Chapter-1 ENV

Multidisciplinary nature of Environmental studies: Defn, scope & impo.

Defn → Environmental studies developed because of the fusion of 3 disciplines (i) Earth science, (ii) Social Scienc (iii) Life science.

→ The Life sc. deals with aquatic ecosystem terrestrial ecosystem, grass ecosystem, study of all animals & all plants.

(iii) Earth sc. deals with study of hydrology, study of atmospheric science, meteorology, Geology, study of geography

(iii) Social science gives laws, policies, politics, management Engineering, ethics

— All these things involved in Environmental studies.

Environment It is the sum total of Social, economical, biological & chemical factors which constituted the surroundings of humans being.

Scope of Environmental studies :-

(i) Developing an awareness & sensitivity to the total environment & it's related problems.

(ii) Motivating people for active participation in environmental protection & improvement

(iii) Developing skills for active identification & development of solutions to environmental problems.

(iv) imbibe & inculcate the necessity for conservation of natural resources.

(v) Evaluation of environmental programmes in terms of social, economic, ecological & aesthetic factors

Impo. of Environmental studies

In the industrialized era that we live today, every components that we intake - be the air, water or food are contaminated by industrial activities. — to minimize this problem, knowledge of environmental study is ~~need~~ essential.

— The environmental study will help us in
(i) we will begin to appreciate & adopt the idea of sustainable development without destruction of the environment.
(ii) knowledge about various types of environments & diff. environmental hazards.
(iii) playing an effective role in protecting the environment by demanding changes in law & enforcement system
(iv) Having a positive impact on quality of life
(v) Creating a concern & respect for the environment

Need for public awareness:-

→ Increasing population, urbanization & poverty have generated pressure on the natural resources & lead to a degradation of the environment.

→ To prevent the environment from further degradation, the supreme court has ordered & initiated environmental protection awareness through government & non-government agencies to take part in protecting our environment.

→ Environmental pollution can't prevented by laws alone. public participation is equally important with regard to environmental protection.

→ Environmental education is a process of learning by giving an overall perspective of knowledge & awareness of the environment.

→ It sensitizes the society about environmental issues & make them interested to develope skills & expertise to provide appropriate solution.

→ climate change, loss of biodiversity, ozon layer depletion, ~~illegal~~ destruction of habitats, land degradation, depleting grand water supplies, introduction of alien species, environmental pollution, etc a serious threat to ecosystem in forest, rural, urban & marine ecosystems.

→ Hence, both formal & informal education on the environment will give the individual the knowledge, values, skills & tools needed to face the environmental challenges on a local

Chapter-2 Natural Resources

~~Natural resources & Associated problems~~ :-

Resources :- Resource is a ~~type of~~ natural environment or it is a part of natural environment which is useful in welfare of human beings or which satisfy the human need → it may be natural or man made

natural resource :-

natural resources are the substances which are inherent to earth & obtained from natural & utilized to create product & service which are useful for human beings.

ex Forest, water, air, soil etc

→ natural resources ~~are of two~~ can be classified into 2 categories. ① Renewable ② non-renewable

Renewable & non-renewable resources :-

Renewable Res : Renewable resources are those resources that can be replenished or renewed naturally over time.

ex Air, water, wind, solar energy etc.

non-renewable Res : Non-renew res are those natural resources that are available in limited quantity.

- These Resources can't be renewed or replenished in short duration.
- Therefore they are also called exhaustible resources

ex Coal, natural gas, petroleum etc.

Forest resource : It is a dense growth of trees, covering a large area of land. Forest is one of the most natural resources on this earth. about 1/3rd of the world's land area is forested.

Uses of forest :-

Commercial use :- forest provides a large no of commercial goods which includes timber, firewood, pulpwood, food items, gum, resin, non-edible oils, rubber, fibers, lace, bamboo canes, medicine, drugs etc.

- Timber is used for heating & cooking. lumber is used for building material, plywood, hardwood are converted into pulp & used for paper industry, many forest lands are used for mining, agriculture, gazing & recreation & for development of dams.

Ecological use :- These trees produce oxygen by

is absorbed by forest affecting photosynthesis
problem of global warming.
(iii) wild life habitat: Forests are the home of millions of wild animal & plants
(iv) Regulation of hydrological cycle: forested watersheds acts like giant sponges, absorbing the rainfall, slowing down the runoff & slowly releasing the water for recharge of spring
(v) Soil conservation: forest binds the soil particle tightly in their roots & prevent soil erosion
(vi) pollution moderators: forest can absorb many toxic gases & can help in keeping the air pure & clean.

Over exploitation of forests.

- Humans are dependent heavily on forest for food, medicine, shelter, wood & fuel. with growing civilization the demands for raw material like timber, pulp, mineral, fuel, wood etc shooted up resulting large scale logging, mining, road building & clearing of forests.
- Excessive use of fuel wood & charcoal, expansion of urban, agricultural & industrial area have together led to over exploitation of our forest leading to their rapid degradation.

Deforestation:-

Deforestation is when human remove or clear large areas of forest lands & related ecosystems for non-forest use. These includes clearing of forest for farming purpose. ranching & urban use.
- Since the industrial age, about half of world's original forests have been destroyed & millions of animals & living things have been endangered.

Causes of deforestation:-

1. Agricultural activities: Due to overgrowing demand for food, products, huge amount of trees are fell down to grow crops & for cattle grazing.
2. Logging: wood based industries like paper, match-sticks furniture etc need a substantial amount of wood supply. wood is also used as fuel, fire wood, charcoal are example of wood being used as fuel.
3. Urbanization: trees are cut to create roads, to directly affect forest covers,

as with the expansion of cities more land is needed to establish housing & settlements. Therefore forest land is reclaimed.

4. ~~Deforestation of land~~:

4. Mining: Oil & coal mining require considerable amount of forest land. Apart from this roads & highways have to be built to move away for trucks & other equipment.

5. Fires: Hundreds of trees are lost each year due to forest fires in various portion of the world. This happens due to extreme warm summers & milder winters. Fires whether caused by man or nature results in huge loss of forest cover.

Major Consequences of deforestation:-

(i) It threatens the existence of many wild life species due to destruction of their natural habitat.

(ii) biodiversity is lost & along with that genetic diversity is eroded.

(iii) Hydrological cycle gets affected, thereby influencing rainfall.

(iv) problems of soil erosion & loss of soil fertility increases.

Effect of timber extraction: ~~deforestation~~ forest

~~Timber~~ There has been unlimited exploitation of timber for commercial use, due to increased industrial demand; → timber extraction has significant effect on forest & tribal people they are.

(i) Thining of forest.
(ii) Loss of biodiversity, especially the tree breeding birds
(iii) Soil erosion & loss of fertility.
(iv) loss of tribal culture.
(v) Migration of tribal people in search of new forests.

Effect of Mining: Mining is a process of removing deposits of ores from the ground level.

- Mining operation for extracting minerals & fossile fuels like coal often includes vast forest areas.

types: · Surface Mining - shallow deposits of ores.
Sub Surface Mining - deep deposit. " "

effects: (i) Clear cutting of forest leads to deforestation
(ii) Soil erosion & loss of water resources
(iii) formation of acid drainage in case of coal mining.

Dams & their effects on forests :

Pandit Jawaharlal Nehru referred dam & valley projects as "temples of modern India". These big dams & river valley projects have multi-purpose use's. However, these dams are also responsible for the destruction of forests.

→ Big dams have been in focus of various environmental groups all over the world which is mainly because of several ecological problems including deforestation & socio-economic problems related to tribal or people associated with them

eg: → The silent Valley hydroelectric project was one of the first such project situated in tropical rain forest area of western ghat which attracted much concern of the people.

→ The case of Sardar Sarovar dam related issues have been taken up by the environmental activities medha patkar, joined by Arundhati Roy & Baba Amte

→ For building big dams large scale devastation of forest takes place which breaks the natural ecological balance of the region. Floods, droughts & landslides become more prevalent in such areas.

→ Forest are the repositories of invaluable gifts of nature & deforestation results in loss of this storehouse of species which have evolved over millions of year in a single stroke.

Water resources :

Water is the most abundant, inexhaustible resource. It covers 70% of the globe in the form of ocean, river, lakes, etc. out of this 70%, only 3% is available as freshwaters. From this 3%, 2% is frozen in polar ice caps & only a fraction of remaining 1% is used as drinking water. & 90% of water used is agricultural purpose in

Use of Surface & ground water :

Consumptive use : in such use, water is completely utilized & can't be reused.

Ex Domestic, industrial, & irrigation.

Over utilization of surface & ground water:

- The rapid increase in population & industrial growth led to severe demand on water resources. After using all available surface water to, human beings began using groundwater to meet their needs.

(+) → over utilization of groundwater in coastal areas leads to rapid intrusion of salt water from the sea thereby rendering it unusable for drinking & agriculture.

→ over-utilization of groundwater leads to decrease in water level thereby causing earthquakes, landslides etc.

→ over-utilization of groundwater leads to drying up of well as well as bore wells.

→ Due to excess use of groundwater near agricultural field, agricultural water that contain nitrogen as a fertilizer percolates rapidly & pollutes the groundwater thereby rendering the water unfit for drinking.

Floods & Droughts, G-

- Floods & droughts are two natural hazards in the world. Floods is due to excess in water flow & the Drought is due to scarcity of water.

→ The amount of rainfall in an area varies from one place to another depending on the local at place, on some place it rains almost throughout the year whereas in other places it might rain for only few days. India records most of it's rainfall in monsoon season.

→ Heavy rain leads to raise in water level of rivers, seas, & ocean. water get accumulated in the coastal areas, which results floods.

floods bring in extensive damage to crops, domestic animals, property & human life. During floods many animals get carried away by the force of water & eventually die.

— on the other hand, droughts sets in when a particular region goes without rain for a long period of time. In a meantime, the soil will continually lose groundwater by the process of evaporation & transpiration. Since the water is not brought back to earth in the form of rains. The soil become very dry.

