UNIT - IV

25/04/24

ENVIRONMENTAL POLLUTION

1) The word pollution was derived from a latin word Pollu tioncum = make dirty.

2) The unfavourable changes in the physical, chemical and bio-logical characteristics of sorrounding is known as environmental pollution.

Pollutant: —

⇒ wrong substance produced at wrong time

Ex:- liquids, solids and gaseous forms.

AIR POLLUTION: —

⇒ The unfavourable changes in the physical, chemical and biological characteristic of AIR is known as air pollution.

Types of air pollution:-

⇒ It is of three types;

1) Personal air pollution: If a person individually exposed to the dust, smoke and particulate matter.
Ex:- cooking & smoking

2) Occupational air pollution:- If a person exposed to the dust, smoke and particulate matter at his/her working area

3) community air pollution:- If a group of people was exposed to the dust, smok and particulate matter
Ex:- Burning of garbage.

Types of air pollutants:-

Types of air pollutants

- Rimary
- secondary

1) primary air pollutant :- The pollutants which are having direct source.

Ex:- CO_2, CO, Pb, NO_2 (Burning of fuel)

SO_2, CH_4 etc -- (Burning of carbon)

2) secondary air pollutant - The primary pollutants reacts with other chemicals in the atmosphere and forms secondary air pollutants

Ex:- H_2SO_4, HNO_3, SO_4^{-2}, O_3, photochemical smog etc --

Causes:-

Air pollution causes

Natural

1) Volcanic eruption (H_2S, SO_2, etc)
2) Forest fires (CO_2, CO, CO)
3) Decomposition (bad odour)

Man-made

1) Rapid population
2) Deforestation
3) Emmissions from vehicles
4) Burning of fossil fuels
5) Industries.
6) Agricultural practices
7) wars.

Man-made:

1) Rapid population :- The excess population, demands excess use of fossil fuels and excess space for human settlements leads to Deforestation and increases air pollution

2) Deforestation :- The Plants maintains balance between O_2 and CO_2, because of deforestation, CO_2 concentration increases and leads to air pollution.

3) Emmissions from vehicles :- The incomplete combustion of petrol and diesel releases, lead (Pb), CO, NO_2 etc — and causes air pollution

4) Burning of fossil fuel :- The burning of coal and fuel wood releases SO_2 and CO_2 leads to air pollution.

5) Industries :- All the industries releases gaseous emissions and contribute 70% of air pollution.

6) Agricultural Practices :- The spraying of pesticides and fertilizers reduces the surrounding air quality

7) Wars :- During wars, the explosion of nuclear bombs releases radio-active elements into the atmosphere and causes air pollution
Ex :- I^{131}, I^{132}, U^{235} etc--

EFFECTS :-
1) All the air pollutants causes respiratory tract infections.
2) Photo chemical smog causes asthama and eye iiritation.
3) CO_2 leads to global warming.
4) CO leads to Asphyxia. (The CO combins with haemoglobin and forms the carboxy haemoglobin which reduces respiration & leads coma).
5) SO_2 causes decolorization of buildings and monuments.
6) H_2SO_4 and HNO_3 leads to acid rain.
7) O_3 causes Necrosis. Calloying of plants leaves which means destruction of chloroplast in plants).
8) Pb reduces the produces of haemoglobin.
9) As causes lung cancer
10) Radio-active elements leads to mutations

CONTROL :-

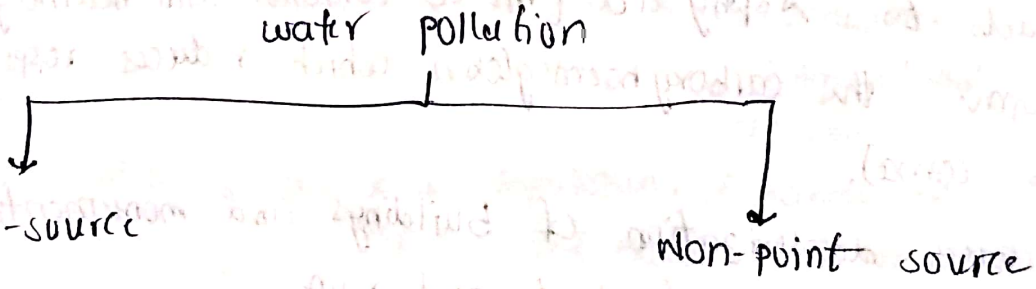
1) The industries should be constructed from away from the cities and towns
2) use of tall chimneys reduces the surrounding air pollution
3) use of filters and electrostatic precipitators within the chimneys reduces the concentration of pollutants.
4) use of renewable energy sources, Ex:- battery and solarpower
5) Afforestation.

