CH-1 THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES :-

Introduction:-

8 Mark

* Environment :-

→ The word environment is derive from the French word "environ" meaning "Surrounding" Each and everything around us is called as environment.

→ Environment can be defined as "all the social, economical, physical or chemical factors that surround man" or "abiotic and biotic components around a man - all living and non-living things around man".

Environmental Science :-

→ Environmental Science is the study of nature and the facts about environment.

→ Environmental Science is the study of the environment, it's biotic and abiotic components and their inter-relationships.

Environmental Studies or Environmental Education :-

→ Environmental Studies are the process of educating the people for preserving quality environment.

→ The principle of environmental education are :-

(i) Examine the major environmental issues.

(ii) Discover the root cause

(iii) Develop problem solving skills

(iv) Promote co-operation in solving problems

Types of environment :-

Environment can be divided into catagories.

(i) Natural Environment

(ii) Man-made Environment

Natural environment :-

→ Natural environment is characterised by natural components. All biotic (living) and abiotic (Non-living) components are created through a natural process creation of these biotic and abiotic components do not required any human support.

Ex :- Soil, water, air, trees, radiation etc.

Man-made environment :-

→ Man is the most powerful environmental agent. He modifies the environment using modern technologies, according to his needs to a great extent. Thus, the man-made environment is created by man.

Ex :- House, Road, Schools, Railway lines, Parks etc.

Components of the environment :-

→ The environment consists of the following three important components.

(i) Abiotic (non-living) Components
(ii) Biotic (living) components
(iii) Energy components.

(i) Abiotic or (non-living) components :-

→ The non-living components of the environments are called abiotic components.

Ex :- Air, water, soil, minerals.

→ The abiotic components enter the body of living Organisms directly or indirectly, take part in metabolic activities and then returns to the environment.

→ Abiotic components are sub-divided into three categories
(i) Atmosphere
(ii) Lithosphere
(iii) Hydrosphere

① Atmosphere :-

→ The cover of air, that envelops the earth is known as the atmosphere. The atmosphere extents upto 1600km from the earth surface.

→ The atmosphere is essential for all living organisms. It compaises 78% of Nitrogen, 21% of Oxygen and 1% of other gases.

Structure of atmosphere :-

Atmosphere consists of following five concentric layers :-

① Troposphere :- (0-18km)

It is the lower portion of the atmosphere and extends from 0-18km. It contains 75% of the atmospheric air mass. The temperature of troposphere changes from 15°c to 56°c and chemical constituents are O_2, CO_2, N_2 and water (clouds).

② Stratosphere :- (18-50km)

→ It lies above the troposphere and extents from 18 to 50km. The temperature of which changes from -2°c to 56°c and the main chemical constituents is ozone.

③ Mesosphere :- (50-85km)

It lies above the stratosphere and extents from (50-85km). The temperature of which drops to about -95°c. The main chemical constituents are N_2, O_2^+ and No^+.

(4) Thermosphere / Ionosphere :-

It lies above the mesosphere and extends upto 50km above the earth surface. The temperature of which raises upto 1200°c.

It contents the charged particles like O_2^+, O^+ and No etc.

(c) Exosphere :-

It is the upper most layer of the atmosphere and extents upto 1600km. The temperature of which is very high due to direct solar radiation. The chemical constituents are only H_2 and He

Functions of atmosphere :-

It maintains the heat balance on the earth by absorving the infrared radiation.

→ The gaseous constituents play an Important role in sustaining like on earth.

(i) Lithosphere :-

The soil and rock components of the earth is called Lithosphere.

Functions of Lithosphere :-

→ It is a home for human beings and wild life.

→ It is a store house of minerals and organic matters

Hydrosphere :-

The aqueous envelop of the earth (i.e 75% of the earth surface) is called hydrosphere. Oceans, lakes, streams, rivers and water vapour constitude hydrosphere. About 97% of earth water in Oceans, which is too salty and not fit for drinking. Only 3% is available as fresh water.

Functions of hydrosphere :-

It is used for drinking purpose and also supports the aquatic life.

It is also used for irrigation, power production, industries and transport.

Biotic or living components :-

The living components of the environment are called biotic components.

Ex :- Animals, Plants and Micro Organisms

Biosphere :-

→ The biological environment where the living organisms lives and interact with physical environments (Soil, Water and Air) is called biosphere.

Functions of Biosphere :-

Plants through photosynthesis produce oxygen in the atmosphere. Animal in hell oxygen during respiration and give out carbon dioxide which is again utilise by plants during photosynthesis.

(iv) Energy components :-

→ The components of energy flows across biotic and abiotic components, which play an important role to maintain the life of living organisms

Ex :- Solar energy, Wind energy, Nuclear energy, thermoelectrical energy etc.

Scope of environmental studies :-

→ Environments studies is an important tobe to educate the people for preserving quality environment.

→ The main scope of environmental studies include :-

(i) To get an awareness and sensitivity to the total environment and it's related problems.

(ii) To motivate the active participation in environmental protection and improvement.

(iii) To develop skills for identifing and solving environmental problems.

(iv) To know the necessity of the conservation of natural resources.

(v) To evaluate environmental programs in terms of social, economical, ecological and aesthetic factors.

Importance or significance of environmental studies :-

→ The air we breathe, the water we drink, the food we consume and the land we live on are all contaminated by the industrial activities.

→ There is no zero pollution industry. Because of the lack of self discipline we are warning about our own future generation, the valuable resources are polluted.

To solve the above problems, the knowledge of environmental studies is very important.

(i) By environmental studies, people will understand the concept of "need of development without distruction of environment."

(ii) Through environmental studies, people can gain the knowledge of different types of environment and the effects of different environmental hazards.

(iii) Environmental studies have a direct relation to the quality of life we live (need)

(iv) Environmental studies develop a concern and respect for the environment

Need for public awareness :-

→ Increasing population, urbanisation and poverty have generated pressure on the natural resources and lead to a (degradation) of the environment.

→ To protect & prevent the environments from the population, supreme court has ordered and directed the environmental awarness to the public through government and non-government agencies to take part

to protect our environment.

Importance of public participation :-

→ Environmental pollution can not be removed by the laws alone. The proper implementation and especially the public participation are the important aspects which should be given importance and stress.

→ The public participation is useful in law making process and controlling the pollution activities. Thus the public participation plays a major role in the effective environmental management.

Types of public participation :-

Public participation in the decision making process can be at any stage and it various forms :-

(i) Pressure group :-

The public "Pressure group" may be formed to influence the government on the hand and the industry on the other hand.

(ii) Watch dog :-

The public can act as "watch dog" to protect the interests of public against environmental hazardous activities.

(iii) Advisory council :-

The public can also act as "advisory council" and agencies, which it constitute to keep the environment suitable for living.

(iv) Enforcing the environmental laws :-

The services of public can be utilised to enforce the environmental laws. If necessary, the member of public should conduct public interest litigations.

Thus many countries have accepted the concept of public participation in environmental management.

Environment :-

- The word 'environment' is derived from the French word 'environner' means "to encircle or surround".
- Environment is the sum of any local, economical, biological physical or chemical factors which constitute the surrounding of men / living organism, who is both creator and moulder of this environment.

Components of Environment :-

- Atmosphere.
- Hydrosphere.
- Lithosphere.
- Biosphere.

Natural Resources :-

- Thing or aspects of the nature that can be put to some use by human being for their growth from development, comfort & other necessity are caused as natural resources.
- ex :- air, water, soil, forest, animals, minerals, metal, energy etc.

Types of natural resources :-

It is divided into two types -

i) Exhaustible.

ii) Inexhaustible.

Exhaustible :-

-> " natural resources are Soil, forest, water, coal, mineral these are consume continuous use throw Continuous use on misuse, ~~it is~~

-> ~~these~~ e.on are divided into two types.

a) Renewable n.r.
b) Non- Renewable n.r.

Inexhaustible :-

-> The " n.r which Can't be ~~exausted~~ exhaust throw continuous use on miss use.
ex. Air and Sunlight etc.

Natural Resources
- Exhaustible
  - Renewable (e.g. soil, water, forest etc).
  - Non Renewable. (e.g. mineral, petrol, coal etc)
- Inexhaustible. (e.g. Air, Sunlight).

Renewable Natural Resources :-

The natural resources which are consumed / exhausted / depleted throw Continuous use and can be recovered by very hard efforts taken of for long period are Called this.
(e.g. soil, forest, ground water, oxygen in air is replenished throw photosynthesis)

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Non-Renewable Resources :-

→ " " are not repensible
→ we can't get back our Coal & Petroleum
resolves to our life time.
→ Coal, Petroleum & natural gas are called
as fossil fuel because they are formed fr
dead remains of plant and animals
burried in the earth long time ago.

Renewable Resources

1) The natural resources which are consumed / exhausted / depleted through continuous use and can be renewed by very hard efforts taken up for long periods are called renewable resources.

2) Eg: Soil, forest, ground water, oxygen in air is replaced through photosynthesis.

Non-Renewable Resources

1) Non-renewable resources are not replenishable or we can not get back our coal and petroleum reserve in our life time.

2) Coal, petroleum and natural gas are called as "FOSSIL FUELS" because they are formed from dead remains of plants and animals buried in the earth long long ago.

Forest Resources :-

-> The resources that we get form the forest like timmber, oxygen, medicines etc are known as forest resources.

~~Photosynthesis is the process.~~

-> From green plant & trees we get oxygen by the processes of photosynthesis. In this process the green plant having chlorophyll absorb Sunlight from the atmosphere and process their food in which they produce and the release bulk oxygen as the by product in to the atmosphere.