— The level of water in ponds & river goes down & in some cases water bodies get dried up completely. Grand water become scarce & this leads to droughts. In droughts condn, it is very difficult to get food & fodder for the survival life gets very difficult.

— ~~frequent floods & droughts~~ are mostly due ~~climate change~~ & global warming.

dam's benefits & problems:

- Dams are built across river to store water for irrigation, hydroelectric power generation & flood control. The dams built to serve more than one purpose are called "multi-purpose dams".

Benefits of dams:

(i) Dams are built to control & store flood water.
(ii) Sometimes dams are used for diverting part or all of water from rivers into a channel.
(iii) Dams are used mainly for drinking & agricultural purpose.
(iv) Dams are built for generating electricity.
(v) Fishery can be developed in the dam area.

problems of dams:- Dams may face problems like:

(i) Displacement of tribal people
(ii) Loss of Non-forest land
(iii) Loss of forests, flora & fauna.
(iv) Landslides, sedimentation occurs.
(vi) Stagnant & waterlogging around reservoirs retards plant growth

(iii) Breeding of

(iii) Reservoir induces seismicity causes earthquake

(iii) Salt intrusion at river mouth.

(ix) Since the sediments carrying nutrients gets deposited in the reservoir, The fertility of the land along the river gets reduced.

(x) Due to structural defects or faulty design of the dam may cause sudden dam failure leading to collapse & destruction to life & property.

Mineral Resources :-

→ Minerals are naturally occuring, inorganic, crystalline solids having a definite chemical composition & characteristics physical properties.

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

→ Minerals are formed over a period of millions of years in the earth's crust.

Use & exploitation :-

The main uses of minerals are as follows :

(i) Development of industrial plant & machinery

(ii) Generation of energy e.g. coal, lignite uranium minerals are used in construction, mining, settlements.

(iii) They can be used for defense equipments weapons.

(iv) They can be used in transportation means

(v) an communication system - telephone wires, cables, electronic device.

(vi) used in medicinal system - particularly in Ayurvedic system

(vii) Formation of alloys for various purposes

(ix) on Agriculture as fertilizers, seeds dressi
& fungicides e.g Zineb contains Zinc &
maneb contains manganese etc.

(x) on jew. jewellery like e.g. Gold, platinum, diamond etc.

Types of minerals: Based on their properties, minerals are basically of two types:

(i) Non-metallic minerals: eg Graphite, diamond etc.

(ii) metallic minerals: Barite, laterite, Haematite etc.

Distribution & uses of some major metallic & non-metallic minerals

Metal	Major world reserves	Major uses
Aluminium →	Australia,	packaging food items, transportation, utensils, electronics
Chromium →		For making high strength steel alloys, in textile / tanning industries
Copper →		Electric & electronics goods, building construction, vessels.
Lead →		Car batteries, paints.
Platinum →		use in automobiles, catalytic converters, electronics, medical uses.
Gold →		ornaments, medical use, electronic use, use in aerospace.
Silver →		photography, electronics, jewellery.
Nickel →		chemical industry, steel alloys.

Non metals.

Non-metal mineral	uses
Silicate mineral →	Sand & gravel for construction, bricks, paving etc.
Limestone →	used for concentrate, building stone, used in agriculture for neutralizing acid soils, used in cement industry
Gypsum →	used in plaster wall-board, used in agriculture
Pb potash, phosphorite →	used in fertilizer
Sulphur pyrite →	used in medicine, car battery, industry

Environmental impacts of mineral extraction & use :-

→ The issue related to the limits of the mineral resources in our earth's crust or in the ocean is not so significant. More Impo. environmental concern arises from the impact of extraction & processing of these minerals during mining, smelting etc.

→ India is the producer of 84 minerals the annual value of which is about Rs 50,000 crores

Some Major Mines which causes severe problems in India :-

(i) Jaduguda uranium mines in Jharkhand :
Here local people are facing radioactive hazards

(ii) Jharia coal mines. In Jharkhand :
Here underground fire leading to land subsidence & forced displacement of people.

(iii) Sukinda chromite mines in Orissa :
due to seeping of hexavalent chromium into river posing serious health hazard, Cr6+ being highly toxic & carcinogenic of groundwater.

(iv) Kudremukh iron ore mine, in Karnataka :
It causes river pollution & threat to biodiversity.

(v) East Coast Bauxite mines in Odisha :- (again after app)
Here, Land encroachment & issues of rehabitation unsettled. (land & area)

(vi) North-Eastern Coal fields, in Assam :
Here, very high sulphur contamination occur on soil

Impacts of mining on environment

→ Mining is done to extract minerals or fossile fuels from deep deposits in soil by using sub-surface mining or surface mining

→ The sub-surface mining is more destructive, dangerous & expensive including risks of occupational hazards & accident.

→ Surface mining: on which

(i) open-pit mining: in which removes the ores.
eg: Cu, ~~iron~~ iron, limestone, sandstone, marble

(ii) Dredging: in which chained buckets & draglines are used which scrap up the minerals from under-water mineral deposits.

(iii) strip mining: in which the ore is stripped off by using bulldozers, power shovels & stripping wheels.

* The environmental damage caused by mining activities are as follows:
(i) subsidence of land.
(ii) Groundwater contamination.
(iii) Surface water pollution
(iv) Air pollution.
(v) occupational Health hazards

Food Resources:-

- Food is one of the basic requirements of human being. It is the most impo. material that our body needs for it's proper functioning & ~~well being at all stages of life~~
- Man eats a variety of foods, of plant & animal origin, as no single food provides us with all the nutrients that we need.

World food problem:

There are 2 types of food problems mainly. i.e
(i) Malnutrition (ii) Undernourishment.

malnutrition:-

- malnutrition arises due to lack of minimum amount of proteins, vitamins, lipids, carbohydrates & other essential nutrients required for proper health & growth

* problems due to malnutrition:
(i) Anemia: it is caused by inability to absorb iron.
(ii) Goiter: " " " by iodine deficiency lead to mental retardation.
(iii) Kwashiorkor: it is caused due to lack of protein & calories
(iv) Kwashiorkor: caused due to lack of protein in diet leads to neutral development & learning disability
(v) Pellagra: deficiency of tryptophan & lysine vitamins
(vi) Chronic Hunger: occurs when people have just enough food to stay alive but not satisfactory lives

Undernourishment :-
- undernourishment means lack of sufficient calories in available food, resulting in little or no ability to move or work.
- people who received less than 90% of their minimum dietary intake on a long-term basis are considered undernourished.
- Children in this category are likely to suffer from stunted growth, mental retardation & other social & developmental disorders.

→ Every year, food problem kill as many people as were killed by the atomic bomb dropped on Hiroshima during world war-II. This shows that there is drastic need to increase food production.

* changes caused by Agriculture & overgrazing :-

Overgrazing : overgrazing occurs when too many animals graze for too long & exceed the carrying capacity of a grass land area.

Impact of overgrazing :

(i) Land degradation : overgrazing removes the grass cover. The humus content of soil is decreased & it leads to poor, dry, compacted soil.

(ii) Soil - erosion : The plant roots are very good binders of soil. when the grasses are removed, the soil becomes loose & susceptible to the action of wind & water.

(iii) Loss of useful species : Due to overgrazing the nutritious species like cenchrus, panicum are replaced by thorny plants like parthenium, xanthium etc. These species don't have a good capacity of binding the soil particles & therefore, the soil becomes more prone to soil erosion.

Agriculture :- From centuries, agriculture is providing i/p's to large no. of industries involved in production, processing & distribution of food.

- The agriculture makes impact on the usage of land generally as follows :

(i) Deforestation (ii) Soil-erosion

(iii) Depletion of nutrients
(iv) Impact related to high yielding varieties.
(v) Fertilizer related problems include micronutrient imbalance, nitrate pollution & eutrophication.
(vi) Pesticide related problems include creating resistance in pests & producing new pests, death of non-target organism, biological magnification.
(vii) Some other problems including water logging, Salinity problems.

Effect of Modern agriculture :-

Modern agriculture :- It makes use of hybrid seeds of selected & single crop variety.
— High-tech equipments, lots of energy subsidies in the form of fertilizers & pesticides, irrigation water

~~Effects~~ Impacts :-

(1) Fertilized Related problems :-

(i) Micronutrient imbalance :- chemical fertilizers have nitrogen, phosphorous & potassium which are essential macronutrients.
- Excessive use of fertilizer cause micronutrient imbalance. For example, excessive fertilizer use in punjab & Haryana has caused deficiency of the micronutrient Zn in the soils which is affecting productivity of soil.

(ii) Nitrate pollution :- Nitrogenous fertilizers applied in the fields often leach deep into the soil & ultimately contaminate the ground water → nitrate get concentrated in water & when their conc. exceeds 25 mg/L, They become the cause of serious health hazard called 'blue baby syndrome' or methaemoglobinema. This disease affects the infants to the maximum extent causing even death.

(iii) Eutrophication :- A large proportion of N & phosphorus used in crop fields is washed off along with runoff water & reach the water bodies causing over nourishment of the ~~lakes~~ water bodies, This process is called Eutrophication.
- Due to Eutrophication the lakes get invaded by algal blooms. These algal species grow very fast

by rapidly using up the nutrients.
— The algal species quickly complete their life cycle & die thereby adding a lot of dead matter. The fishes are also killed & there is lot of dead matter that start getting decomposed.
— oxygen is consumed in the process of decomposition & very soon the water get depleted of dissolved oxygen. This affects aquatic fauna & ultimately anaerobic condn are created where only pathogenic aerobic bacteria can survive.
— Thus due to excessive use of fertilizer in the agricultural field the lake ecosystem get degraded.

(2) Pesticide related problems :-

Thousands of pesticides are used in agriculture. The first generation pesticides include chemical like sulphur, arsenic, lead or mercury to kill the pests. They have no. of side effects as follows:

(i) Creating resistance in pests & producing new pests:
— About 20 species of pests are now known which have become immune to all type of pesticides are known as "super pests".

