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Multi-Disciplinary Nature of Environmental Studies

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Introduction:-

- ⇒ The word environment is derived from the French word "environner" which ^{means} ~~mean~~ to encircle or surround.
- ⇒ Thus, our environment can be defined as "the cultural and physical conditions that surround, and influence the survival, growth and development of people, animals and plants".
- ⇒ This broad definition includes the natural as well as the technological environment as well as the cultural and social contexts that shape human life.
- ⇒ It includes all factors (living and nonliving) that affect an individual organism or population at any point in the life cycle; set of circumstances surrounding a particular occurrence and all things that surround us.

Segments of Environment

- ⇒ Environment consists of four segments.
- (1) Atmosphere - Blanket of gases surrounding earth.
- (2) Hydrosphere - Various water bodies present on the earth.
- (3) Lithosphere :- contains various types of soil and rocks on the earth.
- (4) Biosphere :- composed of all living organisms and their interactions with the environment.

Multi-Disciplinary Nature of Environmental

- ⇒ The Environment Studies is a multi-disciplinary science because it comprises various branches of science like Chemistry, Physics, Medical Science, Life Science, Agriculture, Public Health, and Engineering etc.

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⇒ It is the science of Physical Phenomena in the environment. It studies about the sources, reactions, transport, effect and fate of Physical and biological species in the air, water, soil and the effect of from human activity upon these.

⇒ As the environment is complex and actually made up of many different environments like natural, constructed and cultural environments studies is inter disciplinary in nature including the study of biology, geology, Politics, Policy studies, law, Religion engineering, Chemistry and economics to understand the humanity's effects on the ~~natural~~ natural world.

⇒ This subject educates the students to appreciate the complexity of environmental issues and citizens and experts in many fields.

⇒ By studying environmental science, students may develop a breadth of the interdisciplinary and methodological knowledge in the environmental fields that enables them to facilitate the definition and solution of environmental problems.

Scope of Environmental Studies

Environmental studies as a subject has a wide scope. It includes a large number of areas and aspects, which may be summarized as follows:-

- ⇒ Natural resources - their conservation and management
- ⇒ Ecology and Biodiversity
- ⇒ Environmental pollution and control.
- ⇒ Human population and environment
- ⇒ Social issue in relation to development and environment.

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These are the basic aspects of environmental studies which have a direct relevance to every section of society. Several career options have emerged in these fields that are broadly categorized as:

(i) Research and development in environment

Skilled environmental scientists have an important role to play in examining various environmental problems in a scientific manner and carry out R and D activities for developing cleaner technologies and promoting sustainable development.

(ii) Green advocacy:-

With increasing emphasis on implementing various Acts and Laws related to environment, need for environmental lawyers has emerged, who should be able to plead the cases related to water, air, forest, wildlife, pollution and control etc.

(iii) Green marketing

While ensuring the quality of products with ISO mark, now there is an increasing emphasis on marketing goods that are environment friendly. Such products have ecomark or ISO 14000 Certificate. Environmental auditors and environmental managers would be in great demand in the coming years.

(iv) Green media:-

Environmental awareness can be spread amongst masses through mass media like television, radio, newspaper, magazine, hoardings, advertisements etc., for which environmentally educated persons are required.

(V) Environmental Consultancy:-

Many non-government organizations, industries and government bodies are engaging environmental consultants for systematically studying and tackling environment related problems.

Importance of Environmental Studies

- ⇒ The importance of environmental studies is that, the current trend of environmental degradation can be reversed if people of educated communities are organized, empowered and experts are involved in sustainable development.
- ⇒ Environmental factors greatly influence every organism and their activities.
- ⇒ At present a great number of environmental issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. These issues are studied besides giving effective suggestions in the environment studies.
- ⇒ The environment studies enlighten us, about the importance of protection and conservation of our natural resources, indiscriminate release of pollution into the environment etc. Environment studies have become significant for the following reasons:-

(i) Environment Issues being of International Importance
It has been well recognized that environment issues like global warming, ozone depletion, acid rain, marine pollution and loss of biodiversity are not merely national issues but are global issues and hence must be tackled with international efforts and co-operation.

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(2) Problems Cropped in the wake of Development:-
Development, in its wake gave birth to Urbanization, Industrial Growth, Transportation Systems, Agriculture and Housing etc. However, it has become phased out in the developed world. The North, to cleanse their own environment has, fact fully, managed to move dirty factories to South. When the west developed, it did so perhaps in ignorance of the environmental impact of its activities. Evidently such a path is neither practicable nor desirable, even if developed world follows that.

(3) Explosively Increase in Pollution:-

World Census reflects that one in every seven persons on this planet lives in India. Evidently with 16 percent of the world's population and only 2.4 percent of its land area, there is a heavy pressure on the natural resources including land. Agricultural experts have recognized soils health problems like deficiency of micronutrients and organic matter, soil salinity and damage of Soil Structure.

(4) Need for An Alternative Solution:-

It is essential, specially for developing countries to find alternative paths to an alternative goal. We need a goal as under:

(1) A goal, which ultimately is the true goal of development an environmentally sound and Sustainable development.

(2) A goal common to all citizens of our Earth.

(3) A goal distant from the developing world in the manner it is from the over-consuming wast societies of the "developed" world.

(5) Need to save Humanity from Extinction:-

It is incumbent upon us to save the humanity from extinction. consequences to our activities cause destructing the environment and depleting the biosphere, in the name of development.

(6) Need for wise planning of Development

Our survival and sustenance depend. Resources withdrawal, processing and use of the product have all to be synchronized with the ecological cycles in any plan of development. Our actions should be planned ecologically for the sustenance of the environment and development.

Need for Public Awareness

(1) Growing Population: A population of over thousands of millions is growing at 2.11 percent every year. Over 17 million people are added each year. It puts considerable pressure on its natural resources and reduces the gains of development. Hence, the greatest challenge before us is to limit the population growth. Although population control does not automatically lead to development, yet the development leads to a decrease in population growth rates.

(2) Poverty :- India has often been described a rich land with poor people. The poverty and environmental degradation are mixed with one another. The vast majority of our people are directly dependent on the nature resources of the country for their basic needs of food, fuel, shelter and fodder. About 40% of our people are still below the poverty line.

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(3) Environment degradation has adversely affected the poor who depend upon the resources of their immediate ~~surroundings~~ surroundings. Thus, the Challenge of Poverty and the Challenge of environment degradation are two facets of the same Challenge.

(4) Agricultural growth :- The people must be made familiar with the methods to sustain and increase Agricultural growth without damaging the environment. High yielding varieties have caused soil salinity and damage to physical structure of soil.

(5) Need to Increase Ground water :- It is essential of rationalizing the use of groundwater. Factors like Community wastes, Industrial effluents, Chemical fertilizers and pesticides have polluted our surface water and effected quality of the groundwater. It is essential to restore the water quality of our rivers and other ~~water~~ water bodies. Suitable strategies for conservation of water, provision of safe drinking water and keeping water bodies clean should be developed.

(6) Development and forests :- Forests serve catchment for the rivers with increasing demand of water, Plan to harness the mighty river through large irrigation projects were made. Certainly, these would submerge forests; displace local people, damage flora and fauna. As such, the dams on the river Narmada, Bhagnadi and elsewhere have become areas of political and scientific debate. Forests in India have been shrinking for several centuries owing to pressure of agriculture and other uses. Vast areas that were once green, stand today as waste

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- lands. These areas are to be brought back under vegetative cover. The tribal communities inhabiting forests, respects the trees, birds and animals given them sustenance. We must recognize the role of these people in restoring and conserving forests. The modern knowledge and skills of the forest department should be integrated with the traditional knowledge and experience of the local communities. The strategies for the joint management of forests should be evolved in a well planned way.

(7) Degradation of Land:- At present out of the total 329 mha of land, only 266 mha possess any potential for production. Of this, 143 mha is agricultural land nearly and 85 suffers from varying degrees of soil degradation. Of the remaining 123 mha, 40 are completely unproductive. The remaining 83 mha is classified as forest land, of which over half is degraded to various degrees. Nearly 406 million head of livestock have to be supported on 13 mha, or less than 4 percent of the land classified as pasture land, most of which is overgrazed. Thus, out of 226 mha, about 175 mha or 66 percent is degraded to varying degrees. Water and wind erosion causes further degradation of almost 150 mha this degradation is to be avoided.

(8) Evil consequences of Urbanizations:- Nearly 27% of Indians live in urban areas. Urbanization and industrialization has given birth to a great number of environmental problems.

over 30 percent of urban Indians live in slums. out of India's 3,295 towns and cities, only 21 have partial or full Sewerage and treatment facilities. Hence, coping with rapid urbanization is a major challenge.

(9) Air and water Pollution:- Majority of our industrial plants are using outdated and Pollution causing technologies and makeshift facilities devoid of any provision of treating their waste. A great number of cities and industrial areas have been identified as the worst in terms of air and water pollution. Acts are enforced in the country but their implement is not so easy. The reason is their implementation needs great resources, technical expertise, Political and Social will. Again the people are to be made aware of these rules. Their support is indispensable to implement these rules.

Institutions in Environment

managing natural resources require efficient institutions at all levels i.e local, national, regional and global. Among the large number of institutions that deal with environmental protection and conservation, a few well-known organizations include government organizations like the BS I and ZSI, and NGOs, like the BNHS, WWF-I, etc.

- The Bombay Natural History Society (BNHS), Mumbai
- World Wide Fund for Nature - India (WWF-I), New Delhi
- Centre of Science and Environment (CSE), New Delhi
- C.P.R. Environmental Education Centre, Madras
- Centre for Environment Education (CEE)

⇒ Bhabhathi Vidyapeeth University, Institute of Environment Education and Research, Pune.

⇒ The Salim Ali Centre for Ornithology and Natural History (SACON)

⇒ Wild life Institute of India (WII), Dehradun

⇒ Zoological Survey of India (ZSI)

⇒ The Madras Crocodile Bank Trust (MCBT)

⇒ Botanical Survey of India (BSI)

Nature ResourcesIntroduction

⇒ Natural resources can be defined as 'Variety of goods and services provided by nature which are necessary for our day-to-day lives'.

⇒ Eg: Plants, animals and microbes (living or biotic part), Air, water, soil, minerals, climate and solar energy (non-living or abiotic part).

⇒ They are essential for the fulfillment of physiological, social, economical and cultural needs at the individual and community levels.

Types of Natural Resources

They are of two types of resources namely Renewable and Non-Renewable Resources.

(1) Renewable resources:

The resources that can be replenished through rapid natural cycles are known as renewable resources. These resources are able to increase their abundance through reproduction and utilization of simple substances.

Ex:- Plants, (crops and forests) and animals

⇒ Some examples of renewable resource though they do not have life cycle but can be recycled

Ex:- Wood and wood-products, Pulp products, Natural rubber, Fibers (e.g. cotton, jute, animal wool, silk and synthetic fibers) and leather

⇒ In addition to these resources, water and soil are also classified as renewable resources.

⇒ Solar energy although having a finite life, as a special case, is considered as a renewable resource in as much as solar stocks is inexhaustible on the human scale.

(2) Non-renewable resources:-

The resources that cannot be replenished through natural processes are known as non-renewable resources. These are available in limited amounts which cannot be increased. These resources include fossil fuels (petrol, coal etc.) metals (iron, copper, gold, silver, lead, zinc etc.), minerals and salts (carbonates, phosphates, nitrates etc.). Once a non-renewable resource is consumed, it is gone forever.

⇒ Non-renewable resources can further be divided into two categories, viz.

(A) Recyclable and

(B) non-recyclable:

(A) Recyclable:- These are non-renewable resources, which can be collected after they are used and can be recycled. These are mainly the non-energy mineral resources, which occur in the earth's crust (Ex:- ores of aluminum, copper, mercury etc.) and deposits of fertilizer nutrients (e.g. phosphate rock and potassium and minerals used in their natural state (asbestos, clay, mica etc.))

(B) Non-recyclable:- These are non-renewable resources, which cannot be recycled in any way. Ex:- fossil fuels and uranium, which provide 90 per cent of our energy requirements.

Natural resources And Associated Problems:-

⇒ The main problem associated with natural resources is unequal consumption.

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⇒ A major part of natural resources are consumed in the 'developed' world. The 'developing nations' also over use many resources because of their greater human population. However, the consumption of resources per capita (per individual) of the developed ~~and~~ countries is up to 50 times greater than in most developing countries is up to 50 times greater than in most developing countries.

⇒ Advanced countries produce over 75% of global industrial waste and greenhouse gases.

⇒ Energy from fossil fuels consumed in relatively much greater quantities in developed countries. Their per capita consumption of food too is much greater as well as their waste.

Forest Resources

A forest can be defined as a biotic community predominant of trees, shrubs or any other woody vegetation usually in a closed canopy. It is derived from latin word 'foris' means 'outside'. India's forest cover is 6,76,000 sq. km (20.55% of ~~geogra~~ geographic area). Scientists estimate that India should ideally have 33% of its land under forest. Today we only have about 12%. Thus we need not only to protect our existing forests but also to increase our forest cover.

Functions of Forest

- (1) It performs very important function both to human and to nature.
- (2) They are habitats to millions of plants, animals and wild life.

- (3) They recycle rain water.
- (4) They remove Pollutant from air.
- (5) They control water quality.
- (6) They moderate temperature and weather.
- (7) They influence soil condition and prevent soil erosion.

Uses of Forest

- (1) Commercial uses
- (2) Ecological uses

(1) Commercial uses :-

- (i) wood - used as a fuel
- (ii) Supply wood for various industries - Raw material - as pulp, paper, furniture timber etc.
- (iii) minor forest products - gum, dyes, resins
- (iv) many plants - medicines
- (v) Supply variety of animal products - honey, ivory, horns etc.
- (vi) many forest lands are used for - mining, grazing for dams and recreation.

(2) Ecological uses :- forest provides number of environmental services.

- (i) Production of oxygen :- Photosynthesis produces large amount of oxygen which is essential for life.
- (ii) Reducing global warming :- Carbon dioxide is one of the main green house gas. It is absorbed by plants for photosynthesis. Therefore the problem of global warming caused by CO_2 is reduced.

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(iii) Soil Conservation :-

Roots of trees bind the soil tightly and prevent soil erosion. They also act as wind breaks.

(iv) Regulation of hydrological cycle :- Watershed in forest act like giant sponges and slowly release the water for recharge of spring.

(v) Pollution moderators :-

Forest can absorb many toxic gases and noises pollution.

(vi) Wild life habitat :- Forest is the home of millions of wild animals and plants.

REASON FOR DEFICIENCY OF FOREST :-

In India the minimum area of forest required to maintain good ecological balance is about 33% of total area. But at present it is only about 12%. So over exploitation of forest material occurs.

over exploitation of forest :- Due to over population, there is an increased demand for medicine, shelter, wood and fuel. Hence exploitation of forest materials is going on increasing.

cause of over exploitation :-

- (1) Increasing agricultural production
- (2) Increasing agricultural activities.
- (3) Increase in demand of wood resources.

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

Causes of deforestation :-

(4) Developmental Projects :-

Developmental Projects causes deforestation through two ways.

→ Through Submergence of forest area.

→ Destruction of forest area.

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

(5) Mining operations :- It reduces forest areas

Ex:- mica, coal, manganese and lime stone

(6) Raw materials for industries

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

(7) Fuel requirement :- wood is the important fuel for rural and tribal population.

(8) Shifting Cultivation :- Replacement of natural forest ecosystem for monospecific tree plantation.

Ex:- Teak.

(9) Forest fires :- forest fire destructs thousands of ~~are~~ acres of forest.

(10) over grazing :- over grazing by cattle reduces the cultivation land.

Consequences of deforestation (or) impacts of deforestation :-

(1) Economic loss

(2) Loss of biodiversity.

(3) Destructs the habitats of various species

(4) Reduction in stream flow

(5) Increases the rate of global ~~and~~ warming

(6) Disruption of weather patterns and global climate.

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(7) Degradation of soil and acceleration of the rate of soil erosion.

(8) induces and accelerates mass movement / landslide.

(9) increases flood frequency, magnitude / severity.

(10) Breaks the water cycle.

(11) Breaks the nutrient cycle.

Preventive measures (or) Avoid of Deforestation (or)
Methods of conservation of forests

(1) New plants of more or less of the same variety should be planted to replace the trees cut down for timber.

(2) Use of wood for fuel should be discouraged.

(3) Forest pests can be controlled by spraying pesticides by using aeroplanes.

(4) Forest fire must be controlled by modern techniques.

(5) over grazing by cattle must be controlled.

(6) Steps should be taken by the government to discourage the migration of people into the islands from mainland.

(7) Education and awareness programmes must be conducted.

(8) Strict implementation of law of Forest Conservation Act.

Major Activities in forests

Timber extraction

Wood used for engineering purposes like building houses, making furniture is called timber.

The products derived from timber have been important to many civilizations, and thus it has acquired value within these civilizations.

Timber extraction results in deforestation and in the fragmentation of the last remaining forests. It harms valuable species of trees, birds and wild animals. In spite of this, it is sometimes necessary to extract timber, so as to meet the needs of a developing country. During the extraction of timber, cutting, felling and handling should be done selectively, carefully and in a planned manner, in order to save the remaining forests and biodiversity.

Effects of Timber Extraction

The major effects of timber extraction on forest and tribal people include:-

- (1) Poor logging results in a degraded forest.
- (2) Floods may be intensified by cutting of trees on upstream watersheds.
- (3) Loss of biodiversity.
- (4) Climatic changes such as less rains.
- (5) New logging roads permit shifting cultivators to gain access to logged areas and cut the remaining trees.
- (6) It results in forest fragmentation which promotes loss of biodiversity because some species of plants and animals require large continuous areas of similar habitat to survive.
- (7) Exploitation of tribal people by the contractors.
- (8) Soil erosion especially on slopes occurs extensively.
- (9) Sedimentation of irrigation systems, floods may be intensified by cutting of trees on upstream.

DAMS

Today there are more than 45,000 large dams around the world, which play an important role in communities and economies that harness these water resources for their economic development. Current estimates suggest some 30-40% of irrigated land worldwide relies on dams. Hydropower, another important use of stored water, currently supplies 19% of the world's total electric power supply and is used in over 150 countries. The world's two most populous countries - China and India - have built around 57% of the world's large dams.

Dams Problems

Dams are the massive artificial structures built across the rivers to store water for much beneficial purpose.

Dams are considered a "Temples of modern India". Dams destruct vast area of forest area. India has more than 1600 large dams.

Effects of dams on forest:-

- (1) Thousands of hectares of forest will be cleared.
- (2) Killing of wild animals and destruction of aquatic life.
- (3) Spreading of water borne diseases.
- (4) Water logging increases the salinity of the soil.
Ex: - Narmada Sagar project it has submerged 3.5 lakhs hectares of forest.

Effects of Dam on tribal people

- (1) Construction of big dams lead to the displacement of tribal people.
- (2) Tribal people are ill-treated by the modern society.

- (3) Displacement and Cultural change affect the tribal people both mentally and physically.
- (4) They do not accommodate the modern food habits and life style.
- (5) Many of the displaced people were not recognized and resettled or compensated.
- (6) Body condition of tribal people will not suit with new areas and hence they will be affected by many diseases.

MINING

The process of extracting mineral resources and fossil fuels like coal from the earth is called as mining.

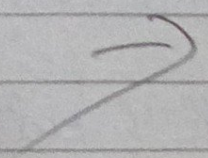
Types of mining

- (1) Surface mining:- mining of minerals from shallow deposits
- (2) Underground mining:- mining of minerals from deep deposits.

Steps involved in mining

- (1) Exploration
- (2) Development
- (3) Exploitation
- (4) Ore processing
- (5) Extraction and purification of minerals.

The extent of damage by underground mining is more than that of surface mining, which needs enormous amount of land area for its operation and management.



Effects of mining

- (1) Pollute soil, water and air.
- (2) Destruction of natural habitat.
- (3) Continuous ~~removal~~ removal of minerals leads to the formation of trench where water is logged which contaminates the ground water.
- (4) Vibrations cause earthquakes.
- (5) Produces noise pollution.
- (6) Reduces shape and size of the forest.
- (7) Increased risk of landslides.
- (8) Spoils the aesthetic beauty.

Water Resources

Water claims to be an important resource. An important use of water in our country is for irrigation. Besides, water is also required in large amounts for industrial and domestic consumption.

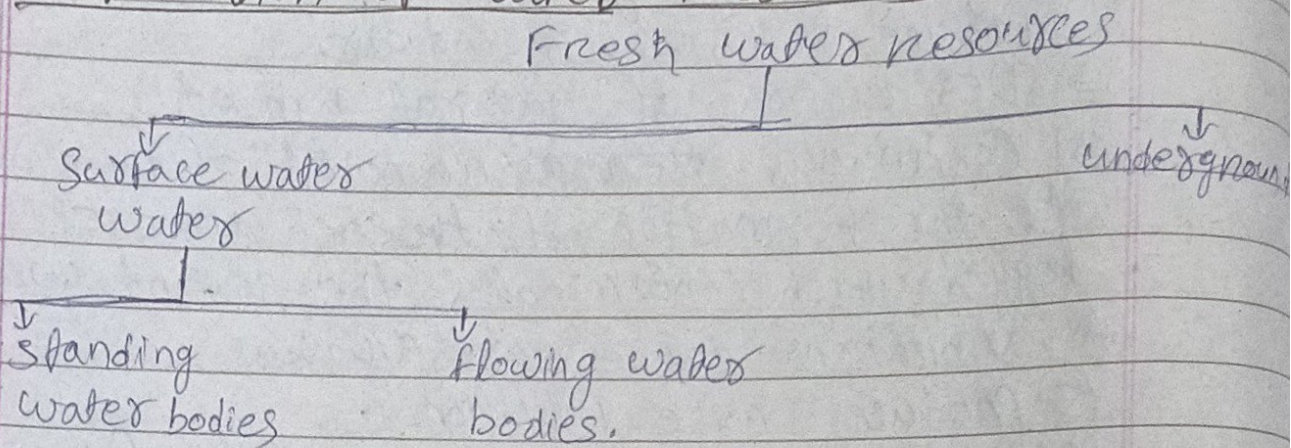
USES

- ⇒ Is essential for all forms of life.
- ⇒ Many uses of water include agricultural, industrial, household, recreational and environmental activities. Virtually, all of these human uses, require fresh water.
- ⇒ No plant or animal species can survive without water. If water in our body drops by 1% we feel thirst, if it drops by 10% we face death.

Hydrological cycle

Water from various water bodies
↓
Evaporated by solar energy enters into the atmosphere as clouds
↓
falls again on earth as rain or snow
↓
Ultimately returns to the ocean

Distribution of water resources



UNDERGROUND WATER

Aquifer :- Layers of highly permeable rock that can store water is called an aquifer. Layer of sand and gravels are good aquifers. Clay and Crystalline rocks are not good aquifers.

Effects of over utilization of water.

(1) Decrease of ground water :-

- (i) Increased usage decreases the ground water.
- (ii) Insufficient rain fall
- (iii) Building construction activities sealing the permeability of the soil.

(2) Ground subsidence :- If ground water withdrawal is greater than its recharge rate, then the sediments in the aquifers get compacted. As a result shrinkage of land surface takes place.

Problems :- (a) Structural damages to the buildings.

(b) Fracture in pipes.

(c) Reversing the flow of canals.

(3) Lowering of water table :- over utilization of ground water in arid and semi arid regions for agriculture disturbs the state of equilibrium of the hydrological cycle.

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Problem:- (a) Lowering of water table

(b) Decrease the number of aquifers

(c) Change the speed and direction of water.

(4) Intrusion of Salt water:- In coastal area over exploitation of ground water leads to the intrusion of salt water from sea. Therefore that water cannot be used for drinking and agriculture.

(5) over utilization of water causes earth quakes, landslides and famines.

(6) Drying up of wells:- Due to over utilization, ground water level decreases much faster than can be regenerated. It leads to drying up of dug well and bore wells.

(7) Pollution of water:-

Near the agricultural land ground water decreases therefore water containing nitrogen enters into the ground and pollute the ground water.

Problem:- Water which contains excess nitrate content is not suitable for drinking.

Reasons for Decline of Ground water

Population continues to rise at an unprecedented and unsustainable rate; many more areas are expected to experience this imbalance in the near future.

(1) Population explosion:-

World population is > 6 billion and will continue to increase significantly during the next few decades - Enormous demands on the world's limited freshwater supply. The total annual freshwater withdrawals today are estimated at 3800 cubic kilometers, twice as much as just 50 years ago (World Commission on Dams, 2000).

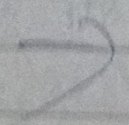
(2) Overutilization of Surface and Groundwater :- occurs at various levels. Use of more water than really needed by human beings. Many agriculturists use more water than necessary to grow crops. Industries in order to maximize short-term economic gains, does not bother its liquid waste and releases it into streams, rivers and the sea.

(3) Deforestation :- once hill slopes are removed of Forest cover, the rainwater rushes down the rivers and is lost. Forest cover permits water to be held in the area permitting it to seep into the ground. This charges the underground stores of water in natural aquifers. This can be used in drought years if the stores have been filled during a good monsoon. This soil and water management and afforestation are long-term measures that reduce the impact of droughts.

The destruction of Forests influences the negative of natural water cycle. The removal of dense and uniform cover over the hilly zones leads to occurrence of floods in drainage basins. Nations situated in tropical climates including India experience disastrous floods caused by the indiscriminate deforestation of the slopes above the valleys.

(4) Hydropower Generation :- Large amount of water is used for generating power which otherwise used for human needs.