~~Problems~~

1) Evergreen.
2) Deciduous.
3) Coniferous.

Evergreen:-
These forest are generally found in equatorial region. Where temp & rainfall are very high. They received heavy rainfall throughout the year. There fore the forest are known as evergreen forest.
e.g. Teak, mogani, rose wood etc.

Deciduous :-
These forest are divided into two types,
i) Typical deciduous.
ii) Temperate deciduous.

Typical Deciduous:-
These forest are generally found in typical monsoon as these " " received only seasonal rainfall they shade their leaves in the summer season.

Temperate Deciduous:-
Due to severe winter cold heavy snowfall they shade their leaves in winter.

Coniferous :-
The Snow slides down from the sloping side of the trees. The needle like leaves possess the waterproof.

Use of benefit of forest:-

-> Forest supply wood which is used as fuel.

-> " " " for various industries which use as raw material such as paper timber etc.

-> Many plant are used in preparing medicine & drugs.

-> Forest produce variety of animal product such as animal product such as honey, ivory, etc.

-> Many forest rent are used for growing grazing for animals, for damps etc.

Over Exploitation:-

Due to over population the material supply by the forest are food, medicine, shelter, wood & fuel are not sufficient to need the people demand. Hence exploitation of forest material is going on increasing day by day.

Causes of Over Exploitation:-

Over exploitation of forest wealth in developing countries occur in the following ways increasing agricultural production, industrial activities,

" in demand of wood

"

resources.

Effect On Consequences Of Over Exploitation:-

-> Over exploitation of forest resources leads to migration of farmers.

-> Environmental damage is caused by over exploitation is heavy.

-> Tropical forest is destroyed in very fast rate.

-> Countless plant species & animals are endangered.

-> The dumping of waste on land water and air is a serious problem.

Deforestation:-

-> It is the removal of forest. Forest areas into unnatural on manmade activities.

Causes of deforestation:-

-> Developmental projects causes deforestation in two ways

i) Submergence of forest area: (e.g. dam)

ii) Destruction " " " (e.g. construction)

-> Mining operations (e.g. gold, iron, coal)

-> Raw material for industries:-

~> Dt. 17/01/2021

~> Rural India & other countries population is dependent on the forest for wood as they used as it fuel requirement.

~> Shifting cultivation the replacement of natural forest ecosystem for more specific for the tree plantation can lead to decrease in no. of plants and animals species.

Forest Fire :-

-> It is one of the major cause of de-forestation due to human interaction & rise in temp in the forest fire takes place.

Concept

Consequences or Impact of deforestation :-

1) Global warming.
2) Rise in Sea level.
3) Ozone layer depression.
4) Soil erosion.
5) Land slides.

Case study :-

Dams And Effects of Forest ~~An Urban~~ Tribal Based People :-

-> Dams are the major artificial structure build across the rivers to create a reservoirs. In order to store water for many beneficial purpose. However these dams are also responsible for the destruction of vast areas of forest & despite event of local people

Effects of Dams on Forests :-

i) Thousands of hectares of forests have been cleared for executing river valley project.

ii) In addition to dam construction the forest is also clear for residential accomdation, office building, laying roads etc.

iii) Hydroelectric projects also have lead to wide spread loss of forest in recent years.

iv) H.P. providing opportunities for the spread of waterborn diseases.

v) The big river valley project also caused waterlogging which leads to salinity of over reduces the fertility of the land.

Effects of dams in tribal people :-

i) The displacement & cultural change effects the tribal people both mentally & physically.

ii) Tribes are ill-treated by modern society.

iii) Many of the displaced people are not recognized.

iv) Travel People and their Culture Can't be questions & they destroyed.

v) Generally the body condition of travel people (live in forest) will not [illegible] the new year & hence they will be affected by many diseases.

Benefits of Constructing dams :-

i) Dams are built to control water and store water.
ii) Sometimes dams are used for diverting part or all of water from rivers into canals.
iii) Dams are used mainly for drinking and agricultural purposes.
iv) Dams are used for re-creational purposes.
v) Navigation and Fishery can be develop in the dams areas.

Problems on Constructing dams :-

Problems of dams can be study by the following two types,

1) upstreams problem.
2) Downstreams problem.

1) upstreams problems :-

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

2) Downstreams problems :-

a) waterlogging and Salinity due to over irrigation.
b) Reduce water flow and silt deposition on rivers.
c) Sometimes due to structural defects the dams may collapse suddenly and destroy many living organisations.

Water Resources:-

-> Water is an important ~~Resources~~ component of all the living beings. Nearly 80% of earth surface is covered with water all organism are made up of mostly by water.

Forms Of water:-

water occurs in three forms i.e.,

i) Solid.

ii) Liquid.

iii) Gas.

Hydrological cycle / water cycle :-

The water of the universe always change to one state to another under the effect of sun. The water from the surface sources like lake, rivers etc converts into vapours by evaporation due to solar heats.

The vapour goes on accumulating continuously after this vapour again condensed due to the fall of temp & pressure. Thus, the cloud are formed.

These clouds the again precipitation causes. Some of the vapour is converted ice, at the peak of the mountain the ice again melts on summer & flows as river to meet the sea or ocean. These processes of evaporation condensation & precipitation & melting of ice goes on continuously like an endless chain & thus balance is maintained in the atm. This phenomenon is known as water cycle.

Types of fresh water Resources :-

The fresh water resources can be broadly classified into two types.,

i) Surface water → ↱ Standing water bodies (eg. lakes, reservoirs, lagoons) ↳ Flowing water bodies

ii) underground water.

Surface water :-
The water which is stored on the surface of the earth is called surface water. The water which is coming out directly from precipitation & does not percolate down into the grounds known as surface water.

i) Lakes :-

These are generally deep, clear & deficient in nutrient.

Oligotrophic lakes :-
These are more nutrient & are more light i.e. water turbidity & support more light

Eutrophic lakes :-
These are shallow & coloured lakes with a low pH & ~~clear~~ clogged with plant life.

i) Reservoirs:-

These are generally large than lakes.

ii) Estuaries:-

Estuaries are A transition of the mouth of rivers, where they joined ocean of sea. The mixing of fresh & salt water give rise to estuaries.

Flowing water bodies:-

The water originate from the point of precipitation & flows in streams & rivers are called this.

The flowing water carries sedimentary deposits minerals.

iv) Under ground water:-

The water which is found available deep in the ground due to percolation of surface waters called under ground water u.g.w is a major source of water its used for all purpose in the world.

v) Aquaforms:-

A layer of highly permeable rock containing water is called this.

These are two types.

* A) unconfined,
B) confined

An unconfined aquifer form of water table is formed when water collects over a less permeable rock or constructed dam. They are recharged by water percolating down from the above surface through permeable.

An confined aquifer is formed where water collects over an impermeable rocks. They are recharged in those areas where the aquifers intersect the land surface.

Over exploitation of water:

Dams Benefits:

Dams are built across the river in order to store water for irrigation, hydro-electric power generation & flood control. Most of the dam are built to solve more than one purpose is called as multi purpose dams.

Benefits of constructing Dams:

i) Dams are build to control water & store flood.

ii) Sometimes dams are used for diverting part or all of the water from river into channels.

iii) Dams are used mainly for drinking and agricultural purposes.

iv) Dams are used for re-creational purposes.

v) Navigation & Fishery can be developed in the dam areas.

Problems on constructing dams:-

Problems of dams can be study by one

following two types,

i) upstream problem.

ii) downstream "

Upstream problems:-

i) Displacement of tribal people.

ii) loss of non-forest land.

iii) " " forest, flora & fauna.

iv) Land slide & sedimentation of salination occurs.

v) Stagnation of water logging around reservoirs unland the plant growth.

Downstream problems:-

i) waterlogging & salinate due to over irrigation

ii) Reduce water flow & silt deposition on river.

iii) Salt water intrusion at river mouth.

iv) Does the sediment carries nutrients that deposit and reservoir that fertility of the land along the reservoir that reduce.

v) Dam failures due to structural defects the dams make collapse suddenly & destroy many human organisms.

Mineral Resources :-

→ Minerals are naturally occurring substance having definite chemical composition & physical properties. ores are mixtures in combination of minerals from which useful substance such as metals, can be profitably extracted & used for manufacture.

Formation of Mineral Deposit :-

→ Concentration of " at a particular spot which can be extracted gives rise to a mineral deposit. The formation of these deposit is a very slow biological process even it take millions of years to form a mineral deposits.

Various Biological Process :-

→ Mineral deposit are formed due to the biological decomposition of dead animals & organic matters.

→ Minerals deposits are also formed due to the concentration of minerals

iii) Mineral deposit are formed due to oxidation reduction reaction in side the earth.

iv) Formation of mineral deposits due to concentration of minerals during either transportation, sedimentation.

* Classification of mineral Resources :-

USA Geological Survey divides non-renewable mineral resources into 3 categories

i) Identified Resources :-

The location, existance, quantity, quality of these mineral resources are known by the direct geological evidence & measurements.

ii) Undiscovered Resources :-

These minerals are assumed to exist on the basis of geological knowledge of theory but there specific location, quality & quantity are known.

iii) Reserevers :-

These minerals resources are identified resources from which useful minerals

can be extracted profitable.

Use of Minerals :-

→ Minerals are used in large no. of ways in everyday in domestic, agricultural & industrial & commercial sectors.

→ The economy & political power of a country is determined from the resources of minerals & technical knowledge & how to extracts the elements.