WATER POLLUTION

⇒ The unfavourable changes in the physical, chemical and biological characteristics of water is known as water Pollution.

Types of pollutants:-

⇒ It is of two types



1) Point-source:-

⇒ The pollutants which are having identifiable source.

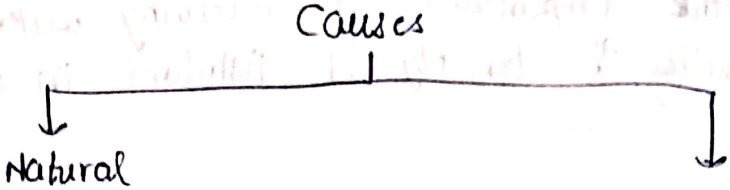
Ex:- sewage water, industrial water

2) Non point source :-

⇒ The pollutants which are not having identifiable source

Ex:- Acid rain, pesticides, fertilizers etc -

causes :-



Natural

1) siltation } increasing
2) floods } micro organisms
3) Decomposition
↓
It leads to increase in CO_2 and decrease in O_2.

Man-made

1) Sewage waste
2) Industrial waste
3) Agricultural discharge.
4) Heavy metals
5) Toxic, chemicals
6) Radio-active elements
7) Heat

Manmade:-

1) Sewage waste:- It includes the waste water from bathrooms and kitchen which contains soap, detergent and also increases the temperature of receiving water body

2) Industrial waste:- All the industries releases waste water and causes water pollution.

3) Agricultural discharges:- It includes the pesticides and fertilisers

4) Heavy metals:- The electroplating industry releases heavy metals like Arsenic, cadmium & mercury (As, Cd & Hg) and causes water pollution

5) Toxic chemicals:- The waste water from pesticide manufacturing industries releases ; DDT, KCN, Benzene hexa-chloride, etc.

6) Radio-active elements: The nuclear test and waste water from nuclear Power plants releases radio-active elements and causes pollution

Ex:- Sr^{90}, U^{235}, Th^{237} etc.

7) Heat:- The waste water from thermal power plants increases the temparature of receiving water body which doubles the toxicity of Pollutants in the water

Effects:-

1) It leads to increase in water borne diseases like Jaundice, cholera and discentry.

2) Phosphorous fertilizer causes Eutrophication.

Eutrophication:- The excess growth of algal blooms on the water body doesn't allows sunlight into the deeped layers of water body and effects metabolic activities of aquatic animals and causes death which leads to increase in Co_2 and decrease in O_2

3) Nitrate fertilizer causes - blue baby syndrom (or) Methhaemo-globinomea

⇒ If a pregnant woman consumed the water contaminated with nitrate fertilizer, instead of O_2 the N_2 combines with haemo globin and forms with haemoglobin which turns the blood into blue color. and leads to death of baby.

4) Mercury causes - Minamata disease

⇒ The mercury is converted into methyl mercury by microbial action in the water body and through food chain it reaches the body of human and causes numbness of essential body parts. (liver, pancreas, brain)

5) Flouride causes - florosis (weakening of bones and teeth), and also causes knock knee syndromes. (the outward bending of knees).

6) The cadmium cause itai itai diseases.

7) Zinc causes renal damage

8) Ni - Nickel acts as a cancer agent

9) As - Arsenic causes lung cancer

10) Cu - Copper leads to hyper tension.

a) DDT causes biomagnification (2nd Lesh)

10) SiO_2 leads to thinning of shells of molluscans

Control: —

⇒ It is by three ways:

i) sewage treatment plant (STP)

ii) Effluent treatment plant (ETP)

iii) common effluent treatment plant (CETP)

i) Sewage treatment plant (STP)

⇒ It is by three methods: —

1) Primary or physical: — It removes the floated materials from waste water by using Grit chamber.