(5) Dams :- for agriculture and power generation



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(6) Rain fall:- The erratic and inadequate rain fall results in reduction in storage in subsurface reservoirs. The building construction activities are sealing the permeable zone, reducing the area for percolation of rain water into subsurface and increase in surface runoff.

(7) India's increasing demand for water for intensive irrigated agriculture, for generating electricity, and for consumption in urban and industrial centers has been met by creating large dams. Dams support 30 to 40% of this area.

FLOOD

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

Causes of Flood

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

Effect of flood

- (1) water spreads in the surrounding area and submerges them
- (2) Cultivated land gets affected
- (3) Extinction of civilization.

Flood management

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

(4) flood may also be reduced by reduction of run-off by increasing infiltration through appropriate afforestation in the catchment area.

Drought

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

- (1) Inadequate rain fall
- (2) late arrival of rain fall
- (3) Excessive withdrawal of ground water.

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

Causes of Drought :-

- (1) when annual rain fall is below normal and less than evaporation, drought is created.
- (2) High Population.
- (3) Intensive cropping pattern.

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

Effects of Drought

- (1) Drought causes hunger, malnutrition and scarcity of drinking water and also changes the quality of water.
- (2) Drought causes widespread crop failure leading to acute shortage of food and adversely affect human and live stock population.
- (3) worst situation of drought causes desertification.
- (4) drought increases the degradation of natural resources.

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

(6) Drought causes large migration of people and —
—urbanization.

Drought management

(1) Indigenous knowledge is essential

(2) Rain water harvesting system

(3) construction of reservoirs to improve ground water level.

(4) modern irrigation technology very useful to conserve water.

(5) Afforestation activities also improve the potential of water in the drought area.

(6) Crop mixing and dry farming are the suitable methods which minimize the risk of crop failure in dry area.

Mineral Resources

Naturally occurring inorganic crystalline solids with uniform chemical composition are called as minerals.

Uses and Exploitation of minerals

(1) Development of industrial plants and machinery —
Fe, Al and Cu

(2) Construction work — Fe, Al and Ni

(3) Generation of energy — coal, lignite, uranium.

(4) Designing defense equipments like weapons and ornaments.

(5) Agricultural purposes — fertilizers and fungicides
= Zn and Mn

(6) Jewellery = Au, Ag and Pt

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- (7) making Alloys for various purposes
 - (8) Communication purposes - telephone, wires, cables and electronic devices.
 - (9) medicinal purposes, particularly in ayurvedic system.

Environmental Damages caused by mining Activities

(1) Devegetation:-

- ⇒ Topsoil and vegetation get removed
- ⇒ Deforestation leads to several ecological losses
- ⇒ Landscape gets badly affected.

(2) Ground water Contamination:-

Mining pollutes ground water, Sulphur is converted into Sulphuric acid which enters into the soil.

(3) Surface water Pollution:-

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

(4) Air Pollution:-

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

(5) Subsidence of land:-

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

Effects of over Exploitation of minerals.

- (1) Rapid depletion of mineral deposits.
- (2) wastage
- (3) Environmental Pollution.
- (4) Needs heavy energy requirements.

management of mineral Resources

- (1) The efficient use and Protection of mineral resources.
- (2) Modernization of mining Industries.
- (3) Search for new deposit.
- (4) Reuse and recycling of the metals.
- (5) Environmental Impacts can be minimized by adopting ecofriendly mining technology.

Food Resources

Food is an essential requirement for survival of life. main components are carbohydrates, fats, proteins, minerals and vitamins.

Types of food supply

- (1) Crop Plants :- Grains mostly constitute about 76% of the world's food. Ex :- Rice, wheat and maize.
- (2) Range lands :- Produces 17% of world's food from trees ~~and~~ and grazing animals. Ex :- fruits, milk and meat.
- (3) Ocean :- fisheries = 7% of world's food.

World Food Problem

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

Energy Resources

Energy Distribution in the world.

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

Types of Energy Resources :-

- (1) Renewable Energy Resource (or) Non conventional energy resources.
- (2) Non-renewable energy resources (or) Conventional energy resources.

Renewable Energy Sources :- Energy which can be regenerated.

merits of Renewable energy resources

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

Types of renewable energy resources :-

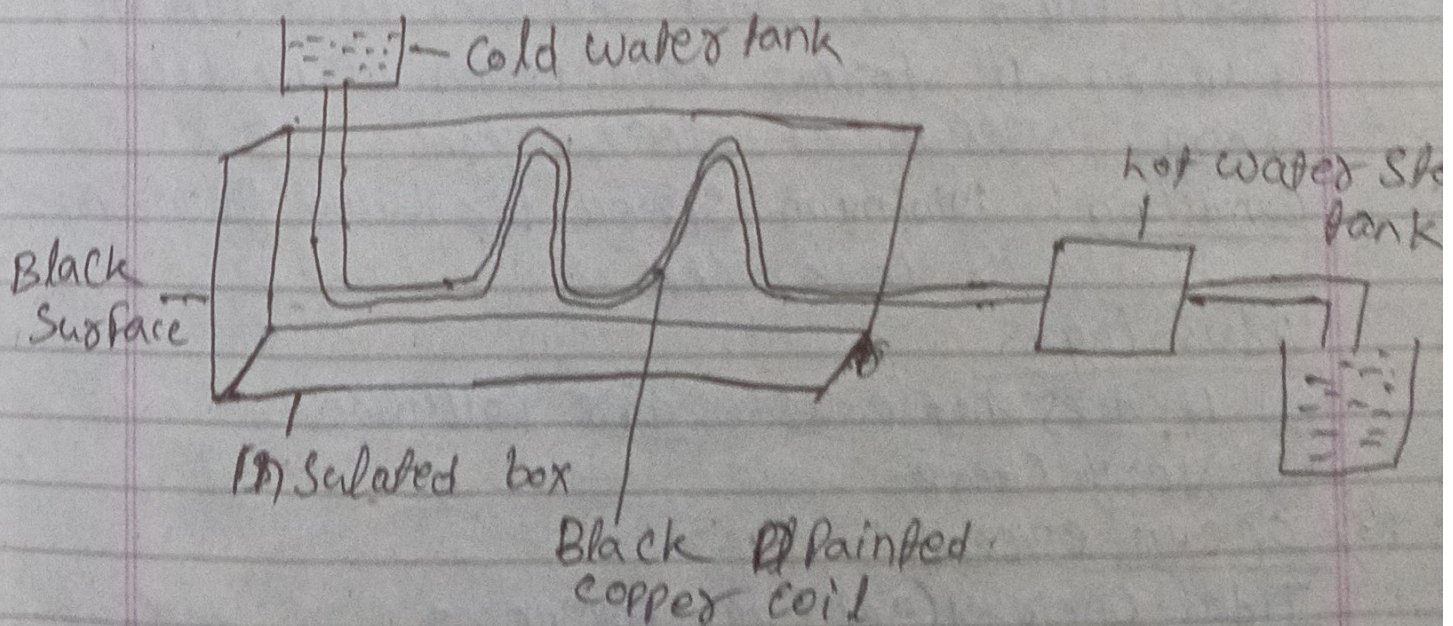
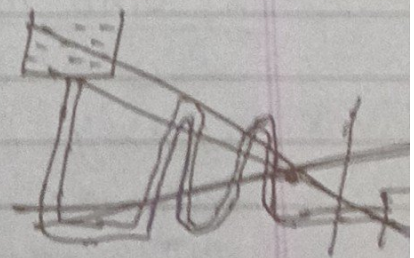
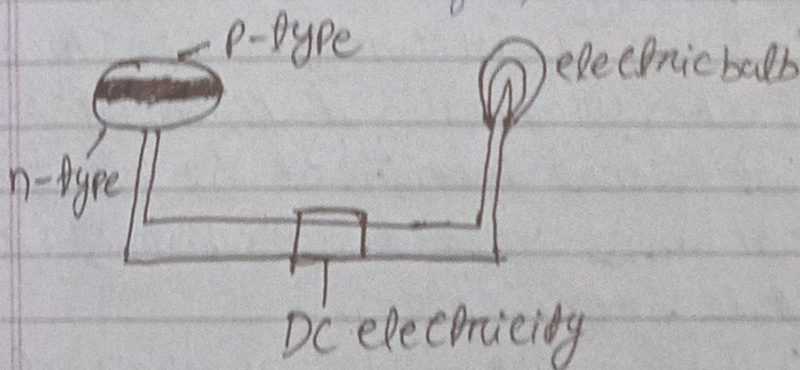
- (1) Solar energy :- Nuclear fusion reaction of Sun produces enormous amount of energy. Several techniques are available for collecting, storing and using solar energy.

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

⇒ Solar cell consists of P-type semiconductor (Si doped with B) and n-type semiconductor (Si doped with P). P-type forms top layer and n-type forms bottom layer.

⇒ Solar rays fall on the top layer, the electron from valence band promoted to the conduction band which crosses the P-n junction into n-type semiconductor. Potential difference between the two layers is created which causes flow of electrons.

Uses :- It is used in calculators, electronic watch, Street light, water pumps etc.



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

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

(2) Wind energy:- moving air is called wind. The energy recovered from the force of the wind is called wind energy. Its speed is high.

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

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

Condition:- Minimum speed for wind generator is 15 km/hr .

Advantages

(1) It does not cause air pollution.

(2) Very cheap.

(3) Ocean energy:-

Tidal energy (or) Tidal power:-

Ocean tides are due to gravitational force of sun and moon which produce enormous

- amount of energy. High tides - rise of water in the ocean. Low tides - fall of water in the ocean.

Tidal energy can be used by constructing a tidal barrage. During high tides sea water enters into the reservoirs and rotates the turbine produce electricity. During low tides water from reservoir enters into the sea rotate the turbine produce electricity.

Ocean thermal energy:-

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

Condition:- Temperature difference should be 20

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

(3) Geo thermal energy:- Temperature of the earth increases at a rate of $200-250^{\circ}\text{C per km}$ when we move down the earth. The energy utilized from the high temperature present inside the earth is called geothermal energy.

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

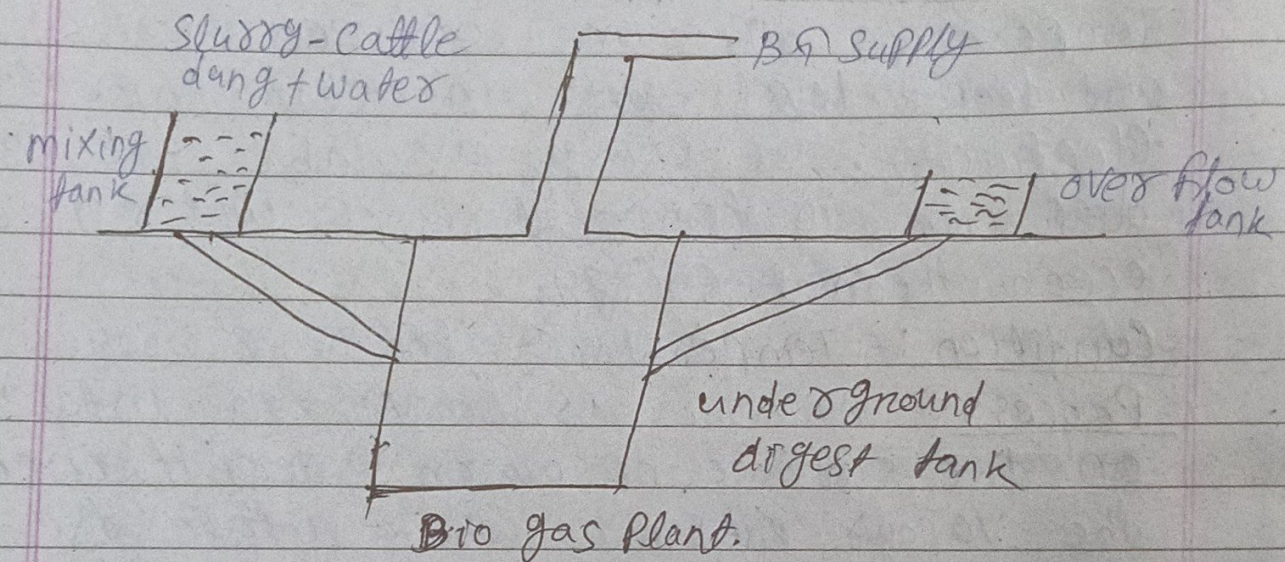
Artificial geysers:- Artificially a drill hole is made to the hot region and by sending a pipe into it. The hot water or steam is used to rotate the turbine and generate electricity.

(4) Bio mass energy:-

Bio mass :- organic matter produced by plants or animals used as source of energy.

Bio gas:-

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



Bio fuels :- Fuels obtained by the fermentation of biomass. EX:- Ethanol, methanol.

Ethanol :- Produced from sugarcane. Calorific value is less.

Methanol :- obtained from ethanol calorific value too less.

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

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

Disadvantages:-

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

Non-Renewable Energy sources:-

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

- (1) Coal:- It is a solid fossil fuel.

Disadvantages:-

- (1) When coal is burnt large amount of CO_2 is released which causes global warming.
- (2) S, N produces toxic gases during burning.

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

(3) Liquefied Petroleum gas (LPG):-

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

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

(5) Nuclear Energy :-

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

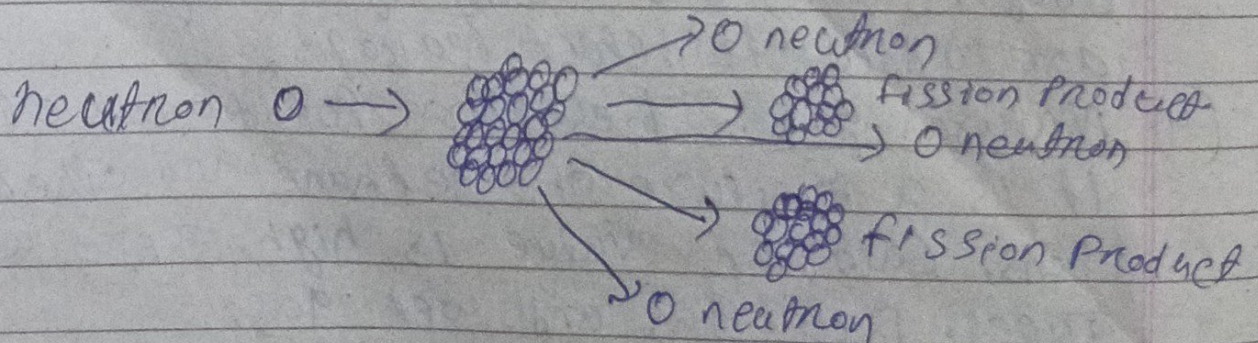
Nuclear fission :- It is a nuclear change in which heavier nucleus split into lighter nuclei on bombardment of fast moving neutrons. Large amount of energy is released through chain reaction.

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

Nuclear fusion :-

It is a nuclear change in which lighter nucleus is combined together at extremely high temp. (1 billion °C) to form heavier nucleus and a large amount of energy is released.

Ex: - Isotopes of hydrogen combine to form helium molecule.



multidisciplinary Nature of Environmental Studies.

* ~~definition~~ ⇒ Environment is derived from the word "Environner" which means Surrounding.

⇒ The environment includes all the biotic and abiotic elements or organic

⇒ It also includes the combined term biosphere which contains all living and non-living parts.

* ~~definition~~ :- Environment is the combination of all social, economical, biological, physical, chemical factors which are around the living organisms

⇒ Some of the changes in nature are irreversible (Eutrophication of lake) process.

⇒ Some others are cyclic (monsoon rain) and others are transient (storm)

⇒ With the development of science the human started to interfere in the natural process by deforestation, water pollution, mining activities, industrial revolution etc. we are using more pesticides, insecticides, chemical fertilizers to get more harvest without caring for natural impact.

* Scope and Importance :-

The basic components of environment are

(1) atmosphere (air)

(2) lithosphere (soil)

(3) hydrosphere (water)

(4) Biosphere (Human, living organism)

We require both interdisciplinary and transdisciplinary approach towards environment to solve different problems for

→ The environmental Science deals with ~~different~~ ^{discipline} different like, science, math, IT, ~~eng~~ material science, ~~geology~~, Biology, ~~psychology~~

different issues solve Problems		major contributes
→ Resource Recovery	N	microbiology and Biotechnology.
Treatment	U	
→ Air, water, marine Pollution.	T	Atmospheric, ocean and Space Science
→ Environmental Ethics.	R	Ethics, Behavioural-science and literature
→ Simulation, Analysis	O	computer Science and I.T.
→ population Explosion	N	Social Science
Sustainable development	M	Physical, chemistry, Geology, mathematics
→ Energy crisis non-renewable resources.	E	Engineering
→ Modelling.	S	medical science
→ Power Generation	C	ecology
→ Disease, medicines	I	life Science
→ Deforestation	E	
→ Biochemical cycle	N	
	C	
	E	

→ The ~~strato~~ stratosphere (6km to 50km) ^{contains} Ozone layer) which restricts/prevents the entry of UV. Ray of the sun into our atmosphere. It helps us to prevent Skin cancer.

→ The Increasing industry, more rearmament of food makes the environment more Polluted.

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⇒ The environmental studies ~~tries~~ try to make different remedial (solution) from prevention of reduction is variability of environment.

Food adulteration:- mixing of toxic elements of food.

Need for Public awareness:-

For Pollution Control or environmental improvement cooperation must be from all sides of society. The social worker, politicians, scientist, educationist and public all must ~~cooperate~~ work together to make the environment clean and green. The burning of fossil fuels releases different pollutant gases (CO_2 , NO_2 etc). for Global warming, increasing ~~sea~~ level, catastrophic climate change, ^{sudden}

⇒ so without arranging for programmes like "Save water, save environment" different steps taken for climate control we can use bicycle for short distance travel, can take transport facilities like bus, train, in place of car.

⇒ different public awareness campaigns are to be made in a regular manner.

⇒ The first world level global meet was held in 1992 at Rio de Janeiro, with the title ~~was~~ "Earth Summit".

⇒ The diesel vehicle emit particles with size less than 10 microns which

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enters in it our lungs. during intake process.

⇒ It produces civic ~~desires~~ disease for ~~cor~~

⇒ The elements from paper industry chemical industry produces many types of air and water pollutants.

⇒ The Sewage when deposited continuously on the soil on the ~~part~~ particular area then its ~~to~~ closes pores of soils

⇒ It produces anaerobic condition which further makes decomposition and production of pollutant gases and makes the land sick.

⇒ high noise creates problem to our ear drums and affects our physical and mental health.

⇒ It increases blood pressure, heart attack, neurological problems etc.

⇒ The environmental protection ^{act} was introduced in India as the 42nd ~~amend-~~ amendment act in our constitution.

* Definition :- All the materials of nature which are use by the human for they are ~~closed~~ growth and comfort are called as Natural resources eg. - Air, water, mineral, soil.

Types :-

- (1) Exhaustable Natural resources
- (2) Inexhaustable Natural resources

(1) - Exhaustable Natural resources :- (i) Renewable

Definition :- This resources are

consume by continuous use.

Forest, animal, Petrol, coal etc...

(ii) Non Renewable Type

(i) Renewable :- This resources are can be renewed sufficient hard effort. ~~For~~

eg. Forest, animal, bird etc...

(ii) Non Renewable :- This resources are cannot be replaced in a life span example are coal, mineral, metal, oil, natural gas etc...

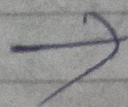
→ The mineral ^{metals} are generally called as stock materials.

* A coal and Petroleum are called as Fossil ~~to~~ because these formed the dead organic material of animal, birds and plants.

* The rock and salts are abiotic resource.

(2) Inexhaustable Natural resources

These are the resources this can't be above exhausted



Natural resources and associated Problem

- ⇒ In ancient times the requirement of human are limited like food, shelter, and cloth. with the development the requirement increase ~~to~~ human demanded to the nature.
- ⇒ With more industry, farming, technology, the human raised started to destroying the natural resource.
- ⇒ hence global warming, acid rain, deforestation, loss of animals, ~~house~~ and food shortage, change in soil erosion etc. made our life miserable.
- ⇒ In order to have solution for the Problem both public and government have to take actual step to lead to comfortable life.

* Forest Resource :

India is having approximately 16% of forest with 7% biodiversity.

⇒ The forest ranges from Alpine, Pa. of Himalaya, the temperate tropical forests, mangrove forest (coastal area) and thorny plain (desert).

⇒ Our govt. is taking step to increase tree plantation. India has 80 no. of national parks or biosphere reserves, 441 wildlife sanctuaries.

Flora = trees
Fauna = animals, birds

* In wildlife sanctuaries protection are giving to wild animals/bird. (441)

* In National Park are PLS taken both animals and tree i.e fauna, flora.

* The biosphere reserves are special larger zone from diversification of ~~animals~~, tree birds etc....

⇒ here that is strict control for any human interfere.

⇒ as the fund of Indian govt. is less hence financial assistances are requested from ~~Public~~ Public NGO and also from ~~for~~ foreign banks.

* NWFP (Non wood forest Products) :- It is generally used by human beings for good life style

Deforestation :- The change of forest area into nonforest area ~~Nonintently or unknowingly~~ 'knowingly or unknowingly' called deforestation.

definition :- There are two types of definition one is (i) broad type = It is the definition which is made by (UNRISD) United National Research Institute for Social Development is state that deforestation of conversion of forest and also decreasing forest quality life, density, structure, diversity of plants and animals.

(ii) Narrow type :- food or Agriculture organisations of UN (FAO)

2) It state that deforestation is the Removal of forest cover only for extra use.

(a) Land cover :- It is the percentage of cover available in any ~~part of~~ area.

(b) Land use :- here deforestation is considered as per utility for land.

Causes of deforestation :-

(1) Present cause

(2) Prehistoric cause

(3) Pre-Industrial history

(4) Industrial pressure

① Present cause :-

Presently deforestation occurs due to agricultural Animal grazing, Petroleum extraction, Poverty, lack of reformation, Slash and burn method.

recently all this above factors increases deforestation which should be control by modify method.

(2) Pre-historic cause :-

• Deforestation has started when human used fire as there working tool. in the Prehistoric period (mesolithic) people used fire for clearing of forest for agriculture and hunting purpose. The removal of forest reduced transpiration which made different peat bogs.

(3) Pre-Industrial history :-

The harbours where previously abandoned due to the deposition of silt (eg. Syria, South asian countries). The population increase along with agriculture pressure ised.

deforestation to happen.

(4) Industrial Pressure:-

As Today the generation is highly develop hence Industrialisation is becoming higher requirement. It leads to Severe deforestation.

* Environmental effects:-

(i) Atmospheric Pollution:-

Deforestation releases Sufficient amount of CO_2 and other gases into the Atmosphere. Trees are generally called as observer of different harmful gases.

(ii) Wildlife:-

Due to deforestation the no. of wildlife decreases and also reduction in diversification. The Hydrology cycle is also effected. The litter, stem of trees reduces the surface runoff. The root of the trees increase water - infiltration they also increase the capacity of storing water in the soil.

(iii) Soil Erosion:-

Deforestation increases soil erosion as the tree litter as absent for example yellow river in China (Sorrow of China). The river beds are yellow river are having no plantation and hence soil are continuous added to the river during rainy season the yellow river makes several flow.

(iv) landslides:- The trees roots generally bind the soil such that the soil will not flow away with running water deforestation causes landslide to happen.

* Controlling deforestation:-

(1) Farming:- High yield crops, modern, techniques cyclic agriculture, increases, agriculture production.

(2) Forest management:-

different rules and regulation are to be made along with proper techniques example silviculture (Germany) are to be adopted. different modern method and economical process are to be adopted along with precaution against forest fire.

(3) Afforestation:-

In China rule has be made that person has age between 11 to 60 years must plant 3 to 5 trees per year or perform equivalent work in other forest lands, due to this more than 1 billion trees are planted in china per year, which covers all there wood requirements.

02-09-24

Case study :-

(1) Brazil-

(2) Indonesia

(3) United States

(4) Timber extraction.

Brazil:- A new type of Soyabean made displacement of beef ranches and slashand burn farm house into the forest area. It increased deforestation.

(2) Indonesia :- Increasing paper / Pulp Industry increase deforestation.

(3) United States :-

In 1850 The European and American people started farming by increasing deforestation. between 1850 and 1920 Industrial Revolution began and people left farming for industry jobs which increased the forest density. again after 1920 due to urbanisation the deforestation increased rapidly.

(4) Timber extraction :- many industries (not imp) like saw mills, plywood mills are made for production of different home furniture and other requirements due to this the deforestation reached such a level that sufficient wood became unavailable for maintaining the demand. so different Govt. made different rules to resist timber shortage. In 1991 International Tropical Timber organisation made different method for sustainable tropical (forest) timber production.

Mining :- It is the process of extraction of different valuable products materials like coal, nickel, uranium, diamond, iron etc. from the earth.

History :- The oldest non mining as per record is Lion cave of Swaziland. The Paleolithic Humans before 40,000 years mined Hematite from Swaziland.

→ In the California Gold Rush during mid 1800 also increased extraction of gold, oil, gas etc. in these areas.

Step in mining process

- (i) location of ~~cont~~ ore
 - (ii) find out extent and value of ore.
 - (iii) make mathematical estimate to find out the extent and grade.
 - (iv) planning ~~too~~ to find out economical way to extraction ~~the~~ ^{and} deposit.
 - (v) make Feasibility Study to evaluate the project.
 - (vi) development of access
 - (vii) Extraction of ore (large quantity)
 - (viii) Reclamation of land (suitable for future use)
 - * ~~(ix)~~ environmental effect and mitigation
- The mining effect the environment in severe manner.

→ different laws and rules are made by govt to reduce the environmental and health effects, in case of mining 5 principle method are used for control of water flow.