→ The basic uses of minerals as follows,

i) The development of industrial plant & machinery. eg:- iron, aluminium, copper etc.

ii) Construction, housing settlements eg. iron, aluminium, nickel etc.

iii) Generation of energy eg, coal, lignite, uranium etc.

iv) Designing defence equipments, weapons, ornaments.

v) Agricultural purposes eg fertilizer, pesticide. e.g. zineb containing zinc, mercury

vi) Making of alloys for various purposes. e.g. phosphamidon.

vii) Communications purposes e.g. telephone wire, cable, electronic devices.

Nutrition:-

To maintain good health and resists diseases we need large amount of macro nutrient such as Carbohydrate, protein, fats and small amount of micro nutrients such as vitamin-A, B, C and minerals such as iron, calcium and iodine.

Under Nutrition:-

People who can't buy enough food to meet their basic energy needs suffer from under nutrition. They receive less than 80% of these minimum dietary calories.

Mal Nutrition:-

Besides the minimum calories intake we also needs protein, minerals vitamins, iron and iodin. Deficiency or lake of nutrition of an individual leads to may nutrition resulting in several diseases.

Over Grazing:-

It is the process of eating away the forest vegetation without giving. It is a chance to re-generate. The whole life Stock population requires more grazing leaves on pastured area. very often we find that the life stock is grazing on a particular grass land or pasture.

Effects or Impact of Overgrazing :-

i) Land Degradation :-

Over grazing removes the cover of vegetation over the soil and the exposed the soil gets compacted so the roots of the plant can't go much into the soil and the adequate soil moisture is not available. The over grazing leads to organic poors, dry compacted soils which can't be use for further cultivation.

ii) Soil Erosion :-

Due to overgrazing by life stock the cover of vegetation get removed from the soil. The roots of the grass are very good binders of soil when the grass are removed the soil become loos and gets eroded by the action of wind and rainfall.

iv) Loss of useful species :-

Over grazing also affects the composition of plant population on their regeneration on capacity. The grass land consists of grasses and forbs with highly nutritive value. when the life stock grazes the grasses heavily the roots stock, which carry the food reserve get decay. Now other secondary species appear in their place which are less nutritive so before some life stock keeps on over grazing these species also.

Effects of dam on tribal People

1. The greatest social cost of big dam is widespread displacement of tribal People. such as biodiversity cannot be tolerated.
2. The displacement and cultural change affects the tribal people both mentally and physically. They do not accomodate the modern life styles and ~~hab~~ food habits.
3. Tribal people are ill-treated by the modern society.
4. Tribal people and their culture cannot be questioned and destroyed.

Timber Extraction

Due to population growth and lack of alternative fuels, People living near by forest area are mostly using wood as fuel. Hence, wood (timber) extraction is increasing day by day.

Uses of timber

→ Timber is used as raw materials for various wood based industries like pulp and paper, composite wood, furniture etc..

→ Timber is also used for various developmental activities like railways, boats, road construction etc.,

Effects of timber extraction

→ Large scale timber extraction causes deforestation.

→ Timber extraction leads to soil erosion, loss of fertility, landslides and loss of biodiversity.

→ Timber extraction reduces thickness of ~~forest~~ the forest.

→ Timber extraction also leads to loss of tribal culture and extinction of tribal people.

Water Resources

Water is an important component of all the living beings. Nearly 80% of earth's surface is covered with water. All organisms are made up of mostly by water.

e.g. 1. A tree is made up of 60% by weight of water
2. Animals are made up of 50-65% of water.

Use of surface and ground water

→ water is mainly used for domestic purposes like drinking, cooking, bathing and washing etc.
→ water is also used for commercial purposes like hotels, theatres, educational institutions, offices etc.
→ Another important use of water is for irrigation like agriculture. Almost 60-70% of the freshwater is used for irrigation.
→ 20-30% of the total freshwater is used for so many industrial operations like refineries, iron and steel, paper and pulp industries.
→ water is very essential to the sustainance of all the living organisms.
→ water also plays a key role in moderating climate and diluting pollutants.

Over utilization of surface and ground water

The rapid increase in population and industrial growth have increased the demand for water resources. Due to increase of ground water usage, the annual extraction of ground water is in fact excess than the natural recharge.

Effects on over utilization of water

1. Decrease of Ground water

Due to increased usage of ground water, the ground water level decreases.

2. Lowering of water table

Over utilization of ground water in arid and semi-arid regions for agriculture disturbs the state of equilibrium of the reservoir in the region.

3. Earthquake and landslides

Over utilization of ground water leads to decrease in water level, which cause earthquake, landslides and famine.

4. Drying up of wells

As a result of over utilization of ground water, the level of ground water getting depleted as much faster rates than they can be regenerated. This leads to drying up of dug wells as well as bore wells.

5. Pollution of water

When the ground water level near the agricultural land decreases, the water containing the nitrogen as nitrate fertilizer, percolates rapidly into the ground and pollute the ground.

Floods

A flood is an overflow of water, whenever the magnitude of flow of water exceeds the carrying capacity of the channel within its banks

Causes of Floods

→ Heavy rainfall, melting of snow (Pico), sudden release of water from dams, often causes floods in the low-lying coastal areas.

→ Prolonged downpour can also cause the over-flowing of lakes and rivers resulting into floods.

→ Reduction in the carrying capacity of the channel, due to accumulation of sediments or obstructions built on flood ways.

→ Deforestation, overgrazing, mining increases the run-off from rains and hence the level of flood rises.

Effect of Floods

→ Due to flood, water spreads in the surrounding areas and submerges them.

→ Due to floods the plain surface have become eroded and silted with mud and sand, thus the cultivable land areas get affected.

→ Extinction of civilization in some coastal areas also occur.

Flood Management

→ Floods can be controlled by constructing dams or reservoirs.

→ Channel Management and embankments also control the floods.

→ Flood hazard may also be reduced by forecasting or flood warning.

→ Encroachment of flood ways should be banned.

Drought

Drought is nothing but scarcity of water, which occurs due to inadequate rainfall, late arrival of rains and excessive withdrawal of ground water.

Causes of drought

→ When annual rainfall is below normal and less than evaporation, drought is created.

→ High population is also another cause for drought. Population growth leads to poor land use and makes the situation worse.

→ Intensive cropping pattern and over exploitation of scarce water resources through dug well or bore well to get high productivity has converted drought-prone areas into desert.

e.g. In Maharashtra there has been no recovery from drought for the last 30 years due to over-exploitation of water by sugarcane crop.

→ Deforestation leads to desertification and drought too.

Effects of drought

→ Drought causes hunger, malnutrition and scarcity of drinking water and also changes the quality of water.

→ Drought causes widespread crop failures leading to shortage of food and adversely affects human and livestock population.

→ The drought indicates the worst situation and initiation of desertification.

→ Drought also accelerates degradation of natural resources.

→ Drought leads to large migration of people and urbanisation.

Drought Management

→ Indigenous knowledge in control of drought and desertification is very useful for dealing with the problems.

→ Rain water harvesting programme is another method to conserve more water and to control drought.

→ To improve ground water level construction of reservoirs are essential in drought area.

→ Modern irrigation technology (drip irrigation) is very much useful to conserve water.

→ Afforestation activities also improves the potential of water in the drought area.

→ Mixed cropping and dry farming are the suitable methods which minimize the risks of crop failures in dry area.

Conflicts over water

Fresh water is considered to be the most environmental issue of this century. Nearly 1.2 billion people do not have access to safe drinking water.

Thus due to increase in population and decrease in water resources, conflicts over water starts.

Causes of water conflicts

1. Conflict through use

Unequal distribution of water has often led to inter-state or international disputes.

Examples

(a) International conflicts

(i) India and Pakistan fight over the rights to water from the Indus.

(ii) India and Bangladesh are fighting for Brahmaputra river.
(iii) Mexico and USA have come in conflict over the Colorado river.

(b) National conflicts

(i) sharing of Mahanadi water between Odisha and Chhattisgarh.
(ii) sharing of Cauvery water bet^{n} Karnataka and Tamil Nadu.
(iii) sharing of Krishna water bet^{n} Karnataka and Andhra Pradesh.

2. Construction of Dams or Power stations

For hydroelectric power generation dams are built across the rivers, which initiates conflicts bet^{n} the states.

3. Conflict through pollution

Not only they act as reservoirs for the supply of fresh water but also as a means of disposing of waste water and industrial rubbish. With the increasing decline in the quality of the water crossing borders, the problem of cleaning the water takes on an international conflict.

Dams Benefits and Problems

Dams are built across the river inorder to store water for irrigation, hydroelectric power generation and flood control.

Most of the dams are built to serve for more than one purpose called "Multi purpose dams".

→ These dams are called as the temples of modern India by the country's first Prime Minister, Pt. Jawaharlal Nehru.

Benefits

→ Dams are built to control flood and store flood water.
→ Sometimes dams are used for diverting part or all of the water from river into a channel.
→ Dams are used mainly for drinking and agricultural purposes.
→ Dams are used for recreational purposes.
→ Navigation and fishery can be developed in the dam areas.

Problems of dams

Problems of dams can be studied in the following two titles,

1. Upstream problems 2. Downstream Problems

1. U/S Problems

→ Displacement of tribal people.
→ Loss of non-forest Land.
→ Loss of forest, flora and fauna.
→ Spreading of water-borne diseases.
→ Landslips, sedimentation and silting occurs.

2. D/S Problems

→ water logging and salinity due to over irrigation.
→ Reduced water flow and silt deposition in rivers.
→ Salt water intrusion at river mouth.
→ ~~But to~~ sometimes, due to structural defects the dam may collapse suddenly and destroy many living organisms.

