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Pollution
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Introduction

Human activities directly or indirectly affect the environment adversely. A stone crusher adds a lot of suspended particulate matter and noise into the atmosphere. Automobiles emit from their tail pipes oxides of nitrogen, sulphur dioxide, carbon dixide, carbon monoxide and a complex mixture of unburnt hydrocarbons and black soot which pollutes the atmosphere. Domestic sewage and run off from agricultural fields, laden with pesticides and fertilizers, pollute water bodies. Effluents from tanneries contain many harmful chemicals and emit foul smell. These are only a few examples which show how human activities pollute the atmosphere.

Pollution may be defined as addition of undesirable material into the environment as a result of human activities. The agents which cause environmental pollution were called pollutants. A pollutant may be defined as a physical, chemical or biological substance unintentionally released into the environment which is directly or indirectly harmful to humans and other living organisms.

Types of Pollution

Pollution may be of the following types :

- Air pollution
- Noise pollution.
- Water pollution
- Soil pollution.
- Thermal pollution.
- Radiation pollution.

Air Pollution

Air pollution is a result of industrial and certain domest activity. An ever increasing use of fossil fuel in power plants, industries, transportation, mining, construction of buildings, stone quarries had led to air pollution. Air pollution may be defined as the presence of any solid, liquid or gaseous substance including noise and radioactive radiation in the atmosphere in such concentration that may be directly and indirectly injurious to humans or other living organisms, plants, property or interferes with the normal environmental process.

Air pollutants are of two types suspeded matter and gaseous pollutants like carbon dioxide (CO_2), NO_x etc. Some of the major air pollutants, their sources and effects

Primary and secondary air pollutants :

A primary pollutant is an air pollutant emitted from a source. A secondary pollutant is not directly emitted as such, but forms when other pollutants (primary pollutants) react in the atmosphere.

The secondary pollutants are not emitted directly. The secondary pollutants from when the primary pollutants react with themselves or other components of the atmosphere. Most important secondary level Air Pollutants are Cground level Ozone, Smog and POP's (Persistent Organic Pollutants)

Particulate pollutants

Particulate matter suspended in air are dust and soot realeased from industry chimneys. Their sizes from 0.001 to 500 μm in diameter. Particles less than 10μm float and in diameter settle down. Particles less than 0.02 μm form persisent aerosols. Major source of SPM (suspended particulate matter) are vehicles, power plants, construction activities oil refinery, railway yard, market place, industries etc.

Fly Ash

Fly ash is ejected mostly by thermal powerplant as by product of coal burning operations. Fly ash pollutes air and water and may cause heavy metal pollution in water bodies. Fly ash affects vegetation as a result of its direct deposition on leaf surfaces or indirectly through its deposition on soil. Fly ash is now being used for making bricks and as a land fill material.

Prevention and control of air pollution

i) Indoor air pollution

Poor ventilation due to faulty design of buildings leads to pollution of the confined space. Paints, carpets, furniture, etc in rooms may

ii) Prevention and control of indoor air pollution

Use of wood and dung cakes should be replaced by cleaner fuels such as biogas, kerosene or electricity. But supply of electricity is limited. Similarly kerosene is also limited.

iii) Prevention and control of industrial pollution.

a) use of cleaner fuels such as liquefied natural gas (LNG) in power plants, fertilizers plant etc.

b) employing environment friendly industrial process so that emission of pollutants and hazardous wast is minimized.

c) installing devices which reduce release of pollutants.

i) Filters - Filters remove particulate matter from the gas stream. The medium of a filter may be made of fibrous materials like cloth, granular material like sand, a rigid material like screen, or any mat like felt pad.

ii) Electrostatic precipitators (ESP) - The emanating dust is charged with ions and the ionized particulate matter is collected on an oppositely charged surface.

iii) Inertial collectors - It works on the principle that inertia of SPM in a gas is higher than its solvent and as inertia is a function of the mass of the particulate matter this device collects heavier particles more efficiently.

iv) Scrubbers - Scrubbers are wet collectors. They remove aerosols from a stream of gas either by collecting wet particles on a surface followed by their removal, or else the particles are wetted by a scrubbing liquid.

Apart from the use of above mentioned devices, other control measures are

a) increasing the height of chimneys
b) closing industries
c) shifting of polluting industries

iv) Control of vehicular pollution

a) The emission standards for automobiles have been set which if followed will reduce the pollution

b) The price of diesel is much cheaper than petrol

c) Earlier lead in the form of tetraethyl lead was added in the petrol to raise octane level for smooth running of engines.

The effects of air pollution vary based on the kind of pollutant But generally, the impact of air pollutant ranges from:

a) Increased risk of respiratory illness and cardivascular problems

b) Increased risk of skin diseases

c) May increase the risk of cancer

d) Global warming

e) Acid rain

f) Hazards to wildlife.

