BTech CSE
1st Year Sem1

Full notes PDF

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ENVIRONMENTAL ECOLOGY

(Environmental Ecology) 29/Nov/2022

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(Module = 1)

(Environment)

The word "Environment" comes from french word "environer" which means to encircle all surroundings. The environment reffers to our immediate surroundings in which all living and non-living components coexist.

(Some other defiriations)

- The sum of all external conditions affecting the life, development & survival of an organism
- Surroundings in which an organisation operates including air, water, land & natural resources, flora-fauna, humans and their interrelation.
- The social environment of an individual is the culture that he or she was educated and/or lived in the people & institutions with whom the person interacts.

(Types of Environment)

There are 2 type:-

· Natural environment (NE)

- it consist of all components Provided by nature, that's why its called as (NE).
- it includes natural resources like soil, water, land, climatic factors. etc.

Manmade / Anthropogenic

· Artificial environment (AE)

- The environment created by man in order to regulate & monitor certain environmental conditions. its also known as social/cultural environment.
- it can be further ÷ into 2 type (external) & (internal)

external (outer environment)

with the use of science & tech humans have altered the condition of their physical environment. It includes modern infra in the city, associated amenities, modes of transport, diff industries electrical appliances

UTKARSH AGGARWAL
SECTION 11

Internal environment:- its the social environment & exists as long as a particular society exists, it belongs to regulations, traditions, organisations.

Note:- Inner & outer environments are co-related & hence inseperable.

#: [Components of Environment]:

There are 2 components:-

① Abiotic ② Biotic.

① Biotic = it consists of living like humans, flora, fauna.

Note:- Abiotic supports the Biotic components of environment.

② Abiotic = it consists of non living like minerals, rocks, metals, soil, H_2O, light, air etc., climatic factor

#[Segments of Environment] 30/Nov/2022

- Biosphere
- Atomosphere
- Hydrosphere
- lithosphere. (earth crust)

lithosphere = it consists of rocks/minerals, soil-various ores, organic matter.

Hydrosphere = it includes all types of H_2O resources/ rivers, ocean, lakes & pond, ground H_2O & ice caps its a unique feature on earth & its responsible for existence of life on earth. because of H_2O on earth, earth is called "BLUE PLANET" it exist in 3 states. Solid (ice), liquid (water), gas (vapours) on earth.

Biosphere = its the region of earth where life exists, it includes <all living organisms>.

Atmosphere = The layer of gases surrounding earth is called atmosphere its a protective blanket of gases surrounding the earth, which sustains life. it helps in maintaining the Δ balance of earth by absorption of Infrared radiation emitted by the sun and

re mitted from the earth. In fact its a greenhouse effect, which keeps the earth warm enough to sustain life.

(Segments of Atmosphere.)

1) Troposphere:- it's nearest to earth surface and extends upto 11km. it consists of O_2, N_2, CO_2, H_2O, and Particulate matter. temp ranges from 14°C to -56°C in it. The top of troposphere is called tropopause. The change of temp with height is called lapse rate.

2) Stratosphere:- The height of this is 11 km to 50km The temperature -56°C to -2°C increases with increase in height in this sphere "OZONE LAYER (O_3)" is present which is protective in nature ▷ protects us from UV rays of sun.

3) Mesosphere:- The height of this 50 km to 85km The temperature. -2°C to -92°C

4) Inosphere / Thermosphere = The height of this 85 km to 500 km and temperature = -92°C to 1200°C

temp ↓ = -ve lapse Rate
temp ↑ = +ve lapse rate

(Importance of Enviromental Studies)

① To understand the current enviromental problems. EVS Provides the skills necessary to raise questions & obtain answers to some of the enviromental problem. our planet is facing today. In addⁿ it encourages the development of scientific principles and Appⁿ of these principles to solve enviromental problems.

05/Dec/2022 Ecology

(2) EVS helps to maintain ecological balance.
(3) It also gives the information regarding the changes takes place due to anthropogenic factors.
(4) It provides knowledge regarding the development & utilisation of energy resources & the role of public policies.
(5) It helps to achieve sustainable development & understand the relation b/w development and environment.

Sustainable development. use of resources that it would be available for future gen.

(6) It educates people regarding their duties towards the environmental protection & educate them towards the conflicts over the use of resources & the importance of environmental stability.
(7) It helps to protect Biodiversity growth.
Life variety

[Scope of Environmental Studies]

(1) Need for trained person regarding EVS.
(2) Green advocacy (3) Green Marketing
(4) Green Media (5) Environment consultancy
(6) Environmental Scientist (R/D) (7) Skilled EV Scientist

[Need for Public Awareness]

(1) To protect the environment.
(2) To save the biodiversity.
(3) To conserve natural resources.
(4) To take Appropriate decisions regarding use of natural resources
(5) To conserve nature & resources for betterment of the society from POV social, cultural & economical development.
(6) To adopt appropriate ways & means to solve the existing environmental problems.

5/Dec/2022 (Ecology)

(Methods for propagating Public Awareness)

- Through mass media
- By organising seminars & conferences.
- science centres

[# Ecosystem #]

- The term 'ecosystem' is proposed by British ecologist A.G Tansley in 1935, who defined it as "the system resulting from the interaction of all living & non-living factors of the environment."

* Types of Components *

 # Abiotic components #

- Physical factors: soil, water, air, sunlight
- Chemical factors: N_2, O_2, CO_2

 # Biotic Components #

- Producers (Autotrophs): All green plants makes their own food by sunlight & chlorophyll
- Consumers (Heterotrophs):
  - herbivores (Primary) eg. rabbit, cattles, deer etc.
  - omnivores (Tertiary) eg lion, tiger
  - carnivores (Second) eg Dog fox, lion etc.
  - Decomposer

* Decomposers:- organisms that feed on dead & decaying matters & convert the organic material into inorganic materials they help in recycling of nutrients in the biosphere. they return nutrients to environment in form that may be used again by producers. they are recycling agents of nature, without them earth will get converted into vast dump of dead organism.

eg = Bacteria, fungi

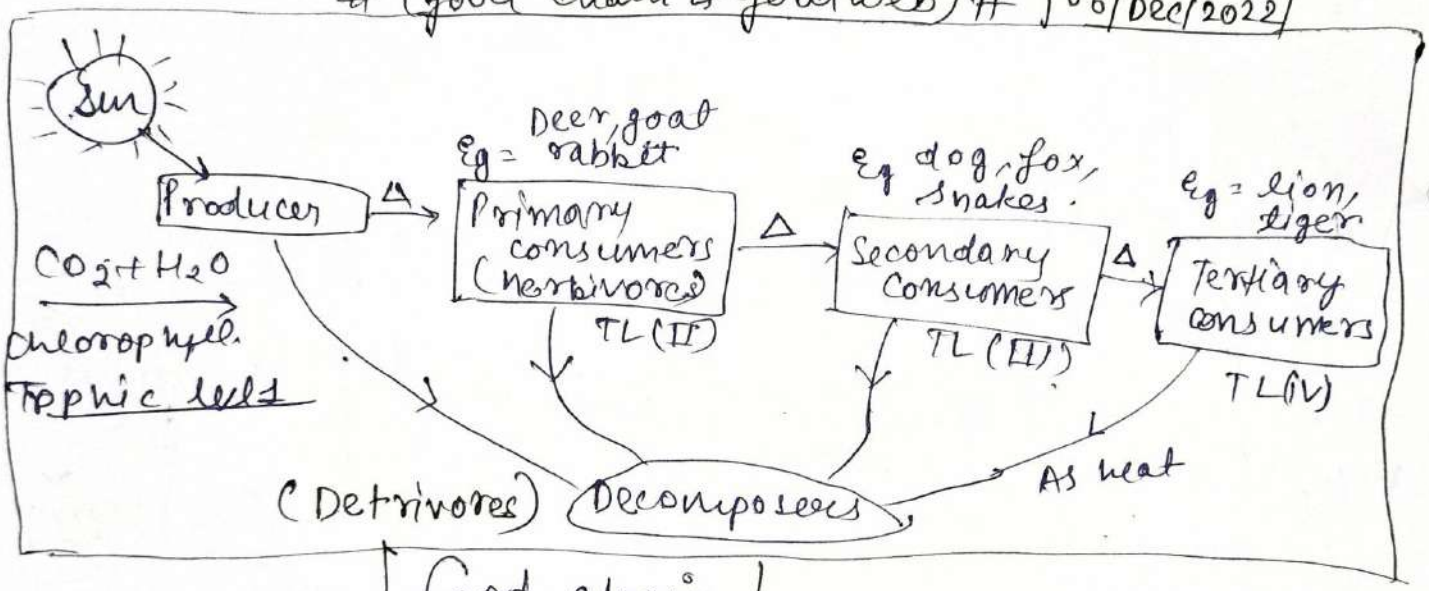
(Ecological Pyramids)

Several types of Biochemical processes takes place in a ecosystem the function of ecosystem can be studied in following forms.

(functions of ecosystem)

1) food chain & food web
2) Energy flow.
3) Mineral nutrient cycles.

(food chain & food web) # 06/Dec/2022



food chain

- A food chain in an ecosystem starts from green plants. the producers are consumed by herbivores who in turn are eaten up by carnivores. hence the transfer of food energy from source (Producers) through series of organisms by repeated eating & being eaten up by is reffered to as food chain.
- The idea of food chain is given by scientist Elton (1927). in food chain each stage of transfer of food energy is known as trophic level

6 DEC/2022 Ecology

(Types of food chain)

1) Grazing food chain 2) Detritus food chain

(Grazing food chain)

- it depends directly on solar radiations, producers forms the first link in this chain.

(Detritus food chain)

- The organic waste & dead matter derived from grazing food chain are termed as detritus. The energy contained in detritus is consumed by detrivores. that forms a detritus food chain in the ecosystem. Detrivores recyle the nutrients in environment by decomposing the organic matter.
  Eg: earthworm, dung meatun, millipedes, etc. insects, bacteria, mites.
- This chain is smaller than grazing chain

(Significance of food chain)

- its helpful in maintaining the ecological balance as food chains maintaing & regulating the population size of animals.
- it shows the uniques property of accumulation of certain chemicals. this phenomenon is called as biomagnification.

(food web)

Internetwork of various food chains in which the various trophic levels interdepend on each other is called as food web. it helps in maintaining the stability of ecosystem.