Minerals

Minerals are naturally occuring substances having definite chemical composition and physical properties.

Ores

Ores are minerals or combination of minerals from which useful substances such as metals, can be profitably extracted and used for manufacture.

Uses and exploitation of minerals

Minerals are used in large no. of ways in everyday in domestic, agricultural, industrial and commercial sectors. The economy and political power of the country is determined from the no. of reserves of minerals and technical know how to extract the elements.

Uses

The important uses of minerals are as follows.

1. Development of industrial plants and machinary.
   e.g. - Iron, aluminium, copper etc.
2. Construction, housing, settlements.
   e.g. - Iron, Aluminium, Nickle etc.
3. Generation of energy
   e.g. - coal, lignite etc.
4. Designing of defence equipments, weapons, ornaments.
5. Agriculture purposes as fertilizers, seed dressings and fungicides.
6. Communication purposes
   e.g :- Telephone wireless cables, electronic devices.

Major uses of some non-metallic minerals

Non-metal mine-real	Major uses
Silicate minerals	Sand and ground for construction, bricks etc
Limestone	Used for concrete, building stone, used in agriculture for neutralizing acid soils, used in cement industry.
Gypsum	Used in plaster, wall-board,
potash, phosphorite	Used as fertilizers.
Sulphur pyrites	Used in medicine, car battery.

Environmental effects or impacts of extracting using mineral resources

Most important environmental concern arises from the extraction and processing of the minerals during mining, melting, roasting etc.

Mining

Mining is the process of extraction of metals from a mi-neral deposit.

Types of mining

(a) Surface mining
surface mining is the process of extraction of raw materials from the near surface deposits.

(b) Underground mining
It is the process of extraction of raw materials below the earth's surface. It includes,

(i) Open-pit mining

In open-pit mining machines dig holes and remove the ores.

e.g. iron, copper, marble.

(ii) Dredging

In dredging, chained buckets and dredglines are used, which scrape us the minerals from under-water mineral deposit.

(iii) Strip mining

In strip mining, the ore is stripped off by using bulldozers, stripping wheels.

Environmental Damage

- Devegetation and defacing of landscape.
- Ground water contamination
- Surface water pollution
- Air pollution
- subsidence of land

Soil erosion

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

Types of soil erosion

- Normal erosion
- Accelarated "

Normal erosion

It is caused by the gradual removal of top soil by the natural processes. The rate of erosion is slower.

Accelarated erosion

It is mainly caused by man-made activities. The rate of erosion is faster than the rate of formation of soil.

Harmful effects of S.E

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

Causes

(i) Water

Water affects soil erosion in the form of rain, run-off, rapid flow, wave action.

(ii) Wind

Wind is the imp. climatic agent, which carries away the fine particles of soil and creates soil erosion.

(iii) Biotic agents

Overgrazing, mining and deforestation are the major biotic agents causes soil erosion.

→ 35% of the world, erosion is due to overgrazing.
→ 30% " " " soil erosion is due to deforestation.

(iv) Landslides
It also cause soil erosion

(v) constructions
construction of dames, buildings, roads removes the protective vegetal cover and leads to soil erosion.

control of soil erosion

1. till or non-till farming
2. Contour farming
3. terracing
4. Agroforestry

Desertification

Desertification is a progressive destruction or degradation of acid and semi arid lands to desert.

Harmful effect of desertification

→ Around 20% of the productivity land is the arid and semi-arid regions are converted into desert.

→ Around 600 million people are threatened by desertification.

causes

(a) Deforestation
(b) Overe grazing
(c) water management
(d) Mining and quarrying
(e) climate changes

→ Increase in water logging, salinity, alkalinity or acid problems
→ Loss of economic social and biodiversity.

Causes

1. population

As population increases, more land is needed for producing food, fibre and fuel wood. Hence there more and more pressure on the limited land resources, which are getting degraded due to over exploitation.

2. Urbanization

The increased urbanization due to population growth reduces the extent of agricultural land. Thus urbanization leads to deforestation, which intern affect million of plant and animal species.

3. Fertilizers and pesticides

Increased application of fertilizers and pesticides are needed to increase farm output. More application of fertilizers and pesticides, which again leads to pollution of land, water and soil degradation.

3. Damage of top soil

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

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

Land Resources: Land as a resource, land degradation, mass induces land slides, soil erosion and desertification

Land as a resource

Land is the most important and valuable resources for mankind as it provides food, fibre, wood, medicine and other biological materials needed for food.

→ Soil is the mixture of inorganic materials (rocks & minerals) and organic materials (dead animal and plants).

Uses of land Resource

→ Land Provide food, wood, minerals etc. for us.
→ Land is used as watershed or reservoir.
→ Land natures the plants and the animals that provides our food and shelter.
→ Land acts as a dust bin for most of the waste created by the modern society.
→ Land is need for construction of buildings, industries.

Land (soil) degradation

Land degradation is the process of deterioration of soil or loss of fertility of the soil

Harmful effect of land (soil) degradation

→ The soil texture and soil structure are deteriorated.
→ Loss of soil fertility, due to loss of ~~nature~~ imp. nutrients.

Food Resources : World food Problems, changes caused by agricultural and over grazing, effects of modern agriculture, fertilizers - pesticides problems, water logging, salinity.

Food Resources

Food is an essential requirement for the human survival. Each person has min^m food requirement. The main components of food are carbohydrates, fats, proteins, minerals & vitamins.

World food Problems

1. We know that 71% of the total area of the earth is covered with water. only 29% of the earth surface is land, of which most of the areas are forests, desert, mountains, only less percentage of the land is cultivated. so the food supplied from the rest of the land is not enough to feed all the people. The problem of population explosion has made it worse. The world population increases and cultivable land area decreases. Therefore the world food problem arises.
2. Environmental degradation like soil erosion, water logging, water pollution, salinity, affect agricultural lands.
3. Urbanisation is another problem in developing countries, which deteriorate the agricultural lands.

4. Since the food grains like rice, wheat, corn and the vegetable like potato are the major food for the people all over the world, the food problem arises.

5. A key problem is the human activity, which degrade most of the earth's net primary productivity which supports all life.

Changes caused by agricultural and over-grazing

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

~~(3) Following are the changes~~

→ Following are the changes caused by agricultural and over-grazing

(i) Land degradation

over-grazing removes the cover of vegetation over the soil and the exposed soil gets compacted. So the roots of the plant can not go much deep into the soil and the adequate soil moisture is not available.

→ Over-grazing leads to organically poor, dry, compacted soil, which cannot be used for further cultivation.

(ii) Soil erosion

Due to overgrazing by livestock, the cover of vegetation gets removed from the soil. The roots of the grass are very good binders of the soil. When the grasses are removed, the soil becomes loose and gets erode by the action of wind and rainfall.

(iii) Loss of useful species

When the livestock grazes the grasses heavily, the root stocks, which carry the food reserve gets destroyed. Now other secondary species will appear in their place, which are less nutritive in nature. Sometimes livestock keep on overgrazing these species also

Agriculture

Agriculture is an art, science and industry of managing the growth of plants and animals for human use.

Types of Agriculture

- Traditional Agriculture
- Modern

Effects of modern Agriculture

1. Problems in using fertilizers

@ Micronutrient imbalance

Most of the chemical fertilizers used in modern agriculture contain nitrogen (N), phosphorus (P) and potassium (K), which are micro-nutrient. imbalance when excess of the fertilizers are used in the fields, it causes micro-nutrient imbalance.

e.g:- Excessive use of fertilizers in Punjab and Haryana has caused deficiency of the micro-nutrients zinc in the soil, which affect the productivity of the soil.

(b) Blue baby syndrome (Nitrate pollution)

When the Nitrogenous fertilizers are applied in the fields, they leach deep into the soil and contaminate the ground water. The nitrate concentration in the water gets increased. When the nitrate concentration exceeds 45 mg/lit, they cause serious health problem called blue baby syndrome. This disease affects infants and leads even to death.

(c) Eutrophication

A large proportion of N and P fertilizers used in crop fields is washed off by the run-off water and reaches the water body causing over-nourishment of the lakes. This process is known as Eutrophication.

Pesticides Problems

In order to improve the crop yield, lot of pesticides are used in the agriculture.

1. Forest generation pesticides

sulphur, arsenic, lead or mercury are used to kill the pest.

2. second generation pesticides

DDT (Dichlorodiphenyl trichloroethane) is used to kill the pests

Although these pesticides protect our crops from huge losses due to pests, they produce no. of side effects

(a) Death of non-target organism

many insecticides not only kill the target species but also kill the several non-target species, which are useful to us.

(b) Producing new pests

Some pest species usually survive even after the pesticide spray, which generates highly resistant generation. They are immune to all type of pesticides and are called super-pests.

(c) Bio-magnification

Many of the pesticides are non-biodegradable and keep on concentrating in the food chain. These process is called bio-magnification. These pesticides in a bio-magnified form is harmful to the human beings.

(d) Risk of cancer

Pesticides enhance the risks of cancer in 2 ways.

→ It directly acts as carcinogens.
→ " Indirectly suppress the immune system.

Water logging

W.L is the land where water stand for most of the year.

Effects

During water logged cond^n, pore voids in the soil get filled with water and the soil-air get depleted. In such a cond^n the roots of the plants do not get adequate air for respiration. So mechanical strength of the soil decreases and crop yield falls.

Causes

1. Excessive water supply to the croplands
2. Heavy rain
3. Poor drainage

Remedy

Preventing excessive irrigation, sub-surface drainage technology.