- (i) Diversion system
- (ii) Contaminant Ponds
- (iii) Ground water pumping
- (iv) subsurface drainage system
- (v) subsurface barriers.

Case Study

- (1) Ashio Copper mines :- It is one of the most polluted Cu mine
- (2) Berkeley lake :- It is one of the most acidic and poisonous area and recently the water treated to reduce the effect.
- (3) Britania mines :- It is a Cu mine and the name means the place where there are no ~~toes~~ fish. Recently the water are purified to some extent there is return of fish to this area.
- (4) Tan Creek :- here the Ground water is contaminated is cadmium and lead.
- (5) Scourioissa :- It is a Cu. mine where dust always blows away.

Benefits of large Dam:-

Dams are constructed for storage of water during requirement and other use the major requirements are (1) water for drinking and industrial use.

- (2) Irrigation
- (3) Flood control
- (4) Hydropower generation
- (5) Inland Navigation
- (6) Recreation.

- (1) water for drinking and industrial use :- The hydrological cycle varies a lot ~~dam~~ are made to store water

which can be supplied as proper time for drinking and industrial use

(2) Irrigation :- It supplies water during non-rainy seasons. It also supply water to arid zones. Sufficient Planning must ~~be~~ ^{be} made, ~~as~~ ^{as} per project to improve irrigation

(3) Flood Control :- The dams ~~can~~ control water flows and regulates flow as per requirement.

(4) Hydropower :- The hydro power is cheap and clean type of energy source. It is used to provide power during peak period. Hydropowers are quick to start and can take load variations.

(5) Inland Navigation :- It must be developed for utilizing dams and reservoir in economic benefits.

(6) recreation :- beautiful site can be made near the dams. It can be also used for different activity like ~~fishing~~ ^{fishing} swimming, ~~boating~~ etc

Problem from dams :-

These are mainly of pre settlement and rehabilitation. It also as different socioeconomic issues and safety aspect all these factors must be considered properly.

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The rehabilitation must be made with sufficient humanitarian bases. Large amount of reliefs must be distributed between affected people.

Case study

The Chipko movement (1987)

It was to protect trees by hugging them and preventing them from being cut down. It is helped local traditions and culture, and allowed people to obtain basic necessities from the forest. It also demonstrated that local community participation can lead to effective forest management.

Water Resource

Evaporation: - ~~the~~ water is one of the important natural resources without which will, will not ~~survive~~ survive in India maximum rain water flows at run off which can be utilized by proper conservation method. Our monsoon season where is from June upto October. The important water area is Indo-Gangetic Plane.

River basin :-

It is the water flowing area associated with any river in India there are in total 24 no. of river basin.

Generally as per Physiography the Indian rivers are divided into 4 groups.

- (1) Himalayan Rivers (2) Deccan Rivers (3) Coastal Rivers
- (iv) Rivers with Inland Drainage

The Himalaya Rivers are always runs full during monsoon and other season. These are called as perennial rivers.

⇒ The perennial rivers always runs due to glaciers source or huge water reservoir source.

Non perennial

⇒ The Deccan rivers are rain fed and normally non perennial.

Coastal area

⇒ these are the very small rivers which flows near ~~forest area~~ coastal area.

⇒ Rivers with Inland Drainage :- It is the river which are not able to reach the sea and generally disappear on the mid way. These rivers generally found in dry and deserts area.

A availability of water resources

India has sufficient water resources but it varies from area to another area even if in the north east region people face water scarcity during north monsoon areas.

Surface water :- Generally we utilize 35% of our surface water 890 BCM (Billion cubic meter) different skill are made by NWDA (National Water Development agency) of conservation of surface water.

Ground water Resource

We are utilizing advantage of 38 to 40% of ground water. Generally when water availability falls below 1000m³ then it creates different health problems. Then if falls below 500m³ it becomes a severe life risk.

→ The ground water can only be used on urgent need based as it is a finite resource.

Water Demand

Our water demand is increasing day by day due to irrigation, domestic, industry.

Around 2050 there will be severe water scarcity.

Hydrological cycle (water cycle): -

→ It is solar driving. Water evaporates from the earth surface (ocean, lake, rivers) and makes water vapour. After condensation, they return back to earth in the form of rain. Some part of the rain flows in the river up to the sea as the surface run off, other parts infiltrate into the ground through the soil. These water flows as sub-surface flow and comes out as streams. Some other parts freeze as ground water. The roots of the tree receive some water for its photosynthesis and evaporated into the atmosphere as for the transpiration.

It is now days changed because of human involvement.

different techniques are now days use for modification of our activities in efficient manners.

Drought:-

In India there are 150 no of Drought affected Districts. The maximum district comes in the States like Rajasthan, Gujarat, Tamil Nadu, Punjab, Karnataka. The food production is effected severely because of drought. The crop production may partially damage or can be damaged in full as per IMD (Indian meteorological Department) when the annual rainfall is less than 75% of normal rainfall then it is declared as drought area. The area is having annual rainfall less than 50% are called severe drought area. In order to make drought in the form on the index different techniques are followed. In India the Palmer Drought Index has been generally considered. It considers the rainfall, soil moisture and transpiration.

as per this Palmer Drought Index generally drought is experienced around 20%-25% of days in every month of the Kharif Season in our country. The frequency of Drought can not be exactly calculated which means that there is no

Particular pattern of rainfall,
some methods also utilize 11 year sun
spot cycle to find out the frequency of
drought. But does not found that this cycle
has not sufficient influence on drought.

Over Exploitation of water

The ground water resource are being
exploited by humans ~~at~~ very rapidly.
So the annual replenishment of ground
water is not possible which reduces
the water level, decreases the ground
water quality. The sea water enters
into the ~~poor~~ coastal aquifers,
and cost of water lifting from higher
depth becomes uneconomical for poor
people. The high rainfall areas like
Meghalaya and Kerala are also facing
water scarcity during summer season.
It happens because of over exploitation
of water and mismanagement there is
already huge gap between water ~~renew~~
available and water demand. The water
tables are reduce sufficiently in
Punjab, Haryana and Gujarat. In Gujarat
the water table ^{reducing} is now ^{down} at 9.5 meters
In Haryana the water drops in
annually 1 to 3 C.M.

Conflicts over water

It is predicted that the future world
war will be for water in India, there

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are many water disputes some examples are (i) water demands in metros are increasing very fast which pressurises on water resource; it produces many problems for surrounding rural areas. It increases the conflict between rural and metro people.

(ii) There is also conflict between the upstream and downstream people of different rivers. It happens due to different agricultural and industrial requirements generally the downstream area are affected ex: - Delhi and Haryana, Chennai, Andhra Pradesh and Karnataka.

Mining:- (mineral resources)

minerals are generally called as stock materials and they can be found out by means of mining activities. examples are

Iron ore Silver
Iron ore Gold
Petroleum etc.
Chromite
Bauxite

Types of minerals

(i) metallic: metallic minerals by using different extraction method we can get the metallic minerals the different types of metallic minerals are ferrous, non-ferrous alloy. ~~It~~ has larger percentage of iron with Al, Zn, Cu in lower quantity.

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Nonferrous alloy :- The main alloy elements are occur $Li, Ti, antimony$ etc. than ferrous. These are generally costly alloy. ~~the alloy~~
other alloy :- These are special alloy which generally use Jewellery industry.
Ex:- Platinum, Gold etc.

(2) Non-metallic :-

These are having non-metallic element.
Ex:- limestone, asbestos, mica, fire clay.

(3) Mineral fuels :- These are the material which provide energy during combustion.
Ex:- coal, petroleum product, mineral gas etc.
The petroleum product are generally made by refining crude oil.

minerals in nature :-

(i) The human civilization as been divided As further us of different type of minerals
stone age $\rightarrow$ copper age $\rightarrow$ bronze age $\rightarrow$ iron age
 $\rightarrow$ machine age $\rightarrow$ AI age

(ii) There are different ways of deposition of minerals (i) molten ~~rock~~ materials

(ii) The water soluble mineral are obtain by evaporation of sea water.
Ex:- $NaCl, H_2Cl, \text{zipsun}$

(iii) deposit mineral like asbestos and graphite are made due to high pressure inside earth crust.

(iv) different mineral deposit are also form by the change of temp. solubility and pH of water.

(v) The oxidation and reduction also produces mineral deposits.

(vi) Some microorganisms also produce mineral deposits autotrophic bacteria.

Mineral resources of India

(fe)
India is generally rich in Iron, Al, Cu, Zn. It is having rank of 5th in Al deposit through the world.

The 2nd and 3rd of iron deposit of India lies between Odisha and Bihar, India has the largest deposit of coal. In manganese deposit, India is placed after Russia. The chromite of India is found in Bihar and Odisha.

⇒ Boxite deposit in India are found in western Bihar and South West of Kashmir. India also produces huge amount of Na from its state like Bihar and Andhra. Zipsun is found in Tamil Nadu. Nickel ore are also found in Bihar and Odisha.

Ca ore are generally found in Andhra and Bihar.

Gold mines are available founds in Andhra and Karnataka.

The only diamond produce area is Meghalaya.

⇒ Petroleum products are available in Assam, Bihar and Mumbai, Bombay.

⇒ Uranium are available in India of very less quantity.

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Environmental effects of ~~extracting~~ ^{mineral} and using ^{resources}

The different environmental effects are:-

- (1) land degradation happen due to removal of surface ~~and~~ layer of earth
- (2) deforestation in mining area mineral soil erosion
- (3) negative effect on ground water table
The height of water table general decreases during mining and an recharge is generally not possible
- (4) frequency of land slide
- (5) The agricultural lands are affected by the mining products.
- (6) The balance of pH is disturb
- (7) The heavy machinery produces noise and ~~and~~ air pollution.
- (8) The drainage of mines pollute near by river and lakes
- (9) The health of the people living near by are greatly affected due to mining
- (10) The flora and fauna of the mining area are severely damaged.

~~Food~~ World Food Problem:- (Food Resource)

a 1999 IFPRI (International Food Policy Research Institute) Reported that There will sufficient increase in food consumption by 2020. which will increase pressure of both developed and developing nation. These before has 6 major issues like Nutrition, grain price, Small scale farming, Biotechnology, Information technology and Precision farming.

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In the world food Summit in 1976 in Rome, 3 points are discussed (Reduced world hunger, agriculture supply and demand, Population growth).

In India between 1960 to 1970 food crisis became severe. So green revolution was made by increasing fertilizer use, expansion irrigation and advancing the crop variety. The role of different economic factors like world market, agricultural subsidies, price of different commodities are to be considered for food security. The irrigation system is to be improved by making large and small irrigation projects to reduce the world food problem.

Changes caused by agriculture

The agriculture field has been imbalanced a lot from the past around 1800 B.C. change has been in the field of agriculture by using advance cultivation method, use of fertilizers and crop rotation.

around 1860 B.C. different factories are established to increase the use of chemical fertilizers and pesticides. By 1873 B.C. different patents are made on variety of insecticides. The tractor used was introduced in 1892 around 1919, the govt. provided fund for different agriculture activities. In 1930 soil and water conservation method are adopted. The utilization of fertilizers

and pesticides increase sufficiently after 1940. After independence India also provided good quality seeds, fertilizers, seeds and machinery to improve agriculture activity.

Food Resources

Date 19-09-2024

Trees are the only food producers. The Herbivores use plants for their food and the carnivores use herbivores as their food. omnivores can take either plant or animal as their food.

The scavengers generally eat dead animals with a humans get our food from the plants, animals, birds and aquatic animals.

overgrazing

It means extra grazing by animals. It generally affects both animal and plant health. The plants become weak with and the root length also decreases along with pasture area. The reduced root length is not able to supply the plant sufficient amount of water and the weakening of pasture increases the numbers of weeds growth. Due to overgrazing the animals also suffer from insufficient amount of food at the time of requirement. The soil erosion also increases due to it. To prevent overgrazing different forage supplements are to be provided as per requirement. Some required grass like Switch grass are to be grown in

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required season. During ~~some~~ summer periods these help as supplements.

Effects of modern agriculture

With the increasing use of chemical fertilizers the food productivity has been enhanced sufficiently. But it has provided different unwanted impacts like (1) damage the soil.

(2) water contamination.

~~damage the soil~~ It generally takes 300 years for production of 1 inch of agricultural top soil but the soil erosion is sufficiently high as compared to new soil formation. The erosion generally removes surface soil, organic matter, plant nutrients.

The soil erosion can be restricted by considering some techniques like crop rotation, cover crops etc.

The soil erosion also reduces water capacity of rivers and lakes and some aquatic species are also destroyed. The nitrate content in water is also hazardous to us.

(ii) water contamination

Surface runoff water carries different fertilizers and pesticides into water bodies and the water becomes contaminated.

It can not be used by living ~~beings~~ being. It also contaminate the ground water supply.

Fertilizers

There are mainly 3 types of fertilizers with nitrogen, phosphorus, potassium content.

- When the nitrogen is more than the concentration of it in ground water makes it not suitable for drinking.
- These fertilizers are most commonly used and easily lost due to high solubility.
- Phosphorus generally makes extra plant on water bodies. It increases the algae percentages in water with bad order and the fishes will not survive due to one less dissolved oxygen.
- Potassium is not sufficiently hazardous but still is not sufficient contaminates ~~water~~ water.

Pesticides

With the increasing pesticides the agriculture production has been enhanced sufficiently but the pest species always becomes more resistance to the applied pesticides. It also increases the no. of pests as the pest eating insects are also killed.

One of the pesticides D.D.T. has been banned in agriculture use in 1973 in USA due to the different issues like water contamination reduction in no. of birds and fish. Hence now days the integrated pest management has been adopted which

Combines different method to increase food production.

water logging

It is the soil which is having very poor drainage due to which the water table raise as in the ground. It is called as water logging.

The air space in the soil are replaced with water and the plant roots can't get sufficient oxygen. It also damages the soil structure. In world around 10% of water land ~~log~~ are water log. It reduces the food production.

Salinity

Generally soils are divided into 3 types

(1) Saline soils

(2) Alkali soils

(3) Saline and alkali soil

① Saline soils :-

It contains higher amount of solute soils generally it has Chloride and Sulphate of Sodium and Calcium. It is generally called as ~~white~~ white alkali.

② alkali soils :-

It has more amount of Sodium and Sodium carbonate. Due to it, it having black colour and called as black alkali.

③ Saline and alkali soil

It has mixed properties of saline and alkali.

Adverse effect's

- (i) Reduction in crop production.
- (ii) Choice of ~~crop~~ crop is limited.
- (iii) The quality of fodder is poor.
- (iv) It increases the water runoff.
- (v) more probability of flood.

Cause of salinity

It generally occurs when the agricultural fields are irrigated with saline water.

→ The rise in water table occurs due to restricted drainage, the sea water enters into the ground water making it unsuitable for drinking.

Reclamation

(i) In case salinity problem generally the salts are to be separated below from the root zone. So the salinity does not come to the surface soil.

(ii) In case of alkali soil generally ~~the~~ gypsum is added to neutralize the alkali content.

(iii) Proper planing and method are to be made which vary from variant area is order which maintain food production as per requirement.

* Land Resources

20-09-2024

Land area upto 1950 There are 5 categories of land area but after 1950 the categories are increase into 9 categories are

- (i) Forest land
- (ii) Land with non-agricultural use

- (3) Barren land
- (4) Permanent Pastures
- (5) Tree crops
- (6) Culturable waste
- (7) Fallow land
- (8) Current fallow land
- (9) Net area ~~sown~~ sown (agriculture)

Land capacity: As per Land capacity there are two types of operation

- (i) Land mapping
- (ii) Planning and executing
(prevent erosion deforestation)

Land types

As per Land capacity the land resources are divided into mainly two groups

- (i) Land for cultivation
- (ii) Land (other use)

Soil Erosion

The soil erosion types which are generally observe in India are (i) Normal or geologic

(i) Normal or geologic erosion

It occurs due to different natural phenomenon which can be preserved again by naturally.

(ii) Accelerated Soil erosion

It occurs generally due to involvement of different human and animal activity. Generally it can't be easily refilled.

(iii) Wind erosion

It happens due to high wind velocity and the top fertile soil are blown away.

making - sufficient soil erosion.

(iv) Water erosion

It has 3 types (a) sheet erosion

(b) Rill erosion

(c) gully erosion.

(a) Sheet erosion :- here the top thin soil covering has been removed due to water.

(b) Rill erosion :- when sheet erosion is not prevented then it is converted into rill erosion. Small finger shaped groups are formed which makes soil erosion.

(c) Gully erosion :- The unchecked Rill erosion is converted into gully erosion here wider and deeper groups are formed and the land becomes unsuitable for cultivation due to it.

(v) Land slide or slip erosion

It happens generally in hilly areas and it is very difficult to prevent.

(vi) Stream bank

The stream/torrent generally flows full during rainy season or during heavy rain. It becomes very narrow after the rain stops. These ~~sudden~~ sudden full of water carries different materials like sand, boulder, rocks, trees etc which generally erodes the bank area.

Mechanism of erosion :-

(i) Water erosion :-

The soil erosion occurs due to either

of falling rain drop and surface water flow the energy of the falling rain drop separates the soil particles. The surface water flow carries the soil with it generally in sloping area.

(2) Wind erosion

(a) Saltation :- The soil with ^{high} ~~big~~ particle with 0.1 to 0.5 mm ~~are~~ are carried away by the wind in a series of short bounce. This method is called as saltation.

The different particle generally moves to a height of approximately 30 cm off height.

(b) Suspension :-

The very fine with less than 0.1 mm are carried with the wind in the form of suspension. The soil particles are carried up to a very long distance and the surface soil become eroded.

(c) Surface Creep :-

For soil particle with size greater than 0.5 mm the wind velocity generally become unable to carry it, so the wind generally moves each particle by pushing.

Remedies of soil erosion :-

- (1) The land must be kept with deep grooves in order to observe excess in the soil.
- (2) different drains may be made under the land in order to make natural drainage.
- (3) Sufficient amount are to be grown

Land degradation :-

The percentage of agricultural land is around 60% rise with forest land approximately 20%. due to increase in population land is being degraded by soil erosion and surface water runoff.

Significants

The agricultural production has been increase many time to provide food to be people hence use of fertilizers has been increased. It increases soil salidity, alkalinity, erosion, water logging, ground water contamination etc.

Land Slide

It is the sudden removal of huge amount of soil along with rock and debris. It generally occurs in steep slopes, where there is problem in drainage and areas where land slide occurs regularly.

Factors causing land slide

- (i) These are generally caused by heavy rain, earthquake,
- (ii) excess use rain fall or melting of snow also causes land slide.
- (iii) forest fire indirectly causes.
- (iv) human activity like mining industry road building, house building, use of explosive land slide

effect

It generally destroy the nearby area along with disposition of mold and debris

It also increases properly less
Desertification

It is increasing day by day due to loss of forest by human activities in the last 50 years around 900 million hectares of land are desertified. hence recently ecofriendly mining technologies are being utilized.

Salinization also makes desert from agriculture lands to prevent it farmers must utilize organic fertilizers, gypsum proper irrigation.

Energy resources

Growing Energy needs

For every activity will need any form of energy to sustain. The GDP growth rate is around 6% for India which is growing continuously the energy intensity increases with economic growth per after a certain limit the energy intensity decreases. The connection between energy and economics factor depends upon the following factors.

- (a) Demographic change
- (b) efficient device
- (c) Technological improvement.
- (d) fuel substitution.

After 1970 There is sufficient increase in utilization of Alternative energy sources.

Energy Sources

It is two type energy source

(i) Renewable or Non-Conventional or Inexhaustible or alternate energy source:-

These energy sources will be long lasting and can meet the human demand of energy for sufficient duration.

Ex:- Solar Energy, Wind Energy, Geothermal energy etc.

(ii) Non-Renewable or Conventional or Exhaustible energy source:-

These are the energy sources which will be completely exhaustible within short duration of years hence proper planning is to be made of conservation of this type of energy. Ex:- Nuclear energy, Atomic energy etc.

Alternate Energy

(i) Solar Energy:- It is freely available to us and can be utilized in two methods:-

(A) Solar Thermal method:-

solar electric method It is used to run pumps, motors, village electrification, lighting of streets etc. one of the most popular applications is solar cooker.

(1) box type:- It has single reflecting mirror and it is generally used in rural areas. It can make food for 4 to 5 members and save 4 LPG cylinders for year life span 15 years and the cost rupees 1000.

(ii) Parabolic Concentrating type:-

It has FRP (Fiberglass Reinforced Plastic) shell with stainless steel reflector. The cooking time will

per 500 people at a time, the cost is Rupees 50,000. The solar panels are placed properly & free from shades. It is generally used between 9am to 3pm which is called as solar window.

(b) Solar electric method :-

It is use to run pumps, etc.

Solar thermal method

The solar thermal method is use for cooking, heating, drying, electricity generation etc.

Solar electricity generation

Solar Photo Voltaic (Solar P.V) :-

The solar electricity is technically called as Photo ~~volt~~ voltaic. Photo means light voltaic means electric.

⇒ The PV shells are generally made as silicon which releases electron under light. The silicon shells is covered with metal grid which direct electrons to flow in a path to produce electric current.

⇒ The P.V Cell are generally groups are solar panel or module to solar array.

⇒ The module generally supply electricity are 12 volt, one PV cell are produce 1.5 W of power.

The P.V tracking system

It is the movable type of panel which moves as per the direction of sun for producing more power.

backup system :- It is used to store for electrical energy in grid of battery to be used as night or cloudy days.

Performance

The efficiency of Solar cell is 15%. Solar water Pump, here the pump is driven by solar electricity which is fitted with solar array. It is used for drawing water from borewell, Pond, Canal etc.

Case study

If total 500 solar pumps are installed in Punjab for agricultural use during 2000 by PED (Punjab electricity development Authority). These pumps irrigate around 5 to 8 acres of land and supply water of ~~1 lakh to 1,40,000 litres~~ of day from a depth of 6 meters.

2nd Case Study

The 2nd case study solar heating system is used in Magarpatta housing complex at Pune. It has an area of 550 acres and contains 10,000 units. Out of these 1500 flats are provided with solar water heating system.

Wind energy

The wind power is used for different works like water pumping, agricultural use, electricity development use and ancient type of use. The wind energy generally utilizes it by using wind turbines.

- (i) Vertical axis wind turbine
- (ii) Horizontal axis wind turbine.

(i) Vertical axis wind turbine:-

The turbine contains blade or cottes with gear box with gear train, generator and supporting tower. It is also consists of other controls like electrical control and other instrument.

Wind potential :-

Generally the production of energy the speed is approximately 15 km per hour. The wind turbine are provided in areas free from obstruction like tree, hill etc.

Hydro energy

The water energy is used in water turbine to produce hydro power generally micro hydro power plants 100 kw and mini hydro power plants 1000 kw to provide power per small area without any rehabilitation problem.

Bio energy

Bio mass is the energy source derived from by products of wood industry agricultural crop, house hold waste etc. It is utilize for cooking, pumping and power generation.

Biogas plant

It is the clean and efficient fuel generally obtain from cow-dung and human waste. The waste is generally mixed with water and then fermented to produce biogas which can be collected and supply to the required area. The most common type of Bio fuels are :-

(a) Ethanol :- It is made alcohol by fermentation of carbohydrates.

(b) Bio-diesel :- It is produced from plants sunflower, soyabins etc.

(c) Sugar industries :- It also produces biomass which can be converted into biogas.

Tidal

It is the energy produced from ocean tide. The head of water required for energy production at least 7m.

ocean energy

It produces energy in 2 ways like thermal and wave energy they are used for production of electric energy from water energy.

geothermal

This energy is used from hot spring and volcano. It is used for production of electrical energy. Italy started using geothermal energy in 1950 India is also using this energy for around 350 hot springs.

Chemical source of energy

It is generally the fuel cell energy. It produces DC current by the reaction between hydrogen and oxygen. It has two electrodes within its electrolyte provided. Oxygen passes over one electrode and hydrogen passes over the other electrode. The reactants chemically to produce electricity heat is water.

these are used in space rides fuel cell driving E.V. due to its high efficiency easy and faster refueling. The fuel cell can supply heat and power to building, hospital etc. It has efficiency of 55%.

Role of an Individual in conservation of Natural Resources

our philosophy about conservation is 'Harmony with nature' hence every individual like old, young, rich, politician, common man, person living in small area almost take part in conserving nature. the different role of individual to conserve natural resources are:

- (1) People must control over utilization of natural resources
- (2) all should protect wild life as much as possible.
- (3) There must be crop rotation, proper utilization of fertilizer, encourage increase of manure or organic fertilizer.
- (4) must practice proper waste disposal.
- (5) educate and enlighten people about proper use of natural resource.
- (6) use of the domestic appliances as per need.
- (7) Install rain water harvesting system.
- (8) limited use of fossil fuel with encouragement alternative source utilization.
- (9) use highly sophisticated technology to conserve energy.

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(10) prevent soil erosion as per as possible by planting sufficient trees.

Equitable use of resources for sustainable life style

The natural resources must be distributed by maintaining proper balance the developed countries are utilizing more natural resources due to which there is always difference betn rich and poor people in living style the under develop country has ~~to~~ very less no. of rich people percentage.

The developed countries USA, Canada, Japan etc. generally use around 85% ~~per~~ of natural resources around 20% of population. so the gap between poor and develop countries in utilizing natural resources ~~a~~ mostly minimize as per as possible. now day different economic model for development are being utilize as per sustainable development betn different countries.

①

Chapter - 3

Ecosystem

The scientific study of interaction or exchange of different organism with their environment is called as Ecology in 1975 Helena Curtis

→ The German geologist E. Haeckel (1966) first use the term Oekologie. It is having two meanings it's greek word OIKOS = home + logos = study = oekologie. Home study. These term is use to define ecology

Concept of ecosystem:-

In 1935 A.G. Tausley in 1935 use the term ecosystem. It is the combination of two word eco + system it is the meaning Environment + complex unit.

