

Unit:4

SOIL POLLUTION

4.1 Soil Pollution

Soil Pollution may be defined as contamination of soil by considerable quantity of chemicals or other substances resulting in the reduction of its fertility with respect qualitative and quantitative yield of crops.

4.2 SOURCES OF SOIL POLLUTION

The major sources of soil pollution are as follow:

1. **Industrial Wastes:** Disposal of industrial wastes is the important source of soil pollution. Industrial pollutants are mainly discharged from chemical industries, sugar factories, tanneries, textile mills, steel industries, distilleries, pulp and paper mills, oil refineries, petroleum industries etc. Thermal and atomic power plants also add pollutants to the soil.
2. **Agricultural Wastes:** Agricultural wastes are the common pollutants of soil pollution. Fertilizers, pesticides, insecticides, weedicides etc. cause soil pollution and adversely affect the physical, chemical and biological properties of soil.
3. **Urban Wastes:** Urban wastes consist of both commercial as well as domestic wastes which include plastics, glass, metallic cans, fibers, paper, street sweepings, leaves, rubbles etc. and contribute to soil pollution.
4. **Radioactive Materials:** Radioactive materials resulting from explosion in nuclear devices penetrate into soil and enter the food chain which cause detrimental effect on the body tissues. Hiroshima and Nagasaki, which were bombarded in Second World War, are good examples of radioactive soil pollution.
5. **Biological Agents :** Other important soil pollutants are biological agents which include biological organisms from human and animal excreta. In addition to this, faulty sanitation and disposal of waste water cause soil pollution.

4.3 Solid waste

Solid waste or refuse is the solid and semi solid waste arising from human and animal activities except human excreta and sullage (i.e. liquid waste from bath rooms, kitchens etc.) discarded as useless. Higher standards of living of ever increasing population has resulted in the increase in quantity of solid waste. Solid waste has a great impact on the environment. Solid waste management aims at minimizing the adverse effect of solid waste.

Pathogenic Organisms Excreted by Man: Human excreta includes pathogens such as enteric bacteria and parasitic by animals like earth worms, millipedes, dipterous larvae, snails including higher animals carry fungal and bacteria spores. The disease producing organisms are transmitted from animals to soil and then from soil to man.

Sediments or suspended Solids: Soil sand and other solids washed into water bodies due to soil erosion (by natural processes, mining, agricultural and constructional activities, etc.) and disposal of sewage and industrial effluents into water bodies result in contaminating the water with suspended solids as well as sediments. These solids are in the form of organic or inorganic particles or of immiscible liquids (oils and greases). The presence of these solids increases the turbidity in water; thereby, reducing the amount of sunlight available for photosynthesis of the aquatic plants. Other effects include suffocation of the aquatic habitats (fishes, etc.) silting of rivers and reservoirs, erosion of pumping equipments and power turbines, etc.

4.4 CLASSIFICATION OF SOLID WASTE

Solid waste may be classified on the following basis :

1. Types of waste:

- (i) Bio-degradable solid waste,
- (ii) Non bio-degradable solid waste.

2. Source of waste:

- (i) Municipal solid waste,
- (ii) Industrial solid waste,
- (iii) Bio- medical solid waste.

1. On the Basis of types of waste :

- (i) **Bio-degradable solid waste:** The waste which can be broken down into harmless or non-poisonous substances by action of micro- organisms is called bio-degradable solid waste.
- (ii) **Non Bio-degradable Solid Waste :** The waste which cannot be broken down by the action of micro-organism is called non bio-degradable solid waste.

2. On the Basis of sources of Waste:

(i) Municipal Solid Waste: Municipal solid waste consists of household waste, waste from streets and roads, sanitation residue, construction and demolition debris etc. With rising urbanization and standards of living, the amount of municipal solid waste is increasing rapidly. More than 70% of Indian cities lack adequate capacity to transport municipal solid waste and there are n sanitary landfills to dispose of the waste. The existing landfills are neither well managed nor well equipped and are not lined properly to protect against contamination of soil and ground water.

Certain types of household wastes are hazardous which include expired medicines, medicine bottles, shoe polish, old batteries, paint tins etc.

(ii) Industrial Solid Waste : Industrial solid waste may be defined as the solid waste generated by manufacturing processes. Industrial waste is generally considered hazardous as it mat contain toxic substances. The major sources of industrial waste are thermal power plants which produce coal ash, sugar industries which produce mud, pulp and paper, industries producing lime and fertilizer, intergrated iron and steel mills, metal industries etc.

(iii) **Biomedical Solid Waste** : Biomedical solid waste consists of waste released by hospitals, clinics, diagnostic centers etc. in the diagnosis and treatment of human beings. This type of waste includes cotton, syringes, bandage, glass bottles, plastic bottles, discarded medicines, anatomical and pathological waste etc.