Salinity

The water, not absorbed by the soil, undergo evaporation leaving behind a thin layer of dissolved salts on the top soil. This process of accumulation of salts is called salinity of the soil.

⇒ The saline soils are characterized by the accumulation of soluable salts like sodium chloride, calcium chloride, magnesium chloride, sodium sulphate, sodium bicarbonates and sodium carbonates.

Remedy

⇒ The salt deposit is removed by flushing them out by applying more good quality water to such soils.

⇒ Using sub-surface drainage system the salt water is flushed out slowly.

—— X ——

Concept of an eco system
structure and fun^{n} of an eco system.
Producers, consumers, decomposers.

Ecology

Ecology is the study of interactions among organisms or group of organisms with their environment. The environment consists of both biotic components (living organisms) and abiotic components (non-living organisms)

or

Ecology is the study of ecosystems.

Ecosystems

Ecosystem is the basic functional unit of ecology. The term ecosystem is coined from a Greek word, meaning study of home.

Definition

A group of organisms interacting among themselves and with environment is known as ecosystem. Thus, an ecosystem is a community of diff^{n} species interacting with one another and with their non-living environment exchanging energy and matter.

e.g. Animal cannot synthesis their food directly, they depend on the plants either directly or indirectly

Biome (small eco system)

On earth there are many sets of ecosystems which are exposed to same climate conditions and

having dominant species with similar life cycle, climatic adoptions and physical structures. This set of ecosystem is called a biome.

Structure and fn of a eco-system

The term structure refers to the various components. so, the structure of an ecosystem explains the relationship bet^n the abiotic (non-living) and the biotic (living components)

→ An ecosystem has two major components
1. Abiotic components
2. Biotic

(Components of an ecosystem and their relationship)

Abiotic components

The non-living components (physical and chemicals) of an ecosystem collectively form a community called abiotic comp.

e.g:- climate, soil, water, air, energy etc.

physical components

They include the energy, climate, raw materials and living space that the biological community needs. They are useful for the growth and maintenance of its member.

e.g:- Air, water, sunlight, soil etc.

2. Chemical components
They are the sources of essential nutrients
e.g:-
(i) Organic substances:- Protein, carbohydrates etc.
(ii) Inorganic " :- Zn, Cu, C, H, O, P, N, K

Biotic Components
The living organisms / living members in an ecosystem collectly form its community called biotic components:-
→ It includes,

1. Autotrophic Components
The members of autotrophic components are producers, which are autotrops (self-nourishing organisms). They derive energy from sunlight and make organic compounds from inorganic substances.
e.g:- Green plants, algae, bacteria etc.

Heterotrophic components
The members of heterotrophic components are consumers and decomposers, which are heterotrophs (dependent on others for food). They consume the autotrophs (producers).
→ The heterotrophs are
(a) Macro consumers
They are herbivores, omnivores and carnivores.
(b) saprotrophs (Micro consumers)
They are decomposers (bacteria, fungi etc.)

Classification of biotic components
- Producers (Plants)
- Consumers (Animals)
- Decomposers (Micro-organisms)

Producers (Autotrophs)

Producers synthesize their food, themselves through photosynthesis.

e.g :- All green plants, trees

photosynthesis

The green pigments called chlorophyll, present in the leaves of plants, converts CO_2 and H_2O in the presence of sunlight into carbohydrates.

e.g

(i) plant eating species

insects, rabbit, goat, deare etc.

(ii) Animals eating species

Lions, tiger etc.

Types of consumers

- Primary consumers
- secondary "
- Tertiary "

(1) Primary consumers (Herbivores) (Plant eaters)

P.C are also called herbivores, they directly depend on the plants for their food. so they are called plant eaters.

e.g :- Horse, insects etc.

(2) secondary consumers (Primary carnivores) (meat eaters)

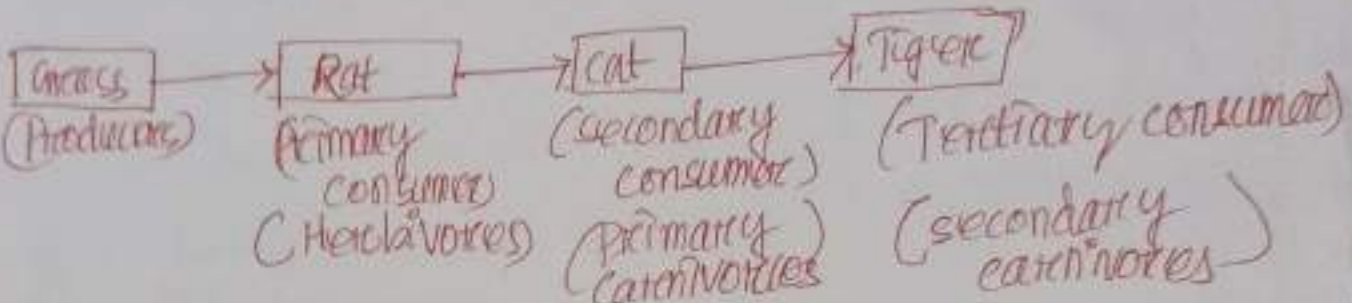
S.C are primary carnivores, they feed on primary consumers. They directly depend on the herbivores for their food.

e.g :- Frog, cat, snake etc.

③ Tertiary consumers (secondary carnivores) (Meat eaters)

T.C are secondary carnivores, they feed on secondary consumers. They directly depend on the primary carnivores for their food.

e.g:- Tiger, lion etc.



Decomposers

Decomposers are those organisms which feed on dead organisms plants and animals and decompose them into simpler compounds. During the decomposition inorganic nutrients are released. These inorganic nutrients together with other organic substances are then utilized by the producers for the synthesis of their own food.

e.g:- Bacteria, fungi etc.

Herbivores

Animals that eat only plants are called herbivores. (vegetarian)

Carnivores

Animals that eat other animals are called carnivores. (non-vegetarian)

Omnivores

Animals that eat both animals and plants are called omnivores. (veg. and non-veg.)

Role of an individual in conservation of natural resources

Conservation of energy

→ Switch off lights, fans and other appliances when not in use.
→ Use solar heaters for cooking your food on sunny days which will cut down your LPG expenses.
→ Dry the clothes in sunlight instead of driers.
→ Grow trees near the houses and get a cool breeze and shade. This will cut off your electricity charges on A/C and coolers.
→ Use always pressure cooker.
→ Ride bicycle or just walk instead of using car and scooter.

Conservation of water

→ Use min^m water for all domestic purposes.
→ Check for water leaks in pipes and toilets and repair them separately.
→ Reuse the soapy water, after washing clothes for washing off the courtyards, drive ways etc.
→ The waste water coming out from kitchen, bathtub, can be used for watering the plants.
→ Build rainwater harvesting system in your house.

Energy Resources

Growing energy need, renewable and non-renewable energy sources, use of alternate energy resources, Case studies

energy

Energy may be defined as, "any property, which can be converted into work".

OR

Energy is def" as, "the capacity to do work."

Growing energy need

Renewable energy resources

Conservation of soil

→ Use mixed cropping, so that some specific soil nutrients will not get depleted.

→ Use manure in the garden, which will protect the soil.

→ soil erosion can be prevented by the use of sprinkler irrigation.

→ Don't irrigate the plants using a strong flow of water, as it will wash off the top soil.

→ while constructing the house don't uproot the trees as fare as possible.

→ Grow different types of plants, herbs, trees and grass in your garden and open areas, which bind the soil and prevent its erosion.

Conservation of Food Resources

→ Eat only minimum amount of food. Avoid overeating. Don't waste the food instead give it to someone before getting spoiled

→ cook only required amount of the food.

→ Don't cook food unnecessarily.

→ Don't store large amount of food grains and protect them from damaging insects.

conservation of Forest

→ Use non-timber Products.

→ Plant more trees and protect them.

→ Grassing, fishing must be controlled →

→ Minimise the use of papers and fuel wood.

→ Avoid of executing developmental work like dam, road and other construction in forest areas.

Equitable use of resources fore sustainable life style

Sustainable development

Sustainable dev. is the development of healthy environment without damaging the natural resources. In other words, all the natural resources must be used in such a way that it must be available fore the future generation also.

Unsustainable development

Unsustainable dev. is the degradation of the environment due to over utilization and over exploitation of the natural resources.

Causes of unsustainability

The main cause is due to the difference bet^{n} the less developed and more developed countries i.e.,

→ over population in poor countries, consume too Low resources with low income.

→ Rich countries consume more resources with more income.

Cond^{n} for sustainable life style

In order to achieve sustainable life styles.

1. It is essential to achieve a more balanced and equitable distribution of land resources and income to meet everyone's basic needs.

2. The richer countries should lower down their consumption levels, while the min^{m} needs of the poor should be fulfilled by providing them resources

Function of ecosystem, Energy flow in the ecosystems
The fun^{n} of an ecosystem is to allow flow ~~for~~ of ener
-gy and cycling of nutrients
Types of fun^{n}
→ Functions of an ecosystem are of three types.
1. Primary fun^{n} or Primary production
The primary fun^{n} of all ecosystem is manufacture of starch (photosynthesis).

2. Secondary fun^{n} or secondary Production
The secondary fun^{n} of all ecosystem is distributi
-ng energy in the form of food to all consumers or the energy stored by the consumer.

3. Tertiary fun^{n}
All living system die at a particular stage. These dead systems are decomposed to initiate the third fun^{n} of ecosystems namely cycling.

The fun^{n} of an ecosystem may be understood by studying the following terms.

