Zero Wastes:-** This technique is designed to eliminate waste from the source as well as at every but of the supply chain to ensnare that no waste I prod had.

**Solid Wastes Management:-** Indiscriminate disposal of solid waste cases adverse environmental effects the main objectives of solid waste management is to minimize these adverse effects before it becomes too difficult to rectify it in the future. Thus there are three basic functional elements of solid waste management.

1. **Collection:-** It refers to the gathering of solid waste from places such as residences, commercials, imitational and industrial establishments and other public places centrally there are two methods of collection – handled container system and stationary container system In these handle container system the container is handled from the collection point to the final point of disposal In the stationary container system the container is emptied into collection vehicles at the point of collection.
2. **Processing:-** It refers to the acuity applied to solid waste to prepare to for subsequent operation processing improves the efficiency of solid waste disposal and ore pares soiled waste far subsequent recycling.
3. **Disposal:-** Disposal is the third fundamental function of solid waste management. It refers to the placing of solid waste in its ultimate resting place.

**E- waste:-** E-waste means discarded electronic products such as computers, televisions, stereos, copiers, fax machines, cell phones, batteries etc. E-waste if not disposed of property, can leach lead and other substances into the solid and ground waste. Many of these products can be reused, recycled in an environmental friendly manner so that they are less harmful to the eco- system.

**E-waste management: -** Management of e-waste should begin at the point of generation. This can be done by waste minimization techniques and by sustainable product design. It involves the following.

1. **Inventory management: -** proper costal over the material also used in manufacturing process is an important way to reduce waste generation. By reducing both the quantity of hazardous material used in the process and amount of excess raw material in stock, the quantity of waste generated can be reduced. This can be done in two ways :) material purchase review ;) Inventory tracking system.
2. **Production process Modification: -** waste generation can be reduced by making changes in the reduction process i.e. by changing materials used to make the product or by efficient use of materials in the production process or by both.
3. **Volume Reduction: -** Volume reduction includes these techniques which removes the hazardous portion of the waste from the non-hazardous portion. These techniques reduce the volume and hence the cost of disposing off the waste material. The techniques used to reduce volume can be divided into two categories:-
4. Waste segregation b) Waste concentration.
5. **Recovery & Reuse: -** This technique eliminates waste disposal cost, reduces raw material cost & provides income from salable waste can be recovered on- site or off-site. A number of physical and chemical techniques. Ore available to reclaim waste material such as vacuum filtration, reverse or Moses, electrolysis, condensation, electrolytic recovery centrifugation etc. however recycling of hazardous products has little environment benefits if it simply moves the hazardous products into secondary products which are then have to be disposed of.

**Eco-Friendly Material:-**

Recycling is the Process of converting waste materials into new material. It is an alternative to conventional waste disposal. It prevent the waste the waste of potentially useful materials and reduce the consumption of fresh raw materials there by redoing energy usage, air pollution, water pollution. Recycling is an important component of modern waste management. of a material will produce fresh supply of the same material. E.g. paper.

Recycling of glass:- Glass can be recycled infinitely as its structure dose not deteriorate when reprocessed. For recycling glass bottles and tars are collected by curbside collection trucks and bottle banks where the glass collect is taken to a glass recycling plant where is monitored for purity and contaminates are removed. The cullet is crashed and added to a raw material mix in a melting furnace. It is then mechanically blown or molded into new bottles and jars. Glass cullet is also used in the construction industry as glass part. Glass phal is a read-laying material which comprises around 30% recycled glass.

Recycling of aluminum:- Aluminum is one of the most efficient and widely recycled material. All is shredded and ground into small pieces. These pieces are melted in an aluminum smelter to produce molten aluminum. By this stage the recycled aluminum is indicting is liable from virgin Aluminum and further processing is identical for both. This process does not processing any change in the metal and hence aluminum can be recycled indefinitely.