2) secondary or bio-logical: — The reduction of strength of waste by using micro-organisms. they are of three types:

1) Trickling filters

2) Activated sludge

3) Oxidation Pond

3) Tertiary or chemical: — By using chlorination or ozonisation kills the micro organism in the water.

ii) & iii) ETP and CETP.

⇒ ot is by three methods

1) primary or physical:-

⇒ The removal of the suspended and floated particls from waste water by using sedimentation and floatation

2) secondary or chemical treatment:-

⇒ ot is by following ways:-

i) absorption

ii) reverse osmosis

iii) chemical coagulation

iv) Electro dialysis

3) Tertiary or biological treatment:-

⇒ The reduction of strength of waste by using micro organisms

1) Trickling filters

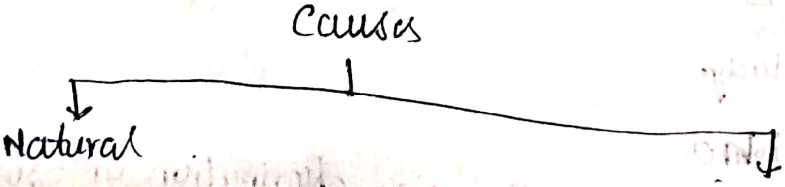
2) Activated sludge

3) oxidation pond

SOIL POLLUTION

⇒ The unfavourable changes in the physical, chemical and biological characteristics of soil is known as soil pollution.

Causes



1) weathering of rocks (C^{14}, K40)

2) Decomposition (it leads to acidic soils).

1) urban waste
2) Industrial waste
3) Agricultural waste
4) Heavy metals

5) Toxic chemicals 6) Radio active elements 7) other pollutants

Manmade:-

1) urban waste:- It includes the waste from residential, industrial, and commercial areas.

2) Industrial waste:- It includes chemical powder, sludge, peticide, plastic and any un-used parts in the industries

3) Agricultural practices:- Rapid use of pesticides and fertilizers reduces the soil fertility.

4) Heavy metals:- The heavy metals like arsenic, cadmium, mercury from electroplating industries causes soil pollution.

5) Toxic chemicals:- The toxic chemicals like DDT, KCN, Benzene Acetic chloride from pesticide manufacturing industries causes soil pollution

6) Radio active elements:- During wars, the explosion of nuclear bombs releases radio-active elements and causes soil pollution

Ex:- I^{131}, I^{132}, Th^{237}, U^{235} etc.

7) other pollutants:- The air and water pollutants also causes soil Pollution.

⇒ Effects:-

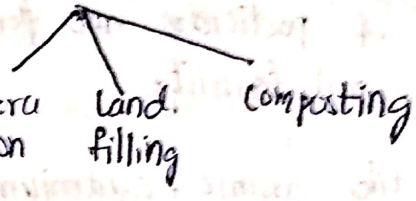
1) It leads to loss of soil fertility.
2) loss of benefecial micro-organisms
3) loss of macro and micro nutrients in the soil.
4) Arsenic causes lung cancer
5) cadmium causes kidney damage.

⇒ control :-

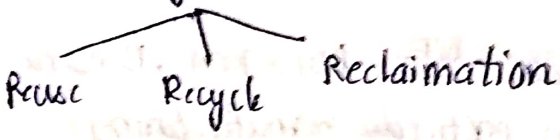
→ it is by three methods:

1) Collection of waste

2) Dispersal of waste



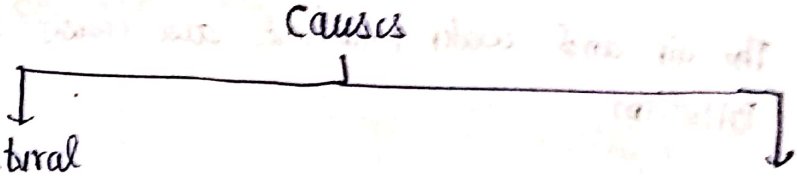
3) Recovery of waste



NOISE POLLUTION

⇒ The unwanted sound produced at unwanted time is called noise pollution

Causes :-



1) Natural water falls (60 dB)
2) Thundering (110 dB)