(ii) Death of non-target organisms: Many pesticides not only kill the target species but also several non-target species that are useful to us.

(iii) Biological magnification: Many of the pesticides are non-biodegradable & keep on accumulating in the food chain, this process is called biological magnification. This is very harmful.

(3) Water-logging: over irrigation of croplands by farmers for good growth of their crop usually leads to water logging.
— Inadequate drainage caused excess water to accumulate underground & gradually forms a continuous column with the water table.

- under water-logged conditions, pore-spaces in the soil get fully drenched with water & the soil-air gets depleted & the roots of plants do n't get adequate air for respiration.
- Sub-surface drainage technology & bio-drainage with trees like Eucalyptus are some of the remedial measures to prevent water-logging.

(4) Salinity problem: At present one-third of the total cultivable land area of the world is affected by salts.
- Saline soils are characterised by the accumulation of soluble salt like sodium chloride, sodium sulphate, calcium chloride, magnesium chloride etc. In the soil profile.
- Their electrical conductivity is more than 4 dS/m. So dic soils have carbonates & bicarbonates of Sodium, The pH usually exceed 8.0 & the exchangeable sodium percentage is more than 15%.

Land Resources :-

Land as Resource: Land area constitute about 1/5 of the earth's surface. To meet out the challenging demand of food, fibre & fuel for human population
- The most impo. natural resource, upon which all human activity is based since time immemorial, is land.
- Land resource is our basic resource.
- Throughout history, we have drawn most of our substances & much of our fuel, clothing & shelter from the land
- It is useful to use a part of food, as a place to live, work & play. It is a productive economic factor in agriculture, forestry, grazing, fishing, & mining.
- It is considered as a standard of social prestige & is the basis of wealth & political power.

Land degradation :-

* Man's progress towards development has however considerably damaged our land resource base, probably since the dawn of civilization.
* Out of the total land area, as many as 175 million hectares suffer from degradation.
* Land degradation is caused largely by soil erosion but also by water logging & excessive salinity.
* The most serious threat to the land is posed by deforestation.
* The exponentially growing population in the country has placed immense pressure on degrading the land resource.
* The high degree of degradation of existing land resource, the changing climate & increasing diversion of land from agricultural to non-agricultural uses have aggravated the problems.
* Consequently, the productivity of land has suffered to a great extent, some have beyond repair.
* India being a large agrarian society, has therefore, an enormous task to meet the growing demands for food, fuel, fiber, together with environmental security for its people in the coming years.

Soil erosion :-

* The top soil is precious to all living beings.
* The top soil is being continually eroded by the different natural agents like air & water.
* Accelerated erosion is due to overgrazing deforestation, mining.
* Two types of agents mostly cause soil erosion: water & wind.

Chapter-3 Ecosystem

- ecosystem refers to a region where living organisms interacts with non-living components of the environment by exchanging material b/w them.
  ex: forest, desert, grassland, ocean, pond etc.
- The term of 'ecosystem' was coined by A.G. Tansley in 1935.

Structure of component of ecosystem: The ecosystem has two main components: (i) Biotic component (ii) Abiotic component.

(i) Biotic or living component: The living components of an ecosystem.
ex: plants, animals, fungi, bacteria etc

(ii) Abiotic or non-living comp: The non living component of an ecosystem.
ex; water, sunlight, soil, air, etc.

→ Some factors of biotic component as follows.

(a) producers: This components of the ecosystem includes the organisms which are able to prepare their own food using atmospheric CO_2 as a source of carbon & ammonia & use solar energy to convert into potential chemical energy
- This produce are of two types (i) photosynthetic autotrophs & (ii) chemosynthetic autotrophs
photosynthetic autotrophs: They contain the green pigment chlorophyll used in the synthesis of carbohydrates.
ex plants, grasses, algae etc.
chemosynthetic autotroph: This includes some bacterias like nitrifying bacteria, sulphur bacteria etc.

(b) Consumers: The component of the ecosystem include those organism which are unable to prepare their own food. They depends on producer.
— The consumers are divided into 4 categories

(i) Decomposer: An organism that breaks down dead organism to get energy.
ex: bacteria, fungi etc.

(ii) Herbivores/primary consumer: The animals that feed on plants
ex: rabbit, insect, cow etc.

(iii) omnivores/secondary consumer: animal that eat a variety of animal & plants
ex human, ~~bear~~ bears, crocodiles etc.

(iv) carnivores/Tertiary: The animals that feed on other animals.
ex lion, wolves etc

(v) Detritivores: animals that feed on dead organic materials, especially plants.
ex ~~to~~ worms, snails

~~Function of ecosystem:~~

Abiotic or non living compo:

Defn

— Abiotic compo divided into 3 categories of factors

(i) The physical condn of the region like air, water, light, ph etc

(ii) climatic factor: it includes temp, humidity, wind etc

(iii) organic & inorganic materials:
organic material are present in living things. ex: protein, lipid, carbohy etc
& inorganic material are present in air surrounding. ex water, carbon, oxygen, N etc

Function of ecosystem: There are mainly 3 functions of ecosystem they are:

(1) Ecological Succession
(2) Energy flow
(3) Nutrient cycling (biological cycle)

1 Ecological Succession:-

The process by which communities of plant & animal species in an area are replaced or changed into another over a period of time is known as ecological succession.

— Succession is characterized by increased productivity, increased diversity of organism with increased niche development, gradual increase in the complexity of food webs

— types of succession: (i) primary & secondary succession.

primary: ~~Succession is a process that starts where no living organism are there~~ - These could be area where no living organism ever existed, say bare rock; ~~secondary~~ in area that somehow, left all living organism that existed there.

(ii) Autogenic & Allogenic Succession:
~~Allogenic~~ ~~Autogenic~~ is succession driven by the abiotic component of an ecosystem & autogenic succession is driven by biotic compo of ecosystem.

(2) Energy flow:- The flow of energy from producer to top consumers is called energy flow & is unidirectional in nature.

— The level through which energy passed from one group of organism to other are called trophic level.

— energy level decreases from first trophic level upwards due to loss of energy in the form of heat at each trophic level.

- This energy loss at each trophic level is quite significant. The no. of trophic level is restricted as the transfer of energy flow 10% law - only 10%. of the energy transferred to each trophic level from the lower trophic level.

plant → Grasshopper → hawk
100% → 10% → 1 ~~0~~ 1%.

- Hence there are usually not more than 4-5 trophic level, beyond this energy available is negligible to support an organism.

- Energy flow consist of following concepts food chain, food web & ecological pyramid

food chain : The chain of transformation & transfer of food energy in the ecosystem from one group of organism to another group through a series of steps or trophic level is called food chain.

→ Eg Grasses → Grasshopper → Frog → Snake → Eagle.

- types of food chain are as follows

(a) Grazing food chain : In a grazing food chain, the first level start with plants as producer Eg & ends with carnivores as consumer at last level.

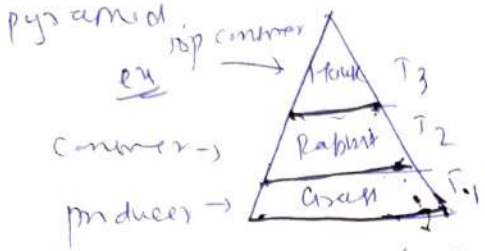
(b) Detritus food chain : This type of food chain goes from dead organic matter into microorganism & then to organism feeding on detritus & their predators.

Eg Detritus → Earthworm → chicken → Hawk

- Detritus food chain may be connected with grazing food chain at some levels
- This natural interconnection of food chains make it a food web

Ecological pyramid:

→ It is a graphical representation of trophic level of diff organism based on their ecological position, producer to consumer is called as an ecological pyramid.



→ The pyramid consist of no. of horizontal bars depicting specific trophic levels.

→ The length of each bar represents the total no. of individuals or biomass or energy at each trophic level in an ecosystem.

→ The ecological pyramid are of 3 categories

(i) pyramid of no (ii) pyramid of biomass &

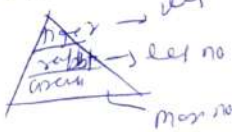
(iii) pyramid of energy or productivity.

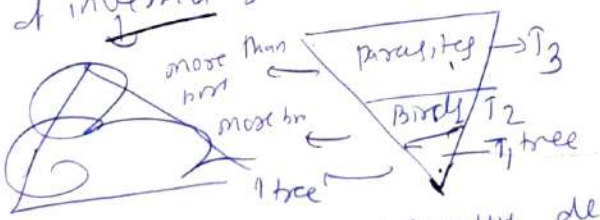
represent the total no. of individual of different species at each trophic level.

- Depending upon size, the pyramid no may not always be upright, & may be completely inverted.

- ex of upright: Grassland ecosystem & pond ecosystem

ex of inverted: tree ecosystem

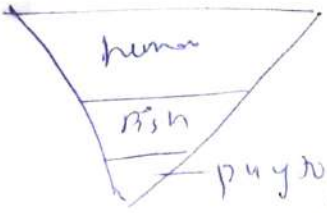




Pyramid of biomass: it is usually determined by collecting all organism occupying each trophic level separately & measuring their dry weight

- This overcome the size diff prob bcoz all kind of organism at a trophic level are weighted. biomass is measured in g/m².

- mostly pyramid of biomass is upright but in many aquatic ecosystem the pyramid of biomass is inverted.



(biomass is very less)

Energy pyramid: It represents the amount of energy at each trophic level & loss at each transfer to another trophic level. Hence the pyramid is always upright with the large energy at the bottom.

(3) Nutrient cycling/biological cycle: The movement of nutrient elements through the various component of an ecosystem is called of nutrient cycling.

- nutrient cycle are of 2 types
  (a) gaseous & (b) sedimentary.

Gaseous: Study of carbon etc.
Sedimentary: Study of phosphorus cycle, sulphur cycle etc.