7/Dec/2022 # Ecological Pyramids

The relation b/w number of organisms (also called biomass) and the energy content of producers and consumers at different levels, can be represented diagramatically using Ecological Pyramids. "An ecological Pyramid is a graphical representation of the trophic structure of an ecosystem where producers occupy the base and the top consumers occupy the Apex of Pyramid."

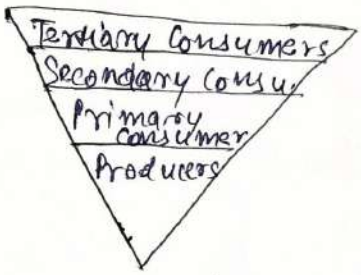
These are of 3 types:-

① Pyramids of number = it shows the no of organisms at each trophic level of the ecosystem.

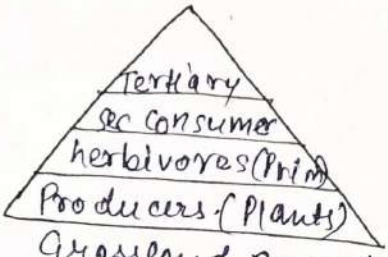
it shows the relation b/w producers, herbivores & carnivores at successive trophic levels in terms of their number.

The organisms which have maximum population in the ecosystem forms the base of Pyramid, while the organisms with minimum population for the apex.

for eg: Grassland, cropland & forest ecosystem.



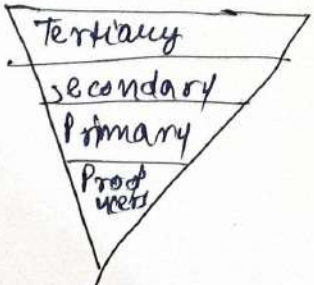
forest ecosystem



Grassland ecosystem

② Pyramid of Biomass :- Biomass is defined as the total living material present in any organism. It's measured by terms of dry weight of organism per unit area

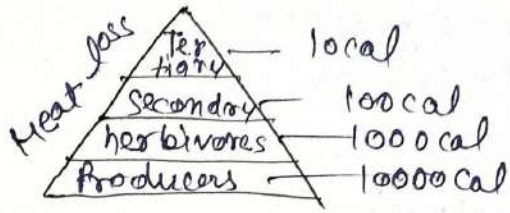
for eg:



forest ecosystem

Grassland ecosystem

(3) Pyramid of energy :- The pyramid of energy provides the best representation of the overall nature of the ecosystem. It shows the rates of passage of energy through the food chain. In terms of energy Δ the producers always possess greater energy in compare of the herbivores. The consumers gets less energy than herbivores. Since the energy relⁿ is always maintained, the shape of energy Δ always remains upside Δ.



(Classification of Ecosystem)

- Man Made
  - Garden, Cropland
  - aquarium
- Natural
  - land
    - forest, grassland
    - Dessert
  - Aquatic
    - fresh H_2O
      - Standing
        - Ponds
        - lakes
      - flowing
        - River
    - Marine H_2O
      - ocean
      - sea

12/Dec/2022

(Characteristics of Balanced Ecosystem)

- population control.
- conservation Biodiversity.
- Air, water soil Pollution control.
- Renewable energy resources are used.

Ecology 12/Dec/2022

(the factors responsible for distruction of Balanced Ecosystem)

Human Activities

(1) Agricultural Practices : morder agricultural techniques are used for good, growth & yeild of crop to meet the other growing demands of rapidly increasing populations.

* Green revolution boosted the food production.

(i) * (Impacts of Overgrazing on crop production) *

- land degradation (makes land infertile after a while).
- loss of useful species & soil erosion.

(ii) * (Impacts of traditional agriculture) *

- deforestation
- depletion of nutrients.

(iii) * (Impacts of Mordern Agriculture) *

(a) Use of excess fertilizers & pesticides side effects.

→ • Excess use of N, P, K chemicals is responsible for micronutrient imbalance in soil. (Cu, Fe, Zn)

→ • use of fertilizers in soil decreases 30% protien & carbs content in crops.

(b) inducing pest resistance species.

→ New generation of pest develop resistance to pesticides which survive even after pesticide spray there are 30 pest species, which are called as super pest. Ex. DDT.

13/Dec/2022

(c) • Biological Magnification.

→ Ex. DDT. (case study of osprey bird)

↳ [Dichloro Di phenyl Trichloro ethane]

(d) • Nitrate Pollution :-

excessive use of nitrogenous fertilizers called the ~~Aicren~~ drug (Miracle) of farming which leads to accumulation of nitrate in the soil. This nitrate transferred to men by plants. Nitrates are soluble in H_2O & becomes more toxic when its concentration exceeds 90 ppm of H_2O.

[ecology | 13/Dec/22]

• In human body these nitrates are converted to nitrosoamine & nitroso compounds. which are suspected as agents of stomach cancer.

Note:- Nitrate in Water causes cyanosis (Blue jaundice/Cyanosis) in children & Methaemoglobinemia. or blue baby syndrome in infants., where Nitride interferes with oxygen carrying capacity of blood.

VVIMP

(e). Eutrophication:- Eu means 'more' trophic means 'nutrients' agriculture runoff contains N and P fertilisers which reaches nearest water body. Excessive use of these fertilizers is responsible for over nourishment of water bodies this phenomenon is called Eutrophication, its the cause of excessive algae known as algal bloom.

After effects • its responsible for the dissolution/reduction of dissolution of oxygen in water.

• it leads to the death of aquatic organism.

• Due to Eutrophication sunlight don't reaches to plant in aquatic life.

• Decomposition of algal blooms leads to O_2 depletion in H_2O.

• Due to which conc of CO_2 (↑) and responsible for the death of aquatic organism.

Eg: Dal lake Kashmir, Hussain Sagar (Hyderbad), Lokatakte lake are seriously choked by aqueous weeds., affecting fish production and the esthetic value

13/Dec/2022

Water logging = excessive irrigation of crop lands for good crop growth leads to water logging. In absence of adequate drainage, excess water seepes into the ground water. Due to excess of H_2O the roots of Plant have insufficient air for respiration. it affects the mechanical strength of plant decrease the crop yeild.

Water salinity:- Due to over irrigation of crop land increases the salinity of soil. Accumulation of salts such as NaCl, Na_2SO_4, $CaCl_2$, $MgCl_2$ etc in the soil makes the soil more saline. It affects the growth and yield of the crop.

- To get rid off salinity, it has to be flushed out by applying fresh water to such soils.

Mining:- Mining is done to extract minerals & fossil fuels from deep deposits in soil by using surface mining. India is the producer of 84 minerals. Mining has created some of the largest environmental zone in the world.

* six major mines are:- causes several problems:

1) Jaduguda uranium mines (Jharkhand):- exposed local People to radioactive hazards.

2) Jharia coal mines (Jharkhand):- underground fire leading to land subsidence & forced displacement of People.

3) Sukinda chrome mine (orissa) Cr(IV):- due to the seepage of chromium from into river water. Its toxic & carcinogenic in nature.
↳ (Causes cancer)

4) Kudremukh iron mines (Karnataka):- it causes river pollution & threat to biodiversity.

5) East coast Bauxite mine (Orissa):- land encroachment & issue of rehabilitation.

6) Copper mines in Kehtrani (Rajasthan):- land encroachment and issue of rehabilitation.

Ecology. 13/Dec/2022

(Impacts of Mining)

- Deregitation of land space.
- land subsidence.
- Ground water contamination.
- Air pollution
- Dust & noise pollution
- occupational heath hazards
- Ecological damage
- it destructs the habitat of people & animal.

14/Dec/2022

(Modified Mining techniques)

① Recycling of all metallic waste
② Adverse effect of mining of it can be minimised by adopting eco-friendly technology. like Microbial leeching technique for extraction of Gold, with the help of bacterium thiobasillus.

(Environmental impact assesment) # (EIA)

The process of identifying, predicting, evaluating and the bio physical, social and other relavant effects of developmental propasals prior to major decision be taken is known as EIA.

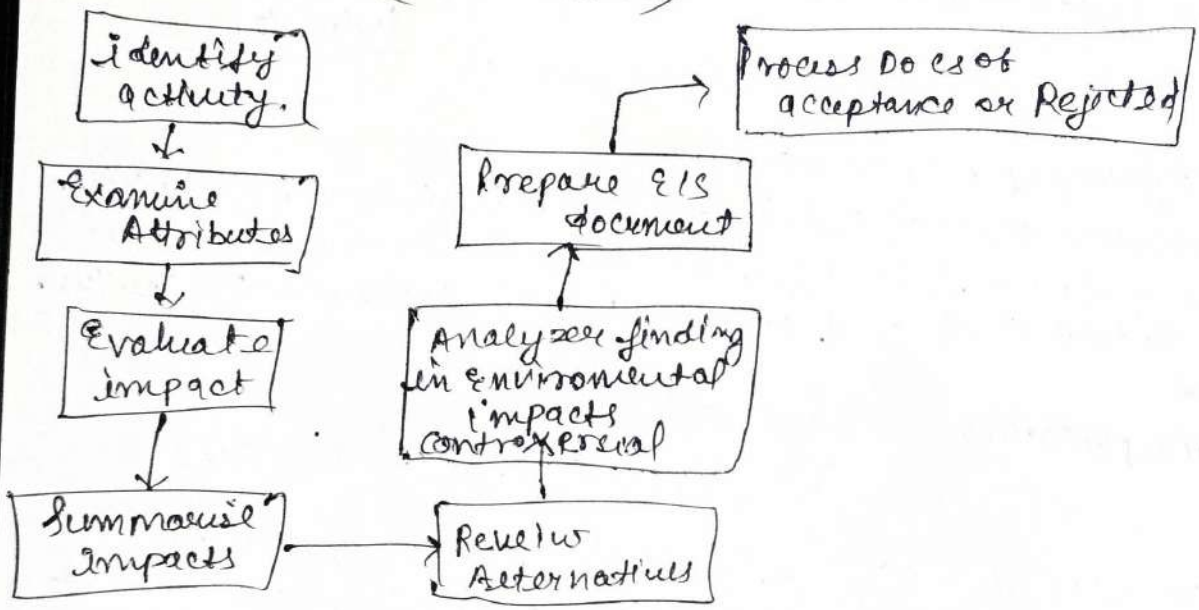
(Role of EIA) # / (Key elements)

① Project falls within jurisdiction of the relevant acts.
② whether the project to create any environmental disruption,
③ if so, EIA is undertaken and the EIS is (Environmental impact statement) is prepared.
④ decision is taken to accept or reject the project.

