

UNIT-I

1. Conservation Of Biodiversity

Conservation

In-situ

(protection of flora and fauna within its natural habitat)

- 1) Biosphere Reserve
- 2) National Parks
- 3) Wild life Sanctuaries
- 4) Gene sanctuary

Ex-situ

(protection of flora + fauna outside its natural habitat)

- 1) Botanical gardens
- 2) seed banks
- 3) tissue and cell culture
- 4) Museums
- 5) Zoological gardens

to
ted

In-Situ

1) Biosphere Reserve

- large area 5000 sq. km
- not meant for any particular species
- Exploitative human activity and tourism is permitted
- used for Educational purpose

Eg: 1) Nanda Devi UP
2) Nokrek Meghalaya

2) National Park

- small area - 100 to 500 sq. kms
- Tourism Encouraged
- conserves 1 or more species
- grazing, private rights, forest activities - prohibited live!

Eg: 1) Kaziranga - Assam - 1 horned Rhinoceros
2) Gir National Park - Gujarat - Lion

- 3) Wild life Sanctuary
- Conserves only animals
 - 500 in India
 - Allows forestry operation
 - Killing, hunting, shooting - prohibited

4) Gene Sanctuary

- Conserves plants

Eg: 1 gene sanctuary - Citrus +

1 for - pitcher plant

Ex-situ

1) Seed Bank

NBPGR - National Bureau of Plant Genetic Resources

- located in New Delhi
- cryo preservation

2) NBAGR - National Bureau of Animal Genetic Resources

- located at Karnal in Haryana
- preserves semen of domesticated animals

3) NEPTCR - National Facility for Plant Tissue Culture repository

- Conserves plants by tissue culture

In-situ

Merits

- 1) cheap & convenient
- 2) species adjust to natural disasters

Demerits

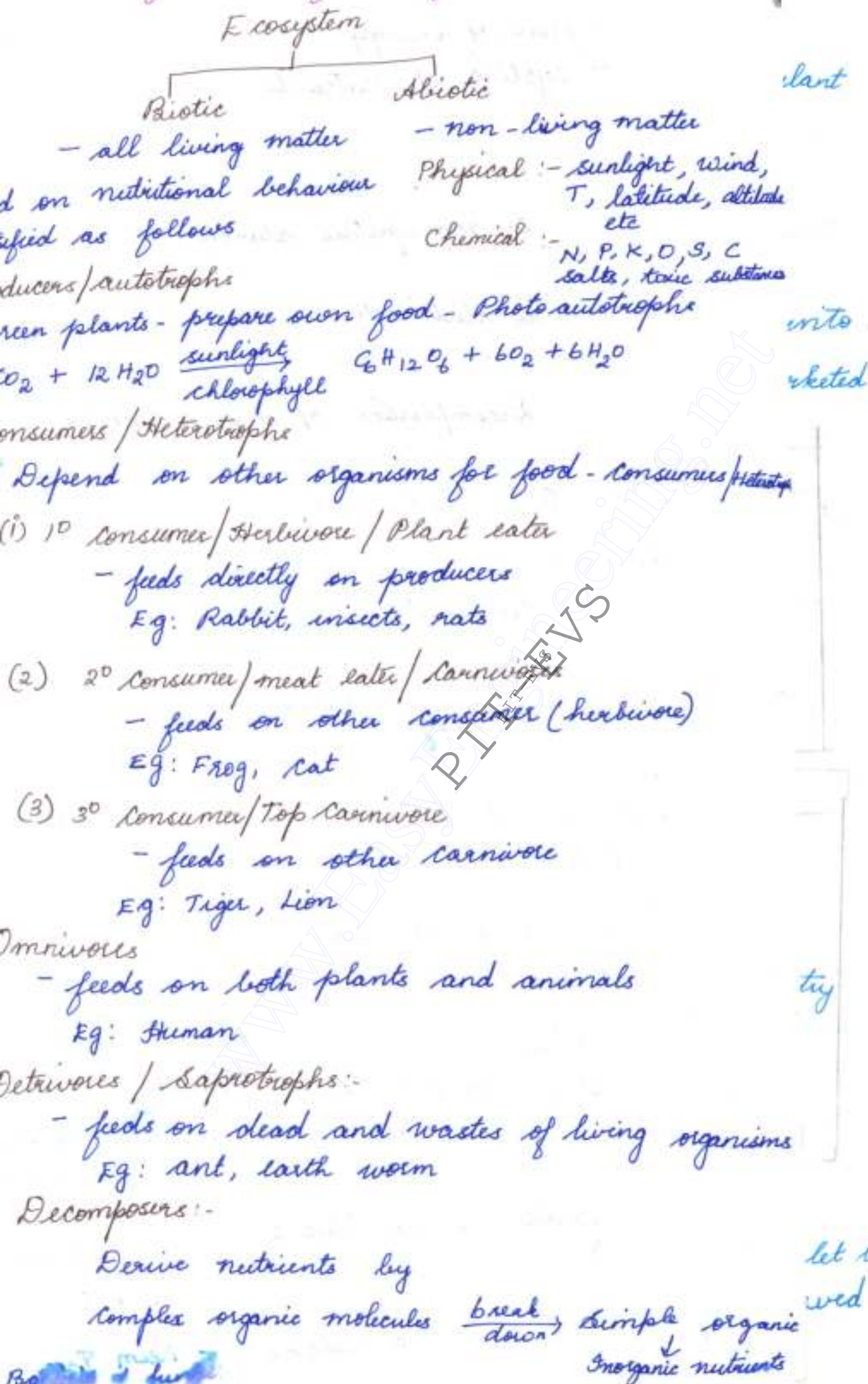
- 1) Requires large area
- 2) Maintenance is not proper

Ex-situ

- 1) survival ↑ due to special care
- 2) Assured food and water to animals

1) Expensive

- 2) Freedom of wild life is lost



Functions :-

- flow of energy
- cycling of nutrients

Types1st function

to manufacture starch

2nd function

to distribute energy

3rd function

Decomposition of dead - cycling

3. Values Of Biodiversity

1) Consumptive Use Value

Consumption

I] FOOD

- 80000 edible plant species + few birds + insects + animals

Eg:

1) *Cucurbita Bulbosa*2) *Codonopsis*II] DRUG

Germany - 2500 plants - in homeopathy + other systems of medicine

India - 3000 plants - Ayurvedha, homeopathy, Unani

30 medicines

Neem Tree

Eg:

Penicillin - Fungus - Antibiotic

Digitalin - Fox glove - Heart stimulant

III] FUEL

Used in the form of 1) firewood

2) fossil fuels

2) Productive Use Value :-

Biodiversity components are converted into commercially useable products and are marketed and sold

Animal Product	Animal
1) Silk	Silk worm
2) Wool	Sheep
3) Musk	Musk Deer
4) Tusk	Elephants
5) Leather	All animals

Product	Industry
Wood	Paper, plywood
Cotton	Textile
Fruit + Vegetable	Food
Leather	Leather Industry
Ivory	Ivory Works
Pearl	Pearl industry
Oil seed	Edible oil

Ethical Value/ Existence Value

→ Based on the concept of 'live and let live'

→ Aims at all life must be preserved

Aesthetic Value

People travel far & wide to enjoy aesthetic value. This is known as Ecotourism.

Option Value

The values of biodiversity are not known today but will be discovered in the near future.

4. Hot Spots In India

1) Eastern Himalayas

2) Western Ghats

I Eastern Himalayas

Covers Nepal, Bhutan, states of east and north east India

PLANTS

1) 9000 plant species, 5800 in India

2) Crops of Economic significance grown

1) Rice

2) Banana

3) Citrus

4) ginger

5) chilli

6) Sugarcane

7) Jute

3) Origin of 5 Palm

1) Coconut

2) Palmyra palm

3) Sugar palm

4) Wild date palm

ANIMALS:-

- 1) Golden langur
- 2) Namdapha flying squirrel
- 3) 163 - globally threatened one-horned rhinoceros
- 4) Himalayan Quail
- 5) Pink headed duck
- 5) Asiatic cheetah

II Western Ghats

Chain of hills along western edge of peninsular India

PLANTS

- 1) 1500 dicotyledone plants
- 2) 245 Orchids
- 3) Eg: 1) Ternstroemia japonica
- 2) Rhododendron
- 3) Hypericum

ANIMALS

- 1) Lion tailed Macaque
- 2) Nilgiri langur
- 3) Nilgiri Tahr
- 4) Malabar Grey Horn Bill

5. Nitrogen Cycle

(Refer To the diagram in notes)

Nitrogen cycle involves 4 process.

1) Fixation :-

- 1) Rhizobium in root nodules of legumes
 - 2) Soil nitrogen fixing bacteria - symbiotic bacteria
- using enzyme nitrogenase fixes nitrogen

Assimilation

- Done by root hairs as
- 1) nitrates (or)
 - 2) Ammonium

2) Ammonification3) Nitrification

4) Denitrification :-



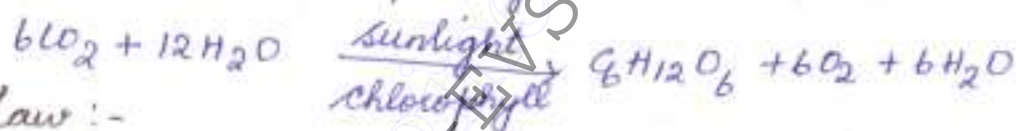
6. Energy flow in an Ecosystem

Governed by I and II law of Thermodynamics

I Law

Energy can neither be created, nor destroyed but can be transformed from 1 form to another

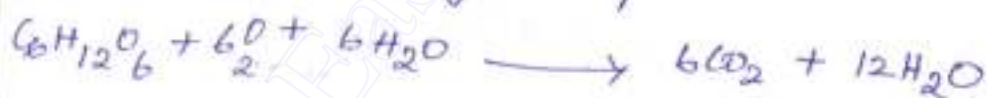
Eg: solar energy $\xrightarrow{\text{photosynthesis}}$ Chemical energy



II Law :-

Whenever energy is transformed there is loss of energy in the form of heat.

Eg: Running, respiration



There is no controversy between 1 and 2 law of thermodynamics. Energy is present in the universe.