Noise Pollution

Noise is one of the most pervasive pollutant. A musical clock may be nice to listen during the day, but may be an irritant during sleep at night. Noise by definition is "sound without value" or "any noise that is unwanted by the recipient". It is therefore of utmost importance that excessive noise is controlled Noise level is measured in terms of decibles (dB). W.H.O (World Health Organization) has prescribed optimum noise level as 45 dB by day and 35 dB by night. Anything above 80 dB is hazardous.

Sources of noise pollution

Noise pollution is a growing problem. All human activities contribute to noise pollution to varying extent. Sources of noise's pollution are many and may be located indoors or outdoors.

Indoor sources include noise produced by radio, television, generators electric fans, air coolers, air conditioners, different home appliances and family conflicts. Noise pollution is more in cities due to a higher concentration of population and industries and activities such as transportation. Noise like other pollutants is a by product of industrialization, urbanization and modern civilization.

Outdoor sources of noise pollution include indiscriminate use of loudspeakers, industrial activities, automobiles, rail traffic, aeroplanes and activities such as those at market place, religious, social pollution. During festivals, marriage and many other occasions, use of fire crackers contribute to noise pollution.

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Noise pollution has now become very common due to dense urbanisation and industrialisation. Noise pollution can bring about adverse effect such as.

a) Hearing loss

b) Tinnitus

c) Sleeping disorders

d) Hypertension (high BP)

e) Communication problems

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Effects of noise pollution

Noise pollution is highly annoying and irritating. Noise disturbs sleep, causes hypertension (high blood pressure), emotional problems such as aggression mental depression and annoyance. Noise pollution adversely efficiency and performance of individuals.

Prevention and control of noise pollution

a) Road traffic noise can be reduced by better designing and proper maintenance of vehicles.

b) Noise abatment measures include creating noise mounds, noise attenuation walls and well mentained roads.

c) A green belt of trees is an efficient noise absorber.

d) Industrial noise can be reduced by sound proofing equipment like generators and areas producing lot of noise.

e) Power tools, very loud music and land movers, public functions using loudspeakers, etc should not be permitted at night.

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Water Pollution

Addition or presence of undesirable substances in water is called water pollution.

Water pollution is one of the most serious environmental problems. Water pollution is caused by a variety of human activities such as industrial, agricultural and domestic. Agriculture run off laden with excess fertilizers and pesticides, industrial effluents with toxic substances and sewage water with human animal wastes pollute water thoroughly.

Natural sources of pollution of water are soil erosion, leaching of minerals from rocks and decaying organic matter. Rivers, lakes, seas, oceans, estuaries and ground water sources may be polluted by point or non point sources. When pollutants are discharged from a specific location such as drain pipe carrying industrial effluents discharged directly into a water body it represents point source pollution.

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Sources of water pollution

Water pollution is the major source of water born diseases and other health problems. Sediments brought by runoff water from agriculture fields and discharge of untreated or partially treated sewage and industrial effluents, disposal of fly ash or solid waste into or close to a water body cause severe problems of water pollution. Increased turbidity of water because of sediments reduces penetration of light in water that reduces photosynthesis by aquatic plant.

i) Pollution due to pesticides and inorganic chemicals

- Pesticides like DDT and other used in agriculture may contaminate water bodies. Aquatic organisms take up pesticides from water get into the food chain and move up the food chain.

- Metals like lead, zinc, arsenic, copper, mercury and cadmium is industrial waste waters adversely affect humans and other animals.

- Pollution of water bodies by mercury causes Minamata disease in humans and dropsy in fishes.

- Oil pollution of sea occurs from leakage of ships, oil tankers, rigs and pipelines.

ii) Thermal pollution

Power plants - Thermal and nuclear, chemical and other industries use lot of water (about 30% of all abstracted water) for cooling purpose and the used hot water is discharged into rivers, streams or oceans. The waste heat from the boilers and heating processes increases the temperature of the cooling water. Discharge of hot water may increase the temperature of the receiving water by 10° to 15°C above the ambient water temperature. This is thermal pollution

iii) Ground water pollution

Lot of people around the world depend on ground water for drinking, domestic, industrial and agricultural uses. Generally groundwater is a clean source of water. However, human activi

iii) 'Eu' means well or healthy and 'trophy' means nutrition. The enrichment of water bodies with nutrients causes entrophication of the waterbody. The sudden and explosive growth of phytoplankton and algae bloom which release substances in water which are toxic in nature that causes death of large population of fishes. The phenomenon of nutrient enrichment of a waterbody is called eutrophication.