EIS contents

- description of proposed action.
- Nature & Magnitude of the environmental effects.
- Possibility of earth quakes & cyclones
- Possible effects on the Quality of H_2O & soil
- effect on vegetation, wild life & endangered species.
- Noise pollution.
- Recycling & reuse of waste
- Risk Analysis & Disaster Management

(Flow Chart)



Human Activities (19/Dec/22)

① Transportation :- This activity is a good consumer of land & energy. it consumes 30% of world's energy & produces SO_2, NO_x, CO etc. this is responsible for emission of NO_x, Particulates, smoke hydrocarbons.

Reason :- They are emitted due to Age of vehicle, Exhaust, fuel composition congestion on roads.

(i) effects of NO_x :- Its highly toxic, easily absorbed by blood, causes Bronchitis & lung cancer / emphysema.

(ii) effects of CO :- it combines with haemoglobin and forms carboxy haemoglobin (stable) which affects the O_2 carrying capacity of blood causing suffocation, headache, dizziness, finally death.

* Carboxy haemoglobin have 3X - 5X more speed to combine with O_2.

(3)

(effects of SO_2)

- It causes asthma (humans),
- It cause cough, lungcancer

- chlorosis (makes leaf yellow) (Plants)
-

(4) # (effects of Hydrocarbons (Poly)) #

- Poly cyclic hydrocarbons are carcinogenic in nature. a new hydrocarbon called 3-nitro benzathrone is responsible for mutation in DNA.

(2)nd Activity [food] :-

- The main food resources are wheat, rice, maize, pulses, fruits, vegetables, milk etc.
- world grain production increased above 3 times during the last 50 years. but at the same time population growth in developing countries also increased and that shows insufficient food production. Every year about 50 million People die of malnutrition and starvation.
- India is 3rd largest Producer of crops yet about 300 million People are still undernourished. food crisis is directly linked to population explosion

Web series Watch.
*Story of Stuffs
suggested by Ma'am.

3rd Activity (Industry) :-

industrial by men & women brought overall change in society movement, population & resources from farm production to manufacturing production & associated services.

effects:-

- industries consumes large amount of energy & release large amount of gases like CO_2, SO_2, CO etc. & many other responsible for Ozone depletion. (CFC)

- Industries creates tonnes of solid waste, hazardous waste and discharged untreated effulents
- Manufacturing industries like paper, textile, pesticides etc releases metallic waste, oil, grease, plasticizers, suspended solids, non biodegradable materials in soil.
- These toxicants are transferred to different organisms causing undesirable effects.
- Discharge of industrial waste in sewage system causes H_2O borne diseases.

21/Dec/2022

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(Sustainable Development (SD))

this defined as "meeting the needs of present without compromising the ability of future generations to meet their needs.

* (objectives of SD) *

1. Population stabalisation
2. Biodiversity conservation
3. Air, water, soil, pollution prevention & control.
4. use of renewable energy resources
5. use of six R's. (Renew, recycle, reduce, reuse, repair,) to minimise waste.
6. Environmental education & awareness at all levels.
7. Sustainability is thus affecting the balance b/w stability and diversity.

* (Sustainable Environmental Programme) *

1. Pollution Prevention
2. Design according to environment
3. industrial ecology
4. Green chemistry - Prevention of waste, design less harmful chemicals, solvents, energy efficient synthetic roots, use renewable feed stocks (Starting Material).

Ecology 24/Dec/22

(5) Preventive environmental management :- Prevention of pollution at source, recycling and treatment in safe manner disposure of waste in ecofriendly manner.

* (Governmental efforts to attain SD) *

(1) Agenda 21 is a blue print to attain (SD).

(2) European union in 1992 started environmental action programme.

(3) In 1999 amsterdam treaty :- one of the core programs of european union.

(4) In June 2001, Gothenburg european council adopted the commission for sustainable development strategy.

(5) from 26 August to 4th sept 2002, the jonasburg earth summit reckned/reviewed the progress made on global sustainable development

Unit:-3

Pollution

The word pollution derived from latin word 'Pollutionem' (to make dirty), is the unfavourable ~~auth~~ alteration of our environment due to human activities.

Some other definitions

1) Pollution is the contamination of the harmful substances into water, air and soil which adversely alter the natural quality of the environment.

2) It is accumulation of foreign substances like organics, inorganic, biological or radiological in nature which may affect living organism directly or indirectly, immediately or after a long time.

Air Pollution

It is defined as undesirable substances present in air, which degrades the natural quality of air and makes it unfit for breathing is called as air pollution.

Air Pollutants

The undesirable substances which degrades the quality of air called as air pollutant. Air pollutants are of two types:-

1) Primary air pollutants.
2) Secondary " ".

Causes of Air Pollution

1) Transportation / Automobiles.
2) Industrial Emission.
3) Nuclear power plant.
4) Construction
5) ~~Smoking~~ Natural Disasters :- Volcanic eruption, forest fire, thunderstorm, cyclones, etc.
6) Thermal power plant.
7) Agricultural activities :- Spray of pesticides and fertilizers, Burning of remains of crops.
8) Mining.
9) Nuclear Explosion.
10) Burning of domestic waste.

1) Effects of Air Pollution

1) ~~Gases like SOx, NOx~~ Effect on plants :-

- SO_x is responsible for chlorosis in plants and NO_x is responsible for Necrosis in plants.
- CO is responsible for curling of leaves and premature falling of leaves.

2) Effect on human beings :-

Carbon Monoxide combines with haemoglobin present in blood

- Sulphur dioxide causes.
- Metal particulates causes damage to respiratory system, blood vascular system and excretory system.

- The birth weight of infants whose mother smoke cigrettes are lower than those of non-smoking mothers.
- Tobacco smoke causes more than eight out of ten cases of lung cancer.
- Asbestos is also responsible for lung cancer.

3) Effect on Climate

- Acid Rain :- Gases SO_2 and NO_2 are emitted as waste from industries, react with atmospheric moisture and form sulphuric and nitric acid respectively these acids mix with rain water and reached to the earth surface as acid rain.

- Green House Effect and Global Warming

The CO_2 gas present in the atmosphere act as green hous that allows heat to enter but prevent it from radiating out. Therefore, an increase in the concentration of CO_2, causes accumulation of heat which leads to the phenomenon of global warming. Due to that the temperature of earth increases. This increase in temperature is responsible for melting of polar icecaps & leads to rise in sea level.

- Ozone layer Depletion

Ozone is consist of three atom of oxygen it exist in gasious state in the stratosphere. It forms protective covering in the atmosphere & filter the harmful UV rays and prevents them from reaching to earths surface.

CFCs is responsible for depletion of ozone layer.

Control Measures of Air Pollution

1) Industrial gases waste should be treated before discharge into the atmosphere.
2) Hazardous chemical should be converted into less harmful substances.
3) Use of eco-friendly fuel such as, LPG, natural gas & gober gas.
4) Use of good quality fuel.
5) Raising of green belts must be promoted.

Water Pollution

the undesirable substances present in water, which changes the natural quality of water and makes it unfit for drinking, is known as water pollution.

Causes of Water pollution

- Sewage
- Industrial waste :- Chemical, paper, textile.
- Agricultural practices :- pesticides, insecticides, fertilizer.
- Tourism.
- Religious practices.
- Domestic waste.
- Human activities in rural area in nereby reservoir

Effect of Water Pollution

- Contaminated water responsible for no of diseases based on bacteria & virus
- It is responsible for Eutrophication and Nitrate pollution in human beings.
- If content of floride is high then it is responsible for florosis.

Control Measures

- Treatment of industrial waste before dumping.
- Non-biodegradable waste should be not dumped into water bodies.
- Human activities such as bathing and washing in rivers, ponds & lake, washing animals, throwing half burned dead bodies, emersion of idols must be stopped.
- Use of pesticides & fertilizer should be minimised, promote the use of biofertilizers.

Noise Pollution

The word noise derived from latin word 'nausea' which means sea-sickness. It refers to loud sound that may cause sickness. High levels of noise that leads to discomfort and health hazards is known as noise pollution. Noise pollution refers to loud sound created by humans or machines that make disrupt the environment & normal living of organism.

2 Jan 2023

Causes of Noise pollution

- Home Appliances like :- Cooler, TV, Fan, Mixture grinder, telephone, Radio, Washing machine etc.
- Transportation :- air craft, Two wheelers, Four wheelers, ships, railway station, Airport, Bus stand and shipping port.
- Industries
- Mining
- Entertainment :- Radio, TV, Crackers, DJs in festival and celebration.

Natural Causes

- Volcanic erruption.
- Earthquack
- Thunder etc.

Effect of Noise Pollution

1) On Human Beings

- Auditory Effect :- → Temperory Effect of noise pollution on hearing activity.
- Temperory deafness, Exposer to high intensity sound even for short duration result in temperory deafness.
- → Permanent deafness :- permanent exposure to high intensity noise causing in permanent hearloss due to damage in cochlea, inner part of ear.

Non-auditory Effect

i) Physiological disorders:- Anxiety, Insomnia, High BP, Fatigueness.

ii) Loss of working efficiency.

iii) Annoyance:- neurotic people get affected due to high intensity noise shows annoyance.

iv) Reading and speech disability in young children.

Effect on Wildlife

- Loud noise increases the rate of mortality of wild animals.
- Whales and Dolphins use sound for communication & navigation also affected.
- Animals and birds prefer to avoid noisy habitat.
- It decreases the no. of migratory birds.
- Noise make animals dull and inactive.

Control Measures

- Stop the use horns.
- Stop the use of silencers.
- Minimise the use of DJs, Crackers, loud speakers

Soil Pollution / Land Pollution

The undesirable substances which degrades the quality of soil or makes it infertile, called as soil pollution.

Causes of Soil Pollution are :-

- Dumping of waste
- Industrial waste.
- Mining activity.
- Agricultural practices.
- Deforestation.
- Hospital waste.

Natural Causes of soil Pollution

- Landslides
- Earthquack.
- Volcanic erruption.
- Thunder storms.
- Cyclones.