Forest ecosystem:- types, characteristics, structure & functions

- It includes a complex assemblage of different kind of biotic communities.
- Forest ecosystem is a favorable environment for growth of flora & fauna species.
- The forest ecosystem have been classified into 3 major types
  (i) Coniferous forest (ii) Temperate forest (iii) tropical forest
  - These are cold region having high rainfall, long winter & short summer. Evergreen species like spur, fir, pine are found in this region.
  - The productivity of soil of this region is very much lesser than other forest because of it's soil fertility is not good & other minerals are also not available in this soil.

Temperate forest:-

This region are less colder condⁿ than coniferous & colder than tropical forest.

— In Temperate forest there are 3 major variants i.e Temperate deciduous forest, Temperate evergreen forest, Temperate rain forest.

— Temperate deciduous forest: Here the climatic condition is moderate & broad leave trees & This trees here shed their leaves in winter season period & they regrow in spring season. The soil in this forest is more good than coniferous

— Temperate evergreen forest: They have mediterian climatic condition. i.e They have warm & Dry Summer & moist & cold winters. They are mainly inhabitate by broad leave trees which are comparatively lower in height.

— Temperate rain forest: Here precipitation is very high. rainfall or fog is very high.

Tropical forest: They are also 3 types. i.e tropical rain forest, tropical seasonal forest, sub-tropical rain forest.

* tropical rain forest: They are near the equator & they are evergreen type of forest. There is very high humidity & high temp, because of this huge amount of most diversed & rich biotic community can be found here.

— Here There is dense vegetation & trees here are very high they have deficiency of Sunlight.

* Tropical seasonal forest:- also known as monsoon forest. In this type of forest there is seasonal rainfall so rainfall may be very high but there is specific wet season & dry season.

— This type of forest are mostly found in Southern America, Southasia, northern Australian region etc.

Sub-tropical rain forest: They are broad leave evergreen forest. They are found in a region where is there is fairly high rainfall but the temperature difference b/w summers & winters is less different.

Impo. of forest: They help in keeping natural balance.

- Purify the air, They help in maintaining micro climate. They play key role in precipitation, They prevent flood, soil erosion. They provide fuel & timber & raw material for industries.

Structure of Forest ecosystem:

Diff. organism exist within the forest layers. These organism interacts with each other & their surroundings. Each organism has a role in sustaining the ecosystem.

- Some provide food for other organisms; others provide shelter or control population through predation.

Producers: All living organism intake energy in order to survive. In a ~~trees~~ forest ecosystem, trees & other plants get their energy from sunlight. plant produces their food in the form of carbohydrates.

Consumers: Animals can't produce their own food. They must consume food sources for energy to survive. All animal including mammals, insects & birds are called consumers.

Decomposer: Leaves, needles & old branches fall to the forest floor as tree grows. Eventually all plants & animal die. So their materials are decomposed by worms, microbes, fungi, ants & other bugs.

- Decomposer breaks the items down into smallest primary element to be used again.
- Decomposers are important in ecosystem as they sustain the nutrient cycle of ecosystem

Human are part of forest ecosystem:

Humans are consumers. We get food & materials from forest. Because of this, we are a part of the forest ecosystem.

- Human intervention may be necessary to sustain forest communities under the increased pressure of human use.

Aquatic ecosystem:-

Aquatic ecosystem deals with water bodies & the biotic components present in them. Aquatic ecosystem are either fresh water or marine water.

- Fresh water ecosystem are again divided into lentic & ~~lotic~~ lotic.

lentic: stationary water ex. lake, pond etc
lontic: free flow water ex. streams, rivers etc

Pond ecosystem:- It is a small fresh water ecosystem where water is stagnant.

- Pond are seasonal in nature i.e they retrieve enough water during rainy season.
- Ponds are usually shallow water bodies which play a very impo. role in villages.
- They contain algae, acquatic plants, insects, fishes etc
- They are used for washing clothes, bathing, ~~for~~ drinking water etc, so it get pollut~~ed~~

Lake ecosystem: Lake's are big fresh water bodies with stationary water.

- It has 3 zone i.e shallow water zone called littoral zone.
- An open water zone where effective penetration of light take place is called limnetic zone
- Depending Deep water are where no light penetration is called profound zone.

Stream ecosystem:- It is a fresh water acquatic ecosystem where water current is a major controlling factor.

- oxygen & nutrient in the water is more uniform & and water exchange is more extensive
- All stream organism have to face more current temp & action of current is more compared to lake & ponds.
- These have large area of exposure to air, so producing lots of O_2. Dissolved oxygen is very high. Hence aquatic plants & animals are more grown in stream.

River ecosystem: Rivers are large stream, that flows downward from mountain, highland & flowing through the plains.

- River ecosystem has 3 phases i.e

phase-i :- Cold water rushes down at high as water fall from the mountain. Large amount of dissolved oxygen.

- once it falls from Large height on small rocks, plants sticked to that rock. & the animal like fishes flow down with the water fall.

phase-ii :- Here, there are some gentle slopes for the water to get warmer & support the growth of plant.

phase-iii :- The river water are very rich in biotic diversity among down the hill.

- They bring rich nutrients, minerals with them, which is deposited on the plane before reaching ocean.

Ocean ecosystem :- The ocean contain large variety of animal like, including fish, mollusc, dolphins, whale, walnuts, bacteria etc.

The ocean covers about 70 % of earth's surface. Ocean is divided up into 3 zones based on how much sunlight they receive. The top layer is called euphotic zone, which receive lots of sunlight. 2nd zone is disphotic zone, which receive some sunlight but not enough for plant to survive. 3rd zone is aphotic zone which gets no sunlight, completly dark, few marine animal can survive here.

Biodiversity :- The term biodiversity is defined as the variety of plant & animal life in the world or in a particular habitat.

- Biodiversity is the degree of variation of life. It is a measure of the variety of organisms present in different ecosystem.

types of biodiversity

Genetic diversity : The variety of genes or ~~individual~~ inheritable characteristics that are present in a population comprise its genetic diversity.

- It refers to the diversity of genes within a species.
- It is related to the no. of genes in a particular population.

eg Domestic Dogs.

Species diversity :- Species diversity is the no. of different species that are represented in a given community. The effective no. of species refers to the no. of equally abundant species

- The no. of species that live in a certain locality is called species richness

eg plants, animals, people

- It has been estimated that more than 1.7 million species have been discovered by ecologist ~~so far~~

Ecosystem diversity :- Ecosystem diversity refers to the variety of ecosystem in a given area where in a community of organism interact with their physical environment, climate & temp etc.

- An ecosystem can occupy a large area of thousand of kilometers.

eg ocean waters,

Biogeographical classification of India:

- India has a rich biological diversity because of it's unique location & rich climatic variation.
- India is located in South Asia b/w the latitude 6° to 38° North & 69° to 97° East. with a coastal line of 7,500 km & an exclusive
- Economic zone of 2 million Sqr km.

Biogeographically India can be classified into 10 different region.

(i) Trans-Himalayan Region: This zone is present in the northernmost area of the country in the state of Jammu & Kashmir & Himachal pradesh.

(ii) Himalayan Region: This region is spread over the entire northern part of India, Including five major states of the country Jammu & kashmir, Himachal pradesh, uttaranchal, Sikkim & north eastern state. (more than 20 inches)

(iii) Desert Region:- It is an extremely arid zone with xerophytic vegetation, include the salty desert of Gujrat & Sand desert of Rajasthan. (region where rainfall/year 20 inches)

(iv) Semi-arid region: The region comprises part of Gujrat, Rajasthan & some part of punjab & Haryana.

(v) Western Ghat: This region is present in the western part of South peninsular India consisting of chain of mountain running parallel to the western coast.

(vi) Deccan peninsula: This region extends to the south central peninsula spread across the state of madhyapradesh, Odisha, Maharashtra, Andhpradesh, Tamilnadu, Karnataka & Kerala

(vii) Gangetic plain: This region extends from the foothills of the Himalayan & the most region of India.

- It extends from eastern Rajasthan through Uttar pradesh to Bihar & West-Bengal.

(viii) North-East India :- The North east zone of India consist of states of Arunachal pradesh, Assam, meghalaya, Manipur, Tripura, Mizoram, Nagaland & sikkim.

(ix) Island :- This zone include Andaman & Nicobar island in the bay of bengal & Lakshadeep island in the Arabian sea.

(x) Costal :- This include the eastern & western cost lines

Value of biodiversity :- values of biodiversity are classified into direct values & indirect values.

→ direct values includes 3 types productive values, consumptive values & economical values.

→ & indirect values includes ethical, generic values aphonal values & ecological values.

Productive values :- Replacing some harmful substances with other non harmful substances in order to protect the environment but farm

→ Pesticide :- We are using pesticides to kill pest this pesticide cause lot of pollution so instead of using this pesticide there are some beneficial called as calabar beans these also kill pest we can use this calabar beans which causes no pollution.

→ medicine :- medicines used are of chemical which some have causes harm so instead of medicine use Neem used in antibacteria & antifungal cream, soap, Shampoo etc. which has no chemical.

Consumptive use :- This is related to natural product that are used directly for food we are consuming food are some products from the environment such as fodder, honey, fuel, wood etc.

- we use almost 40,000 species of plants & animals on a daily basis.

Economical values :- These are the basic needs of human life food, Raw material for clothing, medicines & other products.

Indirect values:

Ethical values :- The ethical values of biodiversity is based on issues like all living being must be preserved "respect for life".

Ethical value means some kind of principles we should follow that helps the society & surrounding around us.

Genetic values :- The variation in the amount of genetic information within & among individual population.

Optional value :- ~~Our~~ Our survival on this planet depends on existence of other species like plants, animals & microorganism.

Ecological values :- It is assumed that every species is an important part of an ecosystem of interacting populations & environment

eg : tiger, gorilla.

~~Biodiversity at global~~, national & local levels :-

- Threats to biodiversity :- Threats of biodiversity is ~~due~~ majorly due to ~~loss~~ the following.