[I INCLUDE DIAGRAM FROM TEXT BOOK]

Threats To Biodiversity

1) Habitat loss

2) Poaching

3) Man-Wild life conflict

1) Habitat Loss

- 1) Deforestation
- agriculture / settlement / development projects
- 2) Draining of Wet lands
- 3) Habitat Fragmentation
habitat lost in installments
- 4) Raw Material
Wild plants - raw materials for HYN's
- 5) Production of Drugs
Pharmaceuticals
- 6) Illegal Trade - smuggling of plants + animals
- 7) Developmental activities
dams, discharge of industrial effluents

2) Poaching :-

- killing of animals / commercial hunting

2 Types

- 1) Subsistence Poaching
Killing animals to provide food for survival
- 2) Commercial Poaching
Hunting + killing to sell their products

Causes :-

- 1) human population
- 2) Poachers depend on trade for livelihood in less developing countries

- Eg:
- 1) Snowy large Egret - US - make feathers for ladies hat
 - 2) Baleen - - - to prepare combs + similar objects
 - 3) Elephant feet - - - Ash Trays

Remedy

- 1) Biodiversity laws - strict

3) Man Wild life conflict

— starts when wild life starts causing immense damage and danger to man

Causes

- 1) Deforestation
- 2) Human encroachment into forest area
- 3) Urbanization
- 4) Animals go in search of food
- 5) Injured animals has tendency to attack
- 6) Female attacks when new-born are in danger
- 7) Cash compensation paid by government is less

Eg:

4 yr old child + 16 Nepalese killed by Tiger in Royal Chitwan National park, Kathmandu

Remedies

- 1) More space for National parks, Wild life sanctuaries & bioreserves
- 2) Solar powered fencing with shock proof trenches
- 3) Permission for eco friendly industries

Unit - II

Environmental Pollution

1) Air Pollution

Pollutant	Sources	Effects
1. CO (colourless, odourless)	<ul style="list-style-type: none"> - Incomplete Combustion of fuels - cigarette Smoking - motor vehicle exhaust (T.V.) 	<ul style="list-style-type: none"> - Inhibits O_2 carry by haemoglobin - anaemia - headache - brain cell damage - death - high global T
2. NO ₂ (Reddish brown irritating gas)	$NO_2 + \text{moisture} \rightarrow HNO_3$ <ul style="list-style-type: none"> - fossil fuel burning in <ul style="list-style-type: none"> a) Motor Vehicle (49%) b) Power Plants (49%) 	<ul style="list-style-type: none"> - lung irritation - acid rain - corrodes metals + buildings
3. SO ₂ (colourless, irritating gas)	<ul style="list-style-type: none"> - Combustion of fossil fuels in power plants (88%) - Industrial process (10%) - In the atmosphere can be converted to H_2SO_4 	<ul style="list-style-type: none"> - Breathing problem, Reduces visibility, damages trees, soil + aquatic life
4. SPM (variety of particles + droplets)	<ul style="list-style-type: none"> - Burning coal (40%) - diesel + other fuels (17%) - Agriculture + construction 	<ul style="list-style-type: none"> - nose, throat infection, lung damage, bronchitis, Reproductive problems, cancer
5. O ₃ (Highly reactive irritating gas, Unpleasant odour)	Chemical reaction with volatile organic compound + NO ₂	<ul style="list-style-type: none"> - climatic changes
6. Photochemical Smog	1) Chemical reaction with NO ₂ + HC by sunlight 2) Brownish smoke frequently	<ul style="list-style-type: none"> - Breathing problem, Cough, eye, nose, throat irritation

7. Pb

Paint, Smelters, lead manufacture
Lead storage batteries, leaded
petrol

Accumulates in
Brain & Nervous
System + Mental
Retardation

8. HC

Agriculture, decay of plants,
Burning of wet logs

Carcinogenic,
Ethylene damages
plants at
low concentration

9. Chromium

Paint, smelters, chromium
plating

- Perforation of
Nasal Septum
- Gastro intestinal
damage
- Cancer - Central
Nervous System
damage

2. Types of Solid Waste and its Management

Types:-

Solid waste

Urban/Municipal

- 1) Domestic Waste
food, cloth, paper
- 2) Commercial Waste
shops, markets, hotels,
office, institutions
- 3) Construction Waste
wood, concrete, sand,
glass

Industrial

- 1) Thermal Power
Plant
fly ash
- 2) Nuclear Power
plant
Radioactive Waste
- 3) chemical
Industries
chemicals
- 4) other
Industries

Hazardous

- 1) Toxic
- poisonous
even in small
concentration
- 2) Acute Toxic
Immediate effect
- causes death
- 3) Chronic Toxic
Long Term Effect
Irreparable harm

4. Biological Waste

Waste Organic materials, infectious Waste

TYPES:

1) Biodegradable Waste

Eg: food, vegetables, egg shells, leaves

2) Non-Biodegradable

Eg: Polythene Bags, Metals, Glass Bottles

air, heat, water

Eg: Gun powder

5) Infectious Waste

used bandages, human tissues, needles.

6) Heavy metals

As, Pb

Management :-

Solid Waste Generation

↓
Collection of Waste

↓
Transportation

↓
Storage

↓
Segregation of Waste

↓
Disposal Methods

Land fill

- 80 cm thick - garbage
- 20 cm thick - soil cover
- 25 to 30% of land used for parks, roads + small buildings

ADVANTAGES

1) Simple + Economical

Incineration

- Heating in Incinerator
- 100 to 150 tonnes of garbage per hour
- 700°C

ADVANTAGES

1) Little space

Composting

- Organic waste
- 1.5 m
- Covered with 20 cm thick soil.

ADVANTAGES

1) No need to

3) Land fill reclaimed

Disadvantages

- 1) Large area required
- 2) Transportation cost is high
- 3) Bad Odour

3) Hygienic

Disadvantages

- 1) Capital operating cost - high
- 2) Skilled personal required

Disadvantages

Non Consumable
not disposed

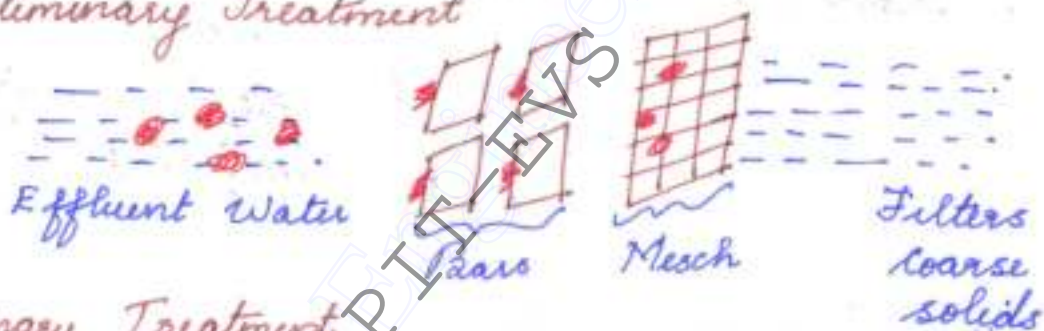
3. Water Pollution - Sources, Causes and Effects

Pollutants	Examples	Sources	Effects
1. Infectious Agents	Bacteria, Viruses, protozoa	Human + Animal waste	Variety of diseases
2. Oxygen demanding Waste	Animal manure, plant debris	Sewage, animal feeds, paper mill, food processing unit	Reduces DO in water - fishes to death
3. Inorganic Chemicals	Acids, Compounds of As, Pb, Se, NaCl, (F^-)	Surface run-off, industrial effluents, house hold cleaners	Skin cancer, Nervous system, kidney, liver damage
4. Organic Chemicals	Oil, gasoline, plastics, pesticide, detergents	Industrial effluents, house hold cleaners, surface run off from farms	Nervous system damage, Cancer
5. Plant Nutrients	Water Soluble compounds containing NO_3^- , PO_4^{3-} + NH_4^+ ions	Sewage, manure, run off of agricultural + Urban fertilizers	Excess Nitrate - blue baby Syndrome Excess algal growth - depletes O_2 - kills fish

6. Sediment	soil, silt	land erosion	Reduces photosynthesis Destroys feeding & spawning grounds of fish.
7. Radioactive materials	Radioactive isotope of Iodine, Radon, U, Cs, Th	Nuclear power plants, Nuclear weapons	Genetic Mutation, birth defects, cancer.
7. Heat	Excessive Heat	Water cooling in Electrical power plants	Lowers DO, Thermal shock.

4. Waste Water (or) Sewage Water Treatment

1) Preliminary Treatment

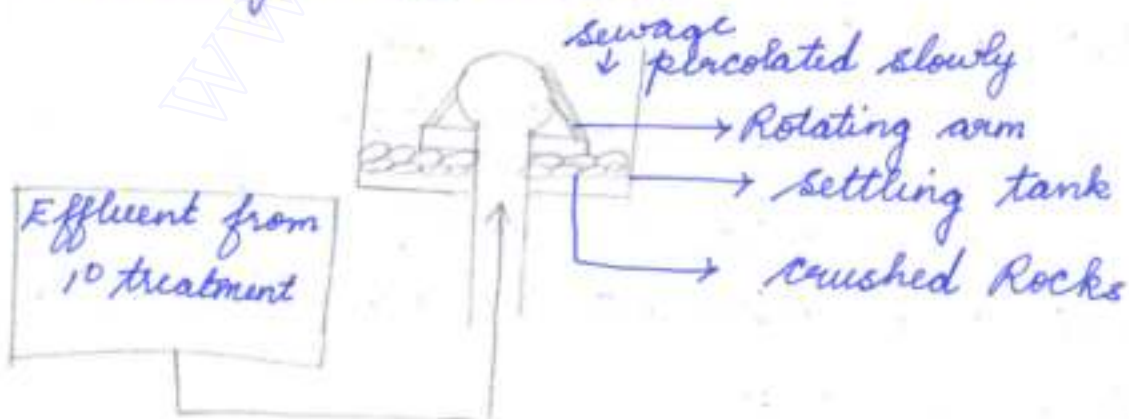


2) Primary Treatment



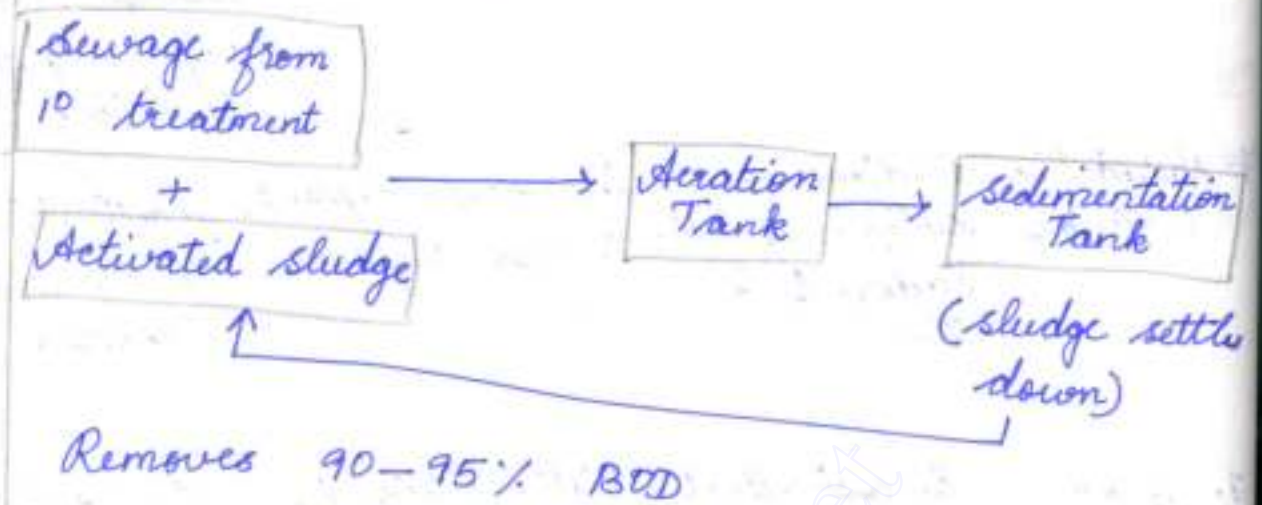
3) Secondary Treatment / Biological Treatment