Effect of soil Pollution

- It degrades the quality of soil.
- It affects the fertility of soil.
- The contaminated waste is responsible for growth of desease causing vectors like mosquitos, house fly
- Soil pollution decreases the asthetic value

Control Measures

- Segregation of biodegradable & non-biodegradable must be dumped and biodegradable waste used for bio-gas production.
- Industrial waste should be treated before dumping on land, to less toxic substance.
- Minimise the mining activities, promote the use of four arts like renew, reuse, repair & recycle.

(Solid Waste Management)

* (Types of waste) :-

1) Domestic waste :- It consist of biodegradable waste like peels of vegetables & fruits, left over food, paper etc. and non-biodegradable waste like plastic, polyethene, tetrapack, metal cans, glass etc. and detergents

2) Industrial Waste :- Industries like paper, textile, cement, steel, metallurgical process

3) Mining waste :- Waste generated during extraction of mineral from earth crust.

4) Agricultural Waste :- Remaining of crops.

5) Hospital waste :- It consist of use cottons, bandages, tissues, used syringes, bottles etc.

6) E-Waste :- It consist of ~~telephone~~ left over electronic objects like mobile phones, CDs, floppy Disk, Personal computers etc.

7> Radioactive Waste :-

8> Commercial waste :-

Effects of Solid Waste / Consequences / Impact

Accumulation of solid waste leads to increase in population of disease causing organism like mosquitos, house flies etc.

- Dumping of waste in water reservoire is responsible for water pollution
- Burning of waste is responsible for air pollution.
- Radioactive substances are responsible for genetic disorders.
- Dumping of solid waste on the land decreases the austhetic of the land
- Non-Biodegradable waste obstructs the sewage system.

Control Measures of Solid Waste

- Collection of solid waste.
- Transportation of solid waste.
- Disposal of solid waste.
- Ocean dumping
- Incineration
- Composting.
- Reduction at source of solid waste.
- Use of 6 R's :- reuse, renew, reduce, refuse, repair, recycle.

Ecology (4 Jan 2023) * (Important Questions) *

Q = explain Air pollution, define air pollutants, write down the causes effects & control measures of air pollutions?

Q = Water pollution (causes, prevention methods)?

Q = Define noise pollution, unit of noise, causes, effects (Auditary & non-Auditary), control measures.

Q = Define soil pollution, causes, prevention?

Q = Types, classification of waste, waste disposal methods, with their advantages & disadvantages.

Q = Explain the use of 5 R's?

Q = Define sustainable development, & its objectives, full form of EIA, EIS?

Q = Explain process of EIA & its objectives?

Q = Explain contents of EIS?

ecology (Unit-3) (Natural resources) 04/Jan/2023

The things which we are getting for our daily routine are called as Resources, when they are present in nature they are called Natural resources they are of 2 types:-

(i) renewable resources:- The resources which are present in abundance in nature and they are inexhaustable are called as renewable resources.

Eg:- Solar energy, H_2O, air, soil

(ii) Non-renewable resources:- Those resources which are available in-definite amount are called as non-renewable, they are exhaustible by the time.

Eg:- fossil fuels, minerals (coal, crude oil)

16/Jan/2023

(Sources of water):-

(i)(a):- # (water resources) #

* Availability on Earth.

Ph of water stay for us = (6-8)

- ice caps:- Glaciers
- rainwater
- Ground water
  - well
  - tubewell
  - handpump
- sea water.
- Surface water.
  - Still
    - Ponds
    - lakes
    - Man Made reservoirs.
    - sea water.
  - Running
    - River
    - Streams.

* Question.

Emergency A step.

* Search on Thermal Power Plant working

$H_2O \xrightarrow{\Delta, fuel}$ Steam $\xrightarrow{Powers}$ Turbines.

(uses of water)

- for Agriculture purpose.
- for drinking purposes
- for washing, bathing purposes.
- various industries.
- in thermal power plant to generate electricity,
- Hydropower plant (Dam construction is must).
- for cooking purpose.

ecology

16/Jan/2023

(Causes of water exploitation)

- Rapid growth of population.
- wastage of water.
- Industrialisation.
- Mining of ground water.
- change in lifestyle.

* (water borne and induced diseases) *

1) water borne diseases:

(a). Typhoid → salmonella Thyphosa (Bacterial name):-

- its due to ingesting contaminated water

symptoms are :- • headache, • loss of apetite.
• Nausea

Prevention: - • use of safe Drinking water,
• Maintain sanitation & good hygene

(b). Cholera → it caused by vibrio cholera (Bacterial name.)

symptoms:- • Diarrhoea, • Vomiting • renal failure.
• Rapid Dehydrating • Muscular cramps

Prevention:- • By improving sanitation.
• Boiled H_2O should be used

Treatment:- • intravenus solution of saline ($NaCl : NaHCO_3 : KCl$ (5 : 4 : 1))
or • by giving oral fluid mixture containing NaCl, $NaHCO_3$, KCl and glucose in ratio of 3.5 : 2.5 : 5 dissolved in 1 litre of water.

• (Antibiotics) (Tetracycline).

iii) Amoebiasis :- • Cause :- Ent Amoeba Histolytica

• Symptoms :- • liquid stool with mucus and blood.

• Reason :- • eating cut fruits, salads, veggies, contaminated H_2O.

• Prevention :- (i) Sanitary disposal of human excreta.

(ii) Drinking boiled & filtered water.

(iii) Protecting food against flies.

(iv) washing veggies with disinfectants like Iodine sol^n or 5% Acetic Acid.

(v) Cyst can be killed in milk by pasteurization process

• Treatment :- • Trinida zole, Entrozyne.

(iv) Diarrhoea :- its caused by bacteria, viruses, Protozoans

• Symptoms :- • Dehydration

• Prevention :- • sanitation, • good hygiene.

2) Water induced Deseases (also known as Vector)

(i) Malaria :- [Parasite Cause :- Plasmodium. # Vector name # female anophelles Mosquito.]

• Symptoms :- • high fever with shivering terminated with sweating. its repeated after 3-4 days

• Prevention :- • using mosquito Repellant.

• Treatment :- Quinine, chloro Quinine and Camo Quinine

• Prevention by spraying mixture of DDT & oil.

(ii) filaria :- . caused by nematodes [worms] .
Vector name :- Culus Mosquitoes.

Symptoms :- swelling of legs & arms.

Treatment :- . Antimony (Sb) & Arsenic (As) Compounds. cures the diseases.

(iii) Dengue :- Viral Diseases.
Vector name :- Male Aides aegypti

Symptoms :- • high fever • flushed face
• headache

Prevention :- • Destroy the breeding places of mosquitos by spraying dieldrine, cleaning of overhead tanks

17/Jan/2023

(iv) Bilharzia :- vector name - schistosomiasis

its caused by parasitics worms, fresh water snails, cyclox (Acts as carrier) and human host. They penetrate the skin of people washing in contaminated water and damages liver, lungs, intestine, bladder.

Short Note Mark (5)

(88) #(fluoride Problem in drinking water) #

• flouride is called as two edge sword, the daily intake of flouride from drinking water and food is usually less than 1 ppm which is necessary but if its level is above 1.5 ppm (WHO Standard), it causes flourosis.

In India states like Punjab (3PPm), gujraj (4PPm), tamil Nadu (4-5 PPm) are affected by fluorosis Problem. (88)

#(effects of fluoride)#

fluoride is responsible for dental decolouration and deformation of bones causing knock knees, bowlegs and stiffening of joints, joint pain and backpain etc.

17/JAN/2023

- fluorosis affects bones, teeth, tissues and other organs of the body leading to death after prolonged illness.
- it affects gastro-intestinal system.

Prevention:-

- Provision of safe drinking H_2O, (1PPm fluoride) and creating
- awareness among people regarding dangers of fluorosis.

* (Mineral resources) *

The term mineral resources refers to the variety of materials obtained from earth. Minerals are occuring naturally. they are inorganic, crystalline solids having definate chemical composition.

#(Types of Minerals)

- Non-metallic
  - Eg:- diamond, graphite, quartz, felspar,
- Elements that Radio-Active
- Energy Generating Minerals.
  - Eg:- coal, oil, naturalgas
- Metallic
  - Eg:- Bauxite (Al), haemitite (Fe), dolamite (Fe), cuprite (Cu)

#(uses of Minerals)

- Generation of energy (coal, oil, uranium etc).
- Development of industrial plant & machinery.
- used in construction of buildings.
- used in making jwelleries. (Gold, silver, pt, diamond).
- used in defense equipments like weapons & armaments.
- used for communication:- Telephone wires, cables, electronics.
- used in transportation.
- used in making utensils.
- used in production of fertilizers for Agriculture, fungi sides.
- used in medicinal system (Ayurvedic :- bhasm)

ecology 17/Jan/23

(Consequences of over exploiting of minerals):-

- Rapid depletion of mineral deposits.
- Wastage of mineral wealth.
- Pollution is caused by heavy energy requirement of mining industries.
- excessive loss of soil nutrients (eg: Gold

(conservation of mineral resources)

- # (positive impacts of minerals) #

Shifted here!

- employment
- economic gains
- enprastructure facility.

(conservation)

- Making durable products, depletion reduces.
- use of 3R's (renovation, recycle, reuse) of materials.
- Applying effective techniques to recover materials from minerals.
- search of new earth's treasures.
- Protection of existing minerals deposits.
- economy in the use of minerals,
- change in life style.

ecology 18/Jan/23

* (forest wealth) *

- forest word is derived from latin word "forris", which means "out of door". it is a plant community of trees and other vegetation present within a closed canopy.

Uses of forrest

1) **Commercial uses:-**

- it provides paper, timber, bamboo, bidi leaves, resins

2) **Ecological uses:-**

- forest are known as lungs of earth.

3) Regulation of climate

4) **Reducing global warming:-** As we know that plants use CO_2.

5) soil conservation

6) Regulation of hydrological cycle.

7) Medicinal purposes (Quinine from cincona plant by Ronald Ross)

8) forest provides varieties of oils (eg: palm oil).

9) it provides food products (rare fruits).

10) shelter for tribal people, wildlife.

11) it increases the asthetic value of the land.

(Deforestration)

↳ Cutting of trees

* Cause:- (1.) Rapid explosion of human race & livestock over grazing, (2.) Developmental projects like Dams, Power station, highways, railways, airport.

(3.) Industrialisation (4.) Increased demand of fuel, wood, paper, medicines.