4.5 EFFECTS OF SOLID WASTE

Improper handling and transfer of solid waste cause ill effects on the environment and human health which are as follow:

1. Flies breed on the refuse dump and solid waste which contaminate water and food. Contaminated water and food cause diseases like diarrhea bacillary dysentery etc.
2. Depending upon the solid wastes, rats may cause diseases like plague, trichinosis, salmonellosis, endemic typhus etc.
3. Perlocation of decomposed garbage dumps into soil cause pollution of land and underground water.
4. Smoke due to the burning of waste pollutes air.
5. Bad odour due to the decomposition of organic solid waste pollutes air.
6. Contaminated water supply may spread large scale epidemic of jaundice, cholera, gastrointestinal diseases etc.

4.6 E-WASTE

E-waste means discarded electronic products such as computers, televisions, stereos, copiers, fax machines, cell phones etc. E-waste, if not disposed off properly, can leach lead and other substances into soil and ground water. Many of these products can be reused, refurbished or recycled in an environmental friendly manner so that they are less harmful to the eco-system. Disposal of e-waste is a big problem across the globe.

Effect of E-waste on Human Health

Source of E-waste	Constituent	Health Effect
Mother-board	Beryllium (Be)	Lung, cancer, skin diseases such as warts.
Computer housing	PVC	Damage of immune system, reproductive and developmental problems, interference with regulatory hormones.
Relays and switches, PCBs	Mercury (Hg)	Chronic damage to brain, respiratory and skin disorders.
Chip resistors and semi-conductors	Cadmium (Cd)	Toxic irreversible effect on human health, damage to kidney and liver.
Solder in PCBs, glass panels and gaskets in computer monitors	Lead (Pb)	

		Damage to central and peripheral nervous system, blood system and kidney.
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4.7 CONTROL OF SOLID WASTE

The main objective of solid waste control is to minimize the adverse effects of solid waste on the environment. The various steps involved are as follow:

1. Collection of solid waste,
2. Disposal of solid waste,
3. Utilization of solid waste
 1. **Collection of solid waste** : Collection of waste includes collection the waste, transporting it to a centralized location and then moving it to the of disposal.
 2. **Disposal of solid waste**: Before the final disposal of the solid waste, it is processed to recover the usable material and to improve the efficiency of the solid waste disposal system.
 3. **Utilization of Solid Waste** : The solid waste can be properly utilized to obtain the benefits such as :-
 - (i) Conservation of natural resources.
 - (ii) Economic development.
 - (iii) Control of air pollution.

4.8 METHODS OF SOLID WASTE DISPOSAL

The following methods may be adopted for disposing of the solid waste:

1. Landfilling,
2. Incineration,
3. Composting,
4. Pulverisation,
5. Pyrolysis,
6. Disposal into sea.
 1. **Landfilling** : Landfilling is the most popular solid waste disposal method used today. Garbage is basically spreads out in thin layers, compresses and covered with soil or plastic foam.

Advantages:

 - (i) It is simple and economical.
 - (ii) Segregation of waste is not required.
 - (iii) Landfilled ares can be reclaimed and used for other purpose.

Disadvantages :

 - (i) Large are is required.
 - (ii) Land availability is away from town, therefore, transportation costs are high.

(iii) It causes fire hazard due to formation of methane in wet weather.

2. **Incineration** : In this method, solid waste is burnt in a furnace called incinerator.

Advantages :

- (i) Residue is only 20-25% of the original solid waste and can be used as clinker after treatment.
- (ii) It requires very little space.
- (iii) An incinerator plant of 3000 tonnes capacity per day can generate 3MW of power.

Disadvantages:

- (i) Its capital and operating cost is high.
- (ii) Operation needs skilled personnel.
- (iii) Formation of smoke, dust and ashes needs further disposal and that may cause air pollution.

3. **Composting**: Due to lack of adequate space for landfills, bio-degradable waste is allowed to decompose in a medium designed for the purpose. Only bio-degradable waste materials are used in composting.

Advantages:

- (i) Manure added to soil increases water retention and ion-exchange capacity of soil.
- (ii) This method can be used to treat several industrial solid wastes.

Disadvantages :

- (i) Non- consumable materials have to be disposed off separately
- (ii) The technology has not caught farmers and hence does not have an assured market.

4. **Pulverisation**: In this method, solid waste is pulverized in grinding machine to reduce its volume and physical character.

5. **Pyrolysis** : In pyrolysis, chemical energy of some organic wastes is recovered by destructive distillation.