(a) Energy & nutrient flow.
(b) Food chains
(c) Food webs
(d) Food ~~pyra~~ pyramids

Energy flow in the ecosystems

Energy is the most essential requirement for all living organisms. Solar energy is the only source to our planet earth. Solar energy is transformed to chemical energy in photosynthesis by the plants (Primary producers). Though a lot of sunlight falls on the green plants, only 1% of it is utilized for photosynthesis. This is the most essential step to provide energy for all other living organisms in the ecosystem.

→ Some amount of chemical energy is used by the plants for their growth and the remaining is transferred to consumers by the process of eating.

→ Thus the energy enters the ecosystem through photosynthesis and passes through the different trophic levels (feeding levels).

Forest Ecosystem

A forest ecosystem is the one in which tall and dense trees grow the support animals and birds. The forests are found in undisturbed areas receiving moderate to high rainfall.

→ The forest occupies nearly 40% of the world's land area. In India it occupies only 19% of its total land area.

Types of forest ecosystem

- Tropical rain forests
- Tropical deciduous "
- Tropical scrub "
- Temperate rain "
- Temperate deciduous "

1. **Tropical rain forests**
   It is found near the equator. They are characterized by high temp. They have broad leaf trees like teak and sandal and the animals like lion, tiger and monkey.

2. **Tropical deciduous forests**
   They are found little away from the equator. They are characterized by a warm climate and rain is only during monsoon.
   → e.g:- mango, oak
   e.g:- fox, rabbit, rat and deer

3. **Tropical scrub forests**
   These are characterized by a dry climate for longer time. They have small deciduous trees and scrubs. e.g:- deer, fox

4. Temperate rain forests

They are found in temperate areas with adequate rainfall. They are characterized by coniferous trees like pines, firs, redwood etc.

e.g:- squirrels, cats, bears, fox etc.

5. Temperate deciduous forests

They are found in areas with moderate temp. They have major trees including broad leaf deciduous trees like oak and animals like deer, fox, bear etc.

Characteristics of forest ecosystems

→ forests are characterized by adequate rainfall, which make the generation of number of ponds, lakes etc.

→ The forest maintains climate and rainfall.

→ The forest support many wild animals and protect biodiversity.

→ The soil is rich in organic matter and nutrients, which support the growth of trees.

→ Since penetration of light is so poor, the conversion of organic matter into nutrients is very fast.

Grassland ecosystem

Grassland occupies about 20% of earth's surface. In addition to grass species, some trees and shrubs are also present.

Types of g.e

- Tropical glassland
- Temperate "
- polar "

1. Tropical Grassland

→ They are found near the borders of tropical rain forests. They are characterized by high temp. and moderate rainfall (40 - 100cm).

→ It also known as Savanna - type.

→ They have tall grasses with shrubs and animals like zebras, giraffes.

2. Temperate Grassland

They are generally found in the centre of conti-nents, on flat, sloped hills.

→ They are characterized by very cold winters & hot summers.

3. Polar grassland

They are found in arctic polar regions. They are characterized by severe cold and strong winds along with ice and snow.

e.g:- arctic wolf, arctic fox etc.

Biogeographic classification of India

B.C. of India is the division of India a/c. to biogeographic characteristics.

→ Biogeography is the study of the distribution of species, organism and ecosystem in geographic space and through geological time. There are ten biogeographic zones in India.

1. Trans Himalayan zone
2. Himalayan zone
3. Desert "
4. semiarid "
5. Western ghat "
6. Deccan plateau "
7. Gangetic plain "
8. North-East "
9. Coastal "
10. Islands

1. T.H.Z

The Himalayan ranges immediately north of the Great Himalayan range are called the ~~Himalayan~~ T.H.

e.g:- snow leopard, migratory black-necked crane.

2. Himalayas

The Himalays consist of the youngest chains in the world. The Himalayas have attained a unique personality owing to their high altitude, steep gradient and wide temperate flora.

e.g:- pine, deodar, oak, panda, snow leopard etc.

3. Semi-Arid Areas

Biodiversity and it's conservation

Introduction - Def^n : genetics, species and ecosy -stem diversity. ; Biogeographically classification of India, Value of Biodiversity : consumptive use, social, ethical, aesthetic and option values.

* Introduction

Bio means 'life' and diversity means 'variety', hence biodiversity refers wide variety of life on the earth.

Diversification in the species is influenced by various physical and climatic factors, resulting in the produ -ction of new sub-species. The species which are unable to adjust with the new environment gradually become extinct.

our planet - earth (biosphere) contains more than 30 million species of organisms. But of which only 1.4 milli -on species have been identified so far. These species differ widely from one another. This variation in living organisms is called biodiversity.

Def^n

Biodiversity is def^n as, "the variety and variability among all groups of living organisms and the ecosyst -em in which they occur.

Importance of Biodiversity

→ Biodiversity is very imp. for human life. as we depend on plants, micro-organisms, earth's animals for our food, medicine and industrial products.

→ Biodiversity protects the fresh air, clean water and productive land.

→ It is also imp. for forestry, fisheries and agriculture which depend on rich variety of various biological resources available in nature.

Classification or Levels of Biodiversity

Biodiversity is generally classified into 3 types

1. Genetic diversity
2. species "
3. community or Ecosystem "

1. Genetic diversity

Genetic: A species with different genetic characteristics is know as sub-species or genera.

Genetic diversity is the diversity within species i.e., variation of genes within the species.

e.g:- Rice varieties, Teak wood varieties

2. Species diversity

A discrete group of organisms of the same kind is known as species.

species diversity is the diversity bet^n diff^n species. The sum of varieties of all the living organisms or the species level is known as species diversity.

e.g:- Plant species: Apple, mango, rice, grapes etc.

Animal species: Lion, tiger, deer etc.

3. Community or Ecosystem diversity

The biotic components in an ecosystem may be composed of a few species only or a large number of species of plants, animals and micro-organisms.
→ The richness of species in an ecosystem is generally referenced as species diversity.

Value of Biodiversity

Biodiversity is a valuable natural resource for the survival of mankind. Many plants and animals including wildlife are of very imp. for human being.
→ They can be used directly or indirectly to have consumptives, productive, social, ethical, aesthetic and option values.

1. Consumptive value :-

Most of the developing countries obtain fuel wood from forests. Still more than 1500 million people cook their food by burning wood.
→ This impose heavy pressure on forests.
→ Various tribal societies fully depend on forests for their habitation and livelihood. They used roots, fruits, seeds and meat of wild animals as their food.

2. Social values

S.V of the biodiversity refers to the manner in which the bio-resources are used to the society. These values are associated with the social life, religion

and spiritual aspects of the people.
e.g: Holy animals: Cow, bull, snake etc.
Holy plants: Tulsi, peepal, lotus etc.

3. Ethical values or Existence value
In India and in other countries biodiversity is considered to have great value on religious and cultural basis.
→ The ethical value means that a species may or may not be used, but its existence in nature gives a pleasure.
e.g:-
(a) The river Ganga is considered as holy river.
(b) Vengai, Tulsi are some of the trees worshipped by the Tamilians.
Thus, there is an ethical value or existence value attached to each species.

4. Aesthetic value
The beautiful nature of plants and animals inspire us to protect the biodiversity. The most imp. aesthetic value of biodiversity is eco-tourism.
e.g:-
(a) Eco-tourism: People from far place spend a lot of time and money to visit the beautiful forests, where they can enjoy the aesthetic value of biodiversity. This type of tourism is known as eco-tourism.
(b) The pleasant music of wild birds, colour of butterfly, colour of the flowers, colour of peacocks are very imp. for their aesthetic value.

Option values

The option values are the potentials of biodiversity that are presently unknown and need to be known. The optional values of biodiversity suggests that any species may be proved to be or valuable species after someday.

e.g:-

(a) The growing biotechnology field is searching or species for curing the diseases of cancer and AIDS.

(b) Medicinal plants and herbs play n very imp. role in our Indian economic growth.

Classification

→ Primary pollutant:-

These are emitted directly in the atmosp
-here in harmful form like CO, NO.

→ Secondary pollutant:-

These may react with one another or
with the basic components of air to
form new pollutants

Effects (Environmental)

→ Increases the global temperature.
→ Reduce visibility, acid deposition
on trees, soil and acquatic life.
→ Damage plants & trees, smog reduce
visibility.
→ Can harm wild life.

Health effects

→ Causes headaches, anamia, breathing
problems.
→ Lung irritation and damage.
→ Nose & throat irritation, lung damage.
asthma, cancer.
→ Perforation of nasal septum, chrome
holes ulcer, central nervous system
disease, cancer.

control Measures

1. source control

→ Use only unleaded petrol.
→ Use fuels that have low sulphur & ash content.
→ plant trees along busy streets because they remove particulates and carbon monoxide and absorb noise.
~~→ Industries~~
→ Industries and waste disposal site should be situated outside the city centre.

2. control measures in Industrial centers

→ Emission norms should be restricted to permissible levels.
→ Air pollution control equipments must be made mandatory.
→ Continuous monitoring of the atmosphere to know the emission level.

3. Equipments used to control air pollution :-

→ Mechanical devices such as scrubbers, cyclone separator, bag houses & electro static precipitators, reducing particulate pollutants.

2. Water pollution

Water pollution may be defined as the altercation in physical, chemical and biological characteristics of water which may cause harmful effects on humans and aquatic life.

causes of water pollution

1. Infectious Agents

e.g. - Bacteria, viruses, protozoa and parasitic worms

Human sources (causes)

→ Human and animal waste

2. Oxygen Demanding Wastes (Dissolved oxygen)

e.g. - Organic wastes such as animal manure and plant debris that can be decomposed by aerobic (oxygen requiring) bacteria.