* Consequences:- (1) Destruction of wildlife habitat.

(2) Destruction of habitat of tribal people.

(3) Responsible for Bio-Diversity destruction,

(4) it effects the hydrological cycle.

(5) responsible for ecological imbalance.

(6) Responsible for increased global warming.

(7) responsible for soil erosion.

(8) responsible for landslide.

[Ecology. 18/Jan/2023.]

(forest conservation)

- Construction of reserve forest → making restricted area for forest.
- Production forestry → manufacturing items we get from forest.
- Social forestry → planting plants in newly construction of societies.
- Agro forestry → using space b/w trees in forest to cultivate crops.
- Urban forestry → maintaining of green belts in cities.

(Energy Resources)

Renewable.

- inexhaustible,
- Present in Abundance.

eg :- solar, air, H_2O, wind energy. Geothermal Plant. Hydrogen Power, Ocean thermal energy.

- can be renewed.

Non-renewable

- exhaustible
- Present in limited manner,

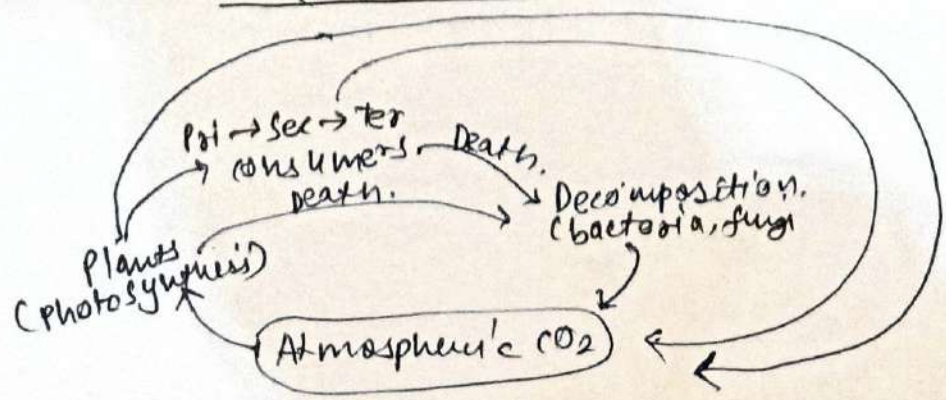
eg :- fossil fuels
- Radioactive elements (uranium)
- can't be renewed again back.
- [coal, crude oil, natural gas] fossil fuels.

(Uses)

- for domestic purposes :- (cooking, electricity)
- Thermal power plant (to generate electricity)
- used in nuclear power plant (to generate electricity)
- for industrial purpose,
- for transportation,
- Agriculture purposes.

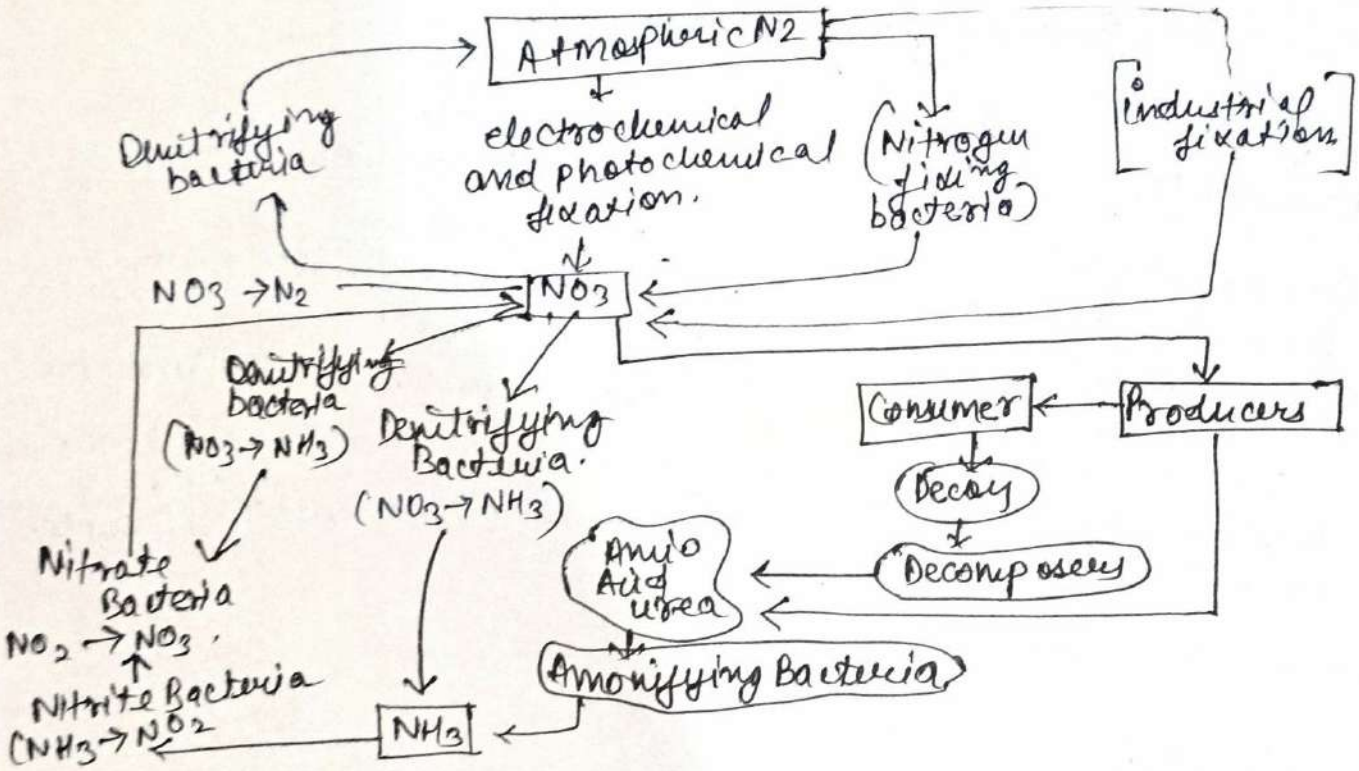
23/Jan/2023

(Carbon Cycles)



- CO_2 is taken up by green plants as raw material for photosynthesis through which variety of carbohydrates & other organic substances are produced. it moves through food chain and ultimately organic carbon present in dead matter is returned to the atmosphere as CO_2 by microorganisms during decomposition.
- respiration by all organism produces CO_2, plants reuse this CO_2 during photosynthesis thus completing the carbon cycle.

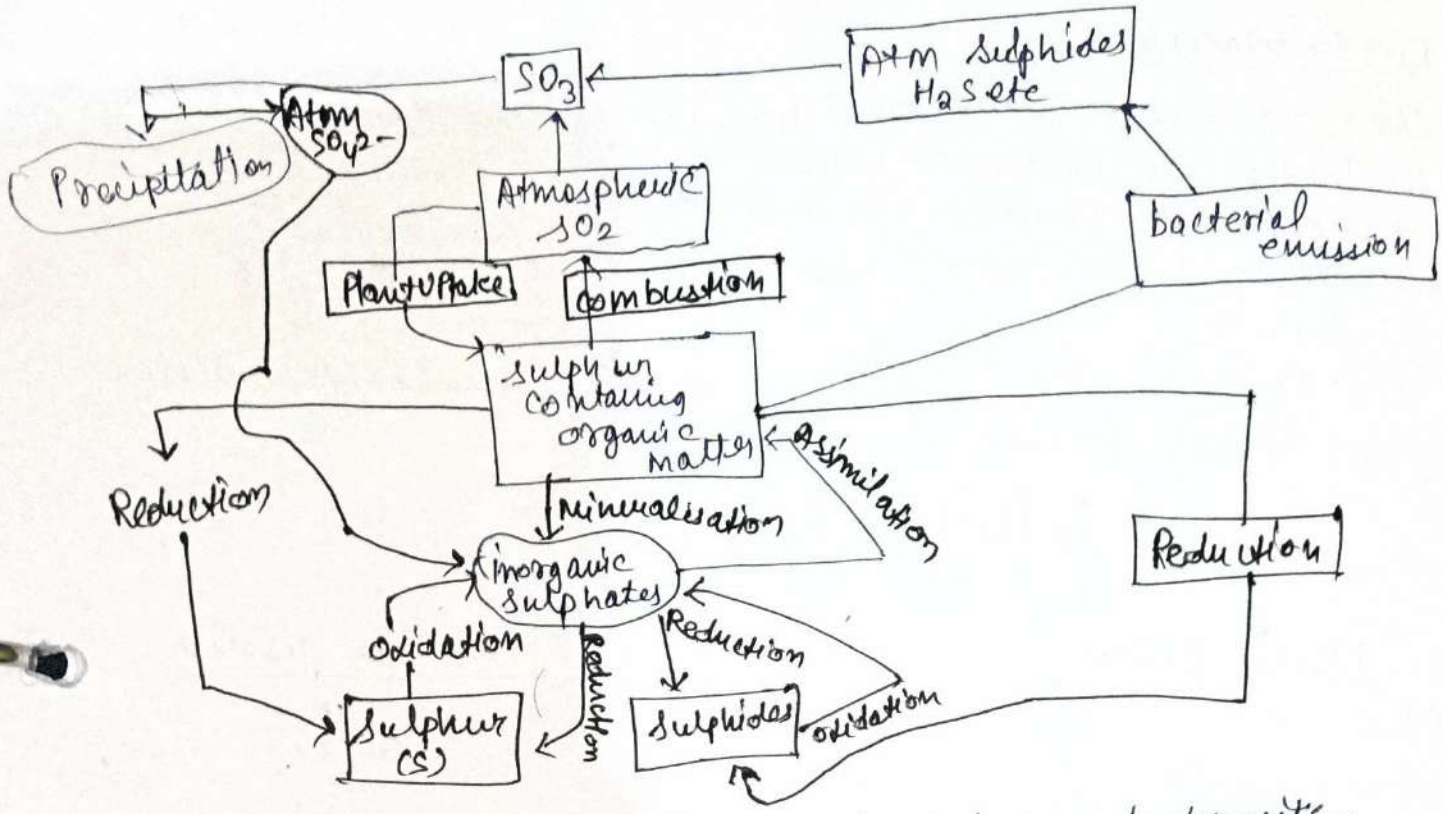
Nitrogen Cycle



- Nitrogen is present in largeamount in atmosphere by 78%. and its fixed either by physical process of lightning or by some bacteria biologically nitrogen is taken up by plant and used for the synthesis of Amino Acids, Protiens, vitamins etc and passes by food chain. After the death of plants & Animals the organic nitrogen in that tissues decomposed by amonifying and nitrifying bacteria which converts them into amonia NH_3, NO_2, NO_3 which are again used by plants.
- Some bacteria converts nitrate into nitrogen (N_2) which is released back into the Atmosphere and the cycle goes on.