→ It can be defined as communication of different organism with each other and also with surroundings it can be also called as study of home.

→ The ecosystem has no fixed boundary. It may be a drop of water, dust, ocean, mountain, glacier, river, ice etc. So ecosystem is an abstraction.

and it has no permanent size for ex:- city, triangle, water body, forest etc

→ The ecosystem concept is about communication between different communities of organism between them along with functional relationship with non living environment.

Functioning of ecosystems

The ecosystem is self dependent. It depends upon energy flow material cycle.

It is having dynamic concept. It has 4 not functional ~~the~~ phases they are:-

- (1) Rapid Release
- (2) Reorganisation
- (3) Exploitative
- (4) Conservative of climax

⇒ ~~Control of~~ The control of ecosystem function, nutrient flow or physical environment is called as bottom up-control the function by using trophical interaction is called Top-down control

Types :-

as per diversity and organised manner different types are:-

- (1) Permanent or natural ecosystem
- (2) Temporary and natural ecosystem
- (3) Artificial or Anthropogenic ecosystem

(1) Permanent or natural ecosystem

It operates only by natural elements or condition. (a) Terrestrial type

(b) Aquatic type → (i) fresh water

(ii) salty water

(a) Terrestrial type :-

It functions on land surface. (forest)

(1) aquatic :- This system operates in water the fresh water type generally consider pond, lake, river, well etc. having fresh water.

(ii) marine water :- It is the largest ecosystem on earth.

(2) Temporary and natural ecosystem

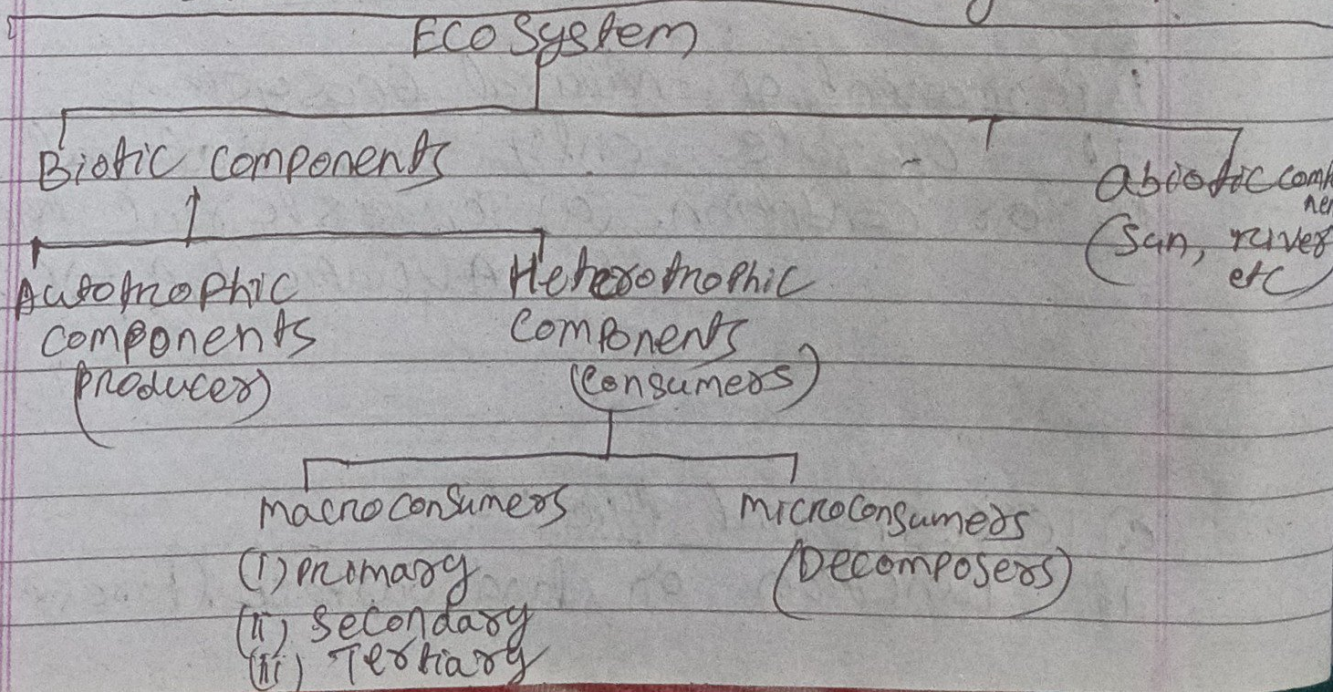
It is short ~~lived~~ and generally operates by natural condition.

(3) Artificial and anthropogenic ecosystem

This are the man made ecosystem like dam, agricultural field, floating boat, ship, home, aquarium etc.

Structure of ecosystem

It define about the information of different organism climate condition both biotic and abiotic element etc. as per Odum from trophic^{of food} point of view the structure have following components



Biotic Structure

It is the combination of producers and consumers. It has different components as per energy source and material and types are (i) autotrophic component.

(ii) Heterotrophic components

(i) Autotrophic components :-

It is self nourishing these are also called as producers. They utilize light and energy to produce complex food materials.

(ii) Heterotrophic components

It is other nourishing. It decompose the complex material prepared by Autotrophs and are generally called as consumers.

Producers :-

These are also called as converters or transformers. They utilize photosynthesis method to produce complex energetic rich chemical foods.

⇒ The producers in the water bodies are called as Phytoplankton and also called as photoautotrophs for ex:- algae

⇒ In the ocean depth where light is not available generally the bacteria produce energy from any sedimental sources.

⇒ They get energy from chemical reaction other than sunlight hence called as chemotrophs. (no sunlight)

Consumers

These are generally heterotrophs and the different types are

- (1) Primary
- (2) Secondary
- (3) Tertiary
- (4) omnivore
- (5) Top carnivores
- (6) Detritivores

(i) Primary :- The other name is herbivore and very as for ecosystem.

(ii) Secondary :- The other name is Carnivore or meat eater these are the small animal, birds, insects.

(iii) Tertiary :- They generally consume the secondary consumers.

(iv) omnivore :- They consume both plant animal, birds etc Ex:- bear, human.

(v) Top carnivores :- These are the last stage of carnivores. generally not killed and eaten by other animals.

(vi) detritivores :- These are bottom living organisms like ant, termites, crabs etc.

decomposer

They generally breakdown the complex compound of dead animals birds etc. and convert them into organic compounds and inorganic compounds. Ex:- mushrooms, molds different bacterias, fungi etc.

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It is also called as Saprophytes or sapro-phytes or saprotrophs.

Sapros:- Rotten

abiotic ~~st~~ structures:-

It has generally two parts or two things
(i) material or chemical factor.
(ii) energy or physical factor.

(i) material or chemical factor

It includes water, minerals, different salts, organic matter like carbohydrates, proteins etc.

(ii) Energy or physical factor

It is having the form of heat, light energy in chemical bond etc.

⇒ This energy flow and cyclic of chemical factors are essential for the ecosystem ~~or~~ running

Energy flow in ecosystem:-

For proper running of ecosystem there must be energy flow in the ecosystem. The energy flows from first from Sun then to the plant and finally to the heterotrophic organisms.

⇒ The plants generally utilize 1 to 5% of sun light.

⇒ There is never 100% flow of energy from producer to consumer and some energy is always lost so "energy can flow always in one way." It can't be recycled.

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The energy flow follows two laws of thermodynamics

1st law of thermodynamics

It states that energy neither be created nor destroyed but can be changed from ~~the~~ one form to another.

Ex:- Solar energy is converted into biochemical energy by plants and then other energy to the consumers.

2nd law of thermodynamics

It states that ~~the~~ energy transformation always include degradation of energy or dissipation of energy. There is always loss of energy from one level to another level.

Ex: Sun as the source of energy.

⇒ The energy from the Sun is distributed by means of radiation.

⇒ The available energy from the Sun are taken by producers.

⇒ They convert it into heat energy and chemical energy.

⇒ The consumers consume the chemical energy of producers and produce heat energy. The decomposers utilize chemical energy and also produce heat energy.

Energy flow in ecosystem (models)

① Odum's Energy Flow models

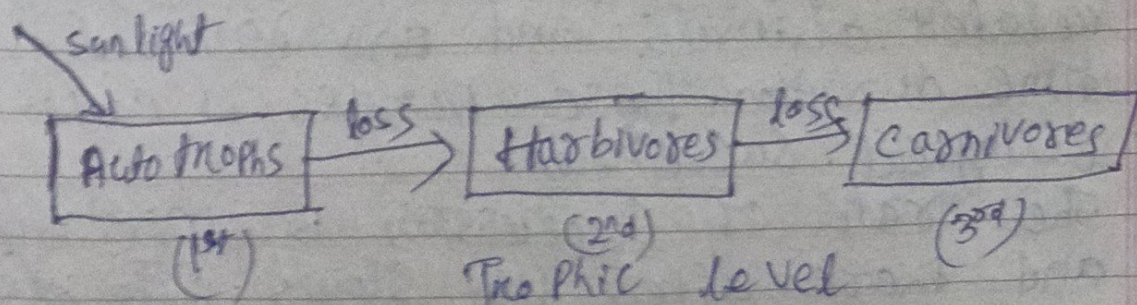
② Lindeman's Energy flow models

⇒ what is Energy flow models?

⇒ The energy flows from sunlight to Herbivores and Carnivores and finally to decomposers and again is utilized by producers. This is called as energy flow model. Generally 35% of sunlight is reflected back to the atmosphere, the ozone layers and water vapours absorb 10% of light energy approximately 55% of sunlight reaches Earth surface, 5% of this energy is utilized by plants for photosynthesis rest 50% is observed as heat by water and earth surface.

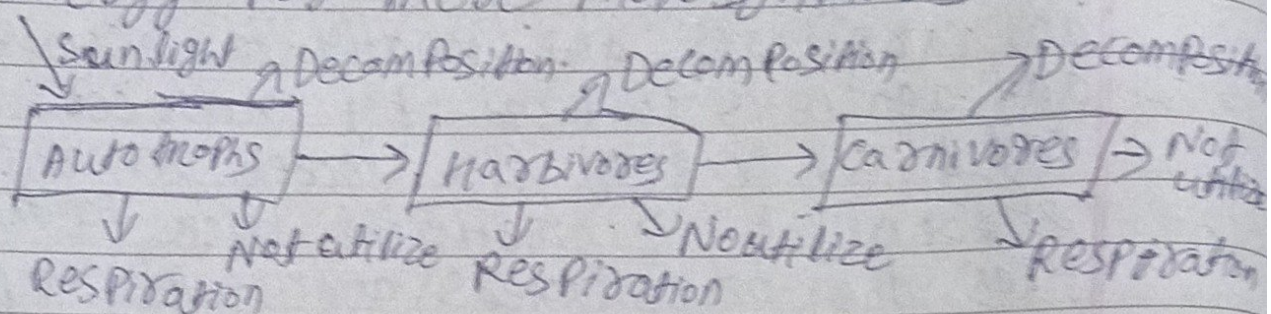
① Odum's Energy flow models (grazing)

In 1963 Odum explained the energy flow model with 3 no. of trophic levels. There is always gradual loss of energy while flowing from one trophic level to another. At a trophic level 50% of energy (1500 kcal) is observed by autotrophs which utilizes 21% in these metabolic processes. Then there is the energy flow from autotrophs to herbivores and finally to carnivores.



(2) Lindeman's Energy flow models

1942 Lindeman's gave 1st energy flow model for fresh water ecosystem. The producers utilize approximately 1% of observed energy for their photosynthesis.



Out of this 21% is utilized for metabolism, 3% is utilized for decomposition, 63% remains not utilized. The Herbivores use 30% as metabolic function, 3% as decomposition and 47% remains not utilized. The rest 20% of energy is transferred to carnivores. The carnivores utilize 60% metabolism activity, 5% is used for decomposition, 35% is not utilized. Both models tell that there is always unidirectional energy flow depending upon sun.

⇒ These are continuous decrease in energy for every trophic level.

Ecological succession:-

The biotic communities always change continuously as per structure, organization, related animals and environment as per time duration. This process is called as ecological succession.

The rate of succession is initially large and thereafter it slows up to equilibrium.

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The Complete Succession is called as serotopy.
→ Succession is the "birth" of an ecosystem and there after "aging" process occurs.
→ Odum in 1971 included three parameters to define ecological succession, which are

(1) Odum's process of community development which includes change in structure and process with time.

(2) By the modification of physical environment due to community activity, the rate of change attempts some limit.

(3) There is stabilization in ecosystem by the organisms as per available energy.

The Succession is generally two types:-

(1) Primary Succession:-

It is the establishment of new colony of species at any new area (previously lifeless). It develops all climate. These series involved in primary succession is called as presere.

(2) Secondary Succession:-

It is the development of community at a place where previously some community is already occupied and it is now completely lifeless. It may occur due to natural hazards or human activities. The previous established organisms modify the environment as per suitability of the other species the serotopy involved

as called as Sere. as per moisture content the Succession can be divided into 3 types.

(1) Hydroseres or Hydrosere :- It is the succession beginning in aquatic condition like pond, lake, well, ocean, river etc.

(2) Mesosere or Mesosere :-

It is the type with medium moisture content.

(3) Xerosere or Xerosere :- (dry area)

It is the succession start with dry areas having minimum moisture content :-

It is of 3 types :- (a) Lithosere

(b) Psammose

(c) Halosere

(a) Lithosere :- Succession starting on rocks

(b) Psammose :- Succession starting on sand

(c) Halosere :- Succession starting on soil or saline water.

* as per community metabolism :-

It is classified as 2 types

(1) Autotrophic Succession :-

It is due to the dominance of autotrophs like plants. It starts in inorganic elements and energy flow is continuously maintain.

(2) Heterotrophic Succession :-

It is begins with heterotrophic like bacteria, animal etc.

⇒ It starts in organic environment with continuous decrease energy.

Autogenic Succession :- It involves due to substitution of one community by another with environment modification.

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 ⇒ Allogenic Succession:- It has replacement of one species by other without any environmental change.

⇒ General process of Succession
The different process are:-

(1) Nudation

(2) Invasion (i) Dispersal or migration

(ii) Ecesis

(iii) Aggregation

(3) Competition

(4) Reaction

(5) Stabilization on climate

(1) Nudation:-

It begins with any area which is created because of natural ~~disasters~~ disasters like land slide or manmade activities like deforestation. here the area becomes ready for new arrival.

(2) Invasion:- It is the arrival of and settlement of new organisms at the area first. Invidex is plant.

It has 3 stages:-

(i) Dispersal or migration:- Here the propagules arrive by means of air water, animals, birds.

(ii) Ecesis:- It is the establishment of migrated plant of new area. It include germination, seedling and reproduction.

(iii) Aggregation:- The new plants increases their number and become largely populated in that area.

(3) Competition:-

Now there is competition between same species Intraspecific (same species) or interspecific (different species) for water nutrition etc. all this species influence the other in different ways which is called as coaction.

(4) Reaction:-

The environment becomes modified due to influence of different species and is called as reaction. so it favours new species over old species

(5) Stabilization on Climax:-

The last of the first species become stable with the modify climate this last community is called as climax community and the vegetation remaining around them is called as climax vegetation.

Food chain

It is the continuous process of eaten and being eaten.

different organisms of the ecosystem are connected together. every step is called as trophic level. the study of energy flow through the step is called as trophic ecology.

generally sun is the main energy source and the energy flows from primary to secondary consumer or secondary to tertiary consumer etc. Example of food chain are:-

Grassland Ecosystem

Grass $\rightarrow$ Rabbit $\rightarrow$ Fox $\rightarrow$ Lion

Pond Ecosystem

Phytoplanktons $\rightarrow$ Small fish $\rightarrow$ large fish
Arctic area (cold area)

Lichens $\rightarrow$ Reindeer $\rightarrow$ Tiger

$\Rightarrow$ The food chain is divided into two types

- (1) Grazing food chain
- (2) Detritus Food chain

(1) Grazing food chain

It starts from plants ends with carnivores.

The energy transfer from primary carnivores to secondary carnivore so on.

Autotrophs (Primary Producer)



Herbivore (Primary consumer)



Primary Carnivores (secondary consumers)

(2) Detritus food chain

It is the food chain which involves of organic waste dead matter and of aquatic elements.

The different species which are involve in this food chain are fungus, insects, worms etc. they generally survive from either rotting food and sea animals/organisms
Odum (1971) and Real (1969) both combine to give the food chain of South of Florida. So the energy flows is

Detritus $\rightarrow$ Detritivores $\rightarrow$ (consumers) $\rightarrow$ small-carnivores
(detritivores)

$\rightarrow$ large carnivores

Food web :-

It is the network of food chains where different organisms of different trophic levels are used as food. One organism can be eaten by different organisms of different higher trophic levels.

Ecological Pyramids

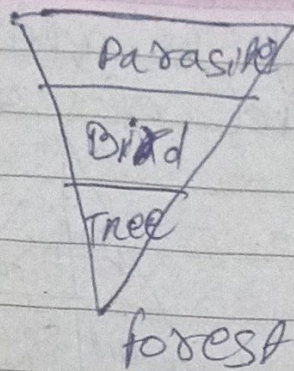
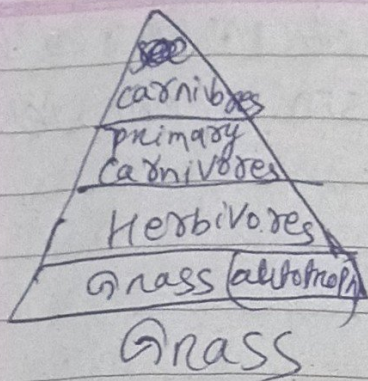
Charles elton (1927) found out that the base of the food chain contains large number of animals while the apex zone contains less no. of animals the relationship between number, biomass, energy can be represented by diagram or graph in the shape of ecological pyramids.

It is generally 3 types

- (1) Pyramid of number
- (2) Pyramid of biomass
- (3) Pyramid of energy

① Pyramid of number :-

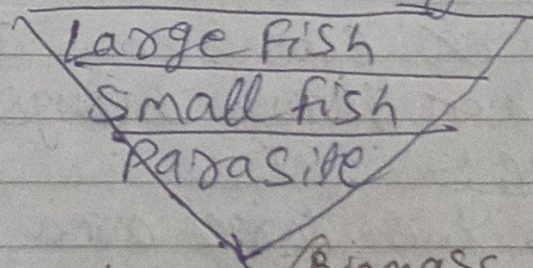
It gives relation between no. of Producers, Herbivores, Carnivores are different trophic level. It may be of Grassland ecosystem or may be of Forest ecosystem. The grassland ecosystem pyramid is straight. While the forest land ecosystem pyramid is inverted. In both case the no. of organisms at the base are larger and the no. of apex level are less.



number pyramid

(2) Biomass

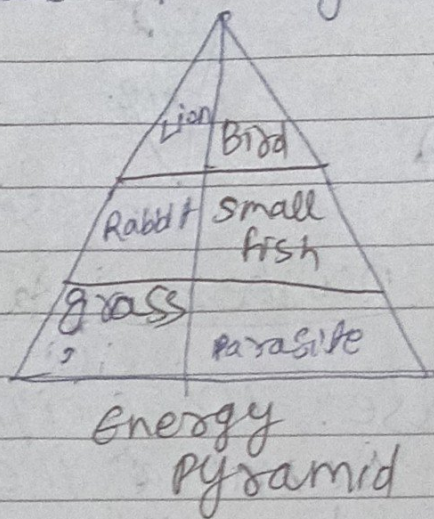
In this case the weight of the Primary produced remain at the base the Biomass of tree is very large on the upper layer Birds are there whose Biomass are less as compare to tree, the at the apex there are parasite whose mass are very less the pyramid of Biomass may be straight. It is also ~~also~~ inverted as the case of aquatic system.



(3) Pyramid of Energy (Biomass Pyramid)

This pyramid is always upright or straight. This is the case which involves both no. and Biomass including time. The total energy of different organism are different trophic level are calculated are area or time period. Base area contains the energy produced by different organism per area per time, hence

less energy is always transferred to the upper level of organism trophic level.



Major Ecosystems :-

It is 3 types

- (1) Terrestrial type
- (2) Freshwater type
- (3) marine type

- (a) forest
(b) grassland
(c) desert

(i) Terrestrial type

This ecosystem considers all living and non living beings on the land surface.
Biome :-

It is the large area containing different types of flora and fauna.

(a) Forest type

In the world there is around 40% in avg. whereas in India, it is approximately 10% to 20%. The Indian forest are of tropical type, semitropical type, temperate mangrove forest etc. The forest ecosystem has two main parts (i) abiotic components (ii) biotic components

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(i) abiotic components :- These are the inorganic, organic substances, minerals, dead organic debris, other non living elements. These components vary as per light condition and different stratification of plants.

(ii) biotic components :- These are the components involving living organism. It has 3^{sub} components

(a) producers

(b) consumer

(c) De composers

(a) producers :- It mainly involve different types of environment in the north side coniferous types of forest are found with needle type leaves. There are also deciduous forest in the temperate region. The different trees, shrubs, herbs grasslands are also available in India and world. The palm and ^{oak} trees are in evergreen forest where as in temperate deciduous forest different trees are found.

(b) consumer :-

It has generally two parts (i) primary (ii) secondary

(1) primary :- It includes herbivores which eat different parts of tree, it includes ant, bugs, flies those feed on tree leaves. The larger herbivores like elephant, deer, mangoose also eat ~~from~~ fruits, shouds.

(2) Secondary :- These are the carnivores like

- Snakes, birds, lizard which feed the herbivores
Tertiary :- These are the top carnivores like pythons, eagles, lions

(C) Decomposers

These are the microorganisms like bacteria, fungi etc. due to them the decomposition rate in tropical forest is larger & quick, than in temperate forest.

* Grassland type :-

(a) Grassland & savannas :- The grassland in Africa continent which are annual rain on 40 to 60 inches

Prairies :- The temperate grassland in USA and Canada having rainfall of 10 to 30 inches are called as prairies.

Pampas :-

These are the temperate grassland of South America

Veld :- Africa area temperate having rainfall 10 to 30 inches

Steppes :- Asia, Central Europe having rainfall 10 to 30 inches

Permafrost :- These are the soil layer which remains frozen in arctic area

* Desert type

(1) Tropical Desert :- These are the driest desert Ex:- Sahara, Thar desert

(2) Temperate desert :- Mojave on South California these are the desert in hot day and only cold in winter season

(3) cold desert :- Gobi (China) desert this desert have very cold desert in warm summer.

Aquatic type

(i) Pond ecosystem

It is the one of the smallest water system which are found smaller in large numbers. The Temporary Ponds which are generally dry in summer season contains different organisms in dormant stage. The Ponds in United state generally called as "mill ponds" which are created by man.

The different components of Pond are

(1) abiotic component :- These components are Calcium, nitrogen, Phosphorus, oxygen, CO₂ etc. These are the inorganic, organic and mineral available in the pond water. The carbohydrates and protein ^{or lipid} form the biomass of the Pond system.

(2) biotic component :- which as different ~~Sub~~ groups (i) Producers - (a) macrophytes
(b) Phytoplankton

(ii) Consumers (a) Primary
(b) Secondary
(c) Tertiary

(iii) Decomposers.

(i) Producers :- These are the green plants of bacteria which use sunlight and mineral

from mud and water to produce different organic elements like carbohydrate, protein and lipid.

(a) Macrophytes :- These are the large plants generally ~~not~~ having roots which may be either submerged or floating. Ex:- Hydrilla, Chara

(b) Phytoplankton :- These are small size plants generally floating. The examples are Ulothrix, Volvox. The biomass and energy content of these generally decreases towards the center.

(ii) Consumers :- Generally these are herbivores with some carnivores.

(a) Primary :- These feed on the plants and again divided into two types (i) Benthos (ii) Zooplankton

(i) Benthos :- These are the organisms which are generally available at the bottom and include fish, mites etc.

(ii) Zooplankton :- These live by ^{eating} ~~rooting~~ ~~the~~ generally Phytoplankton. Example - Cyclops, Paramecium

(b) Secondary :- These are the carnivores which feed on primary consumers. Ex:- Small insect and very small fish.

(c) Tertiary :- These feed on small fish.

(d) Decomposers :- These micro consumers use to decompose ~~use~~ ~~to~~ different organic matter such that valuable, mineral organic matter returns to the pond. Ex:- fungus, bacteria etc.

(2) marine Ecosystem

water available generally for 70% of area, the main characteristic ocean are tide, water internal current, salinity all these factors control the hydrological and biogeochemical. The biotic components of ocean are (i) producers:- These are autotrophs and generally are phytoplankton. Ex:- brown and red algae at different depths of water.

(2) consumer:- These feed on producers and different types are (a) herbivores Ex:- small fish (molluscs) etc

(b) carnivores:- which feed on herbivores and called as secondary consumers Ex:- shark, herring.

(c) Top carnivores:- which are tertiary consumers for Ex:- Shark, Cod

(3) decomposers:- They decay the dead organic matter into useful materials. Ex:- fungi, bacteria etc.

(3) Estuaries (Estuarine)

It is derived from the word aestus means tide. In 1967 Pritchard define estuaries as the ocean water body enclosed by land in some area with open sea - connection. It is effected by sea water, fresh water, tides etc. delta as generally from where there is low tide with some sediments.