1) Air traffic
2) Road traffic
3) Rail ways
4) Industrial areas
5) Commitial areas
6) Mining areas
7) Conductional areas
8) Neibourhood
9) Festivals

Man made :-

1) Air traffic :- It includes the sounds from Aeroplane 120-dB, Jet plane - 150 dB, rocket - 180 dB of noice. leads to noice pollution

2) Road traffic :- The horn of cars, buses, lorricks - 90-110 dB, auto - 90 dB, bikes 75-95 dB and leads to noise pollution.

3) Railways :- The siren of train produces 110 dB, apart from these announcements and crowd leads to noise Pollution.

4) Industrial areas :- The running of machinaries and transportation Produces 90-110 dB of noise.

5) commercial areas :- It includes the noise from shopping malls, exhibition, hotels & theatres around 90-110 dB

6) mining areas :- runnig of machineries and transportation around 90-110 dB and expression of bombs - 125 dB.

7) constructional areas :- welding, breaking of stones and bricks and running of machinaries produces 90-110 dB.

8) neighbourhood :- mixer grind - 75 dB, washing machine - 70 dB, vaccum cleaner - 75-85 dB, Barkening of dog - 130 dB.

9) Festivals :- The festivals like diwali, bonalu, dusshera, immersion of lord Ganesha - 90-110 dB.

Effects :—

Effects

- Physiological
- Psycological

Physiological

1) If a person exposed to the 45dB of noise, 8hrs per day need to lack of sleep

2) If a person exposed to the 65 dB of noise, 8hrs per day registas ear pain

3) At 125dB of noise leads to loss of hearing.

4) It leads to vomitings and headache

5) It leads to ulcers in stomach.

6) It leads to contraction of blood vessels and causes paralysis

7) It leads to heart attacks and heart related diseases

8) Psycological :—

1) Effect on brain

Control :—

1) By using ear protective aids

2) use of ear plugs and headphones by the workers in the industries reduces the exposure to the sound.

3) By using silencers

4) use of silencers in the vehicles and machinaries reduces the noise levels

3) By proper planning of cities & towns.

→ The industries should construct far away from the human settlements reduces surrounding noise pollution

4) By proper designing of doors, windows & ceiling.

→ By using sound proof materials like glass, wood, acoustic tiles and fall ceiling reduces noise levels

5) By Plantations.

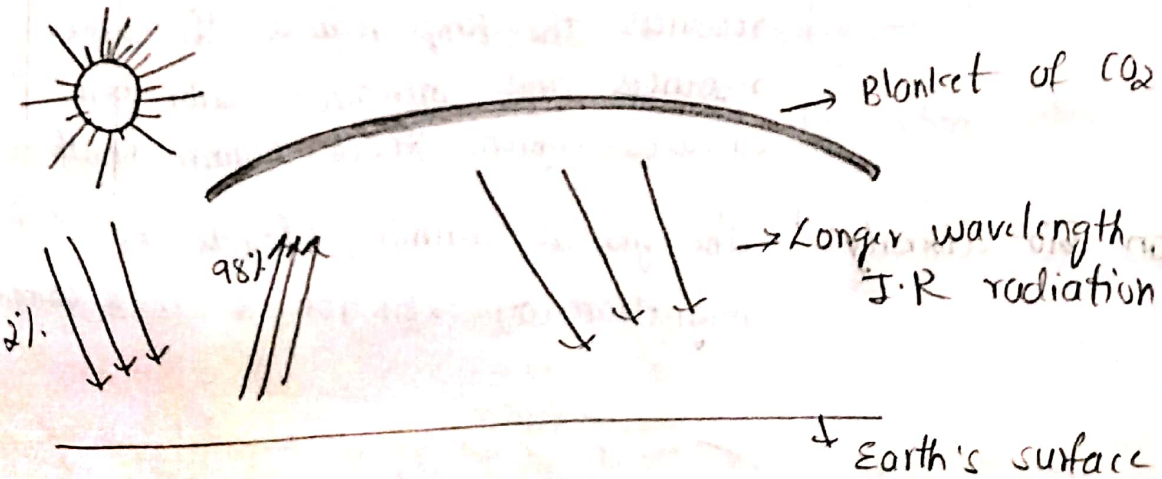
→ The trees like neem, coconut and tamarindus absorbs 6-10 dB of the noise..