(1) habitat loss / destruction of habitat
   → Urbanization / Industrialization
   → Deforestation / Reduced green cover through the world.
   → Soil degradation / erosion

(2) Poaching of wildlife.

(3) Man-wildlife conflicts

1) Habitat loss :- ~~A recent study by researcers indicate that by the~~ Basically habitat is the natural home for an animal or plant.

- Habitat loss is when an animal or plant ~~lose~~ loses. ~~its habitat~~ & it is mainly caused by human activity.
- A recent study by researcers indicate that ~~2050~~ more than $\frac{1}{3}$ of the world life & land species are expected to be extinct due to global warming
- Such loss of species on massive scale will effect on entire ecosystem leading to loss of species & ecological collapse.

Factors contributing to habitat loss:-

- deforestation, urbanization, Industrialization these 3 are one of the most imp. factor to habitat loss.
- Conversion of forest to agricultural land. & ~~livestock production~~, livestock production.
- All type of pollution

Poaching of wildlife:-

Poaching :- poaching is an illegal practice of hunting, killing or capturing animals for commercial purpose

- Animals are poached by using arrows & bows, trap nets etc.

Main causes of poaching:

-> human kills ~~animals for skin & bones of of~~ tiger & leopard ~~to make fashion~~ for their skin & bones to make fashion products & it also uses in medicines.
-> human kills elephants for their ivory tusk (teeth)
-> human kills rhinoceros for their horn.
-> human kills bears for their skin, teeth & claws
-> " " sheep for their skin
-> " " deer for cosmetics
-> Snakes & lizard for their skin for leather industries
-> Hen for food
-> goat as milk & food.
-> around 25% of the world species will undergo extinction at rate of 10,000 to 25000 species per ~~eyes~~ year.

ways to protect wildlife from poaching:

- National park administration should be provided with a dedicated anti-poaching team with essential equipments like torches, first aid kits etc.
-> wildlife forensic lab should be setup at wildlife institutes of India
-> ~~votant~~ we ~~need~~ volunteer ~~to give donate time & money to many organization~~

volunteer: If you don't [illegible], donate your time, many organization, & Zoos have volunteer programs, you can help clean beaches, rescue wild animal or teach visitors.
- visit Zoo's aquarium, national parks & learn more ~~about~~ about our planet.
- stop investing money or purchasing products made from endangered animal.
- Govt should keep some laws for poachers.

(3) man-wildlife conflict :-

Reason behind man-wildlife conflicts:
→ Transformation of forest & other ecosystem into urban area
→ Degradation, fragmentation & honey-combing of wildlife habitats.
→ Climatic effect
→ Increase in livestock population resulting in overgrazing & decrease in no. of herbivores.
→ Deforestation

Can be reduced by;
→ creation of ideal condition in sanctuaries, Zoos etc
→ protection of rural-livelihood & reduce their vulnerability such that wild animal get more
→ Afforestation should be done & hunting of wild animal should be decreased.
→ wildlife habitats should be brought under the conservation network by declaring them as national park.

Chap-4 Environmental pollution :

- **Air pollution** : Air pollution is the introduction of harmful material into the atmosphere causing damage to living organism & to the non-living organisms & to the environment

Ex (i) The pollutants include smoke & soot formed by burning of fuel to power the motor vehicle, chloro fluro carbons used in air conditon

(ii) Gases like CO, NO_2, O_3, Pb, SO_3

Sources of air pollution :-

(i) Natural source : volcanoes, forest fire, natural & organic & inorganic decay, pollen grains of flowers etc.

(ii) Man-made source : during power generation, mining, waste treatment of plants, industrial activities, textile fuels burning, vehicle emission etc.

→ further divided into primary source & secondary source

primary source : The harmful substances are directly released into the atmosphere from an identifiable source

Ex : volcanic eruption, motor vehicle exhaust etc.

secondary source : The harmful substances are formed in the air by chemical reaction mechanism b/w the pollutant of that environment.

Ex photochemical smog, acid rain etc.

Causes of air pollution :-

(i) Rapid industrialization : As the no. of industrialized increased pollution increased

(ii) Fast urbanization : development of villages in cities which increases pollution.

(iii) Rapid growth of population : Growth of population increases the poll°

(iv) Growth of vehicle on road : due to growth of vehicle on road more smoke & hazardous substance released to atmosphere causing air poll°

(v) Burning of textile fuel : As no of vehicle increased on road burning of textile fuel will be more & air poll° will be more.

→ Volcanic eruption: It is a natural cause of air pollution.

→ Forest on fire: Forest on fire lead to harmful gases which causes air pollution.

→ Deforestation: Deforestation also causes to air pollution

Effect of air pollution:

(i) Respiratory & heart problem:- If the polluted air we inhale we will face respiratory problem & heart problem.

(ii) Global warming:- The harmful dangerous gases causes global warming.

(iii) Acid rain:- addition of harmful gases to the water vapour or cloud & forms some acid like Nitric acid, sulphuric acid & falls as rain which is very dangerous.

(iv) Depletion of ozone layer:- The ozone layer which protect us from the UV rays get depleted due to air pollution

(v) Effect on wildlife:- It effects to the wildlife also.

Steps to decrease air pollution:-

(i) ~~Conserve energy~~: We need to conserve energy because if we use less energy like electrical energy fuel energy less pollution will occur.

(ii) We need to understand the concept of reduce, reuse & recycle. & we should use the product which can be reuse & recycle

(iii) use energy efficient devices:- we should use the more efficient devices i.e the consumption of energy will be less & o/p will be more.

(iv) Afforestation should be done; planting of trees helps in consuming some harmful gases & provide us useful gases.

(v) emission of dangerous gases from industries should be stopped: It should be limited up to some level so that it will not cause pollution.

• Water pollution :- water pollⁿ is the contamination of water bodies (eg lake, ocean, ground water etc)

- water pollⁿ occurs when pollutants are directly or indirectly discharged into water bodies without adequate treatment to remove the harmful components.

eg → pesticides & fertilizers in water
→ oil, grease & chemicals from our cars & trucks in water.
→ industrial waste in water.
Sources → dumping waste into water bodies etc.

Types of water pollution :- there are two types of sources ie point source & Non point source.

Point source :- it is direct emission of water. it includes the outfall from factories & refining waste treatment plants.

Non point source :- it is indirect emission of the water.

- these pollutants are indirectly dumped into the water.
- this includes the pollutants that enter the water supply from soils or groundwater system & from the atmosphere via rain water.

Causes of water pollution :-

- Dumping of industrial waste into water bodies
- when fertilizers & pesticides applied on crops, runoff into rivers & streams & causes water pollⁿ.
- Human activities like mining, deforestation, generation of power also leads to water pollⁿ.
- Oil spills are very hard to clean. these are used to purify the oil & causes water pollⁿ.
- Domestic sewage is drained into the water bodies thus causing water pollⁿ.
- Testing of nuclear weapons & during nuclear accidents, the radioactive waste causes water pollⁿ.

Effect of water pollⁿ :-

- it contaminates water bodies
- it effect all ecosystem, specially marine ecosystem
- it includes leads to many disease causing factors.

- More than 1400 people die due to water pollⁿ.
- damage of aquatic ecosystem.
- Reduced availability of drinking water.
- diseases like cholera & Malaria are commonly found

Steps to decrease water pollⁿ:-
- prevent grandwater Contamination.
- Do afforestation.
- Reduce air pollⁿ.
- Follow reduce, reuse & recycle.
- Safely dispose of human excreta.
- usage of plastic items should be decreased.
- use ecofriendly products which don't cause harm to ecosystem.
- Purify the industrial waste so that it won't cause water pollⁿ.

Soil pollution:- Soil pollⁿ is defined as the change in physical, chemical & biological Condition of soil through man's activities resulting in the degradation in quality & productivity.

types of soil pollⁿ: 2 types (i) Agricultural soil pollⁿ (ii) soil pollⁿ by industrial effl. & solid waste.

Agricultural soil pollⁿ:- pollⁿ of surface soil & pollⁿ of underground soil due to use of fertilizers & pesticides in Agriculture

Soil pollⁿ by industrial effluents & solid waste:
- throwing up waste material on the surface of soil. is called pollⁿ of surface soil. → due to industrial waste like chemicals which can easily damage the soil interior parts. This is called disturbances in soil profile.

Causes of soil pollⁿ:-
→ It causes due to acid rain
→ Deforestation Causes soil pollⁿ
→ Throwing of Nuclear waste ——— on surface of soil
→ Mining & other industrial activities.
→ Oil & fuel dumping

→ Agricultural practices such as application of pesticides, fertilizer.

→ disposal of coal ash.

Effect of soil pollⁿ :-

- Soil pollⁿ reduces soil fertility.
→ it Reduces nitrogen fixation.
→ due to soil pollⁿ a larger loss of soil & nutrients
→ it Reduces crop yield
→ Due to soil pollⁿ, dangerous chemicals entering underground water.
→ ~~it causes soil pollⁿ~~ it releases pollutant gases
→ it reduces vegetation
→ it causes public health problems.
→ it causes diseases like cholera, dysentry, typhoid etc
→ it causes food poisoning etc.

Steps to decrease soil pollⁿ :-

→ we need to follow reduce, reuse, recycle.
→ Afforestation should be done.
→ Solid waste treatment should be done to purify the soil waste
→ we should use ecofriendly products & ~~use~~ stop using fertilizers & use manure products.
→ Dangerous chemical usage should be decreased.
~~→ not to cut trees~~

Marine pollⁿ :- The presence of undesirable material in the ocean environment directly or indirectly by humans that adversly effect ~~the~~ biological resource & human beings is called marine pollⁿ.

Sources of marine pollⁿ :-

→ Shipping activities :- oil leakage of ships, radiation by nuclear powered ship, chemicals etc.
→ Dumping :- disposing waste of land based activities - radio active waste, sewage, industrial waste e
→ Sea-bed activities :- structures, industrial debris, domestic refuse, chemical etc

Land based & atmospheric pollⁿ: Fertilizer & pesticides, sewage, industrial waste etc.