1) Trickling Filter Process :-

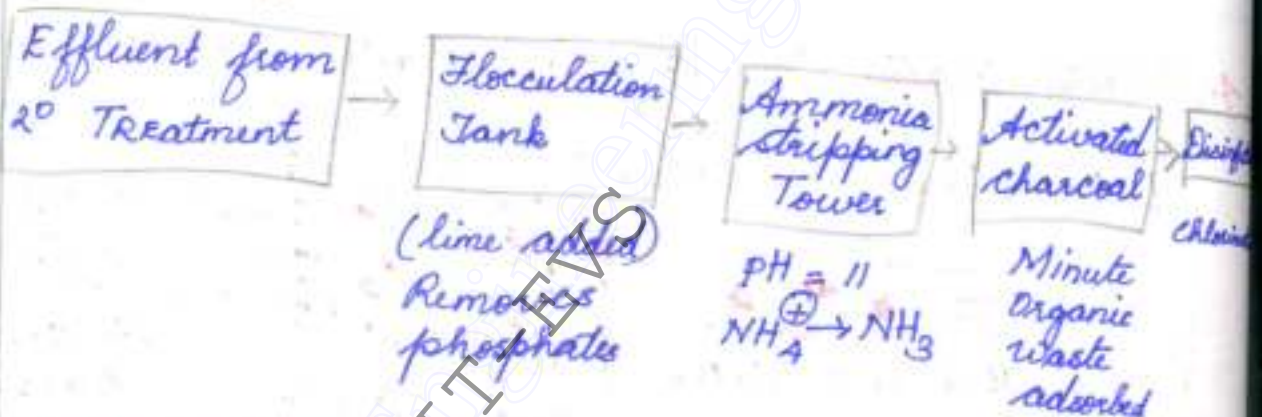


Removes 80-85% BOD

3) Activated Sludge Process



4) Tertiary Treatment



5) Disposal of Sludge :-

- 1) dumping in low lying areas
- 2) burning of sludge
- 3) used as low grade fertilizer

4. Noise Pollution

Sources, Causes and Effects :-

— Unwanted, unpleasant / disagreeable sound that causes discomfort for all living beings

Types & Sources :-

I) INDUSTRIAL :-

- 1) Machines of factories
- 2) mills

II) TRANSPORT :-

1) Road traffic noise due to vehicles

III) NEIGHBOURHOOD NOISE :-

1) disturbance from house hold gadgets

EFFECTS :-

- 1) Contraction of blood vessels
 - 2) Increased blood pressure
 - 3) Increases rate of heart beat
 - 4) Mental distress
 - 5) Neurological problems
 - 6) damages fine hair cells in ear leading to permanent hearing impairment
 - 7) damages ear drum
 - 8) Affects brain - causes Psychiatric illness
- Control Measures :-
- a) heart attack
 - 10) dilation of pupil

1) Source control

- a) Acoustic treatment to machine surface
- b) limiting operational timing
- c) design change

2) Transmission Path Intervention :-

- a) source kept inside insulating enclosure
- b) construction of noise barrier
- c) sound absorbing material

3) Receptor Control :-

- a) ear plugs
- 4) Diling
- 5) Planting trees
- 6) Silent zones near schools, hospitals
- 7) Reducing traffic density

Marine Pollution :-

Discharge of waste substances into the sea, resulting in harm to living resources, hazards to human health, hinderance to fishery and impairment of quality for use of sea water.

Coral Reefs

→ They are underwater structures formed by Calcium Carbonate secreted by corals.

→ Corals are tiny living animals in marine water

→ They are affected by

- 1) Sediment
- 2) agricultural & industrial chemicals
- 3) lost anchors
- 4) Rising ocean Temperature

Sources of Marine pollution :-

1) Dumping the waste

- Industries dump untreated sewage
- Rivers carry garbage
- pesticides & heavy metals

EFFECT:-

Marine birds ingest plastic - gastro-intestinal disorders

2) Oil Pollution :-

- 1) leaks, spills, cleaning of tankers

EFFECT:-

- 1) heavy petroleum adsorbed on rocks, stone and sand banks

- 2) 1 drop spreads to a vast area

Effects :-

- 1) heavy Metals in birds - thinning of egg shells
- 2) 50000 to 250000 birds killed every year
- 3) Low body T in birds - hypothermia
- 4) HC, benzo(a)pyrene accumulate in food chain and consumption of fish by man causes cancer
- 5) Detergent used to clean spills - harmful

Control Measures :-

- 1) People - educated about marine ecosystem
- 2) Local communities involved in protection
- 3) Social & economic incentives for conserving

TO REMOVE OIL :-Physical Methods

- 1) Skimming of oil by suction
- 2) Absorbing material like polyurethane, foam, chopped straw - used
- 3) Adding coagulants

Chemical Methods

- 1) Dispersion
- 2) Emulsification
- 3) Chemical additives

Thermal Pollution :-

The addition of excess of undesirable heat to water that makes it harmful to man, animal or aquatic life

Sources :-

1) Nuclear Power Plants

Nuclear experiments & explosions - discharge ^{unutilized} heat & traces of toxic radio nuclides.

2) Coal fired Power Plants :-

→ ash + hot water - discharged into cooler water bodies
 → heated effluent ↓ res the

Hydro Electric Plant :-

→ -ve power loading in water

EFFECTS :-

- 1) Reduction in DO with \uparrow in T
- 2) Affects metabolism of fishes
- 3) Increase in toxicity - $10^\circ \uparrow$ in Temperature
- increases toxic effect of KCN
- 4) Interference with biological activities of fishes
- 5) Interference with reproduction
- 6) Causes direct mortality of fishes

Control Measures :-

- 1) Cooling Towers :-
 - a) wet cooling tower
 - b) Dry cooling tower
- 2) Cooling Ponds .
- 3) spray ponds
- 4) Artificial lakes .

Natural Resources

1. Effects Of Over-Utilization of Ground Water

1. Decrease of Ground Water

- Excessive usage
- Inadequate Rainfall
- Buildings, constructions seal permeable soil reducing area of percolation of rain water

2) Ground Subsidence

- When ground water withdrawal $>$ Ground water recharge
sediments gets compacted and results in shrinking
- Causes structural damage in buildings

3) Lowering of Water Table

Over utilization for agriculture lowers water table

4) Intrusion of Salt water

- Common in coastal areas
- Water becomes unfit for drinking & agriculture

5) Earthquakes & Landslides

↓ in water level causes earth quakes & landslides

6) Drying of Wells

Excessive usage makes the wells dry

7) Pollution of Water

When ground water level ↓s, pollutants like nitrates gets mixed up.

2 Water Cycle :-

Consists of 3 steps

- 1) Evaporation
- 2) Condensation and precipitation
- 3) Transpiration

1) Evaporation :-

Heat energy from the sun converts the water from water bodies like rivers, lakes and oceans into vapour is called as evaporation.

2) Condensation & Precipitation :-

a) Condensation :-

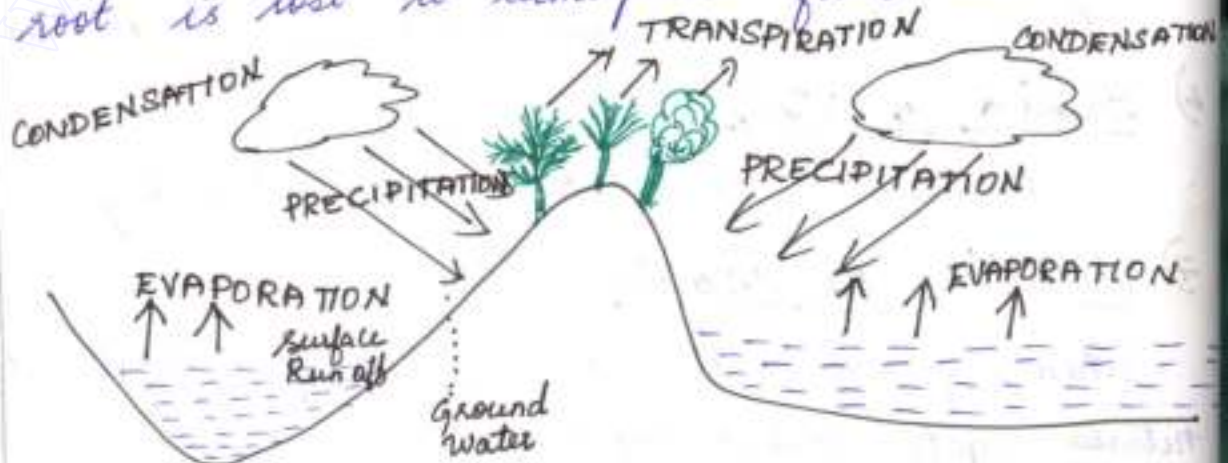
The process of conversion of vapour into droplets of water is called condensation.

b) Precipitation :-

The condensed droplets come down as rain by gravity. Gravity continues to operate either pulling water underground / across the surface.

3) Transpiration

The water absorbed by plants through root is lost to atmosphere from leaves.