This degradation consumes dissolved oxygen in water. Dissolved oxygen (DO) is the amount of oxygen dissolved in a given

quantity of water at a particular pressure and temperature.

3. Inorganic Chemicals

e.g. Water soluble inorganic chemicals

(i) acids

(ii) compounds of toxic metals such as lead, arsenic & selenium.

(iii) salts such as NaCl in ocean water and fluorides (F) found in some soils

4. Organic chemicals

e.g:- Oil, gasoline, plastics, pesticides, cleaning, solvents, detergents.

Effects

⇒ suspended solids such as silt and coal may injure the gills of the fish and cause asphyxiation.

⇒ volatile substances such as alcohols, aldehydes, ethers and gasoline may cause explosion in sewers.

⇒ highly repulsive odour is imparted to the receiving water. The dissolved constituents like proteins are putrefiable.

→ The acidic or alkaline effluents are corrosive to concrete and metal pipes.

→ The effluents may contain pathogenic bacteria.

→ Suspended solids may also cause bad odour and tastes and also may promote conditions favourable for growth of pathogenic bacteria.

Controls:-

→ Scientific techniques are necessary to be adopted for the environmental control of catchment areas of rivers, lakes, ponds & streams.

→ Industrial plants should be based on recycling operations.

→ Plants should be developed to recover metal from metal bearing waste waters.

→ Water resources should be used in the best possible economic way.

→ Treatment plants should be constructed & govt. should also help by funding for domestic, sewage & industrial effl

-ents.

3. Soil pollution

Soil pollution is defined as the contamination of soil by human and natural activities which may cause harmful effects on living beings.

causes

⇒ Disposal of industrial wastes is the major problem for soil pollution.

⇒ Urban wastes comprises both commercial and domestic wastes consisting of dried sludge of sewage. All the urban soil wastes are commonly referred to as refuse

⇒ Modern Agricultural practices pollute the soil to a large extent. Today with the advancing agro-technology, large quantities of fertilizers, pesticides, herbicides, weedicides are added to increase the crop yield. Apart from these farm wastes, manure, debris, soil erosion containing mostly inorganic chemicals are reported to cause soil pollution.

⇒ Radioactive substances resulting from explosions of nuclear dust and radio

active wastes (produced by nuclear testing lab and industries) penetrate the soil and accumulate there by creating land pollution.

Effects

→ These pollutants affects and alter the chemical and biological properties of soil.

⇒ wheat, maize etc. grown on soils fertilized with NPK fertilizers may result in considerable reduction in protein content of the crop

⇒ Excessive use of nitrogenous fertilizer leads to the accumulation of nitrates in the soil which may contaminate the ground water.

⇒ Excessive use of chemical fertilizers may reduce the ability of plants to fix nitrogen.

⇒ Pesticide residues in soil may be taken up by plants and cause phototoxicity. They may enter the aquatic environment and enter the food chain

→ ~~Aquatic~~

controls—

→ Implementing ~~stgn~~ stringent and pro-active population control programmes.

→ Launching extensive afforestation and community forestry programmes.

→ Implementing deterrent measures against deforestation.

→ Formulation of stringent pollution control legislation and effective implementation with powerful administrative machinery.

→ Avoiding excessive use of chemical ferti-lizers & insecticides and providing more organic manures to the fields and thereby maintaining healthy biota.

→ Enforcing environmental audit for industries and promoting ecolabelled products.

4. Marine pollution

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Marine pollution is def^{n} as the discharge of waste substances into the sea resulting in harm to living resources, hazards to human health, hindrance to fishery and impairment of quality for use of sea water.

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Causes :-

⇒ Rivers are the main source of marine pollution. They carry wastes in their drainage and joins the sea/ ocean. The drainage include sludge, industrial effluents, detergents etc.

⇒ Ships which carry toxic substances, lubricating oil, paints heavy oils, fuels, automotive material from one place to another, sometimes by accident or by leakages pollute the marine water.

⇒ Marine pollution also caused by oil drilling in seas, tourism activities & heat released from industries etc.

⇒ Testing of atomic weapons, space crafts, missiles and other radioactive wastes when dumped in seas, causes heavy loss to aquatic biota.

Effects :-

⇒ Marine pollution effects the food chain in seas. Serious diseases like cancer are the caused when affected animals are taken by man from ocean.

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⇒ Detergents, either from cleaning up the spills or from drainage also responsible for high mortality of marine life.
⇒ Heavy metals (like lead & mercury), factory materials, minerals oils, acids and other biocides are also a serious threat to marine life when mixed with sea water.
⇒ Plastic or plastic materials when dumped into sea by commercial ships or from drainage, animal take it through their food in stomach. It causes ulcer and reduces hunger.
⇒ Oil is most dangerous pollutant when afloat on sea or mixed with water a great threat to marine life specially fish, birds and algae. Thousands of birds killed every years because once they oiled, seldom survived despite efforts to clean themselves.

Control :-
⇒ Plans for conserving marine biodiversity must be taken into account of human needs.
⇒ People should be educated about marine ecosystems and the benefits offered by them.

⇒ Local communities must be involved in protecting and managing their coastal resources.

⇒ Ships and ports should have certain facilities for reducing pollution.

⇒ Nuclear explosions and other nuclear activities in sea should be minimized.

⇒ Drilling should not be allowed in coastal areas.

5. Noise pollution

Noise pollution is def^{n} as the unwanted, unpleasant or disagreeable sound that causes discomfort for all living beings.

⇒ Unit of noise (Decibel)
The sound intensity is measured in decible (dB).

⇒ The normal conversation sound ranges from 35dB to 60 dB. Impairment of hearing takes place due to exposure to noise of 80 dB or more. Noise above 140 dB becomes painful.

Causes :-

It has been found that environmental noise is doubling every 10 years. Generally noise is described as

1. Industrial noise
2. Transport noise
3. Neighbourhood noise.

1. Industrial Noise

⇒ Highly intense sound or noise pollution is caused by many machines. There exists a long list of sources of noise pollution including different machines of numerous factories, industries and mills.

Recently, it has been observed by the Institute of Oto Rino Laryngology, Chennai that enormously increasing industrial pollution has damaged the hearing of about 20% workers.

2. Transport Noise

The main noise comes from transport. It may includes road traffic noise, rail traffic noise and aircraft noise. The numbers of road vehicles like motors,

scooters, cars, motor cycles, buses, trucks and particularly the diesel engine vehicles have increased enormously in recent years.

3. Neighbourhood Noise

This type of noise includes disturbance from household gadgets and community. common noise makers are musical instruments, TV, VCR, radios, telephones and loudspeaker etc.

Effects:-

⇒ It causes contraction of blood vessels, makes the skin pale, leads to excessive secretion of adrenalin harmon into blood stream which is responsible for high blood pressure.

⇒ Blaring sounds have known to cause mental distress, heart attacks, birth defects and abortion.

⇒ It causes muscles to contract leading to nervous breakdown, tension etc.

⇒ It affects health efficiency and behaviour. It may cause damage

kidneys, liver and may also produce emotional disturbances.

→ In addition to serious loss of hearing due to excessive noise, impulsive noise also causes psychological and pathological disorders.

→ Brain is also adversely affected by loud and sudden noise as that of jet and aeroplane noise etc. People are subjected to psychiatric illness.

Control :-

→ Proper oiling will reduce the noise from the machines.

→ Planting trees around houses can also act as effective noise barriers.

→ Different types of absorptive material is can be used to control interior noise.

→ Reduction of noise at the source or the origin.

→ Application of sound proofing techniques to muffle down loud noise.

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7. Thermal Pollution

Thermal pollution is defn as the addition of excess of undesirable heat to water that makes it harmful to man, animal or aquatic life or otherwise cause significant departures from the normal activities of aquatic communities in water.

Causes :-

(a) Nuclear power plants
(b) Coal-fired power plants
(c) Industrial effluents
(d) Domestic sewage
(e) Hydro-electric power.

Effects

→ concentration of dissolved oxygen decreases with increase in temp nature of water.

→ The rising temperature increases the toxicity of the poison present in water.

→ fishes show a marked rise in basal rate of metabolism with temperature to the lethal point.

The respiratory rate, oxygen demand, food uptake & swimming speed in fishes increase.

→ Temperature plays an important role in affecting the physiology, metabolism, growth and development of marine animals.

→ Due to the heated discharges from the industries and plants, the bacteria are severely damaged.

Control:-

The following methods can be adopted to control the high temperature caused by thermal discharges.

a. Artificial lakes
b. Spray ponds
c. Cooling ponds
d. cooling towers

@ Artificial ~~dams~~ lakes :-

Artificial lakes are man made bodies of water which offer possible alternative to once through cooling. The heated effluents can be discharged into the lakes at one end and the water

fore cooling purposes may be withdrawn from the other end. The heat is eventually dissipated through evaporation.

(b) Spray ponds :-

The water coming out from condenser is allowed to pass into the ponds through sprayers. Here the water is sprayed through nozzles as fine droplets. Heat from the fine droplets get dissipated to the atmosphere.

(c) Cooling ponds :-

Cooling ponds are the simplest method of cooling thermal discharges. Heated effluents on the surface of water in cooling ponds maximise dissipation of heat to the atmosphere and minimise the water area and volume. This warm water wedge acts like a cooling pond.