Ecology 23/Jan/23

Sulphur Cycle



* Sulphur is existing with inorganic and organic deposits. It's released by weathering & decomposition.
- Sulphur released has sulphate ions is used by plants in synthesis of protiens (sulphydril group) (SH).
- Some sulphates are reduced under Anaerobic conditions directly to sulphites, H_2S or to elemental sulphur by desulpho Vibrio bacteria. H_2S released to air and is also oxidised by oxygen to sulphates by thio bacillus excess of sulphur combines with H_2O & comes as rain

24/Jan/2023

(Hydro Power)

- For generation of electricity from hydropower plant, it is necessary to utilise energy produced from descent of water from higher to lower level.
- In practice a water reservoir is constructed by means of dams in a river for storage of water, when stored water under high pressure is released from upper level into a water driven turbine placed at lower end electricity is generated

* (eg = Hirakud Dam, Tehri Dam, Bhakhda Nangal Dam)

Advantages:-

- It's the cleanest source of electricity, No emission of greenhouse gass.
- Non polluting source, cheapest, No fuel consumption

Disadvantages:-

- land acquisition (large area) required for construction of Dam.
- construction machinery are required.
- It degrades the quality of environment in that particular area.
- It destructs the habitat of people & wildlife locals refugees forms.
- Capacity of reservoirs decreases due to silt formation/Accumulation.
- flood chances increase.

:- (Nuclear Energy) :-

Nuclear fusion

at sem.

$H + H \rightarrow 2He^4 \cong 13ev$

$2He^4 + 2He^4 \rightarrow 4Be$

Nuclear fission

- $_{92}U_{235} + {}_0n^1 \rightarrow {}^{51}_{33}Sb + {}^{49}_{39}Nb + 200MeV + 3{}_0n^1$

- Nuclear Energy can be generated by nuclear fusion reaction which are based on fusion of uranium 235 nuclei by thermal neutrons.

eg Th_{232} $\boxed{92U_{205} + 0^{n1} \rightarrow 5^1Sb_{133} + 4^1Nb_{99} + 200mev + 3on^1}$

- Energy from nuclear reaction is used to heat water in the reactor and produce steam to run a steam turbine. Thus energy is converted into electricity. The other radioactive elements are PU_{239}.

Advantages

- Nuclear power plant do not emit polluting gases like CO_2, CO, SO_2
- 1gm, U_{235} produces heat energy equivalent to 3 tonnes of coal or 14 Barrels of crude oils

Disadvantages

- large amount of radioactive waste products forms during nuclear reaction which remains lethal for thousands of years.
- There is no proper disposal method for radioactive waste.

25/Jan/2023 Ecology

Environmental Ecology Notes

Nuclear fusion:-

$H^2 + H^2 \rightarrow 2He^1$ + large amount of energy 17.6 MeV.

utilize for large amount of energy which can be utilised for electricity production.

Advantages

- No formation of any radioactive waste.

Disadvantages

- technological problems for harnessing fusion energy is there and several years are required.

(Solar Energy)

- As we know that sun is the source of all energy on the earth, it is a large nuclear reactor where H_2 gas is continuously burning at high temperature and pressure.
- Solar Energy originates from the thermo-nuclear fussion reaction occuring on sun.
- The energy generated by sun into the space is recieved a electromagnetic radiation on earth.

(Production of electricity using solar energy)

It can be used either by absorbing radiations to produce heat or by converting it directly into electricity by following methods.

(i) **Photovoltage cell:-** solar panels or large no of solar cells are connected in series and parallel combination to obtained the requirement of power. These cell when exposed to solar radiations, gives which can converted into AC. using inverters. These silicon solar cell are used to produce electricity.

(ii) Solar through collectors :-

- Sunlight heating the solar collectors is reflected on to a pipe and heat the fluid circulating through it.
- The heated fluid is used to boil water, there by generating steam to run turbo generators.

(iii) Solar furnaces :-

Thousand of small plane mirrors are arranged in concave reflectors. which collect the solar heat & produces high temp up to 3000°c.

(iv) Power Tower :-

In this method an array of sun tracking mirrors is used to focus light on a large area of land onto a boiler mounted. The resultant heat producers produces steam in the boiler which drives a turbo generator to generate electricity

(Use/ Applications of Solar Energy)

(i) Solar Geyser.
(ii) Solar cells, used electronic watches, calculator, traffic signals and artificial satellites.
(iii) It is used in solar cooker, solar dries.
(iv) Solar water heaters.

(Advantages)

- its non polluting.
- Solar cells are called as green & clean cells.

(Disadvantages)

- CO_2 produced during the production of solar cell.
- Cadium is used in fabrication of cell.
- Density of solar energy is very low as oil gas, coal.

30/Jan/2023. # (Wind Energy) #

- In India wind power can be used for the generation of electricity as there are large coastal hills, desert areas.
- To converted the wind energy into electricity we utilise wind mills which converts the kinetic energy of wind into electrical energy.

Page No.
Date :

→ The blades of wind mill moving continuously due to the force of wind.
→ The rotation of blades derive a no. of machine like water pump, electric generator.
→ A large no. of wind mills are installed in cluster caussed at wind farm.

→ These wind farms are located in coastal area, open grass lands, or hilly regions, particularly mountain passes where the wind are strong and steady. the minimum wind speed required for working of wind generator is 15 km/hr.
→ In our country the largest wind farm is near Kanya Kumari in tamil nadu generating 380 MW electricity. per year.
mega ~~watt~~ watt

*. Advantages of wind energy. (Benefits).
1. It is renewable.
2. It is cheap
3. It is non - polluting.
4. It is useful in supplying electric power to remote and rular areas.

* Disadvantages of Wind energy (Limitation)
1. Wind is variable, irregular and intermitant.
2. The installion of wind mills is difficult due to atmospheric conditions where they have to operate
3. Small units are more reliable but have higher capital cost per kilo watt.
4. Large units require higher technology.

Page No.
Date :

5. It requires energy source & batteries which indirectly contribute to environmental pollution.
6. Wind generators may interfare with habitats of people and wildlife
7. It causes noise pollution.

Geothermal energy

The energy harnessed from the hot rocks present inside the earth is called geothermal energy. High temperature, high pressure steams ~~feeds~~ fields exist below the earth surface in many places.
The heat comes from fission of radio-active material naturally present in the rocks. In some places the steam or hot water comes out of the ground naturally through cracks in the form of natural geysers. as in manikaran, Kullu in H.P. and sohana in Haryana.

* Advantages.

1. It can be used with heat pumps for home heating & cooling.
2. It is non polluting.
3. It is clean

* Disadvantages.

1. The hot steam coming to the surface is contaminated with salts and sulphur compound which are corrosive to the turbines

e.g. → World's largest Geothermal production facility exist in Sanfransico in U.S.

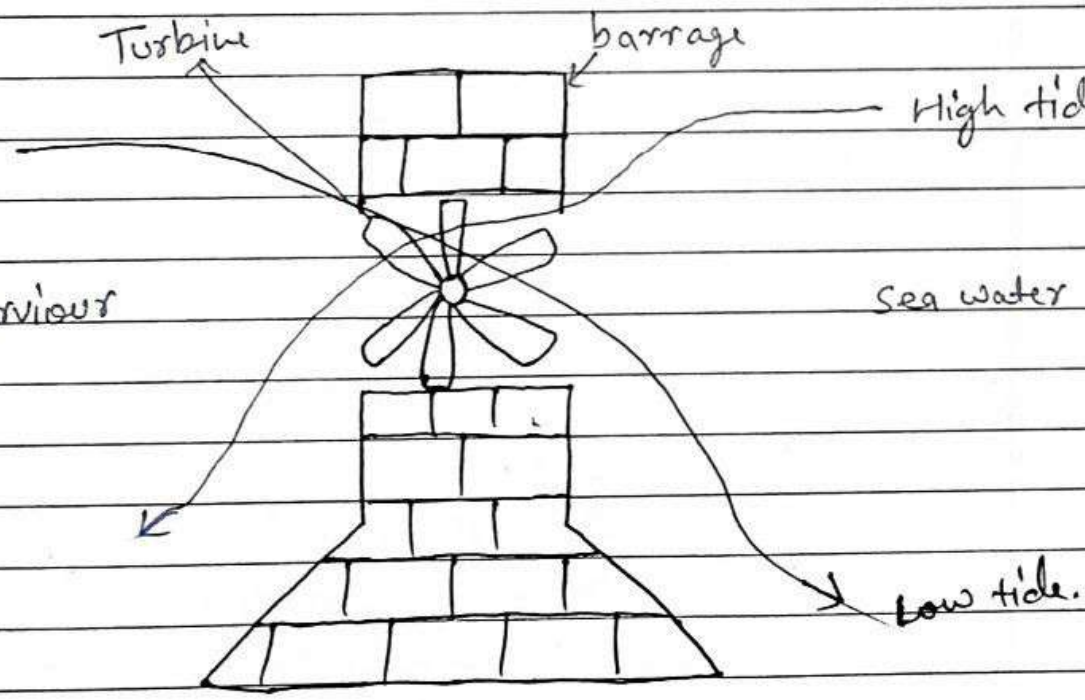
Page No.
Date :

Tidal energy

→ Ocean tides produce by gravitational forces of sun and moon contain large amount of energy. the high tide and Low tide refer to the rise and fall of water in the ocean

→ The Tidal energy can be harnessed by constructing a tidal barrage during high tide the sea water flow into the reserviour of the barrage and turn the turbine which produces electricity by rotating the generators.

During Low tide the sea water stored in the reserviour flow down into the sea & again turns the turbine.



Gulf on convey, Gulf of Kucch & sunderban delta are the tidal power tide.

Page No.
Date :

* Advantages.

1. Non polluting.
2. It is clear.
3. It is renewable.

*. Disadvantage.