Deforestation - Causes and ill effects :-

Deforestation - Destruction of forest

Causes :-

- 1) Commercial logging of Wood
 - a) New extractive technologies used to cut trees
 - b) Non target species are damaged
- 2) Logging companies create infrastructure
 - like roads to make their task easier
- 3) Invasaders
 - like hunters, poachers, plant collectors exploit forest resources.
- 4) Developmental Projects :-
 - like dams, HE projects, roads etc are constructed after depleting forest
- 5) Mining Operations :-
 - To mine out limestone, mica, coal, etc the forest area is greatly reduced.
- 6) Fuel Requirements :-
 - Wood is used as fuel by rural and tribal people.
- 7) Shifting Cultivation :-
 - Replacement of forest by monospecific tree plantation leads to disappearance of plants and animals.
- 8) Forest Fires :-
 - Usually caused by lightning or by human intervention
 - Frees the minerals locked in organic matter
 - Mineral ash used for growth of plants

Impacts / Ill - Effects of Deforestation

1) Global Warming :-

↑ in CO_2 , ↑ in global warming

2) Loss of Genetic Diversity :-

- Destroys genetic diversity
- New food, new medicine destroyed

3) Soil Erosion :-

- No trees, the soil is freed
- Causes soil erosion by rainfall or heavy wind

4) Loss of biodiversity

- Important species are lost
- When plants become extinct, animals also become extinct

5) Unemployment problems :-

- people living in and around forest area lose their livelihood

6) Floods and Landslides :-

- No forests - frequent floods and land slides occur in hilly areas
- Wind speed is high.

A. Over Grazing - Impacts :-

Over Grazing :-

THE PROCESS OF EATING AWAY THE FOREST VEGETATION WITHOUT GIVING IT A CHANCE TO REGENERATE.

Impacts :-

1) LAND DEGRADATION :-

- Over grazing removes vegetable cover on soil
- Exposed soil gets compacted
- Soil becomes organically poor. cannot be used for further cultivation

2) SOIL EROSION

- Roots of grasses are good binders of soil

3) LOSS OF USEFUL SPECIES :-

- Original grasslands are of high nutritive value
- When overgrazing occurs, these grasslands are destroyed and new secondary species which are less nutritive come up.

5. Impacts of Modern Agriculture :-PROBLEMS IN USING FERTILIZERa) Micro-Nutrient Imbalance

- Addition of fertilizers to enhance N, P, K results in loss of micro nutrients like Zinc in soil.

b) Blue Baby Syndrome

- Nitrogenous fertilizers increases nitrate concentration in water
- Nitrates beyond 25 mg/l causes blue baby syndrome.

c) Eutrophication :-

- Excess nutrients gets washed off to close-by water bodies
- It increases Algal growth
- Algae's have less life time and they die.

PROBLEMS IN USING PESTICIDES :-

1st generation Pesticides :-

As, Hg, Pb - used to kill pests

2nd generation Pesticides :-

DDT, Malathion - kills pests and produces side effects

a) Death Of Non-target Species

kills other species which are useful

b) Produces New pests :-

Some pests are immune to pesticides they are called as super pests.

c) Bio-Magnification

- Pest accumulates in food chain
- Finally consumed by human - turns harmful

d) Risk Of Cancer

- directly acts as carcinogens
- Suppress the immune system

Desired Qualities of Ideal Pesticide

- 1) Must kill only target species
- 2) Biodegradable
- 3) Should not produce new pest
- 4) " " " " toxic vapours
- 5) Chlorinated / organophosphate pesticides - should not be used.

Water Logging

Land where water stands for most of the year.

Causes

- 1) Over irrigation
 - 2) Heavy rain
 - 3) Poor drainage
- 1) During water logged conditions, pore voids in the soil gets filled with water
 - 2) Roots of plants do not get adequate air for respiration
 - 3) Mechanical strength of soil ↓ and crop yield falls

Remedy:-

- 1) Preventing excessive irrigation

2) Bio drainage by Eucalyptus trees

SALINITY

Water which is not absorbed by soil undergo evaporation leaving behind a thin layer of dissolved salts in the top soil.

Saline soil has

- | | |
|---------------|-----------------------|
| 1) NaCl | 4) $MgCl_2$ |
| 2) Na_2SO_4 | 5) Sodium bicarbonate |
| 3) $CaCl_2$ | |

PH = 8.0, alkaline

Causes:-

- 1) Over Irrigation - Canal water - more salty than rain water - decreases crop yield.

Remedy:-

Flushing out salt by good quality water.

6. Soil Erosion - Causes, Effects, Control Measures.

Soil Erosion:- THE PROCESS OF REMOVAL OF SUPERFICIAL LAYER OF SOIL FROM ONE PLACE TO ANOTHER

TYPES:

- 1) Normal Erosion - natural process - slow
- 2) Accelerated Erosion - man-made " - fast

CAUSES:-

- 1) WATER :- affects soil as 1) rain
2) rapid flow
- 2) WIND :- carry away fine particles of soil
- 3) BIOTIC AGENTS :- Overgrazing, Mining, deforestation
- 4) LAND SLIDES :-

EFFECTS:-

- 1) Soil fertility lost
- 2) Cannot hold water
- 3) kills aquatic life

CONTROL OF SOIL EROSION1) CONSERVATIONAL TILL FARMING:-

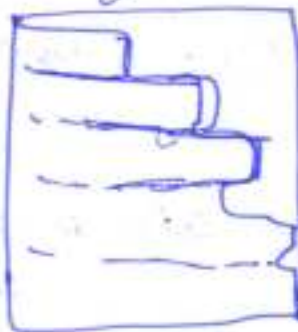
- land is not ploughed
- causes minimum disturbance to soil
- Machines makes slits and inject seeds

2) CONTOUR FARMING:-

- planting crops in rows across contours

3) TERRACING

- Conversion of steep slopes into terraces

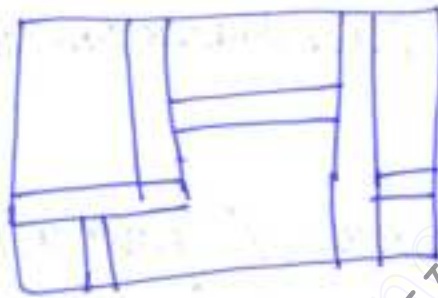
4) ALLEY CROPPING:-

- planting crops in strips/alleys between rows of trees



5. WIND BREAKS / SHELTER BELTS

- trees planted in long rows along the boundary of cultivated land.
- helps retain soil moisture



7. Environmental Damages caused by Mining

(1) DEVEGETATION & DEFACING OF LANDSCAPE

- Vegetation - removed.
- landscape becomes exposed
- badly affected

(2) GROUND WATER CONTAMINATION

- Sulphur mixes with water and becomes sulphuric acid.
- Water becomes acidic
- heavy metals also leach into ground water.

(3) SURFACE WATER POLLUTION :

- Drainage of acid mines pollutes streams and lakes
- Radioactive Wastage kills aquatic animals