Tidal flats are formed when higher amount of sediments are deposited in delta. The different classification of estuaries as per "Pritchard" according to geomorphological view mean land form and development, it is 4 types :-

- (a) ~~gao~~ Drowned river valley.
- (b) Fjord type
- (c) Bar-built
- (d) By tectonic method

* Physiochemical aspects :- The water current which is varies as per wind, rainfall controls the estuaries.

Salinity also plays major role in controlling the estuaries.

Biotic Communities :- as per "Archer" (1967) the estuaries are divided into 3 layers apex, middle, lower. In 1971, Gopal krishnan studied the largest estuaries in India Hoogly - matla estuaries and ~~both~~ biotic communities there are found sufficient type of planktons blue green algae in these area the madras east estuary has sufficient member of ~~shrimade~~ ~~vertebra~~ fauna etc

(1) Lake ecosystem (zones of lake)

The size and depth of these water system varies. The different zones of lake are (1) Littoral zone :- It is the area which is having inclination and near the shore. The general depth is upto 6 metres

It has oxygen rich and upper layers of water and called as epilimnion

(2) Sublittoral zone :- It is the area from rooted plants having upto cold water. It contains very less oxygen and called as hypolimnion. The depth is upto 10 metre.

(3) Limnetic zone :- It is the open water area ~~at~~ of the lake. It has sufficient sunlight to carries out photosynthesis

(4) Profundal zone :- It is the water level below limnetic zone with partial sunlight available.

(5) Abyssal zone :- It is the water zone at higher depth. Generally begins of 200m and below. It has no sunlight and generally dark.

Kind of lake

as per temperature, productivity and other factors, lakes are divided into different types for generally it has two types (i) clear water (ii) brown colour lake

Physicochemical properties of lake

This are generally thermally stratified during summer and winter season and also as per availability of sunlight etc.

Biotic communities of lake

The different organisms of lake are

(a) Neuston :- These are different floating

Plants or animal are called as Neuston.

EX:- duckweed. → floating plant

The floating animal are called as epineuston

The floating insect are called as hyponeuston

(b) Plankton:- These are the small plants and animal having very less mobility. The active planktons are called as nekton - Plankton.

(c) Nekton:- These are the animals which are good swimmers.

(d) Benthos:- These are the organisms living at the bottom. The organisms which live above the bottom sediments are called as benthic epifauna.

The organism living inside the sediments are called as infauna.

Stratification in lakes:-

It is depends upon the different seasons and temperature in summer

→ The upper water becomes warmer are called as epilimnion.

→ the lower water level which remain called as hypolimnion.

→ In 1957 Hutchinson divided different categories of stratification in lakes.

(1) Dimictic:- where both layers free mixed in different season ^{is called} Dimictic.

(2) Cold monomictic:- mixed in any one season or water temp. less than 4°C .

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(3) Warm monomictic :- mixed in any one season and temp. above 4°C

(4) Polymictic :- Generally mixes with short duration but in sufficient numbers

(5) Oligomictic :- The different water levels are rarely mixed.

(6) Micro-mictic :- Generally permanently mixed in water.

* Stream ecosystem

It is generally different ecosystem due to the flow of water, the different condition affecting organisms are factors :-

(a) Current :- It is the major controlling factor because water velocity changes in the same stream during different season. but in case of large stream the velocity of water is not sufficient - it the water current controls the different organisms and it depends upon the slope, the depth and width of the stream.

(b) Land water interchange :- It is the connection of water body along with the surrounding land. It also depends upon the different source of supply, lakes, back water etc. There is also transfer of different organisms from different sources so stream is generally open ecosystem.

(C) Oxygen :-

In stream generally depth is less as compare to big water body and it contain sufficient dissolved oxygen. The stream organisms have more sensitivity towards oxygen due to pollution. The oxygen supply reduces and different organisms either generally modify them and their numbers are reduced.

* Zonations in Stream (imp)

It is longitudinal, the different organisms the composition varies in longitudinal direction that is there numbers are more in the first part from the source ~~that is~~ ^{as per} ~~and~~ ^{of} ~~Thomson~~ ^{Thomson}. The number of fish are more in the upstream, but size of the fish is more in the downstream.

* Stream Communities

It has mainly two types of categories

- (i) Rapid :- ~~and~~ ^{the} ~~Pool~~ ^{the} current is the main controlling factor from the rapid type.
- (ii) Pool :- In this type available at the bottom in the stream. The some ex are snail, larva, big fish, vertebrates.

The end

Biodiversity

* According to Article-2 of CBO (Convention of Biodiversity) Biodiversity is the variability of different living organisms from different sources like terrestrial and marine ecosystems including ecological area available in the ecosystem as per B. Lillywhite, it can be defined as the variety and variability of different living organisms and their ecological complex. In general biological diversity can be defined as the total variation of available life form in our world.

Genetic species and ecosystem diversity:-

① ⇒ Diversity of Biotic community and ecosystem
The ecosystem includes the different types of living organism at a particular area as per these environmental conditions.
Ex:- Pond, river, forest, land, grass etc.

② Diversity of Species composition in a community
A biotic community consists of different types of species of animal, birds, micro organism, plants etc. This variety of species in the biotic community is called species diversity.

③ Diversity of genetic organizations in the species
In the within the species the different living beings exist due to these differences in size, shape, quality, resistance to disease and adjust with environment because of genes. This variation of gene is called as genetic diversity.

The gene ^{generally} transfer for parent to offspring.
The gene control individual differences.

~~Biogeological~~ Biogeographical classification of India is one of the 12 megabiodiversity countries of the world. India has land area of 2.4%, 7 to 8% of species diversity.

India is situated at the meeting point ~~point~~ of 3 realms $\Rightarrow$ Afro-tropical
 $\Rightarrow$ Indo-malayan
 $\Rightarrow$ Paleo-Arctic

Hence India has many variation of flora and fauna. The biogeography is the distribution of flora and fauna. Study in detail.

These are two major approaches to study biogeography as per Kendrick.

- ① Descriptive or static biogeography.
 - ② Interpretative or dynamic biogeography.
- $\Rightarrow$ The biogeographical regions of India are divided into 13 types :-
- ① Himalaya
 - ② The desert
 - ③ Deccan Peninsula
 - ④ Malabar
 - ⑤ Andaman Islands
 - ⑥ Nicobar Islands
 - ⑦ Gangetic Plains
 - ⑧ Laccadive Islands
 - ⑨ Maldives / Chagos Island
 - ⑩ Western Ghats

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- (11) Burman / Bangallan forest
 - (12) marine coast
 - (13) Coromondal mahanandian.

Botanical regions of India

- (1) Western Himalaya
 - (a) Submontane zone
 - (b) Temperate zone
 - (c) Alpine zone
- (2) Eastern Himalaya
 - (a) Tropical zone
 - (b) temperate zone
 - (c) Alpine zone
- (3) Indus plains
- (4) Gangetic plains
- (5) Central India
- (6) Malabar (west coast)
- (7) Deccan Plateau
- (8) Assam
- (9) Andaman

- (1) It is from Kumaon to Kashmir. It has annual rainfall upto 200cm. It has 3 zones:-
 - (a) It is a combⁿ of tropical and subtropical and it is upto 1500m altitude. There is no snowfall. It has plants like Acaia, Sissoo, Dalbergia Sissoo, Acaia (atechu).
 - (b) It is from 1500m upto 3500m. The common trees are Acer, Pinus.
 - (c) It is from 3500-4500m altitude. The common trees are Betula, Primula.
- (2) It has more rainfall, less snow, higher temperature.
 - (a) It is upto 0-1300m altitude. It has

• Semi-evergreen and deciduous forest. The plants are bamboo, dalbergia sissoo.

(b) It is upto 1800-3800m. It is dominated by oaks at the lower level and at the upper by conifers like Pinus.

(c) It is upto 3800-5000m. It generally has alpine type trees.

(3) It is the arid and semi-arid areas of Punjab, Rajasthan, Kutch, Gujarat and Delhi. It has rainfall of 770cm. This area has desert area and thorn forest. The common plants are Acacia Neotica, Paniclem.

(4) It covers the region of the Ganga river and includes UP, Bihar, Bengal & part of Odisha. It has medium rainfall, fertile soil (alluvial). It has tropical, deciduous forest. The common plants are Dalbergia sissoo, Acacia Neotica, mahua, Ashoka, khair, Piplal, Neem.

(5) The rainfall is from 150-200cm. It consists of MP, Gujarat & Odisha. It has mixed deciduous and thorny forest. The main plants are Acacia madhuca.

(6) It includes the western coast side from Gujarat upto Cape Comorin. It has heavy rainfall. It contains evergreen forest on extreme west, semi evergreen forest in the interior and mangrove forest near coast.

(7) It has rainfall upto 100cm. It has area of AP, Tamil Nadu, Karnataka, MP and Odisha. The central hilly area has dry deciduous

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- forest. the lower eastern part has dry evergreen forest (chandan tree) Acacia tree etc. (Dry coromondal coast)

(8) It has heavy rainfall from 200-1000cm it contains dense evergreen forest which has trees like bamboos. It also contains diff. types of ferns and orchid.

(9) It has a combⁿ of mangrove and beach forest at the coast and evergreen forest in the interior. Diff. plants are Mimosa.

Values of biodiversity

(1) Consumptive Value

(2) Productive Value

(3) Social Value

(4) Ethical Value

(5) Aesthetic Value

(6) Option Value

Biodiversity is very essential for the existence of human race. It is the natural resource with great value, the humans domesticated many number of wild varieties of plants and animals as per the requirement.

(1) We generally use the roots, fruit, seed of different trees and meat and egg of diff. animals as our need. A large percentage of people till date (approx 150 cr) use wood for cooking their food for this approx 100 cr m³ of wood is used which increases deforestation. These are the general consumptive values of biodiversity.

(2) Bamboos, grass, can, Rudraksha, honey, lac gums, spices, mahua flowers etc are generally used due to their higher commercial value. diff. herbs and animal body parts are also used in scientific research, education and other purposes but generally lack of market, technical and financial support generally makes farmers not interested in these resources. The microorganisms also used to produce diff. medicines hence the biodiversity has higher productive value.

(3) It is the value which is connected with our social links. The ecosystem provides our society the following elements:-

- (1) Food, Fuel, Fodder
- (2) diff building materials
- (3) Air and water purification
- (4) Decomposition of waste
- (5) Pests and disease control
- (6) Soil fertility improve

The biodiversity protects us from many calamities

(4) It is the ethical or religious value and is indirect in nature. The base is that humans are only a single species but many diff. religions has diff. ideas but the basic aim is ~~the~~ same that is to conserve nature. Ethical value is non-use value as it comes from our own ethics

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(5) It is linked with our culture like art, literature, music, dance. The forest is the place which contains different species in a beautiful atmosphere. Generally tourists visit diff. reserve forest destination for their mental peace and physical health. Thus ecotourism can create lots of wealth as revenue which is the aesthetic value of biodiversity.

(6) It tells that every species in the nature has a miracle value in future. The optⁿ value is also indirect value which also provides economic benefits. It is also the people's WTP to preserve our natural resources for the future generation. The optⁿ value may act as insurance benefit for protection of our future. The optⁿ value is the possibility of a natural resource with some value in the future like developing new medicines, new chemical compounds. The biodiversity always tries to reduce the negative situations both in current and future.

Biodiversity at Global level

At global level the total variety of species is around 30 million. Out of which we have only identified 1.5 million. It includes around 3 lakh species green plant, 8 lakh species of insects, 40 thousand (vertebrates), 3 lakh 60 thousand (microorganisms).

It is also expected that out of 30 million total no. of insects will be around 10 million. It is also estimated that 1 lakh 25 thousand of flower species, only 1 to 3% are known till end. The maximum varieties of species like plant, bird, insects, mammals, amphibians are found in ~~the~~ rain forest. It is also estimated that 70% of biodiversity are found in rain forest which is only 7% of the total land area.

2) The biodiversity is generally high in rain forest because the conditions of evolution are optimum, The ~~exten~~^{exten} is lower and the temp., climate, topography, soil condⁿ are also very favorable. The 12 mega biodiversity nation countries are

① Brazil	⑤ Ecuador
② Colombia	⑥ Indonesia
③ Venezuela	⑦ Zaire
④ Peru	⑧ India
⑨ China	⑩ Malaysia
⑪ Australia	⑫ Mexico

Biodiversity at National level

3) India has latitude 6° and 38° N, longitude 69° and 97° E. ~~at~~ 3029 million hectares in geographical land area. India has Himalayas in the north, Indian Ocean in the south, Bay of Bengal in the east and west respectively. India has very rich biodiversity with sufficient percentage of endemism (flora + fauna) Unique

The western ghat has humid tropical while hot desert in Rajasthan. India has also cold desert in Ladakh, and warm ~~coast~~^{coast} of Peningulla and also Ice ~~to~~ mountain of Himalaya. In India only 1 lakh 15 thousand varieties of plants and animal are identified.

The different crops are which initiated are rice, millet, sugarcane, Banana, mango etc. India is also the secondary base of Soyabean, Potato, rubber plant, Black paper etc.

India has 15% of the known plants. It includes 35% of endemic flowers which are available in 26 endemic area. The north eastern side is the rich base of orchids.

India has 75 thousand varieties of animal species with 80% in insects the endemism in reptiles ~~38%~~ and 62% amphibians.

India has total ~~1000~~ coast line of 7 thousand k.m. and it has sufficient seaweeds, fish, ~~corals~~, mammals, reptiles, crustaceans.

India is a country having large no. of species having. It is estimated that $\frac{1}{3}$ of animal varieties in western ghat.

Biodiversity at local level:

It is generally affected by the richness of plants, animals, these living condition, genetic values etc. the local biodiversity is generally studied due to the following point

- (i) richness of Species
- (ii) Physical condⁿ of habitat and vegⁿ
- (iii) Change in composition of species
- (iv) local variation as per climate vegⁿ - phy, location for new creation
- (v) rate of change in gradients.

HotSpot of biodiversity

The hot-spot as mainly 2 main condⁿ

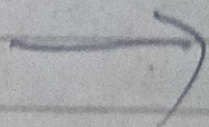
- (i) Plant endemism.
- (ii) Degree of threat.

In the world generally there are 25 no. of hot-spot out of which India has 2 no. of hot-spot

- (1) Indo Burma
- (2) Western Ghats and Srilanka

The 8 no. of hottest hot-spot includes 2 no. of hotspot in India.

Different govt. policies are made for hotspot conservation. The population growth are to be controlled with in this area. The hotspot has less than 2% of earth land area but with above 1 lakh 21 thousand species of biodiversity.



Threats of biodiversity:-

Generally threats means shortage in space food, raw material for both human and plants. Wilson (1985) describe the bio-diversity loose as crisis the human activity are mainly responsible for extinction of different animal and plants as per Mr. Wilson There is a loss of 10 thousand organism per year. If it will continue than millions of species will be extinct within few decades. Nature is also responsible for extinction of species (1 species 1000 years) So the human activity must be controlled in order to conserve the different varieties of species as per Indian wild life act 1972, Schedule-1 there are about 150 no of endangered species.

The different causes and issues related to biodiversity threat are

- (i) habitat loss
- (ii) poaching of wildlife
- (iii) man-wildlife conflict.

(i) habitat loss :- It is mainly due to different human activities. due to the population growth humans there is sufficient habitat loss. the habitat is divided into small areas called as habitat Segmentation.

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The forest and grassland are now days generally converted into agricultural field, pasture which max the habitat loss. There is also reduction in marine or aquatic habitat due to different industries, thermal plant etc. It is estimated that there will be loss of 12% birds and 15% plant species in south and central american there is also reduction of mangroves and increase in deserts.

→ Poaching of wildlife

Poaching is generally done for the purpose of collecting furs, hides, horn, tusk, herbal products. It is generally used in illegal trades. The coat of bengal tiger is as cost of 1 lakh dollar, a single orchid cost 5 thousand dollar, horn of Rhinoceros is also around 1 lakh dollar. The over collection and over exploitation are the main causes for reduction in biodiversity. So it is generally advised that the smuggled products of wild animals are more to be purchased.

→ man-wildlife conflict

Due to the habitat loss wild animals generally comes out from the forest and either destroy the agricultural field or conflict with human. The animals kept in captivity suffer pain and generally attacks humans. The injured and weak animals generally attacks humans due to the loss of natural habitat.

marine pollution

Sanctuary - boundary not specified

National Park - Have defined boundary

Reserve - full area

zoo - artificially

marine Pollⁿ

Defⁿ :-

marine is the largest water source available on the earth. It is polluted due to drainage from rivers, industries, toxic materials leakage from ships etc. due to this the aquatic life becomes destroyed and it has also effect on humans which is very harmful. It is called as marine Pollⁿ.

Causes/sources of marine pollution

- ① The main sources are rivers as they carry waste materials, sewage, industrial by products chemicals, plastics etc.
- ② The large countries with larger industries hotels, large buildings produce huge amount of waste which are supplied to the river without any purification.
- ③ The ships which carry toxic materials oils, fuels, different chemicals: due to leakage by accident or due to war pollute the marine severely. The diff. harmful products of nuclear power plants. Scientific organisations, missile and nuclear bomb test also sufficiently pollutes the marine.
- ④ The oil drilling, tourism also pollutes the marine.

Effects

- (1) The most dangerous marine pollutant is oil. When it mixes with sea water then lots of birds, fish, algae, invertebrates are killed.
- (2) The plastic materials after dumping if consumed by the aquatic animals then it creates alse and other problems.
- (3) The marine pollⁿ also destroys the food chain and we humans also suffer from cancer if consumed affected sea animals.
- (4) The chemicals and detergents are also responsible for reduction in marine life. The factory materials acids, pesticides, insecticides also pollute the marine and finally it affects our economy.

Control :-

It has 2 parts

- (1) Steps already in operation / use
 - (2) Future steps for control.
- (a) There are strict guidelines for Port authorities about pollⁿ control and Coastal guards also controls inside the sea.
 - (b) Different research orgⁿ are also controlling the pollⁿ by scientific activities.
 - (c) There are ~~strict~~ guide monitoring and survey operation in many countries.
 - (d) The authorities also take proper care about oil leakage.
 - (e) The urban and municipal corporations

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- are helping in recycling and dumping of waste.

- (2) (a) the drainage should not be discharge directly into the sea without any treatment.
- (b) there must be banned on development activities near coast.
- (c) the ships and ports should have additional facilities for pollution control.
- (d) Diff biological methods must be followed in order to reduce pollution.
- (e) Proper measures to be taken to minimize different nuclear activities.
- (f) there must be proper awareness within the people to control waste in daily life.

Noise Pollution

measurement of noise are 2 types :-

- (i) Frequency (Hz) No. of sound waves per time
- (ii) Intensity (DB) sound energy. (loudness)

Human :- (20Hz - 20,000Hz) Normal ^{Range} (200Hz - 3000Hz)

< 20Hz - Infrasound

> 20,000Hz :- Ultrasound

Intensity

0 DB = low

10 DB $\Rightarrow$

30 DB $\Rightarrow$ Library

Human $\Rightarrow$ 40 DB - 70 DB

DJ $\Rightarrow$ 100 DB, 120 DB

Defination :-

Sound is generally called as noise when it is undesirable at undesirable place and time.

Noise is generally measured in two types

- (i) Frequency
- (ii) Intensity.

(i) Frequency :-

It is the total no. of sound waves available per a particular time period. It is generally expressed in (Hz). We humans can detect sound frequency from 20Hz upto 20000 Hz. below 20Hz the frequency is called as infra sound frequency and above 20,000 Hz frequency is called as ultra sound frequency. the normal frequency zone for humans is 200Hz upto 3000 Hz.

(ii) Intensity

It is the sound energy available at any place and other wise called as loudness. It is measured in terms of Decibell (DB). our normal hearing range is from 40 DB upto 70 DB. greater than 80 DB is called Annoying or around 90 DB is effect for hearing loss (temporary) and 110 DB is painful for human or 135 DB is hearing loss for human. 0 DB is Threshold of hearing.

Sources of noise Pollution

The different sources are aeroplane take-off, launch of space vehicle, from industrial activity, running of different vehicles,

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in theatre, music band DJ, city traffic
large people gathering, for any cultural
event, celebration diffⁿ function, use of
rackus (high sound) etc.

Effects

(1) Physiological :-

When the noise intensity is greater
than 150 DB, then there is permanent hearing
loss. ~~in ear~~ for range betⁿ 120 to 150 DB.
the effects are respiratory problem
~~and~~ Dizziness (ବିକଳତା / ଗୁମାସ), loss of physical
control, vomiting, when the sound level
is greater than 70 DB causes irritation
loud sound also increases secretion
~~of~~ diffⁿ hormone, which increases B.P,
sugar level, decrease efficiency of
diffⁿ organ.

(2) Psychological

The loud noise reduces our concentration,
work efficiency, increases in working
errors, mind distress.

⇒ It also affects sleep. (important from
emotional stability)

(3) Hearing loss

Continuous exposed to higher sound produces
either permanent or temporary loss ~~and~~ to
our hearing ability, ear drum may be
damaged. temporary hearing loss are called
as TTS (Temporary Threshold Shift). Very
loud noise like bomb blast max permanent
hearing loss. till date medical helps available
for the middle ear loss which uses mesize surgical

But there is no remedies in most hear loss.

(4) other health effects :-

loud noise also increases fatigue, headache reduction in night vision, reduction in colour detection ability.

It also decreases blood circulation for heart, reduction in heart beat rate.

Control :-

(i) reduction of noise at the source. It can be done by using advance machinery or equipment, proper oiling, greasing, use of silencers

(ii) application of sound proofing technology or method :-

The porous materials generally absorb sound materials hence different elements or method may be used in order to reduce noise like making sound proofing and different other techniques.

(iii) keeping residential locality away from noising area, residential building must be located at proper distance from aerodrome, industries, highway etc.

(iv) application of different rules and regulation of noise pollution.

different rule noise pollution reduction are properly implement or people are to be aware.

(v) noise control method in industries.

Different modern techniques used the

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- industrial areas to be control like proper silenced, anacoustic cover, muffler, anacoustic screen, proper lining, use of enclosures, different damping method.

Air Pollution

* Defination :- It can be defined as presence of different contaminated particle mixed with air such that it can be harmful to all living beings.

Classification :-

(1) AS Per origin :- (a) Primary Pollutants
(b) Secondary Pollutants

(a) these Pollutants are directly emitted in to the atmosphere (Ex:- CO_2 , SO_2 , NO_2)

(b) These are obtain from primary Pollutants due to diff. chemical's reaction (Ex:- Photo-chemical, ozone)

(2) AS Per Chemical Composition :- (a) Organic Pollutant
(b) Inorganic Pollutant

(a) These Pollutants contain Cu are main element (Ex (Hydrogen, Aldehyde, ketone)

(b) These Pollutants does not contain generally Cu element (Ex:- H_2S , NH_3 , O_3)

(3) AS Per State of matter

(a) Gaseous Pollutants

(b) Particulate Pollutants

→ These Pollutants contains gaseous elements which are mixed with air (Ex:- CO , SO_2 etc)

→ These Pollutants generally, small solid particle which are mixed with water (Ex:- dust, smoke, fog)

① oxides of sulphur (SO_x) =

It is generally SO_2 and SO_3 form. These are colourless, odourless, in the atmosphere it mixed with water vapour to produce acid rain (H_2SO_4)

② oxides of Nitrogen (NO_x)

⇒ It generally NO and NO_2 . It is colourless and react with metal and diff compound. It produces different problems like decrease of oxygen, soiling of lungs tissues, reduce hemoglobin level.

③ CO :- Colourless, odourless and toxic gas. It produces diff. metabolic disorders, mainly to death.

④ ozone (O_3) :- It is having blue colour. Sweet odour can combine with diff. compound of our soil tissues. It damages our DNA. Makes problem in lungs, reduces respiratory function. Irritation in our eye.

⑤ Hydrocarbons :- It causes destruction of soil. Produces cancer, very reactive also produces more amount of ozone.

⑥ particulate matter

These are the smoke, dust etc which produces lungs problems, tends to make respiratory problem. Reduces visibility etc.

⑦ Sources

(i) Carbon monoxide is generally produced from incomplete combustion of fuel, blast furnaces, smoking etc.

- (i) SO_2 sources are automobile exhaust, combustion of coal, Sulfuric acid plant
- (ii) NO is produced from automobile exhaust, fertilizer industry, combustion of wood etc.
- (iv) H_2S :- Produces in petroleum industry, sewage treatment plant, coke oven, oil industry etc.
- (v) Cl_2 chlorine :- It is produced from different chlorine processing industries, cotton industries
- (vi) CO_2 Carbon dioxide :- Produced on combustion of fuel, jet engine exhaust, automobile exhaust
- (vii) Dust :- Sources are mining activities, cement industry, agriculture, factories, glass industry etc.
- (viii) NH_3 :- ammonia :- Sources are chemical industries, coke oven, oil refineries etc.
- (ix) Radioactive gases and dust :-
It is produced in areas having radio isotope sources, atom plants etc.
- (x) lead - from automobile exhaust, mining, coal burning.

Effects of air pollutants on human and its environment

① Damage to materials :- different building materials, latex, rubbers, metals are affected due to corrosion, abrasion, chemical reactions etc. The temp, moisture, sunlight increases intensity of air pollution.

(2) Damage to Vegetation :-

The air pollutants affects the plant growth on the leave, branch, ~~chlorine~~ ^{chlorophyll} formation etc. the time humidity, temp. effects, the vegetations in diff. ways.

(3) Damage from animals :- The pollutants like, lead, arsenic and fluorides mainly affects animal arsenic decreases livered function, changes nerve system, lead produces paralyses, breathing problem, dipresion.

(4) Darkening of the sky :- It is generally caused by smoke, fog, dust ~~stun~~ ^{stir} the diff small particles, are suspended to the air to reduce visibility it dependes upon wind speed and temp etc.