Causes of marine pollⁿ:-

Causes due to air pollⁿ

→ Oil spillage & petrol spillage into the marine
→ Industrial waste & chemical.
→ Sewage
→ Solid waste
→ Agricultural run off water due to fertilizer & pesticides
→ electronic waste like batteries & some unwanted electronic waste.

Effect of marine pollⁿ:

→ Reduction in photosynthetic rate: as increase in pollⁿ rate, water loses it's minerals so marine plant can't perform photosynthesis
→ decrease in oxygen conc. in water & leads
→ ~~effect~~ sea to decrease in underground plants
→ Increases toxicity level in waters.
→ It effects alot on sea life.
→ effects human being: As human eat sea food they can easily get disease
→ Eutrophication occurs: extreme higher conc. of nutrients which causes harm to organism

Steps to decrease marine pollⁿ:-

→ we need to reduce air pollⁿ
→ " " " usage of toxic chemicals
→ stop dumping wastes into sea or ocean
→ Follow Reduce, Reuse & Recycle ~~process~~ principle
→ Use ecofriendly products
→ purify the industrial waste

Noise pollⁿ :- The unwanted, unpleasant or disagreeable sound that causes discomfort to all living beings.

- units of noise = decibel (db)
- 35-60 db normal sound, it crosses 80 db it's causes unpleasant & it crosses 140 db it causes painful.

Sources of Noise pollⁿ :-

- Transport system are main source of noise pollⁿ in urban areas
- Construction of buildings, highways & streets cause a lot of noise, due to the usage of air compressors, bulldozers etc.
- Industrial noise & loud speakers noise ~~also causes noise pollution~~

Causes of Noise pollⁿ :-

- Traffic noise
- Aircraft noise
- Noise from construction work
- Noise from industries
- Horns, explosion etc.
- Railway station etc.

Effect of Noise pollⁿ :-

primary cause

-> Permanent hearing loss.

-> High blood pressure

- Insomnia
- Labored breathing
- Stress, brain disorder
- permanent damage to voice

Steps to decrease Noise pollⁿ :-

- The sources of the noise must be reduced
- The path of transment of sound must be stopped
- Know which noise can cause damage
- Wear earplug or other protecting devices.
- Be alert on environment
- protect the ears of children who are too young
- Use sound absorber.
- plant trees around the house.

Thermal pollⁿ :- Thermal pollⁿ is the discharge or release of heated water from the industrial processes into the water bodies like stream, river, lakes or ocean water resulting in killing or injuries the aquatic organism.

Sources

(i) electric power plant :- Huge amount of energy is released in the form of heat when coal, oil or natural gas is burnt or nuclear fuels undergo fission.

(ii) Industrial factories :- water from these river or ocean is used to cool their machinery.

(iii) Loss of vegetation Near water bodies :- Increased water temp lowers the minerals which are required for plants.

Causes of thermal pollⁿ :-

- Nuclear power plant
- Industrial wastes
- Domestic sewage
- Hydro-electric power
- Coal based power
- Thermal sheets
- deforestation
- Soil erosion

Effect of Thermal pollⁿ

- Decrease dissolved oxygen content
- Reduce in water productivity
- Reduce in water quality
- Loss of vegetation
- Aquatic ecosystem will be damaged both plants & animals can't survive

Steps to decrease the pollⁿ

→ cooling ponds :- Artificial ponds should be created & water from industries should be cooled & purified before disposed.

- cooling towers & spray ponds to be created. So that the hot waters before entering into water bodies they are cooled down to normal temp

Nuclear pollution : Any undesirable effect caused in the environment due to radioactive substances or radiation is called nuclear pollution.

Nuclear fission :- The process involving a large nucleus splits into smaller nuclei with the release of energy.

Causes of Nuclear pollution :-
- Uranium mining
- production of nuclear fuel
- Nuclear power reactor.
- Transportation of Nuclear matters.
- Nuclear Accidents.
- Nuclear tests carried out by the defence personnel
- Disposal of nuclear waste.

Effect of Nuclear pollution :-
- weakens the immune system of the body.
- when radioactive material is shipped via water then it can also cause toxicity in water & we use the same waste for various purpose.
- Nuclear pollution is another major cause of earth warming
- Skin diseases
- Damages the reproductive organs
- Destroys the Retina of eye
- shortening the life span

Steps to decrease :-
- proper maintenance of nuclear plants
- The disposal of radioactive material must be safe & secure
- Ban usage of nuclear weapons
- Safe transportation
- proper storage
- Radioactive nuclear experiments
- fission reaction need to be minimized
- Minimum use of nuclear energy.

Solid waste management

Solid waste management refers to applicable suitable techniques, technology & management aimed at reduction in waste & ~~less~~ le environmental poln.

Solid waste

- Solid waste refers to the waste from household industries or hospital wastes.

(i) Household waste: It includes vegetable & fruit ~~peel~~ peels, left over food stuff, carry bags, containers, trash ~~bags~~ bags, bottles, leaves from garden, construction waste. These are also called as municipal waste.

(ii) Industrial waste:- It includes old batteries, shoe polish, painting, old medicine & medicine bottles ~~etc~~, machinery waste etc

(iii) Hospital waste:- It includes hazardous, infectious ~~waste~~, waters, low level radioactive waste. ~~etc~~. medicines etc.

→ types of Solid waste:-

Biodegradable:- Biodegradable material can be decomposed by Morganisms such as bacteria, enzyme & fungi

ex: ~~dead body, fe leaves~~ food waste, paper waste, human waste. Dead animals & plants

Non biodegradable: substances that can't be decomposed into organic & environmentally safe waste products ⇒ ex: Glass, plastic, metallic ~~waste~~ can be recycled waste, nuclear waste etc

→ Municipal Solid waste are divided into two

Non point source:- which delivers pollm indirectly through environmental changes

ex roadside waste products

point source: when harmful subst are directly left at.

ex shopping malls; household waste, dustbin etc

Transport of garbage to disposal :-

- Transport of our [illegible] of waste to disposal

Causes of Solid waste :-

→ over population
- [illegible] urbanization
- [illegible]
- [illegible]
- usage of non-biodegradable material
- Lack of public awareness

Effect of :-

- Solid waste [illegible] in [illegible] or [illegible] causing organisms such as [illegible] flies etc
- [illegible] with rain water & mixing with the [illegible] water [illegible], causing water pollution
- Burning of solid waste [illegible] air pollution
→ [illegible] [illegible] substances present in solid waste causes a number of diseases in human beings.
→ Non-biodegradable material [illegible] a lot of [illegible]

Ways to dispose solid waste :-

→ Do [illegible] afforestation.
→ use RRR principle
→ use eco-friendly products
→ [illegible] should be done with [illegible] material
→ [illegible] [illegible] a [illegible]
→ [illegible] [illegible] in [illegible] or sell them
- [illegible] in nearby area instead [illegible] dump them in of throwing them away
→ Reduce usage of plastic
- [illegible] usage of [illegible]
→ [illegible] as many products as you can.

Disaster Management :- A continuous & integrated process of planning, organizing, coordinating & implementing programmes which are necessary for -

- prevention of ~~damage~~ danger or threat of any disaster
- Reduction of the risk of any disaster or it's ~~severity~~ consequences
- Assessing the severity or magnitude of effects of any disaster
- Evacuation, rescue & relief.
- Rehabilitation & reconstruction.

(writing according to it's original route)

Integrated disaster management :

Preparedness :- The activities prior to a disaster are as follows :

- preparedness plans
- Emergency exercise
- Training
- warning system.

Response :- The activities during a disaster are :

- public warning system
- Emergency opsum
- Search & rescue.

Recovery :- Activities belong a disaster are

- Temporary housing
- Claims processing
- ~~Grants~~.
- Medical ~~Be~~ Care

Mitigation :- Activities that reduce effects of disaster.

- Building codes & Zoning
- vulnerabilities analysis
- public education

Chapter 5 Social issues & the

Sustainable development :-

→ Sustainable development can be defined as "meeting the needs of the present without compromising the ~~ability of future generations to meet their own needs~~"

→ Sustainable development is the effective use of resource for economic development while preserving the environment & ecosystem so that not only the needs of presents are fulfilled but also for future generations.

How to achieve sustainable development :-

(i) Reduce our dependency on heavy metals & fossil fuels such as coal, oil & natural gas.

(ii) Reduce our dependency on synthetic chemicals

(iii) & use natural products ~~like Agro~~

(iv) Reduce our destruction of nature which includes cleaning of forest & natural habitats for human needs

(v) Ensure that we don't stop people from meeting their needs in order to achieve environmental sustainability we must maintain a balance b/w environmental & economical sustainability.

(vi) Recycle & Reuse as many waste products & resources possible.

(vii) Make more goods that last longer & easy to use, recycle & repair.

(viii) Depend on renewable source of energy, ~~Solar~~ sun, ~~wind~~ wind, biomass, flowing water, geothermal & tidal

problems in obtaining sustainability :-

(i) Disagreement b/w stakeholders : each stakeholder has diff priorities & hence it is extremely difficult for all to agree upon common goal of sustainable development.

(ii) Uncertainty : there is always uncertainty regarding diff. ~~goods~~ global environmental issues & the manner in which they interact with global system.

* Consumption & lifestyle: People don't want to change their life style to the betterment of environment.

Urban problems related to Energy:-

Urbanization:- It is the process by which large number of people become permanently concentrated in relatively small areas, forming cities.

→ There are 2 factors which lead to urbanization.

Pull factor:- These are those factor which attract the person for the availability of employment like more income, best education, etc

Push factor:- Those factor which force the person to migrate from their house due to circumstances.

→ In India urbanization is mainly due to pull factor.

Causes of urbanization:-

(i) Industrialization: Industrialization is major cause of urbanization, As it has expanded employment opportunities. So rural people migrated to cities

(ii) Social factor: Many social factors such as attach of cities, better standard of living, better education facilities induces migrate to cities.