→ Mining generates SPM, arsenic particles, Cd, Pb etc

→ Air pollutants like SO_x , NO_x emitted

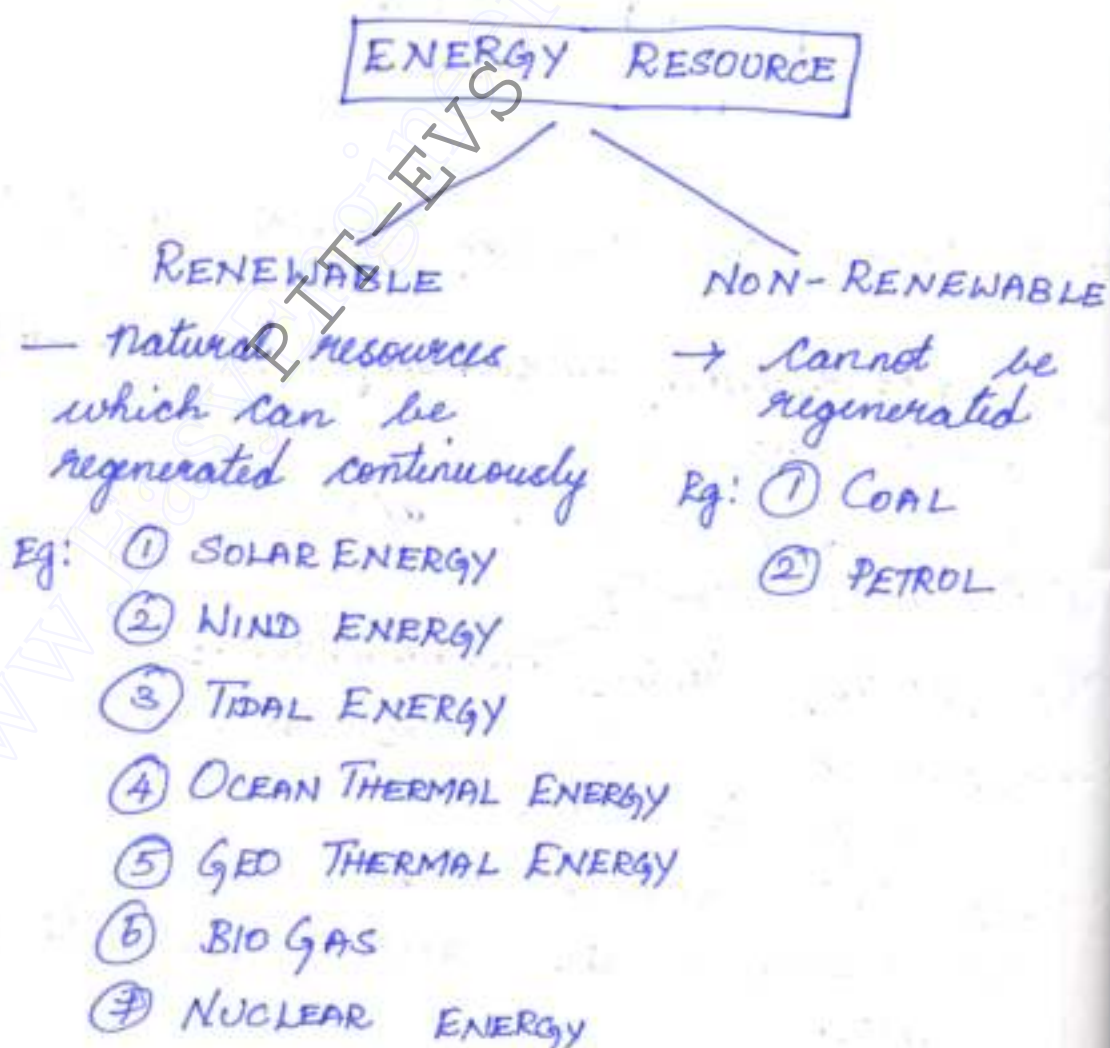
(5) SUBSIDENCE OF LAND

→ Cracks in houses

→ tilting of buildings

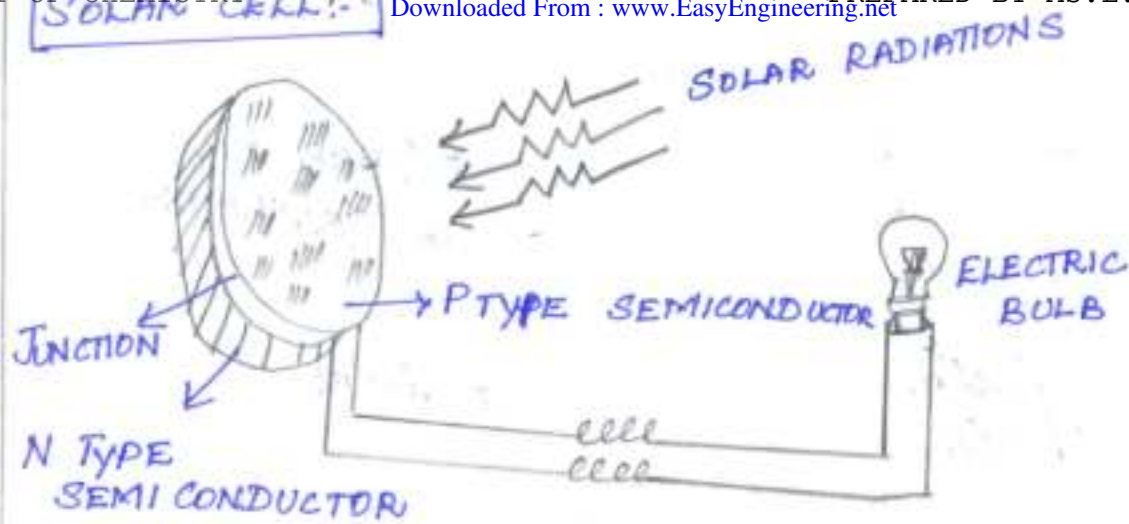
→ bending of rail tracks

8. RENEWABLE AND NON RENEWABLE ENERGY RESOURCES



I) SOLAR ENERGY :-

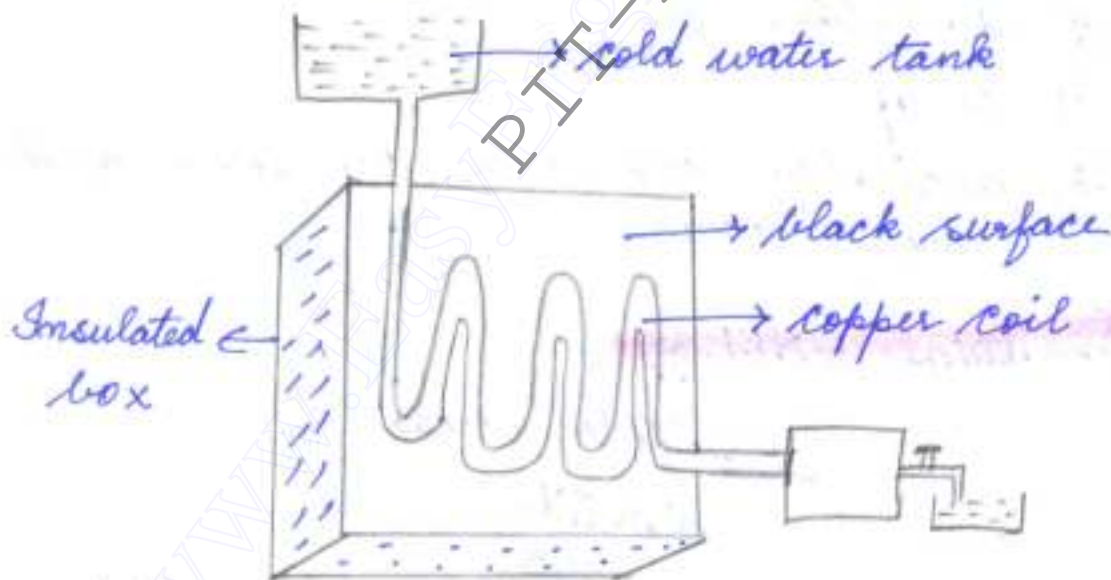
Energy directly got from the sun is called solar energy.

SOLAR CELL:-Uses

→ Calculators, electronic watches, street lights etc

SOLAR BATTERY

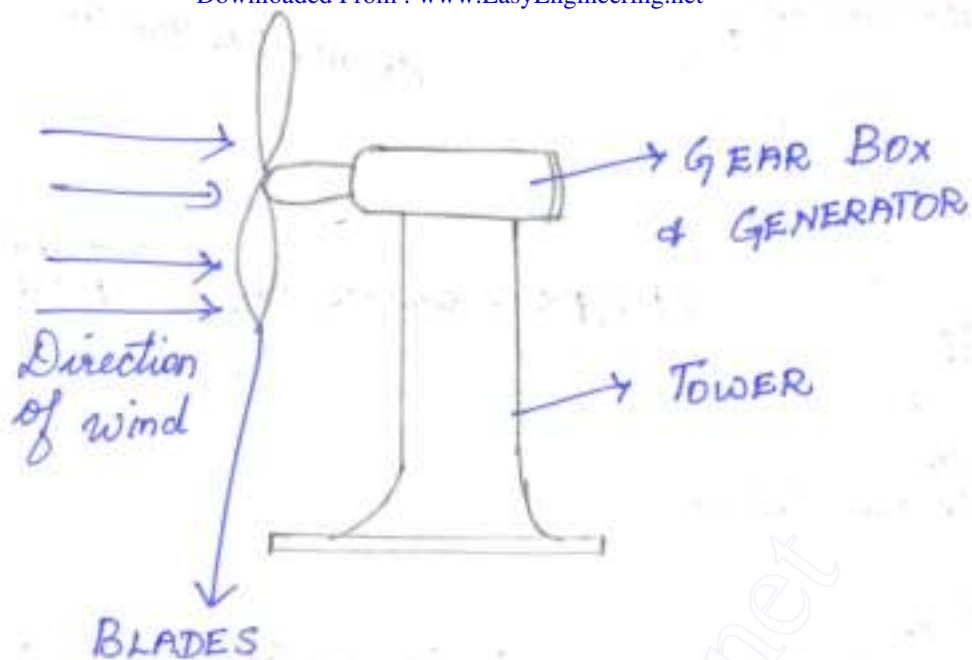
→ large number of solar cells connected in series it forms a solar battery.

SOLAR WATER HEATERSignificance of solar energy

- 1) pollution free
- 2) Can be used in remote areas like forests and hills.

WIND ENERGY

Moving air is called wind. Energy recovered from wind is called wind energy.



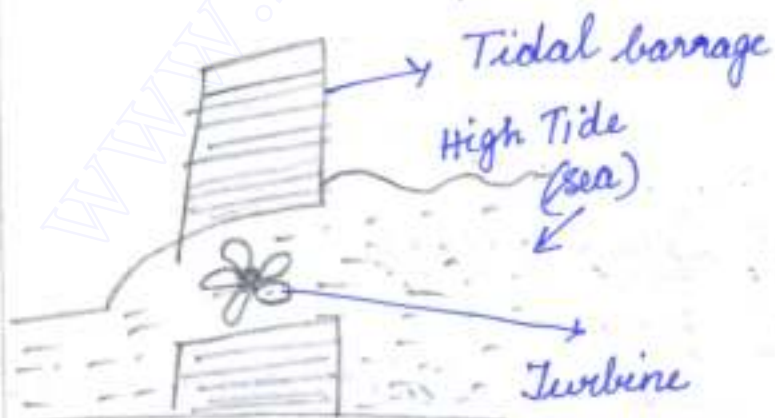
Wind farms

large number of wind mills installed forms a wind farm

Significance

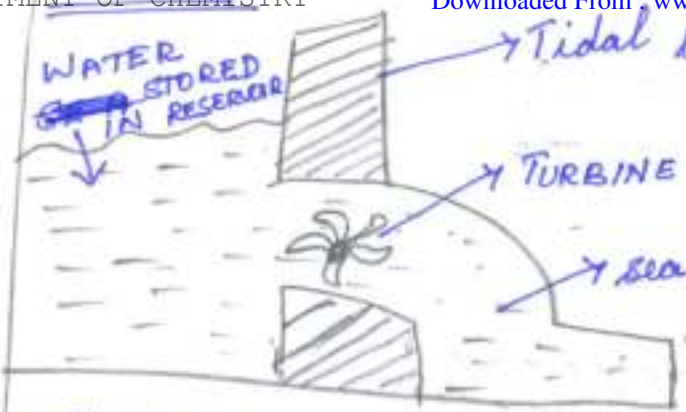
- ① pollution free
- ② cheap
- ③ available off shore, on shore and remote areas

III TIDAL ENERGY



HIGH TIDE :-

- 1) Water flows from sea to land across barrage
- 2) Rotates turbine



- 1) Water flows from reservoir to sea
- 2) rotates turbine
- 3) generates electricity

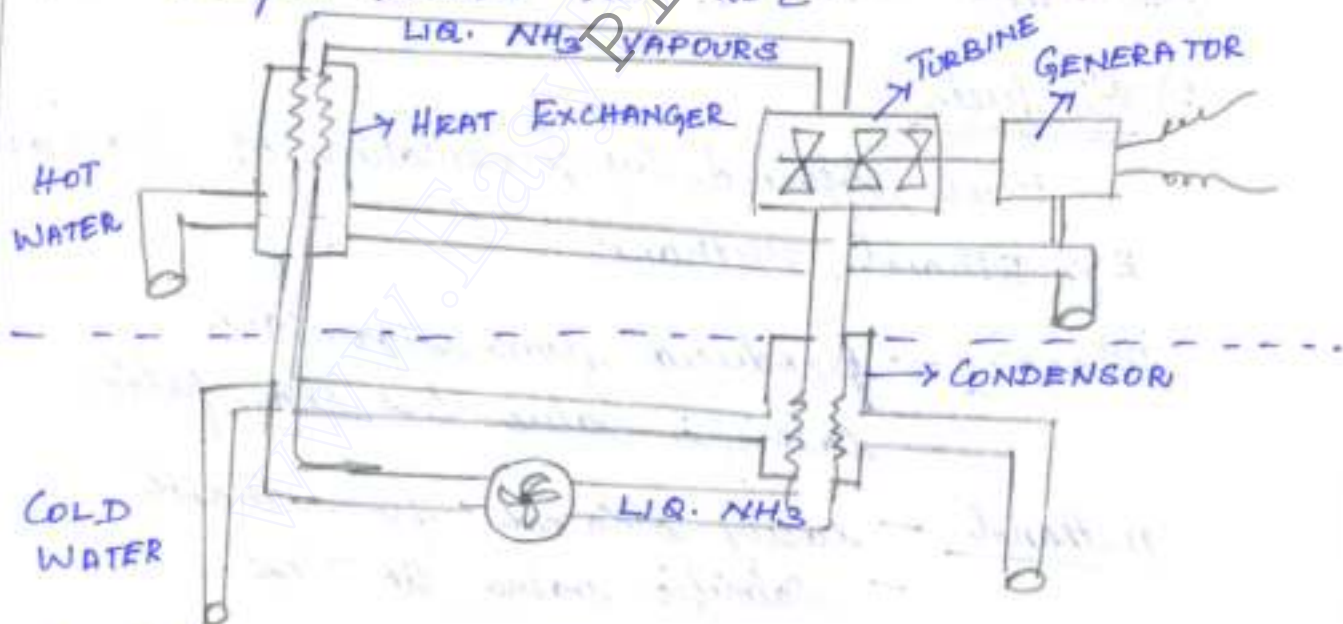
Significance

- 1) does not require large area
- 2) sea water - inexhaustible
- 3) pollution free

OCEAN THERMAL ENERGY (OTE)

The energy available due to the difference in temperature of water is called ocean thermal energy.