1. The construction of barrage is difficult
2. This energy can be harvest only Coastal areas.

Ecology 31/Jan/2023

(fossil fuel based Energy)

fuel

- Solid (coal)
  - Types
    - Peat 60%C
    - lignite 70%C
    - Bituminous 80%C
    - Anthracite. 90%.C.
- liquid (crude oil)
  - Petrol
  - Diesel
  - kerosene.
- Gas (Nature gas)

- coal, crude oil, natural gas are called fossil fuels, because all of them were once a living matter.

(i) Coal (Black Diamond) :- coal derived from partial degradation of plants is mainly of 4 types :-
Peat (60% carbon), lignite (70% carbon), Bituminous (80% carbon), Anthracite (90% carbon)

- Athracite is hard, clean, burning, low sulphur coal is most desirable of all types of 4 coals. The typical Approx. Composition of coal is [$C_{100} H_{85} N_{2.1} S_{2.1} O_{9.5}$] in India coal mines are (Jharia, Bokaro, singrauli) its a non renuable energy source.
- On combustion coal emits SO_2 gas, NO_2 which forms sulphuric & Nitric Acid in Air & causes Acid rain.
- it produces CO_2 which is responsible for global warming.
- forms residue and smoke.

Advantages -

1) Easy to handle
2) Easy to transport & storage.

*Bajra → consumes more energy to digest that's why we Prefer Atta over it.

(ii) Crude oil = on fractional distillation gives petroleum gas, kerosene, petrol, diesel, lubricating oil, wax, polymers.

* Advantages: -
- cleaner fuel, leaves no residue, easy to transport and use.

(iii) Liquified Petroleum Gas (LPG) & it's a combination (Butane & Propane) in india its available in Digboi (Assam), & gujrat Plants.

(iv) Natural Gas:- it is 95% (CH_4) (methane) with small amount of propane & ethane.

- Natural gas deposits mostly accompany oil deposits because it has been formed by decomposing remains of dead animals and plants buried in earth.

* Advantages:-
- Its a clean fuel
- Burns without smoke
- it can be transported by pipelines
- high calorific value.

Locations found
* In India Tripura, Jaisalmer, offshore Area of Mumbai.

Uses:- 1) domestic & industrial fuel 2) Thermal Power Plants.
3) source of H_2 gas in fertiliser industry

[BioMass Energy]

- its the organic matter produced by plants or animals which includes crop Residues, wood, Dung, Manure, sewage & Agricultural waste etc.
- Biomass energy refers to direct Burning of Biomass and converting them to a fuel, its of following type.

(1) Energy plantation (Indirect use of solar Energy)

ecology 31/Jan/2023

solar energy is trapped by green plants through photosynthesis and converted into biomass energy. fastgrowing trees like cotton, grasses, sugarcane, Aquatic weeds, sea weeds, carbohydrate rich potato etc are some of the energy plantation ~~they~~ may produce energy either by burning directly or converted into fuels by fermentation

[Petro Crop]

- latex containing plants like palms, euphorbia. Provides energy on burning which is comparable to that of crude oil and gasoline, calotropis procera (Akra) Provides energy on burning comparable to that of crude oil and gasoline

01/feb/2023

biodiesel is an ester based oxygenated fuel is made from vegitable oil.

(Agricultural waste biomass)

1) crop residue, coconut shells, cotton stacks, Paddy husk etc produce energy on burning.

2) At Jalkheri in punjab, a rice straw fired thermal plant is the only plant in the world which will generate 62 Million units of electricity / year.

3) Rice bran is used as a source of oil which is converted into methyl ester and used as fuel

(Biogas / green gas / green Energy)

- It is a mixture of CH_4 (methane), CO_2, H_2, N_2, and H_2S, Its Produced by anaerobic degradation of animal or plant waste in presence of H_2O.
- There is a vast reserve of biogas in indian villages, Biogas plants are of mainly two type.
  (1) floating gas holder type
  (2) fixed dome type

Ecology (01 feb 2023)

Advantages

- its environmentally a clean technology.
- there is direct supply of gas from plant without any storage Problem.
- Airtight digestion of waste prevent direct exposure to pathogens & Parasites.
- Biogas slurries produce organic manure which is a good substitute for chemical fertilizers

* (Hydrogen as an alternative future source of energy) *

- Hydrogen provides clean, safe, affordable, secure energy from abundant renewable, traditional energy resource.

(Attributes of H_2)

- H_2 is considered as alternative perfect fuel because
  (i) its renewable and abundent element in universe (93%)
  (ii) its major reserve (water) is inexhaustible

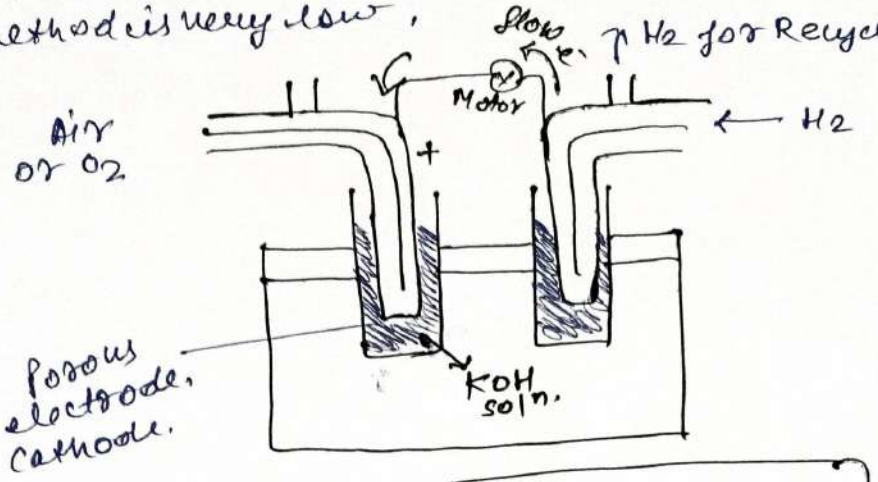
(Production of H_2)

- from feedstocks like coal, residual oil and natural gas.
- from Biomass -: high temp is req^d to convert biomass into H_2 & CO_2
- from water by electrolysis :- Hydrogen is generated directly by electrolysis of water. electricity is passed b/w electrodes emerged in a conducting aqueous solution. H_2 generated at cathode & Oxygen at anode. the energy stored in hydrogen can be reconverted into electricity using the reverse of the electrolytic cell, called fuel cell

-: (Extraction of energy from H_2) :-

method ① :- By fuel cell :- A fuel cell is electrochemical engine that converts the chemical energy contained in H_2 molecule into electrical energy. Hydrogen is oxidised at the cathode where

electrons are produced and passed through the circuit to the anode where oxygen is reduced. efficiency of this method is very low.



Anode Reⁿ:- $\frac{1}{2}O_2 + H_2O + 2e^- \rightarrow 2OH^-$

cathode Reⁿ:- $H_2 + 2OH^- \rightarrow 2H_2O + 2e^-$

Disadvantages

- highly inflamable.
- explosive
- Difficult to store & transport
- very light.

Advantages

- non polluting
- carbon free fuel
- it can reduce greenhouse gas emissions
- can be easily produced
- calorific value is high 150 Kjoule/gram.

Unit:-

(Climate change & global Warming)

Climate means the avg pattern in which weather varies in time. The climate of a region depends on the presence or absence of water, the reflection of solar radiation or albido, the ability to transfer water to the atmosphere (evaporation) the capacity to store wat, topography & structure of region.

- weather & climate are not the same thing it refers to the condition of temperature, humidity, cloudy, windness, and precipitation at a given moment. The weather is variable.

#(Greenhouse effect of global warming)#

The term 'greenhouse effect' was 1st given by J. fourier in 1827, is also called as global warming.

- greenhouse means a building made up of glass, with Δ & humidity regulated by plants. A greenhouse is that body which allows the incoming of solar radiation but doesn't allow the outgoing of IR rays. in similar way the earth's atmosphere trap the energy of the sun & act like green house where CO_2 acts as glass window.

- greenhouse effect is progressive warming of the earth's surface due to blanketing effect of man made CO_2 atmosphere.

#(Greenhouse Gases)#

1) CO_2 = (50%) ② Methane (19%) ③ CFC (17%) ④ O_3 (8%)

⑤ N_2O (4%) contributes to global warming.

effects of change in climate:

1) Extreme weather events: * in 1994 the northern hemisphere experiences the coldest winter in 50 years in Europe & USA. most of the europe was affected by heavy snow ball.

- In 1990, 1994, 1998, 2002, 2009 are the hot years ever considered due to solar radiation changes & volcanic Activity.

- There was a superclone in 1999 in orissa, where velocity of wind was more than 221 KM/Hr.

2) Rise in sea level:- - Global warming is responsible for melting of glaciers due to which there is a rise in world sea level

- low lying areas of calcutta/kolkata & Dhaka will be flooded; major coastal cities such as New York, London, stockholm, Bangkok, Singapore may be flood.

3) effect on human health:- - increased rainfall is responsible for more stagnant water, which will be the breeding area of mosquitoes and causes malaria, Dengue to men.

4) effects on Animals:- - Due to increase in temp or global warming. some species of animals endangered and some of them become extinct.

5) effects on Agriculture:- Due to global warming cotton yields increases with increase in temperature & CO_2, but the yield of wheat decreases with increase in temperature & CO_2.

6) increase in Global temp:- the temperature of world increases in the range of 1 to 6°C in the past 10000 years

(Causes of global warming)

* Air pollution due to industries, vehicles emissions
* Deforestation
* Agricultural Practices
* use of Refrigerator, AC, Aerosols, responsible for CFC.
* Thermal power Plant

ecology 06/feb/2023

(Control Measures)#

- use of clean fuels
- use of ecofriendly fuels
- work on needs than desire
- Treatment of waste emission by industries
- Afforestation
- use of natural fertilisers.

Acid Rain

* causes:- The pressure of SO_x & NO_x in the atmosphere due to human activities are responsible for acid rain.

1) Transportation :- burning of fuel.
2) Thermal power plant
3) Agricultural activities.
4) Industries:
5) Mining:
6) Refiners:-

* (effect of Acid Rain) *

1) on human health:- Acidification of drinking water reservoirs effect the health of human being.
- Presence of heavy metals are carcinogenic in nature.