(iii) Employment opportunities:- In rural sector people have to depend on agriculture for their livelihood, but Indian agriculture depends upon monsoon. In Drought stricken rural people have to migrate to cities in search of food, then they preferred to stay there.

(iv) Modernization:- Urban areas are characterised by sophisticated technology, better infrastructure, communication, medical facilities etc. So people feel they can live a comfortable life in city & thus migrate to cities.

problems related to urbanization:-

(i) Unplanned urbanization: due to unplanned urbanization, India is facing too much problems such as unemployment, electricity problems, pollution, social problems, improper sanitation facilities etc

Urban problems related to energy :-

→ Energy is one of the major pillars of economic development of the society & economic growth is along with growing population and consume a lot of energy.

→ Houses in urban area are made up of more heat sensitive material such as metals which includes iron, steel, Aluminum, glass etc instead of heat intensitive material such as wood, bricks, so consume lots of energy.

→ to make their houses comfortable we use Air conditioner, room heater which run by electricity & hence use of energy.

→ High raise building needs ~~a lift~~ energy to operate lifts & electric energy for lighting in houses.

→ Most urban people use their individual transport rather than a public one.

→ Similarly each & every steps in an urban centre needs energy, to meet the normal energy need & for long term sustainability we should be more specific about the most efficient & cost effective manner of energy use.

→ Energy is a essential need of a man wherever he lives in urban or rural society. In urban area the need of more energy.

Water conservation :- (water saving)

water conservation refers to preservation, control & development of water resource, both surface & ground water & prevent pollⁿ.

Few water conservation measures :-

→ Avoid washing of fruits & vegetables under running water, but wash them in a bowl water.

→ We may take shorter showers.

→ Taps may be turned off after use.

→ Washing dishes & clothes should be done only

→ Avoid playing with water toys which needs frequent filling of water.

→ use drip irrigation method so that it can save lots of water in Agriculture

→

→ Collect rain water by using rain water harvesting

→ Avoid using of toilets as a waterbasket or flushing it without any reason.

→ ~~Washing~~ while washing vehicles, sponge them this helps conserve around 300 ltr of water.

→ while brushing & ~~Sha~~ shaving don't let water to flow off.

→ Fill the glass with just enough water to quench them thirst.

Rain water harvesting :-

- Rain water harvesting is one of the most important & economic tools of for water conservation at a time of rainwater.

— ~~It~~ It is the method of collecting, storing & conserving raincwater from roof tops of buildings for agriculture production.

Ways of Rainwater Harvesting :

(i) Surface runoff Harvesting :- the surface runoff of rain water is used to recharge the ground water in urban areas.

(ii) Roof ~~runoff~~ top raincwater harvesting :- The rain water from the ~~roof of~~ roofs ~~is collected~~ of building or houses are collected & divided to artificial recharge system to recharge the ground water.

• Rain water harvesting : It is a simple method by which raincwater is collected for further use. The collected raincwater may be stored, utilized in diff ways or directly used for recharge purpose

Advantage :-

→ It provides good sufficiency to water supply.
→ Reduce cost for pumping of ground water
→ provides high quality waters.
→ Reduces soil erosion & flooding.
→ The roof top rain harvesting is less expensive
→ In saline or coastal areas & island, rain water provide good quality of waters.

Disad

→ limited & uncertain local rainfall & installation
→ Requires more technical skill to provide regular maintenance
→ If it is not installed properly it may cause attack of mosquitoes.
→ Certain roof top may lead of chemical, pesticide & other pollutant into the water that can harm the plant

Water shed management :- watershed management is a process to guid & organize natural resources in a watershed including land.
— This managment of land resource is aimed to provide goods & services without adversely affecting soil, water & other natural resources.

Objective of watershed management :-

— To provide adequate quantities of usable water by adopting sustainable land use measures
protection of reservoirs.
→ To control damaging runoff & degrading & thereby conservation of soil & water.
→ to manage & utilize the runoff water for useful purpose
→ To increase percolating of rain water

Resettlement :- It is process of simple relocation or displacement of human population

[due to last page]

Rehabilitation: It is a process of making, system to work again by allowing, system to function naturally
- It included replacing the lost economic assets, subsequent employment, proper sale land or building
- It is the process of restoring something or someone to satisfactory state.

Resettlement :- We are often benefited through developmental projects like construction of dams, mining, creation of national park etc. but quite often, the native people of the project sites are displaced from their home land. This is called resettlement.

Causes of displacement :-

Displ due to dams :- Millions of people were displaced during the big rivers, valley projects like Hirakud dam, Bhakra Nangal Dam (punjab) Srisailam dam (Andrapradesh), Pond dam (Maharashtra) have made refugees in their own home land.

Displ due to mining :-

Mining operation covers thousand of land & local people are displaced.

Eg: Jharia coal field (Jharkhand)
-> Major problem caused due to underground fire & residents are asked to vacate, Till now there is no alternate land for Rem-

Disp due to national parks.

when a forest area is converted into a national park, it deprives the local dwellers of their ancestral rights. As a result, the tribal protest by starting destructive activities

Ex Wayanad wildlife sanctuary (Kerala)

→ due to this wildlife sanctuary 53,472 tribal families displaced but till 2003, only 843 families could get the land

— tribal felt betrayed & have started encroachment into the forest.

• Rehabilitation delhi (last page)

Rehabilitation issues :-

→ The united nations Universal declaration on human rights has declared that housing is a basic human right.

→ Acc to land Acquisition Right 1894 The Govt is empowered to serve notice to the people to vacate their lands if there is a need as per govt planning

→ provision of cash compensation in lieu of the land vacated exists in sec 16 of the Act

Major issues Related to displ. & rehabilitation :-

→ Kinship systems, marriages, social & cultural functions varieties with their displacement

→ Loss of identity & intimate link b/w people & environment is one of the biggest loss

→ Displacement of already poor tribes increases their poverty As tribes aren't family familiar with market policies & trends

Rehabilitation policy :-

- There is a need for comprehensive national rehabilitation policy. Land for land is better policy than cash settlement of displaced people
- displaced should be rehabilitated their own environment
- necessary services should be provide to continue agriculture in the new areas.

→ Tribal should be provided vocational training & job opportunities.
→ displaced people should be provided monetary & post resettlement services.

Environmental ethics :- It refers to a feeling of moral responsibilities & personal conduct towards the natural landscapes, resources, species & non human organisms.
→ We depend on nature for our food, supplies, source of wood, medicines etc.

Few Human activities (ethics) which are damaging environment

(i) overpopulation - The population of Earth is growing at an incredible pace. At the rate of population increases, pollution increases, man's requirement increases, industry increases which causes lots of problems to environment.

(ii) Wastage of Natural Resource : The various natural resources in the environment are land, water, minerals, forest & wildlife. with increase in human population there is increase in the usage of natural resources. over usage of natural resources causes depletion in them.

(iii) Deforestation :- It is cutting down the forest for real resource which causes problem to environment
- This cause soil erosion.
→ extinction of species.
→ Increase in temperature.

(iv) pollution Rapid industrialization, vehicles causes a lot of air pollution, dumping waste into water causes water pollution, Human activities are main reason for pollution → It also causes the falling :
→ Soil degradation
→ Depletion of groundwater
→ Depletion of ozone layer.

Chap-6 Climate change → glo... nuclear accident, hole... depln.

Global warming :-

→ It refers to increase in the ~~over~~ average surface temp of an planet due to the effect of greenhouse gases such as carbon dioxide, water vapors, chlorofluorocarbon etc

✱ Causes

① Natural cause :- It include release of methan gas from Arctic Tundra & wet land

② Man made cause :- It include burning of fossile fuel, deforestation, population explosion, urbanization, pollution of environment.

Impact of Global warming :-

→ Rising in Sea level :- The density of water decreases as temp raises. Thus increase in temp warms the ocean water thus sea level increases

→ change in precipitation blw rain & snows.

→ Melting of ice ~~takes~~ takes place at the earth's pole near Antarctic, Greenland etc ~~Antarctic sea~~

→ loss of species of ecosystem ~~change~~.

→ Scracity of fresh water in some area due to the disappearance of glaciers.

✱ preventive measures :-

→ Land & water pollution should be stopped

→ Mass ~~water~~ awareness prog should be conducted

→ Afforestation should be done.

→ emission of greenhouse gases should be stopped.

→ Alternative source of energy should be used.

Acid rain :- The phenomenon of acid rain involves the combination of atmospheric water droplets with air pollutants which falls as acid rain

→ Acid rain consist of mainly sulphuric acid, carbonic acid, Nitric acid produced from fossile fuel combustion in car engine & power plant

Eq ① $2SO_2 + O_2 \rightarrow 2SO_3$

$SO_3 + H_2O \longrightarrow H_2SO_4 \longrightarrow$ acid

② $N_2 + O_2 \rightarrow 2NO$

$NO + \frac{1}{2}O_2 \rightarrow NO_2$ → acid

$3NO_2 + H_2O \rightarrow 2HNO_3 + NO$

$CO_2 + H_2O \rightarrow H_2CO_3$ → acid.

$H_2CO_3 \rightarrow H^+ + HCO_3^-$

Causes of Acid rain :-

(i) Nat causes :- It includes volcanic eruption & lightning etc.

(ii) Man made :- It includes, rapid industrialized burning of coal, & fossile fuels

Impact of Acid rain :-

→ It causes damage to human health like lung disorders, asthama, nervous system problem

→ It causes damage to land like soil erosion & loss of minerals etc.

→ Acid rain mostly causes acidic bram of lakes, rivers, streams & ocean. & can cause toxic water

⇒ It can also melt metals & form toxic metal liquids

Preventive measures :-

→ use less energy hence less fuel burnt

→ use clean fuels

→ Remove oxides of sulphur & nitrogen before releasing

→ Follow reduce, recall & recycle.

Ozone layer dep :- The ozone layer is found b/n Stratosphere & the troposphere. The ozone layer filters out & convert UV light into heat energy This makes it a higher temp than other part of the upper atmosphere.