Temperature difference between surface water and deep water is 20°C

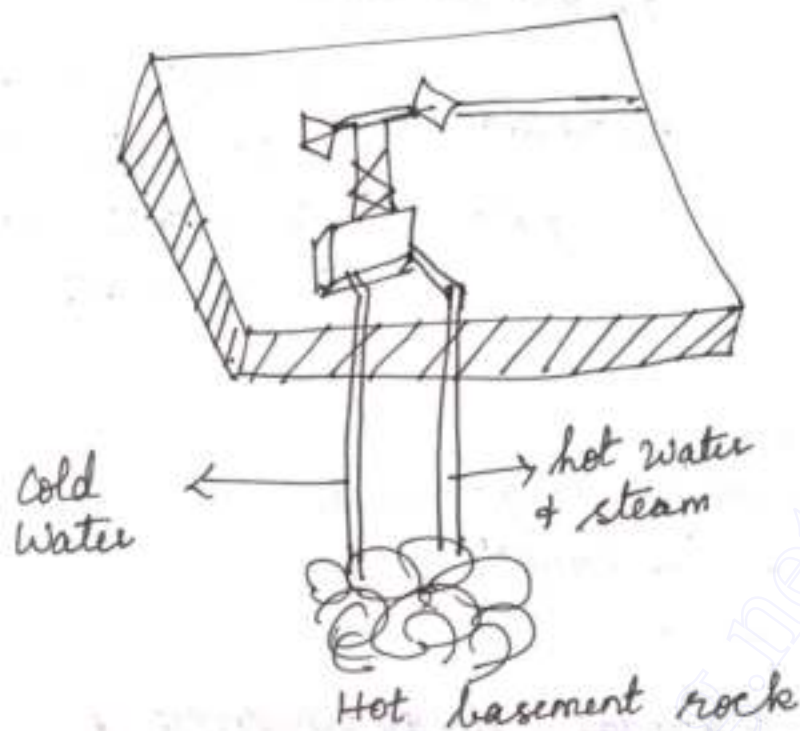


Significance

- 1) continuous, renewable, pollution free

GEO THERMAL ENERGY

Energy harnessed from the high temperature



Significance :-

- 1) power generation level is higher
- 2) pollution free

BIO MASS ENERGY :-

1) Bio fuels

Fuel obtained by fermentation of biomass

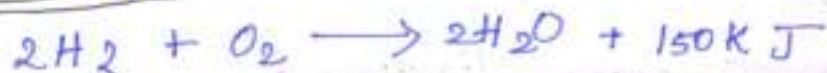
Eg: Ethanol, Methanol

Ethanol — produced from sugar cane
— calorific value less than petrol

Methanol — easily obtained from ethanol
— calorific value too low.

Gasohol — Mixture of ethanol + gasoline.

2) Hydrogen Fuel



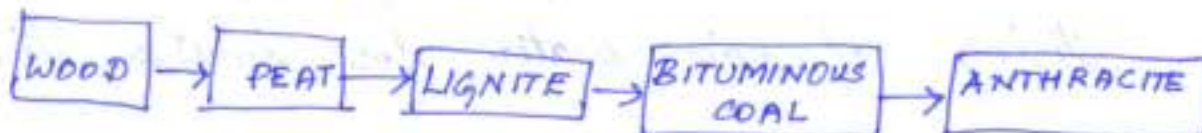
Significance :-

- 1) cost of obtaining energy is low

NON CONVENTIONAL ENERGY RESOURCE

1) COAL :-

- solid fossil fuel
- various stages of coal

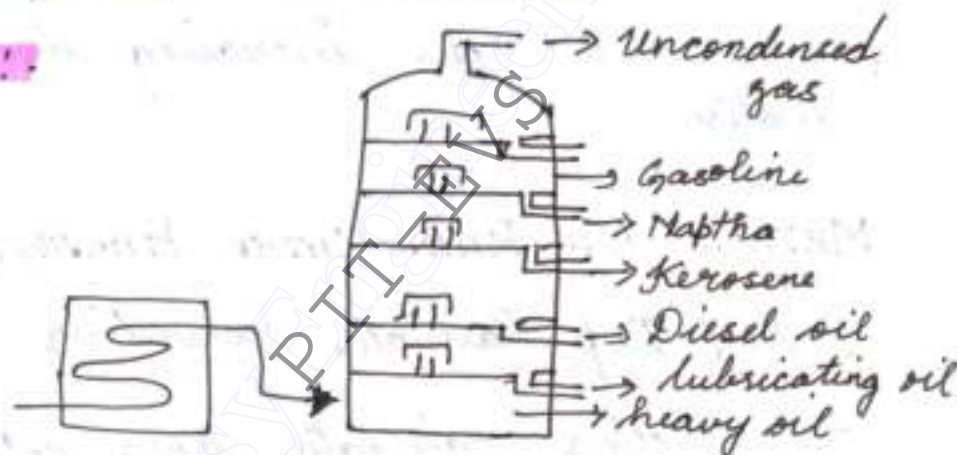


Carbon content of Anthracite is 90%.

Disadvantages of using coal

- 1) when coal is burnt, it produces CO_2
- 2) Has impurities like S and N

2) PETROL :-



3) LPG :-

Liquified petroleum gas is colourless and odourless. But during bottling some mercaptans are added which produces odour and avoids accidents.

NUCLEAR ENERGY

Nuclear fission :-

Heavier nucleus split into lighter nuclei on bombardment by fast neutrons and a large amount of energy is released.

Nuclear fusion :-

Lighter nuclei combine to form heavier nuclei.

Unit - 4

SOCIAL ISSUES AND ENVIRONMENT

1. Rain Water Harvesting

— Is a technique of capturing and storing of rain water for further utilization.

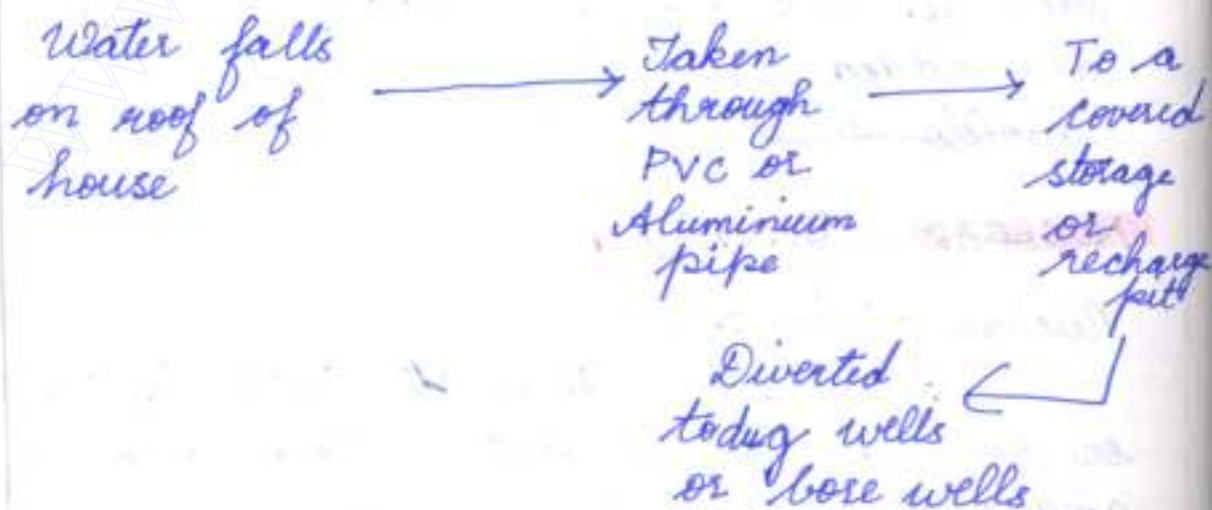
NEED :-

- 1) Recharge ground water table
- 2) To reduce surface run off and soil erosion
- 3) To minimize water crises and water conflicts
- 4) To meet the increasing demands of water

METHOD OF RAIN WATER HARVESTING

a) Roof Top Rainwater harvesting method :-

→ collecting rainwater from roof of the building and storing it in ground for our future use.



[Refer diagram from book]

ADVANTAGES OF RAINWATER HARVESTING

- 1) Reduction in use of current for pumping water
- 2) Rise in ground water level
- 3) Future generation is assured of water
- 4) Controls droughts
- 5) stops floods and soil erosion

2) Resettlement and Rehabilitation

— Most serious problem of developmental activities

Causes :-

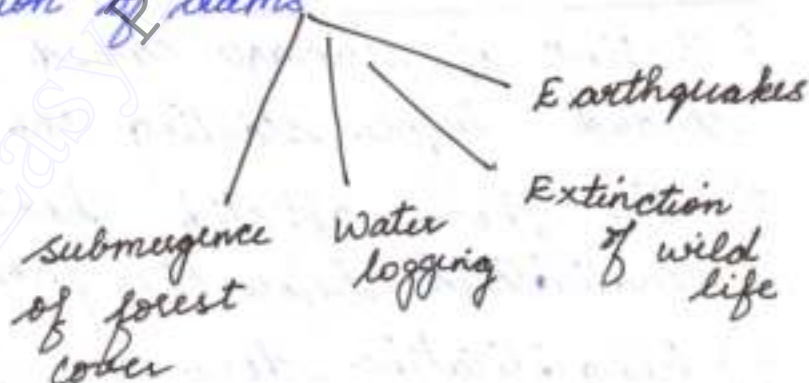
1) Due to developmental activities

1) Construction of dams

2) Mining

3) roads

4) Airports



2) Due to disaster :-

1) Natural Disaster :- Earthquakes, floods, landslides

2) Man-Made Disaster :- Industrial accidents, Nuclear accidents

3) Due to Conservation

1) National park

2) forest reserve

3) Biosphere reserve

Resettlement :-

- Simple relocation or displacement of human population

Rehabilitation

Making the system work again by allowing the system to function naturally

Issues :-

- 1) Tribals - most affected
- 2) Break up of families affects women
- 3) low cash compensation
- 4) Marriages, social + cultural functions vanish
- 5) loss of identity

Rehabilitation policy :-

- 1) Extent of damage caused should be studied before starting the project
- 2) All those affected should be ~~re-settled~~ rehabilitated before the project starts
- 3) Rehabilitation done on minimum dislocation basis
- 4) Should meet social justice
- 5) People should feel happy at new location

3.