Recycling of Iron and steel:- Iron and steel are the world’s most recycled materials. These are among the easiest materials to reprocess as these can be separated magnetically from the waste stream. Recycling is via a steelworks. Scrap is either remitted in an electric are furnace. Any grade of steel can be recycled to top geniality new metal. Steel can be recycled repeatedly.42% of crude steel produced is recycled steel.

Recycling of Timber:-Recycling of timber has become popular due to its image as an environmental friendly product. Consumers commonly believe that purchasing recycle wood will reduce the demand for green timber and will ultimately benefit the environment. Arrival of recycle timber as a construction product has been important in raising awareness among industries and consumers towards deforestation and promoting timber mills to adopt more environmentally friendly practices.

Advantage of great extant because

* Recycling minimize all type pollution’s to a great extant because by this process industrial waste products rather than just being thrums angry.
* The major advantage of recycling is that it protects the nature in the must balance way e.g. recycled paper reduced deforestation.
* It is perfectly true that recycling minimize global warming and its grave impacts. The process of recycling involve min. composition and waste is converted into reusable martial with min. harmful impact on the environment.
* Recycling conserves nature resources as it reduces the demand of fresh raw material.
* Recycling of old and used material into reusable products, reduces the possibility of choking landfill sites to a great event.
* Recycling contributes to creation of jobs as the process involved in recycling like collection and delivery are carried out by humans , so this will triggers the opportunities

**Disadvantages of Recycling:**

* Recycling is not always cost effective sometimes it requires a lot of capital for building up new waste recycling plant, for different kinds of utility vehicles for up a recycling units , for waste and chemical disposal.
* Recycling sites are always unhygienic, unsafe and usely. The harmful chemical from waste are dangerous also there is always danger of infectious diseases.
* The quality of products manufactured from recycled waste may not be up to marks and may be less durable.
* Though recycling plays a vital role in reducing the rate of pollution, but it has not been widely developed.

**Green Building:**

* Green building is also known as green construction or sustainable building .A green building is one which uses less water optimize energy efficiency, convers nature resources , generates loss waste and provide healthy space for occupants as compared to a conventional building .Indian green building council is leading green building movement in the country.

Thus the concept of green building focuses mainly on two points:-

1. Increasing the efficiently with building use energy water and materials.
2. Reducing building impact on human health and the environment, through better site selection, design, construction, operation, maintenance and removal throughout the complete life cycle.

Components of Green Building:-

1. Site Selection:- Construction green building starts with the proper site selection. The site selected should have easy availability of public transport and conveniences so to cut down the energy consumption for transportation. Also rehabilitation of site damaged by environmental contamination is a better option than any new piece of lend.
2. Materials of Resources:- 1.) sustainable construction material are chosen keeping in mind various properties such as low or zero toxicity, high recyclability, low are zero emissions of harmful gases on the air, durability, reused and recycled products, sustainably harvested materials etc.

ii) Utilization of rapidly renewable materials such as bamboo flooring, wool carpets, strawboard etc. reduces the use and depletion of finite raw materials.

1. Water efficiency:- I.) Installing water efficient or low water flow equipment’s in kitchens and bathrooms to reduce water consumption.

ii) incorporating waste water management techniques like dual plumbing for using recycled water in toilet flashing or using water conserving fixtures such as low flow shower heads, self-closing nozzles on hoses, water closets with dual flush options.

iii) Use of micro irrigation techniques are site instead of high sprayers.

iv) Recirculation system for centralized hat water distribution.

v.) integrating rain water harvesting system in building design to ensure maximum possible urination of rain water.

 Benefits of Green Buildings:- with the constant development of new technologies to complement current practices in creating greener structures, the benefits of green building can range from environmental to economic to social. Benefits of green building are as follow:

1. Environmental Benefits:-
2. Reduce wastage of water
3. Conserve natural resources
4. Improve air and water quality
5. Protect biodiversity and ecosystem
6. Economic Benefits:-
7. Reduce operating casts
8. Improve occupant productivity
9. Create market for green products and services
10. Social Benefits:-
11. Improve quality of life
12. Minimize strain on local infrastructure
13. Improve occupant health and comfort