(5) Effect on human :- The air pollutions makes diff. problems like - asthma, bronchitis, lungs ~~cancer~~ ^{cancers}, irritation of eyes, decreases efficiency, ruginace etc.

Control

⇒ The diff method are used to control air pollution.

(1) Control at source

(2) Site Selection (zoning)

(3) using Devices

(4) By growing vegetation

(5) By fuel selection.

(1) Control at source :- Modify the process to control pollution within limits.

⇒ The pollutants must be reduces within ~~in~~ ⁱⁿ ~~reduced~~ ^{reduced} limits.

(2) Site selection or zoning :- control are to be made as for rearrangement which is called as zoning it means factories and industry are in a particular area far from residential area and generally in unutilized land.

(3) Using devices :- It has two types of method.

① Methods to control gaseous pollutants
It has the following method,

- (a) Absorption
- (b) Adsorption
- (c) Combustion
- (d) Condensers
- (e) Others,

(a) Absorption :- generally scrubbers are used to control gaseous pollution, it is generally used to remove NO_2 , SO_2 , H_2S etc.

(b) Adsorption :- It uses diff porous solid materials called as adsorption like Silica gel, zeolite etc.

* It is used to adsorbed H_2SO_4 , HNO_3 , SO_2

(c) Combustion :- It uses diff type of filters mechanical instrument, press Pelators etc.

(d) Condensers :- It is used to resipitate diff gases like SO_2 , NO_2 etc by decreasing the temp.

(e) Others :- It generally uses plantations of more trees to control air pollution.

Water Pollution

Defination :- It's the Pollutants mixed with water such that it cannot be used for drinking, agriculture, and other domestic uses.

* The water which is uses in drinking purpose is called potable water.

Properties of Potable Water :-

It is colourless and odourless, free from suspended particles, free from germs, Bacteria, toxic element having pH of 7 to 8, hardness is 150 ppm (Parts per million)

Sources :-

(1) Oxygen Demanding wastes :- It includes Sewage, Industrial waste, Paper mill exhaust etc. here the DO (Dissolve oxygen) is less.

(2) Disease causing waste :-

It include diff Sewage, from our home, hospitals it containing diff, dangerous virus which are typhoid, kolera, denteries etc.

(3) Synthetic organic compounds :- These are the man made material ~~in~~ pesticides and Plastic etc these are toxic to all living beings.

(4) Agricultural run off :- It includes diff pesticides diff chemicals which produces serious diseases in living beings.

(5) oil :- oil pollution effects the aquatic life. It happens due to oil leakage from ship and diff. oil drilling activities.

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(6) Radioactive materials :- The diff. elements like uranium, Cesium, Cobalt, Isotope etc effect the hole area.

Effects :- (i) The acidic or alkaline pollutants are corrosive to concrete and metals.
(ii) The pollutants also contains diff bacteria which are harmful to our health.
(iii) The Chromium is very toxic to aquatic life.

(iv) Accretion salt degrades the quality of ground water diff substenabul particle.

(v) The radioactive particles nuclear area effects severe disorder in human.

Controls :- The diff methods of water pollution are :-

(i) Use of proper ^{statetic} ~~scientific~~ technologies for water control.

(ii) Industries must have recyltic operation.
(iii) minimum use of ~~for~~ folged, ~~pestro~~ -sides in agricultural fields.

(iv) Sufficient treatment plant must be established.

(v) All should be encourage to plant more trees.

(vi) People should be award to minimize water pollution as far as possible.

(vii) There must be ~~a~~ sufficient plant to utilize the waste product either to produce energy or to have ~~and~~ other utilities.

Soil Pollution

Soil $\rightarrow$ Soilum (Latin word)

Earthy material help in growing plant

Scientific Study of Soil $\rightarrow$ pedology (edaphology)

Definition

It is defined as the converted layer of rocks, crushed with living organism and different decay products. The major elements of crushed are oxygen, silicon, aluminium, Iron, Calcium, Sodium, Potassium, magnesium, hydrogen, titanium, Chlorine, Carbon and others.

rocks are 3 elements:- (1) Igneous rock

(2) Sedimentary rock

(3) metamorphic rock

Magma $\rightarrow$ lava $\rightarrow$ Igneous rocks

(1) Igneous rock:- formed by cooling and solidification of molten and of rock material.

(2) Sedimentary rock:-

formed because of deposit and hardening of different sediments of particle carried by wind and water, limestone, sand stone.

(3) metamorphic rock:-

Produce under high pressure and temperature, Ex:- marble, Quartzite

different mineral in crushed are mineral (crust)

(1) Feldspar (2) pyroxene, (3) quartz, (4) mica

Important function of Soil

(1) Provide mechanical support

(2) due to porosity it absorbs water and supply to the plants during requirement.

(3) The soil controls the mineral amounts, absorbs and supply at a time of requirement.

- (4) It control the PH level, &
(5) It contains different bacteria, fungi, micro organism in order to decompose and regenerate different element like mineral.
- different type of soil in India:

- (1) Alluvial Soil
- (2) mountain Soil
- (3) Black Soil
- (4) Red soil
- (5) Lateritic Soil
- (6) Desert Soil

Alluvial soil

very fertile found in river delta
mountain soil

rich in organic matter and fertile found in hill area.

Black soil

Generally made from volcanic rocks highly fertile found in Gujarat, Maharashtra, madhy Pradesh.

Red soil

It is moderate fertile found in (Odisha)

Lateritic soil

Generally low fertile for support scrub, herb, pasture, found in Odisha, Andhra Pradesh, Assam, part of western Ghats

Desert Soil

made up sand low pasture etc, very less fertile, found in Rajasthan, Gujarat, Madhya Pradesh, Punjab.

Plants as pollution indicators

Some plants grow in pollute areas which acts as indication of pollution. Plants like *Agrostis indica*, *Impatiens*, indicates pollution of different materials Cu, Cd, Zn.

Leaf cabbage :- It indicates higher deposits of hydrocarbons.

Growth of lichens indicates the polluted soil.

The soil pollution generally reduces productivity max. different animal diseases.

Sources of soil pollution

The main sources of soil pollution are (i) mining

(ii) industrialisation

(iii) fertilizers

(iv) pesticides

(v) waste from hospital or household etc.

The different metal like cadmium, Nickel, molybdenum etc. are highly toxic metals. The improper dumping of different waste adds toxic materials into the soil. Use of different types of agricultural by products also contaminates the soil.

fly ash, different metal sludge, farm waste, radioactive waste, increases soil pollution.

Effects

The different effects are :-

(1) Effect of modern agricultural practices.

(a) Synthetic fertilizers :-

The fertilizer is generally used to increase soil fertility and increases different required nutrients but it is harmful to the microorganisms.

which is required for plant growth.

- (1) wheat, corn etc grows well with fertilizers but there is reduction in protein content.
- (2) The nitrogen fertilizers when increase nitrate concentration $> 90 \text{ ppm}$, then the drinking water causes diarrhoea, cyanosis and also effects infants. It also make toxic effects of cattle and also causes stomach cancer in human body.
- (3) higher chemical fertilizers increases the number of algae in water body.
- (4) increasing potassium reduces the vitamin content in fruit and vegetables.
- (5) The vegetables grow in polluted soil are less resistant to insect attack

(b) Pesticides :-

It hampers the crop production and when enters in the food creates health problem. and it is biodegraded into several harmful form.

The different types of pesticides use are :- inorganic compounds (PbO_2)
chlorinated hydrocarbon (Aldrin)
other compounds...

The effects of pesticides are :-

- (i) reduces soil fertility permanently.
- (ii) contaminate ground water.
- (iii) The fruits and vegetables or other compound consume makes several health problem like eye damage, skin problem, Nerve disorders

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It also damage of tissues reduces metabolic activity.

→ Increases, dizziness, It also reduces animals birds and bees.

→ also increases poisoning rate in farmers who are spraying the fertilizers and pesticides.

(2) Effect of Industrial effluents

~~The~~ The industrial product from different industry like, paper, automobile industries etc. produces diff. heavy metal, different detergent, ^{waste} particles etc. The fly ash reduces vegetations on the exposed area.

~~(2) →~~ The dumping of waste also reduces fertility. Production etc.

(3) Effect of urban waste

The different urban waste from household industries effect very badly on the soil. It acts as a cover ~~ing~~ the soil and reduces fertility on the soil. It also increases soil erosion and toxic amount in soil.

Control

→ The different control methods are:-

- (i) Population control.
- (ii) more plantation (afforestation)
- (iii) Implementation of strict pollution control rules.
- (iv) making public more awareness about pollution problem.
- (v) banned toxic and chemical pesticides
- (vi) encourage to a increase biopesticides

(vii) Soil Conservation from erosion and unscientific crop cultural method.

(viii) - making proper rotation of crop.

(ix) - proper ~~the~~ treatment of domestic, ~~municipalities~~ municipalities and industrial waste.

(x) more effort in research and development to find out diff. solutions of soil pollution.

Thermal Pollution

It can be defined as the pollutions related to heat. the increasing temp. generally negatively effects the aquatic life, to humans, to animal, bird and plants, it also reduces the number, different activities, increases diseases etc.

Sources

The different sources are

(1) Nuclear Power Plant :- It produces different nuclear waste which affects the nearby aquatic and animal bird human life.

(2) Coal-fired Power Plant :- The ^{waste} products from these plants when mix with nearby water source increases the overall temp. It reduces ~~the~~ dissolve oxygen, which decreases the aquatic life.

(3) Industrial waste

The industry like Paper-textile, chemical plant, fertilizer plant etc. produces high temp. waste with also the mixed with water bodies, reduces aquatic life.

(4) Hydro electric Power Plant

The outlet from hydro power plant also increases the temp. and it also requires sufficient cooling pond which creates problem.

(5) Domestic Sewage :-

The high temp. domestic waste where mixed with water bodies reduces d.o. & different cond. produces offensive gases.

Effects

(1) Reduction in dissolved oxygen ^(d.o) :- When the d.o is reduced below 6ppm then because of oxygen requirement the aquatic life is reduced.

(2) Change in water properties :-

The temp. rise reduces the ~~viscosity~~ viscosity, density, solubility and hence food supplied of aquatic life is reduced.

(3) Increasing ~~toxic~~ toxicity :-

With 10°C rise in temp. increases the effect of Potassium cyanide.

(4) Interference with biological activities :-

The high temp. increases diff. problems on physiology, metabolism and other activities due to which the ecosystem faces, different problem like reduction in number, more health problem, more number of death.

(5) Variation in reproduction rate

It either increases or decreases the reproduction rate.

(6) Change in metabolic rate

It reduces our respiratory system food eating capacity, oxygen demand etc.

(7) Invasion of destructive organisms

The no. of destructive organisms attach ~~to~~ will increased.

(8) destruction of organism in cold water

→ no of aqualife in decrease.

(9) Biochemical oxygen demand

~~with~~ With increasing temp. the oxygen demand increase due to reduction on oxygen supply. There will be increase in fifth death.

(10) effect on Bacteria :-

The high temp. ~~to~~ kills the useful bacterias by torication.

Control

→ The different Principle use are conduction, convection, evaporation, radiation.

→ So industries use ~~cooling~~ cooling Pond, spray pond, ~~cooling~~ cooling towers etc, to reduce the high temp. of industrial effluents.

Nuclear Pollution

It deals with the radiations from diffⁿ radioactive elements generally the radioactive element has 4 no. of property :-

(1) Half life period.

(2) mode of decay

(3) Energy of radiation

(4) Particular energy state.

The different radiations of decay are

① Emission of :-

- ① α -Particle
- ② β -Particle
- ③ γ -Particle

① α -Particle :- This emission is generally having low penetration power and can be stop by approximately 8 cm thick material.

② β -Particle :- Higher penetrating power.

③ γ -Particle :- These are the high energy radiation and can penetrate higher value of thickness.

Sources

(1) Natural sources :- It generally happen due to cosmic radiation in the space and also due to different radioisotope present in atmosphere, lithosphere, hydrosphere. This emit high strength radiation etc.

(2) Man made :-

- (a) Nuclear weapon
- (b) Atomic reactors
- (c) Radioactive ~~isotopes~~ isotopes
- (d) other

(a) Nuclear weapon :-

The uncontrolled atomic explosion using Uranium-235 ^{→ fission} and hydrogen as fusion material produces huge amount of radioactive clouds which causes severe destruction.

(b) Atomic Reactors

The common fuels are Uranium. When there is ~~some~~ some leakage in case of Atomic reactors then the radioactive element causes destruction.

(c) Radioactive isotopes :- It is generally used for scientific research when these waste mixed with water body caused severe pollution to the living being.

(d) Other :- Those elements like X-Ray effect our body severely.

Effects

① Outside of body (or) Inside of body
The diffⁿ effects at the molecular level causes damage to DNA and RNA. At the sub-cellular level it damages the cell membrane and chromosome. at the Cellulose level it caused cell division causing to death. It also effects our born, nerve system, eye sight etc. It also cause burning sences of all over the body and produces severe disease.

Generally the radioactive emission can not be stop by any physical, chemical or biological process only it will be stabilize after few hundred years. Uranium-235 takes generally 7 lakh to thousand years to reduce its half life.

② The nucleic acid generally absorb the radiation and causes severe disease. The biological generally no able distinguish betⁿ normal isotope, radioactive isotope.

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The harmful effects of the radiation energy is generally expressed in Rads means to absorb 100 ~~erg~~ ^{erg}/gm. of tissue

Control

The total control is not possible hence what of the solution is they are to be dispose in proper containers such that the radiations ^{are not able to} reach the living beings but the ~~time~~ half life period of radioactive element are sufficiently high hence we have to reduce the use of radioactive elements as per as possible.

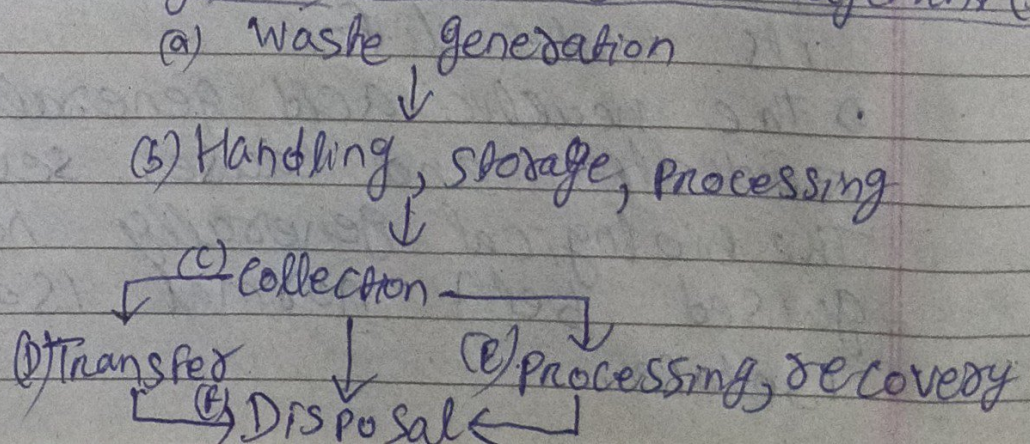
Solid waste management

The materials which are generated by the human and animal activities considered unwanted are called as solid waste.

The management of this waste is known as solid waste management.

Its purpose is (I) Identify the solid waste
(II) Examine its composition
(III) Consider different activities for its management.

different activity of solid waste management (swm)



Sources :-

- (1) Residential
- (2) Commercial
- (3) Municipal
- (4) Industrial
- (5) open area
- (6) Treatment Plant
- (7) agriculture
- (8) Hazardous waste
- (9) Construction sites.

(1) Residential :- It includes different houses apartment It has food waste, rubbish etc.

(2) Commercial :- Market, Restaurant, office It has food waste, rubbish other waste.

(3) Municipal :- It includes ^{Govt.} office, court, Colleges, Park, Bank It has food waste rubbish, Paper waste, leather waste etc

(4) Industrial :- It includes mining, Power Plant Chemical plant etc, It generate food waste rubbish, ash, different chemicals.

(5) open area :- It includes vacant land, Sea beach, forest contains food waste, rubbish, water bottles plastic etc.

(6) Treatment Plant :- It includes water treatment, Industrial treatment It has Sludge.

(7) agriculture :- It includes agriculture land, farms, dairies etc. It includes food waste rubbish, hazardous chemical waste, etc.

- (8) Hazardous waste :- It includes Hospital, RND atomic plant, It has waste products of different metal substances, operation waste etc.
- (9) Construction Sites :- It includes construction area like park, house, industries, It includes pipe waste, brick waste, stone etc.

Types of Solid waste

- (1) Garbage :- These are the food waste of human, animals, birds etc.
- (2) Rubbish :- These are the different waste of our household activities; animal, bird activities excluding food.
- (3) Ashes and Residues :- These are the burnt out waste products of different combustible material.
- (4) demolition and construction waste :-
It includes the waste products at construction site.
- (5) Special waste :-
It includes the waste from street debris, dead animals, abandon vehicles and litter.
- (6) agriculture waste :-
It includes all the products of agriculture field from milk processing plant, slaughter house.
- (7) Hazardous waste :-
It includes waste of chemical, atomic, explosive plants.

Collection of solid waste

Generally the collection is difficult in urban area as it has large no of residential industrial areas including sufficient area of slums.

⇒ The people must be aware to separate their waste and through them in separate dustbins due to this the collection of waste by municipality to be easier and of less costly. Generally municipality is use to govt. money transportation only due to high fuel and labour cost.

Effects of solid waste :-

Due to accumulation of solid waste for long time different microorganisms like bacteria, fungi, virus, worm etc are produced and grow in number which increases the health hazards, these microorganism spread through air and water and make different diseases like Cholera, diarrhoea etc. The harmful industrial waste badly effects our skin eye and different body parts etc. These waste material also rich under ground water and pollute them. The different waste can be recycled for ~~the~~ further use also effect the animal, birds and aquatic beings.

Management or control ways

There are different ways for disposal of solid waste. It has generally 3 types of disposal process, physical removal

Dumping, Compacting and bailing.

① Physical Removal -

The different solid waste must be disposed in proper dustbins such that:-
→ municipality will carry it away

② Dumping

It is the transfer of collected solid waste to the disposal site, which must be far away from locality.

③ Compacting :-

It is the collecting and pressing by the machines in order to reduce the size.

Bailing :- when the compacted waste are rolled there is called as Bailing. There are also different methods for controlling solid waste.

→ 1 method is called as 3R method (WIMP)

(i) Reduce

(ii) Reuse

(iii) Recycle

(i) Reduce :- all person must try to reduce the amount of different waste produce by them the industry must take the ~~help~~ ^{help} of modern technique to reduce waste.

(ii) Reuse :- As far as possible almost try to use different materials upto max^m limit.

(iii) Recycle :- Different modern technique must be use for recycle purpose.

- (i) Sewage treatment :- different industries must are settling chambers where lime is mixed with the sewage in order to neutralized it then it is decomposed in the absence of oxygen. The second method is
- (ii) Pulverisation :- where the solid waste are made into small particle.
- (iii) Composting :- Here the decompose waste is converted into composed by means of microbes.

Sanitary land filling :-

In this process different waste are filled in low land areas and it is covered with soil.

Thermal process

The solid waste must be burned in the absence of air which is called as Pyrolysis. It destroys the harmful element and can be reused. If waste are burned in the presence of air it is called as Incineration. It is to be avoided as it creates toxic gases and totally destroy the waste which cannot be reused.

Role of individual in prevention of Pollution

Every person should be motivated by own self to take different step from controlling Pollution.

must make different awareness campaigns.

- ⇒ make advertisement through paper, magazine, social media etc.
- ⇒ make promotion for plantation, organise seminar on our pollution control.
- ⇒ Rural people must be informed about prevention of pollution in different gathering.
- ⇒ Proper motivation must be reveal in school's in order to prepare them to event pollution.
- ⇒ Different Days about conservation should be celebrated with practical work.
- ⇒ Population growth must be control.
- ⇒ Different mass Transportation System must be promoted for all people.

Disaster management :-

① Flood :- when the rivers overflow due to high rain low depth of river bed and due to other natural and artificial process.

② Casual Phenomena and characteristics :-

The rain fall in India depends upon monsoon and cyclonic depressions. The flood damages makes food shortage, reduction of productivity of fertile land, loss of life, and properties, buildings etc. The ancient people took proper major as per their technology but the population growth made them casual. The small catchment area of the rivers increases flood activities as the coastal river belts are flat so water does not find sufficient time to flow into the

sea due to reduction in speed and large volume of water. India is one of the highest country. It is estimated there around 10 80 million ha of land are if a paid during 1950 to 1990 which is the average data.

Vulnerability:

mostly people ~~live~~ ^{live} ~~here~~ ^{here} by the River hence flood effects them a very much so the identification of the occurrence of ~~so the~~ ~~in~~ flood. as for ~~analysis~~ ^{analysis} is called as hazard.

Assessment

- ⇒ Variability shows the diff condⁿ of the safety which ~~are~~ ^{are} prone to ~~undesired~~ ^{undesired}
- ⇒ The main factor of diff type and degree of loading ~~are~~ ^{are} was (i) Climatological
(ii) Hydrological
(iii) geomorphology.

Adverse Effects

High floods generally effects both develop and under develop nation it generally so much agriculture land, Sand covering of land, damages proper ties of people, creates food shortages etc.

⇒ The average annual loss from flood in around 1000 Cr.

⇒ It can be controlled by taking diff - extent steps by both Govt. and the Common people the data is average data not accurate.

Control Preparedness

⇒ It is defined as the total planning for quick response of the anticipated flood. It must include timely warning proper evacuation plan sufficient stock and distribution of food and other material.

⇒ The flood reduces irrigation, communication, settlement, ~~and~~ farming etc.

⇒ In 1980 our India govt. set up national flood commission.

⇒ In order to manage flood ~~and other~~ activities.

⇒ The state govt. are also involved in it to take diff. local ~~decision~~ ^{decision} for its control.

⇒ The UNGA (United Nations General Assembly) declared the decade of 1990 as the international decade for natural disaster reduction.

Earthquake :-

General Characteristics

def ⇒ Different as the destruction due to moving of rock of the crust or tectonic plate or volcano or due to other activities. due to this generally land structure changes.

Properties

⇒ The different properties are still date is not possible to predict accurately about the place, time and magnitude of earth quake.

⇒ It is very sudden only steps are taken as for identifies earthquake areas for an average around 20,000 people die every year. about 200 large earthquakes occur in a day.

⇒ Due to the buildings, dams, Population these activities are enhanced.

⇒ It is the exact point under the earth where the earthquake begins. (Focus)

⇒ Epicenter:- It is the point on our earth surface which is exactly vertically about the focus.

⇒ The energy released is called as magnitude

⇒ The magnitude is measured by means of Richter Scale with a value from 1 to 9.

⇒ This scale is having logarithmic values $\log_{10}$.

⇒ The earthquake has generally 2nd wave

(i) Primary wave (P-wave)

(ii) Secondary wave (S-wave)

(i) Primary waves:-

It is due to ~~the~~ longitudinal vibration which produces pull and push.

(ii) Secondary wave:-

It happens due to transverse vibrations.

This secondary wave is most dangerous and destructive. Though it has less amplitude and size than primary wave.

The earthquake are also calculated by means of intensity, and it depends upon distance from epicenter. As the distance increases the destruction are less.

Pre- & Precursors (Instrumental and non Instrumental)

⇒ Pre-cursors are the different indication about earthquake. Instrumentals are the indicators which are measured by different instrument. The non instrumentals are the indicators which are not measured but can be easily assessed.

⇒ The different instrumental types are :-

- (i) Velocity change in P and S wave.
- (ii) Changes in gravity
- (iii) Tilt in underground rocks
- (iv) Change in magnetic field
- (v) Emission of Radox gas from the ground.

⇒ The non instrumental types are :-

- (i) Rise or fall of water level in the well, lakes, Pond etc.
- (ii) The surface water becomes muddy.
- (iii) Change in flow of natural springs.
- (iv) ~~an~~ unusual behavior of animal and birds.
- (v) Several or noticeable advance and retreat of sea water.

Vulnerability

The earth quake has generally 3 types of vulnerability :-

- (i) Physical
- (ii) Social
- (iii) Economical

(i) Physical :- It is related to the different building, industries, fields etc. due to earthquake there are several destruction in this infra structure hence special arrangement

are made to lower the effects.

(i) Social :-

These include single parent family, pregnant women, children, elderly people, handicapped person so different plan and activity are to be taken both govt. and public to reduce the effects.

(ii) Economical :-

It includes the different losses by direct loss, indirect loss and the secondary effects hence all should take different activities to minimize it as much as possible.

Impact and effects

It includes loss of life, destruction of property, crops, production; loss of livelihood, disturbance in essential service, National economic loss, social loss. Some severe problem in earth quake are life loss, medical recruitment, difficult to access or movement recovery recruitments which is generally costly, lack of public awareness.

Nature of damage :-

It depends upon the following matters

→ Nature of earthquake

→ geological condition

→ Construction quality

→ Social factors.

→ Generally different essential services water, electricity, food are - severe damage including damage in drainage line.

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⇒ The telephones are damaged including rail line and road line, large dams may produce severe floods.

⇒ there may ~~also~~ ^{also} T-sunami waves.

* Cyclone :-

⇒ IT consists of extremely severe winds along with heavy rain. It generally forms over the ocean water which are generally warmer nearer to the equator within 30° North to 30° South. In India max^m cyclone for mean way of Bengal and also in Arabian Sea.

* Characteristics

The Tropical cyclones are generally large and rotates with length of (150 to 1000 km). They generally rotate in anticlockwise direction in the northern side and moves with a speed of 300 km - 500 km in one day.