8. Nuclear Hazards (Pollution)
(Radio active pollution)

The radiation hazard in the environment comes from ultraviolet, visible, cosmic rays and microwave radiation

which produce genetic mutations in man. The biggest hazard comes from X-rays which account for 95 % of our radiation exposure other than cosmic rays.

Causes

various causes of nuclear hazards are grouped into two types

1. Natural sources 2. Man made sources

1. Natural sources

→ The very important natural source is space, which emit cosmic rays

→ soil, rocks, air, water, foods, radioactive radon-222 etc. also contain one or more radioactive substances

2. Man-made sources

Man-made sources are nuclear power plants, X-rays, nuclear accident, nuclear bombs, diagnostic kits etc. where radioactive substances are used.

Effects

→ Exposure of the brain and central nervous system to high doses of radiation causes delirium and death within hours or days

→ The use of eye is vulnerable to radiation. As its cell die, they become opaque forming cataracts that impaire sight.

→ Acute radiation sickness is marked by vomiting, bleeding of the gums and in severe cases, mouth ulcers.

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

→ Unborn children are vulnerable to brain damage or mental retardation, especially if irradiation occurs during formation of the central nervous system in early pregnancy.

Control:

→ Minimum number of nuclear installations should be commissioned.

→ Nuclear devices should never be exploded in air. If these activities are extremely necessary than they should be exploded underground.

→ In nuclear reactors, closed cycle coolant system with gaseous coolant

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may be used to prevent extraneous activities products.

⇒ Production of radioisotopes should be minimized, as once produced they cannot be rendered harmless by any means except the passage of time.

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

Solid waste management

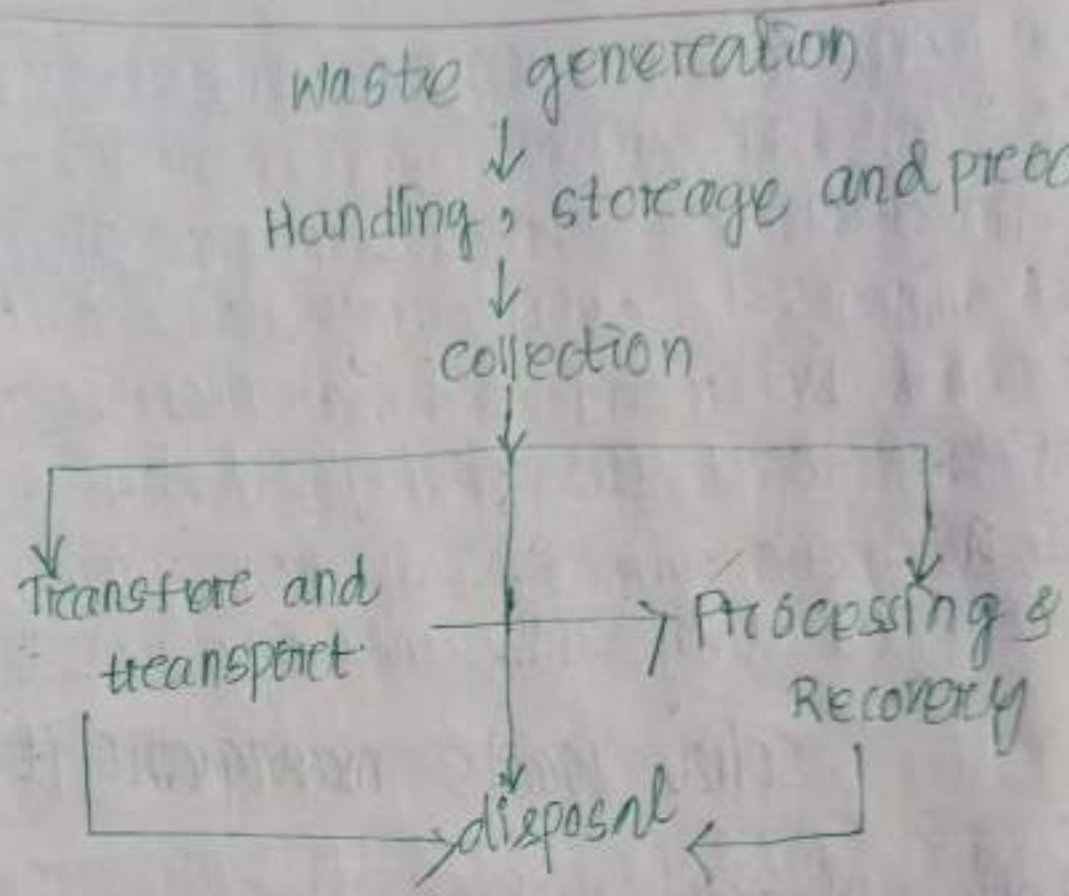
Any material that is thrown away or discarded as useless and unwanted by human or from animal activities is considered as solid waste. The purpose of the study of solid wastes is to-

(i). Identify the various types of solid wastes and their sources.

(ii) ~~Examination~~ Examine the elem

(iii) Examine the composition of wastes.

(iv) consider the elements involved in their management of solid waste from the point of generation to final disposal have been grouped into six functional elements.



The total quantum of solid waste generated in an area depends upon its population and urbanization. Solid wastes generation is directly related with income. Higher the income greater is the waste generation.

Sources of solid wastes

Sources of solid wastes can be classified in to following categories:-

→ Residential
→ Commercial
→ Municipal
→ Industrial

→ Open areas
→ Treatment plants
→ Agriculture
→ Hazardous wastes
→ Construction site

Types of solid wastes

Garbage

Food wastes are the animal, fruit or vegetable residues resulting from handling preparation, cooking & serving of foods. It is also known as garbage.

Rubbish

Rubbish consists of combustible & non-combustible solid wastes of households, institutions, commercial activities etc. excluding food wastes or other highly putrescible materials.

Ex: combustible → paper, cardboard etc.
non-combustible → Aluminium cans, tin cans, glass etc.

Ashes & Residues

materials remaining from the burning of wood, coal, coke and other combustible wastes are categorized as ashes and residues.

Demolition & construction wastes

Wastes from buildings and other structures are classified as demolition wastes. wastes from the construction, remodeling and repairing of individual residences, commercial buildings & other structures are classified as construction waste.

Special wastes

special wastes such as sweepings, roadside litter, catch basin debris, dead animals.

Agricultural wastes:

~~Agricultural wastes~~ a

collection of solid wastes

collection of solid wastes in urban areas is difficult and complex because the generation of residential & commercial & industrial solid wastes is a diffusive process that takes place in every home, every apartment building and every commercial and industrial facility

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as well as on the streets, parks, and even the vacant areas of every community.

Effects of solid wastes

→ Due to improper disposal of municipal solid wastes on the road side and their immediate surroundings, biodegradable undergo decomposition. This produces foul smell and breeds various types of insects, which spoil the land value.

→ Industrial solid wastes are the sources of toxic metals and hazardous wastes, which affects the soil characteristics and productivity of soils where they are dumped on the soil.

→ Toxic substances may percolate into the ground and contaminate the ground water.

→ Burning of some of the industrial wastes or domestic wastes (like cans, pesticides, plastics, radio-active materials, batteries) produce furans, dioxins

and polychlorinated biphenyls which are harmful to human beings.

Management of solid waste

Methods of solid waste disposal

There are following methods :-

(a) physical removal

It is generally done by manual activities like collection of wastes and sorting out into reusable, decomposable and non-decomposable. some municipals are also doing such jobs.

(b) Dumping

Transfer of solid waste from place of collection to the site of disposal is called dumping. corporations and municipal bodies collect & dump them on suitable and safe site away from human habitation.

(c) Compaction and Bailing

The solid wastes are often spread on plane and hard surface and later pressed by bulldozer. This is called compaction. These compacted layer are rolled and piled. This is called bailing. Now such compacted and bailed solid wastes are dumped for decomposition.

3R etc Reduce, reuse and recycle of solid waste

@ Reduce the usage of raw materials

If the usage of raw materials are reduced, the generation of waste also gets reduced.

(b) Reuse of waste materials

→ The refillable containers, which are discarded after use can be reduced

→ Rubber rings can be made from the discarded cycle tubes., which reduces the waste generation during manufacturing of rubber bands

(c) Recycling of materials

Recycling is the reprocessing of the discarded materials into new useful products.

e.g:-

→ old aluminium cans and glass bottles are melted and recast into new cans and bottles.

→ Preparation of fuel pellets from Kitchen waste.

→ Preparation of cellulose insulation from

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Paper II.

Sanitary landfilling

In this process solid wastes are scientifically filled into low lands. As all this wastes can not be recycled or burnt, these will be always in need for land fill. In sanitary landfills, garbage and other waste is spread out in their layers, compacted & covered with clay or plastic foam. The process of filling is done in such a way that wastes can not create any type of hazard to public health.

Thermal process

Burning of solid waste under controlled conditions is called as thermal process. The heat produced in this process may be utilized. It is carried out in both the presence and absence of air.

→ Burning in presence of air is called incineration when in absence is done, it is called pyrolysis.

Incineration of waste is considered to be an unsound practice, because -

→ It destroys most of the waste.
→ It creates toxic gases and ash, which can harm local populations.
→ Release of Dioxins after burning of mixed wastes is hazardous.

Role of an individual in prevention of pollution.

→ Plant more trees.
→ Help more in pollution prevention than pollution control.
→ Use water, energy and other resources efficiently.
→ Purchase recyclable, recycled and environmentally safe products.
→ Use CFC free refrigerators.
→ Use natural gas than coal.
→ Reduce deforestation.
→ Increase use of renewable resources.
→ Remove NO_x from motor vehicular exhaust.
→ Use office machines in well ventilated areas.