2) effects on Aquatic ecosystem:-
Many bacteria & blue green algae are killed due to acidification, it causes death of fish by clogging there gills.
- Acid rain destruct the aquatic ecosystem.
- In winter acid rain accumulates as acid water/snow when it melts it gives jolt of acid water to lakes. This acid jolt damage young fishes, algae & insects.
- Acid rain causes death to snail's moisture.

③ Effect on terrestrial ecosystem:-

- Demineralisation of soil ocurs cations like calcium, magnesium, Na, K are leached away & replaced by other cations like Al_3^+ ion.
- Acid rain effects nitrogen fixation by nitrifying bacteria.
- Acidification of soil affects the forest productivity.
- Acid rain decreases the growth of vegetables like beans, pea, spinach & carrots.
- Acid deposition weakens the trees like pine, spruce.

④ Effect on vegetation:-

- Acid rain is responsible for chlorosis in the leaves of plants.

⑤ Effects on Buildings:-

Acid rain cause extensive damage to buildings & structural materials of marble, limestones etc. The attack of acid on marble is called as stone laporsy.

$$CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$$

- Architectural monuments like Taj Mahal in Agra may be destroyed due to slow corrosion by acid deposition & air pollutants released from Mathura reginary.
- Throughout europe and greek many famous building & monuments get deterioated at an alarming rate due to acid deposition.
- ornamental stone were on a church in bristole is corroded by acid rain.
- Acid rain causes damage to steel, oil based paints and automobiles coating. it disintegrates textiles & papers.

(Control Measures)

- Desulphurisation & denitrification of fuel has to be done.
- Reduction of sulphur oxide emission by coal cleaning can reduce acid rain.
- change in lifestyle.

Ecology 08/Feb/2023

(ozone layer depletion)#

- ozone gas plays a key role in atmosphere its present in the stratosphere segment of atmosphere, thickness of this ozone layer is 15 to 30km. its known as ozone umbrella as it protects earth from harmful UV rays coming from sun in

- In the absence of O_3 layer all the UV rays of sun will reach the earth surface. consequently the temperature of the lower atmosphere will rise to such extent that the biosphere will turn into blast furnace. Thus ozone layer absorbs the UV rays and protects the life on earth.

(Mechanism of ozone formation)

① $O_2 \xrightarrow{UV} O^{\circ} + O^{\circ}$

② $O^{\circ} + O_2 \xrightarrow{h\nu} O_3$

③ $O_3 + O^{\circ} \rightarrow O_2 + O_2$

Thus ozone is constantly created by solar radiation on earth's atmosphere, in lower mesosphere the atmospheric O_2 absorbs UV rays and break into two oxygen atoms. These oxygen atoms combines with O_2 of upper stratosphere and form O_3.

(Mechanism of ozone depletion)#

① ozone depletion by chlorine radical :- ozone in stratosphere is destroyed by man made CFC's and halons. these are used in air conditioner, refrigerators, mattresses, deodrants they slowly reaches to stratosphere and stay for 100's of years. in presence of UV rays CFC undergos photochemical dissociation into Cl which readily consumes ozone.

$$CFCl_3 \xrightarrow{h\nu} CFCl_2 + Cl$$
$$Cl^{\circ} + O_3 \rightarrow ClO^{\circ} + O_2$$
$$ClO^{\circ} + O \rightarrow {}^{\circ}Cl + O_2 .$$

The free radical Cl is generated, responsible for the chain reaction it is estimated that 1 Cl atom can destroy 1 lac of ozone molecule similarly bromine from halons can replace

Cl. and destroy ozone molecules.

(causes)

- use of refridgerators
- use of Air conditioners
- mattress & styrofoam manufacture
- use of deodorants & Aerosols.

(effect of O_3 depletion)

① On human health: • it's responsible of skin cancer, cataract
• it's responsible for skin-allergy & sun Burns.
• it is responsible of DNA Breakage, it's responsible for Photochemical smog.

② On Plants: ozone is responsible for damages to the crop of tomatos Peas, pine and other plants. In Denmark O_3 effects Spinach, Potato, alpha alpha etc.

(climatic impacts) :-

- It changes the weather like temperature, wind Pattern.
- it's responsible for increase in the temp of atmosphere

(Automobile Pollution)

it's a important factor responsible for destruction of the air quality. it takes place due to increased use of petrol & diesel vehicles.

Types of Automobiles are:-

- Two & Three wheelers powered by 2 stroke Petrol engines
- cars powered by 4 stroke petrol engines
- Bus & trucks are powered by 4 stroke diesel engines

(Automobile Emission)

- exhaust emissions, these are NOx, (oxides of Nitrogen), CO, Particulates containing unburned hydrocarbons & lead compounds
- crank case emissions it contains mostly hydrocarbons,
- evaporative emissions These are mainly CO, Hydrocarbons.
- other factors which are responsible for Automobile Pollutions are Age of vehicle, fuel composition, congested traffic, poor road conditions.
- outdated automotive technology

(effects of Automobile emissions)

① effect of NO_x:- NO_2 acts as precursor prodyl acetyl Nitrate (PAN) and ozone which are extremely lethal.

ecology 08/feb/2023

- NO_2 is highly toxic gas which is absorbed by the blood stream causing bronchitis and lung cancer.

② (effects of CO) :- it adversely affects human health, plants buildings & materials.

③ (effects of SO_2) :- SO_2 is responsible for irritation, cough, asthma, lung cancer & respiratory diseases in humans

[IMPORTANT QUESTION]

Water disputes on Indian rivers
water conflicts internationally (eg Indo china for Brahmaputra)

Bacteria's Name, preventions, causes of Water borne & Induced.

* Non conventional = Renewable fuels (Hydro, tidal, solar power)

Dilution of Pollution is a solution (Justify the statement)

(Ecology) unit-5 ((13/Feb/2023)

(Population Growth)

Today earth is being overrun, over exploited in almost all the countries of the world. human population has grown faster in 20th century than ever before. World population doubled in 40 years b/w 1950 & 1990 to cross 5 Billion.

(Population growth in india)

- In has joined 1 Billion club with population of 1.02 Billion according census report.

(Age structure) *

Age structure of population of a nation can be represented by pyramids based upon people belonging to different age groups like 0-14 years, 15 years to 44 years & 45 years & above.

- Three types of Age pyramid are observed :-

1) Expanding Age pyramid : The very young population is more, making a broad base & old people are less.
- India, Bangladesh, ethopia, Nigeria are the examples of this type. Such a structure favours fast population growth.

2) Stable Age pyramid :- (Bell shaped) : The proportion of different age group. (0 to 35 years). people is more or less same in France, USA, Canada.

3) Diminishing Age Pyramid :- (Urn Shaped) : The number of individual in very young age is smaller than middle age resulting in decline of population growth.

Germany, italy, hungary, sweden & japan are the example of this type.

Ecology (13/feb/2023)

(Population Variation among Nations)

- USA, canada & USSR have population of 250 Million western europe & Africa have about 500 million people, east asia ie: china, japan, korea, india, pakistan have more than 1 Billion. South Asia is the most populus region with 1.5 Billion people. India is adding per year population of Australia.

(Population characteristics)

- Doubling time:- The period within which the population of a country doubles is known as it's doubling time, it gives an idea of adverse effect of population growth. most developed countries have Doubling times of more than 100 years while in developing countries the population has (DT) less than 25 years

(Td) can be calculated as = $\boxed{Td = 70/r}$ where r is the annual increase and growth of population.

- if a nation have 2% Annual growth rate its population will double in 35 years.

- Infant Mortality rate & life expectancy :- (IMR)

- IMR is an important parameter affecting future of a population. IMR sets the parameter of life expectancy, (Average no of years that an infant is expected to survive).

- Death rate is generally expressed as the no of Deaths/year for every 100 people. progress in medical science has increased the life expectancy and decrease the infant mortality rate (IMR).

- The life expectancy is now increased to more than 70 years in developed countries as the (IMR) decreased to about 10 per (K).

- highest expectancy is that of japan (79 years). which enjoys highest literacy & high standard of living.

Assignment (Due on Fridays)

(T1) # Environmental Protection Act.

(i) Section 2 of the Act

(ii) Salient features of Act

(iii) Powers of Central Govt regarding this Act.

(T2) Environmental notifications

(i) EIA notification

(ii) Ecomark notification.

(iii) Environmental Audit notification.

(iv) important rules given by Central Govt.

Ecology (15/feb/2023) (IMPORTANT FOR EXAMS)

NGO (Non Governmental Org)

1) Kalpa Vriksh (Delhi Based Against Deforestration)
2) Kerela shastra sahitya Parishad (KSSP)
3) Worldwide fund for nature (WWF)
4) Bombay Natural history society (BNHS) (Mainly Defends forest)

NGO Movements :- (Important)

1) Chipko Movement
2) Silent Valley movement
3) Narmada Dam Bachao Andolan.

Environmental Education

A) Objective :- chinese proverb which says "if you plant for one year, plant rice if you plant for 10 yrs plant trees, and if you plant of 100 years educate people"

(i) Awareness
(ii) skill (identify & solve environmental needs)
(iii) knowledge of conservation.
(iv) Evaluation Ability. (like knowing consequences)
(v) Attitude & participation -

(B) Principles of Environment Education :- (Discuss these when Asked in Short note).

- To consider environment in its totality
- To consider a continuous life process
- To be inter disciplinary in Approach. (Important)
- To focus on current environmental situation.
- Active participation in prevention & control of Pollution.
- To examine root cause of environmental degradation.
- To provide an opportunity for making decisions & exceptig their consequences.

{ Cover Above Points in Your Views & knowledge }

ecology (15/feb/2023

:- (formal environmental education) :-

- Environmental education have 4 major interrelated component.
  1) Awareness
  2) real life situation.
  3) conservation
  4) Sustainable Development.

* the stages are:
  1) Primary School stage - environment intro.
  2) lower Secondary stage (middle school) - identify problems
  3) Higher secondary school stage - conservation
  4) college state - conserved & sustainable Develop
  5) University Education - At this stage it covers teaching, research & extension.

:- (Non-formal environmental education) :-

1) Adult Education
2) Rural Youth & Non-student Youth
3) Tribals
4) Children Activities
5) Eco Development camps
6) NGO's workings.
7) Public representatives
8) Training Executives
9) R&D programmes
10) foundation Course
11) Development of Educational materials & teaching Aids.
12) Development of man power
13) the world environmental Day (celebrated by All Orgs)