6) through law

→ The below table contains the standards for different areas given by noise pollution control act

S.No	Areas	During day 6:00 am - 10:00 pm	During night 10:00 pm to 6:00 am
1	Industries	75 dB	70 dB
2	Commercial	65 dB	55 dB
3	Residential	55 dB	45 dB
4	Silent zone	45 dB	40 dB

⇒ Global warming and green house effect :-



→ The progressive warming up of Earth surface due to blanketing effect of CO_2 is known as Global warming

Green house gases:— 1) CO_2
2) CH_4
3) N_2O
4) water vapour
5) O_3
6) CFC's

Effects:—

1) climate change:-

i) climate:— the weather extreams and seasonal variations are maintained same for longer directions is regarded as a climate of particular area.

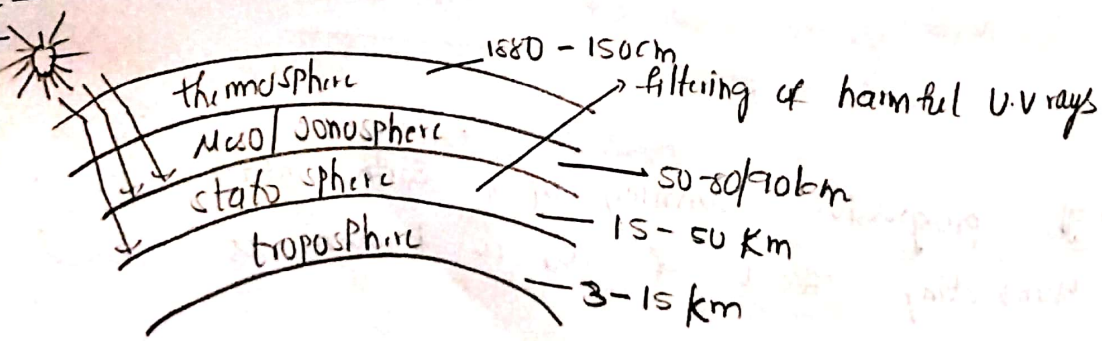
2) rise in sea level:— the increased temparature leads to melting of polar ice caps which expands c level and leads to floods and submarins of postal areas.

3) Effect on agriculture:— the increase temparature raises soil temp and decrease soil water which reduces the yielding of crops

4) Effect on human health:— the increased temp. reduces the water resources the temp reduces the water resources and increases water born diseases which effect human health.

5) Effect on bio-diversity:— the global warming leads to migration (or) extintion of wild anima

Control:—



Formation of O_3 :—

→ on the presence of sunlight the O_2 molecule is divided two nacent oxygen, and each material nascent combine with oxygen molecule and forms O_3.

Depletion

Natural

1) $O_3 \xrightarrow{UV} O_2 + O$

2) $O_2 + O \xrightarrow{UV} O_3$

Manual

1) $CFCS \xrightarrow{UV} Cl^+$

2) $O_3 + Cl^+ \xrightarrow{UV} ClO^+ + O_2$

3) $O_3 + ClO^+ \xrightarrow{UV} ClO_2 + O_2$

4) $O_3 + ClO_2^+ \xrightarrow{UV} ClOOCl + O_2$.

Ozone depleting substances:—

1) chloro flouro carbons (CFCs)
2) hydro chloro flouro carbons (HCFC's) } used as coolants in refrigirator units
3) hydro bromo flouro carbons (HBFC's)
4) Halons → used as fire extinguishers
5) carbon tetra chloride (CCl_4) } used as a cleaning solvents to clean electronic circuits in industries.
6) methyl chloroform (CH_3Cl_3)
7) methyl bromide (CH_3Br) } used as pesticide and soil fumigant.
8) chloro bromo methane ($ClBrCH_2$)

on stratosphere the CFC's releases chloride atom which converts $O_3 * O_2$ and leads to thinnig of ozone layer

→ The life span of chloride atom is 100 years and one chloride atom can convert one lakh of $O_3 * O_2$.