6. **Disposal into Sea** : This method is used in coastal areas having deep sea water (>30m) at a reasonable distance (<10 to 20 km). It is a simple and cheap method , but has following disadvantages:

- (i) Light components of solid waste float on the water surface and tend to return to shores during high tides.
- (ii) Some portion of solid waste may return to the beaches despite all necessary precautions.

EXERCISES

VERY SHORT ANSWER TYPE QUESTIONS:

- Q. 1 What is solid waste ?
- Q. 2 Classify solid waste according to the types of waste.
- Q. 3 What is bio-degradable solid waste?
- Q. 4 What is non bio-degradable solid waste?
- Q. 5 What do you mean by E-waste?
- Q.6 Name the sources of solid waste.

SHORT ANSWER TYPE QUESTIONS:

- Q.1 Name of some methods of solid waste disposal.
- Q. 2 Write the advantages of land filling.
- Q.3 Write the disadvantages of land filling.
- Q.4 Write the advantages of incineration.
- Q. 5 Write the disadvantages of incineration.
- Q. 6 Write the advantages of composting.
- Q.7 Write the disadvantages of composting.

LONG ANSWER TYPE QUESTIONS:

- 1. What do you mean by solid waste? Give its Classification.
- 2. Explain the causes of rapid growth of solid waste.
- 3. Explain different methods of solid waste disposal.
- 4. What do you mean by E- waste? What are the effects of E-waste on human health? Explain.
- 5. Explain E-waste management.

UNIT:5

NOISE POLLUTION

NOISE POLLUTION

A loud, unwanted or unpleasant sound that causes discomfort is called noise. The release of unwanted sound in the atmosphere is called noise pollution.

The unit of sound level is decibel (dB). Noise level can range from 0 to more than 120 dB. The intensity of normal conversation sound ranges between 35 dB to 60 dB. Prolonged exposure to noise of 80 dB or more may lead to hearing impairment. A noise above 140 dB becomes painful.

SOURCES OF NOISE POLLUTION

Noise pollution is the result of industrialized urban life and congestion. The main sources of noise are various industries such as textile mills, heavy engineering establishments, printing presses, defence equipments and vehicles (tanks, artillery, rocket launching, explosions), transport vehicles, domestic gadgets (mixers, exhaust, fans, desert coolers), entertaining equipments (radio, record players, television sets), public address system etc. The operations such as blasting, bulldozing, construction work, stone crushing etc. and use of crackers on festivals also contribute to noise pollution.

EFFECT OF NOISE POLLUTION

A noise is an undesirable sound. It has adverse effects on human beings, their environment, natural wild life and ecological system. The following are the ill-effects of noise pollution:

1. Repeated exposure to noise may cause hearing problem.
2. Noise causes irritation and effect sleep and work efficiency.
3. Noise causes headache, thus reducing concentration.
4. Sudden and high intensity sound level-affect the nervous system.
5. Noise pollution causes depression and fatigue which considerably reduce the efficiency of person.
6. Noise pollution disturbs sound and refreshing sleep.

ACCEPT NOISE LEVEL

The Central Pollution Control Board (CPCB) Has recommended acceptable noise levels for different location :

Area Code	Types of Area	Noise Level (dB)	
		Day	Night

(A)	Industrial	75	70
(B)	Commercial	65	55
(C)	Residential	55	45
(D)	Silence Zone	50	40

5.5 CONTROL OF NOISE POLLUTION

Following measures can be adopted to control noise pollution:

- Noise producing industries, railway stations, aerodromes etc. should be located away from human settlements.
- Proper lubrication and maintenance of machines can reduce noise pollution.
- Noisy machines should be installed in sound-proof chambers.
- Quieter machines should be fabricated to replace the noisy ones.
- Noise by motor vehicles on roads can be reduced by planting several rows of coniferous trees.
- There should be silence zones around residential areas, educational institutions and hospitals.
- Use of loud-speakers and amplifiers should be restricted to a fixed intensity and fixed hours of the day.
- Occupational exposure to noise can be reduced by using protective devices such as ear muffs or cotton plugs.
- Personal protection against noise can be done by stuffing a bit of cotton in the ears or holding hands over ears under noisy conditions.
- Legislation can ensure that sound production is minimized at various social functions. Unnecessary horn blowing should be restricted especially in the vehicle congested areas.
- People must be made aware of health hazards of noise pollution through newspapers, articles, televisions, radios, cinema halls, workshops, and popular lectures.

EXERCISES

VERY SHORT ANSWER TYPE QUESTIONS:

Q. 1 Define noise pollution.

Q. 2 Write the unit of sound measurement.

SHORT ANSWER TYPE QUESTIONS:

Q.1 Name the sources of noise pollution.

Q. 2 Write the effects of noise pollution.

LONG ANSWER TYPE QUESTIONS:

1. How can noise pollution be controlled? Explain.