It is generally develops and converted into depression which finally converted into cyclone.

Speed:- low depression $\rightarrow < 30 \text{ km/hr}$

Depression $\rightarrow 30 \text{ to } 55 \text{ km/hr}$

Deep Depression $\rightarrow 55 \text{ to } 65 \text{ km/hr}$

Cyclonic storm $\rightarrow 66 \text{ to } 90 \text{ km/hr}$

Severe cyclonic storm $\rightarrow 90 \text{ to } 115 \text{ km/hr}$

Hurricane storm $\rightarrow > 115 \text{ km/hr}$

The central part of cyclone is called as eye. Generally every year 2 to 3 severe cyclone occur is ^{here} ~~year~~ the time of cyclone.

May to June (pre monsoon), October to December (post monsoon)

* Warning

The warnings are provided through Sim imp cyclone warning center at (i) Bhubaneswar (ii) Kolkata (iii) Visakhapatna (iv) Madras (v) Mumbai (vi) Ahmedabad.

The cyclone warning are generally issued to all India radio and T.V for making the local people aware it. Cyclones are detected by means of different satellite radars, weather report from ship etc.

The radars are situated at Paradip, Kolkata, Vishakhapatna, Chennai, Karaikal, Goa, Kochin, Mumbai, Bhuj etc.

The warning are provided in 2 stages first one called ~~as~~ as given within 48 hours before the cyclone 48 hours and cyclone warning is given 24 hours before landfall.

The cyclone warning are generally given by telegrams, dardhasan telecast, radio broadcast, Press Bulletin, disaster warning social media.

* Preparedness

It is the different precaution steps taken by Govt. organisation, community and the people.

It is plan sufficiently before the land fall. It includes evacuation of people, identification of shelter centers. Sufficient storage of food drinking water medicine other essential requirement are stored properly.

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The ministry of agriculture proper
step for effective implement during cyclone
N.G.O.s also take parts in this activities.

* RISK Reduction process

The loss of human life and destruction of properties can be minimized by taking different steps. The cyclone shelters are properly built in cyclone disaster area. people must be sufficiently aware and proper training to be given to them. Insurance policy are also provided for the losses.

* Effect :-

The main dangers of cyclone are strong wind, heavy rain, high tides, maximum casualty are occurred in the coastal areas.

The floods also effect the different area. Cyclone also produces high tides or waves upto 50 ft. or more. This rise in sea level is called as T-sunami. The cyclone air and land combinedly produces the storm. Due to recent development and technology losses due to cyclone are minimize now days.

* Land Slide

It is the sliding and fall of huge land mass and it creates huge amount of loss. One of the measure landslide area is the Himalaya mountains another notable area are western ghat, eastern ghat etc.

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These mountain has fragile rock system. So landslide occurs generally in monsoon season and also in winter season. (snow avalanches)

Landslides in India

It generally affects the town or villages near the mountain regions. This regions are generally difficult to reach quickly.

The land slides frequently occurs in the hilly area (Himalaya, western ghats) during heavy rain fall.

Kind and magnitude of damage

The land slide are combination of rock-slide, rock fall including fall of soil. It generally occurs suddenly as per movement. Land slides divided into followings:-

- (1) Debris slide
- (2) Debris fall
- (3) Rock slide
- (4) Rock fall.

The landslide damages the property and population which are living near by hilly area the roads and agriculture soil are severely damaged. It ~~also~~ reduces the economic condⁿ, communication, agriculture capacity etc. It also sometimes blocks the stream or causes over flowing of lakes to make flash flood.

Relief and Rehabilitation

The different relief steps are taken as follows :- (i) search and rescue

- (ii) medical assistant
- (iii) food and water
- (iv) shelter
- (v) opening of roads
- (vi) house repair
- (vii) financial and mental support.
- (viii) Disposal of Dead body.

The rehabilitation may be short term or long term, the long term rehabilitation are (i) taking proper steps such that the ~~hazard~~ hazard will be reduce in future.

- (ii) reduction in improper mining activity
- (iii) planting of sufficient tree.
- (iv) creation of voluntary workforce in order to improve confidence of the people.

⇒ supplying sufficient assistant for long term, agriculture business and other activities

Social Issues and the environment:-

Pollution has made sufficient changes in our social life and environment due to our activities (agriculture, industries buildings, deforestation etc.)

From unsustainable to sustainable development

The unsustainable development is the development of only a few no. of countries by using the natural resources. It is expected that it will only invite doom's day, (day of destruction). Sustainable development is the development which take in the account the development of all. It has the basis in the ^{World} Summit 1992 are Brazil.

① The redeclaration tells that sustainable development can be achieved by protection of environment along with development process including reduction of poverty. The freedom and sustainable development has different meanings. Freedom mean people can do anythings and give power in the people to control the govt. Sustainable development defects the people what to do and what not to do. So it gives power to govt. to control people. The sustainable development has 2 aspects

- (1) Inter-generational equity
- (2) Intra generational equity

① Inter-generational equity :-

It tells to reduce over use of resources, waste production, ambition and maintain balance in environment. Such that future generation will also get the benefits.

(2) Intra generational equity :-

It tells the support for the economic growth of poor countries with proper

- technological development.

→ The different majors of sustainable development are (i) To promote environment education and awareness

It must be introduced in the primary education such that children will be aware of it. Govt must take different policies and awareness campaign.

(ii) 3R's approach (Reduce, Reuse, Recycle)
It means Reduce, Recycle, Reuse.

(iii) Proper Technology

It is to include minimum waste and production as per as use.

→ Using resources according to environment carrying capacity.

The carrying capacity has mainly 2 components.

(i) Supporting capacity

(ii) Assimilative capacity

(i) Supporting capacity :- It includes the productive and protective system.

(ii) Assimilative capacity :- It includes the system utilize the waste the human activity.

Urban Problem related to energy

→ Due to life style in provement the urban people are consuming more and more energy requirement are connected with every field like industry, agriculture etc. due to the growth of urban area new slums are being establish which also require more energy to sustain we are facing power cut demand in more than production.

Main Causes

→ Energy increase for domestic and commercial use industries using more energy, more uses non-renewable energy source, increase in transportation, reduction in productivity in less rain etc.

Diff. step (solve energy crisis):-

- (i) control urbanization.
- (ii) more use of renewable energy source.
- (iii) use of non-renewable energy source, only during non-availability of renewable energy source.
- (iv) awareness program about saving energy.
- (v) steps for energy theft and transmission loss.

Water conservation

→ water is called as universal solvent.

→ water is required for diff. purposes like irrigation, industry, domestic ~~require~~ requirement, thermal power plant, hydroelectric generation.

→ In order to conserve water diff steps are to be taken ① water economy (2R) $\Rightarrow R = \text{Reuse}$
 $R = \text{Recycle}$

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- water meters must be installed for control of use of water the industry must recycle their water such that it can be reused.
- (2) Agricultural Run off: It can be use with proper drainage to utilize the agriculture filled which was the downside.
 - (3) Efficient distribution system: there must be some means for as far as possible equal distribution of water.
 - (4) Enhancement of surface storage capacity.
 - (5) Reduce evaporation losses.
 - (6) Improvement of underground storage capacity
 - (7) Desalination of sea water.
 - (8) Planting of more trees.
 - (9) Artificial rain.

Rain water harvesting

→ It means conservation of water by diff. means like Roof top, rainwater harvesting, saving water in ponds rivers etc. The rain water harvesting for agriculture flood control and recharge of ground water are required for our future.

Domestic water harvesting

* The basic components are:-

- (i) Catchment area.
- (ii) The diff. transport channels up to the storage.
- (iii) The Screens and washers.
- (iv) Storage tanks (cistern)
- (v) all the water treatment elements
- (vi) The main causes of reduction in ground

Water level are :-

- * over enpludition of ground water.
- * Non - availability of other sources.
- * Low availability of municipal water
- * misuse of water conservation area like ponds, rivers, brolis, percolation tanks.

Effect of overexploitation of ground water

- ⇒ fall in ground water level.
- ⇒ Drying up wells and brwells.
- ⇒ use of more energy.
- ⇒ Reduction in ground water quality.
- ⇒ entry of seawater

The diff. method and techniques of water

- (1) Roof top rain water harvesting to recharge well and boxwell etc.
- (2) making method to improve to catchment area by construction of checkdam, small dyke etc.
- (3) making village catchment are improved to stored water.
- (4) Recharging the treated urban and industrial water.

Objective of rainwater harvesting

- ⇒ Restore the water to the aquifers.
- ⇒ Improve the water leaves in aquifers
- ⇒ Storage of extra water.
- ⇒ Improve quality of ground water.
- ⇒ Reduction of sea water entry / Ingrace.
- ⇒ Reduction of effect of drought.
- ⇒ Ruduction of Soil erosion.

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⇒ Reduction of flood.

⇒ proper use of unused well and tubewells.

⇒ Improving the society and environment.

Watershed management

* Watershed :- (Source of water) :- It is the area which receives water from precipitation and flows to large stream and river.

→ In 1949 Damodar Valley Corporation started the first watershed management program.

It includes the increase in forestation of animals, birds, reduction in human contrones.

* The main objective of watershed management

are : (1) Increase in agriculture production like fuel wood, team barge, other raw materials etc.

(2) proper utilization of soil and vegetation.

(3) to reduce floods, drought, land slide etc.

(4) management of diff control activities like water supply, irrigation, hydro power production.

(5) The farmer and tribal people are to be included with their proper education.

Resettlement and Rehabilitation of people

(problems and cons) :-

* Diff of dam, mine and other constructions are projects required for the development of society. These project generally displaces people from their homeland and there must be proper resettlement of this people. The diff types of projects which generally displaces the local people are :-

- (1) Displacement because of dam.
- (2) Displacement due to mining.
- (3) Displacement due to national park.

Case Study

* Indira Sagar Project (due to dam)

* It is situated in Khandua district of Madhya Pradesh. It has 1000 MW capacity and under the control of National Hydroelectric Development Corporation (NHDC).

* It is the largest reservoir in India (12.22 Bm³) of water and irrigates 2.70 lakh Hectare of agriculture land.

* As lot of people of diff villages are affected by it hence a new township has been established for the displaced people. The diff. advantages are:- (Pisciculture) (Fish) improved upto 1500 tons/year.

* Before a new industry are developed sufficient water can be supplied to 2000 MW Thermal Power Plant, the tourism is also increased.

(2) Tehri Dam

* It is established as the meeting point of Yamuna river and Bhilangana. It is very famous for the controversy around 1990. Sri Sunderlal Bahuguna started Chipko movement against it. This dam is having a length of 573 meter length, height 26m. It is the highest rock fill dam.

* It has Power Production capacity of 29000 MW, can provide irrigation upto 8 lakh hectares. The displaced people are rehabilitated in deheradun and haridwar.

(3) Sardar Sarovar Project

⇒ It is in the Bhavnagar district of Gujarat. It will submerge large no. of villages in Gujarat, Madhya Pradesh and Maharashtra. It will produce agriculture of around 900 crore rupees and can supply water of value 500 crore rupees.

Due to mining (Case Study)

① Jharia Coal field

* It is in Jharkhand with huge amount of coal, large no. of people are displaced from it and filled data the resettlement and Rehabilitation as not completed.

Due to national park

⇒ When government one area from national park the core people (person living inside the forest) are generally prevented to enter the forest and forced to be evicted.

Case Study

① Valmiki Tiger Reserve

⇒ It is in west Champaran district. It generally displaced 142 villages of Tharu community.

(2) Wagaband Sanctuary

⇒ It displaced around 5000 tribal communities the central people trying to get sufficient consolation amount.
Rehabilitation

⇒ The United Nations declaration on human rights (Article 25) tells that right to housing basic human rights.

⇒ Indian govt under land acquisition act, of 1984 has power to use any private land for public purpose but still govt provides sufficient compensation for rehabilitation.

⇒ The diff. resettlement and rehabilitation provided in (Indira Sagar Project) are as follows:-

- (1) Developed plot of Rupees 2000 to purchase plot.
- (2) Rehabilitation grant of Rupees 1800
- (3) Transportation grant of Rupees.
- (4) Two to eight acres of agriculture land.
- (5) Sufficient amount for other house structure.
- (6) Developed road, water supplied, shops etc.
- (7) Additional benefit.
- (8) Professional training.
- (9) Free medical check of camp.
- (10) Diff development works.

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The air (prevention and control of pollution) Act, 1981

* AS for the ~~desi~~ decision taken in the united nation conference held at Stockholm, June, 1972, India as a member agreed for the prevention and control of air pollution.

* This air prevention and control act bill was passed on 29 march 1981 (passed) in our parliament (14 of 1981) but it came into force in (16th may 1981).

* The amendment also made in the year 1987 (47 of 1987)

Defination

* This act provides different methods and gives power to control and prevent air pollution.

Preliminary Rule of Chapter - I

① Short title, extent and commencement

* It may be called as air prevention and control of pollution act, 1981 :-

(i) Extends through out India

(ii) It shall come in to force after official gazette notification.

(iii) Central and state boards for the prevention and control of air pollution

* Central Pollution control boards

* It is constitutated under section 3 of water prevention and control of pollution Act, 1974 (60th)

* And given power and functions in order to prevent air pollution.

* State pollution control boards

* The states which are under the water prevention act 1974 the same board will also act as air pollution control boards, under sections. It has powers and function as per air pollution control act.

* Constitution of State boards

⇒ The state where the water act 1974 has not come in force or not constituted. State board for that will make a new state board immediately with power and function as for air prevention act.

* Central board will be formed as state board in union territories

* Powers and function of boards.

* Powers and function of board

* Functions of air pollution control board

(i) As per this act the main function of central board is to improve air quality and prevent or control air pollution in India.

(ii) It may advise the central govt. to maintain air quality.

(iii) It will plan national wide program for pollution control.

(iv) It will co-ordinate the different activity of state board and solve disputes.

(v) It will provide technical assistance and guidance in research to control air pollution.

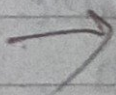
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- (vi) It performs other function to State board under SubSection 10 of Section 18.
- (vii) It will plan and organize the training of different function for control of air pollution.
- (viii) It will also organize different program in media for air pollution control.
- (ix) It will make the standards of air quality.
- (x) It may establish laboratory to check and develop air pollution.
- (xi) It may delegate or give away its power to any appointed committee.

→ function of state board :- (same as central air pollution control board)

* Prevention and control of air pollution

The air pollution control board it may declared different air pollution control area.

- Issue instruction for automobile emission control.
- It can control the activity of different industries.
- It can take air samples as and when required. analysis
- It can ~~analysis~~ the report can also make as take sample.



Penalty and Procedure

→ different penalty are available under Section "21" or Section "22" or Section "31 A"

→ (i) Generally who does not apply the air standard can be punished with imprisonment from 6 months upto 6 years
(ii) for additional disobey fine can be imposed upto 5000 ₹ per day.

(iii) If it continues for 1 year or more can be given additional imprisonment from 2 years to 7 years with or without fine.

(iv) The penalty are ~~imposed~~ generally give in following activity.

(i) Removes ~~Not~~ any notice or any structure of the board.

(ii) Resists any person acting under the direction of the board.

(iii) Whens to give any ~~not~~ information to the consult authorities.

(iv) Phase to give the data of air pollution ~~and~~ fcd the air quality limits.

(v) does not give any information or false information.

Penalty for Violating certain rule of the act:

In this case the penalty they vary from 3 months with 10,000 Rupees with other fines.

~~Power to amend the statute~~

Maintenance of registered

- Every state board must maintain state board about standard of ambition those agreed with standard of ambition etc.
- (ii) This register can be sent for inspection to authority and people as per rule.

Effect of other laws

There must be provision such that know to other laws will have any effect on it as per providence.

~~Water Pollution Central Govt.~~

Power of Central Govt. to make rule:-

- (i) It can make rules by consulting with central board and notification in official gadget.
- (ii) It interval period and place of different meeting of central Govt.
- (iii) The fees and allowances of central board member.
- (iv) The function to be perform by central board.
- (v) Impression of form for the annual budget of central board.
- (vi) The annual report of the central board along with accounts.
- (vii) All this rule must be passed in the two houses of central Govt. and both houses must give consent on it.

Power of State govt to make rule:-

- The terms and condition of service of different member of State board.
 - The manner of declaring different areas as air pollution control areas.
 - The manner in which air samples are to be connected.
 - The authority who will perform ~~tasks~~ ^{duties}.
 - The condition under which concerned ~~are~~ ^{are} appointed.
- The water prevention and control act 1970.

→ Water Pollution Committee work setup in 1962, then different sessions of ~~committee~~ ^{Council} member, local people held in 1965.

→ After long discussion it is placed in the parliament and passed by both ~~the~~ ^{house} with assent of the president on 23rd march 1974.

→ The bill name is the water (prevention and control of pollution act 1974) and 8th of 1974.

→ It was amended twice:-

(i) 44th of 1978 and (ii) 15th 38th of 1988

Water ^{Pollution} act definition

It is used for the prevention and control of water pollution with establishment and according of different ~~water~~ ^{water} pollution board with power distribution.

Preliminary :-

- ~~Short~~ title application and commencement.
- (i) This act may be control water.
 - (ii) It is applied to different state like assam, bihar, Gujarat etc. and also to the other states who will add this.
 - (iii) It will can be to the forced immediately in the above mention state, union. & territories and other state as per their resolution.

Powers and functions of board

- * function of central board $\leftarrow$ (same of the air)
- * function of state board $\leftarrow$ (assignment)
- * prevention and control of water pollution

Penalty and Procedure

- failure in obeying different directions under Subsection 20, 33 of Section 20, 32, 33 Subsection 2 or 33 'A' the following penalty are given:-

- (i) awareness and different rule may be penalised by imprisonment of 3 month with ₹ of 10,000 rupees or both.
- (ii) If the failure continues the $\text{₹} 5000$ implement per day for the violation of section 20.
- (iii) violation of section one year and ₹ or upto 6 years.
- (iii) If failure continues $\text{₹} 5000$ is implemented.

(iv) If failure continues for a one year may be imprisonment 2 years or year with 5.

→ Penalty of the following acts (same as write)

assignment

- Power of Central govt. to make Rule
- Power of State govt. to make rule

Public awareness

- ⇒ The environmental pollution, crisis all come from the different factors like Industrialisation, Population growth, urbanisation, lifestyle change etc.
- ⇒ different acts are made to control pollution but it can be only implemented by all the people including the govt. official, the public awareness mean to realise people about physical, social and aesthetic of environment.

Methods

- ⇒ The different method to protect and conserve environment are:-

(i) Through ~~mass~~ media:-

It include radio, TV, magazine different article, stories, football, debate, poster.

(ii) Through education, the children from lower school must be motivated from the environment, the students are the backbone of country.

(iii) Through rallies, orientation and training program it includes different awareness program

celebration of different work.

(iv) Through voluntary and NGOs they generally participate in musicaly program, footpath natak, different compition, awareness movements, different voluntary organisation are ~~created~~ so world wide found nature.

(v) The different NGOs are group under 3 catagories (i) special agencies with limited including scientist and profess-
-onal ex:- international council of scientific region.

(ii) Institute and centers which are used to collect information and concetation.

(vii) the artist member generally for environmental and wild life conservation of important works.

Assignment

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* function of central board on water pollution

- (i) As per this act the main function of central board is to improve water quality and prevent or control water pollution in India.
- (ii) It may advise the central govt. to maintain water quality.
- (iii) It will plan Nation wide Program for Pollution control.
- (iv) It will co-ordinate the different activity of state board and solve disputes.
- (v) It will provide technical assistance and guidance in research to control water pollution.
- (vi) It performs other function to state board under Subsection 10 of section 18.
- (vii) It will plan and organize the training of different function for control of water pollution.
- (viii) It will also organize different program in media for water pollution control.
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* Prevention and Control of water Pollution

The water pollution control board It may declared different water pollution control area.

⇒ Issue instruction for ~~water~~ ^{non water} pollution ~~sub~~ ^{ambition} control.

⇒ It can control the activity of different industries.

⇒ It can take water samples as and when required.

⇒ It can analysis the report can also make as take a 'appeals'.

* penalty of the following acts

⇒ different Penalty are available under Section 21 or Section 22 or Section 31 'A'.

⇒ Generally who does not apply the water Standard can be punished with Imprisonment from 6 months upto 6 years.

⇒ for additional dis obey fine can be imposed upto 5000₹ Per day.

⇒ If It continues for 1 year or more can be given additional Imprisonment from 2 years to 7 years without fine.

⇒ The Penalty are generally give in following activity.

(i) Removes NGOs any notice or any structure of the board.

(ii) Resists any person acting under the direction of the board.

(iii) Whens to give any information to the Consult authorities.

(iv) Phase to give the data of water Pollution & C.O.D the water quality limit.

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- ⇒ Impression of form for the annual budget of central board.
- ⇒ The annual report of the central board along with accounts.
- ⇒ ~~The~~ All this rule must be pass in the two houses of central govt. and both houses must give consent on it.

Power of State govt. to make rule:-

- ⇒ The terms and condition of service of different member of state board.
- ⇒ The manner of declaring different areas as ~~and~~ ^{water} Pollution control areas.
- ⇒ The manner in which ~~and~~ ^{water} samples are to be connected.

Human Population and Environment

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The world population reached 100 crore in 1804 and became 200 crore in 1927. Now it is around 800 crore. due to medical advancement the death rate has been declined upto 9 per 1000 around 1970. The Annual Growth rate is around 1.99 which was reduce to 1.4 during 2000.

⇒ 1804 = 100 Growth

1927 = 200 Growth

1999 = 800 Growth

1960 = 300 Growth

1974 = 400 Growth

1987 = 500 Growth (5 billion or 500 crore)

⇒ It is accepted that 1 will be which a billion around 2042.

⇒ The population growth will cause low food amount per person, less living space, lower physical quality of life more corruption, more deforestation.

⇒ ~~Variation~~ among nations (Developed and developing countries)

⇒ In 1750 The population is ^{Europe} growth 6.3 crore and increased upto 27.6 crore in 1850.

⇒ with development in medical technologies and reform in environmental condition.

⇒ The population increased upto 72 crore in 1999.

⇒ It is expected to decrease upto 70 crore in 2025.

⇒ North America population was 2 billion in 1750.

⇒ It is increased upto 30 crore in 1999

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⇒ Due to the immigration.

⇒ The population of Latin America and Caribbean islands became 60 million in 1750 and became 51.2 crore in 1999.

⇒ Around 1750 the population of Asia was 50.2 crore and increased upto 140 crore in 1950. The two Asian elephant are China and India added measures in world population. But the fastest population growth was found in Africa which was around 10.6 crore in 1750.

⇒ The growth rate are not uniform through out a world which is very less in Arabian countries and North America countries and higher in Africa, Latin America and South East Asia.

⇒ The fertility rate of India, Indonesia and Thailand is more.

⇒ For as South Korea and Singapore has lower fertility rate.

⇒ It is highest in African countries.

* Population growth in India :-

⇒ Around 1800 the population of India was 12 crore which increased upto 2001. 25.5 crore around 1871.

⇒ The modern population census was started in 1881 which such population around 26.7 crore.

⇒ The population census is generally held regularly in every 10 years.

- The population growth decreased in 1901 due to severe famine, monsoon failure and plague.
- Again in 1921 the population again decreased due to world war and influenza.
- The year 1921 is called as the year of Great divide because it separates the ERA of decreased population growth with the ERA of increasing population growth.
- This year such the growth in India population in rapid manner.
- due to increasing agriculture technique, medical facility, improve sanitation, transportation, there is sufficient growth of population in India.
- It is doubled from 1951 upto 1991 (84.6 million).
- India population became 1 billion 11th May 2000.
- The percentage of decadal growth has been reduced.
- India has 2.4 Percentage of land area with 16.7 Percentage of world population. Including growth rate of 1.93 (2001).
- Uttar Pradesh is having more population of 16.6 crore of India (greater than population of Pakistan (6th population country)).
- Bihar and Maharashtra 2nd and 3rd population state.

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- half of India population are in 5 states (U.P., Maharashtra, Bihar, West Bengal, Andhra Pradesh)

⇒ Andhra Pradesh decrease in Annual Growth rate 2.2 to 1.3.

Population Explosion

⇒ Growth rate = $\frac{\text{No. of birth (b)} - \text{no. of death (d)}}{(n)}$

Average Population in time intervals.

⇒ It means several growth of population.

⇒ It depends upon growth rate.

⇒ It is having more no. of births with less no. of deaths, due to higher medical facility.

⇒ The population growth is the growth which happens generally in exponential growth.

⇒ The Explosion follows by Population Crash which means decreasing population due to unfavorable condition.

⇒ As per economist Malthus when the resources increase by 1, 2, 3, 4, ... times then the population increases 2, 4, 6, 8, ... times

⇒ The population growth in India was much more than twice the growth rate of world is 2.2% and it is increase around 9.2 crore in year (Population of ~~max~~ ~~max~~ max)

⇒ The resources like land, water, fuel, minerals ~~not~~ ~~are~~ etc. are limited.

different regions high growth rate countries are lower marriage, importance to ~~main~~^{main} child, religious believe, increasing life span due to medicine.

initially it is named as national family planning programme which is change into National family welfare programme 1977.

⇒ In 1952 India, the first country in the world started family planning programme.

⇒ During the 3rd 5 year plan (1961-66) the family planning declared as centre of planned development.

⇒ After that the importance of clinical approach was shifted into about educational approach.

⇒ a separate family planning ^{dept.} was created in 1966, 1976 national population policy was friend.

⇒ In 1977 it was renamed as family welfare programme and family planning became voluntary.

⇒ the health care which is the main important factor started formulation of wide spread national ~~planning~~^{family} welfare programme in 1982.