Water Shed Management :-

Watershed :-

The land area from which water drains under the influence of gravity into a stream, lake, reservoir or other body of surface water.

Need :-

- 1) Minimize floods, draughts, landslides
- 2) Develop rural areas economically
- 3) Developmental activities like domestic water supply, Hydro electric power generation
- 4) Employment Opportunities
- 5) Promotes Social Forestry
- 6) Protect soil from soil erosion
- 7) Raise ground water level.

Management Techniques :-

1) Trenches (pits)

pits dug at equal intervals

2) Earthen dam (or) stone Embankment

To check run-off, earthen dam is constructed

3) Farm Pond :-

Constructed to improve water storage capacity

4) Underground barours

build to raise water table.

Maintenance of Water shed/Components of Watershed management

prevents soil erosion

3) REDUCING SOIL EROSION

done by terracing and contour cropping

1) SCIENTIFIC MINING & QUARRYING

- Improper mining disturbs soil.
- Planting soil binding plants at an interval of 1m.

2) PUBLIC PARTICIPATION

people's co-operation

3) MINIMIZING LIVE STOCK POPULATION

Livestock in surrounding villages - minimizing

④ WASTE LAND RECLAMATION & CONSUMERISM

Waste land :-

Land which is not in use is called waste land

Types :-

1) CULTIVABLE ::

not cultivated for more than 5 years

2) UN CULTIVABLE

Cannot be brought under cultivation

Causes :-

- 1) soil erosion, deforestation, over grazing, water logging, salinity
- 2) pesticides - excessive use
- 3) demand for fire wood
- 4) Developmental activities
- 5) Mining

Methods :-1) DRAINAGE :-

- Excess water removed by artificial drainage
- used in water logged soil

2) LEACHING :-

Removal of salt by water

3) IRRIGATION PRACTICES :-

High frequency irrigation with controlled amount of water.

4) GREEN MANURES & FERTILIZERS :-

used in saline soil

5) APPLICATION OF GYPSUM :-

reduces soil sodicity

Ca replaces Na

6) AFFORESTATION PROGRAMMES :-

NCA - National Commission on Agriculture launched afforestation programme.

7) SOCIAL FORESTRY PROGRAMME :-

strip plantation on road, canal sides.

5) CONSUMERISM :-

Consumerism refers to consumption of resources by the people

Rights of buyers

- 1) To buy or not buy
- 2) To expect a product to be safe
- 3) Ingredients of the product
- 4) Manufacturing & Expiry date

Rights of sellers

- 1) To charge any price
- 2) To spend any amount to promote the product
- 3) To use incentives

Objectives :-

- 1) Improves rights & powers of buyers
- 2) Forces manufacturer to reuse and recycle
- 3) Items that are non-decomposable are returned to the manufacturer reclaiming useful parts & disposing the rest
- 4) Improves human health and happiness

6) 12 PRINCIPLES OF GREEN CHEMISTRY

1) PREVENTION OF WASTES :-

prevent waste than to treat / clean

2) ATOM ECONOMY

Synthetic methods for maximum usage of materials

3) LESS HAZARDOUS CHEMICAL SYNTHESIS

Generation of less toxic / non toxic materials

4) DESIGNING SAFER CHEMICALS

Chemical substances - perform desired function alone; Non-toxic

5) SAFER SOLVENTS AND AUXILIARIES

auxiliaries - are unnecessary
If used - should be safe

6) DESIGN FOR ENERGY EFFICIENCY

Energy requirements - minimized

7) USE OF RENEWABLE FEEDSTOCK

Raw materials used - renewable

8) REDUCE DERIVATIVES:-

Unnecessary derivatives - avoided/minimized as it consumes more reagents and produces waste

9) CATALYSIS:-

Catalytic reagents are superior

10) DESIGN FOR DEGRADATION

Chemical products at the end should break down into harmless degradation products

11) REAL TIME ANALYSIS FOR POLLUTION PREVENTION

Analytical methodologies to control formation of hazardous substances

12) INHERENTLY SAFER CHEMICALS FOR ACCIDENT PREVENTION:-

Substances chosen should minimize chemical accidents including releases, explosions and fires

AIR (PREVENTION AND CONTROL OF POLLUTION) ACT, 1981

Aim:-

To control air pollution and monitor air quality

FEATURES :-1) Central Pollution Control board :-

- lays standards for quality of air
- provides technical assistance and guidance to state board
- Its directions are mandatory on state board
- Industries prohibited in heavily polluted areas.

2) State Pollution Control board :-

- lays standards for quality of air in industries and automobiles
- collects & compiles information related to pollution
- Examines manufacturing processes
- declares heavily polluted areas as 'pollution control areas'.

VIOLATORS :-

- 1) fine of Rs 10,000
- 2) 3 months imprisonment

WATER (PREVENTION AND CONTROL OF POLLUTION) ACT, 1974Aim :-

Prevents and control water pollution

FEATURES :-

- 1) Establishes state and central pollution control boards
- 2) Any person cannot discharge effluent into any water body

- 3) Any industry cannot discharge effluent into any water body.
- 4) Use altered outlet for discharge of sewage
- 5) Order closure of electricity and water to polluting unit

VIOLATORS :-

- 1) Fine of Rs 5000 every day if default continues
- 2) 1½ years to 6 years imprisonment

WILD LIFE (PROTECTION) ACT 1972, AMENDED IN 1983, 1986 and 1991

Aim :-

To protect and preserve wild life

FEATURES :-

- 1) Rights and non-rights of forest dwellers listed
- 2) Restricted grazing in sanctuaries and national parks
- 3) Prohibits collection of non-timber products

DRAWBACKS :-

- 1) Does not involve local conservation measures
- 2) Ownership certificates help for illegal trading
- 3) J & K has its own wild life act.

VIOLATORS :-

- 1) Fine of Rs 25000
- 2) 3 years imprisonment

ENVIRONMENT (PROTECTION) ACT, 1986

Aim :-

- To improve and protect the environment
- To prevent hazards to all living creatures

FEATURES :-

- 1) lays down procedures and safe guards for prevention of accidents + remedial measures if accident occurs
- 2) can close/prohibit any industry or its operation
- 3) The person who is directly incharge is punishable in case of offence
- 4) Empowers central government to inspect the site or plant.

VIOLATORS

- 1) 5 years imprisonment
- 2) Fine of Rs 1 lakh
- 3) If violation continues, additional fine of Rs 5000/day.

FOREST (CONSERVATION (OR) PRESERVATIVE) ACT 1980

Aim :-

- To protect and conserve forest

FEATURES :-

- 1) Reserved forest should not be considered as dereserved without prior permission of central government.
- 2) Forest land should not be used for

- 3) Illegal activities within forest area should be stopped.
- 4) Forest department should not assign forest land for lease.
- 5) Clearance of forest land for re-afforestation is forbidden.
- 6) Diversion of forest land for non-forest use is offence.

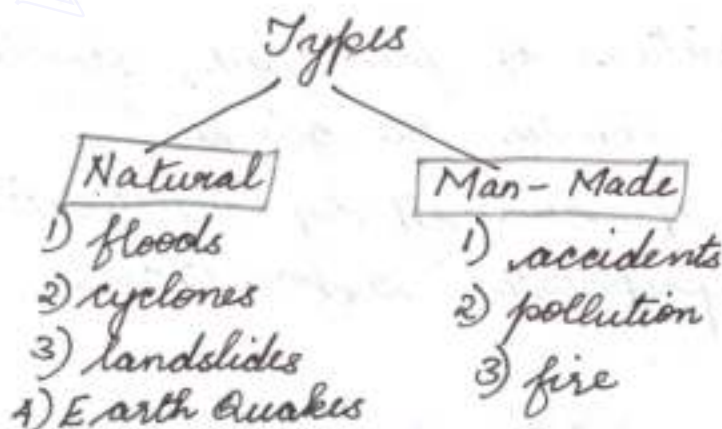
DRAWBACKS:-

- 1) Power is given to central government
- 2) local communities not taken into consideration
- 3) Tribals involve in criminal activities as they have lost their livelihood

⑧ DISASTER MANAGEMENT:-

Disaster:-

Disaster is a geographical process, concentrated in time and space, in which a society, or subdivision of society undergoes severe danger and causes loss of its members and physical property.



D FLOODS :-

Definition :-

Whenever the magnitude of water flow exceeds the carrying capacity of the channel within its banks, the excess of water over flows on the surroundings causes floods

CAUSES :-

- 1) Heavy rain
- 2) Sudden snow melt
- 3) Reduction in carrying capacity of channels
- 4) Deforestation
- 5) Construction of roads, buildings

EFFECTS :-

- 1) houses washed away
- 2) Damages crops and livestock

MANAGEMENT :-

- 1) Encroachment of flood ways banned
- 2) Building check dams
- 3) Inter linking of rivers
- 4) Flood forecast and flood warning should be given
- 5) Satellite pictures of pre-flood, flood informations should be given
- 6) Reduction of run-off by infiltration through appropriate afforestation

2) CYCLONE

Definition :- Cyclone is a meteorological phenomenon, intense depressions forming over the open oceans are moving towards the land.

FEATURES :-

- 1) They move like spinning top at the speed of 10-30 km/hour
- 2) Cyclones from bay of bengal are more intense than Arabian sea
- 3) In India cyclone occurs during October - December / April - May.

NAMES :-

- 1) Hurricanes
- 2) Typhoons
- 3) Cyclones
- 4) Willy Willies

Effects :-

- 1) damage depends on intensity of cyclone
- 2) damages human, crops, roads & livestock

MANAGEMENT :-

- 1) Weather forecasting should be done
- 2) Radar system used to detect cyclone
- 3) Satellite pictures used for forecasting

3) LANDSLIDE

Definition :-

The movement of earthly materials like coherent rock, mud, soil and debris from higher region to lower region due to gravitational pull is called landslides.

CAUSES:-

- 1) Rainfall
- 2) Movement of heavy vehicles
- 3) Earthquakes
- 4) Soil erosion
- 5) Mining

EFFECTS:-

- 1) Block the roads
- 2) Erosion of soil increases
- 3) damages houses, crops etc

MANAGEMENT:-

- 1) unloading upper parts of slope
- 2) steepness of slope can be reduced
- 3) soil stabilization by using chemicals
- 4) Constructing stone embankments

EARTHQUAKES:-Definition:-

An earthquake is a sudden vibration caused on the earth's surface due to sudden release of tremendous amount of energy stored in rocks under earth's crust.