→ Ozone or trioxygen gas made of 3 oxygen atoms forms a thin layer of 3mm over the entire earth at approximately 10 to 30 miles above the earth surface.

→ In the absence of ozone layer, life on earth would not have existed.

→ It is a natural layer termed as a protection layer of higher

attitude of stratosphere against the bombardment of ultraviolet radiation from the sun.

Impact of ozone layer Depletion :-

→ Skin disease.
→ Destruction of marine life
→ Damaged plants & river ecosystem

→ due to some gases like CFC in the atmosphere breakes the ozone oxygen molecules which causes ozone layer depletion.

Preventive measures :-

→ Limit private vehicle driving
→ Use eco-friendly products.
→ Avoid using pesticides.
→ Follow reduce, reuse & recycle.
→ emission of dangerous gases from industries should be stoped.

Nuclear accident ~~& hazardous~~ holocausts :-

→ Nuclear energy is a clean & cheap substitute to energy from fossile fuels. Though greately beneficial to mankind this form of energy has many problems.
→ when accident happens at nuclear power plants massive radioactivity is released. This can cause huge loss of human life, long term illness like cancer, thyroid disorder, tumours etc.
→ Accidents at three mile Island (USA - 1979) and chernobyl (USSR - 1986) are important examples.
→ Disposal of nuclear waste also remains a major problem.
→ Nuclear weapons used in War cause holocausts. Hirosima & Nagasaki (Japan 1945) are examples.

set permissible limit
pollutn & release of hazardous substances.

AIR Prevention & Control of pollution Act (1981)

→ The Aire act is a Central act of parliament passed in 1981.

→ This act is for the prevention and Control of air pollution and maintaining the good quality of air, & to appoint the pollution control board to prevent, control & abatement of air pollution.

→ This act assign a set of responsibilitys, powers, & functions to the boards for the prevention & Control of air pollution.

Aire pollutant:- It means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

Functions of the Central pollution Control board (CPCB)

1. The main function of the Central board shall be to improve the quality of air & to prevent ~~the~~ & control air pollution

...ing.

... advise the central Govt on any matter concerning the prevention & control of air pollution

... to coordinate the activities of the State boards & resolve disputes among them

... to provide technical assistance & guidance to the state boards, carry out & sponsor investigations & research relating to problems of air pollution & prevention & control of air pollution

... to plan & ~~conduct~~ cause to be executed a nation-wide programme for the prevention & control of air pollution

... to plan & organize the training of persons at different stages who are engaged or to be engaged in programmes for the prevention, & control of air pollution

... to collect, compile & publish technical & statistical data relating to the air pollution

... the central board may establish or recognise a laboratory to enable the central board to perform its functions under this Section efficiently

(Powers & functions of State pollution Control boards (SPCB))

... to plan a comprehensive programme for the prevention, & control of air pollution in the state.

... to advise the ~~state~~ Govt on any matter

2. To encourage, conduct & participate in investigations & research relating to problems of air pollution.

3. To collaborate with central board in organizing the training of persons engaged ~~or to be~~ in programmes relating to air pollution to organize mass-education programme.

4. To inspect industrial plants & to give such direction to take steps for prevention & control of air pollution

5. To inspect air pollution control areas & to ~~access~~ assess the quality of air.

6. To lay down, in consultation with the central board, standards for emission of air pollutants into the atmosphere.

Powers of Central & State boards under Air pollution act. -

→ power to declare Air pollution control areas.

→ powers to give instructions for ensuring standards for emission from automobiles.

→ power to restrict the use of certain industrial plants.

→ Power to enter & inspect any places for the purpose of performing it's functions.

→ power to obtain information & to collect sample of air.

Penalties :- Imprisonment up to 3 months or a fine of Rs. 10,000 or both.

Water prevention & ~~Control~~ Act 1974

→ Objective of the water act is prevention & Control of water pollution.

- ~~Main~~ to maintain or restore the wholesomeness of water & establishment of boards for prevention & control of water pollution.

Water pollution :-

→ Pollution means contamination of water or alteration of physical, chemical or biological properties of water or discharge of any sewage effluent or trade effluent ~~@~~ or any other liquid substance into water.

Sewage effluent :- effluent from any sewage system or any sewage disposal works include sludge.

Trade effluent :- Liquid / solid / gaseous effluent from premises being used for a business, trade or industrial process.

Implementation Mechanism :-

* Central pollution Control board (CPCB) - Constituted by central government.
* State pollution Control board (SPCB) - Constituted by State government
* Joint board - Two or more states or Union territory.

Function of CPCB :-

→ Lay down standards for wells & streams.
→ To advice the Union government regarding matters concerning prevention & control of water pollution
→ To co-ordinate the activities of State boards & to resolve & disputes arising among them
→ plan & execute nation-wide program for prevention of water pollution using mass media

→ Establishing or recognizing laboratory for analysis of any sample or any other purpose.
→ collect, compile & publish data relating to water pollution & measure taken for it's control etc.

→ Function of State pollution control board

→ To plan & implement program for prevention of water pollution
→ To advise state government for prevention of water pollution,
→ To collect & disseminate data regarding water pollution
→ To ~~engage~~ arrange training of person engaged in water pollution
→ To inspect any sewage, trade effluent, plant, equipment, manufacturing process etc. to prevent water pollution
→ To inspect water pollution control area to control pollution in such area.
→ To recognize any laboratory to perform it's function
→ To develope methods of disposal of sewage or trade effluent
→ To lay down standard of emission of water pollution from industries etc.

Power & procedure to take samples:

when a sample is taken, ~~the person~~ taking the sample will
→ serving of any immediate notice on the agent/occupier stating intention to get the sample analyzed.
→ Sample to be taken in the presence of occupier.
→ Sample to be divided into two parts, if requested by occupier.

→ Container is required to be marked, sealed & signed.

→ one sample to be sent to board laboratory

→ ~~at no request~~

→ at the occupier makes a request, then sample to be sent to state water laboratory → at no request for division of sample, then the sole sample to be sent to board laboratory.

Legal provisions regarding prevention & control of water pollution :-

→ Liability of person in charge of premises to inform SPCB about ~~pres~~ excessive discharge caused by accident or unforeseen circumstances

→ Liability of SBCB to take corrective measures

→ ~~pre~~ power of SPCB to call for information

→ power of SPCB to issue appropriate directions including directions for closure, prohibition regulation etc

Public awareness :-

Chap 7 Human population & the environment

~~Population growth: change in population over time~~

Population:- A group of organism of the same species that live in the same area at a given time

→ Scientific study of human population is called demography

Parameters affecting population size:-

Birth rate: Number of live birth per 1000 people in a population in a given year

Death rate: Number of death per 1000 people in a population in a given area.

Immigration: Arrival of individuals from ~~neighbouring population~~ other areas.

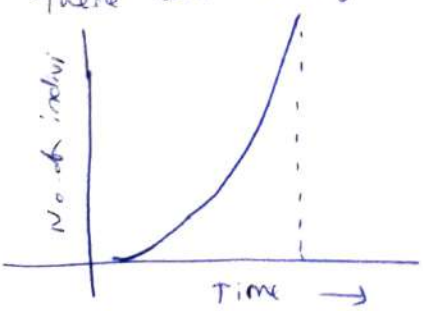
Emigration: Dispersal of individuals from the original population to new areas.

Population growth:- It refers to increase in it's size. It is determined by number of individuals added to the population (birth + immigrants) & the number of individuals lost from the population at ~~a~~ (death + emigrants) in a given time.

→ Population have characteristic pattern w.r.t time

Growth curve:- Mathematical operation of growth of a population from it's begining till the stabilizes.

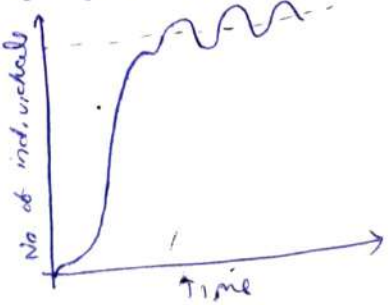
— There are two types of growth curve J-shape & S-shape.



(J-shaped)

↓

(Exponential growth curve)



(S-shaped)

(Sigmoid growth curve)

population

Variation among nation :-

→ Different regions of the world find themselves at different stages of demographic transition from high to low mortality & fertility.

→ Their growth path also differ considerably, resulting in significant shifts in the geographical distribution of the world's population.

→ At present the world's population has crossed 7 billions.

→ this existing population is also not evenly distributed.

→ Less developed ~~cantinal~~ countries have 80% population while the developed countries have only 20%.

Population Explosion - family welfare program

Population explosion :- The rapid increase in population over a relatively short period is called population explosion.

→ World population which was around 2 billions in 1900 & reaches about 6 billions by 2000

→ In India approximately 350 ~~millions~~ million at the time of independence reached ~~to~~ close to billion by 2000 & crossed a 1 billion in May 2000.

→ Rapid decline in death rate (DR) Maternal Mortality (MMR) rate & Infant Mortality rate (IMR). ~~and in increase in number of people in reproductive~~ are probably reasons for this.

→ Reproductive & child health care programmes we could bring down the population growth rate.

Reasons for high population growth:

1. Spread of education for disease.
2. Control of disease.
3. Advancement in agriculture.
4. Storage facilities.
5. Better transportation.
6. protection from calamity.
7. Government efforts.

Consequences of overpopulation :-

1. poverty
2. Food supply decreases
3. Hygienic condition
4. Unemployment
5. Housing problem
6. pollution
7. Education problem.

Family welfare programm

→ It was started in the year 1951.
→ the concept of welfare is basically related to quality of life, as such it includes, education, nutrition, women's welfare & rights, shelter, safe drinking water all vital factor associated with the concept of welfare.

Aim :- To promote adoption of small family size norm
→ To promote the use of spacing Methods (gaps b/w 2 children)
→ To ensure adequate supply of contraceptive to all eligible couple within easy reach.