→ The thickness of ozone layer is measured in dobson units

1 D.U = 0.01 mm thickness of O_3.

1) Effect on terrestrial plants:—

The harmful UV destructs chloroplast in the plants and reduces leaf size, photo synthesis and yielding of crops.

2) Effect of Aquatic plants:—

the harmful UV rays 20m deep into water and kills phytoplanktons and disturbs entire ecosystem.

3) Effect on human health:—

the harmful UV rays cause skin cancer cataracts in Eye and reduces humidity

4) Effects on climate:—

the thinning of Ozone layer allows more radiation and increases Global warming

control:—

⇒ By montreal Protocal

PROTOCOLS:—

1) Earth summit (1992)

~~2) Kyoto~~

⇒ It is also called as united nations convention on environment and development (UNCED) and Rio summit held on june 3rd – 14th in 1992 Riode jeniro, brazil.

⇒ 178 nations have participated along with 117 heads of states and 30 thousand deligates including industrial persons and media people

⇒ The main aim of this protocol is to achieve sustainable development

Key issues:-

1) The earth chapter: deals with environmental Protection and development

2) Agenda 21:- It is a global action plan for sustainable development

3) UNFCCC :- united nations frame work convintion on climate change

4) UNCB :- united nation convention on biodiversity.

5) Rio declaration :- gives the rights and responsibilities to the states.

6) Principles to forest :-

2) KYOTO PROTOCOL (1990) :-

⇒ It is a supplement of UNFCCC and the main aim of this protocol is to reduce green house gases proposed in 1990 and adapted on december 11th, 1997. which took place in kyoto, Japan.

⇒ According to this protocol, the developed countries have to reduce their green house gas emissions atleast by 5% by the year 2012.

Key issues:-

1) clean development mechanism (CDM).
The developed countries, provides financial and technical support to the developing countries to reduce their green house gases.

2) Emmission trading
If any developing country have reached beyond the target, the extra credits can sell to any developed country.

3) Joint implementation:-

If any two developed or developing countries failed to reach their target, these two countries by mutal understanding can reach the same target.

3) MONTREAL PROTOCOL (1989)

⇒ Proposal in the year 1987 but adapted in the year 1989.

⇒ The main objective of this protocol is to reduce the ozone depleting substances.

⇒ According to this protocol the following are the ozone depleting substances.

1) CFC's
2) HCFC's
3) HBFc's
4) Halons
5) CCl_4
6) CH_3CCl_3
7) CH_3Br
8) $ClBrCH_2$

⇒ The protocol has passed a resolution, that is September 16th as a international ozone day.

★ Deforestation and Desertification :- (UNIT-2)

★ Solid waste management :-

Solid waste :- The waste in the form of solid which arises from various sources like residential, commertial and industrial areas.

Classification:-

1) Garbage or Food waste :-

It includes bio-degradable waste like spoiled vegetables, fruits and meat.

2) Rubbish :-

It is of 2 types :-

i) combustible :- The waste which can be subjected to heat

Ex:- plastic, cardboards etc---

ii) Non-combustible :- The waste which cannot be subjected to heat.

Ex:- crokary, alumium can etc-.

3) Agricultural waste:-

It includes, cotton, jute, rice straw, tea, coffee leaves and cattle shed management

4) Industrial waste:-

It includes chemical Powr plastic, pesticicls, cemint and unused products

5) Biomedical waste:-

It arises from hospitals which includes syringes, gloves, plastic bottles, tubes etc...

6) Hazardous waste:-

It is of 4 types:-

1) corrosive chemicals:

2) flammable chemicals

3) toxic chemicals

4) radio active elements.

7) constructional waste:-

It includes the broken bricks, stones, electric wires, and sanitary parts.

⇒ WASTE Management :-

1) collection of waste :-

It is of 3 types :-

i) community collection :- collecting the waste from fixed dustbins.

ii) kerb side collection :- collecting the waste from roadside dustbins and are movable.

iii) Block collection :- The collecting staff comes to the various houses and collects the waste.