CAUSES:-

- 1) volcanic eruptions
- 2) movement of tectonic plates
- 3) dams
- 4) underground nuclear testing
- 5) mining

SEVERITY:-

measured on Richter scale

Less than 4 - Insignificant

4 - 4.9 - Minor

5 - 5.9 - Damaging

6 - 6.9 - Destructive

7 - 7.9 - Major

More than 8 - Great

EFFECTS:-

- 1) Causes land slides
- 2) Damages settlement and transport systems
- 3) Collapses houses
- 4) Causes seismic waves

MANAGEMENT:-

- 1) Constructing earth quake resistant building
- 2) Seismic hazard map should be given

⑨

NUCLEAR ACCIDENTS AND HAZARD

TYPES OF NUCLEAR ACCIDENTS:-

1) Nuclear Test :-

nuclear explosions carried out underground will cause settling down of radioactive particles

2) Nuclear power plant accidents:-

Release of radiation during accidents.

3) Improper disposal of radioactive waste:-

Drums stored underground can rust and leak radioactive materials

4) Accident during Transport :-

Trucks carrying radioactive wastes

5) Core melt down:-

major accident in nuclear power plant causes core melt down.

EFFECTS:-

- 1) Break down chemical bonds in DNA. Causes irreparable damage
- 2) Exposure to low dose of radiation, people suffer from fatigue, vomitting and loss of hair
- 3) Exposure - high dose of radiation - affects bone marrow, blood cells.
- 4) Exposure - very high dose of radiation - kills and damages tissues of heart and brain

NUCLEAR HOLDOCAUST:-

— destruction by nuclear bombs and equipments

EFFECTS:-

1) NUCLEAR WINTER:-

- * Nuclear bombardment causes large quantity of soot particles to rise
- * This absorbs all UV radiations
- * This causes cooling
- * This is called nuclear winter

EXAMPLES OF NUCLEAR HOLDOCAUST:-

- 1) NUCLEAR WAR:- Hiroshima and Nagasaki
Nuclear bombs dropped in Hiroshima and Nagasaki

2) CHERNOBYL :-

Nuclear reactor exploded at Chernobyl in Ukraine when reaction went out of control.

Control measures:-

- 1) Suitable precautions to be taken
- 2) Constant monitoring of radiation levels.
- 3) Regular checks.

Unit - 5

Human Population & The Environment1) Variation of population based on Age structureAge structure

- 1) Pre-productive population (0-14) years
- 2) Reproductive population (15-44) years
- 3) Post-productive population (Above 45 years)

1) PYRAMID SHAPED VARIATION OF POPULATION

- shows increase in population growth
- Eg: → India, Bangladesh, Ethiopia etc
- pre-reproductive age group (0-14) is more
- post-reproductive (above 45) is less
- so pre-reproductive enters reproductive stage

2) BELL SHAPED VARIATION OF POPULATION

- shows stable population growth
- Eg: France, USA, UK, Canada
- Pre reproductive and reproductive are equal

3) URN SHAPED VARIATION OF POPULATION

- shows decrease in population
- Eg: Germany, Italy, Sweden, Japan
- Pre reproductive smaller than reproductive age group.

[Refer diagrams in Text Book]

2) Role of Information Technology in Environment protection and Human health

Information Technology:-

Means collection, processing, storage and dissemination of information

Softwares for environment education

1) REMOTE SENSING:-

→ method used to gather information about an object without actually coming in contact with it

→ Used to derive information on natural resources and environment

→ Uses forces like electromagnetic radiations, gravity etc.

Applications of Remote Sensing:-

- 1) AGRICULTURE:- optimal usage of land and water resources
- 2) FORESTRY:- Type, density & extent of forest cover
- 3) LAND COVER:- Spatial information of land usage
- 4) WATER RESOURCES:- water body mapping, water quality monitoring, irrigation water management.

2) DATA BASE:-

Collection of inter-related data on various subjects

Applications:-

- 1) Ministry of Environment & Forest

2) National Management Information System [NMIS]

- database on R+D projects
- On research scientist and personnel

3) Environment Information System [ENVIS]

- functions in 25 centres
- On pollution control, biodiversity, environment management.
- headquarters is Delhi

3] GEOGRAPHICAL INFORMATION SYSTEM (GIS)

- Technique of super imposing various thematic maps using digital data.

Eg: Water resources, forest, crop lands are super imposed in layered form in computer.

4] SATELLITE DATA :-

- provides information on forest cover
- atmospheric phenomena
- new reserves of oil, minerals etc

5] WORLD WIDE WEB :-

* Online learning center

1) www.mhhe.com/environmental-science

- provides information on environmental science
- has digital files of photos, power-point, animations etc

ROLE OF IT IN HUMAN HEALTH :-

- Data regarding birth and death rates, immunisation etc

maintained correctly

- 2) Helps doctor to monitor people
- 3) Information on outbreak of epidemic diseases are conveyed easily
- 4) Drugs and its replacement can be administered.

Health service technology involves 3 systems

- 1) finance & accounting
- 2) pathology
- 3) Patient administration

National Institute of Occupational health

- developed by Indian government

→ deals on health aspects of people working in hazardous & non-hazardous industries.

3. WOMEN AND CHILD WELFARE

WOMEN WELFARE

Aim :-

To provide opportunities to raise the status of women

Need :-

- 1) Women suffer gender discrimination
- 2) dowry deaths, rape, criminal offence exists
- 3) human rights violated

Objectives :-

- 1) To provide education

- 3) To improve employment opportunities
- 4) To restore dignity, status, equality and respect for women

Measures / Schemes towards Women Welfare

1) The National Network For Women And Mining [NNWM]

→ fights for gender audit in mining companies

2) United Nations Decade For Women

— Women welfare on international agenda

3) International Convention On the Elimination of All forms of Discrimination Against Women [CEDAW]

— Women's human and socio-economic upliftment

4) Non-Government Organizations (NGO's)

Empowers women in rural areas

5) Ministry for Women and Child Development

Upliftment of women by family planning, health care, education and awareness.

CHILD WELFARE

Reason for Child Labour

- 1) poverty
- 2) want of money.

Measures / Schemes towards Child Welfare

1) UN CONVENTIONS ON RIGHTS OF CHILD :-

→ set of international standards for well being of children

a) The Right to survival

- good living conditions, nutrition and health

b) The Right to Participation - freedom of thought and informationc) Right to Development - ~~emphas~~ education, security and supportd) Right to Protection :- freedom from exploitation2) WORLD SUMMIT ON CHILDREN :-

aims at well being on children

3) MINISTRY OF HUMAN RESOURCE DEVELOPMENT (MHRD)

Concentrates on child's health, education, nutrition and sanitation

4. VALUE EDUCATION :-Formal Education

→ learning process is self related

→ Teaches to read, write

Value education

→ It is an instrument used to analyse our behaviour

→ Teaches the distinction between right + wrong + other good qualities

Objectives / Need of Value Education :-

- 1) improves integral growth of human being
- 2) creates attitudes
- 3) Increases awareness on national history and culture
- 4) Helps to understand natural environment

METHODS :-

1) TELLING :-

→ Imparting values by narration

2) MODELING :-

→ a certain individual is perceived as model by learners because of the values they possess.

3) ROLE PLAYING :-

→ Acting out using actors to impart values

4) PROBLEM SOLVING :-

→ A situation is presented to learners asking them to make decisions

5) STUDYING BIOGRAPHIES OF GREAT MAN :-

→ Studying the life history of great men helps us to get their good deeds and thoughts.

TYPES OF VALUES :-

1. UNIVERSAL VALUES / SOCIAL VALUES :-

→ reflected in joy, love, truth etc

2) CULTURAL VALUES:-

- speaks about right and wrong and behaviour of human beings
- Varies with time and place
- reflected in language, aesthetics etc

3) INDIVIDUAL VALUES:-

- Our personal values
- Parents and teachers shape it
- reflected in individual goals, relationships etc.

4) GLOBAL VALUES:-

- Inter-relationship between human and nature
- This balance should not be disturbed.

5) SPIRITUAL VALUES:-

- Promotes conservationism
- reflected in self-discipline, contentment etc.

5. HIV/AIDS :-

AIDS - Acquired Immune Deficiency Syndrome
caused by HIV (Human Immune Deficiency Virus)

ORIGIN:-

- discovered in 1983
- Transferred to human from African Monkey
- spreads
 - Through Polio vaccine in Africa
 - Small pox vaccine in Africa
 - Hepatitis-B vaccine in Los Angeles + New York
- India ranks II in the World in AIDS.

MODES OF TRANSMISSION:-

- Syringes, needles contaminated with blood of HIV positive person
- From infected mother to their babies
- Blood transfusion during accidents/pregnancy

NOT TRANSMITTED BY :-

- Tears, food, air, saliva, urine, mosquito etc.

FUNCTIONS IN BODY :-

- Weakens immune system
- destroys T-cells of WBC

SYMPTOMS :-

MAJOR

- 1) fever
- 2) Diarrhea
- 3) Cough and T
- 4) Fall of hair
- 5) loss of body weight

MINOR

1. persistent cough
- 2) Skin disease
- 3) fungal infection in mouth and throat
- 4) frequent fever, headache

CONTROL AND PREVENTION

- No medicines or vaccines so prevention is better than cure.
- 1) Education :- Health education and sex education should be given
- 2) Prevention of Blood Borne HIV Transmission :-
 - Blood should be screened for HIV before transmission
 - Strict sterilization should be done in hospitals.

3) PRIMARY HEALTH CARE:-

→ Awareness programs organized

4) COUNSELLING SERVICE:-

→ should be done either in person or through telephone.

5) DRUG TREATMENT:-

Seeking early medical treatment makes the person stay active

6. HUMAN RIGHTS:-

Human rights are the fundamental rights, which are possessed by all human beings irrespective of their caste, nationality, sex and language.

Universal Declaration Of Human Rights (UNDHR) established in 1948.

1) Right to freedom:-

- freedom to express views
- to form unions / associations
- to start any profession

2) Right to property:-

→ Right to earn property

3) Right to freedom of Religion:-

- All religions are equal before the law
- We can choose the religion according to our wish

4) Right to culture and education:-

- to follow any culture
- to establish educational institution

5) Right to Constitutional Remedies :-

→ If a citizen is denied of fundamental rights, they can go to the court for protection

6) Human Right to Equality :-

All citizens are equal before the law

7) Human Right against Exploitation :-

Children should not be employed as labourers

8) Human Right to food and environment :-

All human have the right to get healthy food, safe water and environment

9) Human right to good health :-

All human have good physical & mental health