Importance of family welfare program

- (1) It is required for social, Economical development.
- (2) It is needed to reduce the Population growth as for land area.
- (3) It also helps in achieving the birth rate.
- (4) It helps in people to know the advantages of small family.
- (5) It is 100% centrally sponsored.

Organizational set up. (1) Center level

(1) central level :- our prime minister heads the central cabinet sub-Committee the next family is population advisor Council headed by union minister of health and family welfare.

(2) It has members of diff. technical persons and professional persons. the third level is central family welfare Council headed by the union minister and ministers for health and family welfare of diff. state.

(3) The national institute of health and family welfare is the main institute for research directorate general of health services is the head officer for diff. programs.

(2) State level

* The Council state minister is the top level for the state.

* The state family welfare below organize diff. programs at state level. It has 3 wings :-

- (1) Administrative wings
- (2) Education and Information wings

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(3) ~~field~~ operation and evaluation wings.

(3) District level

The district level has also 3 wings like State level :-

- (1) Administrative
- (2) Education and Information
- (3) field operation and evaluation

(4) Periferreal level

* It is generally managed by rural family welfare center attached with primary health center

* In Urban area urban family welfare center are available

(5) Village level

* The MPWA (Multi Purpose health assistance) both male and female mainly assist in the program with the help of anganwadi workers.

Goals of National Population Policy

- (1) Birth rate must be around 2.1 or 2
- (2) Death rate is 9 per 1000 family size must be within 2.3
- (3) Decrease IMR (infant mortality Rate) must be around 60 per 1000

Program strategies or method

- (1) Integrated approach :- It included the increase of marriages, increase in ~~min~~ female literacy, empowering woman etc.
- (2) Life ~~radia~~ approach : It is voluntary and works of motivation and education.

(3) Wellfair approach

It shows the diff. facility giving for family wellfare.

(4) It provides the maximum supports for the needed person.

Environment and human health

* Environment is the combination of living and nonliving things available around us.

* The environment has 4 components for betterment of our health:-

① Physical environment:- These include all the non-living things and forces or energy present around us.

EX:- Air, water, temp., pressure, lighting, dark radiation, noise, vibration, waste.

② Biological environment:-

It includes all living things around us. EX:- animals, plants, microbes, human.

③ Social environment:-

It is the activities related to society like wear of leaving, utilization of health service.

④ Cultural environment:-

It involves diff. culture like knowledge, belief, practice, customs etc.

* environmental sanitation according to the (WHO) is the control of environment which gives negative effect for development and health.

* The dictionary meaning of science to

Human rides religious and philosophical movement (early Political, of king John rides start)

⇒ The human rights started from the area of king John of England as he Voleted the anciantians and customs. So he is forced to sign the write by his subordinates know as magna carta. It provided freedom to all Citizens about property takes, Personal belive a sound life. north america became independent from british ampar by telling about their freedom in 1789 the Franch evolution made peoples govt in france. ~~henry~~ ~~and~~ ~~henry~~ david, firstly used the term human right in his book civil disobedience. It influence about mahatma gandhi and nonviolence.

non-violence resistance Russia also in
the end of 19 Century for the role of moral
America also demolish the slavery system
in its country during that period in Euro-
-Pean countries the labour unions demanded
good working condition 48 hour work in a
week prevention of child labour etc.
The same was also seen in

The woman also subsidised grafting their white to bhoot, many countries mainly India, freedom to the british for mahatma gandhi in 1961 a group of lawyers, writers, journalist burn a group named as appeal for amnesty against the imprisonment of 20 years of 2% college students for

raising their glasses about freedom. This appeal also includes 6 other persons who are imprisoned due to their peaceful protest. The modern human rights movement is also guided by these principals. The persons who are involved increase groups in future modified their work to be more cases. It has made different wings for the actual investigation of diff cases. The Amnesty organization works for the fair trial of the beginners then in 1978 Helsinki was group was created. It generally helps about the human rights violation in Russia during that period around 1970 diff. human rights movement started.

The United Nations made the permanent observer status as ~~NGO~~ NGO in 1977. It got Nobel Peace Prize ~~spool~~ certain group called in as organization of Sobhate KGB. While Sobhate clamp it to be controlled by VSCIA Stal. It is the foundation for human rights movement through out the world.

Practice

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2 mark

* deforestation effect

- (i) Soil erosion
- (ii) Drought
- (iii) Lack of water.

* Renewable

These resources are renewed by nature in short time

Ex:- Solar energy, wind energy etc.

non-renewable

These resources are do not renewed by nature ^{very} take in long time to form again.

Ex:- fossil, oil, coal etc.

* Types of biodiversity:-

- (i) Species biodiversity
- (ii) Genetic biodiversity
- (iii) Ecosystem biodiversity.

* Ozone layer deflection:-

It is defined as a thinning of ozone layer in a upper atmosphere caused due to use of chemical compound, gaseous compound from industries or other human activity.

* Two causes of air pollution in urban areas.

- (i) motor vehicles
- (ii) industries activities.

* Endangered species:-

[Rhinos]

Animal whose numbers are reduce to a level of that they might face extinction.

Ex:- Bengal Tiger, Kangaroo, wild buffalo, Blue whale etc.

* 3 'R's' in waste management:-

3 R:- Reduce, Reuse, and Recycle.

- * Various objectives of family welfare programme
- (i) family planning information.
 - (ii) services to women for healthy reproduction.

* Natural resources :-

Natural resources are the raw material or source of energy we use.

Ex:- Soil, air, water, wood, metal etc.

* Example of non-renewable resource :-

⇒ Coal

⇒ Natural oil.

⇒ Natural gas

* Soil erosion :-

It is defined as the movement of soil particles from the point of origination through wind, water and human activity.

* Producers in ecosystem :-

⇒ Producers in ecosystem that can produce their own food. They usually include green plants.

⇒ It uses to make food by the process of photosynthesis.

* Biodiversity :-

Biodiversity is the number of total variations of available forms in our world.

Ex:- Plants, animals and micro organisms.

* Poaching of wild life :-

⇒ The illegal killing of prohibited wild animals is known as poaching of wild life.

It is done to earn illegal money through sale of tusks, horns, furs etc.

* Unit of sound intensity :-

⇒ decibel (db)

* greenhouse effect.

→ It is a way in which heat is trapped close to earth's surface by greenhouse gases.

acid rain.

(17) When the sulphur dioxide and nitrogen oxides are reacted with rain water and form acid rain or falling the ground.

EX:- acid rain with react with marble like Taj Mahal which their colour are washed by the rain.

(18) Genetics :-

① It is defined as a branch of biology which study of genes and heredity.

→ Father of Genetics are Gregor Mendel.

Species :-

Species is defined as a group of living organisms which similar individual exchanging genes that may interbreeding and produce offspring.

Example :- horse and donkey are capable to mating on one organism called a mule.

(19) environment :-

It is the sum of all social, economical, physical and chemical factors which the surrounding living or non living organism.

(20) Mortality :-

A mortality rate is a measure of the number of death in a particular population per unit of time.

EX:- all animals or humans will die.

(19) ~~25~~ Environment :- It can be defined as a sum of the total living and non living elements and their effects that human life,
ex:- animals, plants, water, land, air etc.

(21) Sustainable development :-
It is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

(22) Water Pollution :-
All forms of pollution which contamination of source ^{of water} to pollute. ~~It~~ is known as water pollution.

⇒ In this water ~~is~~ unusable for drinking, cooking, swimming etc.
⇒ In this water ^{pollutants} include chemicals, bacteria, mould and parasites.

(23) Deforestation :-

⇒ when the forest are destroyed by cutting trees and not replanting them.

(24) decomposers :-

Decomposers breakdown the dead organics material of plant and animals for their food.

(25) hot spots :-

Biodiversity hotspot is a region with a high level of biological diversity include the endemic species.

(26) ecosystem

⇒ All the plants and animals in a particular area considered together with their surroundings.

ex:- Pond, forest, desert ecosystem etc.

(27) Psychological effect of noise pollution :-

- ⇒ Depression
- ⇒ High blood pressure
- ⇒ Heart disease

(28)

- Major reasons
- ⇒ Increased birth rate
 - ⇒ Poverty
 - ⇒ Reduce mortality

(29)

Solid waste management

It is the process of collecting, transporting and disposing ~~the~~ of solid waste.

- ⇒ It is no longer useful.

(30)

Drought :-

A drought is an event of prolonged ~~shortage~~ shortages in the water supply.

(31)

Renewables Energy Resources

When natural resources are renewed and can be used to generate energy.

Ex:- Solar, wind, hydroelectric etc.

(32)

Energy flow in ecosystem :-

- ⇒ flow of energy in an ecosystem takes place through a food chain.
- ⇒ Energy flow unidirectional (one way flow) which moves cyclic manner.

(33) energy cropping :-

When the crops are grown slowly for energy production, not for food. It is low cost maintenance.

- ⇒ The crops are processed into solid, liquid and gaseous fuels. ~~more~~ generate power and heat.

5 mark

Environmental effects of mining :-

1. (i) Air Pollution :-

Unrefined materials are released when mineral deposits are exposed on the surface through mining.

(ii) Water Pollution :-

mining also caused water pollution, which includes contamination of metal ~~comp~~ chemical ~~comp~~ compounds etc. which are unusable for drinking, swimming, fishing and other activities.

(iii) damage to land :-

It causes erosion, sinkhole and loss of land in mining.

(iv) Loss of biodiversity :-

mining can destroy the diversity of flora and fauna of landscape and endemic species.

(v) Long term ill effect :-

mining can have long term ill effects on the environment including water quality, land use, and biodiversity lost permanently.

2) What are the effects of acid rain.

When the sulfur dioxide and nitrogen oxide are react with rain water and form the chemical sulfuric acid and nitric acid which fall on ~~earth~~ ground is known as acid rain.

Effects :-

- (1) Health Problem.
 - ⇒ Respiratory disease
 - ⇒ ~~to~~ Lungs Problem.
 - ⇒ Harmful effect on Plant, aquatic animal etc.

(3) Rain water harvesting :-

- method by which collecting the rainwater for future usage.
- ⇒ It is use different in different way or directly use recharge purpose.
 - ⇒ It can be used for crop harvesting, gardening, toilet etc.
 - ⇒ It helps in reducing the water supply bills.
 - ⇒ It may reduce the stress of public water supply sources.
 - ⇒ It may be practice from Ancient (4000 years) times.
 - ⇒ It has been apply for drinking water, water for live stock.

Advantages :-

- ⇒ cost effect
- ⇒ conserves water
- ⇒ It reduces soil erosion.
- ⇒ Simple method use.

disadvantages

- ⇒ Initial highest
- ⇒ Regular maintenance
- ⇒ Unpredictable rainfall

(4)

Bio-gas Plant :-

⇒ A biogas plant is a facility that produces biogas a renewable fuel, from organic waste.

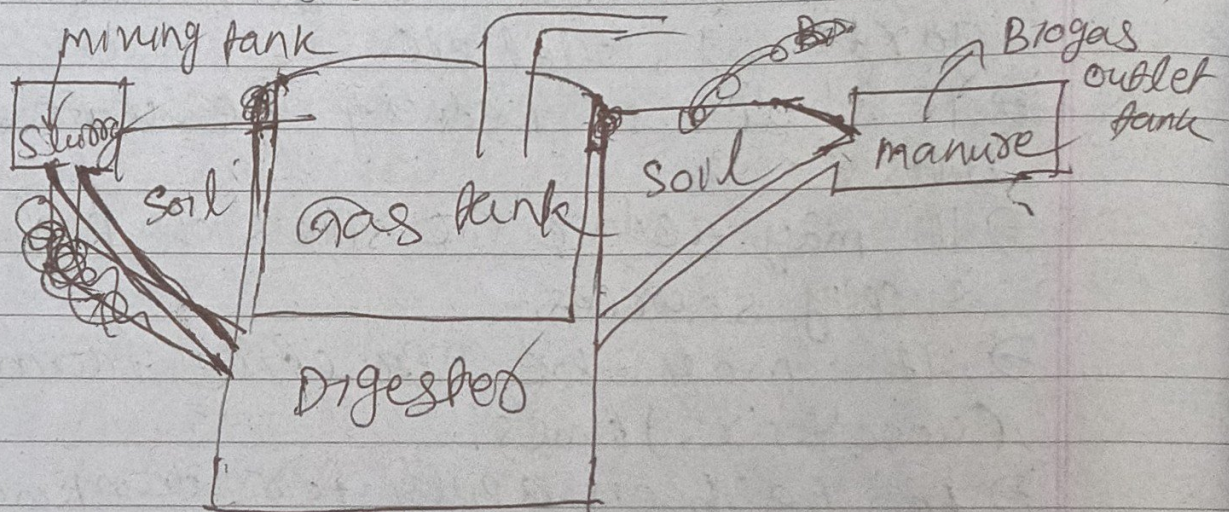
⇒ In this plant can be used to generate electricity, heat and cooking purpose.

⇒ a biogas are production for digestion tank.

⇒ In this biogas plants are ~~effect of~~ ^{significantly} green house effect

⇒ Biogas is produced by decomposition of organic matter

⇒ It consists of a dome like structure



(5)

Modern agriculture effect

⇒ ~~Hydroponics~~

⇒ It's ~~other name is~~

⇒ It's also known as industrialized agriculture.

⇒ modern agriculture make use of Hybrid seeds, fertilizers and pesticides etc.

Effect

⇒ Excess use of chemical fertilizers like Phosphorus, Nitrogen, Potassium in cornfield causes micronutrients imbalance.

~~Water Pollution~~

- Excess Nitrogen fertilizers applied in field which contaminate the ground water.
- This water as drinking so the lead to fetal condition in new born baby.
- Stomach Problem
- Loss of fertility of soil
- Risk of cancer. ~~on pesticide~~

(6) Food Chain :-

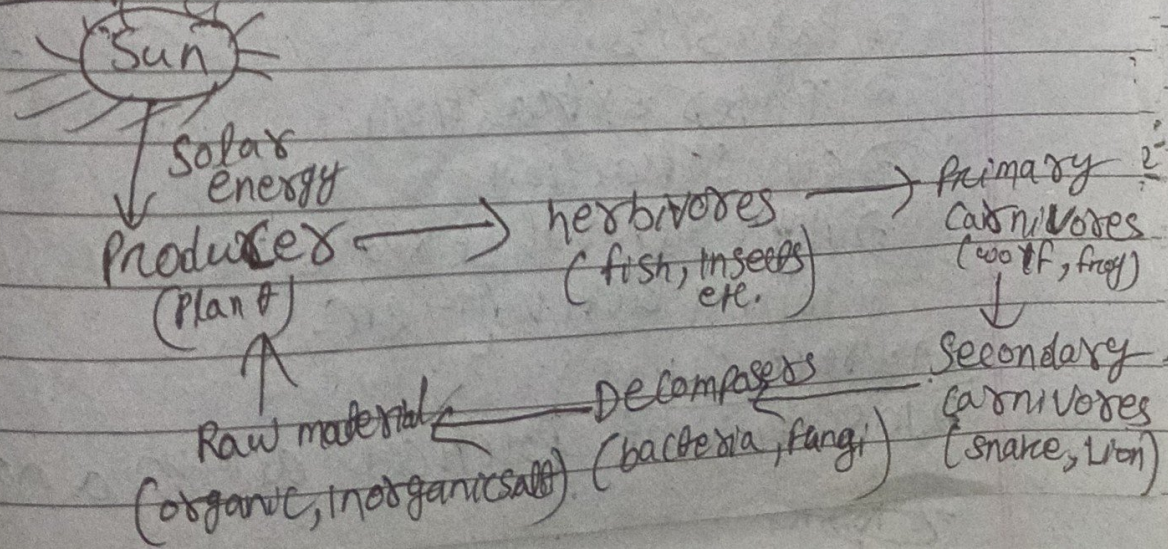
Food chain is the flow of energy from one trophic level to another trophic level by eating and being eaten.

- In the energy transfer from Producer to herbivores to omnivores to carnivores ~~to decomposers~~.

~~Plant~~ → grass → goat → man

- Food chain starts from producer and end from carnivores through herbivores.

- ~~Decomposers~~ → Detritivores are decomposers break down the dead organic matter in feeding, ~~and~~ which meet their energy and nutrient requirement.

Example

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(7) needs of Public awareness towards environment.

→ The public awareness needs to be created. Both media and electronic device can strongly influence public opinion.

→ politicians should respond positively to a strong public support in activity.

→ Environment is an integration of both living and non living organisms.

→ Can not pollute air, water, soil.

→ don't cut tree and replant them.

→ supporting the minerals, wild life, grassland etc. of the all life.

→ human activities are cause factors for environmental degradation.

→ so each one of us need to feel responsible to protect the environment.

(8) causes of deforestation :-

→ It is caused by either be direct and indirect.

direct causes :-

→ floods

→ fires

~~→ Human activities~~ → cyclone

→ Parasites.

→ Timber extraction

→ oil extraction

→ Agricultural expansion

→ mining activity etc.

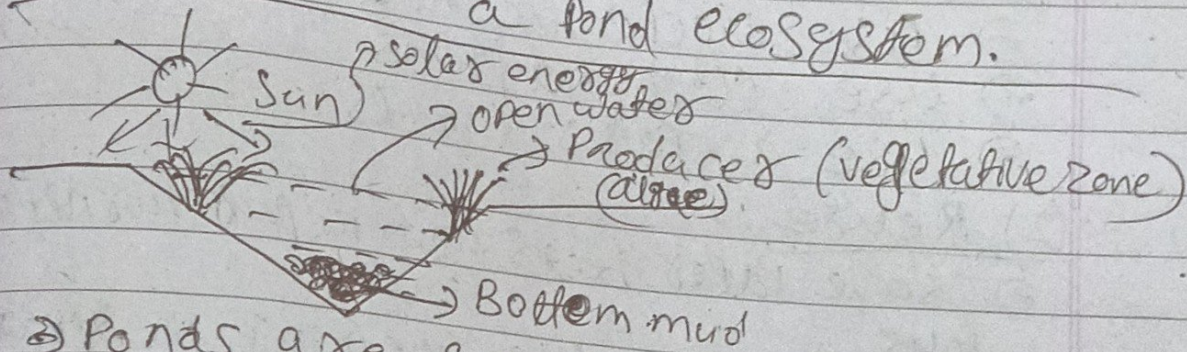
Indirect causes

→ Insufficient political action and govt. failure

- Corruption
- climate change
- cause by population growth ^{with}

~~St~~

Structure of a pond ecosystem.



- Ponds are small body of freshwater
- Pond ecosystem is divided 4 zone

- (i) Vegetative zone
- (ii) open water zone
- (iii) Bottom mud zone
- (iv) free surface water zone

- water is stationary of pond
- food webs are based both algae and aquatic plant.

- aquatic plant in producers in pond ecosystem
- aquatic plant collect solar energy from the sun
prepare their food by photosynthesis.

- The primary consumers are small insects whose depend on aquatic plant for their food.

- small fish are eat small insect and algae

- frog and big fishes are eat small fishes

- Snake are eat small frog and fishes.

- The energy flow in one trophic level to another trophic level by forming food chain.

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 (10) 3.R in Controlling environmental Pollution.

3.R = Reduce, Reuse and Recycle

(1) Reduce :-

- Avoid foil, Paper and Plastic, cups
- napkins, lighters.
- Use electronic mail
- Use cloth napkins
- Use a Paper towels

(2) Reuse :-

- save Paper bags and repair furnitures and toys.
- use a ceramic coffee mug in stead of Paper cups.
- Reuse grocery bags
- Sell old clothes, appliances, toys and furniture in garage sales.

(3) Recycle :-

- Buy products made from recycle material.
- collected the recycling in buy products.
- use recycled Paper for Coffee Paper and news letter.

(11) Global warming and effects :-

It means Surface temp. change then climate change also.

→ when the increased CO_2 in the atmosphere then ~~the~~ temp. are increased.

~~so~~ effect

- Increase in Pest, Insect Population.
- Sea level is raising.
- Risk

- Risk of flood
- Ecosystem will change

(b) Individual in controlling Pollution of ^{new} _{causes} environment

- (i) Use CFC Refrigerator.
- (ii) Reduce deforestation.
- (iii) Avoid Polythene.
- (iv) Use Family Planning.
- (v) Save electricity.
- (vi) Use natural gases than coal.
- (vii) Clean properly to the drains.
- (viii) Avoid noise producing activity.

13] Ex Situ

→ Ex-Situ Conservation of ^{species outside} ~~preserving wild life~~ through their ~~preservation~~ natural habitats

→ The endangered species are protected, ~~from~~ ^{not} ~~are~~ These are artificially developed habitats known as botanical garden for plants and zoological park or zoo for animals

→ EX! - zoo, seed banks

In-Situ

→ In-Situ conservation of ^{species} ~~preserving wild life~~ through their natural habitats

→ The endangered species are protected from predators.

→ These are the natural habitats for wild life.

EX! - Sunderbans, Simlipal, Nilgiris etc.

PTO →

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(14) Precautionary measures should be taken during earthquake:-

- ⇒ Do not use elevators during an earthquake.
- ⇒ Turn off heating elements immediately.
- ⇒ Turn off gas, electricity etc.
- ⇒ Keep phone lines clear for emergency use.
- ⇒ Avoid broken glass
- ⇒ Try to go away to an open area
- ⇒ If driving stop quickly.
- ⇒ Don't enter the building whose visible cracks in the walls.

(15) Global warming causes

- (i) Deforestation
- (ii) Gas produces CO_2 and NO
- (iii) Increasing live stock farming
- (iv) Fertilisers containing nitrogen produce nitrous oxide emissions.

to mark

- ① Solid waste management :-
- ⇒ The collecting, transporting and disposing the solid waste material.
 - ⇒ It is no longer useful.
 - ⇒ Once collected municipal solid waste may be ordered to reduce the total volume and weight of material that require final disposal.
 - ⇒ It make ~~the~~ changes easy to handle.
 - ⇒ It recover certain materials, as well as heat energy for recycling or reuse.
- Municipal solid wastes :-
- ⇒ Solid wastes from home, office, hospital, hotels, schools etc.
 - ⇒ Industrial solid waste
 - ⇒ mining solid waste
 - ⇒ electronic waste
 - ⇒ fertilizer
 - ⇒ Pesticides.

Type of solid waste management

- ⇒ Solid waste open burning.
- ⇒ Sea dumping process
- ⇒ Composting process
- ⇒ Disposal by hog feeding
- ⇒ Solid waste sanitary land fills.

Principles of solid waste management :-

- ⇒ Recycling ②
- ⇒ waste minimisation ①
- ⇒ waste processing ③
- ⇒ waste transformation ④
- ⇒ Disposal on land ⑤

(2) Describe the aquatic ecosystem?

Ans:- An aquatic ecosystem includes fresh water habitats like lakes, ponds, rivers and oceans and streams.

⇒ The aquatic ecosystem is the habitat for water living species including animals, plants and microbes.

⇒ It is a water based environment where in living organisms with both physical and chemical features of the environment.

⇒ Water plays a significant role in the aquatic ecosystem.

⇒ The ~~phy~~ physico-chemical features that reflect the water bodies quality.

⇒ The physico-chemical characteristics of an aquatic ecosystem determines its functions and how long it can support life form.

⇒ The many physico-chemical properties of determines its quality.

⇒ In this environment, they serve as a trophic level and a source of energy.

⇒ Fish has a significant ecological role in the whole food web at the trophic level.

features

⇒ Fresh water or salt water can be used to make them.

⇒ They serve as a home for a variety of aquatic animal.

⇒ They have a lot of biological diversity which makes them the most productive and wealthiest ecosystem on the planet.

→ The ~~most~~ majority of the vegetation is made up of algae.

(3) Noise Pollution :-

Ans:- Noise pollution is defined as regular exposure to elevated sound levels that effects in human beings or other living organisms.

Effects :-

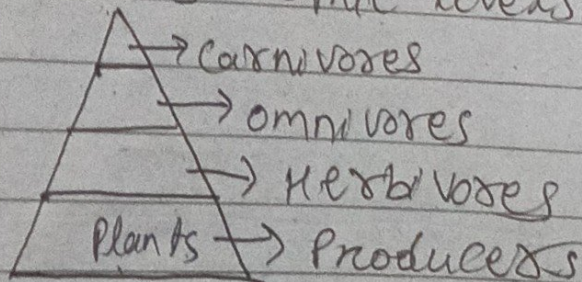
- (i) It raises blood pressure and pulse rates.
- (ii) Cause of irritation.
- (iii) It breaks sleeping at night.
- (iv) Cause of mental fatigue.

Control

- (i) Use ear plugs to restrict heavy sound.
- (ii) Lower the volume.
- (iii) Go green by planting trees.
- (iv) Control noise level.
- (v) Stay away from the noisy area.

(4) Pyramid of energy :-

→ Pyramid of energy starts from producers and end carnivores through the various trophic levels.



Herbivores = Grass eating animal.

omnivores → Taking both green and meat

carnivores → Taking meat.

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⇒ Carnivore is the highest level in the pyramid. Carnivores will eat the omnivores. Omnivores will eat the herbivores. Herbivores will collect their food from the producers. The producers will prepare their food by collecting the solar energy from sun.

(b) Green house effect

⇒ It is produce increased CO_2 is mixed with air.
⇒ ~~the~~ When the heat trapped from closed the ^{earth} surface by causes green house gases.

Causes :-

- (i) Deforestation
- (ii) Farming used Nitrous oxide
- (iii) Industrial waste
- (iv) Burning of fossil fuel.

Effect

- (i) Global warming
- (ii) Depletion of ozone layer
- (iii) Smoke and air pollution.
- (iv) Acidification of water bodies.