Methods for control of water pollution and water recycling

Waste water from domestic or industrial sources or from garbage dumps is generally known as sewage. It may also contain rain water and surface runoff. The sewage water can be treated to make it safe for disposal into water bodies like rivers, lakes etc. The treatment involves three stages : primary, secondary and tertiary. This includes

a) sedimentation
b) coagulation
c) filtration
d) disinfection
e) softening
f) aeration.

Water recycling

With increasing population the requirement for the water is increasing rapidly. However the availability of water is limited but an ever increasing water withdrawl from different sources such as rivers, lake and ground water is depleting these sources and deteriorating their water quality. Therefore, it is essential to utilize the available water with maximum economy. Recycling refers to the use of waste water by the original user prior discharge.

Control of water pollution

The following measures can be adopted to control water pollution :

a) The water requirement should be minimized by altering the techniques involved.

b) Water should be reused with or without treatment.

c) Recycling of water after treatment should be practiced to the maximum extent possible.

) The quantity of waste water discharge should be minimized

Soil Pollution

Addition of substances which adversely affect the quality of soil or its fertility is known as soil pollution. Generally polluted water also pollute soil. Soil waste is a mixture of plastics cloth, glass, metal and organic matter, sewage, sewage sludge, building debris, generated from households, commercial and industrial establisments add to soil pollution. Fly ash, iron and steel slag, medical and industrial wastes disposed on land are important sources of soil pollution. Acid rain and dry deposition of pollutants on land surface also contribute to soil pollution.

Sources of soil pollution

Plastic bags - Plastic bags made from low desity polyethylene (LDPE), is virtually idestructible, create colossal environmental hazard. The discarded bags block drains and sewage systems. Leftover food, vegetable waste etc. on which cows and dogs feed may die due to the choking by plastic bags. Plastic is non biodegradable and burning of plastic in garbage dumps release highly toxic and poisonous gases like carbon monoxide, carbon dioxide, phosgene, dioxin and other poisonous chlorinated compounds.

Industrial sources - It includes fly ash, chemical residues, metallic and nuclear wastes. Large number of industrial chemicals, dyes acids, etc. find their way into the soil and are known to create many health hazards including cancer.

Agricultural sources - Agricultural chemicals especially fertilizers and pesticide pollute the soil. Fertilizers in the run off water from these fields can cause eutrophication in water bodies. Pesticides are highly toxic chemicals which affect humans and other animals adversely causing respiratory problems, cancer and death.

Control of soil pollution

Indiscriminate disposal of solid waste should be avoided. To control soil pollution, it is essential to stop the use of plastic bags and instead use bags of degradable materials like paper and cloth. Sewage should be treated properly before using as fertilizers and as landfills.

The organic matter from domestic, agricultural and other waste should be segregated and subjected to vermicomposting which generates useful manure as a by product treated for removing hazardous materials. Biomedical waste should be seperately collected and incinerated in proper incinerators

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The effects of soil pollution are numerous.

a) Loss of soil nutrients, which renders the soil unfit for agriculture

b) Impacts the natural flora and fauna residing in the soil

c) Degrades vegetation due to the increase of salinity of the soil.

d) Toxic dust

Soil Pollution Facts

Soil acts as a natural sink for contaminants, by accumulating and sometimes concentrating contaminants which end up in soil from various sources. Tiny amounts of contaminants accumulate in the soil and depending on the environmental conditions and the degradability of the released contaminant can reach high levels and pollute the soil.

Conclusion

All type of pollution has their kind of negative impact on our environment. The lives of humans and animals get impacted due to this. It is our responsibility to take various initiatives to project nature.

We need to fight against pollution to take steps towards a better tommorow. If we dont stop it now, our future generation will be in great danger.

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Tanmoy Bachar

Bibliography

To make this project I have taken source from the following :—

1. Brainly.com
2. Quora.com
3. Topperr.com

I have taken help of our ENVS teacher

Zinc (Zn)

Potential sources : mining ; foundry activities ; construction activities.

Nickel (Ni)

Potential sources : mining ; foundry activities, construction activities.

PAHs (polyaromatic hydrocarbons)

Potential sources : coal burning, vehicle emissions, accumulation in plants and vegetable grown on polluted soils.

Herbicides / Insecticides

Potential sources : agricultural activities, gardening

Examples of Soil Contaminants

There is a large variety of pollutants that could poison the soil. Examples of the most common and problematic soil pollutants can be found below.

Lead (Pb)

Potential sources: lead plant, mining, foundry activities, vehicle exhaust, construction activities, agricultural activities.

Mercury (Hg)

Potential sources: mining, incineration of coal, alkali and metal processing, medical waster, volcanoes and geologic deposits

Arsenic (As)

Potential sources. mining, coal-fired power plants, lumber facilities, electronics industry, foundry activities

Copper (Cu)

Potential sources: mining; foundry activities, construction activities.